Who's Afraid of a Globalized World? Foreign Direct Investments, Local Knowledge and Allocation of Talents*

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Abstract

We study the distributional effects of globalization within a model of heterogeneous agents where both managerial talent and knowledge of the local economic environment are required in order become a successful entrepreneur in a given country. Agents willing to set up a firm abroad incur a learning cost that depends on how different the foreign and domestic entrepreneurial environments are. In this context, we show that globalization fosters FDI and raises wages, output and productivity. However, the steady state relationship between welfare and talent is U-shaped: high and low ability agents are better off in a globalized world, while mediocre agents (domestic entrepreneurs) may lose. The effects of openness follow from highly efficient foreign entrepreneurs driving inefficient local firms out of the market by increasing labor demand and wages. Consistent with empirical evidence, the model predicts globalization to increase inequality at the top of the income distribution while decreasing it at the bottom. We provide additional empirical evidence in line with the implications of the model that shows a significant negative effect of the distance between nationwide regulations indexes on bilateral FDIs.

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1 Introduction

Foreign Direct Investments (FDI) are one of the predominant and most debated features of globalization. FDI grew dramatically in the last 15 years of the 20th century, far outpacing the growth of trade and income: whereas world-wide real GDP increased at a rate of 2.5 percent per year between 1985 and 1999 and world-wide exports by 5.6 percent, world-wide real inflows of FDI increased by 17.7 percent. Another salient feature of FDI is that they take place mostly between developed countries, i.e. between countries that are similar in terms of natural endowments and relative supply of inputs. For the period 1970-2000, Barba Navaretti and Venables (2004) report that more than 90% of outward flows of FDI originates from advanced countries. Over the same period, the share of the world FDI inflows directed to developed countries ranges between 58 and 78 percent.[1] At the same time, a growing body of empirical evidence is pointing to the existence of a positive effect of FDI inflows on wages and productivity. Baldwin, Braconier and Forslid (1999) show that FDI positively affect wages using industry-level data for seven OECD countries. Keller and Yeaple (2003) provide firm-level evidence from the US showing that FDI spillovers account for about 14% of productivity growth in U.S. firms between 1987 and 1996. Javorcik (2004) provides similar evidence for Lithuania.[2]

In this paper, we build a very simple general equilibrium model that is consistent with these facts and, at the same time, allows to study the distributional effects of globalization.

It is well known that in a Hecksher-Ohlin context the process of globalization produces winners and losers as a consequence of the changes in the relative abundance of factors. Despite its obvious relevance, this issue has been so far hardly analyzed in the context of intraindustry trade models *à la* Melitz (2003), where gains from trade do not arise from international differences in factor endowments, but from consumers' love for variety and from the different ability of entrepreneurs to overcome the barriers that distance generates. So far this literature has focused on models with "heterogenous firms" but "homogeneous agents". Differently, we consider a world of heterogeneous agents where both managerial talent and knowledge of the local economic environment are required in order to set up a firm and earn positive profits. The main trade-off that arises in the model depends on how individuals with different abilities are allocated to different types of jobs available in the economy.

To be more specific, a first key feature of the model is that agents with different levels of managerial ability are allowed to select their occupation and choose whether to become entrepreneurs or workers. Those who become entrepreneurs may engage in FDI and set up a firm abroad. However, in order to become a successful entrepreneur in a given country, managerial ability is not sufficient: some *knowledge* of the local economic environment is also required.

A second key feature of the model is that domestic agents are assumed to know the charac-

[1] Surprisingly, economic theory has been geared mainly towards explaining flows of capital (and goods) among countries that are different. This is clearly the case for Ricardian and Heckscher-Ohlinean models while "new-trade" models *à la* Krugman explain intraindustry trade and investment flows between economies that are *ex-ante* similar and *ex-post* different: increasing returns to scale favor specialization and concentration of production (and, thus, trade). Locations are *ex-post* different because, once specialization has taken place as the consequence of increasing returns, different varieties are produced in each country.

[2] See Lipsey (2002) for a review of the micro evidence on the home and host country effects of FDI.

teristics of the domestic economic environment (e.g. domestic consumers' tastes) and to ignore the characteristics of the foreign economic environment. Domestic agents have to *learn* how the the foreign economic environment works in order to profitably set up a firm abroad. Thus, both managerial ability *and* nationality contribute to determine career choices. The idea is that a certain level of managerial talent, though allowing agents to profitably produce within the economic domestic environment, may be of little help when setting up a firm abroad. The more so, the more different the foreign and the domestic economic environments. This *distance* between entrepreneurial environments is the only explicit barrier to capital movements that matters in the model. It may be overcome only at the cost of learning how the foreign environment works. Of course, in equilibrium, only the most talented entrepreneurs have incentives to pay the learning cost and produce abroad.

The model endogenously determines the allocation of talents between (domestic and international) entrepreneurial activity and salaried work. It follows that FDIs, Total Factor Productivity (TFP), GDP and wages depend on how efficiently talents are allocated. Talent allocation, in turn, depends on how hard it is to learn how to deal with the foreign entrepreneurial environment. A lower distance between entrepreneurial environments reduces the learning cost and raises the inflow of foreign-owned firms into the domestic market. This increases domestic wages and makes the entrepreneurial activity less profitable, driving a fraction of low-ability domestic entrepreneurs out of the market. This general equilibrium effect improves the allocation of talents and increases both TFP and GDP. On the contrary, a larger distance between entrepreneurial environments protect low-ability entrepreneurs from foreign competitors and reduce output, wages and TFP. Thus, globalization fosters aggregate efficiency.

However, in our model not everybody win when the degree of globalization increases. The individuals with the lowest level of entrepreneurial talent (who choose to become workers independently of the level of globalization) and the individuals with the highest level of talent (who choose to become multinational entrepreneurs if the degree of globalization is high enough) are better off in a globalized universe, i.e. an universe where the learning cost is zero and therefore GDP, TFP and wages are largest. Differently, individuals with an "intermediate" level of talent (i.e. local entrepreneurs who never choose to engage in FDI and may be even driven out of the entrepreneurial activity if the degree of globalization is high enough) prefer to live in a non-globalized universe. The reason is that, in a globalized world, they pay the cost of tougher competition without enjoying the benefits of accessing to wider markets. Only in a non-globalized world they survive as entrepreneurs as they are sheltered from foreign competitors. Thus, consistently with recent empirical evidence, the model predicts globalization to increase inequality in the upper tail of the distribution and to decrease it in the lower tail of the distribution (see Autor et al., 2005 and 2006 and Machin and Van Reenen, 2007).

The model is based on the idea that globalization reduces the distance between economic environments and therefore reduces the cost of learning how to profitably produce abroad. For this reason, it leads to higher bilateral FDIs. We test this prediction against the data. We proxy the differences between economic environments using OECD and World Bank indexes that measure the level of Product Market Regulation. We match these data with data on bilateral FDIs drawn from the *OECD International Direct Investment Statistics*. Our empirical

specification lies in the tradition of gravity models with an additional explanatory variable: the *absolute value* of the difference between the source and host country indexes of regulation. We find that, controlling for the *level* of regulation in both countries, countries fixed effects, time effects, countries GDP and a set of geographical variables, the coefficient of the variable capturing regulation proximity is negative and in most cases significant. We interpret this finding as evidence consistent with the hypothesis that the distance between nationwide regulations contributes to shape the size of bilateral FDIs. Thus, we find our empirical results suggestive that similarity in economic environments fosters FDI.

This paper is related to different strands of literature. To better highlight the main differences between previous contributions and this paper, it is convenient to discuss them separately. We do so in section 2. In particular, subsection 2.1 discusses the role of allocation of talents in heterogeneous agents intraindustry trade models, subsection 2.2 considers the literature on the distributional effects of globalization, and subsection 2.3 discusses the determinants of FDI.

The rest of the paper is organized as follows. Section 3 presents the data and shows that cross-country differences in regulation affect FDIs. Section 4 describes the model economy. Section 5 solves for the closed economy benchmark and section 6 introduces the framework where entrepreneurs are allowed to set up firms abroad. Section 7 analyzes the distributional effects of globalization. Finally, section 8 concludes.

2 Related Literature

2.1 Heterogeneity and Allocation of Talents

Our paper is strictly related to the seminal paper of Melitz (2003), who develops a dynamic industry model with heterogeneous firms to analyze the intra-industry effects of international trade. As in our paper, also in Melitz (2003) only the most efficient firms export and exposure to trade forces the least productive firms to exit the market via higher real wages. The key difference is that in Melitz (2003) heterogeneity is cast at the firm level: consumers are homogeneous and there is no endogenous sorting of agents into jobs. In our paper, firms' heterogeneity stems from the heterogeneity (in managerial talent) of the agents, who are allowed to make career choices. These features of our model allow to stress the role of the (endogenous) mechanism by which exposure to foreign competition improves the allocation of talents and, most importantly, to discuss the distributional implications of globalization.

In order to make the differences between Melitz (2003) and the present paper clear, let us stress (again) the link (absent in Melitz, 2003) between globalization and allocation of talents *via* FDI. As already explained, in our model agents have both different levels of managerial ability and different nationalities. Nationality matters because, given a certain level of managerial ability, it gives an advantage *vis-à-vis* foreign entrepreneurs thanks to a better knowledge of the local economic environment. Once individuals are allowed to make career choices, in each country the pool of entrepreneurs will consist of individuals with *relatively* high entrepreneurial talent. Within the pool of entrepreneurs, only the most talented will set up firms (not only at home but also) abroad. The issue is *how much* talent is required in order to become a

local/multinational entrepreneur. It obviously depends on how costly it is to be an entrepreneur and, in particular, on how costly it is to hire labor.

In this respect, we make a very simple point. Globalization, by reducing the cost of acquiring information about the foreign country, spurs FDIs, increases the demand for labor and, consequently, raises wages. The increase in wages has two effects. **(1)** It reduces firms' profits, making the entrepreneurial activity less attractive *per se*. **(2)** It increases the opportunity costs of being an entrepreneur, making the alternative choice (be a worker) more attractive. The obvious consequence is that larger FDIs, by pushing up the cost of labor, drive the least talented domestic producers out of the entrepreneurial activity. Notice that this happens even in the absence of the standard pro-competitive effect of FDI that works through lower prices;[3] only the general equilibrium effect, via higher labor demand and higher wages, is at work.

Allocation of talents and FDIs are therefore strictly related. As only the most efficient entrepreneurs can afford the cost of learning how the foreign economic environment works and engage in FDI, larger FDIs directly improve the domestic allocation of talents and raise aggregate efficiency. Moreover, the effect on efficiency is further reinforced by the fact that larger FDIs drive bad domestic entrepreneurs out of the market.

A further point that differentiates this paper from Melitz (2003) is the analysis of the distributional implications of globalization, to which we now turn.

2.2 The Effects of Globalization: Winners and Losers

To the best of our knowledge, this is the first paper that uncovers the distributional effects of globalization in the context of intraindustry trade models.[4] For the sake of clarity, let us consider two polar cases. The case of a *Globalized Universe*, where the economic environment is identical across locations and therefore nationality is irrelevant; and the case of a *National Universe* where entrepreneurial environments differ and nationality is a relevant characteristic.

(1) *Globalized Universe*. In this world only talent matters: learning costs are zero. The most talented individuals become entrepreneurs and there exists a critical level of talent that makes the marginal individual indifferent between being an entrepreneur or a worker. An individual whose entrepreneurial talent lies just below that critical level would choose to be an entrepreneur only if wages were lower, both because profits would be higher and because the worker option would be less attractive.

(2) *National Universe*. In this world the entrepreneurial environments are different across countries and learning how the foreign environment works is costly. For the sake of clarity, let us consider the case where the cost of learning how the foreign environment works is infinitely

[3]The competition effect is present in almost all the standard IO-based FDI models, since Horstmann and Markusen (1992). In our model product market competition does *not* increase in the domestic country as a consequence of foreign competition. We rule this effect out by assuming monopolistic competition and Dixit-Stiglitz preferences. See Melitz and Ottaviano (2008) for a model of trade with firm heterogeneity and endogenous mark-ups.

[4]Obviously many papers have treated the distributional effects of decreasing trading costs in a Hecksher-Ohlin context. Closest to us is a recent paper by Helpman et al. (2009) that study the distributional consequences of international trade in a model with heterogeneous firms and workers and imperfect labor markets. One key difference between our approach and their model is that we allow for endogenous career choices and learning of the foreign environment.

large so that FDI are *de facto* ruled out. In this world only local firms demand labor in the local labor market. Consequently, wages are lower compared to the *Globalized Universe*.

Consider now three individuals. In decreasing order of managerial ability:[5] Ms Capitalistson, Ms Petitbourgeoison and Ms Proletariatson.

The first one (Ms. Capitalistson) has a large degree of entrepreneurial talent. In the *Globalized Universe* she invests both at home and abroad while in the *National Universe* she is a domestic entrepreneur. On the one hand, she likes the *National Universe* because wages are lower and this implies larger domestic profits. On the other hand, she also likes the *Globalized Universe* because of the larger investment possibilities. It turns out that if her talent is large enough she prefers the *Globalized Universe*.

The second one (Ms. Petitbourgeoison) has a lower degree of entrepreneurial ability. Her talent level is such that, in the *Globalized Universe*, she (slightly) prefers to be a worker. Therefore, in the *National Universe* where wages are lower, she chooses to become entrepreneur. Thus, globalization expels her from the entrepreneurial activity and makes her strictly worse off.[6] The intuition is simple: from an entrepreneur's point of view, globalization is beneficial insofar it allows to gain access to larger markets. Low-ability entrepreneurs lose from globalization because tougher competition drives them out of the market and prevents them from reaping the benefits of accessing to larger markets.

Finally, Ms. Proletariatson has even lower entrepreneurial abilities. So low that she chooses to be a worker independently of the world (*Globalized* or *National*) where she happens to live. It follows that she prefers to live in the *Globalized Universe*, where wages are higher.

Thus, in a national world differences in entrepreneurial environments shelter inefficient firms. Even if there is no direct pro-competition effect of FDI, the general equilibrium effect on the labor market is sufficient to expel mediocre entrepreneurs as differences in the environments become smaller. Our model predicts that the middle-ability class (i.e. local entrepreneurs that would not invest abroad anyway) always supports localisms and regional fragmentation while the end-tails of the ability distribution (i.e. workers and producers willing to engage in FDI) would rather live in a globalized universe.[7]

2.3 Cross-country differences and FDIs

An extensive (theoretical and empirical) literature has studied the factors that drive FDIs.[8] The key findings may be quickly summarized as follows.

[5]By managerial ability we mean any individual characteristic that helps being a successful entrepreneur. Talent is one, though not the only one. The ability of raising funds in a world with capital market imperfections is certainly another; in that case having wealthy parents would be akin to being more talented. In this paper we will consider managerial ability as exogenous and independent of the economic environment (the degree of competition, etc.). To see a model where this is not the case (i.e., where the contributions of talent and family background depend on equilibrium outcomes) see Hassler and Rodríguez Mora (2000). In any case, there is nothing offensive about having less managerial talent in our model.

[6]To see that Ms. Petitbourgeoison is strictly worse off under globalization notice that she is almost indifferent between career choices in the *Globalized Universe* and is an entrepreneur in the *National Universe*. Lower wages imply that entrepreneurial profits are larger in a *National world*, so she must be better off in such a world.

[7]Section 7 elaborates more on this point.

[8]See among others Horst (1972), Deardorff, (1998), Ekholm (1998), Lipsey (2001), Razin et al. (2003), Shatz (2003).

First, a host of institutional, technological and market factors affect firms' decision to set up production facilities in a foreign market.[9] Obvious examples are trade barriers, (firm- vs. plant-level) economies of scale, and market size.[10] Second, larger cross-country factor cost differentials, generated either by differences in productivity or in the relative supply of inputs, are typically associated to larger FDIs.[11] Third, and more importantly for this paper, *larger* cross-country differences along some well identified dimensions, negatively affect FDIs. Variables like "smaller physical distance", "sharing a common language" or "sharing a border" significantly contribute to determine the size of bilateral FDIs in gravity-like empirical models (see Ekholm (1998) and Shatz (2003)). Moreover, Markusen and Maskus (2002) show that the similarity between host and home factor endowments is one of the main factors driving the location of foreign subsidiaries (together with the size of the host market).

We focus our attention on the third set of determinants of FDI and **(1)** provide an explanation of why smaller cross-country differences (along some *non obvious* dimensions) foster bilateral FDIs and **(2)** produce new empirical evidence in support of this finding.[12]

In our model countries will not differ in terms of factor endowments. Cross-country differences will rather lie in a factor that we call "entrepreneurial environment". The following statement from Unilever's website helps understanding what we mean by "entrepreneurial environment":

> "Many of our brands have international appeal, while others are leaders in local markets. It is our *keen understanding of cultures and markets* that allows us to anticipate consumers' needs and to provide them with what they need, when they need it." (Unilever, emphasis added)[13]

Broadly speaking, one may think of the entrepreneurial environment as representing the complex set of circumstances, generally different across countries, entrepreneurs need to deal with: identification of consumers' tastes, communication with costumers, relationship with the bureaucracy, comprehension of the legal environment, purchase of inputs, relationship with other firms, setup of the production process (hiring and firing procedures, salary structure, technology choices,...).[14]

[9] See Barba Navaretti and Venables (Chap 2, 2004) for an in-depth discussion of the benefits and costs to the firm of FDI.

[10] First, trade barriers encourage *horizontal* FDI, i.e. FDI aimed at serving a local market, while they discourage *vertical* FDI, i.e. FDI aimed at reducing production costs by relocating (part of) the production activities abroad. Second, multinational firms are likely to be characterized by intangible firm-specific assets from which firm-level (as opposed to plant-level) scale economies originate. Finally, most FDI are directed toward large markets: as investing in a given country implies large fixed costs, firms are willing to afford it if perspective sales are sufficiently large (Brainard (1997)).

[11] Vertical FDI, that involve the fragmentation of the production process and the relocation of the most labor intensive technologies to relatively low wage countries, typically exploit factor prices differences. Using US data, Brainard (1993) and Markusen and Maskus (2001) get some support for the relevance of factor market considerations as determinants of FDI.

[12] The reason why we do not focus on the first two sets of determinants of FDI is twofold. First, the channels through which they shape *Ricardian* (and *"Hecksher-Ohlinean"*) FDIs are well understood. Second, the overwhelming proportion of FDI is horizontal rather than vertical and this implies that typically FDI do not flow in order to exploit factor price differences.

[13] Cite taken from Barba Navaretti and Venables (2004).

[14] Thus, the entrepreneurial environment is shaped by demand- and supply-side factors. Demand factors are

Given this, our reasoning is simple: in each country only some agents become entrepreneurs. These are the ones that have a combination of managerial ability and knowledge of the local environment that allows them to profitably produce and sell in the domestic country. However, at least to some extent, knowledge of the local environment also allows to infer the characteristics of the foreign economic environment. The more so the more similar the two countries. It follows that smaller cross-country differences between entrepreneurial environments make it easier for domestic entrepreneurs to set up firms abroad.

While we describe this mechanism in a formal general equilibrium model (sections 5 and 6), our contribution, in this respect, is also empirical. We regress bilateral FDIs on (a set of controls and) variables that proxy the distance between "entrepreneurial environments". The variables that we use are indexes that measure the cross-country distance between the levels of Product Market Regulation. Usually in empirical works, proximity in "regulations" is not taken into account as one of the possible determinants of FDI. However, our model shows that it should matter. The reason is that national regulations contribute to shape the economic environment, because they typically prescribe to follow particular procedures (e.g. business start-up procedures, administrative rules, safety and health regulations, food regulations). The more the institutional settings (or any kind of law that imposes to comply with some procedures) are different, the more costly the adaptation process to the new environment and the smaller the incentives to actually run businesses abroad. Thus, rough as it may be, this measure captures (at least part of) the difference between entrepreneurial environments and has the advantage of being easily observable. Interestingly, we find that the coefficient of the variable capturing regulation proximity is negative and typically significant. Thus, similarity in the levels of nationwide regulations does seem to contribute to raise the size of bilateral FDIs.

3 Empirical Evidence on the Differences between Economic Environments and FDIs

The model outlined in section 4 is based on the idea that a lower distance between economic environments reduces the cost of learning how to deal with the foreign environment and therefore leads to higher bilateral FDIs. This sections provides empirical evidence consistent with this idea. Specifically, it shows evidence of a negative relationship between bilateral FDI stocks and variables that proxy for the cross-country distance between entrepreneurial environments.

From an empirical point of view, a crucial problem is to find reasonable proxies for the "distance between entrepreneurial environments". A first natural proxy may be the difference between languages. Countries sharing the same language are likely to be more homogeneous than countries with different languages. The cultural environment is arguably more similar and both mutual understanding and exchange of ideas are easier when the same language is spoken. The interplay between those factors is very likely to contribute to enhance the homogeneity of the economic environment as well.

related to the environment of the downstream market where final transactions take place, while supply factors are related to the environment where *production* take place.

Another proxy may be offered by the cross-country distance between regulations. The idea is that regulation is one of the key determinants, although of course not the only one, of the entrepreneurial environment. Thus, cross-country differences in the extent of regulation should translate, at least partly, into differences between entrepreneurial environments.

To conduct the empirical analysis we rely on data on bilateral FDIs, on nationwide regulation indexes and on country characteristics, including language.

3.1 The Data

FDI figures are drawn from the *OECD International Direct Investment Statistics* that provide annual data on international direct investment stocks for a number of OECD countries by geographical distribution, i.e. to and from partner countries and regions from 1981 to 2002 in current dollars. Table 1 presents descriptive statistics and shows that the FDI data contain 5371 non-missing observations on bilateral FDI stocks, of which 127 are negative (and have been therefore dropped) and 246 are zero. A notorious problem in the literature that estimates traditional log-linear gravity models is that the log eliminates all zeros. For this reason we will show results both from the traditional log-linear specification and from the Poisson Pseudo-Maximum-Likelihood model recently suggested by Santos Silva and Tenreyro (2006), described in section 3.2, that allows to easily incorporate zero stocks.

GDP per capita and population are taken from the Penn World Tables version 6.2 (Heston, Summers and Aten, 2006).[15] Geographical variables include an adjacency dummy (i.e. if countries share common land borders); a linguistic tie dummy (i.e. if countries share a common language); the (log of) distance between (the main cities of the) countries; European Union, North America and Asian dummies; a NAFTA dummy; a Latin country dummy. All geographical variables are drawn from Frankel, Stein and Wei (1995) and Frankel and Wei (1998).

Variables measuring the level of regulation implemented in different countries are taken from the OECD (Nicoletti et al., 2000 and Conway et al., 2005) and from the World Bank *Doing Business 2004* Dataset (available at `http://www.doingbusiness.org/`). The OECD dataset consists of indexes measuring the extent of Product and Labor Market Regulation in a number of OECD countries during the 90's. As to Product Market Regulation, the OECD provides both an overall index and a set of sub-indexes measuring the extent of regulation along particular dimensions. Of particular interest for our purposes are the indexes capturing mostly administrative burdens and red tape costs (*Administrative regulations* and *Barriers to entrepreneurship*), i.e. all those bureaucratic procedures whose *knowledge* is an essential prerequisite in order to be able to set up a firm in a (foreign) country. The Labor Market Regulation index measures the strictness of employment protection legislation.

The World Bank, on the other side, provides a comprehensive database, called *Doing Business*, collecting information on business regulations and their enforcement, especially on small- and medium-size domestic firms, for 145 countries. The dataset we exploit refers to January

[15] We use the variables CGDP and POP. The variable CGDP is the real gross domestic product per capita in International US$ at current prices. To transform it into current dollars (as the FDI figures) we multiply it by the PPP index obtaining per capita GDP in national currency, and then divide it by the exchange rate. Both the PPP index and the exchange rate are taken from the Penn Tables.

2004. The available indicators cover seven major areas, namely Starting a Business, Hiring and Firing, Registering Property, Getting Credit, Protecting Investors, Enforcing Contracts, and Closing a Business. For each of them different indexes are provided. Some indicators (like *Number of procedures to register a business* or *Index of employment law rigidity*) aim at measuring the effect of *actual* regulation on businesses, while others (such as *Time and cost to register a business, enforce a contract, or go through bankruptcy*) are measures of regulatory *outcomes*.

In the empirical exercise we will interpret the linguistic tie dummy, that captures mostly cultural proximity and ease of communications, as a first a qualitative measure of similarity between economic environments, and the absolute value of the difference between regulation indexes as a further measure of proximity, more strictly related to the entrepreneurial environment. Of course, the measures of regulation are far from perfect. Ideally, one would like to have (time-varying) information on whether regulations are *qualitatively* different rather than just *quantitatively* different as, for example, two countries that require the same number of procedures to start up a business may demand to comply with very different tasks. However, since qualitative differences in regulations plausibly generate quantitative differences as well, these data should allow to capture, at least partially, the distance between entrepreneurial environments. One may still worry that biases arise if the distance between regulations proxies for factors that are not linked to the economic environment. For example, Latin countries may all tend to be more regulated than Anglo-Saxon countries for historical reasons. To deal with this, we add in the regression a "Latin country" dummy, on top of the other geographical variables.

We conduct the analysis on a final set of 24 OECD countries, listed in Table 2, for which we have data both on FDI stocks and regulation indexes. Table 3 shows the closest and farthest country pairs in terms of average proximity.

3.2 The Empirical Model

We first estimate the following standard log-linear gravity model:

$$\ln F_{ijt} = \alpha_i + \eta_j + \tau_t + X_{ijt}\beta + \delta lang_{ij} + \gamma|reg_i - reg_j| + \ln \varepsilon_{ijt} \tag{1}$$

where $\ln F_{ijt}$ is the (log of) the stock of FDI in year t from country j (the source) to country i (the host); α_i and η_j are host and source countries fixed effects; τ_t is a year effect; the matrix X_{ijt} includes variables, such as the (log of) the source and host countries GDP (in US dollars); the (log of) the source and host countries population;[16] the (log of the) distance between the main cities of the two countries; dummies for country i and j sharing common land borders, for both countries belonging to the European Union; for both countries being located in North America and for both countries being located in Asia; for both countries being "Latin". These geographical variables are meant to capture the proximity-concentration trade-off (Brainard, 1997).

Finally, the matrix X_{ijt} also includes an index of Product Market Regulation (Conway et al., 2005) to control for the *level* of regulation in both the host and source country. As this

[16]The latitude and longitude of the host and source countries, as well as any other time-invariant characteristics of the host and source countries, are captured by the fixed country effects α_i and η_j.

measure varies over time, it allows to control for the level of regulation even if both host and source country fixed effects are included.[17]

As we control for the level of regulation, the coefficient γ captures exclusively the effect of *regulation proximity*, as measured by the absolute value of the difference between regulation indexes, on the stock of FDIs, while the coefficient δ measures the *ceteris paribus* impact of cultural proximity as proxied by the dummy variable $lang_{ij}$ that takes the value of one if countries i and j share the same language.

A well-known problem of the log-linear specification outlined in equation (1) is that it provides biased estimates if the variance of the *level* error term ε_{ijt} is a function of the covariates (such as for example the distance between countries), because the expected value of the logarithm of a random variable depends both on the mean and on higher moments of the distribution. A second problem is that the log-linear specification obliges to drop all country pairs with zero bilateral FDIs.

To address these problems we show results also from a non-linear model, the Poisson Pseudo-Maximum-Likelihood model (PPML henceforth), recently suggested by Santos Silva and Tenreyro (2006), that allows to get consistent estimates in the presence of heteroskedasticity and provides a very natural way to deal with zeros of the dependent variable. The PPML model specifies the conditional mean of the dependent variable as follows:

$$E\left[F_{ijt}|covariates\right] = \exp\left(\alpha_i + \eta_j + \tau_t + X_{ijt}\beta + \delta lang_{ij} + \gamma|reg_i - reg_j|\right) \tag{2}$$

Under the assumption that the conditional variance of F_{ijt} is proportional to its conditional mean, the coefficients of the above model can be estimated by solving the very same set of first order conditions used for Poisson MLE on count data (see Santos Silva and Tenreyro, 2006, and Head and Ries, 2008). Thus, equation (2) not only allows to get unbiased estimates even in the case where the variance of ε_{ijt} is a function of the covariates but it also easily allows to incorporate the zero FDI stocks. Moreover, the coefficients of the model in equation (2) are as easily interpretable as those of the log-linear model as they represent the percentage change in the dependent variable for a unit increase in the independent variable.

3.3 Results

Before turning to the estimates, let us provide a visual summary of the relationship between the distance in entrepreneurial environments and the stock of FDIs.

The top left panel in Figure 1 displays the difference between country i and country j indexes of *Product Market Regulation* on the horizontal axis and the non-parametric prediction of the mean stock of FDIs from country j to country i on the vertical axis. The graph shows that a smaller difference between regulations is associated with larger bilateral FDIs. The top right panel in Figure 1 uses a different measure of regulation, the extent of *State Control over Business Enterprises*, on the horizontal axis. On the vertical axis, as before, the average stock of FDIs. Again, a smaller difference between regulations tends to be associated with larger bilateral FDIs.

[17] Results are unchanged if one controls for the regulation level using other measures of regulation.

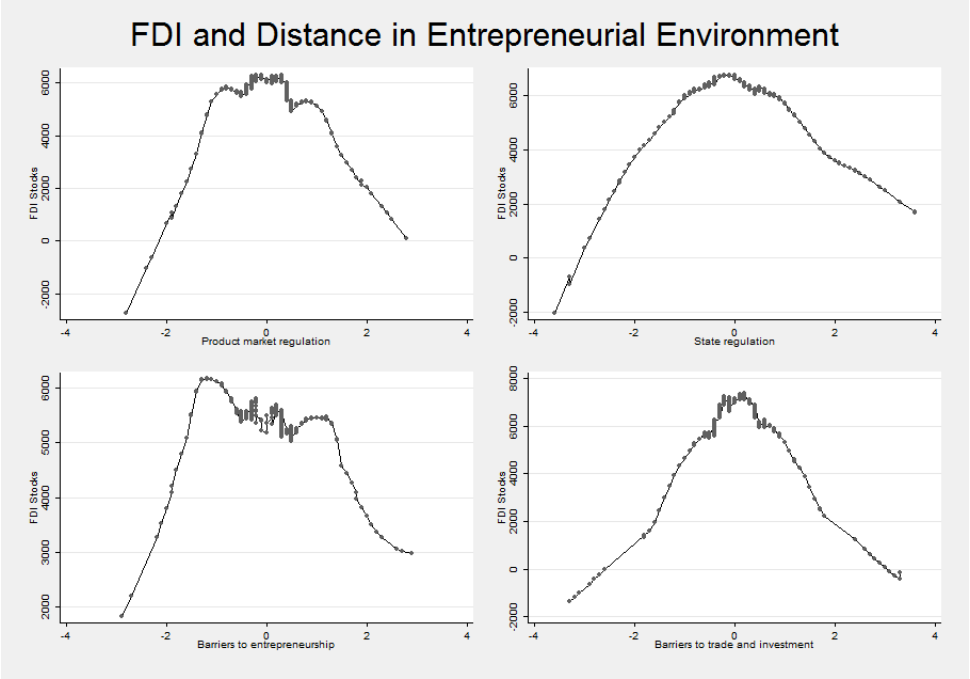


Figure 1: Vertical axis: non parametric prediction from a weighted local linear regression smoother with bandwidth 0.8 of the stock of FDIs from country j to country i in years 1981-2002. Horizontal axis: the regulatory distance between country i and j.

Finally, the bottom panels in Figure 1 consider *Barriers to entrepreneurship* and *Barriers to Trade and Investment*. Also these graphs provide strong visual evidence of an inverse U-shaped relationship, centered around zero, between FDIs and the distance between regulations.

The graphs in Figure 1 show that FDIs do not flow from more regulated countries – where one would tend to think that the rewards from capital are low[18]– to less regulated economies, where one would tend to think that the rewards from capital are high. Our explanation for this is that similitude in entrepreneurial environment fosters FDI. But there is an alternative explanation, that FDI flows take place mostly among (rich) non-regulated countries and regulation proximity is simply capturing the effect of the *level* of regulation. To discern between these two explanations, we now show results from the estimation of the log-linear and PPML models where we control for both the source and host country regulation *levels*. The formal analysis allows to rule out the alternative explanation and largely bears out the impression given by the figures: similitude in regulation fosters FDI flows.

Tables 4-7: results from the log-linear model

Table 4 presents the results from the estimation of equation (1) obtained exploiting the OECD regulation variables. Columns 1–9 report the results of nine alternative specifications that differ only in the measure of regulation proximity included on the right hand side. In column 1 we use the overall index of Product Market Regulation and, from column 2 to column 9, the sub-indexes

[18]Unless, of course, regulated countries are poor and have a high marginal productivity of capital. In this case we should expect these countries to enjoy net FDI inflows. Our point is that, *in addition to this effect*, the flows seem to depend negatively on the regulatory *distance*.

that focus on particular dimensions of product market regulation. All specifications include the linguistic tie dummy. The regulation *level* of the source and host country is controlled for by the time-varying regulation measure described above and by the source and host country fixed effects.

As our regulation variables are, in many cases, indexes with no natural scale, the magnitude of the coefficients would not be *per se* informative of the potential impact of regulation proximity on FDIs. Therefore, all tables report the so-called "beta" coefficients. In linear regressions a beta coefficient is given by the product of the estimated coefficient and the standard deviation of its corresponding independent variable, divided by the standard deviation of the dependent variable. The regression coefficients are thus converted into units of sample standard deviations. This is equivalent to a regression where all variables are previously divided by their standard deviations.

The first row of table 4 reports the beta coefficients of the linguistic tie dummy. They are, as expected, positive and significant in all specifications and their magnitude is around 0.1. This means that, even after conditioning for all the relevant geographical and regulation variables, the stock of FDI from country i to country j is 0.1 standard deviations larger if the two countries share the same language. The remaining rows of table 4 show the coefficients of the different indexes that measure the cross-country distances between regulations. Out of nine variables, seven turn out to be negative and significant at the conventional significance levels. The magnitude of the beta coefficients reported in table 4 suggests that regulation proximity has a non negligible impact on bilateral FDI stocks. For instance, a one standard deviation decline in the distance between *State Control*, i.e. a decline of 0.779, raises the stock of FDIs by 0.048 standard deviations. In other words, if the distance in *State Control* regulations between France and Italy would move from the actual value of 1.3 to 0.5 (which is the actual distance between France and Austria), the stock of French FDIs in Italy would increase on average by as much as $0.048 \times 17172 = 824.256$ million dollars, where 17172 is the standard deviation of the stock of FDIs (see table 1). The average stock of French FDIs in Italy would thus increase by approximately 9.2%.

Tables 5-7 report the results from the estimation of equation (1) using the World Bank *Doing Business 2004* dataset. The coefficients of the World Bank indexes of regulation proximity are all negative (except one) and typically significantly different from zero. Again, the coefficient of the linguistic tie dummy is always positive and significant in all specifications and around 0.1.

Table 5 shows that the distance in regulations that measure the difficulty of *Starting a Business* and the difficulty of *Hiring and Firing* are all negative and significant. The magnitude of the coefficients range from -0.03 of the *Cost of starting a business* to -0.088 of the *Difficulty of firing index*. Table 6 shows that higher similarity in regulations concerning *Property Registration* also has a positive effect of FDIs as both the *Number of procedures to register a property* and the *Number of days to register a property* enter negatively and significantly. The results on the effect of differences in the *Credit* system also display negative and significant coefficients, except for the the *Cost to create collateral* which, though negative, is not significant. Finally, Table 7 shows that, while larger differences in the index of *Investor Protection* do not seem to matter, a larger distance in the procedures related to *Contract Enforcement* and to *Bankruptcy*

procedures typically reduces the FDIs.

Tables 8-11: results from the PPML model

Tables 8-11 present the results from the estimation of the PPML model in equation (2).[19] The results show that the coefficient of the linguistic tie dummy is positive and significant in all specifications and in all tables. Moreover, the point estimates are typically larger than in the log-linear model and range between 10% and 15%. As to regulation proximity, in more than half of the specifications a lower distance in the entrepreneurial environment fosters FDIs. The point estimates of the regulation proximity coefficients obtained with the PPML model are, again, typically larger than those obtained with the log-linear model, even though significance is not attained as frequently. On the whole, the results from the PPML model confirm the existence of a negative relationship between the indexes of regulation proximity and FDIs.

The overall evidence suggests that, even controlling for the level of regulation in both countries, the distance between entrepreneurial environments has a bearing on FDIs. In particular, we find that sharing the same language strongly matters and that regulations concerning *Product Markets*, *Labor Markets* (with some emphasis to be placed on firing restrictions), *Credit markets* and *Contract Enforcement* also play a prominent role in shaping bilateral FDIs. Notice that these regulations have to do with the way entrepreneurs have to set up firms.

The next section presents a simple general equilibrium model, consistent with the above empirical evidence, that allows to study the distributional effects of globalization.

4 The Model

4.1 Demand and Production

There are two political entities (countries). In each of them agents have Dixit-Stiglitz preferences on the mass of products sold in their country. The demand for good j is:

$$x_j = Y p_j^{-\theta}$$

where Y stands for aggregate demand in the country, θ is the constant demand elasticity and p_j is the price of the good. We normalize the price of the "aggregate" good in each country to 1. All goods are consumed in the country where they are produced.[20]

Agents choose to be either entrepreneurs or workers. Workers receive the current wage of their country. Entrepreneurs set up firms (either at home or abroad) and face a monopolistic environment. All firms produce with constant returns to scale using only labor according to the production function $x_j = 4\rho L$. As explained in detail in subsection 4.2 the parameter ρ is stochastic, and agents are heterogeneous because its stochastic distribution is different across

[19] Also in this case we report beta coefficients obtained by estimating the model after having divided all variables by their standard deviations.

[20] See the working paper version (Pica and Rodríguez Mora, 2007) for an extension to a two-sector model, in a very similar setting, where a tradable good is produced by perfectly competitive firms. This allows to multinational entrepreneurs to move their foreign profits between countries. In the present model we abstract from it, as it is an obvious (and not too interesting) extension.

different agents. Agents choose whether to be workers or entrepreneurs based on their knowledge of their distribution of ρ, and if entrepreneurs they maximize expected profits based upon this knowledge. Assuming for the sake of simplicity that $\theta = 2$, gross expected profits of entrepreneur i (gross of fixed costs, as explained below) can be written as

$$E(\pi) = 2E^i\left(\rho^{\frac{1}{2}}\right) Y^{\frac{1}{2}} (L_P^i)^{\frac{1}{2}} - wL_P^i$$

Optimally choosing the labor input L_P^i, gross profits and productive labor demand (*productive* as opposed to *total* labor demand, as again explained below) of a single firm are respectively:

$$L_P^i = \left[E^i\left(\rho^{\frac{1}{2}}\right)\right]^2 \frac{Y}{w^2} \tag{3}$$

$$E^i[\pi] = \left[E^i\left(\rho^{\frac{1}{2}}\right)\right]^2 \frac{Y}{w} \tag{4}$$

Thus, in this setting, more "talented" agents (with higher expected ρ) on average set up more productive firms, hire more labor and earn higher profits.

4.2 Entrepreneurs and net profits

Agents are heterogeneous and differ in their ability to run businesses. Each agent faces a career choice. She has to decide whether to become a worker or an entrepreneur. Agents choosing to become entrepreneurs set up a firm and produce a good that enters symmetrically in the utility function of consumers, generating the demand presented above. We assume that entrepreneurial ability affects total factor productivity, denoted above as ρ, which is equivalent in this single-input-CRS-setting to labor productivity. The parameter ρ is the source of heterogeneity and determines the career choice.

The idea is that in the day-by-day running of the firm, entrepreneurs face options and have to take decisions. In order to take the right decision two types of abilities are required. The first is managerial talent: good entrepreneurs are better able to solve problems and therefore make larger profits. The second type of ability is related to the entrepreneurial environment. Given a certain level of managerial talent, entrepreneurs with a deeper knowledge of the entrepreneurial environment are able to take better decisions. We think of the entrepreneurial environment as the set of factors that shape the economy primarily (though not uniquely) through its *demand* side. Examples are cultural factors, language, tastes, but also regulations (e.g. different procedures to start up businesses) or any other factor that does not directly affect technology. Therefore, it is quite natural to think that entrepreneurial environments differ across countries and that entrepreneurs that have "local" knowledge have an advantage vis-à-vis entrepreneurs who do not have this knowledge.

We model these two types of entrepreneurial abilities (talent and local knowledge) by assuming that, in each period t, agents need to take two actions. In each case the "right action" is a number in the real line:

$$r_t \in \mathbb{R} \quad ; \quad \mu_t \in \mathbb{R}$$

Both r_t and μ_t are random variables.[21] Managerial talent produces more accurate guesses on r_t , while knowledge on the local environment improves predictions on μ_t. We assume that the two decisions are independent (i.e, r_t and μ_t being independently distributed) and that each requires a different type of ability, which is a useful analytical simplification.[22]

Entrepreneurs do not know the precise value of r_t and μ_t and take decisions based on their available information. The further away their action from the "right action", the lower the productivity of workers. That is, productivity ρ is:

$$\rho = e^{-(r_t-a)^2} e^{-(\mu_t-b)^2}$$

and therefore

$$E\left(\rho^{\frac{1}{2}}\right) = E\left(e^{-\frac{1}{2}(r_t-a)^2}\right) \times E\left(e^{-\frac{1}{2}(\mu_t-b)^2}\right)$$

We now specify the information set available to producers.

Information on r_t. We assume that all producers know that r_t is a normally distributed random variable, with independent draws over time, that has a certain known mean (whose value is irrelevant) and a variance V_r. In each period, before taking decisions, each entrepreneur receives an unbiased signal on r_t. The precision of the signal determines the ability of the entrepreneur.

If the precision of the signal received by the entrepreneur is τ, the variance of the posterior is $\frac{1}{\frac{1}{V_r}+\tau}$ and the precision is $P_A = \frac{1}{V_r} + \tau$. Given that the optimal action is to choose a equal to the expectation of r_t, it is clear that:

$$E\left(e^{-\frac{1}{2}(r_t-a)^2}\right) = \sqrt{\frac{P_A}{1+P_A}}$$

The first type of heterogenity between agents is that they differ because they receive signals on r_t with different levels of precision. More talented entrepreneurs have larger precision (lower variance) and they expect to take, on average, more correct decisions on r_t. Consequently, they expect to have on average more productive workers.

Information on μ_t. Agents do not receive signals on the value of μ_t. Rather, they know that it evolves according to the following process:

$$\mu_t = \mu + u_t$$

where μ is a *country-specific* constant and u_t is an individual-specific white noise disturbance with zero mean and variance equal to σ_u^2. Agents take decisions before the realization of the shock u_t.

We assume that domestic and foreign producers differ in their knowledge on μ and, thus, in

[21] It is irrelevant if the realizations of r_t and μ_t are different across agents or if they are common to all of them, the agents differing just in their information on them. The two cases are isomorphic.

[22] It is possible to specify a model where a single decision is taken at the cost of getting a much more involved learning process without gaining further insights.

their ability to guess any specific μ_t. Local producers *know* μ therefore they are only left with the residual uncertainty implied by the presence of the shock u_t.

Foreigners, instead, do not know the exact value of μ and have to learn it by observing its realizations over time. The first time they produce in the foreign country they have a prior on the value of μ with a certain precision $\frac{P_0}{\sigma_u^2}$. We assume that whenever they have a positive level of production they observe an additional realization of μ_t, thus acquiring further information on the value of μ. It follows[23] that the precision of the conditional distribution of μ grows linearly with the stretch of time the foreign entrepreneur has been exposed to the domestic environment. The precision of the prior on μ after having observed $t-1$ realizations of μ_t is:

$$P_t = \frac{P_0}{\sigma_u^2} + \frac{t-1}{\sigma_u^2} = \frac{P_0 + t - 1}{\sigma_u^2},$$

and the variance of the beliefs of such a foreign producer on μ_t is therefore:

$$\frac{1}{P_t} + \sigma_u^2 = \sigma_u^2 \times \left(\frac{1}{P_0 + t - 1} + 1 \right)$$

Thus a foreign entrepreneur faces a more difficult problem than a domestic one. The variance that she faces is equal to the variance that a local entrepreneur faces (σ_u^2) times the an additional term $\left(\frac{1}{P_0+t-1} + 1\right)$ which depends on the initial precision[24] and on the length of the time period the foreign entrepreneur has been exposed to the local environment.

The initial precision P_0 reflects the difference in entrepreneurial environment between the two countries. If there is no difference its value is infinite, and there is no difference between domestic and local entrepreneurs. The larger the difference, the less foreign entrepreneurs know about local conditions, and the smaller the precision of the prior of foreigners.

Independently of the distance in entrepreneurial environment, the precision of foreign entrepreneurs on μ approaches infinity as they spend time in the local market. Eventually, they learn everything needs to be learned about the local market, and the difference with the local entrepreneurs becomes trivial.[25]

It is then useful to introduce the following definitions:

- We define the "managerial talent" of an agent as:

$$a = \frac{P_a}{1 + P_a}, \tag{5}$$

  Its distribution across agents is determined by an exogenous CDF $F(a)$. Notice that a lies between 1 (for highly talented agents that always guess r_t right) and 0 (for agents who receive no signal on r_t or whose signal has a very high variance V_r.).

[23] We assume that talent does not affect either the initial knowledge or the speed of learning. Allowing for such interactions would complicate the algebra without adding further insights, as all we need for our story to go through is that there are two dimensions of heterogeneity: talent and location.

[24] To be precise, the initial precision is $\frac{P_0}{\sigma_u^2}$, but we parametrized it by P_0 only.

[25] Notice that there are no incentives either to enter into a market only to learn, or to produce a lot in order to learn faster. Learning is a byproduct of *being* in the market. It is not increasing with production, thus leaving no room to active learning strategies.

- Let $b(t)$ denote the disadvantage of a foreign entrepreneur producing for the t^{th} time in a foreign country:

$$b(t) = \frac{1+\sigma_u^2}{1+\sigma_u^2\left(1+\frac{1}{P_0+t-1}\right)} \tag{6}$$

  Notice that $b(t) \in [0,1]$, $\lim_{t\to\infty} b(t) = 1$ and $\forall t \lim_{P_0\to\infty} b(t) = 1$.

The average productivity of local entrepreneurs with talent a equals $\sqrt{\frac{a}{1+\sigma_u^2}}$, and the average productivity of foreigners with talent a investing abroad for the t^{th} time is $\sqrt{\frac{ab(t)}{1+\sigma_u^2}}$. Without loss of generality from now on we assume that σ_u^2 equals one. We can now state the following result:

Result 1 *An individual with talent a who sets up a firm in his country has expected profits and labor demand equal to:*

$$E[\Pi(a)] = \frac{a}{2}\frac{Y}{w} \tag{7}$$

$$L(a) = \frac{a}{2}\frac{Y}{w^2} \tag{8}$$

A corollary of result 1 is that:

Result 2 *More productive firms earn higher profits and are larger than less productive ones.*

We will return to the expected profit of foreign entrepreneurs in section 6. In order to have a suitable benchmark when we allow for cross-border activity, the next section solves for the closed economy equilibrium.

5 Closed Economy Equilibrium

At the aggregate level the only relevant price is the wage rate. Given a certain wage, agents choose to become entrepreneurs if and only if:[26]

$$w \leq E[\pi(a)] \quad \Leftrightarrow \quad a \geq 2\frac{w^2}{Y} \equiv x \tag{9}$$

Where x is defined as the threshold level of talent that induces an agent to become entrepreneur. It increases with wages and decreases with aggregate income as **(1)** higher wages make the option of being a worker more appealing and **(2)** higher wages and lower GDP make the option of being an entrepreneur less appealing.

Notice from equation (8) that labor demand depends only on x (and on entrepreneurial talent, of course). By definition labor supply is also determined by x. This is very convenient as it allows to express the equilibrium as a function of x, and not Y and w separately. Effectively x is akin to a price that reflects how hard it is to be an entrepreneur, as the larger x the more

[26] We assume the existence of perfect capital markets, so that only expected profits are relevant.

expensive the labor input (relative to GDP). Thus, x clears the labor market and determines the agents' career paths.

Assuming a continuum of agents of mass one, and given a value of x, labor supply and demand are respectively:

$$L_S(x) = F(x) \tag{10}$$

$$L_D(x) = \int_x^1 \frac{a}{x} dF(a) \tag{11}$$

Labor supply is monotonously increasing in x; it equals 0 at $x = 0$ (labor being so cheap that everybody would rather be an entrepreneur) and approaches one as $x \to \infty$ (labor being so expensive that even the smartest agent prefers to be a worker). Labor demand is decreasing in x, equals zero if $x = 1$ (labor being so expensive that nobody wants to be an entrepreneur) and approaches ∞ as $x \to 0$.

Equilibrium is attained when **(1)** career choices (being an entrepreneur or not) are optimally taken; **(2)** the labor market clears (labor demand equals the mass of workers); and **(3)** aggregate demand equals the total income generated in the economy.

Result 3 *Let X^A be the unique solution of*

$$L_S(x) = L_D(x) \tag{12}$$

X^A completely characterizes the closed economy equilibrium as the equilibrium wage and aggregate income are respectively:

$$w = \int_{X^A}^1 a dF(a) = [1 - F(x)] \, E\left(a \mid X^A < a\right) \tag{13}$$

and

$$Y = 2 \int_{X^A}^1 \frac{a}{X^A} w dF(a) \tag{14}$$

The proof is straight forward, as the shapes of labor supply and demand (described above and depicted in figure (2)) guarantee that there exists a unique value X^A that clears the labor market.

In equilibrium, aggregate demand Y equals total output, the sum of profits plus wage bill. Taking into account (12), this amounts to (14). Finally, (13) is derived from (14) and the definition of x.

6 The Open Economy

We now turn to a world where entrepreneurs are allowed to set up firms abroad.[27] We focus on "horizontal" FDIs, i.e. on investments aiming at establishing production facilities in a foreign

[27] We rule out trade. For a model where FDI and trade are substitutes see for instance Helpman, Melitz and Yeaple (2003).

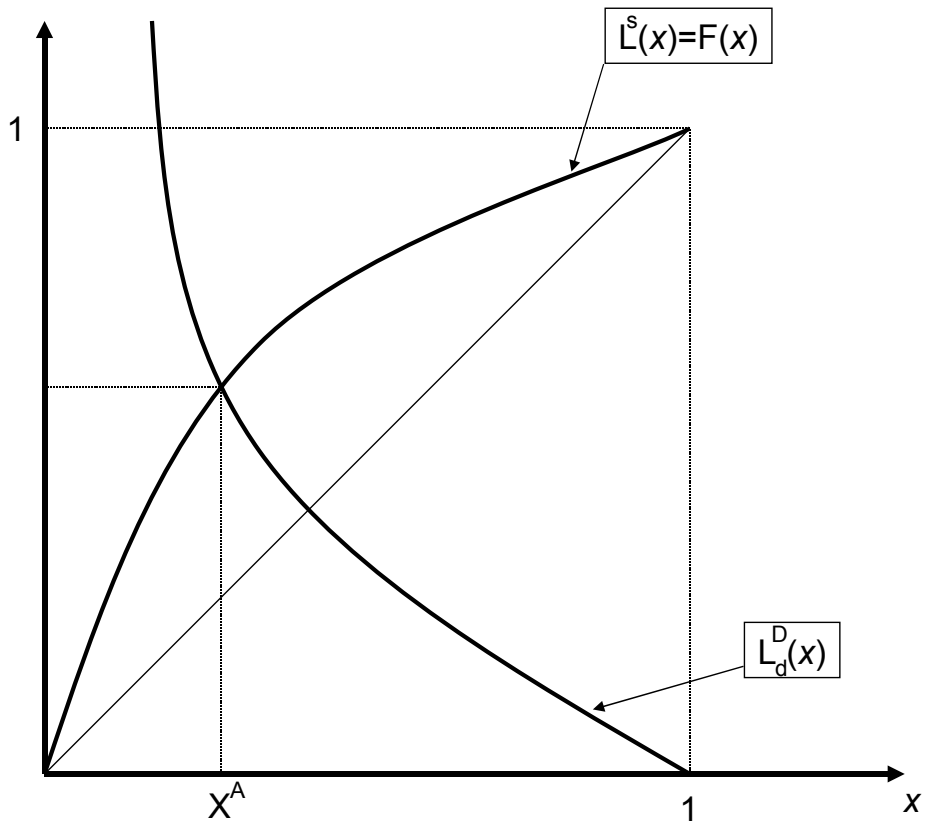


Figure 2: Labor market equilibrium in closed economy

country in order to serve the local market by making use of the local workforce. In other words, we restrict to goods that need to be produced in the same geographic location where they are consumed. One can think either of firms providing services, or firms facing substantial trade costs. As discussed in section 2.3, there is a general consensus that the overwhelming proportion of FDI is horizontal rather than vertical.[28]

In our setting, entrepreneurial ability is country-specific and, as we saw in section 4.2, foreign profits are a function of the amount of time spent abroad. Thus, the model acquires a truly dynamic structure. In order to obtain a non-degenerate steady state distribution of firms we assign to each individual an exogenous probability of dying equal to $(1-\beta)$ and assume the same birth rate in order to keep a constant population. The probability of death is i.i.d. across agents. Thus, in each period a proportion $(1-\beta)$ of the population randomly dies and is replaced by the same number of individuals. Each agent is born with a certain level of talent independently drawn from a certain distribution $F(a)$. Like in Melitz (2003), we assume no time discounting beyond the probability of death. Thus, the discount factor equals the probability of survival, β.

In addition, we assume that each foreign entrepreneur needs to hire one local manager. The local manager does not add to the local knowledge of the firm, but is nevertheless necessary for production. It can be thought of as representing the need to overcome moral hazard and

[28] We rule out both the licensing alternative (on this see Ethier (1986), Horstmann and Markusen (1987), and Ethier and Markusen (1996)) and "vertical" FDI, in which the production process is fragmented across countries (on this see Helpman (1984), Helpman (1985), Markusen (2002, Ch. 9)).

operational control issues that arise from physical distance. In any case, this assumption makes sure that there are no increasing returns to scale generated by FDIs. Agents who choose to be local entrepreneurs cannot be workers in their own firms. This impossibility generates a per-period fixed cost in the local production technology. If there was no identical fixed cost – of exactly 1 worker – in the production technology of the foreign subsidiary, there would be an asymmetry between local and foreign investments. Investing abroad would reduce the per unit cost, as the fixed cost (the entrepreneurs' time) could be used among a larger base. By assuming the same fixed cost (of one worker) in the foreign firm we make both branches identical (except in the difficulty of running them, of course).[29]

The introduction of this fixed costs implies that (in addition to the difference in knowledge) the profits and the labor demand of foreign firms are slightly different from those of local firms summarized in result 1:

Result 4 *An individual with talent a who has been running a firm in the foreign country for* $t-1$ *periods has, in the* t^{th} *period, expected profits from the foreign firm and demand for foreign labor equal to:*

$$E[\Pi_f(ab(t))] = \frac{a}{2}b(t)\frac{Y}{w} - w = \left(\frac{ab(t)}{x} - 1\right)w \tag{15}$$

$$L_f(ab(t)) = \frac{a}{2}b(t)\frac{Y}{w^2} + 1 = \frac{ab(t)}{x} + 1 \tag{16}$$

We consider symmetric equilibria in two countries that are identical in all respects except their entrepreneurial environments. They differ, but in no respects one is worse than the other; they are just different. Thus, in steady state both countries will have the same aggregate income Y, wage w and relative cost of labor x.

6.1 Career-path decisions

We focus on steady state analysis and characterize the values of the three possible career choices that each individual faces: **(1)** be a worker, **(2)** be a domestic entrepreneur or **(3)** be a multinational entrepreneur.

In steady state, the value of being a worker and the value of being a domestic entrepreneur are given by $V_w = \frac{w\beta}{1-\beta}$ and $V_d = \frac{w\beta}{1-\beta}\left(\frac{a}{x}\right)$. They equal, respectively, the expected present discounted value of the future streams of wages and net profits.

The value of becoming a multinational entrepreneur and operating abroad for the rest of life (this is, the value of *setting up* a firm abroad given that the "effective talent" in the foreign country is $ab(t)$ in each year t) is:

[29] We could in principle allow foreign entrepreneurs to hire local managers to help them solving local problems. This would not change results provided that the talent of the foreign entrepreneurs – and their knowledge of the local circumstances – would still affect the productivity of the firm. This would happen under reasonable assumptions. For instance, it would happen in a world where the ability of the foreign entrepreneur contributes (at the very least) to the choice of the *quality* of the local manager. In any case, this would introduce an unnecessary level of complexity.

$$V_f = \sum_{s=1}^{\infty} \beta^s \left(\frac{ab(s)}{x} - 1 \right) w$$

It is convenient to define the degree of globalization as *the weighted average of the disadvantage of being a foreigner* as discounted from the point of view of an individual who survives, and thus discounts with probability β:

$$c \equiv \sum_{s=1}^{\infty} \frac{\beta^s}{\sum_{s=1}^{\infty} \beta^s} b(s) \qquad \in [0,1] \tag{17}$$

The value of c measures the degree of globalization, i.e. the inverse of the distance between countries. If two countries are identical $P_0 \to \infty$ and $c \to 1$, with c monotonously increasing in P_0 (see equation (6)).[30] In our comparative statics exercise we will look at the effects of an exogenous increase in globalization, represented by an increase of c. We can now rewrite V_f as:

$$V_f = \frac{w\beta}{1-\beta} \left(c\frac{a}{x} - 1 \right) \tag{18}$$

First, notice that if an agent chooses to become a domestic entrepreneur she looses the option to be a worker. Thus, the condition to be a domestic entrepreneur is $V_d \geq V_w$, while the condition to become a foreign entrepreneur (where there is no such an opportunity cost) is simply $V_f \geq 0$.

Two additional important remarks are in order:

(1) If an agent chooses to become a multinational entrepreneur, she will remain so the rest of her life (as $b(t)$ increases monotonously over time).

(2) No agent would choose to be an entrepreneur abroad but not at home (as $V_f \geq 0 \Rightarrow V_d \geq V_w$).

From this, the next result follows immediately:

Result 5 *The career path decisions are determined by the talent of the agent, the degree of globalization and the endogenous variables Y and w, summarized by x:*

- *An agent is a worker only if $a \leq x$. Her value is then $V_w = \frac{w\beta}{1-\beta}$*
- *An agent is a domestic entrepreneur not investing abroad only if $x \leq a \leq \frac{x}{c}$. Her value is then $V_d = \frac{w\beta}{1-\beta} \left(\frac{a}{x} \right)$*
- *An agent is an entrepreneur investing at home and abroad only if $\frac{x}{c} \leq a$. Her value is then $V_d + V_f = \frac{w\beta}{1-\beta} \left[\frac{a}{x} + \left(c\frac{a}{x} - 1 \right) \right]$*

Notice that result 5 implies that agents self-select into the different career paths in a way that is consistent with the empirical evidence on the cross-sectional distributions of firm-size and productivity across domestic and foreign-owned firms:

Result 6 *Firms that open foreign subsidiaries are the most efficient (and the largest) among the domestic firms.*

We now turn to the analysis of the open economy steady state.

[30] The lowest value of c is actually $\sum_{s=1}^{\infty} \frac{\beta^s}{\sum_{s=1}^{\infty} \beta^s} \frac{1+\sigma_u^2}{1+\sigma_u^2\left(1+\frac{1}{t-1}\right)}$ which approaches zero only as $\beta \to 0$ or as $t \to 1$.

6.2 Equilibrium

Labor market

It is clear from result 5 that in each country aggregate labor supply is given by the total number of individuals who choose not to be entrepreneurs. Exactly as in the closed economy case, we obtain:

$$L_S(x) = F(x)$$

Labor demand is now the sum of the demand for labor generated by domestic entrepreneurs and the demand for labor generated by foreign entrepreneurs. From result 5 and equation (16) these are respectively

$$L_D^d(x) = \int_x^1 \frac{a}{x} dF(a) \tag{19}$$

$$L_D^f(x) = \begin{cases} \left(1 - F\left(\frac{x}{c}\right)\right) + (1-\beta)\sum_{s=1}^{\infty} \beta^s b(s) \int_{\frac{x}{c}}^1 \frac{a}{x} dF(a) & \text{If } x \leq c \\ 0 & \text{If } c \leq x \end{cases} \tag{20}$$

Notice that in the determination of the foreign labor demand, each generation of foreign entrepreneurs has initial size $1-\beta$, and in each period only a fraction β of them survives. Given that the individual discount rate and the survival rate coincide, equation (20) can be rewritten as:[31]

$$L_D^f(x) = \begin{cases} \left(1 - F\left(\frac{x}{c}\right)\right) + c \int_{\frac{x}{c}}^1 \frac{a}{x} dF(a) & \text{If } x \leq c \\ 0 & \text{If } c \leq x \end{cases} \tag{21}$$

Labor supply and domestic labor demand are identical to the closed economy case. However, now also foreign producers demand labor. Their demand is decreasing in x, approaches infinity as x approaches zero, and is zero if $x \geq c$. Thus:[32]

Result 7 *There exists an unique function $x(c)$ that determines the threshold level of talent needed to become a domestic entrepreneur as a function of the degree of globalization c:*

$$x(c) : [0,1] \to [0,1], \qquad x(c) = \begin{cases} X^A & \text{if } c \leq X^A \\ \hat{x}(c) & \text{if } c \leq X^A \end{cases} \tag{22}$$

Where $\hat{x}(c)$ is the (unique) solution of x to:

$$1 = [1 - F(x)] + \int_x^1 \frac{a}{x} dF(a) + \left[1 - F\left(\frac{x}{c}\right)\right] + \int_{\frac{x}{c}}^1 \frac{a}{\frac{x}{c}} dF(a) \tag{23}$$

[31] As in all overlapping generations models, if there was individual discounting beyond the survival rate, the sum across people of the size of the cohort after s periods in the foreign market would differ from the individual discount factor of that period. The model in such a case would *not* be intractable, but it would be difficult to define globalization, as there would be a further factor in the demand for labor. Globalization, as it is now, weights the disadvantage of being a foreigner from the point of view of the individuals. In the other case, the weights would depend on the cohort size. If the subjective discount was β and the survival rate was λ, the value of the average from the point of view of the individual (that, thus, determines the productivity thresholds) would be $c \equiv \sum_{s=1}^{\infty} \frac{\beta^s \lambda^s}{\sum_{s=1}^{\infty} \beta^s \lambda^s} b(s)$, while the value of the average appearing in the total labor demand of foreign entrepreneurs would be $\hat{c} \equiv \sum_{s=1}^{\infty} \frac{\lambda^s}{\sum_{s=1}^{\infty} \lambda^s} b(s)$. The effects of an increase of P_0 would differ in the two cases, as the weight given to any point in the future differs in the two cases. While the algebra would be substantially more involved, no deeper insights would be gained.

[32] The proof follows from the shapes of the curves and the definition of X^A.

Where (23) states simply that labor supply equals total labor demand (domestic plus foreign).

To understand the intuition behind result 7, it is convenient to define the threshold talent that induces an individual to be a foreign entrepreneur as $z(c) \equiv \frac{x(c)}{c} \geq x(c)$ and notice that only individuals with talent between $z(c)$ and 1 choose to be foreign entrepreneur: no individual chooses to set up a firm abroad if $c < x \Leftrightarrow 1 < z(c)$. Thus, if there are large differences between entrepreneurial environments, i.e. if $c < x$, total labor demand equals the domestic labor demand, which is in turn equal to the closed economy labor demand (see figure 3). Thus, not surprisingly, for relatively high learning costs (and relatively high means precisely that $c < X^A$), the economy is *de facto* in autarchy. and $x(c) = X^A$. There are no FDIs as nobody finds it worth to open a subsidiary abroad: foreign entrepreneurs would demand labor in the domestic country only if it was cheaper, i.e. if $x < c$. Therefore, their presence has no effect on the equilibrium level of the threshold needed to become an entrepreneur which remains at the closed economy level.

If the degree of globalization is large enough, i.e. if $X^A < c$, total labor demand is, in the relevant range, the sum of both domestic and foreign, as shown in figure 4. In this case, in equilibrium, both domestic and foreign entrepreneurs hire labor in the domestic country. Therefore, labor demand cannot be smaller than in autarchy (see again figure 4). As the supply of labor is not affected by the possibility of cross-border investments, in any equilibrium with multinational entrepreneurs (i.e. whenever $X^A < c$) **(1)** labor is relatively more expensive ($X^A < x(c)$) and consequently **(2)** the number of workers is larger (the number of entrepreneurs smaller) than in autarchy.[33]

Goods market

In equilibrium, total production in each country must be equal to the income of its inhabitants (earned either at home or abroad), or equivalently, the income generated in each country (independently of the country of the earner) has to be equal to the total production. Taking into account the definition of x in (9) and the definition of $z(c) \equiv \frac{x(c)}{c}$, the following result holds:

Result 8 *Given $x(c)$ and $z(c)$, the equilibrium wages and aggregate income are respectively:*

$$w(c) : [0,1] \to \mathbb{R}, \quad w(c) = [1 - F(x(c))] E(a \mid x(c) < a) + c[1 - F(z(c))] E(a \mid z(c) < a) \quad (24)$$

$$Y(c) : [0,1] \to \mathbb{R}, \quad Y(c) = 2w(c) \left[\int_{x(c)}^{1} \frac{a}{x(c)} dF(a) + \int_{z(c)}^{1} \frac{a}{z(c)} dF(a) \right] \quad (25)$$

This completely characterizes the steady state as a function of c. Notice that the wage, in equation (24), is a weighted sum of the average productivities of domestic and foreign entrepreneurs, the weights reflecting the proportion of each group.

Before moving to the comparative statics exercise, it is useful to determine the steady state value of an agent with talent a as a function of c. In order to do that, it is convenient to first

[33]The fact that in each country the mass of agents that become entrepreneurs is smaller if, in equilibrium, some (high-ability) agents invest across borders does not mean that the number of firms that sells to consumers is going to be *necessarily* smaller, because entrepreneurs from both countries serve them. Actually, the total mass of products will typically increase. Section 7.2 discusses this issues further.

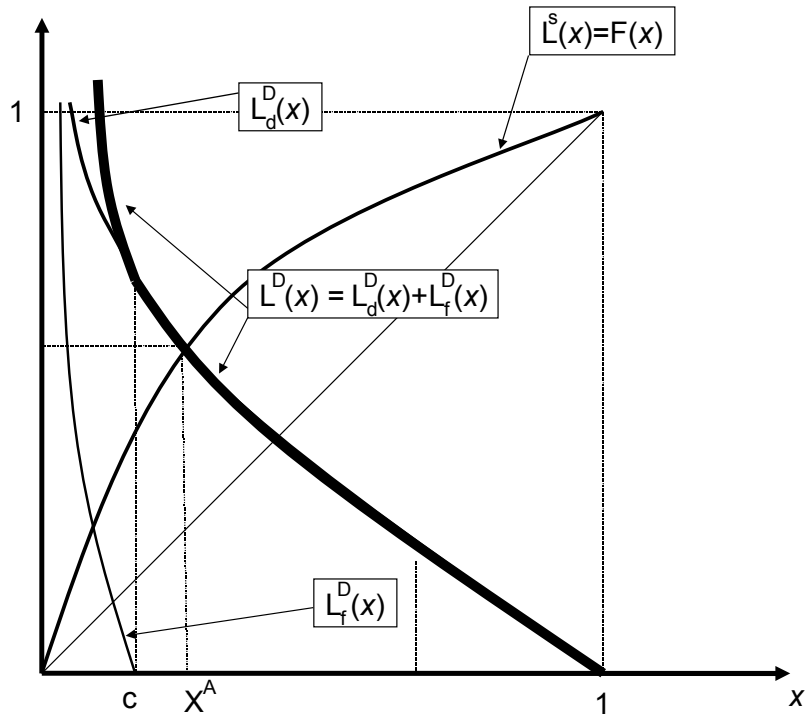


Figure 3: "Open" economy equilibrium: the distance between countries is so large ($c < X^A$) that there are no FDIs: $x(c) = X^A$

define the following two functions:

Definition 1 *Let* $\theta(c) : [0,1] \to \mathbb{R}, \quad \theta(c) = \frac{w(c)}{x(c)} = \frac{Y(c)}{2w(c)}$

The function $\theta(c)$ determines the profits obtained in the domestic market "per unit of talent". In other words, the operating profit of domestic entrepreneurs with talent a is $\theta(c) \times a$.

Definition 2 *Let* $\phi(c) : [0,1] \to \mathbb{R}, \quad \phi(c) = \frac{w(c)}{z(c)} = c\,\theta(c)$

The function $\phi(c)$ determines the profits (gross of the fixed cost) obtained in the foreign market "per unit of talent". This is, the average net operating profit of foreign entrepreneurs of talent a is: $\phi(c) \times a - w$.

Result 9 *Let* $W_w(c)$, $W_d(c|a)$ *and* $W_f(c|a)$ *be the value of a worker, of a domestic firm and of a foreign firm as a function of c, for a given level of talent of the entrepreneur (a). Then:*

$$W_w(c) : [0,1] \to \mathbb{R}, \qquad W_w(c) = \frac{\beta}{1-\beta} w(c) \tag{26}$$

$$W_d(c|a) : [0,1] \to \mathbb{R}, \qquad W_d(c|a) = \frac{\beta}{1-\beta} a\theta(c) \tag{27}$$

$$W_f(c|a) : [0,1] \to \mathbb{R}, \qquad W_f(c|a) = \frac{\beta}{1-\beta} \left[a\phi(c) - w(c)\right] \tag{28}$$

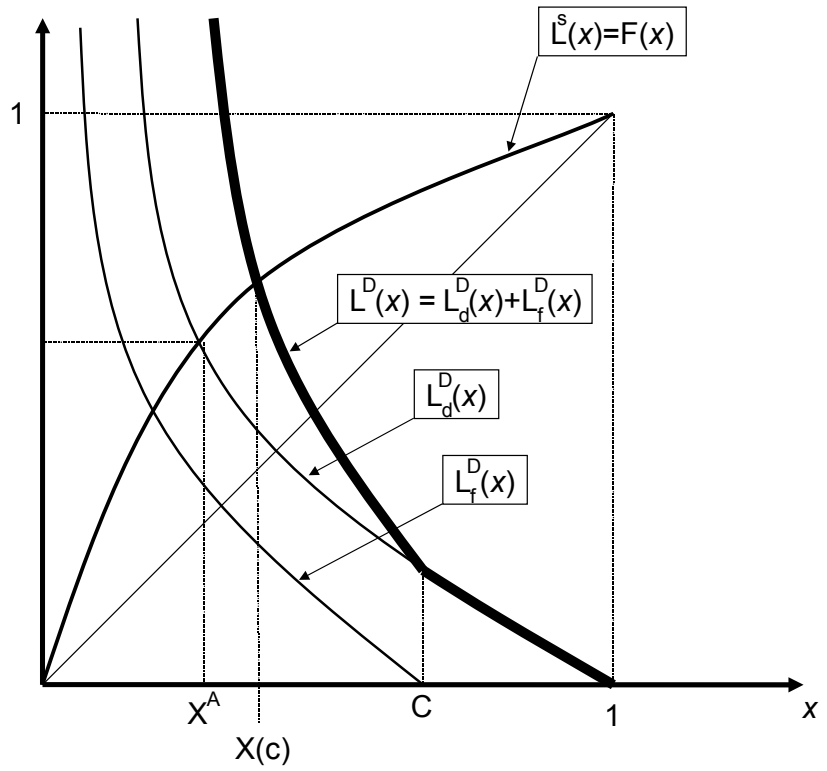


Figure 4: Open economy equilibrium: globalization is large enough ($X^A < c$) to allow for FDIs: $x(c) > X^A$

The value of an individual with talent a is the following function of c:

$$\begin{aligned} V(c|a) : [0,1] \to \mathbb{R}, \quad V(c|a) &= max\{W_w(c), W_d(c|a), W_d(c|a) + W_f(c|a)\} \\ &= \begin{cases} W_w(c) & If\ a \leq x(c) \\ W_d(c|a) & If\ x(c) \leq a \leq z(c) \\ W_d(c|a) + W_f(c|a) & If\ z(c) \leq a \end{cases} \end{aligned} \tag{29}$$

We are now in the position to analyze the effects of an increase in globalization, i.e. the effects of a decrease in the entrepreneurial distance between countries.

7 The Effects of Globalization

In this section we analyze the implications of the model concerning the distributional effects of globalization. We compare the steady states of worlds with different values of c (in the introduction we deemed them as the *Globalized Universe* (high c) and the *National Universe* (low c)) and ask how the value of an individual with a certain a depends on c. We consider the impact of an increase in globalization, i.e. of an increase in c.

7.1 Effects on the Thresholds of Talent

It is clear from figures 3 and 4 that $x(c)$ is an increasing function. It is also relatively easy to see that the elasticity of $x(c)$ is smaller than one, implying that the threshold to become a foreign entrepreneur $z(c)$ increases. In appendix A.1 we prove the following result:

Result 10 *Whenever* $c \geq X^A$*:*[34]

$$\frac{dx(c)}{dc}\frac{c}{x(c)} \quad \in (0,1) \tag{30}$$

$$\frac{dz(c)}{dc}\frac{c}{z(c)} = \frac{dx(c)}{dc}\frac{c}{x(c)} - 1 \quad \in (-1,0) \tag{31}$$

There are two different effects when the entrepreneurial environments become more similar. On the one hand the average local firm is more productive, as the least talented entrepreneurs become workers. On the other hand the threshold to become a foreign entrepreneur decreases, and relatively less talented agents now opt to open subsidiaries abroad. Both effects are represented in figure 5. For any given value of c, the number of workers is equal to mass of agents whose talent is lower than $x(c)$; the number of domestic entrepreneurs who do not invest abroad is given by the mass of agents whose talent lies between $z(c)$ and $x(c)$; and the number of entrepreneurs operating abroad equals the mass of agents with talent larger than $z(c)$.

It is now convenient to define and characterize a fully integrated world in which the countries have exactly the same entrepreneurial environments, i.e. $c = 1$ and learning costs to operate abroad are zero. The fully integrated economy is not equivalent to a single double-sized economy, because in the integrated world setting up a production activity requires a manager in each location: in the integrated world being a manager in the "domestic" market does not allow to save the fixed cost of hiring a manager abroad. Thus, the results that follow do not depend on the presence of increasing returns to scale in production generated by FDIs.

Definition 3 *Call* X^I *the threshold to become domestic entrepreneur in the integrated economy. If* $c = 1$*,* $z(1) = x(1) = X^I$*, where* X^I *is the (unique) value such that:*

$$1 = \left[1 - F(X^I)\right] + \int_{X^I}^{1} \frac{a}{X^I} dF(a) + \left[1 - F\left(X^I\right)\right] + \int_{X^I}^{1} \frac{a}{X^I} dF(a) \tag{32}$$

Notice in figure 5 that as c moves from X^A to 1, the threshold to become entrepreneur increases monotonically from X^A to X^I, while the threshold to become an entrepreneur abroad decreases from 1 to X^I. Thus, $X^A < X^I$ for all $c < 1$: in autarchy the equilibrium threshold to be an entrepreneur is smaller than in the integrated economy.

7.2 Aggregate Effects: Income, Wages and TFP

Closer entrepreneurial environments expose low-productivity domestic entrepreneurs to competition from highly-talented foreign entrepreneurs. As a response, they either become workers or

[34] Obviously if $c < X^A \rightarrow \frac{dx(c)}{dc} = 0$

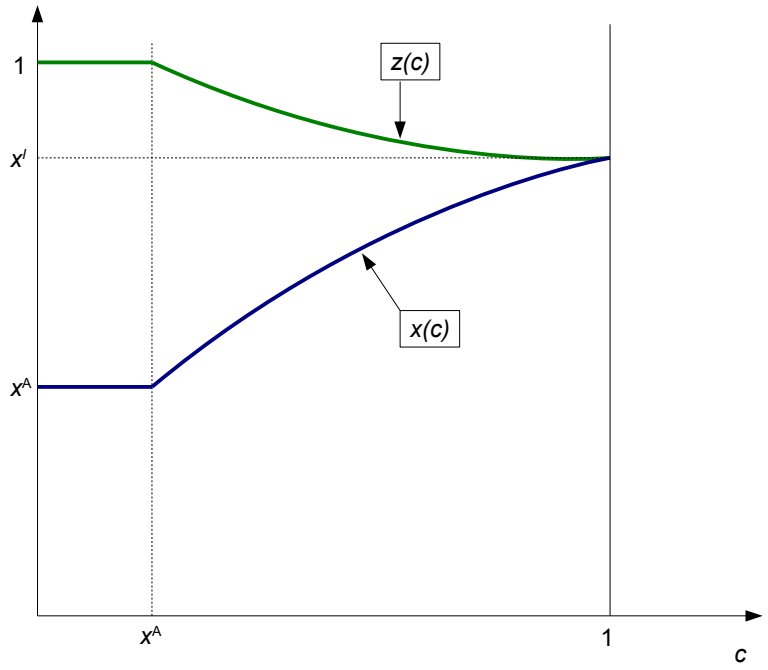


Figure 5: Productivity thresholds for domestic and foreign entrepreneurs as a function of c

produce less because of the higher wages due to the increase in labor demand. This improved allocation of talent results in higher aggregate output, wages and productivity. In appendix A.2 we prove the following general result:

Result 11 *The steady state values of wages and output are larger the smaller the entrepreneurial distance between countries:*

$$\frac{dw(c)}{dc} \geq 0, \qquad \frac{dY(c)}{dc} \geq 0$$

This result reflects the increase in productivity generated by entry in the market of more talented foreign entrepreneurs. Indeed, aggregate TFP increases. This simply follows from the fact that wage rate can be written as the weighted sum of the productivities of domestic and foreign entrepreneurs (see equation (24)).[35] Thus, if it was possible to redistribute at no cost, globalization would be Pareto improving. There are nevertheless redistributive aspects to the story, to which we turn now.

7.3 Distributional Effects

Wages going up are good news to workers but cannot be good news to entrepreneurs. Indeed, the increase in labor demand that pushes up wages has a first order negative effect on the income of domestic entrepreneurs. However, in our imperfectly competitive setting, globalization

[35] Aggregate GDP would increase even in the hypothetical case that the total number of entrepreneurs (and of products) would decrease. The drop in the number of firms, albeit unlikely, might indeed take place in our model and would negatively affect aggregate income given the love for variety implied by the Dixit-Stiglitz preferences. However, even in this case, the positive productivity effect would always dominate and output would increase (as in Melitz, 2003).

also generates a positive aggregate demand externality, i.e. a (second order) positive effect on firms profits *via* higher aggregate demand (see result 11). In general, the magnitude of this second effect depends on the shape of the distribution of talents, which determines how many domestic entrepreneurs become workers after an increase in globalization and the level of their talent. Indeed, if the total number of entrepreneurs decreases as a consequence of an increase in globalization, the profits from domestic firms could in principle even go up, in spite of the higher wages, as there would be a smaller mass of entrepreneurs sharing a larger cake (as, again, result 11 states that Y always increases with c).

Thus, in order to establish results on the distributional effects of globalization we need to impose the following restriction on the distribution of talent:

Assumption 1

$$\frac{d\{af(a)\}}{da} = f(a) + af'(a) \geq 0 \qquad \forall a \in [X^A, 1] \tag{33}$$

Assumption 33 is far from demanding. It holds in the whole family of Pareto distributions ($F(a) = a^\gamma; \quad \gamma \geq 0$). This includes the uniform ($f(a) = 1, \gamma = 1$), but it even holds if the marginal is decreasing ($0 < \gamma < 1$). It simply states that, following an increase in talent, the reduction of its frequency should not be so large as to offset the increase in talent itself.

We now establish two results that will be useful both in the analysis of the effects of globalization on the value of agents with different levels of talent (in section 7.3.1) and in the analysis of the effects of globalization on the *relative* position of high-, middle- and low-talent agents (in section 7.3.2).

In appendix A.3 we prove the following result:

Result 12 *If assumption 1 holds, an increase in the degree of globalization reduces the steady state profits per unit of talent of domestic entrepreneurs and increases the total number of entrepreneurs (domestic and foreign) in the market:*

$$\frac{d\theta(c)}{dc} \leq 0 \tag{34}$$

$$\frac{d\left(1 - F(x) + 1 - F(z)\right)}{dc} \geq 0 \tag{35}$$

The above result implies that, in general, wages grow faster than GDP as globalization rises. Thus, domestic firms make lower profits per unit of talent. Therefore, agents who are always domestic entrepreneurs prefer a world where entrepreneurial environments are very different, as this difference shelters them from competition from highly talented foreign entrepreneurs, making sure that wages are low and domestic profits high.

In principle, foreign entrepreneurs may also lose from globalization as they also need to pay higher wages. However, the fact that they enjoy smaller operating cost while learning the local procedures is enough to make profits from foreign subsidiaries increasing in the degree of globalization. In appendix A.4 we prove that:

Result 13 *The steady state operating profit (gross of the fixed cost) of foreign subsidiaries ($\phi(c)$) increases with globalization: $\frac{d\phi(c)}{dc} \geq 0$. Moreover, for highly-talented individuals who own*

a foreign subsidiary, an increase in c increases the net profit obtained from foreign subsidiaries:

$$\text{If } a \geq z(c) \quad \Rightarrow \quad \frac{dW_f(c|a)}{dc} = a\frac{d\phi(c)}{dc} - \frac{dw(c)}{dc} \geq 0 \tag{36}$$

We are now ready to analyze the effect of globalization of the value of agents with different levels of talent.

7.3.1 Effects on the Value of Individuals with Different Levels of Talent

This analysis is best carried out with the help of graphical tools. Figure 6 shows the wage ($w(c)$) and the gross profits per unit of talent of domestic and foreign entrepreneurs. As the wage rate is increasing in c, it is clear that individuals which always choose to be workers prefer to live in the economy with the highest value of c. Result 14 establishes who these individuals are.

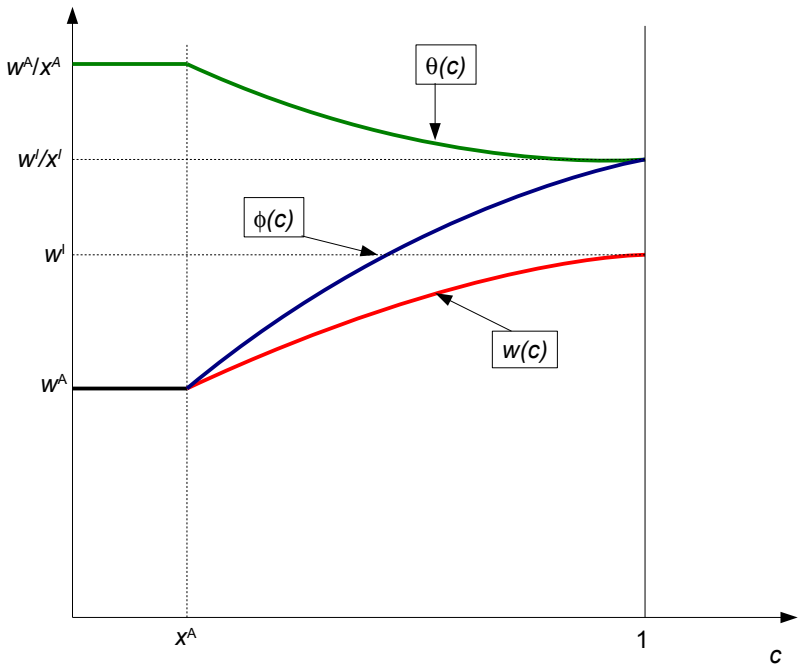
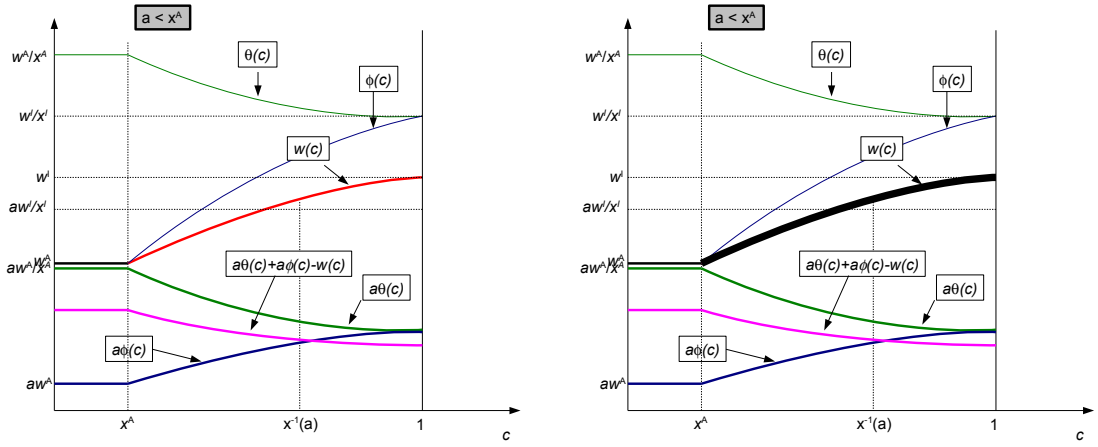


Figure 6: $\theta(c)$, $\phi(c)$ and $w(c)$

Result 14 *Individuals with talent $a \leq X^A$ always choose to be workers. Their value function is*

$$a \leq X^A \quad \Rightarrow \quad V(c|a \leq X^A) = W_w(c) \quad \forall c \tag{37}$$

Figure 7 shows the value function of the individuals with a low level of a as a function of c. The more similar the economies, the better they are, as they are never going to be entrepreneurs, and more openness implies higher labor demand and higher wages. Figure 7(a) depicts the wage $w(c)$ together with the values of $\theta(c)$ and $\phi(c)$, showing that for any value of c these agents prefer to be workers. In figure 7(b) the bold line marks the best choice (being a worker) out of the three available options (w if workers, $a\theta$ if local entrepreneurs and $a\theta + a\phi - w$ if foreign entrepreneurs).



(a) $W_w(c|a)$, $W_d(c|a)$ and $W_f(c|a)$ if $a \leq X^A$ (b) $V(a|c)$ if $a \leq X^A$

Figure 7: Value of an individual with very little talent, who would never be an entrepreneur even in a closed economy

Let us now consider agents with an intermediate level of talent, i.e. talent between X^A and X^I. Those individuals choose to be domestic entrepreneur only if a low level globalization shelters them from foreign competition. If foreign competition increases, because of higher globalization, they prefer to become workers.

Result 15 *Individuals with talent $a \in [X^A, X^I]$ are workers if $c \leq x^{-1}(a)$ and domestic entrepreneurs (not investing abroad) otherwise. Their value is:*

$$X^A \leq a \leq X^I \quad \Rightarrow \quad V(a|c) = \begin{cases} W_d(c|a) & c \leq x^{-1}(a) \\ W_w(c) & x^{-1}(a) \leq c \end{cases} \tag{38}$$

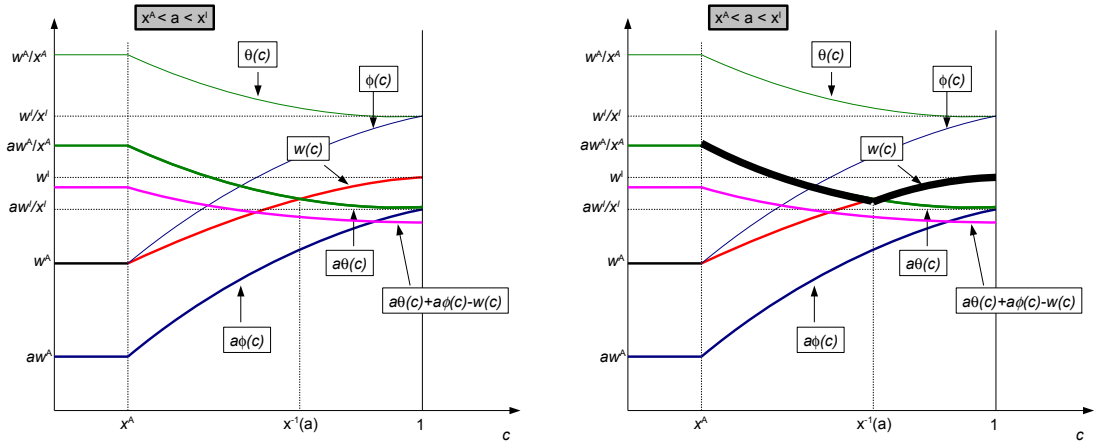
Figure 8 shows the value function of the individuals with talent between X^A and X^I as a function of c. They choose to be domestic entrepreneurs only if there is enough protection from foreign competition that allows to enjoy low wages, i.e. if $c \leq x^{-1}(a)$. As the entrepreneurial environments become more similar both the income as entrepreneur decreases (see result 12) and the outside option of being a worker becomes more attractive. Once c is such that $a = x(c)$, they are indifferent between the two options. For higher levels of globalization they prefer to be workers, and their income increases with c.[36] Thus, their value function is U-shaped. Figure 8(a) shows the value of $a\theta(c)$ and $w(c)$. Figure 8(b) marks the best option available.[37]

We finally consider the individuals with the highest level of talent, i.e. talent between X^I and 1. Those individuals always choose to become domestic entrepreneurs and operate also abroad if the degree of globalization is large enough.

Result 16 *Individuals with talent $a \in [X^I, 1]$ are always entrepreneurs. They operate abroad if*

[36] They never consider the possibility of investing abroad, as the value of investing abroad ($a\phi(c) \leq a\theta(c)$) is always lower than the available alternatives.

[37] Notice that the individuals with talent $a = X^I$ are indifferent between being workers or entrepreneurs at $c = 1$. If entrepreneurs, they are also indifferent between investing abroad or not.



(a) $W_w(c|a)$, $W_d(c|a)$ and $W_f(c|a)$ if $X^A \leq a \leq X^I$ (b) $V(a|c)$ if $X^A \leq a \leq X^I$

Figure 8: Value of an individual with middle talent, who is an entrepreneur if there is enough protection from foreign competition.

and only if $c \geq z^{-1}(a)$.

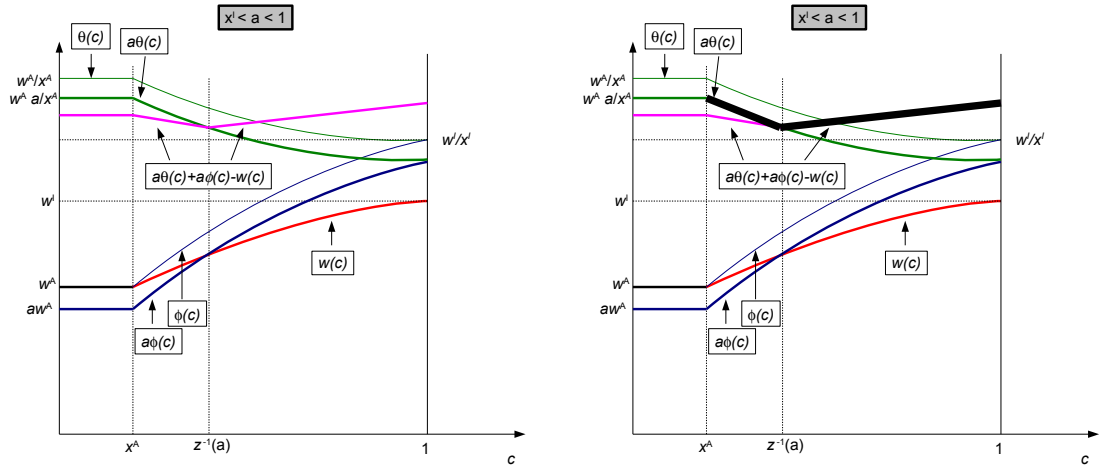
$$X^I \leq a \leq 1 \quad \Rightarrow \quad V(a|c) = \begin{cases} V_d(c) & c \leq z^{-1}(a) \\ V_f(c|a) & z^{-1}(a) \leq c \end{cases} \tag{39}$$

Figure 9 shows the value function of the individuals with $X^I \leq a \leq 1$ as a function of c. By definition they are always better off as entrepreneurs than as workers, as in the lowest possible value for a domestic entrepreneur and the highest possible value for a worker (with $c = 1$) they would get $a\frac{w^I}{X^I} \geq w^I$. Only if the economy is sufficiently integrated they choose to operate abroad. Observe that the profits from a foreign subsidiary increases with c and it is negative at $c = X^A$ insofar $a < 1$. Thus, by continuity, there must exist a value of $c < 1$ such that foreign profits are zero, because at $c = 1$ they are necessarily positive, as foreign and domestic subsidiaries produce the same gross profits. The value function is U-shaped if the increase in c produces an increase in the profits of the foreign subsidiary larger than the decrease in the domestic one, which is the case depicted.[38] Figure 9(a) shows the value of the different options, and figure 9(b) marks the best option that available.

Summing up, so far we have shown that – except for low-productivity individuals who always choose to be workers and therefore always like the higher wages brought about by more openness – individuals' value functions are U-shaped in the degree of globalization. This implies that more globalization – though potentially Pareto improving – actually reduces the well-being of some agents: those on the decreasing part of their value functions. These are the domestic entrepreneurs that would keep being domestic entrepreneurs even in a more open world.

We now turn to the effects of globalization on the *relative* well-being of the agents.

[38]The owners of foreign subsidiaries enjoy larger profits abroad, but lower profits at home. It cannot be ruled out that the value of being a foreign entrepreneur decreases with globalization, as the fall in domestic profits may be larger than the increase in foreign profits. This is nevertheless unlikely to happen, particularly if the number of countries is large, as in this case the gains obtained abroad represent a larg fraction of the income of foreign entrepreneurs.



(a) $W_w(c|a)$, $W_d(c|a)$ and $W_f(c|a)$ if $x^i \leq a \leq 1$

(b) $V(a|c)$ if $x^i \leq a \leq 1$

Figure 9: Value of an individual with high talent, who does not engage in foreign activity only if there is too much protection.

7.3.2 Effects on Inequality

The previous analysis clearly shows that "workers" should like a more globalized world, in which the wage rate is higher, while "domestic entrepreneurs" should dislike it, as more globalization decreases their operating profits per unit of talent (θ). Notice that the second effect happens precisely because the first one happens. Thus, the relative income of workers must improve with respect to domestic entrepreneurs.

Moreover, as globalization increases, domestic entrepreneurs only suffer from the fall in domestic profits, while foreign entrepreneurs also enjoy higher foreign profits. Thus, the well-being of foreign entrepreneurs always improves vis-a-vis domestic entrepreneurs and may even improve in absolute terms.

We summarize these considerations in the following result:

Result 17 *Consider three individuals $\{l, m, h\}$ such that their respective talents are $a^l < a^m < a^h$. Assume that none of them would pursue a different career choice in a world with a higher degree of globalization and that l is a worker, m a domestic entrepreneur and h a foreign entrepreneur.*

Then, an increase in globalization raises the steady state value of $\frac{V(a^l)}{V(a^m)}$, while it reduces the steady state value of $\frac{V(a^m)}{V(a^h)}$.

Result 17 simply follows from high wages being beneficial to workers and harmful to entrepreneurs, while more globalization (higher c) being valuable for foreign entrepreneurs and detrimental for domestic entrepreneurs.

The above result implies that the effect of globalization on the income distribution is U-shaped: the position of the "middle class" deteriorates *relative* to both low- and high-income agents. As globalization increases, the lower tail of the distribution benefits from higher wages, while the upper tail benefits from higher foreign profits due to lower learning costs. Differently,

domestic entrepreneurs (the "middle class") are not talented enough to benefit from the easier access to foreign markets, while suffering from the higher wages caused by foreign entry in the domestic market.

These predictions are in line with the available empirical evidence. Autor et al. (2005), Autor et al. (2006) and Machin and Van Reenen (2007) show that since the 1990's the ratio between the income of the 90th and 50th percentiles has increased ("upper tail inequality") in both the US and the UK, while the ratio of the 50 to 10 percentiles ("lower tail inequality") has decreased.

8 Concluding remarks

This paper first presents empirical evidence on the positive effect of cross-country proximity in "entrepreneurial environments" on bilateral FDIs. By exploiting the *OECD International Direct Investment Statistics* and data on nationwide regulation levels from the OECD and the World Bank, we find evidence that smaller differences in regulations across countries tend to be associated with larger bilateral flows of FDI, after controlling for the *level* of regulation, for countries fixed effects and for time effects, in the context of a standard gravity model.

Motivated by this evidence, we build a general equilibrium model that – while consistent with the main stylized facts about FDI – allows to study the distributional effects of globalization. In the model, agents are heterogeneous and differ both in their ability to be entrepreneurs or workers and their nationality. Entrepreneurs *may* set up a firm abroad, i.e. engage in FDI. If they do so they incur in the additional cost of *learning* how the foreign environment works. In this framework, globalization fosters FDI and improves the allocation of talents in the economy boosting wages, output, and productivity.

The mechanism is as follows. Only the more able entrepreneurs engage in FDI, and their fraction grows larger the "easier" it is to set up a firm abroad, i.e. the more similar the domestic and foreign entrepreneurial environments. This, in turn, increases the demand for domestic labor, output and wages. As a consequence, the minimum ability level needed to become an entrepreneur goes up. This implies that the size of the pool of entrepreneurs goes down while its composition changes: a greater proportion engages in FDI. Hence, globalization improves the allocation of talent of the economy because the increase in the wage rate dissuades low-ability people from becoming entrepreneurs. At the same time, even if less people opt for an entrepreneurial career, a larger fraction serve clients abroad, implying that the variety of products that costumers may acquire increases.

The model implies that globalization increases aggregate productivity, wages and GDP. However, not everybody gain. High- and low-ability agents are better off in a globalized universe, i.e. in a world where learning costs are low. The reason is that low-ability agents, who decide to become workers, earn higher wages in a globalized environment, whereas high-ability agents can exploit larger investment opportunities. Middle-talent agents, differently, prefer to live in a closed world where they are sheltered from foreign competition and can therefore enjoy low wages and high domestic profits. This implies that a higher degree of globalization has a U-

shaped effect on the income distribution: it improves the position of low- and high-income agents relative to middle-income individuals.

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Table 1: Descriptive Statistics

Variable	Mean	Std. Dev.	*N*	Max	Min
FDI Stocks (million $)	5617	17172	5371	277613	-1207
GDP per capita of reporting cty ($)	19479	9518	5371	44951	1781
GDP per capita of partner cty ($)	20216	9780	5371	44951	1194
Population of reporting cty (thousands)	56604	67202	5371	289821	3562
Population of partner cty (thousands)	47502	62461	5371	289821	3439
Geographical variables					
(Log) distance between main cities	7.98	1.15	5371	9.9	5.38
Common border dummy	.105	.307	5371	1	0
EU Dummy	.264	.441	5371	1	0
Nafta dummy	.00894	.0941	5371	1	0
Latin country dummy	.0317	.175	5371	1	0
Common language dummy	.105	.306	5371	1	0
Both in Asia Pacific	.00968	.0979	5371	1	0
Both in North America	.0227	.149	5371	1	0
OECD regulation variables: distance between country pairs					
Product market regulation	.637	.509	5371	2.8	0
Barriers to Trade and Investment	.812	.771	5371	3.3	0
Barriers to Entrepreneurship	.749	.537	5371	2.9	0
State control	1.1	.779	5371	3.6	0
Administrative Regulation	.948	.644	5371	3	0
Economic Regulation	.919	.663	5371	3	0
Inward-oriented regulation	.793	.593	5371	2.8	0
Outward-oriented regulation	.745	.698	5371	3.3	0
Employment protection regulation	1.32	.921	4698	4	0
World bank regulation variables: distance between country pairs					
Starting a Business					
N. of procedures	3.43	2.42	5371	13	0
N. of days	23.7	21.7	5371	105	0
Cost (% of income per capita)	8.83	7.39	5371	35.2	.1
Minimum capital (% of income per capita)	44.6	49.4	5371	238	0
Hiring and Firing					
Difficulty of hiring	29.5	21.8	5371	78	0
Rigidity of hours	28	23	5371	80	0
Difficulty of firing	23.4	20.5	5371	90	0
Rigidity of employment	24.4	16.7	5371	69	0
Firing costs (number of weeks)	32.6	27.1	5371	133	0
Registering Property					
N. of procedures	2.73	2.17	5371	11	0
N. of days	48.1	57.9	5371	203	0
Cost (% of property value per capita)	2.92	2.39	5371	13.5	0
Getting Credit					
Cost to create collateral	8.09	8.56	5371	29.5	0
Legal rights index	2.78	2	5371	9	0
Credit information index	1.05	.847	5371	3	0
Public registry coverage	68.9	165	5371	637	0
Private bureau coverage	422	308	5371	1000	0
Protecting Investors					
Disclosure Index	1.02	.909	5371	5	0
Enforcing Contracts					
N. of procedures	7.27	6.26	5371	30	0
N. of days	285	353	5371	1342	1
Cost (% of debt)	5.52	3.76	5371	16.9	.1
Closing a Business					
Number of years	1.05	.903	5371	4.1	0
Cost (% of estate)	6.3	5.42	5371	22	0
Recovery Rate (cents on the dollar)	21.7	15.4	5371	66.7	0

Table 2: Countries

Australia	Austria	Canada	Denmark	Finland	France
Great Britain	Greece	Germany	Hungary	Ireland	Italy
Japan	Mexico	Netherlands	New Zealand	Norway	Portugal
Poland	Spain	Sweden	Switzerland	Turkey	USA

Table 3: Closest and farthest country pairs

Closest	Farthest
AUS-IRL	FRA-GBR
CAN-AUS	GBR-GRC
DEN-CHE	GBR-ITA
FIN-AUT	GBR-POL
GBR-AUS	GBR-PRT
GBR-CAN	GBR-TUR
GER-AUT	GRC-AUS
IRL-GBR	GRC-CAN
JPN-AUT	GRC-IRL
JPN-GER	ITA-CAN
NLD-AUT	NZL-GRC
NLD-FIN	NZL-POL
NLD-GER	NZL-TUR
NLD-JPN	POL-AUS
NOR-FIN	POL-CAN
NZL-AUS	POL-ESP
NZL-CAN	POL-IRL
NZL-USA	PRT-CAN
PRT-ESP	TUR-AUS
SWE-AUT	TUR-CAN
SWE-FIN	TUR-IRL
SWE-GER	USA-GRC
SWE-NLD	USA-ITA
USA-AUS	USA-POL
USA-CAN	USA-PRT
USA-GBR	USA-TUR

Table 4: **OECD variables: log-linear model**

Dependent variable: Log of FDI Stocks.

Regulation Variables	1	2	3	4	5	6	7	8	9
Common language	0.102	0.107	0.098	0.091	0.096	0.102	0.108	0.085	0.081
	(0.008)***	(0.008)***	(0.008)***	(0.008)***	(0.008)***	(0.008)***	(0.008)***	(0.009)***	(0.008)***
Distance between regulations:									
Product market regulation	-0.027								
	(0.011)*								
Barriers to Trade and Investment		0.023							
		(0.011)*							
Barriers to Entrepreneurship			-0.037						
			(0.008)***						
State control				-0.048					
				(0.009)***					
Economic Regulation					-0.039				
					(0.009)***				
Administrative Regulation						-0.023			
						(0.007)***			
Overall outward-oriented regulation							0.025		
							(0.012)*		
Overall inward-oriented regulation								-0.058	
								(0.011)***	
Employment protection regulation									-0.040
									(0.008)***
R-squared	0.841	0.841	0.841	0.842	0.841	0.841	0.841	0.842	0.843
N	4998	4998	4998	4998	4998	4998	4998	4998	4485

Notes: The distance between regulations is measured as the absolute value of the difference between the source and the host country regulations. The level of regulation in both countries is accounted for by a time-varying measure of PMR (evaluated in 1998 and 2003). All specifications include the following control variables: host and source country fixed-effects, host and source country (log) GDP and (log) population, year dummies, and (log) distance between main cities; common language dummy, EU dummy, NAFTA dummy, latin countries dummy, common land borders dummy, both in Asia dummy, both in North America dummy. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Robust standard errors in parentheses.

Table 5: **World Bank variables: log-linear model**

Dependent variable: Log of FDI Stocks.

Regulation Variables	1	2	3	4	5	6	7	8	9
Common language	0.102	0.101	0.101	0.100	0.099	0.087	0.081	0.082	0.103
	(0.008)***	(0.008)***	(0.008)***	(0.008)***	(0.007)***	(0.008)***	(0.008)***	(0.008)***	(0.007)***
Distance between regulations: ***Starting a Business***									
N. of procedures	-0.035								
	(0.009)***								
N. of days		-0.039							
		(0.013)**							
Cost (% of income per capita)			-0.031						
			(0.008)***						
Minimum capital (% of income per capita)				-0.034					
				(0.015)*					
Distance between regulations: ***Hiring and Firing***									
Difficulty of hiring					-0.047				
					(0.008)***				
Rigidity of hours						-0.068			
						(0.010)***			
Difficulty of firing							-0.088		
							(0.010)***		
Rigidity of employment								-0.071	
								(0.009)***	
Firing costs (number of weeks)									-0.055
									(0.010)***
R-squared	0.841	0.841	0.841	0.841	0.842	0.842	0.843	0.843	0.842
N	4998	4998	4998	4998	4998	4998	4998	4998	4998

Notes: The distance between regulations is measured as the absolute value of the difference between the source and the host country regulations. The level of regulation in both countries is accounted for by a time-varying measure of PMR (evaluated in 1998 and 2003). All specifications include the following control variables: host and source country fixed-effects, host and source country (log) GDP and (log) population, year dummies, and (log) distance between main cities; common language dummy, EU dummy, NAFTA dummy, latin countries dummy, common land borders dummy, both in Asia dummy, both in North America dummy. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Robust standard errors in parentheses.

Table 6: **World Bank variables: log-linear model**

Dependent variable: Log of FDI Stocks.

Regulation Variables	1	2	3	4	5	6	7	8
Common language	0.109	0.108	0.109	0.107	0.104	0.106	0.102	0.110
	(0.008)***	(0.008)***	(0.008)***	(0.008)***	(0.007)***	(0.008)***	(0.008)***	(0.008)***
Distance between regulations: ***Registering Property***								
N. of procedures	-0.025							
	(0.009)**							
N. of days		-0.067						
		(0.012)***						
Cost (% of property value per capita)			-0.023					
			(0.010)*					
Distance between regulations: ***Getting Credit***								
Cost to create collateral (% of income per capita)				-0.006				
				(0.014)				
Legal rights index					-0.041			
					(0.009)***			
Credit information index						-0.037		
						(0.007)***		
Private bureau coverage							-0.016	
							(0.007)*	
Public registry coverage								-0.192
								(0.018)***
R-squared	0.841	0.841	0.841	0.841	0.841	0.841	0.841	0.842
N	4998	4998	4998	4998	4998	4998	4998	4998

Notes: The distance between regulations is measured as the absolute value of the difference between the source and the host country regulations. The level of regulation in both countries is accounted for by a time-varying measure of PMR (evaluated in 1998 and 2003). All specifications include the following control variables: host and source country fixed-effects, host and source country (log) GDP and (log) population, year dummies, and (log) distance between main cities; common language dummy, EU dummy, NAFTA dummy, latin countries dummy, common land borders dummy, both in Asia dummy, both in North America dummy. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Robust standard errors in parentheses.

Table 7: **World Bank variables: log-linear model**

Dependent variable: Log of FDI Stocks.

Regulation Variables	1	2	3	4	5	6	7
Common language	0.112	0.098	0.108	0.109	0.108	0.111	0.108
	(0.008)***	(0.008)***	(0.008)***	(0.008)***	(0.008)***	(0.008)***	(0.008)***
Distance between regulations: ***Protecting Investors***							
Disclosure Index	0.015						
	(0.008)						
Distance between regulations: ***Enforcing Contracts***							
Number of procedures		-0.055					
		(0.013)***					
Number of days			-0.012				
			(0.021)				
Cost (% of debt)				-0.052			
				(0.007)***			
Distance between regulations: ***Closing a Business***							
Number of years					-0.008		
					(0.010)		
Cost (% of estate)						-0.071	
						(0.009)***	
Recovery Rate (cents on the dollar)							-0.032
							(0.007)***
R-squared	0.841	0.841	0.841	0.842	0.841	0.843	0.841
N	4998	4998	4998	4998	4998	4998	4998

Notes: The distance between regulations is measured as the absolute value of the difference between the source and the host country regulations. The level of regulation in both countries is accounted for by a time-varying measure of PMR (evaluated in 1998 and 2003). All specifications include the following control variables: host and source country fixed-effects, host and source country (log) GDP and (log) population, year dummies, and (log) distance between main cities; common language dummy, EU dummy, NAFTA dummy, latin countries dummy, common land borders dummy, both in Asia dummy, both in North America dummy. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Robust standard errors in parentheses.

Table 8: **OECD variables: PPML model**

Dependent variable: Volume of FDI Stocks.

Regulation Variables	1	2	3	4	5	6	7	8	9
Common language	0.109	0.145	0.137	0.067	0.091	0.152	0.145	0.068	0.121
	(0.017)***	(0.013)***	(0.015)***	(0.017)***	(0.017)***	(0.015)***	(0.013)***	(0.020)***	(0.018)***
Distance between regulations:									
Product market regulation	-0.107								
	(0.031)***								
Barriers to Trade and Investment		0.005							
		(0.046)							
Barriers to Entrepreneurship			-0.027						
			(0.020)						
State control				-0.161					
				(0.022)***					
Economic Regulation					-0.135				
					(0.025)***				
Administrative Regulation						0.015			
						(0.016)			
Overall outward-oriented regulation							0.067		
							(0.052)		
Overall inward-oriented regulation								-0.156	
								(0.029)***	
Employment protection regulation									-0.040
									(0.016)*
R-squared	0.597	0.597	0.597	0.598	0.597	0.597	0.597	0.597	0.587
N	5244	5244	5244	5244	5244	5244	5244	5244	4599

Notes: The distance between regulations is measured as the absolute value of the difference between the source and the host country regulations. The level of regulation in both countries is accounted for by a time-varying measure of PMR (evaluated in 1998 and 2003). All specifications include the following control variables: host and source country fixed-effects, host and source country (log) GDP and (log) population, year dummies, and (log) distance between main cities; common language dummy, EU dummy, NAFTA dummy, latin countries dummy, common land borders dummy, both in Asia dummy, both in North America dummy. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Robust standard errors in parentheses.

Table 9: **World Bank variables: PPML model**

Dependent variable: Volume of FDI Stocks.

Regulation Variables	1	2	3	4	5	6	7	8	9
Common language	0.146	0.148	0.124	0.136	0.149	0.124	0.099	0.118	0.140
	(0.014)***	(0.014)***	(0.015)***	(0.015)***	(0.014)***	(0.014)***	(0.015)***	(0.015)***	(0.013)***
Distance between regulations: ***Starting a Business***									
N. of procedures	0.005								
	(0.027)								
N. of days		0.052							
		(0.050)							
Cost (% of income per capita)			-0.100						
			(0.028)***						
Minimum capital (% of income per capita)				-0.048					
				(0.031)					
Distance between regulations: ***Hiring and Firing***									
Difficulty of hiring					0.020				
					(0.022)				
Rigidity of hours						-0.091			
						(0.019)***			
Difficulty of firing							-0.162		
							(0.020)***		
Rigidity of employment								-0.081	
								(0.017)***	
Firing costs (number of weeks)									-0.182
									(0.027)***
R-squared	0.597	0.597	0.597	0.597	0.597	0.597	0.598	0.597	0.597
N	5244	5244	5244	5244	5244	5244	5244	5244	5244

Notes: The distance between regulations is measured as the absolute value of the difference between the source and the host country regulations. The level of regulation in both countries is accounted for by a time-varying measure of PMR (evaluated in 1998 and 2003). All specifications include the following control variables: host and source country fixed-effects, host and source country (log) GDP and (log) population, year dummies, and (log) distance between main cities; common language dummy, EU dummy, NAFTA dummy, latin countries dummy, common land borders dummy, both in Asia dummy, both in North America dummy. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Robust standard errors in parentheses.

Table 10: **World Bank variables: PPML model**

Dependent variable: Volume of FDI Stocks.

Regulation Variables	1	2	3	4	5	6	7	8
Common language	0.145	0.145	0.146	0.143	0.151	0.110	0.158	0.147
	(0.013)***	(0.013)***	(0.013)***	(0.013)***	(0.013)***	(0.014)***	(0.016)***	(0.013)***
Distance between regulations: ***Registering Property***								
N. of procedures	-0.031							
	(0.029)							
N. of days		-0.052						
		(0.040)						
Cost (% of property value per capita)			-0.021					
			(0.027)					
Distance between regulations: ***Getting Credit***								
Cost to create collateral (% of income per capita)				-0.192				
				(0.046)***				
Legal rights index					-0.087			
					(0.027)**			
Credit information index						-0.150		
						(0.021)***		
Private bureau coverage							0.032	
							(0.020)	
Public registry coverage								-0.632
								(0.039)***
R-squared	0.597	0.597	0.597	0.597	0.597	0.598	0.597	0.598
N	5244	5244	5244	5244	5244	5244	5244	5244

Notes: The distance between regulations is measured as the absolute value of the difference between the source and the host country regulations. The level of regulation in both countries is accounted for by a time-varying measure of PMR (evaluated in 1998 and 2003). All specifications include the following control variables: host and source country fixed-effects, host and source country (log) GDP and (log) population, year dummies, and (log) distance between main cities; common language dummy, EU dummy, NAFTA dummy, latin countries dummy, common land borders dummy, both in Asia dummy, both in North America dummy. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Robust standard errors in parentheses.

Table 11: **World Bank variables: PPML model**

Dependent variable: Volume of FDI Stocks.

Regulation Variables	1	2	3	4	5	6	7
Common language	0.123	0.090	0.167	0.165	0.148	0.143	0.145
	(0.016)***	(0.016)***	(0.014)***	(0.014)***	(0.014)***	(0.013)***	(0.013)***
Distance between regulations: ***Protecting Investors***							
Disclosure Index	-0.042						
	(0.018)*						
Distance between regulations: ***Enforcing Contracts***							
Number of procedures		-0.266					
		(0.035)***					
Number of days			0.301				
			(0.081)***				
Cost (% of debt)				-0.117			
				(0.019)***			
Distance between regulations: ***Closing a Business***							
Number of years					-0.019		
					(0.024)		
Cost (% of estate)						0.034	
						(0.035)	
Recovery Rate (cents on the dollar)							-0.007
							(0.017)
R-squared	0.597	0.598	0.597	0.598	0.597	0.597	0.597
N	5244	5244	5244	5244	5244	5244	5244

Notes: The distance between regulations is measured as the absolute value of the difference between the source and the host country regulations. The level of regulation in both countries is accounted for by a time-varying measure of PMR (evaluated in 1998 and 2003). All specifications include the following control variables: host and source country fixed-effects, host and source country (log) GDP and (log) population, year dummies, and (log) distance between main cities; common language dummy, EU dummy, NAFTA dummy, latin countries dummy, common land borders dummy, both in Asia dummy, both in North America dummy. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Robust standard errors in parentheses.

A Proofs

A.1 Proof of Result 10

We can rewrite the labor market equilibrium condition (23) in function of x and z. We call this relationship LM:

$$1 = [1 - F(x)] + \int_x^1 \frac{a}{x} dF(a) + [1 - F(z)] + \int_z^1 \frac{a}{z} dF(a) \tag{40}$$

Differentiating totally (40) with respect to x and z:

$$\left.\frac{dx}{dz}\right|_{LM} = -\frac{-2f(z) - \int_z^1 \frac{a}{z^2} dF(a)}{-2f(x) - \int_x^1 \frac{a}{x^2} dF(a)} \leq 0 \tag{41}$$

And thus, the elasticity of x wrt z along LM:

$$\left.\frac{dx/x}{dz/z}\right|_{LM} = -\frac{-2zf(z) - \int_z^1 \frac{a}{z} dF(a)}{-2xf(x) - \int_x^1 \frac{a}{x} dF(a)} \leq 0 \tag{42}$$

The definition of $z \equiv \frac{x(c)}{c}$ implies that $dx/x = dc/c + dz/z$. Thus:

$$\frac{dx/x}{dc/c} = \frac{2zf(z) + \int_z^1 \frac{a}{z} dF(a)}{2zf(z) + \int_z^1 \frac{a}{z} dF(a) + 2xf(x) + \int_x^1 \frac{a}{x} dF(a)} \in (0, 1) \tag{43}$$

$$\frac{dz/z}{dc/c} = -\frac{2xf(x) + \int_x^1 \frac{a}{x} dF(a)}{2zf(z) + \int_z^1 \frac{a}{z} dF(a) + 2xf(x) + \int_x^1 \frac{a}{x} dF(a)} \in (-1, 0) \tag{44}$$

QED

A.2 Proof of Result 11

First, define two functions:

$$g(x) = g_x \equiv xf(x),$$
$$D(x) = D_x \equiv \int_x^1 \frac{a}{x} dF(a),$$

Notice that both $g(x)$ and $D(x)$ are non negative and that $D(x)$ is decreasing:

$$dD(x) = -(g_x + D_x)\frac{dx}{x}$$

It is now useful to notice that, being $\theta = \frac{Y(c)}{2w(c)}$, equation (25) implies that

$$\theta = (D_x + D_z)$$

Then:

$$d\theta = -\left[(g_x + D_x)\frac{dx}{x} + (g_z + D_z)\frac{dz}{z}\right]$$

Which after some algebra results in:

$$d\theta = -\frac{g_z D_x - g_x D_z}{(2g_z + D_z)}\frac{dx}{x}$$

We can now prove the following two results.

A.2.1 Wages increase with globalization

$$w = x\theta$$
$$\frac{dw}{w} = \frac{dx}{x} + \frac{d\theta}{\theta}$$

Then:

$$\begin{aligned}\frac{dw}{w} &= \left(1 - \frac{g_z D_x - g_x D_z}{(2g_z + D_z)(D_x + D_z)}\right)\frac{dx}{x} \\ &= \frac{D_x D_z + 2g_z D_z + D_z D_z + g_z D_x + g_x D_z}{(2g_z + D_z)(D_x + D_z)}\frac{dx}{x}\end{aligned}$$

Thus, irrespectively of whether assumption 1 holds or not, wages always increase with c:

$$\frac{dw}{dc} \geq 0$$

QED

A.2.2 GDP increases with globalization

$$Y = 2x\theta^2 = 2w\theta$$
$$\frac{dY}{Y} = \frac{dw}{w} + \frac{d\theta}{\theta} = \frac{dx}{x} + 2\frac{d\theta}{\theta}$$

$$\begin{aligned}\frac{dY}{Y} &= \frac{dx}{x} - \frac{2g_z D_x - 2g_x D_z}{(2g_z + D_z)(D_x + D_z)}\frac{dx}{x} \\ &= \left(1 - \frac{2g_z D_x - 2g_x D_z}{(2g_z + D_z)(D_x + D_z)}\right)\frac{dx}{x} \\ &= \frac{2g_z D_z + D_x D_z + D_z D_z + 2g_x D_z}{(2g_z + D_z)(D_x + D_z)}\frac{dx}{x}\end{aligned}$$

Thus, irrespectively on whether assumption 1 holds or not, income always increases with c:

$$\frac{dY}{dc} > 0$$

QED

A.3 Proof of Result 12

Consider again the two functions defined in the proof of Result 11 (section A.2):

$$g(x) = g_x \equiv xf(x),$$
$$D(x) = D_x \equiv \int_x^1 \frac{a}{x} dF(a),$$

Recall that both $g(x)$ and $D(x)$ are non negative and that $D(x)$ is decreasing:

$$dD(x) = -(g_x + D_x)\frac{dx}{x}$$

Additionally, notice that assumption 1 implies that $g_z > g_x$.

Then:

$$\theta = (D_x + D_z)$$
$$d\theta = -\left[(g_x + D_x)\frac{dx}{x} + (g_z + D_z)\frac{dz}{z}\right]$$

Which after some algebra results in:

$$d\theta = -\frac{g_z D_x - g_x D_z}{(2g_z + D_z)}\frac{dx}{x}$$

Thus, as x increases with c, given that $D_x > D_z$ and that assumption 1 guarantees that $g_z > g_x$:

$$\frac{d\theta}{dc} < 0$$

The fact that the number of entrepreneurs operating in the market increases follows from noticing that the labor market equilibrium implies:

$$1 = [1 - F(x) + 1 - F(z)] + \theta$$

Thus, if θ decreases, $[1 - F(x) + 1 - F(z)]$ must increase.

QED

A.4 Proof of Result 13

$$\phi = \frac{w}{z} = c\theta$$
$$\frac{d\phi}{\phi} = \frac{dw}{w} - \frac{dz}{z}$$
$$= \frac{2g_x D_x + 3g_x D_z + g_z D_x + 2g_z D_z + D_x D_x + 2D_x D_z + D_z D_z}{(2g_z + D_z)(D_x + D_z)}\frac{dx}{x}$$

$$d\phi = \frac{c}{x}\frac{2g_xD_x + 3g_xD_z + g_zD_x + 2g_zD_z + D_xD_x + 2D_xD_z + D_zD_z}{(2g_z + D_z)}dx$$

$$ad\phi = \frac{a}{z}\frac{2g_xD_x + 3g_xD_z + g_zD_x + 2g_zD_z + D_xD_x + 2D_xD_z + D_zD_z}{(2g_z + D_z)}dx$$

$$\begin{aligned} ad\phi - dw = & \frac{a}{z}\frac{2g_xD_x + 3g_xD_z + g_zD_x + 2g_zD_z + D_xD_x + 2D_xD_z + D_zD_z}{(2g_z + D_z)}dx \\ & - \frac{g_xD_z + g_zD_x + 2g_zD_z + D_xD_z + D_zD_z}{(2g_z + D_z)}dx \\ & = \left(\frac{a}{z} - 1\right)\frac{g_xD_z + g_zD_x + 2g_zD_z + D_xD_z + D_zD_z}{(2g_z + D_z)}dx \\ & + \frac{a}{z}\frac{2g_xD_x + 2g_xD_z + D_xD_x + D_xD_z}{(2g_z + D_z)}dx \end{aligned}$$

Thus it is clear that for those who have foreign subsidiaries the profits of those subsidiaries increase:

$$if \;\; a > z \Longrightarrow \frac{d\left(a\phi - w\right)}{dc} > 0$$

QED