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FDI, Allocation of Talents and Differences in Regulation♥

Giovanni Pica* **and José V. Rodríguez Mora****

Abstract

This paper presents evidence on the effect of countries proximity in regulation on bilateral FDI flows. By exploiting the *OECD International Direct Investment Statistics* and data on nationwide regulation levels, we find a significant negative effect of the *absolute value* of the difference between countries indexes of regulation on the associated bilateral flows of FDIs, controlling for each country regulation *level*. Motivated by this evidence, we build a model where agents are heterogeneous and differ in their abilities to be entrepreneurs or workers. Entrepreneurs *may* engage in FDIs, which entails incurring additional fixed costs, one of which is the cost of *learning* the foreign regulation. In this framework, more similar regulations foster FDI, raise wages, output and productivity. The increase in productivity is the consequence of very efficient foreign entrepreneurs driving out of the market inefficient local firms, improving the allocation of talent in the economy as a whole.

JEL Classification: E61-F23-F41.
Keywords: Multinational Firms, Heterogeneous Agents, Policy Harmonization

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1 Introduction

Which factors drive FDIs in the real world? An extensive literature has been dealing with this question.[1] From an empirical standpoint, it is well known that the cross-country pattern of FDI may be well approximated by the "gravity" relationship (Ekholm (1998), Shatz (2003)). Proximity variables like "physical distance" or "sharing a common language" or "sharing a border" do contribute to determine the size of bilateral FDI flows between countries. Additionally, trade barriers, the size of the market and the difference in factor costs are also found to be significant explanatory variables of FDIs.

However, proximity in "regulation" has never been taken into account as one of the possible determinants of FDI. There are actually good reasons to think that such a variable should matter. For instance, if regulations shape the economic environment and the entrepreneurs are those agents that have the talent to profitably produce and sell goods in *that* environment, then a higher degree of similarity among countries increases the chances that *domestic* entrepreneurs are able to run businesses *abroad* in a profitable way. The more the institutional settings (or administrative rules, or safety and health regulations, or food regulations, or any other 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.

In order to give an empirical look at this issue, this paper exploits the OECD indexes measuring the level of Product Market Regulation in a number of OECD countries (Nicoletti et al. 2000), and the World Bank data set *Doing Business* that collects information on business regulations and their enforcement in 145 countries. We match these data with the data on bilateral FDI flows drawn from the *OECD International Direct Investment Statistics*.

A first check may be performed by simply plotting the difference between countries regulation indexes against their bilateral FDI flows.[2] Graph 1 displays on the horizontal axis the difference between country i and country j index of *Barriers to International Trade and Investment* in the late 90's, as measured by the OECD, and on the vertical axis the flow of FDI from country j to country i (from 1980 to 1997). The graph shows that bulk of FDI flows lies in the area where the difference between regulations is close to zero. The smaller the difference between regulations the larger and the more frequent the bilateral flows of FDI. Graph 2 displays a different measure of regulation, namely *Barriers to Entrepreneurship*, on the horizontal axis. On the vertical axis, as before, the flow of FDIs from country j to country i. Though maybe less evident, it still seems that a smaller difference between regulations tends to be associated with larger bilateral FDI flows. Finally, in graph 3, we consider a third measure of

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

[2] For more details on the data and a proper empirical investigation see section 2.

regulation: the extent of *state control over business enterprises*. Also this graph has the same "triangular" shape of the two previous ones.

These graphs seem to suggest that FDIs *do not* flow from more regulated countries (where one would tend to think that the rewards from capital are low[3]) to less regulated economies (where one would think that the rewards from capital are high), otherwise we would observe much larger and frequent FDI flows in the area where the difference between the two indexes is negative, which does not seem to happen. One explanation may be that the negative relation between differences in regulations and FDI flows is due to the fact that FDIs take place mostly among (rich) non regulated countries that, for this reason, have *similar* regulation levels. If this was case, what would actually foster bilateral FDIs is not the regulation proximity between countries but, rather, their low regulation levels.

However, the more robust - yet still preliminary - empirical analysis performed in section 2 suggests that this is not the case. In that section we run a bunch of regressions in the tradition of gravity models, adding as an additional explanatory variable the *absolute value* of the difference between the source and host country indexes of regulation. Controlling for the *level* of regulation, for countries fixed effects and for time effects, we still find that the coefficient of the variable capturing regulation proximity is, in a number of relevant cases, negative and significant. We interpret this finding as evidence in favour of the hypothesis that the distance between nationwide regulations does contribute to shape the size of bilateral FDI flows.

This fact raises some questions. Why do differences in regulations matter at all for FDIs once the levels are controlled for? Why do some countries have similar regulation levels - and large bilateral FDI flows - and others do not? Should we expect these differences to be persistent? In "closed" countries, will there be political support for changes in regulation that tend to favor FDI flows? And in more "open" countries, will there be political support to keep them open?

This paper will confine itself only on the explanation of why regulation differences seem to matter for FDIs and leave the other questions for further research. In order to do so, we build a simple general equilibrium model of heterogeneous agents that differ in their abilities to be entrepreneurs or workers. Some of them, the ones that have more managerial abilities, become entrepreneurs in a monopolistically competitive environment. The rest become workers. Entrepreneurs *may* set up a firm abroad, i.e. engage in FDIs. We focus on *horizontal* FDIs, i.e. investments aiming at establishing production facilities in a foreign country

[3]Unless, of course, regulated countries are poor countries with high marginal productivity of capital.

in order to serve the local market by making use of the local workforce.[4,5]

Setting up a firm abroad, however, requires incurring in a series of fixed costs. First, entrepreneurs operating in a foreign country are less efficient than domestic ones with the same level of entrepreneurial ability. We assume that this entails hiring an extra amount of workers. The difficulty of monitoring workers abroad, for instance, may be one reason for it. Second, FDIs give rise to a *learning cost* that is to be borne when *moving* to the foreign country, because of the need to learn how things work there. To the extent that regulation shapes the economic environment and prescribes to follow certain procedures in order to start a business, it is plausible to think that sharper differences in regulations may actually impose a larger learning cost on foreign entrepreneurs willing to engage in FDIs. Hence, we assume that entrepreneurs operating abroad need to undertake a learning process and to incur a learning cost that is *larger the larger the difference in regulation between countries*. Once the cost has been paid and the learning process completed, the entrepreneur does not need to pay it ever again. We model the learning cost as an extra amount of workers, decreasing over time, to be hired in order to run the firm properly.

In this framework, only some entrepreneurs - the more able ones - effectively engage in FDIs. More similar regulations provide larger incentives to engage in FDIs and a larger fraction of entrepreneurs will do so. This, in turn, increases the labour demand, the output and the wage rate. As a consequence, the minimum ability needed to become an entrepreneur goes up. This implies not only that the total number of entrepreneurs goes down, but also that their composition changes: a greater proportion of them engages in FDIs. More similar regulation improve the allocation of talents: it deters less talented people from becoming entrepreneurs by increasing the wage paid to workers. At the same time, even if less people opt for an entrepreneurial career, a larger amount of them serve clients abroad, implying that the variety of products that costumers may acquire increases. Summarizing, more similar regulations imply larger FDIs, higher wages and higher output. However, of course, not everybody gains.

The rest of the paper is organized as follows. Section 2 presents the data and the results from the empirical investigation. Then, we turn to the model. Section 3 describes the demand and production sides of the model economy. Section 4 solves for the closed economy benchmark and section 5 analyses the framework where entrepreneurs are allowed to set up firms abroad. Section 6 concludes.

[4]In other words, we consider goods that need to be produced in the same geographic location where they are consumed. One can think of the firms providing services, like restaurants (McDonald's) or retail shops (Zara or H&M). We rule out both the licensing alternative (on this see Ethier (1986), Horstmann and Markusen (1987), and Ethier and Markusen (1996)) and "vertical" FDIs, in which the production process is fragmented across countries (on this see Helpman (1984), Helpman (1985), Markusen (2002, Ch. 9)).

[5]We also rule out trade. For a model of FDI and trade see Helpman, Melitz and Yeaple (2003).

2 The empirical analysis: some preliminary evidence

2.1 The Data

The first aim of the paper is to understand whether, among the determinants of FDIs, the cross-country *distance* between regulations may play some role. For the sake of the empirical analysis, we exploit data on bilateral FDI flows and cross-country data on regulations (plus a set of control variables).

The data on FDIs are drawn from the *OECD International Direct Investment Statistics* that provides yearly statistics for OECD countries on international direct investment flows (inflows, outflows) by geographical distribution, i.e. to and from partner countries and regions from 1980 to 1997.[6] Data are provided in national currency and have been converted to US dollars using yearly average exchange rates (OECD).

The control variables we employ are GDP, drawn from the *OECD Main Economic Indicators*, population from the Penn World Tables, and a set of geographical variables that includes: latitude and longitude of the source and host country; an adjacency dummy (i.e. if they share common land borders); a linguistic tie dummy (i.e. if they share a common language); distance between (the main cities of the) countries; European Union, North America and Asian dummies; a NAFTA dummy. The geographical variables are drawn from Frankel, Stein and Wei (1995) and Frankel and Wei (1998).

Finally, we exploit variables (ideally) capturing the level of different types of regulation implemented in different countries. We use two sets of such variables, one from the OECD and one from the World Bank.

The OECD data on regulation.

Nicoletti et al. (2000) builds indexes measuring the extent of Product Market Regulation (and Employment Protection Legislation) in a number of OECD countries during the 90's.

The basic data used in the elaboration of these indexes come from (1) the responses of Member countries to an ad hoc questionnaire (*The OECD Regulatory Indicators Questionnaire*) distributed to Member countries and the European Union in 1998; and (2) from data on economy-wide and industry-specific regulations drawn from publications of the OECD or other institutions. From these sources, a number of detailed indicators of regulation were constructed and classified in three broad regulatory domains:

- *Barriers to international trade and investment.*

[6] Actually the dataset arrives till 2001, but the last years are very noisy due to many missing data.

- *Barriers to entrepreneurship.*
- *State control over business enterprises.*

These three sets of variables are then summarized in a single measure of Product Market Regulation. In addition, the last two indicators above are further classified into the following alternative broad areas:

- *Administrative regulations.*
- *Economic regulation.*

Finally, regulatory provisions were classified as inward-oriented or outward-oriented, depending on whether they are directed at domestic or foreign operators. Figure 4 (in appendix, drawn from Nicoletti et al. (2000)) shows how the overall index of Product Market Regulation was built starting from the raw data by further aggregating the information in homogeneous domains. This process provides us both with an overall index of Product Market Regulation, and with a set of sub-indexes of regulations described above. Of particular interest to us are those capturing mostly administrative burdens and red tape costs (like *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. In what follows we will be exploiting the whole set of sub-indexes. Though some of them are clearly highly correlated, others, like *Administrative regulations* and *Barriers to international trade and investment* display very low correlation (see Table 1 in the appendix).

The World Bank dataset *'Doing Business 2004'*.

The World Bank provides a comprehensive database, called *Doing Business*,[7] 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 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*. Table 2, in the appendix, displays the full set of variables available.

Differently from perception-based surveys, the *Doing Business* dataset uses factual information in order to measure the extent of regulation along several

[7]The dataset, as well as a detailed description of the variables, is available at http://rru.worldbank.org/doingbusiness.

dimensions. In particular, the dataset is built starting from an analysis of the laws and regulations in force, that yields to a questionnaire designed for *local* professionals experienced in their fields. The questionnaire is structured around a hypothetical case to ensure comparability across countries and over time. Next, the local experts engage in several rounds of interaction with the *Doing Business* team. The preliminary results are presented to academics and practitioners, prior to refinements in the questionnaire and further rounds of data collection. Finally, the data undergo numerous tests for robustness.

Of course, these measures of regulation are far from being perfect. At best we would like to have time-varying information on whether regulations are *qualitatively* different among countries rather than just *quantitatively* different. In particular, two countries that we classify as similar with these data, because they require, say, the same number of procedure to start up a business, may actually be different because they require very different tasks to be complied with. However, since quantitative differences in the amount of regulation plausibly come together with qualitative differences, we may be confident that these data allow to capture, at least partially, qualitative differences as well.

2.2 Results of the empirical analysis

In order to check whether the patterns highlighted by the raw data are robust to a more severe empirical investigation, we run a bunch of regressions in the tradition of gravity models, adding as additional explanatory variables both the regulation *level* and the *absolute value of the difference* between the source and host country indexes of regulation. Taking into account that, unfortunately, our measures of regulation do not vary over time, we estimate the following model:

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

where F_{ijt} is the FDI flow from country j (the source) to country i (the host) at time t, as a share of GDP of the host country; α_i is the fixed host country effect; τ_t is a year effect; the vector X_{ijt} includes variables, such as the source and host countries GDP (in US dollars); the source and host countries population; the latitude and longitude of the source country;[8] the distance between the main cities of the two countries. A set of dummy variables is included as well in order to control for the possibility that countries i and j share the same language; share common land borders; they both belong to the European Union; are both located in North America; are both located in Asia; they both belong to NAFTA. Finally we also control for the regulation *level*. The vector β is the ceteris paribus effect of X_{ijt} on Y_{ijt}.

[8]The latitude and longitude of the host country, as well as any other non time-varying characteristic of the host country, are captured by the fixed country effect α_i.

Controlling for the *level* of regulation, the coefficient of interest γ captures exclusively the effect of *regulation proximity*, as measured by the absolute value of the difference between regulation indexes, on FDI bilateral flows.

We perform our analysis on a set of 25 countries, for which we have data on both regulation and FDI flows, listed in Table 3 (see appendix). Tables 4, 5, 6 and 7 report the results of the estimation.

Table 4: results using the OECD regulation data

Table 4 presents the results from the estimation of equation (1) obtained exploiting the OECD regulation variables. The columns (from A to I) report the results of different specifications differing in the measures of regulation proximity included on the right hand side. In column A we use the overall index of Product Market Regulation and, up to column H, the different sub-indexes of product market regulation produced by the OECD and described in the earlier section. In the last column we use the only *time-varying* index available, which measures the strictness of Employment Protection Legislation (Nicoletti et al. (2000)). In each specification the regulation *level* (of the source country) is controlled for by adding the regulation index with the lowest correlation with the one taken in differences.

The table reports the coefficient of the variable of interest, the absolute value of the difference between regulation indicators, and shows that it is negative and significant in all but one specifications at least at the 5% level.[9] The regulation indicators that are arguably closer in spirit to the model presented in what follows are the *Barriers to Entrepreneurship*, the *Administrative Regulation* and the *Employment Protection Legislation* variables whose coefficients are all negative and significant. The coefficients of the other variables, namely the extent of *State Control over Businesses*, *Economic Regulation*, *Barriers to Trade and Investment*, and both *Inward-* and *Outward-Oriented Regulation* are negative and significant as well.

Tables 5, 6 and 7: results using the World Bank regulation data

These tables report the results from the estimation of equation (1) using the World Bank *Doing Business 2004* dataset.[10] Overall, out of the 24 indexes of regulation proximity, half of them enter negatively and significantly in equation (1). In particular, Table 5 shows that the indexes measuring the distance in regulations dealing with the processes of *Starting a Business* and of *Hiring and*

[9] In all specifications, GDP of both the host country and the source country is not significant. This is expected due to the inclusion of countries fixed-effect and the time trend. The population of the source country enters always positively and significantly. The EU dummy and the common language dummy are always positive and significant. See Razin et al (2004) for comparable panel data results.

[10] In these tables, the *level* of regulation is accounted for by adding the OECD Overall Product Market Regulation index.

Firing are negative and significant. Table 6, differently, seems to show that similarities in regulations concerning *Property Registration* and the *Credit* system do not affect much FDI flows. Finally, Table 7 suggests that, while differences in the indexes of *Investor Protection* are not significant, a larger distance in the procedures related to *Contract Enforcement* does reduce the flows of FDIs. Finally, larger differences in the *Bankruptcy* procedures seem to actually foster FDI.

Overall, the evidence seems to suggest that, at least along *some* dimensions, differences in regulations may matter i.e., controlling for the regulation level, a smaller distance between national regulations may actually foster bilateral FDI flows. In particular, we find that some effects on FDIs may be attributed to regulations concerning *Product Markets*, the *Labour Market* (with some more emphasis to be placed on firing restrictions), and *Contract Enforcement*.

Notice that these regulations have to do and interact with the way an entrepreneur has to set up a firm. For instance, product markets regulation may imply the existence of particular start up procedures one needs to comply with in order to start a business. Labour market and contract enforcement regulations may forbid (or allow only for) certain types of contractual arrangements to be stipulated with workers and/or suppliers. Therefore, the differences between the regulation indexes may be due to the fact that, in the two countries, different sets of rules are actually implemented, with whom any multinational-entrepreneur-to-be needs to get acquainted with. It follows that if the difference between regulation indexes grows large, the cost of setting up a firm abroad grows large as well, because of the need to learn and understand a *different* system of rules. This may be a costly process that raises the cost of FDIs and reduces its attractiveness.

In what follows we formalize this idea. Next section presents the model economy.

3 The Model: 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, so that the demand in one country for a certain 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. Entrepreneurs (who can be either national or foreigner) set up firms and face a monopolistic environment. All firms produce with constant returns to scale and using

only labour. They maximize:

$$\max_{p_j} p_j x_j - awx_j = Y p_j^{-\theta} (p_j - aw)$$

a being the labour requirement for unit.

Thus the gross profits (gross of fixed costs, as explained below) and productive labour demand (*productive* as opposed to *total* labour demand, as again explained below) of the firm are respectively:

$$\pi = Y \left(\frac{\theta}{\theta - 1} \right)^{-\theta} (wa)^{1-\theta} \frac{1}{\theta - 1}$$

and

$$z = \left(\frac{\theta}{\theta - 1} \right)^{-\theta} a^{1-\theta} w^{-\theta} Y$$

In what follows we will assume without loss of generality that $\theta = 2$ and $a = \frac{1}{4}$, so that the gross profit and productive labour demand of a firm (any firm) in a country with wage w are:

$$\pi = \frac{Y}{w} \tag{2}$$

$$z = \frac{Y}{w^2} \tag{3}$$

3.1 Entrepreneurs and net profit

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 entrepreneurs-to-be need to pay a fixed cost in order to run their business. The fixed cost takes the form of hiring a number of workers κ, on top of the productive labour demand in equation (3). The cost κ is going to be the source of heterogeneity and to determine who becomes an entrepreneur and who becomes a worker. As standard, we assume that no individual can be an entrepreneur and a worker at the same time.

When setting up a firm in the own country, the fixed number of workers required to start the production process is decreasing with the talent of the individual, indexed by ϕ, i.e. $\kappa = \phi$, with ϕ being distributed according to some CDF $F(\phi)$. Therefore, the net benefits and the total labour demand of a firm are given by:

$$\Pi = \frac{Y}{w} - \phi w$$

and

$$L = \frac{Y}{w^2} + \phi = z + \phi$$

It is useful to notice that:

$$\Pi = (z - \phi)\, w$$

4 Closed Economy Equilibrium

In order to have a suitable reference and benchmark when we allow for cross-border activity, we first develop the equilibrium in a closed economy. At the aggregate level the only relevant price is the wage rate. Given a certain wage, agents are going to choose to become entrepreneurs if and only if:

$$w \leq \Pi \quad \Leftrightarrow \quad \phi \leq z - 1$$

Assuming a continuum of agents of mass one, the number of agents that will choose to be entrepreneurs is $F(z-1)$. Hence, labour supply and demand are:

$$L_S(z) = 1 - F(z-1) \tag{4}$$

$$L_D(z) = F(z-1) \times z + \int_{-\infty}^{z-1} \phi dF(\phi) \tag{5}$$

Notice that *en lieu* of expressing supply and demand as a function of prices, we express them as a function of firms' productive labour demand (z). We do so for simplicity; z is a monotonously decreasing function of the wage rate, and expressing everything in terms of z simplify matters enormously. An increase in z means that labour has become relatively cheaper relative to Y (thus labour demand goes up and supply down), and it is therefore convenient to think of z as of how cheap labour is.

Equilibrium is attained when **(1)** career choices (being an entrepreneur or not) are optimally taken; **(2)** the labour market clears (labour demand equals the number of workers), and **(3)** aggregate demand equals the total income generated in the economy. We will refer to the last two conditions as labour market equilibrium and goods market equilibrium.

4.1 Labour Market

In what follows we are going to maintain the hypothesis that ϕ (the inverse of talent) is uniformly distributed in $[0, 1]$. Hence, from (4), labour supply reads as follows:

$$L_S(z) = 2 - z$$

and from (5) labour demand is given by:

$$L_D(z) = \begin{cases} 0 & \text{If } z \leq 1 \\ \frac{1}{2}(z-1)(3z-1) & \text{If } 1 \leq z \leq 2 \\ z + \frac{1}{2} & \text{If } 2 \leq z \end{cases}$$

In equilibrium it must be that $1 \leq z \leq 2$, and therefore the condition that $L_D = L_S$ boils down to:

$$\frac{3}{2}z^2 - z - \frac{3}{2} = 0$$

There is a unique positive solution to this equation, whose value is denoted by Z_A (specifically $Z_A = \frac{1}{3} + \frac{1}{3}\sqrt{10}$, which does not mean anything by itself). What is interesting is that there exists a unique value of z that clears the labour market. Moreover, z (how cheap is labour relative to the output of the economy) is the only variable that determines the labour market behaviour. This property will turn out to be very useful later on.

4.2 Goods market

In equilibrium, aggregate demand Y must be equal to the total output of the economy. The latter is equal to firms gross profits $\left(\pi = \frac{Y}{w}\right)$ plus the wage bill $(z \times w)$, hence total output per firm equals $2zw$.[11] There are $F(z-1)$ firms, thus the goods market equilibrium condition reads as follows:

$$Y = 2F(z-1)zw$$

and therefore, any equilibrium price needs to be such that:

$$w = 2F(z-1)$$

Keeping the assumption on the uniform distribution of talent $\phi \sim U(0,1)$:

$$w = 2(z-1)$$

Thus, z (how cheap it is labour) is all that is needed to completely characterize the equilibrium. Moreover, in order to determine the value of z, it is enough to clear the labour market. For later reference it is useful to observe that, given our assumptions, the equilibrium values of wages and income are respectively $w_A = 2(Z_A - 1) = \frac{2}{3}\sqrt{10}$ and $Y_A = 4Z_A(Z_A-1)^2 = \frac{40}{27}\left(1 + \sqrt{10}\right)$

[11] Gross profits are split between entrepreneurs' income and the fixed costs.

5 The open economy

We now turn to a world where entrepreneurs are allowed to set up firms abroad, i.e. engage in FDIs. In particular, we focus on "horizontal" FDIs, i.e. investments aiming at establishing production facilities in a foreign country in order to serve the local market by making use of the local workforce. In other words, we are considering goods that need to be produced in the same geographic location where they are consumed. One can think of firms providing services, like restaurants (McDonald's) or retail shops (Zara or H&M).

Engaging in FDIs implies the need to incur in additional fixed costs. First, we assume that due to, say, the difficulty of monitoring workers abroad, foreign entrepreneurs are less efficient than domestic ones (with the same level of talent). This entails hiring an extra amount of workers γ. This assumption captures the idea that running a business from a distant location somehow reduces the profitability of the activity.

Moreover, setting up a firm abroad requires incurring a further fixed cost, namely a *learning cost*. Such a cost is borne when *moving* to the foreign country, because of the need to learn how things work there. This cost, as explained in the introduction, may be generated by cultural differences (say language) or differences in regulations (say, different procedures to start up businesses) and is larger the larger the differences between countries. An important point is that, once an entrepreneur has paid the learning cost and learned how things work abroad, she will never need to pay it ever again. We model the learning cost as an extra amount of workers to be hired in order to run the firm properly equal to $\delta^t \lambda$, where t is the time elapsed since the foreign entrepreneur started producing abroad, $\delta \in (0, 1)$ measures the speed of learning ($\delta = 1$ implies that one never learns, while δ close to zero implies very fast learning), and λ is the size of the cost.

Both δ and λ may depend on legislation, particularly on how different legislations are. Our working assumption is going to be that changes in legislations or procedures tending to make the countries more different are bound to increase the value of δ and λ (of either of them, or of both). However, changes in legislation will not affect evenly the entrepreneurs in the two countries. It is reasonable to think that if the *home* country legislation changes, then the *domestic and foreign* entrepreneurs producing at *home* are able to adjust instantaneously to the change. The only agents affected are the foreign entrepreneurs that *would like* to open a business in the home country. This asymmetry simply implies that if an agent (independently of the nationality) has set up a firm in a country, she is able to react faster to changes than agents not producing there.

Our interpretation of δ and λ is that they are the only visible consequence of legislation, and are affected only by changes in the *distance* between legislations. Legislation *per se*, i.e. the legislation *level*, has no effects in our model. In the real world, of course, policies are most likely to have direct effects as well, and some

of them are going to be better than others. We are completely abstracting from those effects. This approach is consistent with the empirical analysis (presented in section 2) where we do control for the regulation *level*.

5.1 Individual decisions

We confine ourselves to 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.
3. Be an multinational entrepreneur.

In steady state, the value of being respectively a worker and a domestic entrepreneur, denoted by V_W and V_N, is given by:

$$V_W = w\frac{1}{1-\beta} \tag{6}$$

$$V_N = (z-\phi)\, w\frac{1}{1-\beta} \tag{7}$$

The above asset equations simply state that the values are equal to the present discounted values of the future streams of wages and net profits.

The value of being a multinational entrepreneur and *having already learned how the foreign country works*, is:

$$V_X = V_N + \frac{1}{1-\beta}\left(\widetilde{z}-\phi-\widetilde{\gamma}\right)\widetilde{w} \tag{8}$$

where the variables with a tilde refer to the foreign country. In equation (8) the first term of the right hand side is simply the value of being a domestic entrepreneur while the second term is the value of being a multinational "educated" entrepreneur, thus it accounts only for the extra fixed cost $\widetilde{\gamma}$ associated to FDIs (and not for the learning cost).[12]

Finally, the value of *starting* to engage in FDIs, is:

$$\begin{aligned} V_{BX} &= V_X - \frac{1}{1-\beta\delta}\lambda\widetilde{w} \\ &= V_N + \frac{1}{1-\beta}\left(\widetilde{z}-\widetilde{\phi}-\gamma\right)\widetilde{w} - \frac{1}{1-\beta\delta}\lambda\widetilde{w} \end{aligned}$$

[12]Notice that we need to assume that $\widetilde{z}-z \leq \widetilde{\gamma}-1$, in order to make sure that the set of domestic entrepreneurs is non empty for any level of the learning cost. It seems both a convenient and natural assumption, but it is disturbing because both z and $\tilde{z}$ are endogenous. In any case, later on we will concentrate on the symmetric case where the condition simplifies to $1 \leq \widetilde{\gamma}$.

Where $\frac{1}{1-\beta\delta}\lambda\widetilde{w}$ is the present discounted value of the learning cost. Given that the cost decreases over time, no agent will produce abroad for some time only: if an agent sets up a firm abroad, it is forever.

Heterogeneity. At the end of the day, there are two dimensions along which individuals differ. On the one hand they are more or less talented. On the other hand, they may or may not have already engaged in FDIs.

5.1.1 Steady State Decisions

By making use of the above asset equations, we first look at the decisions of the individuals who have *not* been FDI entrepreneurs in the past and have therefore not learned how things work in the foreign country. Then, we will analyse the decisions of the agents who do know how foreign country legislation works.

- Individuals who have *not* engaged in FDIs,
  - will be workers only if[13]
$$z - 1 \leq \phi$$
  - will be domestic entrepreneurs only if
$$\widetilde{z} - \widetilde{\gamma} - \frac{1-\beta}{1-\beta\delta}\lambda \leq \phi \leq z - 1$$
  - and will change their mind and do set a firm abroad only if
$$\phi \leq (\widetilde{z} - \widetilde{\gamma}) - \frac{1-\beta}{1-\beta\delta}\lambda$$
- Individuals who have been running a firm abroad in the past (or that for any circumstances do not need to pay the learning cost) have a different decision scheme.
  - They become workers only if:
$$z - 1 \leq \phi$$
  - They become domestic entrepreneurs only if
$$\widetilde{z} - \widetilde{\gamma} \leq \phi \leq z - 1$$

[13]The actual restriction is

$$\max\left\{z-1, (z-1)\frac{w}{w+\widetilde{w}} + \left(\widetilde{z} - \widetilde{\gamma} - \frac{1-\beta}{1-\beta\delta}\lambda\right)\frac{\widetilde{w}}{w+\widetilde{w}}\right\} \leq \phi$$

but the assumption that $\widetilde{z} - z \leq \widetilde{\gamma} - 1$ makes the wage in the other country irrelevant.

– And continue being multinational entrepreneurs only if

$$\phi \leq \widetilde{z} - \widetilde{\gamma}$$

Notice that agents with $\phi \in \left[(\widetilde{z} - \widetilde{\gamma}) - \frac{1-\beta}{1-\beta\delta}\lambda, \widetilde{z} - \widetilde{\gamma}\right]$ *will be engaging in FDIs only if they have been doing so in the past, but will be domestic entrepreneurs otherwise.*

If in steady state any agent who *could* be a multinational entrepreneur *is* actually one, then individuals will split up among the three categories according to the following rules:

$$\begin{aligned} z - 1 \leq & \phi && \text{(Workers)} \\ \widetilde{z} - \widetilde{\gamma} - \frac{1-\beta}{1-\beta\delta}\lambda \leq & \phi \leq z - 1 && \text{(Domestic entrepreneurs)} \\ & \phi \leq \widetilde{z} - \widetilde{\gamma} - \frac{1-\beta}{1-\beta\delta}\lambda && \text{(Exporting entrepreneurs)} \end{aligned}$$

In order to simplify notation we define a variable C capturing the learning costs: $C = \frac{1-\beta}{1-\beta\delta}\lambda$. We now turn to analyse first the labour market equilibrium condition and then the goods market equilibrium condition.

5.2 Labour market

In a symmetric steady state countries have the same aggregate income Y and the same wage rate w. The labour supply, in the home country, is given the total number of individuals who choose not to be entrepreneurs of any type.

$$L_s = 1 - F(z - 1)$$

The labour demand in the home country is given by the sum (i) of the labour demand of national entrepreneurs (ii) and the labour demand of foreign entrepreneurs operating in the home country, i.e.:

$$\begin{aligned} L_D &= \int_0^{(z-\gamma-C)} (z + \gamma + \phi)\, dF(\phi) + \int_0^{z-1} (z + \phi)\, dF(\phi) \\ &= [z + \gamma + E(\phi | \phi \leq (z - (\gamma + C)))]\, F(z - (\gamma + C)) + \\ &\quad + (z + E(\phi | \phi \leq (z - 1)))\, F(z - 1) \end{aligned}$$

where $\int_0^{(z-\gamma-C)} (z + \phi + \gamma)$ is the labour demand of foreign producers that we denote by L_D^f, and the second term $\int_0^{z-1} (z + \phi)\, dF(\phi)$ is the labour demand of domestic producers, denoted by L_D^d.

Notice that a drop in C affects labour demand *via* two margins. On the one side, a lower C induces a larger amount of foreigners to engage in FDIs, thus

increasing the domestic labour demand (*extensive* margin). On the other side, the *marginal* foreign entrepreneurs (and *only* the marginals) need to hire less workers (*intensive* margin) because the fixed cost C is lower.[14] However, the net effect on labour demand of a decrease in C is clearly positive.[15] Recalling that talent is uniformly distributed ($\phi \sim U(0,1)$) and realizing that the number of entrepreneurs that demand labour is bounded between zero and one:

$$\begin{aligned} L_D &= \left[\max\left\{\min\left\{\left(z-(\gamma+C)\right),1\right\},0\right\}\right](z+\gamma)+ \\ &\quad +\frac{1}{2}\left[\max\left\{\min\left\{\left(z-(\gamma+C)\right),1\right\},0\right\}\right]^2+\left[\max\left\{\min\left\{\left(z-1\right),1\right\},0\right\}\right]z+ \\ &\quad +\frac{1}{2}\left[\max\left\{\left\{\min\left(z-1\right),1\right\},0\right\}\right]^2 \end{aligned}$$

With

$$\begin{aligned} L_D^f &= \left[\max\left\{\min\left\{\left(z-(\gamma+C)\right),1\right\},0\right\}\right](z+\gamma)+ \\ &\quad +\frac{1}{2}\left[\max\left\{\min\left\{\left(z-(\gamma+C)\right),1\right\},0\right\}\right]^2 \\ L_D^d &= \left[\max\left\{\min\left\{\left(z-1\right),1\right\},0\right\}\right]z+\frac{1}{2}\left[\max\left\{\left\{\min\left(z-1\right),1\right\},0\right\}\right]^2 \end{aligned}$$

Thus domestic and foreign labour demands are given by:

$$L_D^d=\begin{cases} 0 & \text{If } z\leq 1 \\ \frac{1}{2}(z-1)(3z-1) & \text{If } 1\leq z\leq 2 \\ z+\frac{1}{2} & \text{If } 2\leq z \end{cases}$$

and

$$L_D^f=\begin{cases} 0 & \text{If } z\leq \gamma+C \\ \frac{1}{2}(z-\gamma-C)(3z+\gamma-C) & \text{If } \gamma+C\leq z\leq 1+\gamma+C \\ z+\gamma+\frac{1}{2} & \text{If } 1+\gamma+C\leq z \end{cases}$$

Total labour demand $\left(L_D=L_D^f+L_D^d\right)$ is increasing in z (how cheap labour is). The domestic labour demand is larger than the foreign if labour is relatively expensive (low z), while if wages are low (high z) the foreign labour demand is larger, because foreign firms need to have larger staffs to operate ($\gamma>0$).

When $z\geq 2$ labour is so cheap that all domestic agents want to be entrepreneurs, at least locally. This, of course, cannot happen in equilibrium. When

[14] Notice that a *larger* C would affect labour demand only through the extensive margin because in that case a lower amount of foreigners would engage in FDIs, leaving unaltered the labour demand of those who keep exporting.

[15] The fixed cost γ affects labour demand as well, first by changing the proportion of foreign agents who decide to produce in the home country (very much as the learning cost C), and second by affecting the labour demand of *all* foreign producers (and not only the marginals).

$z \geq 1+\gamma+C$ labour is even cheaper (recall that $\gamma > 1$) and therefore everybody would like to engage in FDIs, which again cannot happen in equilibrium.

Let us now turn to what *can* happen in equilibrium. Given our assumption that the cost of operating abroad is large enough ($\gamma > 1$), the shape of total labour demand depends on the size of $\gamma + C$.

We first analyse the case of a relatively high ($\gamma + C > Z_A$). Notice that, in this case, whenever z is lower than $\gamma + C$ (labour is very expensive) the total labour demand equals the domestic labour demand, which is equal to the autarchic labour demand Z_A. Thus, not surprisingly, for relatively high fixed costs (and relatively high means precisely that $\gamma + C > Z_A$) the economy is *de facto* in autarchy. This can be seen in figure 5. Foreign entrepreneurs demand labour in the home country only if it is very cheap, $z > \gamma + C$, so their presence has no effect in equilibrium.

We now turn to the case where the costs of opening a plant abroad are not so high ($\gamma + C < Z_A$). The total labour demand is now, in the relevant range, the sum of both domestic and foreign demand, as in picture 6. In that case, in equilibrium, both domestic and foreign entrepreneurs hire labour in the home country.

Since in equilibrium it can not happen neither than $z > 1 + \gamma + C$ (because then everybody would want to be a multinational entrepreneur) nor that $z > 2$ (because then everybody would want to be a domestic entrepreneur), the equilibrium condition reads as follows:

$$\begin{aligned} L_S &= L_D \\ (2-z) &= \frac{1}{2}(z-1)(3z-1) + \frac{1}{2}(z-\gamma-C)(3z+\gamma-C) \end{aligned}$$

The above equation is satisfied for a unique value of z that we will denote $Z_T(\gamma, C)$:

$$Z_T(\gamma, C) = \frac{1}{6}\left((1+\gamma+2c) + \sqrt{(1+\gamma+2c)^2 + 6(\gamma-C)(\gamma+C) + 18}\right)$$

The value of z in equilibrium is then:

$$z^* = \begin{cases} Z_T(\gamma, C) & \text{If} \gamma + C \leq Z_A \\ Z_A & \text{Otherwise} \end{cases}$$

Notice that when foreign producers actually hire in the home market, the labour demand can never be smaller than in autarchy (see again figure 6), while labour supply is not affected by the possibility of cross-border investments. Thus it is clear that, *in any equilibrium with multinational entrepreneurs* (i.e., whenever $\gamma + C < Z_A$), **(1)** labour is relatively more expensive ($Z_A \leq Z_T(\gamma, C)$) and consequently **(2)** the number of workers is larger (the number of entrepreneurs smaller) than in autarchy.

The mass of agents that become entrepreneurs is smaller in each country if, in equilibrium, some agents (the more talented) invest across borders. This, anyway, does not mean that the number of firms that sells to consumers is going to be smaller, because entrepreneurs from both countries serve them.

5.3 Goods Market

In equilibrium, total production in each country must be equal to the income of its inhabitants (either at home or abroad in the form of entrepreneurial rents), or equivalently, the income generated in each country (independently of the country of the earner) has to be equal to the total production, i.e.:

$$Y = F(z-1)\,2zw + F(z-\gamma+C)\,2zw$$

which implies that:

$$w = 2 \times [F(z-1) + F(z-\gamma+C)]$$

Thus, the wage is a linear function of the number of entrepreneurs that operate in the country. In the appendix we prove that in equilibrium the following statements are true:

$$\begin{aligned} \frac{\partial z(C)}{\partial C} &> 0 \\ \frac{\partial w(C)}{\partial C} &< 0 \\ \frac{\partial Y(C)}{\partial C} &< 0 \\ \frac{\partial [Y(C)/w(C)]}{\partial C} &> 0 \end{aligned}$$

It is not surprising that a larger learning cost determines a smaller equilibrium number of foreign entrepreneurs. Less obvious is that this will reduce wages and increase the gross profits of firms. We plot the above functions for a particular value of γ ($\gamma = 1.1$) in figure 7.[16]

A larger C reduces the wage rate because it induces some foreign producers not to engage in FDIs. This reduces the domestic labour demand and the wage rate. In turn, this will induce a positive proportion of domestic workers (the more talented among them) to become (local) entrepreneurs, thus partially offsetting the drop in labour demand. Despite this, the net effect on the wage rate is negative. So, overall, a larger C implies that, in equilibrium, firms are less

[16]Notice, however, that is is not really appropriate to make comparative statics. We need to be careful and interpret this exercise as the comparison of the steady states of two (pairs of) countries with different values of C.

efficient. The foreign producers expelled are actually very efficient: their ϕ was low enough to induce them to move in spite of the extra fixed costs associated to foreign operations. Additionally, with lower cross-the-border investments, even if the number of persons that become entrepreneur in each country increases, the number of entrepreneurs from which any individual may buy goes down. Dixit-Stiglitz love for variety implies then that less "openness" lowers efficiency. Notice that this decrease in variety is a direct consequence of the entrepreneurs being less productive (and thus requiring more workers) in an economy with high learning costs. Trade (low learning costs) is (behind the veil of ignorance) welfare improving because it improves the allocation of talent.

Moreover, in case of a larger C, the aggregate demand is lower, so that the gross profits of firms $\left(\frac{Y}{w}\right)$ could in principle move in any direction. Nevertheless, the effect of wages is undoubtedly larger, meaning that the gross profits would be larger if C were larger. Actually, also the *net* profits of the local producers (that keep being local, i.e. do not *start* engaging in FDIs) would be larger, because their fixed costs ϕ do not depend upon the learning cost, and, being wages lower, the total fixed cost ϕw goes down, thus making the increase in net profits larger than the increase in gross profits.

As to foreign producers, the effect of the would-be exercise of considering a larger C is clear. Producers engaging in FDI are already acquainted with the foreign environment and thus bear no direct effect of having a larger C. However, *to the extent that general equilibrium effects take place through the wage rate*, gross profits would be larger for them as well.

Finally, a larger C would imply that the profits of the entrepreneurs that *start* engaging in FDIs would be lower, because the negative direct effect of C on net profits more than offsets the increase in gross profits.

The four functions object of this discussion (wage rate, local entrepreneurs profits, multinational entrepreneurs profits, and profits of becoming a multinational entrepreneur) are plotted in figure 8 for the agent with $\phi = \frac{1}{2}$ (with $\gamma = 1.1$).

6 Concluding remarks

This paper has first presented evidence on the effect of countries proximity in regulation on bilateral FDI flows. 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 countries regulations tend to be associated with larger bilateral flows of FDIs, even controlling for the *level* of regulation, for countries fixed effects and for time effects, in the context of a gravity model.

Motivated by this evidence, we build a general equilibiurm model trying to explain why differences in regulations may affect bilateral FDI flows. In the

model agents are heterogeneous and differ in their abilities to be entrepreneurs or workers. Entrepreneurs *may* set up a firm abroad, i.e. engage in FDIs. If they do so they incur in two additional fixed cost, one of which is the cost of *learning* the foreign regulation, which increases in the *distance* between regulations.

In this framework, more similar regulations foster FDI and improve the allocation of talents in the economy. Wages, output and productivity go up.

The mechanism is as follows. Only the more able entrepreneurs engage in FDIs, and their fraction grows larger the "easier" it is to set up a firm abroad, i.e. the more similar the regulations. This, in turn, increases the demand for domestic labour, output and wages. As a consequence of the latter effect, the minimum ability needed to become an entrepreneur goes up. This implies that the *total* number of entrepreneurs goes down while the composition changes: a greater proportion of them engages in FDIs. Hence, more similar regulations improve the allocation of talent by deterring less talented people from becoming entrepreneurs by increasing the wages paid to workers. At the same time, even if less people opt for an entrepreneurial career, a larger amount of them serve clients abroad, implying that the variety of products that costumers may acquire increases.

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A Proofs

We now prove that the following statements are true:

$$\begin{aligned} \frac{\partial z(C)}{\partial C} &> 0 \\ \frac{\partial w(C)}{\partial C} &< 0 \\ \frac{\partial Y(C)}{\partial C} &< 0 \\ \frac{\partial \left[Y(C)/w(C)\right]}{\partial C} &> 0 \end{aligned}$$

Proof. First we prove that $\frac{\partial z(C)}{\partial C} > 0$

Recall that:

$$z(C) = \frac{(1+\gamma)+2C+\sqrt{((1+\gamma)+2C)^2 - 12\left(\frac{1}{2}(C^2-\gamma^2)-\frac{3}{2}\right)}}{6}$$

then,

$$\frac{\partial z(C)}{\partial C} = \frac{1}{3}\left(1+\frac{(1+\gamma-C)}{\sqrt{(1+\gamma+2C)^2 - 12\left(\frac{1}{2}(C^2-\gamma^2)-\frac{3}{2}\right)}}\right) > 0$$

since

$$\begin{aligned} \gamma &> 1 \\ \gamma + C &< Z_A \end{aligned}$$

which implies that $C < 1$ and $\gamma + 1 > 2$, therefore $\gamma + 1 - C > 0$. ■

Proof. Next, we prove that $\frac{\partial w(C)}{\partial C} < 0$, where

$$w = 4z - 2(\gamma + C + 1)$$

hence,

$$\begin{aligned} \frac{\partial w(C)}{\partial C} &= 4\frac{\partial z(C)}{\partial C} - 2 \\ &= \frac{4}{3}\left(\frac{(1+\gamma-C)}{\sqrt{(1+\gamma+2C)^2 - 12\left(\frac{1}{2}(C^2-\gamma^2)-\frac{3}{2}\right)}} - \frac{1}{2}\right) \end{aligned} \tag{9}$$

Which is negative if

$$\begin{aligned} (1+\gamma-C) &< \frac{1}{2}\sqrt{(1+\gamma+2C)^2 - 12\left(\frac{1}{2}(C^2-\gamma^2)-\frac{3}{2}\right)} \\ (1+\gamma)^2 &< 2\left(\gamma^2 - C^2\right) + 6 + \frac{4}{3}(1+\gamma)C \end{aligned} \tag{10}$$

Which is true since $(1+\gamma)^2$ must be smaller than $(1+Z_A)^2 = 5.6997$ and the right hand side is larger than 6. ■

Proof. Next, we prove that $\frac{\partial Y(C)}{\partial C} = \frac{\partial z(C) w(C)^2}{\partial C} < 0$.

$$\begin{aligned}\frac{\partial Y(C)}{\partial C} &= \frac{\partial z(C)}{\partial C} w^2 + 2zw \frac{\partial w(C)}{\partial C} \\ &= w\left(4z \frac{(1+\gamma-C)}{\sqrt{(1+\gamma+2C)^2 - 12\left(\frac{1}{2}(C^2-\gamma^2)-\frac{3}{2}\right)}} - \frac{\partial z(C)}{\partial C} 2(\gamma+C+1)\right)\end{aligned}$$

recalling that

$$z = \frac{(1+\gamma)+2C+\sqrt{((1+\gamma)+2C)^2 - 12\left(\frac{1}{2}(C^2-\gamma^2)-\frac{3}{2}\right)}}{6}$$

then,

$$\begin{aligned}\frac{\partial Y(C)}{\partial C} &= w2\frac{(1+\gamma)+2C+\sqrt{((1+\gamma)+2C)^2 - 12\left(\frac{1}{2}(C^2-\gamma^2)-\frac{3}{2}\right)}}{3\sqrt{(1+\gamma+2C)^2 - 12\left(\frac{1}{2}(C^2-\gamma^2)-\frac{3}{2}\right)}}(1+\gamma-C) - \\ &\quad -w\frac{\partial z(C)}{\partial C} 2(\gamma+C+1) \\ &= w\frac{2\left((1+\gamma)^2 - C^2\right) + 2C(1+\gamma-C)}{3\sqrt{(1+\gamma+2C)^2 - 12\left(\frac{1}{2}(C^2-\gamma^2)-\frac{3}{2}\right)}} + w\frac{2(1+\gamma-C)}{3} - \\ &\quad -w\frac{\partial z(C)}{\partial C} 2(\gamma+C+1)\end{aligned}$$

and using again

$$\frac{\partial z(C)}{\partial C} = \frac{1}{3}\left(1 + \frac{(1+\gamma-C)}{\sqrt{(1+\gamma+2C)^2 - 12\left(\frac{1}{2}(C^2-\gamma^2)-\frac{3}{2}\right)}}\right)$$

we get that:

$$\begin{aligned}\frac{\partial Y(C)}{\partial C} &= w\frac{2\left((1+\gamma)^2 - C^2\right) + 2C(1+\gamma-C)}{3\sqrt{(1+\gamma+2C)^2 - 12\left(\frac{1}{2}(C^2-\gamma^2)-\frac{3}{2}\right)}} + w\frac{2(1+\gamma-C)}{3} \\ &\quad -\frac{w}{3}\left(1 + \frac{(1+\gamma-C)}{\sqrt{(1+\gamma+2C)^2 - 12\left(\frac{1}{2}(C^2-\gamma^2)-\frac{3}{2}\right)}}\right) 2(\gamma+C+1) \\ &= w\frac{2}{3}C\left(\frac{(1+\gamma-C)}{\sqrt{(1+\gamma+2C)^2 - 12\left(\frac{1}{2}(C^2-\gamma^2)-\frac{3}{2}\right)}} - 2\right) < 0\end{aligned}$$

the above expression is negative since, as shown above:

$$\frac{(1+\gamma-C)}{\sqrt{(1+\gamma+2C)^2 - 12\left(\frac{1}{2}(C^2-\gamma^2)-\frac{3}{2}\right)}} < \frac{1}{2}$$

■

Proof. Finally, we prove that $\frac{\partial[Y(C)/w(C)]}{\partial C} = \frac{\partial(z(C)w(C))}{\partial C} > 0$

$$\begin{aligned}\frac{\partial\left(z\left(C\right)w\left(C\right)\right)}{\partial C} &= \frac{\partial z\left(C\right)}{\partial C}w + \frac{\partial w\left(C\right)}{\partial C}z \\ &= 2z\left(\frac{1}{3} + \frac{4}{3}\frac{\left(1+\gamma-C\right)}{\sqrt{\left(1+\gamma+2C\right)^2 - 12\left(\frac{1}{2}\left(C^2-\gamma^2\right)-\frac{3}{2}\right)}}\right) - \\ &\quad -\frac{2}{3}\left(1 + \frac{\left(1+\gamma-C\right)}{\sqrt{\left(1+\gamma+2C\right)^2 - 12\left(\frac{1}{2}\left(C^2-\gamma^2\right)-\frac{3}{2}\right)}}\right)\left(\gamma+C+1\right)\end{aligned}$$

where being:

$$z = \frac{\left(1+\gamma\right)+2C+\sqrt{\left(\left(1+\gamma\right)+2C\right)^2 - 12\left(\frac{1}{2}\left(C^2-\gamma^2\right)-\frac{3}{2}\right)}}{6}$$

we get that

$$\begin{aligned}\frac{\partial\left(z\left(C\right)w\left(C\right)\right)}{\partial C} &= 4\frac{\left(1+\gamma\right)+2C+\sqrt{\left(\left(1+\gamma\right)+2C\right)^2 - 12\left(\frac{1}{2}\left(C^2-\gamma^2\right)-\frac{3}{2}\right)}}{9\sqrt{\left(1+\gamma+2C\right)^2 - 12\left(\frac{1}{2}\left(C^2-\gamma^2\right)-\frac{3}{2}\right)}}\left(1+\gamma-C\right) \\ &\quad +\frac{2}{3}z - \frac{2}{3}\left(1 + \frac{\left(1+\gamma-C\right)}{\sqrt{\left(1+\gamma+2C\right)^2 - 12\left(\frac{1}{2}\left(C^2-\gamma^2\right)-\frac{3}{2}\right)}}\right)\left(\gamma+C+1\right)\end{aligned}$$

hence,

$$\begin{aligned}&\frac{\partial\left(z\left(C\right)w\left(C\right)\right)}{\partial C} = \frac{1}{9}3C + \frac{1}{9}\left(\left(1+\gamma\right)-C\right)\times \\ &\times\left[\frac{\sqrt{\left(\left(1+\gamma\right)+2C\right)^2 + 12\left(\frac{1}{2}\left(\gamma^2-C^2\right)+\frac{3}{2}\right)}}{\left(1+\gamma\right)-C} - \left(1 + \frac{2\left(1+\gamma-C\right)}{\sqrt{\left(1+\gamma+2C\right)^2 - 12\left(\frac{1}{2}\left(C^2-\gamma^2\right)-\frac{3}{2}\right)}}\right)\right]\end{aligned}$$

the above is negative since the expression in square brackets

$$\frac{\sqrt{\left(\left(1+\gamma\right)+2C\right)^2 + 12\left(\frac{1}{2}\left(\gamma^2-C^2\right)+\frac{3}{2}\right)}}{\left(1+\gamma\right)-C} - \left(1 + \frac{2\left(1+\gamma-C\right)}{\sqrt{\left(1+\gamma+2C\right)^2 - 12\left(\frac{1}{2}\left(C^2-\gamma^2\right)-\frac{3}{2}\right)}}\right) > 0$$

may be rewritten as follows

$$\frac{1}{l} - \left(1+2l\right)$$

and it is clearly positive if $l = \frac{2(1+\gamma-C)}{\sqrt{(1+\gamma+2C)^2 - 12\left(\frac{1}{2}(C^2-\gamma^2)-\frac{3}{2}\right)}} < \frac{1}{2}$, which holds true by (10). ■

B Figures and Tables

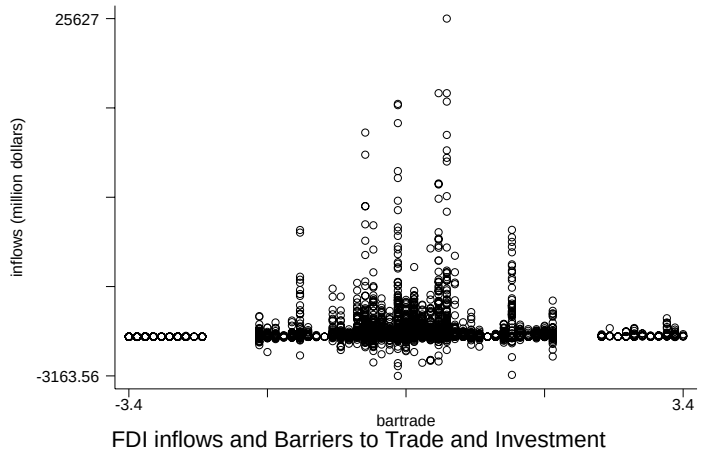

Figure 1: Difference between country i and country j *Barriers to international trade and investment* against the flow of FDI from country j to country i (1980-1997).

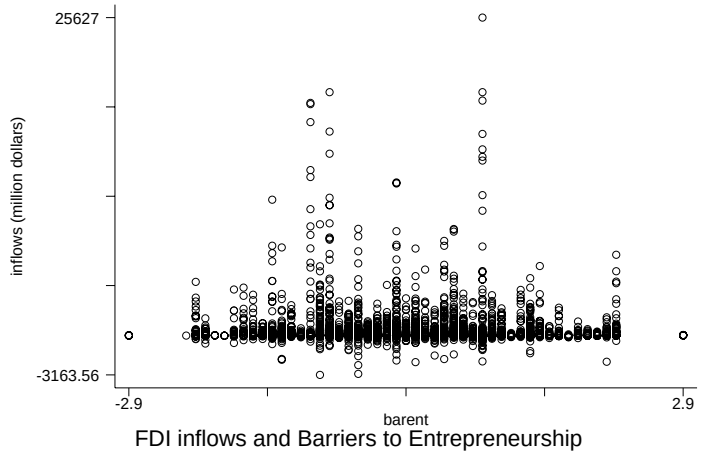

Figure 2: Difference between country i and country j *Barriers to entrepreneurship* against the flow of FDI from country j to country i (1980-1997).

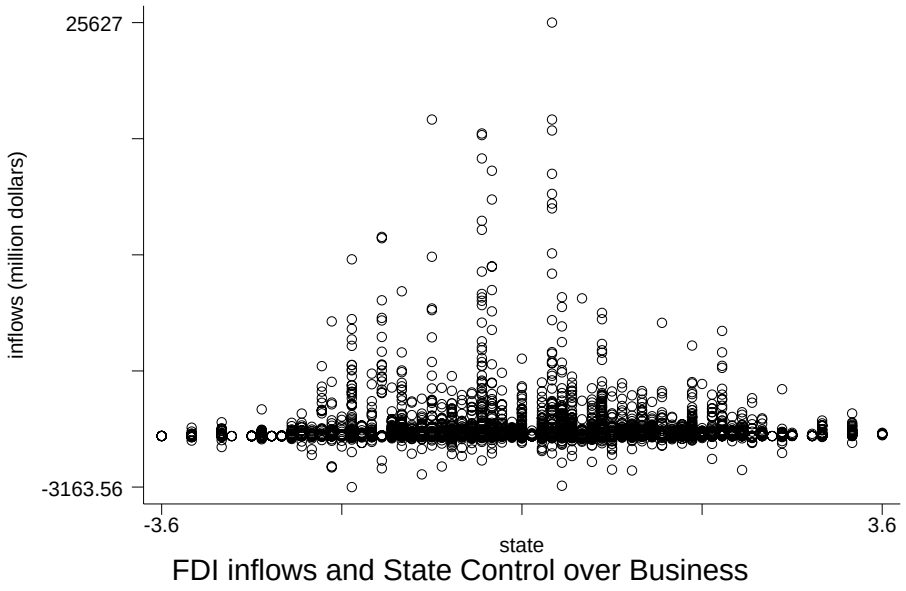

Figure 3: Difference between country i and country j *state control over business enterprises* against the the flow of FDI from country j to country i (1980-1997).

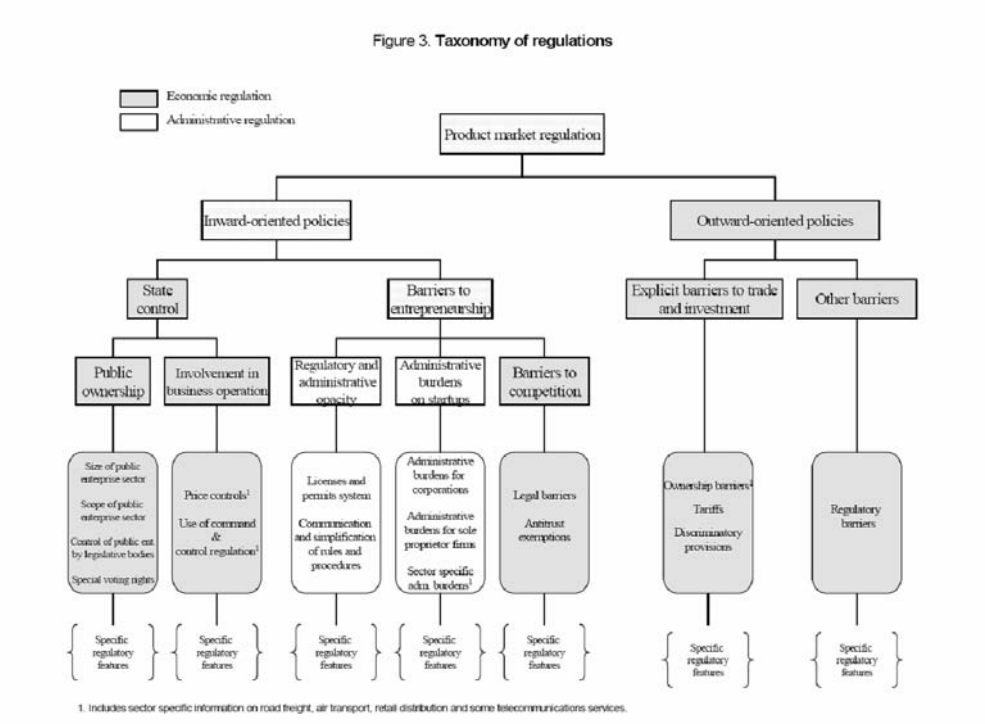

Figure 4: The OECD Product Market Regulation indicators. From Nicoletti et al. (2000)

Table 1: Correlations between the OECD Regulation Subindexes

	PMR	State	B. Ent.	B. T&I	Ec. reg.	Ad. reg.	Inw.	Outw.
PMR	1							
State Control	0.86	1						
Bar. Entrep.	0.54	0.42	1					
Bar. T&I	0.76	0.45	0.03	1				
Econ. reg.	0.84	0.98	0.47	0.4	1			
Admin. reg.	0.49	0.36	0.97	0.01	0.38	1		
Inward reg.	0.85	0.89	0.79	0.37	0.90	0.73	1	
Outward reg.	0.82	0.52	0.1	0.99	0.47	0.08	0.40	1

Table 2: Variables of the World Bank dataset *Doing Business 2004*

Starting a Business	Number of procedures
	Average time spent during each procedure (in calendar days)
	Official cost of each procedure (% of income per capita)
	Paid-in minimum capital (as a percentage of income per capita)
Hiring and Firing	Difficulty of hiring index
	Rigidity of hours index
	Difficulty of firing index
	Rigidity of employment (average of the three above)
	Firing costs (number of weeks)
Registering Property	Number of procedures
	Number of days
	Official cost (% of property value per capita)
Getting Credit	Cost to create and register collateral (% of income per capita)
	Index of legal rights of borrowers and lenders
	Index of credit information availability
	Coverage of public registry (borrowers per 1000 capita)
	Coverage of private registry (borrowers per 1000 capita)
Protecting Investors	Disclosure of ownership and financial information index
Enforcing Contracts	Number of procedures
	Number of days
	Official cost (% of the debt value)
Closing a Business	Number of years
	Official cost (% of estate)
	Recovery rate (cents on the dollar)

Table 3: **Countries**

Australia
Austria
Belgium-Luxembourg
Canada
Denmark
Finland
France
Germany
Greece
Hungary
Ireland
Italy
Japan
Mexico
Netherlands
New Zealand
Norway
Poland
Portugal
Spain
Sweden
Switzerland
Turkey
United Kingdom
United States

Table 4: **OECD Regulation variables.**

Dependent variable: FDI Inflows as a share of the host country GDP.

Regulation Variables	Panel A:	Panel B:	Panel C:	Panel D:	Panel E:	Panel F:	Panel G:	Panel H:	Panel I:
Overall PMR	-.0001426								
	(.0000994)								
Barriers to Trade and Investment		-.0004267							
		(.000074)**							
Barriers to Entrepreneurship			-.0001616						
			(.0000706)*						
State control				-.0001417					
				(.0000546)**					
Economic Regulation					-.0002251				
					(.0000665)**				
Administrative Regulation						-.0001246			
						(.0000563)*			
Overall outward-oriented regulation							-.0003944		
							(.0000828)**		
Overall inward-oriented regulation								-.0001419	
								(.0000707)*	
Employment Protection Legislation†									-.0001798
									(.0000492)**
Observations	3905	3905	3905	3905	3905	3905	3905	3905	3722

Notes: Regulation variables in absolute value of the difference between source and host country. Each panel controls for the source country regulation *level*, choosing the OECD regulation variable with the lowest correlation with the one taken in differences. The *host* country regulation level is accounted for by countries fixed-effects. All specifications include the following set of control variables: Countries fixed-effects, host and source country GDP and population, a time trend, distance between main cities, latitude and longitude of the host country; common language dummy, EU dummy, NAFTA dummy, common land borders dummy, both in Asia Pacific dummy, both in North America dummy. Standard errors in parenthesis. * significant at 5%; ** significant at 1%.

†Time varying: changes in 1990 and 1998.

Table 5: **World Bank Regulation variables: *Starting a Business* and *Hiring and Firing***

Dependent variable: FDI Inflows as a share of the host country GDP.

Regulation Variables	Panel A:	Panel B:	Panel C:	Panel D:	Panel E:	Panel F:	Panel G:	Panel H:	Panel I:
Starting a Business									
N. of procedures	-.0000242								
	(.0000164)								
Number of days		-7.96e-06							
		(1.84e-06)**							
Cost (% of income per capita)			-.0000113						
			(5.21e-06)*						
Minimum capital (% of income per capita)				1.42e-06					
				(1.21e-06)					
Hiring and Firing									
Difficulty of hiring					-3.49e-06				
					(1.71e-06)*				
Rigidity of hours						-6.80e-06			
						(1.98e-06)**			
Difficulty of firing							-9.56e-06		
							(2.21e-06)**		
Rigidity of employment								-6.87e-06	
								(2.27e-06)**	
Firing costs (number of weeks)									-3.63e-06
									(1.54e-06)*
Observations	3905	3905	3905	3905	3905	3905	3905	3905	3905

Notes: Regulation variables in absolute value of the difference between source and host country. Each panel controls for the source country regulation *level*, using the OECD Overall Product Market Regulation index. The *host* country regulation level is accounted for by countries fixed-effects. All specifications include the following set of control variables: Countries fixed-effects, host and source country GDP and population, a time trend, distance between main cities, latitude and longitude of the host country; common language dummy, EU dummy, NAFTA dummy, common land borders dummy, both in Asia Pacific dummy, both in North America dummy. Standard errors in parenthesis. * significant at 5%; ** significant at 1%.

Table 6: **World Bank Regulation variables: *Registering Property* and *Getting Credit***

Dependent variable: FDI Inflows as a share of the host country GDP.

Regulation Variables	Panel A:	Panel B:	Panel C:	Panel D:	Panel E:	Panel F:	Panel G:	Panel H:
Registering Property								
N. of procedures	-.000016							
	(.0000172)							
Number of days		4.14e-07						
		(7.88e-07)						
Cost (% of property value per capita)			-8.30e-07					
			(.0000132)					
Getting Credit								
cost to create collateral (%of income per capita)				-5.33e-06				
				(5.56e-06)				
Legal rights index					-.0000619			
					(.000021)**			
Credit information index						-4.35e-06		
						(.0000424)		
Public registry coverage							-4.22e-07	
							(2.40e-07)	
Private bureau coverage								-1.83e-07
								(1.05e-07)
Observations	3905	3905	3905	3905	3905	3905	3905	3905

Notes: Regulation variables in absolute value of the difference between source and host country. Each panel controls for the source country regulation *level*, using the OECD Product Market Regulation index. The *host* country regulation level is accounted for by countries fixed-effects. All specifications include the following set of control variables: Countries fixed-effects, host and source country GDP and population, a time trend, distance between main cities, latitude and longitude of the host country; common language dummy, EU dummy, NAFTA dummy, common land borders dummy, both in Asia Pacific dummy, both in North America dummy Standard errors in parenthesis. * significant at 5%; ** significant at 1%.

Table 7: **World Bank Regulation variables: *Protecting Investors*, *Enforcing Contracts* and *Closing a Business*.**

Dependent variable: FDI Inflows as a share of the host country GDP.

Regulation Variables	Panel A:	Panel B:	Panel C:	Panel D:	Panel E:	Panel F:	Panel G:
Protecting Investors							
Disclosure index	-.0000405						
	(.0000434)						
Enforcing Contracts							
N. of procedures		-.0000244					
		(8.77e-06)**					
Number of days			-3.79e-07				
			(1.47e-07)**				
Cost (% of debt)				1.08e-06			
				(9.78e-06)			
Closing a Business							
Number of years					.0001303		
					(.0000445)**		
Cost (% of estate)						-4.75e-06	
						(8.96e-06)	
Recovery Rate (cents on the dollar)							5.62e-06
							(2.37e-06)*
Observations	3905	3905	3905	3905	3905	3905	3905

Notes: Regulation variables in absolute value of the difference between source and host country. Each panel controls for the source country regulation *level*, using the OECD Product Market Regulation index. The *host* country regulation level is accounted for by countries fixed-effects. All specifications include the following set of control variables: Countries fixed-effects, host and source country GDP and population, a time trend, distance between main cities, latitude and longitude of the host country; common language dummy, EU dummy, NAFTA dummy, common land borders dummy, both in Asia Pacific dummy, both in North America dummy. Standard errors in parenthesis. * significant at 5%; ** significant at 1%.

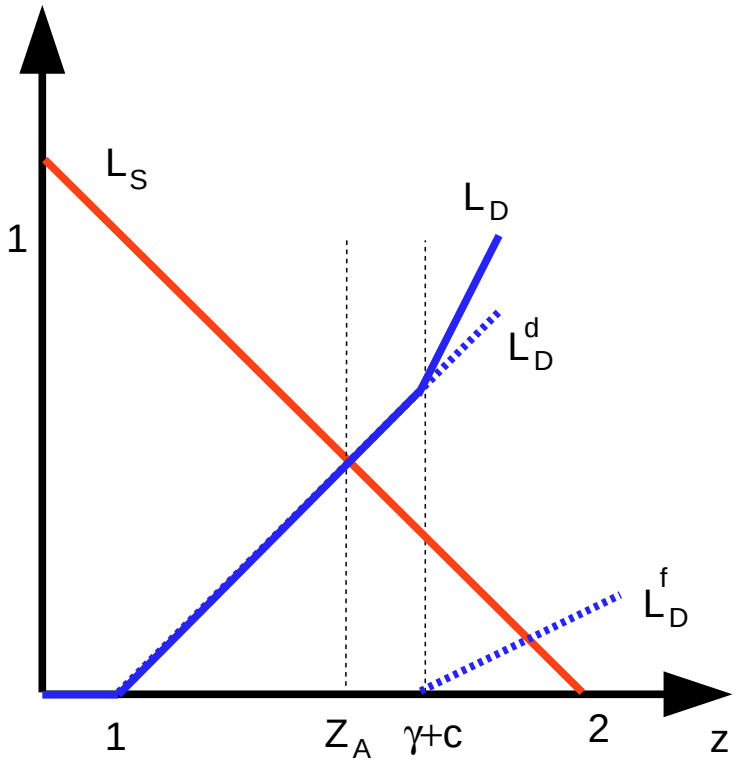

Figure 5: Fixed costs are large ($\gamma + C > Z_A$)

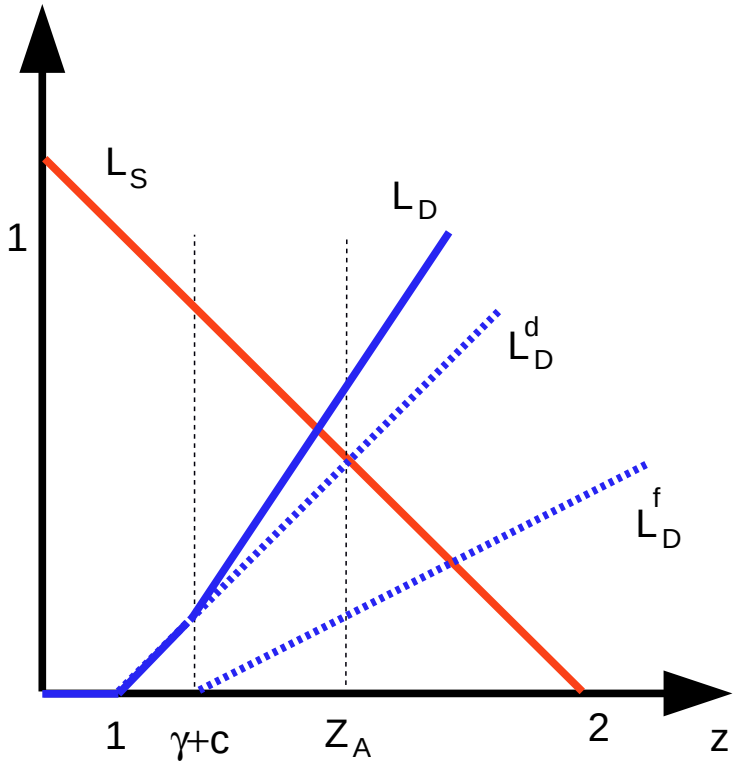

Figure 6: Fixed costs are small ($\gamma + C < Z_A$)

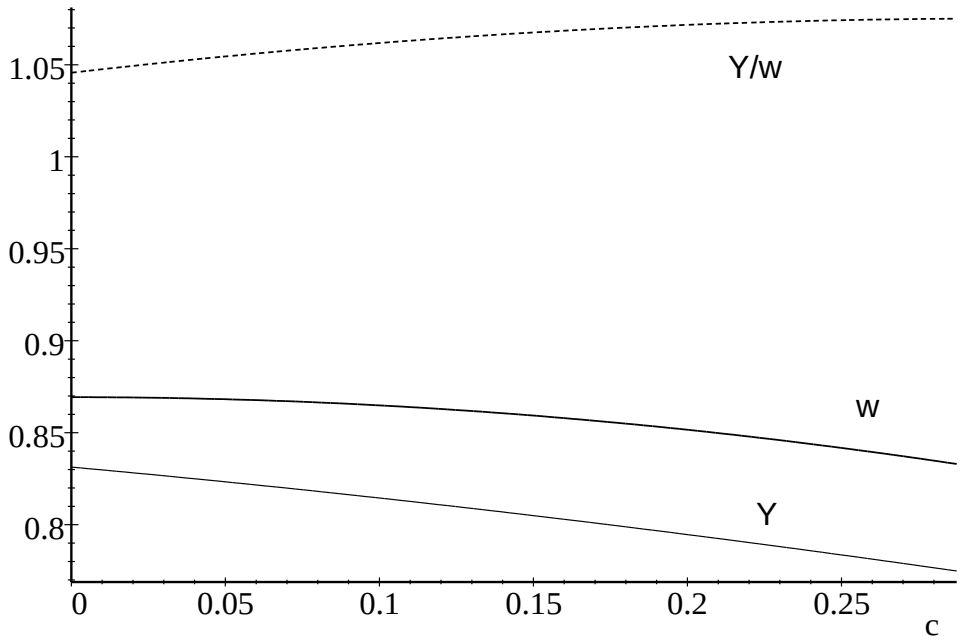

Figure 7: $\gamma = 1.1$. Gross profits, wages and output

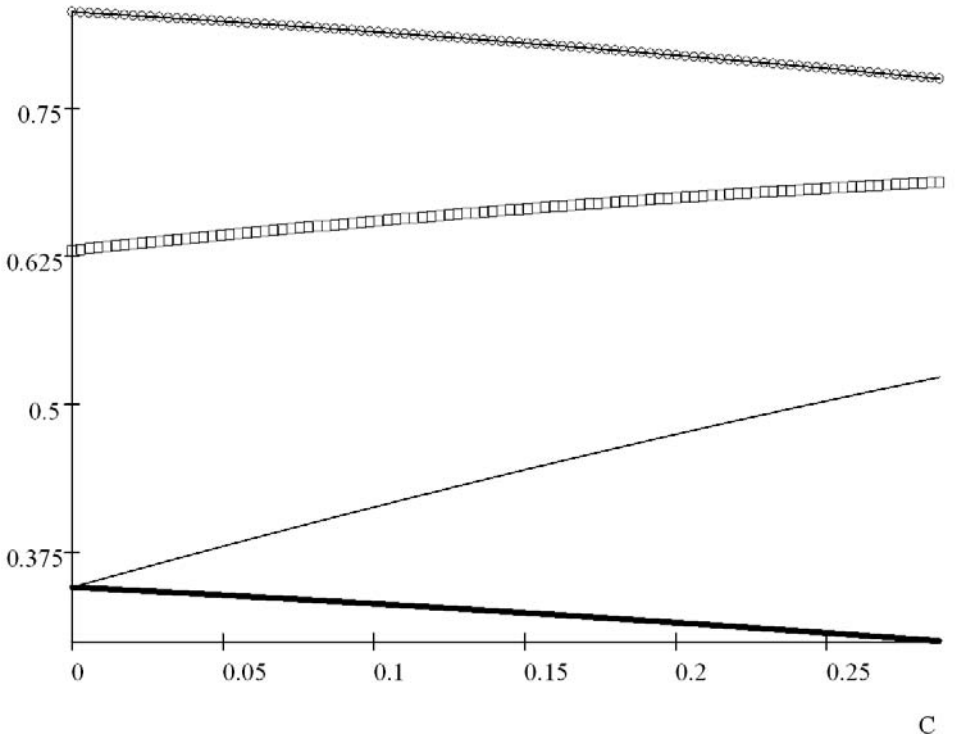

Figure 8: $\phi = \frac{1}{2}, \gamma = 1.1$. Dotted line: wage rate. Diamond line: local entrepreneurs profits. Solid line: multinational entrepreneurs profits. Thick solid line: profits of becoming a multinational entrepreneur.