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

Giovanni Pica (Università di Salerno and CSEF)
José V. Rodriguez Mora (University of Edinburgh)

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Summary *(1/3)*

Summary *(2/3)*

- Plant profits and Labor Demand
  - Discussion: Productivity and Size
- Globalization Defined
- Closed Economy Equilibrium
- The Open Economy
- Career-path decisions
  - Three possible career choices
  - Oportunity Costs
  - Decisions
  - Distribution of Firm Sizes
- Equilibrium and Career Paths
  - Equilibrium
  - Thresholds
  - 3 Types of agents
- Effects on GDP and Wages
- Effects on Domestic and Foreign Profits
  - 2 effects on profits

Summary *(3/3)*

What we do? What we find?

- To analyze the distributional effects of globalization

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  - U-shaped effect on the income distribution
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- Consistent with evidence (Autor et al., 2005; Autor et al., 2006 and Machin and Van Reenen, 2007)
  - Since 1990's (U.K. and the U.S.) inequality went
    - UP in the upper tail of the distribution
    - DECREASED in the lower tail.

- Dramatic Growth, far outpacing trade and income. 1985-99:
  - GDP growth of 2.5 %
  - World-wide exports by 5.6 percent
  - World-wide real inflows of FDI increased by 17.7 percent.

- Mostly between developed countries
  - Similar in endowments and relative supply of inputs.

- We provide empirical evidence documenting that bilateral FDIs are also higher if countries have more similar *economic environments*

Sketch of Model *(1/2)*

- Two dimensions of entrepreneurialability:
  - managerial talent
  - knowledge of the local economic environment

- Both dimensions determine career path:
  - Worker
  - Local Entrepreneur
  - Entrepreneur with foreign plant

- know more about domestic environment than about the foreign.
  - Can LEARN, but takes time.
  - Talent itself maybe not enough.
  - If abroad very different that at home.

- This *distance* between entrepreneurial environments is the only explicit barrier to capital movements that matters in the model.

Sketch of Model *(2/2)*

- FDI, TFP, GDP, wages depend on how efficiently talents are allocated.
- which depends on how hard it is to learn about the foreign environment
- lower distance between environments reduces the learning cost and raises the inflow of foreign-owned firms into the domestic market
  - increases wage and makes the entrepreneurial activity less profitable
  - driving a fraction of low-ability domestic entrepreneurs out of the market.
  - general equilibrium effect improves the allocation of talents and increases both TFP and GDP
  - consistent with evidence of a positive relationship between FDI and both wages and productivity
- larger distance protects low-ability entrepreneurs from foreign competitors and reduces output, wages and TFP.

Example

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  - **Globalized Universe**
    - Identical environments.
    - The most talented individuals become entrepreneurs
    - Critical level of talent makes marginal individual indifferent between being an entrepreneur or a worker
    - Individual whose entrepreneurial talent lies just below that critical level would choose to be an entrepreneur only if wages were lower (more Π, less w)

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  - **National Universe**.
    - environments are very different
    - FDI are *de facto* ruled out
    - wages are lower

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    - *Globalized Universe*, she (slightly) prefers to be a worker
    - *National Universe* (lower w), chooses to become entrepreneur.
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  - **Ms. McCapitalist**
    - large degree of entrepreneurial talent
    - National Universe: domestic entrepreneur
    - Globalized Universe: entrep home and abroad
      - ... pays more w, but larger market.

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- Value of the big asset is large if you are local entrepreneur.

- Value of the second asset is small if you are not very talented.

- The big losers are those
  - who **obtained a high return on the destroyed asset**.
  - and get **little return on the second**.

Related Lit.

- Melitz (2003), difference heterogeneity is cast at the firm level: consumers are homogeneous and there is no endogenous sorting of agents into jobs.

- Heckscher-Ohlin context. 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.

- Recent working paper Helpman et al. (2009) also study the distributional consequences of international trade in a model with heterogeneous firms and workers in which labor markets are imperfect.

  Difference between our approach and their model is that we allow for endogenous career choices and learning of the foreign environment.

  In our context the welfare effects of globalization are U-Shaped.

  The individuals at the low-end of the income distribution improve their position because the demand for their labor services is larger when foreign firms have access to the local market.

- literature that studies the driving factors of FDI.Among others Horst (1972), Deardorff, (1998), Ekholm (1998), Lipsey (2001), Razin et al. (2003), Shatz (2003), Fumagalli (2003).

What is the entrepreneurial environment?

- Set of (demand and supply) factors entrepreneurs 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, health and safety rules, setup of the production process. . .

"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)

Cross-country differences and FDI *(1/2)*

- Which factors drive FDI?
  - Institutional, technological and market factors affect firms' decision to set up production facilities in a foreign market.
  - Larger cross-country factor cost differentials are typically associated to larger FDI flows.
    - We do not talk about this.
  - **Smaller cross-country differences positively affect FDI flows**:
    - Smaller physical distance,
    - sharing a common language,
    - sharing a border, etc. . .
- In the model **Entrepreneurial Environments** are different.
- Smaller differences between **EE** make it easier for domestic entrepreneurs to set up firms abroad.
- **Regulation**, along its several dimensions, is one key determinant of the entrepreneurial environment.
- Exploit two datasets (OECD and World Bank) providing country-level indexes of **Product Market Regulations**.

Cross-country differences and FDI *(2/2)*

- We exploit (panel of) measures of Product Market Regulation in each country.
- Additionally, we also interpret the difference between languages as a qualitative proxy of the distance between economic environments.
- We match these data with data on bilateral FDI stocks. Using both
  - A traditional log gravity model
  - and a Poisson Pseudo-Maximum-Likelihood model,
- we find that
  - **controlling for**
    - the *levels* of regulation,
    - GDPs and populations in both countries,
    - host and source countries fixed effects,
    - time effects,
    - and a set of geographical variables,
- **a higher distance between economic environments affects negatively the size of bilateral FDI.**

Data Description

- Economic Data
  - FDI: *OECD International Direct Investment Statistics* (1980-1997)
  - GDP: *OECD Main Economic Indicators*
  - Population: *Penn World Tables*
  - Geographic variables: Frankel, Stein and Wei (1995); Frankel and Wei (1998)
- OECD Regulation indexes (Nicoletti et al. (2000))
  - Product Market Regulation; Employment Protection Legislation
  - Barriers to international trade and investment, Barriers to entrepreneurship, State control over business enterprises
  - Administrative regulations, Economic regulation, Inward-oriented regulation and Outward-oriented regulation
- World Bank 'Doing Business 2004'
  - Starting a Business, Hiring and Firing, Registering Property, Getting Credit, Protecting Investors, Enforcing Contracts, and Closing a Business

Empirical Model

- Gravity model:

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

- Variables:
  - $\ln F_{ijt}$ 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 GDPs per capita (in US dollars); the (log of the) source and host countries populations; 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; 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). Latitude and longitude, as well as any other time-invariant characteristics of the host and source countries, are captured by the fixed effects. 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 the source country. As this measure varies over time, it allows to control for the level of regulation even if both host and source country fixed effects are included.

Empirical Results

- Beta Estimates. Coefficients from a regression where all variables have been standardized so has to have unit standard deviation.
  - Coefficients of variables measured in different units are comparable.

- **Tables**

- **Graphical Results**

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

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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

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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.

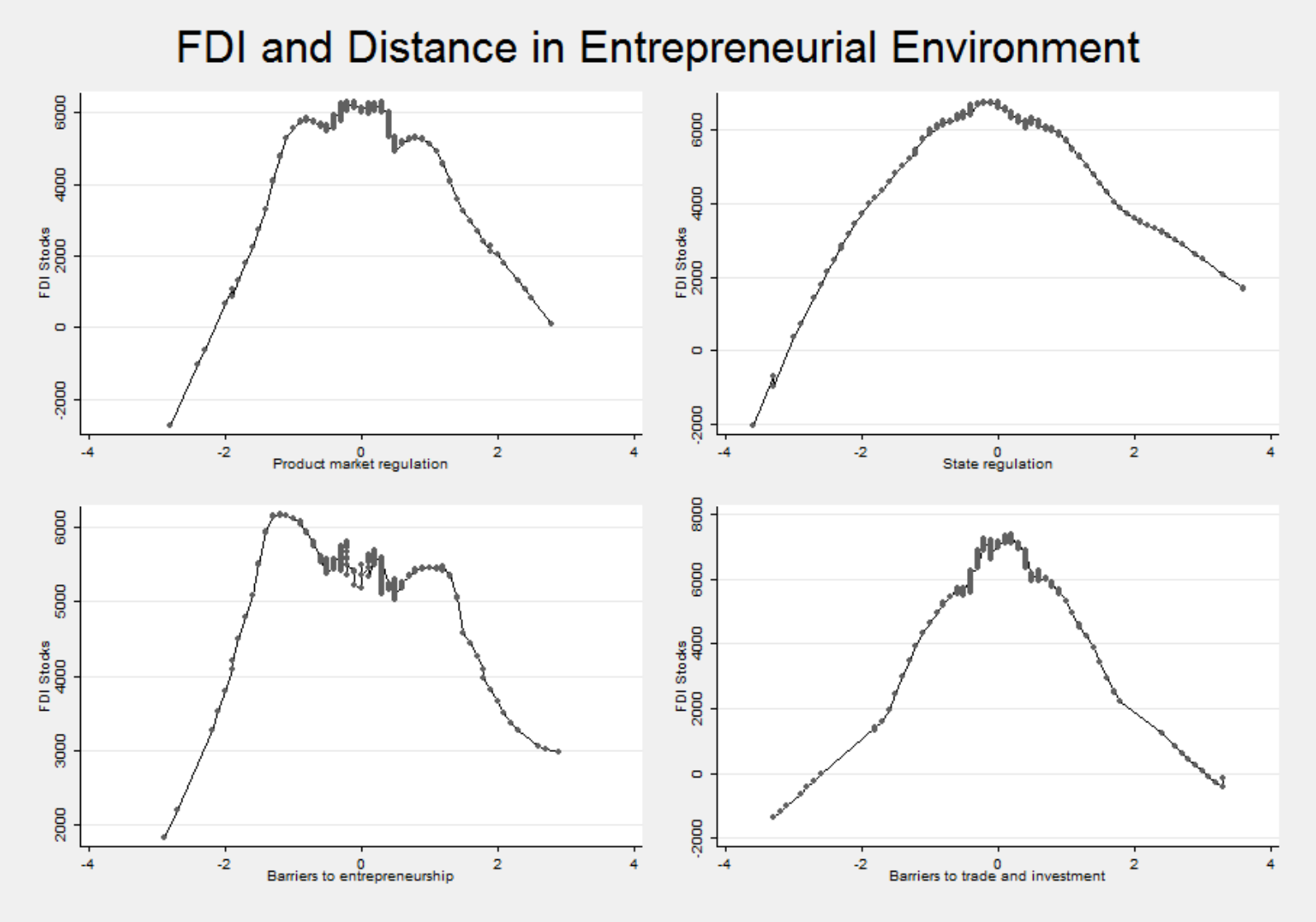
Table 11: **World Bank variables: PPML model**

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.

Graphical Results



Demand and Production *(1/2)*

- Two political entities (countries).
- Unit mass of agents in each country.
- Dixit-Stiglitz preferences on products sold in the country.
- The demand for good j is: $x_j = Y p_j^{-2}$
- All goods are consumed in the country where they are produced.
- Exogenous i.i.d. probability of dying $(1 - \beta)$ and the same birth rate in order to keep a constant population.
  - Discount factor equals the probability of survival, β.

Demand and Production *(2/2)*

- Production:
  - $x_j = 4\rho L$
    - ρ is stochastic
    - **Heterogeneous agents**: different stochastic distribution of ρ.
  - Gross profits: $E(\pi) = 2E^i\left(\rho^{\frac{1}{2}}\right)Y^{\frac{1}{2}}(L^i)^{\frac{1}{2}} - wL^i$.

- Profits and labor demand are respectively:

$$\begin{aligned} L^i &= \left[E^i\left(\rho^{\frac{1}{2}}\right)\right]^2 \frac{Y}{w^2} \\ E^i[\pi] &= \left[E^i\left(\rho^{\frac{1}{2}}\right)\right]^2 \frac{Y}{w} \end{aligned}$$

Talent heterogeneity and information *(1/2)*

- Each period t, agents need to take two actions, v_1 and v_2.
  - In each case the "right action" is a number: $r_t \in \mathbb{R}$; $\mu_t \in \mathbb{R}$
  - r_t and μ_t are (independent) random variables.

- 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:

$$\rho = e^{-(r_t - v_1)^2} e^{-(\mu_t - v_2)^2}$$

and therefore

$$E\left(\rho^{\frac{1}{2}}\right) = E\left(e^{-\frac{1}{2}(r_t - v_1)^2}\right) \times E\left(e^{-\frac{1}{2}(\mu_t - v_2)^2}\right)$$

Talent heterogeneity and information *(2/2)*


- Managerial talent produces more accurate guesses on r_t,
- Knowledge of the local environment improves predictions on μ_t.


Talent

- All producers know that r_t
  - is a normally distributed,
  - with independent draws over time,
  - that has a certain known mean (whose value is irrelevant)
  - and **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.
  - More able
    - More precise signals
    - Fewer mistakes.

$$E\left(e^{-\frac{1}{2}(r_t - v_1)^2}\right) = \sqrt{\frac{P_{v_1}}{1 + P_{v_1}}}$$

- **First type of Heterogeneity**:
  - Signals on r_t with different levels of precision.

Local Knowledge *(1/3)*

- Agents do not receive signals on the value of μ_t.
  - They **know** that evolves according to the following process:

$$\mu_t = \mu + u_t$$

  - μ is a *country-specific* constant
  - u_t is an individual-specific white noise disturbance with zero mean
    - Variance equal to σ_u^2

- Domestic and foreign producers differ in their knowledge on μ
  - In their ability to guess any specific μ_t.

Local Knowledge *(2/3)*

$$\mu_t = \mu + u_t$$

- **Local** producers **know** μ.
  - residual uncertainty implied by u_t.

- **Foreigners** the first time they produce in the foreign country they have a **prior** on the value of μ with a certain **precision** P_0/σ_u^2
  - Whenever they produce, observe an additional realization of μ_t,
    - Acquiring further information on the value of μ.
  - Precision on μ grows linearly with time of exposure
    - After having observed $t-1$ realizations:

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

Local Knowledge *(3/3)*

- Foreign entrepreneur faces a **more difficult problem** than a domestic one.

- P_0 reflects the **distance between entrepreneurial environments** across the two countries.

- Foreign entrepreneurs become better as they keep spending time in the local market.
  - Eventually, learn everything and are identical to local entrepreneurs.

Plant profits and Labor Demand *(1/2)*

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

$$a = \frac{P_{v_1}}{1 + P_{v_1}},$$

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

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

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

- wlog assume that $\sigma_u^2 = 1$.

Plant profits and Labor Demand *(2/2)*

- Agent with talent a who sets up a firm in his **own country**:

$$\begin{aligned} E\left(\rho^{\frac{1}{2}}\right) &= a \\ E[\Pi(a)] &= \frac{a}{2}\frac{Y}{w} \\ L(a) &= \frac{a}{2}\frac{Y}{w^2} \end{aligned}$$

- Agent with talent a has been running a firm abroad for $t-1$ periods. In the **foreign subsidiary**:

$$\begin{aligned} E\left(\rho^{\frac{1}{2}}\right) &= a \times b(t) \\ E[\Pi_f(ab(t))] &= \frac{a}{2}b(t)\frac{Y}{w} - w \\ L_f(ab(t)) &= \frac{a}{2}b(t)\frac{Y}{w^2} \end{aligned}$$

Discussion: Productivity and Size

- Obviously...

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  More productive plants earn higher profits and are larger than less productive ones...


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  ... irrespectively if they are local or foreign own


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  - Entrepreneurs' **talent**


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Discussion: Productivity and Size

- Obviously...

  More productive plants earn higher profits and are larger than less productive ones...

  ... irrespectively if they are local or foreign own

- Productivity determined by:
  - Entrepreneurs' **talent**
  - Entrepreneurs' **nationality**
  - Entrepreneurs' **experience** (if foreigner)

Globalization Defined

- define the **degree of globalization as the weighted average of the disadvantage of being a foreigner**

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

  - c measures degree of globalization: inverse of distance.
  - Comparative statics: effects of an exogenous increase of c.

Closed Economy Equilibrium *(1/3)*

- Given w, agents choose to become entrepreneurs iff:

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

- x: threshold level of talent that induces an agent to become entrepreneur.
  - Increases with wage
  - Decreases with aggregate income
  - higher wage makes option of being a worker more appealing and
  - higher wages and lower GDP makes being an entrepreneur less appealing.

- Labor market equilibrium as a function of x, and not of Y and w separately:
  - Labor demand (**??**) depends only on x (and a).
  - Labor supply is also determined by x only.

- Effectively x is akin to a price that reflects how hard it is to be an entrepreneur, as a higher level of x means that the labor input becomes more expensive (relative to GDP).

- Thus, x clears the labor market and determines the agents' career paths.

Closed Economy Equilibrium *(2/3)*

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

$$\begin{aligned} L_S(x) &= F(x) \\ L_D(x) &= \int_x^1 \frac{a}{x} dF(a) \end{aligned}$$

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

- Let X^A be the unique solution of

$$L_S(x) = L_D(x)$$

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

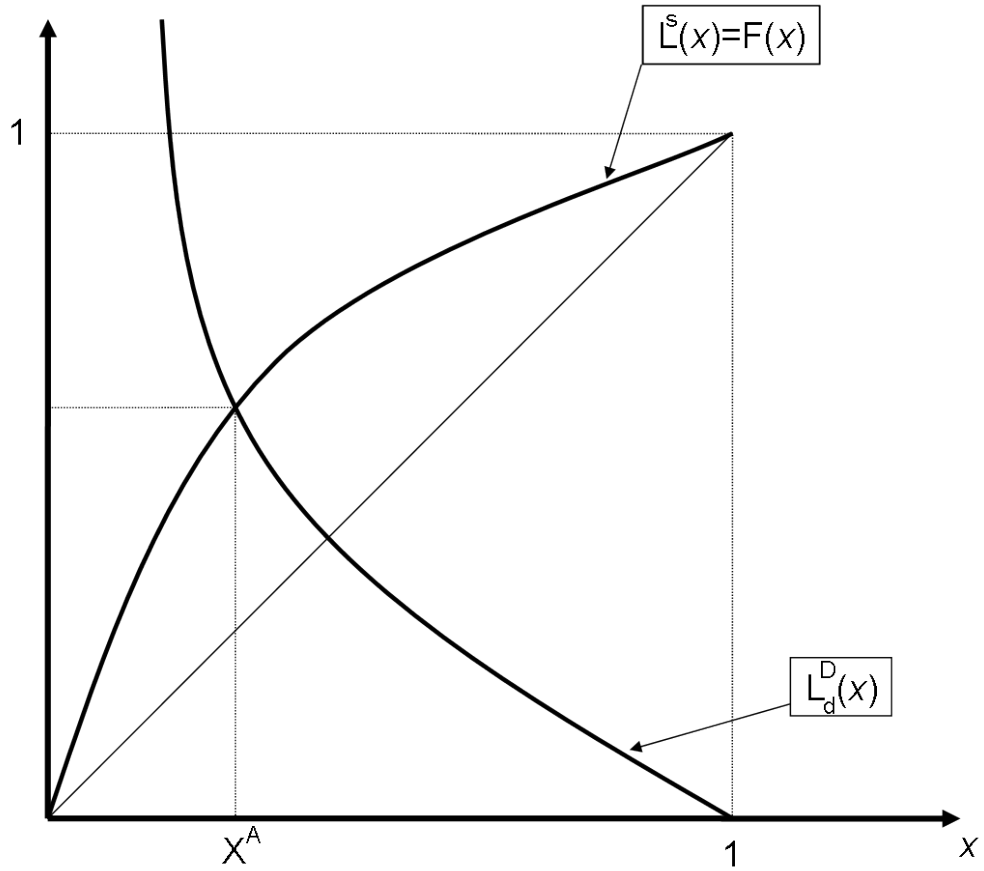
$$w = \int_{X^A}^1 a dF(a) = [1 - F(x)]\, E\left(a \mid X^A < a\right)$$

  and

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

Closed Economy Equilibrium *(3/3)*

Labor market equilibrium in closed economy



- Each foreign entrepreneur needs to **hire one local manager.**
  - Local manager does not contribute to the local knowledge of the foreign-owned firm, but is nevertheless necessary for production.
  - Assumption makes the production technologies of the domestic and foreign production facilities symmetric
    - One manager in each plant.
    - No increasing returns to scale generated by FDI.
- We consider symmetric equilibria in two countries that are identical in all respects except their entrepreneurial environments.

Net of fix cost

$$
\begin{aligned}
E[\Pi_f(ab(t))] &= \left(\frac{a}{2}b(t)\frac{Y}{w^2} - 1\right)w = \left(\frac{ab(t)}{x} - 1\right)w \\
L_f(ab(t)) &= \frac{a}{2}b(t)\frac{Y}{w^2} = \frac{ab(t)}{x}
\end{aligned}
$$

Career-path decisions


- Three possible career choices
- Oportunity Costs
- Decisions
- Distribution of Firm Sizes





Three possible career choices

Three possible career choices

- Be a worker:

$$W_w = \frac{\beta}{1-\beta} w$$

Three possible career choices

- Be a worker:

$$W_w = \frac{\beta}{1-\beta} w$$

- Be a domestic entrepreneur

$$W_d = \frac{\beta}{1-\beta} \left(\frac{a}{x}\right) w$$

Three possible career choices

- Be a worker:

$$W_w = \frac{\beta}{1-\beta} w$$

- Be a domestic entrepreneur

$$W_d = \frac{\beta}{1-\beta} \left(\frac{a}{x}\right) w$$

- Becoming a multinational entrepreneur and operating abroad for the rest of life:

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

  - **Remember c!**

Oportunity Costs

- If she becomes a domestic entrepreneur she loses the option to be a worker.
  - Domestic entrepreneur if $W_d \geq W_w$,

- Condition to become a foreign entrepreneur
  - (where there is no such an opportunity cost): $W_f \geq 0$.

Decisions

The career path decisions are determined

- by the talent of the agent,
- the degree of globalization
- and an endogenous variable: x

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The career path decisions are determined

- by the talent of the agent,
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- and an endogenous variable: x

  - An agent is a worker only if $a \leq x$.
    - Her value is $W_w = \frac{w\beta}{1-\beta}$

Decisions

The career path decisions are determined

- by the talent of the agent,
- the degree of globalization
- and an endogenous variable: x

- An agent is a worker only if $a \leq x$.
  - Her value is $W_w = \frac{w\beta}{1-\beta}$
- An agent is a domestic entrepreneur not investing abroad only if $x \leq a \leq \frac{x}{c}$.
  - Her value is $W_d = \frac{w\beta}{1-\beta}\left(\frac{a}{x}\right)$

Decisions

The career path decisions are determined

- by the talent of the agent,
- the degree of globalization
- and an endogenous variable: x

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

Distribution of Firm Sizes


- Only the largest and most efficient domestic firms open foreign subsidiaries.

- Foreign subsidiaries are larger (and more productive) the larger the home activities of the multinational firm and the longer they have been operating abroad.



Equilibrium and Career Paths


- Equilibrium
- Thresholds
- 3 Types of agents



Equilibrium *(1/3)*

- **Labor Supply** as in the closed economy: $L_S(x) = F(x)$

- **Labor demand** is now the **sum** of the demand generated by **domestic** entrepreneurs and **foreign** entrepreneurs.

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

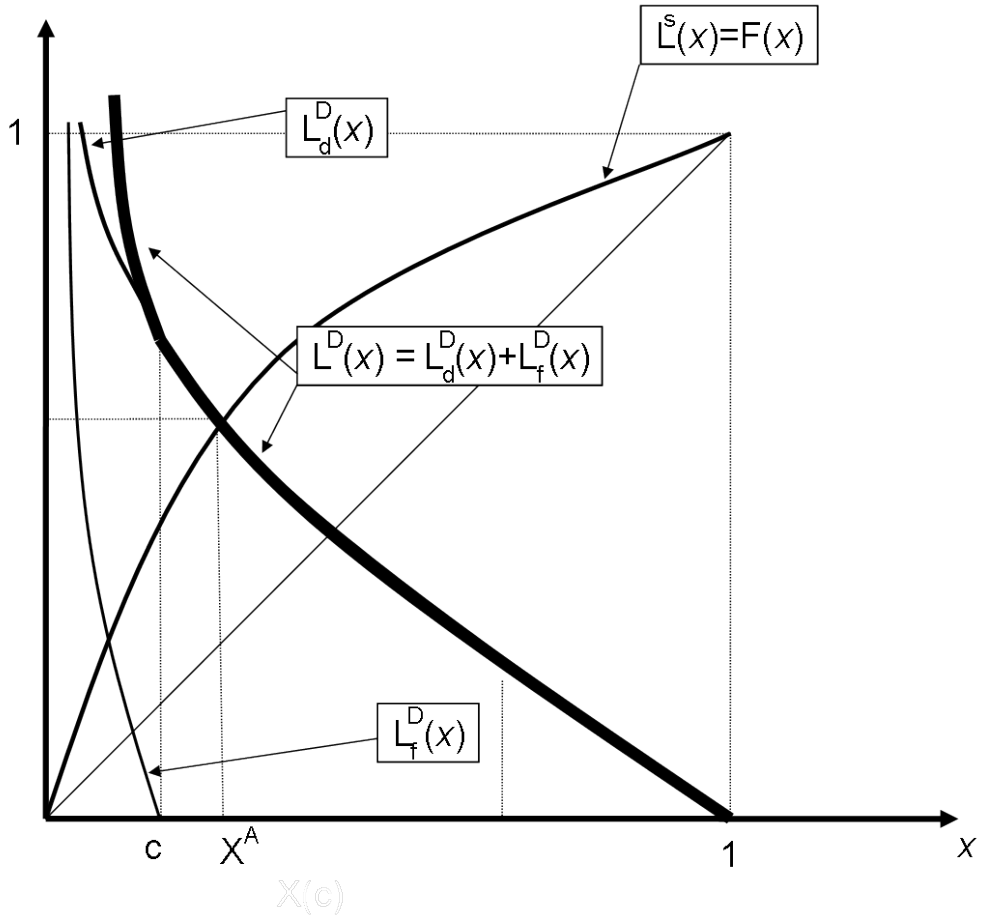
$$L_D^f(x) = \begin{cases} \left(1 - F\left(\frac{x}{c}\right)\right) + c\int_{\frac{x}{c}}^1 \frac{a}{x} dF(a) & \text{If } x \leq c \\ 0 & \text{If } c \leq x \end{cases}$$

- **Labor supply and domestic labor demand are identical to the closed economy case.**

- However, **now foreign producers demand labor too**. Their demand is decreasing in x, approaches infinity as x approaches zero, and is zero if $x \geq c$.

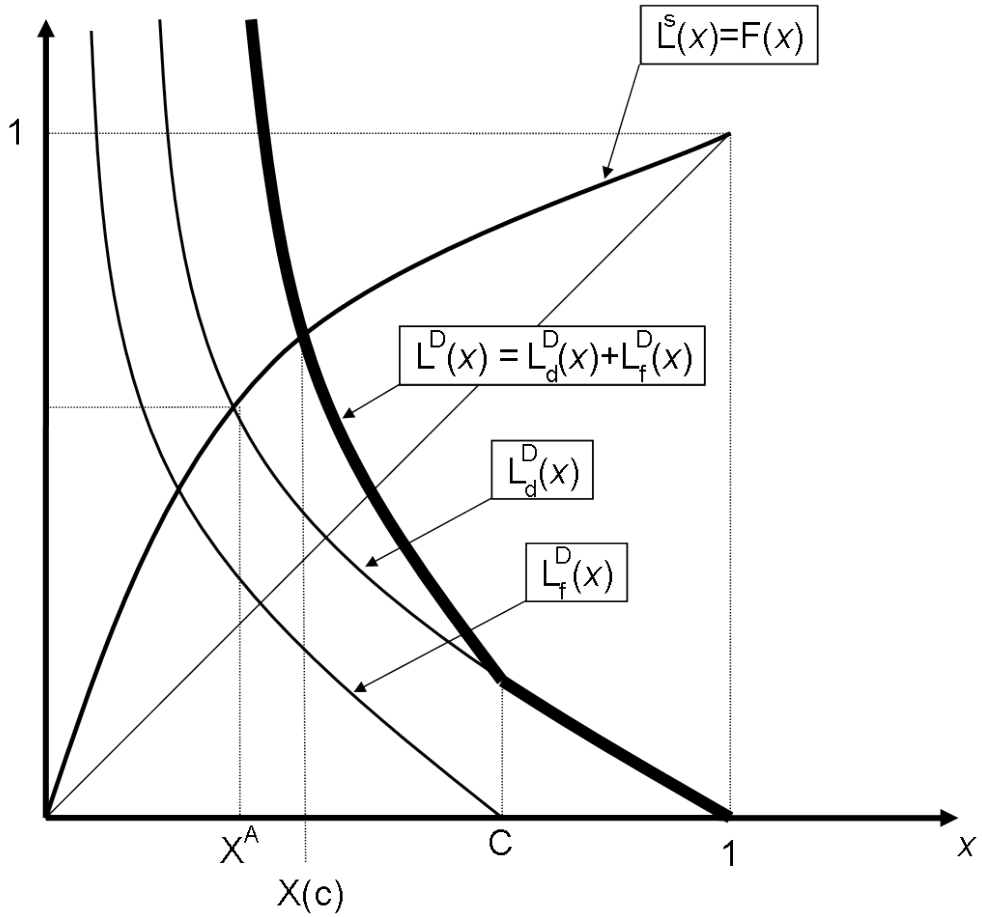
Equilibrium *(2/3)*

- NO FDI if no globalization: $c < X^A$



Equilibrium *(3/3)*

- FDI if $X^A < c$



Thresholds *(1/2)*

- $\widehat{x}(c)$ is the (unique) solution of x to labor supply equal demand:

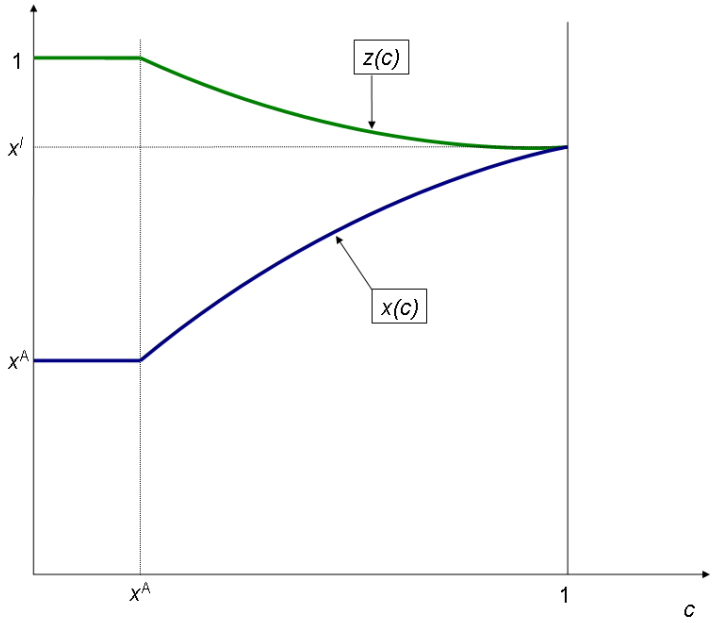
$$1 = [1 - F(x)] + \int_x^1 \frac{a}{x} dF(a) + \left[1 - F\left(\frac{x}{c}\right)\right] + \int_{\frac{x}{c}}^1 \frac{a}{\frac{x}{c}} dF(a)$$

- Two functions $x(c)$ and $z(c)$
  - $x(c)$ threshold of talent for domestic entrepreneur
  - $z(c)$ threshold of talent for foreign subsidiary

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

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

Thresholds *(2/2)*



- X^A: Threshold in Closed Economy.
- X^I: **Threshold in Integrated Economy**.

- x increases with c:

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

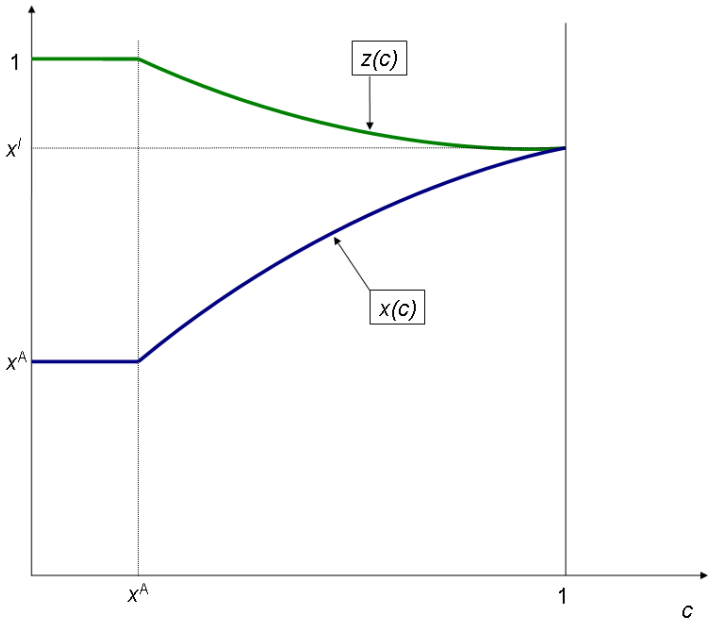
- z decreases with c:

$$\frac{dz(c)}{dc}\frac{c}{z(c)} \in (-1,0)$$

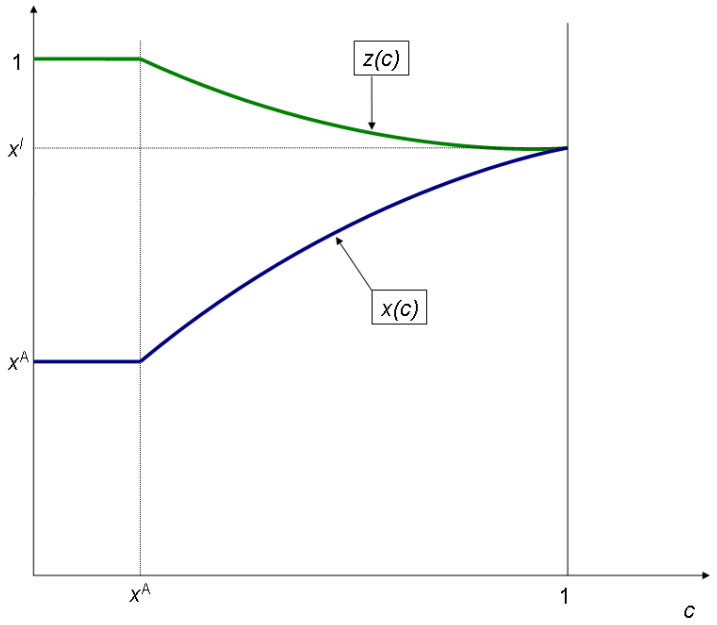
Threshold in Integrated Economy

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

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

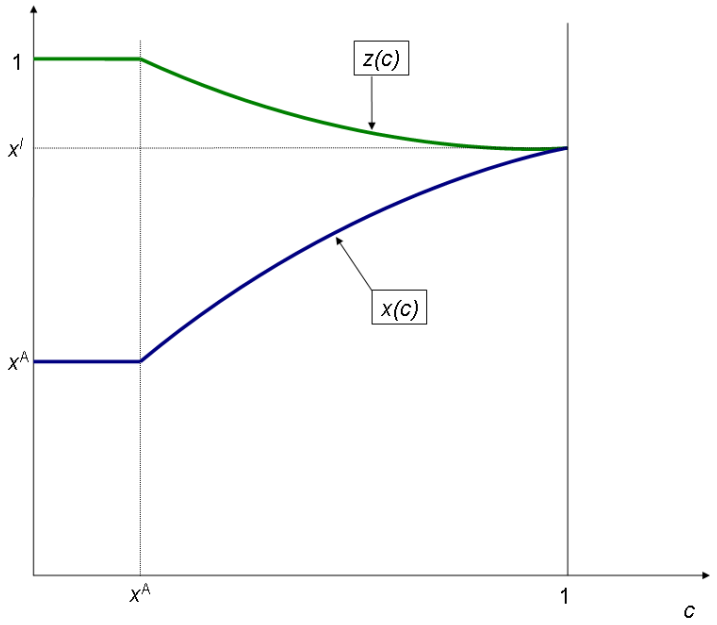


3 Types of agents



3 Types of agents

- $a < X^A$
  - Always worker.



3 Types of agents

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- $X^A \leq a \leq X^I$
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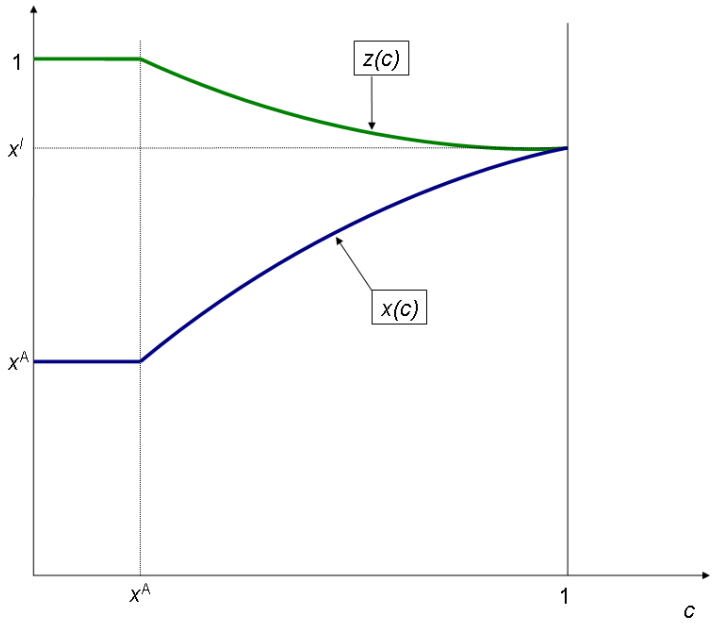
  - Worker otherwise



3 Types of agents

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- $X^A \leq a \leq X^I$
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  - Worker otherwise
- $X^I \leq a$
  - Domestic entrepreneur if $c < z^{-1}(a)$
  - Foreign entrepreneur if $z^{-1}(a) < c$

Types of agents

The career paths and value functions are as follows:

$$a \leq X^A \Rightarrow V(c|a) = W_w(c) = \frac{\beta}{1-\beta} w(c) \quad \forall c$$

$$X^A \leq a \leq X^I \Rightarrow V(c|a) = \begin{cases} W_d(c|a) = \frac{\beta}{1-\beta} a\theta(c) & \text{If} \quad X^A \leq c \leq x^{-1}(a) \\ W_w(c) = \frac{\beta}{1-\beta} w(c) & \text{If} \quad x^{-1}(a) \leq c \leq 1 \end{cases}$$

$$X^I \leq a \leq 1 \Rightarrow V(c|a) = \begin{cases} W_d(c|a) = \frac{\beta}{1-\beta} a\theta(c) & \text{If } X^A \leq c \leq z^{-1}(a) \\ W_d(c|a) + W_f(c|a) = \frac{\beta}{1-\beta} \left[a(\theta(c) + \phi(c)) - w \right] & \text{If } z^{-1}(a) \leq c \leq 1 \end{cases}$$

Effects on GDP and Wages

- Given $x(c)$ and $z(c)$:

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

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

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- Increases productivity, GDP and wages:

$$dw(c)/dc \geq 0, \qquad dY(c)/dc \geq 0$$

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- Competition from talented foreigners forces bad entrepreneurs out.

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- Increases productivity, GDP and wages:

$$dw(c)/dc \geq 0, \qquad dY(c)/dc \geq 0$$

- Competition from talented foreigners forces bad entrepreneurs out.

- If lump sum redistribution $\to$ globalization would be Pareto superior.

Effects on GDP and Wages

- Given $x(c)$ and $z(c)$:

$$w(c) : [0,1] \to \mathbb{R}, \qquad w(c) = [1 - F(x(c))]\, E(a \mid x(c) < a) + c\,[1 - F(z(c))]\, E(a \mid z(c) < a)$$
$$Y(c) : [0,1] \to \mathbb{R}, \qquad Y(c) = 2w(c) \left[\int_{x(c)}^{1} \frac{a}{x(c)} dF(a) + \int_{z(c)}^{1} \frac{a}{z(c)} dF(a) \right]$$

- Increases productivity, GDP and wages:

$$dw(c)/dc \geq 0, \qquad dY(c)/dc \geq 0$$

- Competition from talented foreigners forces bad entrepreneurs out.

- If lump sum redistribution $\to$ globalization would be Pareto superior.

- If not: **distributional effects**!

Effects on Domestic and Foreign Profits


- 2 effects on profits
- Definition: Value functions of tasks
- Number of firms serving the market increases
- Domestic Profits Fall
- Foreign Profits Increase
- Profits, graphically

2 effects on profits

- Wages going up
  - Good news for workers

  ... but cannot be good news for entrepreneurs.

- On the other hand, increase of Y increases demand.
  - ... entrepreneurs like that.

- Magnitudes of effects depend on shape of the distribution of talents.
  - Determines both how many entrepreneurs become workers
  - and their market shares of the entrepreneurs.

- To establish results on the distributional effects of globalization need to impose **restrictions on the distribution of talent**.

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

  - Total "mass of talent" does not decrease as the level of talent increases.
  - Very-Very **mild assumption.**

Definition: Value functions of tasks

- $\theta(c)$: profits in domestic market "per unit of talent".
  $\theta(c) : [0,1] \to \mathbb{R}, \quad \theta(c) = \frac{w(c)}{x(c)} = \frac{Y(c)}{2w(c)}$

- $\phi(c)$ profits (gross of the fixed cost) foreign market "per unit of talent"
  $\phi(c) : [0,1] \to \mathbb{R}, \quad \phi(c) = \frac{w(c)}{z(c)} = c\,\theta(c)$
  - Expected foreign net operating profit: $\phi(c) \times a - w$.

Value of worker	$W_w(c) : [0,1] \to \mathbb{R},$	$W_w(c) = \frac{\beta}{1-\beta} w(c)$
Value of domestic firm	$W_d(c\|a) : [0,1] \to \mathbb{R},$	$W_d(c\|a) = \frac{\beta}{1-\beta} a\theta(c)$
Value of foreign subsidiary	$W_f(c\|a) : [0,1] \to \mathbb{R},$	$W_f(c\|a) = \frac{\beta}{1-\beta} [a\phi(c) - w(c)]$

Number of firms

- Number of domestic entrepreneurs decreases.
- But more than compensated by the number of new foreign entrepreneurs.

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

- Increase in variety.
- More firms sharing the extra demand.
- ... more competition, not good for firms.

Domestic Profits Fall

- Domestic profits fall: $\frac{d\theta(c)}{dc} \leq 0$
- Wages grow faster than GDP as globalization rises.
- If always domestic entrepreneurs you would like your country to be very different...
- Protection from foreign competition.

Foreign Profits Increase

- Foreign Subsidiaries:
  - Have to pay higher wages
  - But also have more productivity.

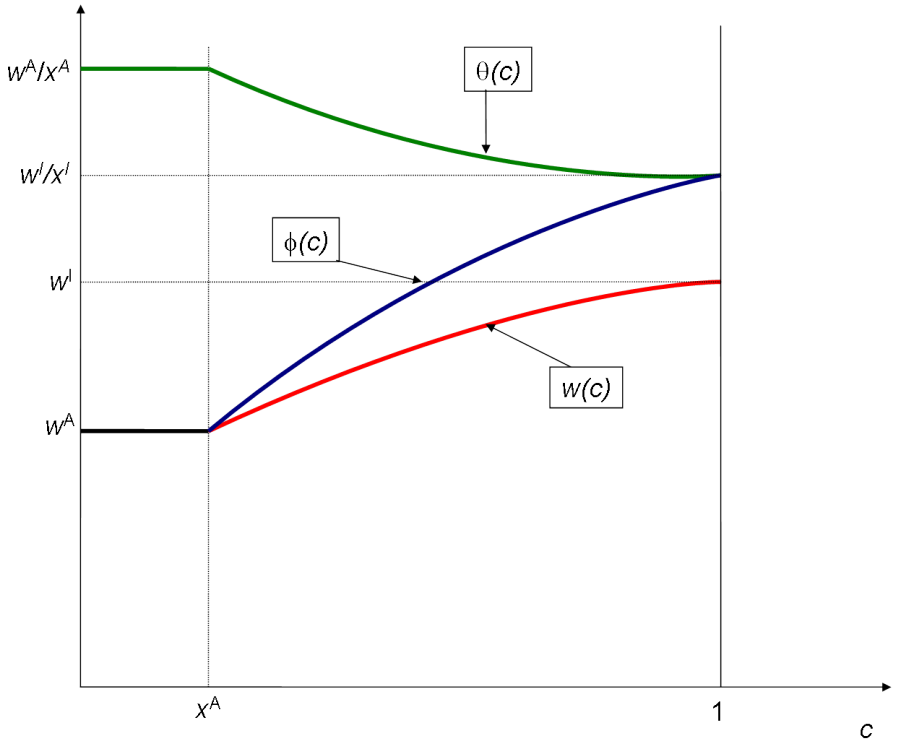
- Increase operating profit abroad(gross of the fixed cost):

$$\frac{d\phi(c)}{dc} \geq 0$$

- Moreover, for those who are talented enough how to own a foreign subsidiary, the net profit also increases:

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

Profits, graphically



- $\frac{dW_w(c)}{dc} > 0 \quad \forall a, c \text{ if } c > X^A$
- $\frac{dW_d(c|a)}{dc} < 0 \quad \forall a, c \text{ if } c > X^A$
- $\frac{dW_f(c|a)}{dc} > 0 \quad \forall a, c \text{ if } a > z(c)$

Value of individuals, not professions

- Value for individuals slightly more complex
- Some individuals change profession with c

$$V(c|a) : [0,1] \to \mathbb{R}, \quad V(c|a) = \max\left\{W_w(c), W_d(c|a), W_d(c|a) + W_f(c|a)\right\}$$

$$V(c|a) = \begin{cases} W_w(c) & \text{If } a \leq x(c) \\ W_d(c|a) & \text{If } x(c) \leq a \leq z(c) \\ W_d(c|a) + W_f(c|a) & \text{If } z(c) \leq a \end{cases}$$

Globalization and Distribution of Income

- Decrease in lower tail inequality: $\forall a, \tilde{a} : a < \tilde{a} < X^I \Rightarrow \frac{d\frac{V(a|c)}{V(\tilde{a}|c)}}{dc} \geq 0$
  - $\uparrow W_w$, $\downarrow W_d$: Ratio W_w to W_d increases.
  - W_d changes proportional to talent.
  - Among those who never operate abroad: equalization.
  - ... among the poorer, equalization
    - Compare $a = X^A$ (always w) with $a = X^I$ (always d)

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- **Increase in upper tail inequality:** $\forall a, \tilde{a} : X^I < a < \tilde{a}$ and $a < z(c) \Rightarrow \frac{d\frac{V(a|c)}{V(\tilde{a}|c)}}{dc} \leq 0$
  - If entrepreneur only at home (less a): $\downarrow W_d$
  - If entrepreneur abroad (more a) : $\downarrow W_d$, but also $\uparrow W_f$.
  - Among those who are richer: more inequality.
    - Compare $a = X^I$ (always d) with $a = 1$ (always f)

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  - Among those who are richer: more inequality.
    - Compare $a = X^I$ (always d) with $a = 1$ (always f)
- Matches the evolution of income distribution:
  - Autor et al. (2005), Autor et al. (2006) and Machin and Van Reenen (2007)
  - Since 1990's
    - $\uparrow$ "upper tail inequality"
    - $\downarrow$ "lower tail inequality"

Winners and Losers in Absolute Terms *(1/2)*

- Consider increase of globalization $c_l \to c_h$, with $X^A \leq c_l < c_h \leq 1$. → **Summary**

- Low talent ($a < X^A$)
  - **Increasing value.**
  - Win, as more on demand.

- Intermediate talent ($X^A \leq a \leq X^I$)
  - **U-shaped** value function. Minimum at $c = x^{-1}(a)$ (becoming workers)
  - $\exists a^* = \frac{w(c_h)}{\theta(c_l)}$: $x(c_l) < a^* < x(c_h)$, and:

$$\forall a \in [X^A, X^I] \to \begin{cases} \text{If } X^A \leq a < a^* & \Rightarrow V(c_l|a) < V(c_h|a) \\ \text{If } a = a^* & \Rightarrow V(c_l|a) = V(c_h|a) \\ \text{If } a^* \leq a < X^I & \Rightarrow V(c_l|a) > V(c_h|a) \end{cases}$$

  - Those with relatively low talent win:
    - Did not profit a lot from closed environment.
    - Early converts to worker.
    - Win with workers. $a = X^A$ always wins!
  - Those with relatively high talent loose:
    - They had much more than workers, and now essentially like workers
    - Those who remain d obviously loose.
    - Some who become w also loose.

Winners and Losers in Absolute Terms *(2/2)*

- High talent ($X^I < a$)
  - If $\downarrow (W_d + W_f)$
    - Decreasing value.
    - Loose (but less that those with $X^A \leq a \leq X^I$)
  - If $\uparrow (W_d + W_f)$
    - **U-shaped** value with minimum at $c = z^{-1}(a)$ (becoming exporters)
    - $\exists a^* : \quad z(c_h) < a^* < 1$ and:

$$\begin{aligned} \forall a \in [X^I, a^*) &\Rightarrow V(c_l|a) > V(c_h|a) \\ \text{If } a = a^* &\Rightarrow V(c_l|a) = V(c_h|a) \\ \forall a \in (a^*, 1] &\Rightarrow V(c_l|a) < V(c_h|a) \end{aligned}$$

    - Those with relatively low talent loose:
      - They do not win much by becoming exporters.
      - Loose with domestic entrepreneurs (even some who end up exporting)
      - X^I always looses
    - Those with high talents win
      - They win a lot in the foreign market.
      - $a = 1$ always wins.

Summary

Summary

- People in the bottom win
  - Including the less talented domestic entrepreneurs before globalization

Summary

- People in the bottom win
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- People in the middle looses
  - Including the more talented workers (after globalization)
  - Including the less talented exporters (after globalization)

Summary

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- People in the middle looses
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  - Including the less talented exporters (after globalization)

- People in the top may win
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  - In the worse case, they loose less the more talent they have.

Summary

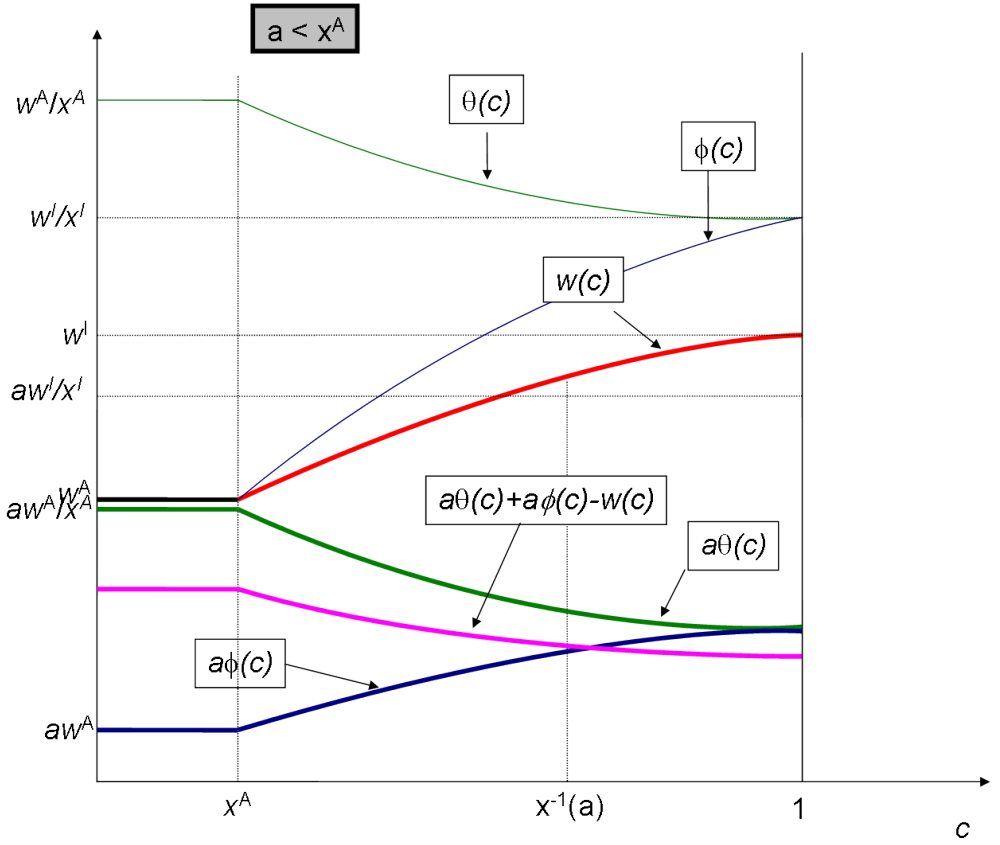
- People in the bottom win
  - Including the less talented domestic entrepreneurs before globalization

- People in the middle looses
  - Including the more talented workers (after globalization)
  - Including the less talented exporters (after globalization)

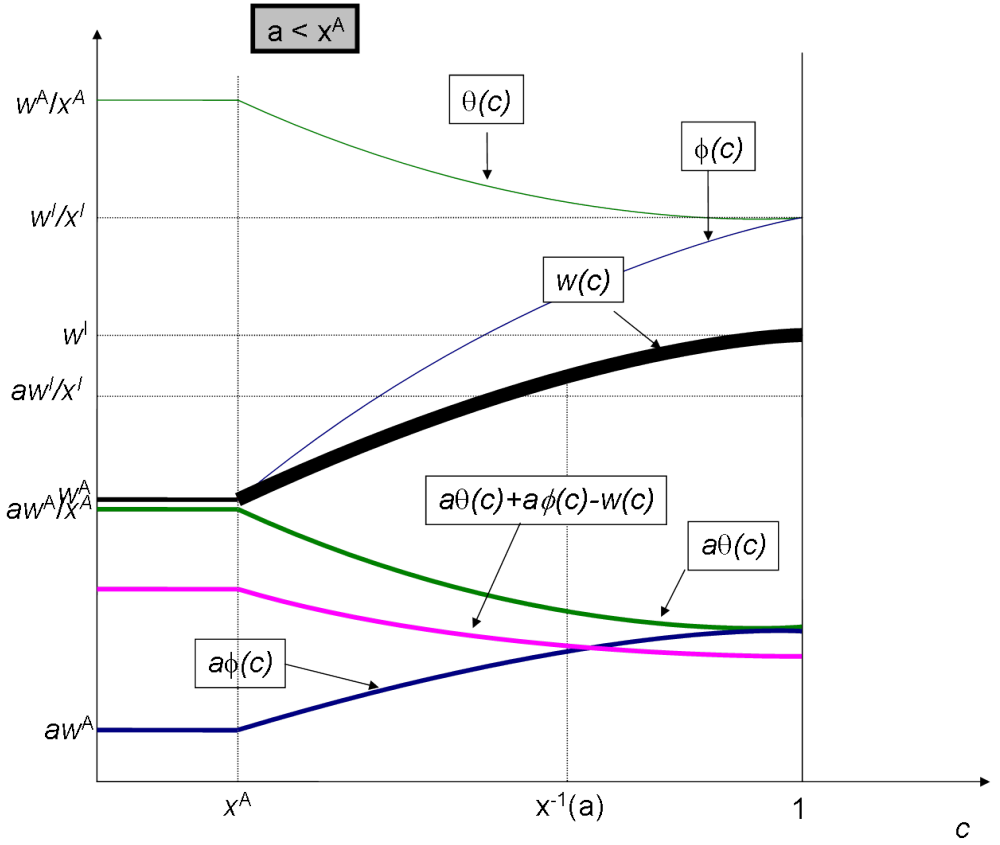
- People in the top may win
  - Including the more talented local entrepreneurs (before globalization)
  - In the worse case, they loose less the more talent they have.

- Losers:
  - those who loose an asset (local knowledge)
  - ... but can not use the new one (knowledge on foreign lands)

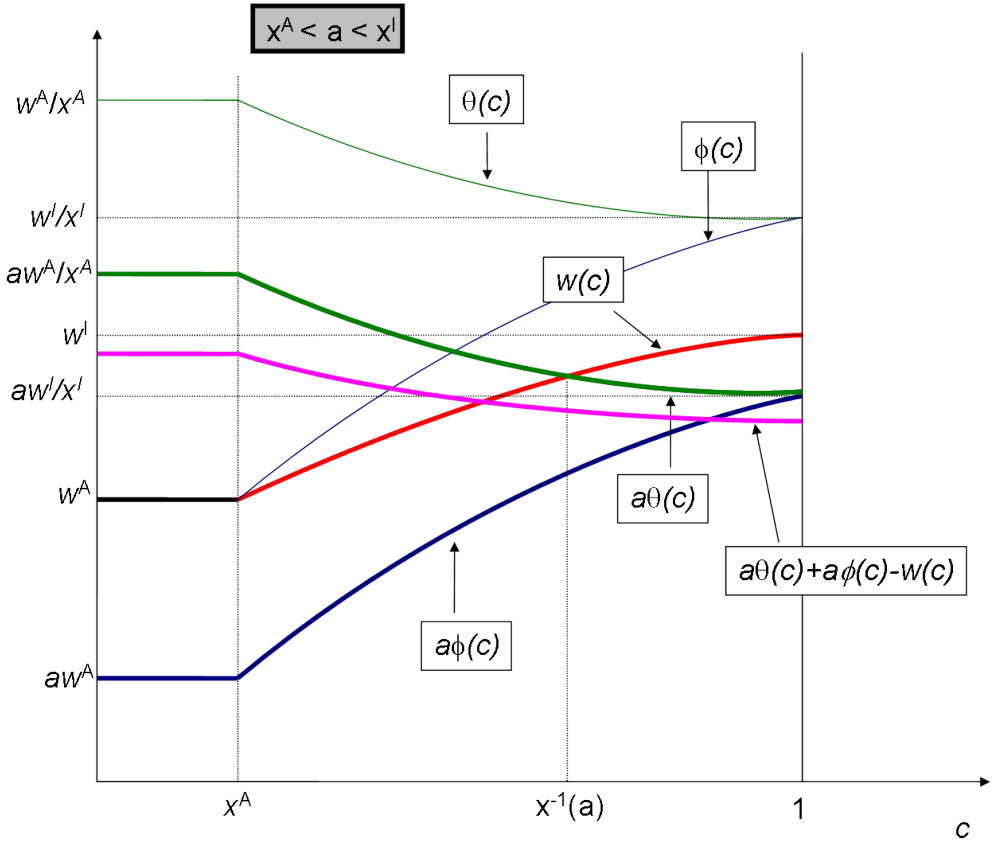
Value function $a \leq X^A$ (1/2)



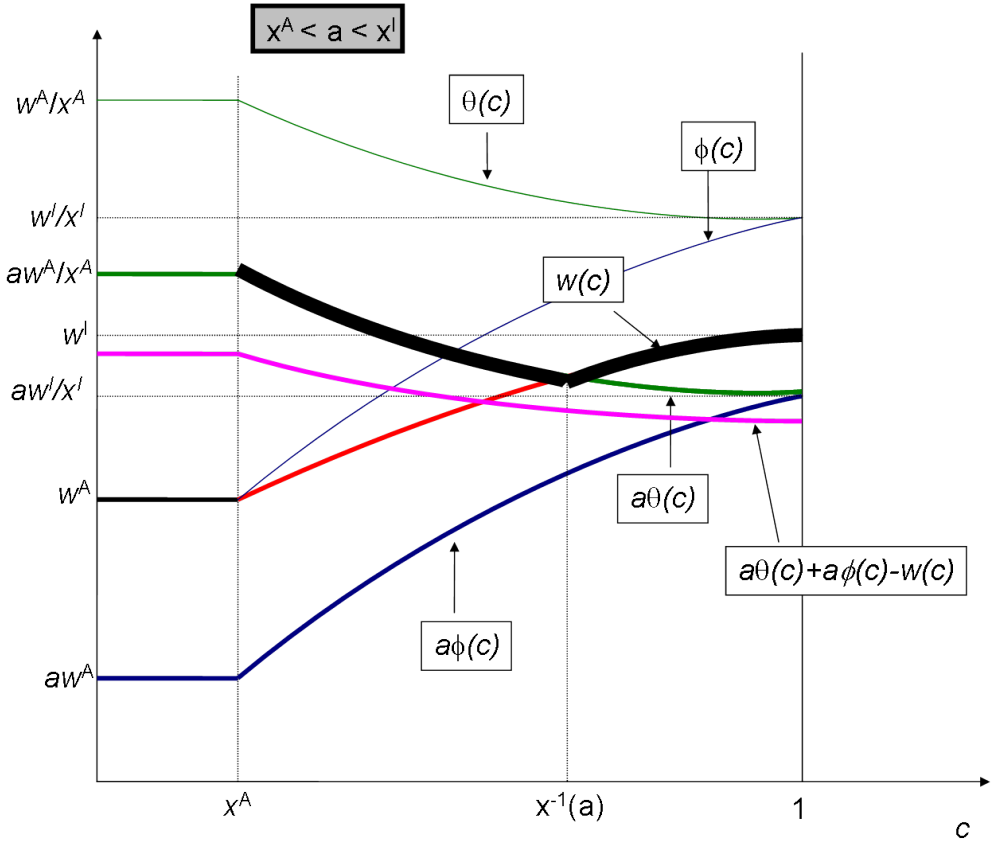
Value function $a \leq X^A$ (2/2)



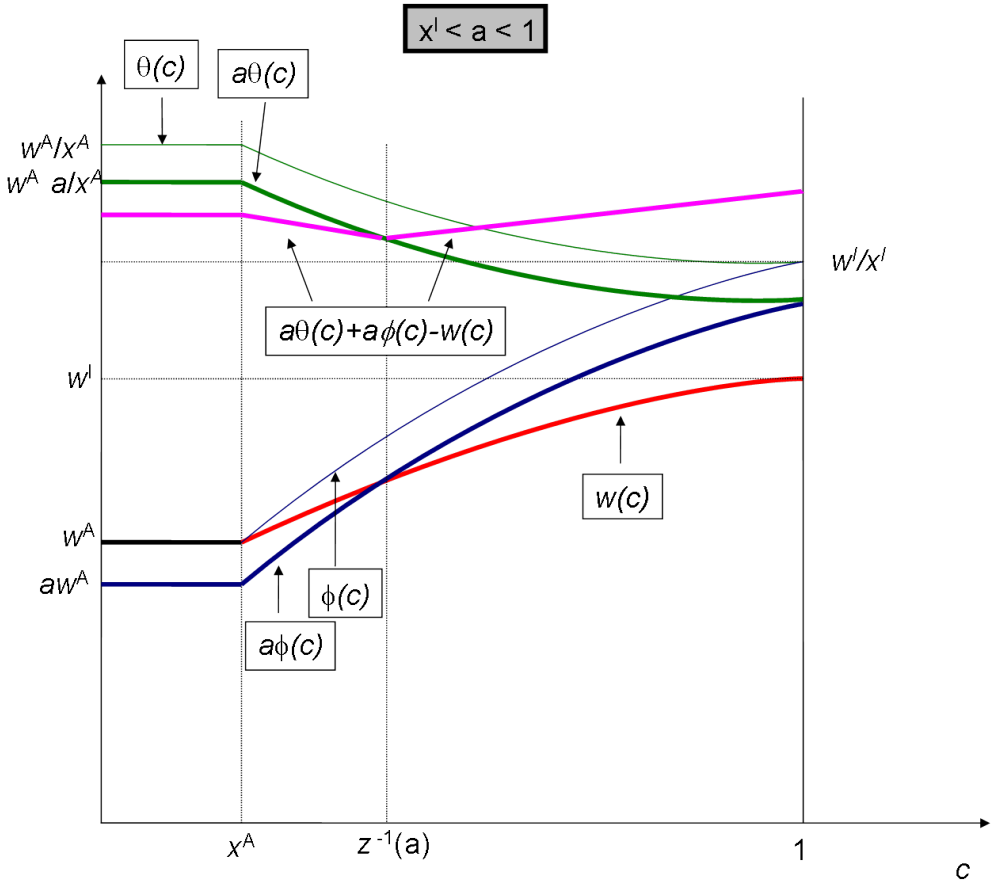
Value function $X^A \leq a \leq X^I$ (1/2)



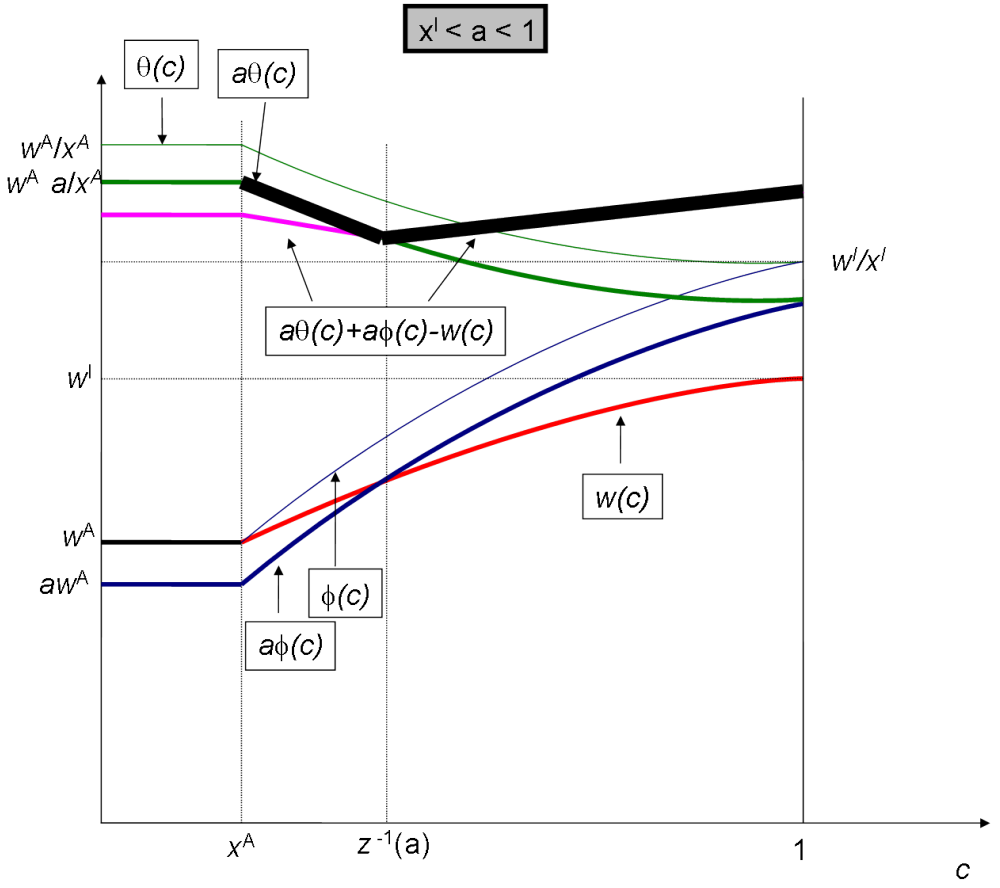
Value function $X^A \leq a \leq X^I$ (2/2)



Value function $X^I \leq a \leq 1$ (1/2)



Value function $X^I \leq a \leq 1$ (2/2)



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

Giovanni Pica (Università di Salerno and CSEF)
José V. Rodriguez Mora (University of Edinburgh)

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