

Financing Multinationals

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Introduction

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 - Abstract from capital and financial frictions
 - Silent on FDI, an important government statistic
 - Determinants: unable to rationalize the documented relationship between financial development & MNC activities
 - Welfare implications: (static) overlook access to parent funding as advantage of affiliates; (dynamic) capital accumulation under imperfect financial market \Rightarrow dynamic welfare implications different from static

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- This paper: technology + capital

This paper

- Data
 - Relationship between financial market conditions, FDI, and MP
- Theory
 - Het. firm model with technology and capital
 - Tractable enough for asymmetric countries and transitional dynamics
 - Capital accumulation under financial frictions + allocation of investment across countries
 - Sources of finance: -host country -parent country (internal + external)
- Quantification
 - The determinants of FDI: focus on the role of evolving credit markets over 2001-2012 in explaining the global (36 economies) FDI
 - Welfare effects of FDI policies

Findings

- Accounting for the dynamics of FDI

- Credit boom before 2007: 30% of the aggregate FDI growth
- Credit crunch since 2008: reduce FDI growth by around 50%
- The role of general equilibrium and third-country effects: aggregate effect is only half of the sum of country-specific effects

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 - Dynamic: gains smaller and heterogeneous by host primitives, could be negative
 - Comparison to literature:
 - The neoclassical view of FDI misses the technology content of MNCs
 - Technology-based view of MP suitable for static analysis but misses dynamics

Literature

- Quantitative models of MNCs
 - Technology rival: Burstein and Monge-Naranjo (2009)
 - Technology non-rival: McGrattan and Prescott (2009), Arkolakis et al. (2018), Ramondo (2014), Cravino and Levchenko (2016), Tintelnot (2016) ...
- Capital market integration w/ or w/o financial frictions
 - Mundell (1957), Feldstein (1995), Gourinchas and Jeanne (2006a)
 - Caballero et al. (2008), Ju and Wei (2010)
- Contribution: unified model for portfolio investment and technology-embedded capital (FDI); application to many asymmetric countries

Literature

- Empirical studies on business groups/multi-unit firms
 - MNCs: Antras et al. (2009), Bilir et al. (2014), Desbordes and Wei (2017), Alfaro and Chen (2012)...
 - Reallocation between units important for transmission of shocks across regions (Giroud and Mueller, 2017, Shi et al., 2019) and the effects of tax policy (Giroud and Rauh, forthcoming)
 - Contribution: tractable model suitable for answering questions related to multi-unit firms in general; key assumptions consistent with evidence
- Multi-country dynamic accounting exercises
 - Caselli et al. (2015), Eaton et al. (2016), Kehoe et al. (2018) ...
 - Contribution: focus on FDI; first study of incomplete market in multi-country/region setting

Facts

Data, measurement, and sample

- Data sources and measurements:

- Ramondo et al. (2015): bilateral FDI (within-firm capital flow) and MP (# of affiliates and their sales)
- proxies for financial development: indicators (WB Enterprise Survey), Credit/GDP
- additional controls: policy restriction on foreign firms (OECD), actual business tax rates (WB), bilateral distance
- country size and income (PWT 9.0)

- Sample country and period:

- 50+ countries, averaged over 1996-2000

MP, FDI, and financial markets

1. MP systematically correlates with FDI

- At country-pair level, controlling for host and home FEs. Correlation robust to including extensive margin variation (number of affiliates at bilateral level)
- → The role of parent finance

Fact 1

Fact 2

Fact3

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2. Host financial development and inward MNC activities

- Countries with better financial institutions attract more inward FDI, and conditional on FDI, more inward MP
- → **The role of host-country finance**

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3. Home financial development and outward MNC activities

- Countries with better financial institutions send more outward FDI, but conditional on FDI, *not* more outward MP
- → **Home country finance encourages outward MP, but only through FDI**

Fact 1

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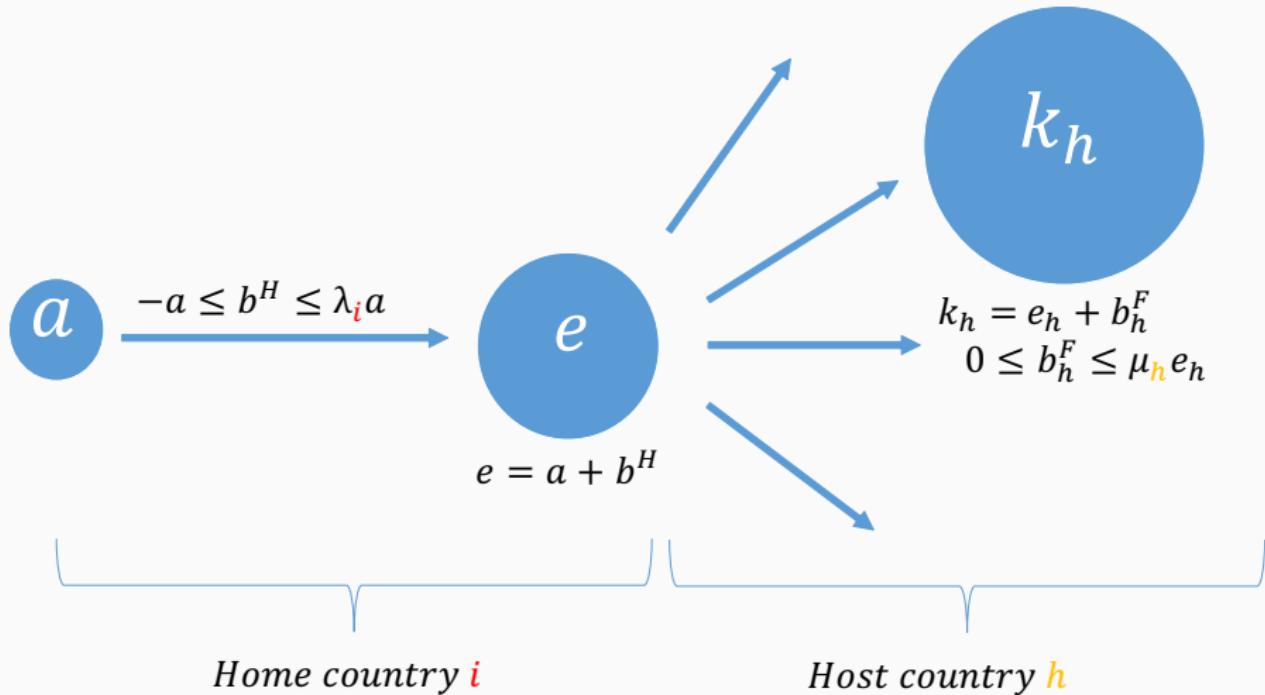
Fact3

The Model

Environment

- N countries. Discrete time. Single homogeneous good
- Workers are immobile, hand-to-mouth
- Firms are heterogeneous in their home country, productivity (exogenous process), and net worth (endogenous)
- Firms decide on financing, funds allocation, investment and dividend payout

Firm Investment and Financing Decision Overview



Affiliate financing and production

Given parent investment e_h , a country- h affiliate (z_{ih}, e_h) solves

$$\begin{aligned} \max_{l, k, b^F} \quad & (z_{ih}k)^{\alpha}/^{1-\alpha} + (1 - \delta)k - w_h l - (1 + r_h^b)b^F \\ \text{s.t.} \quad & 0 \leq k \leq e_h + b^F \\ & 0 \leq b^F \leq \mu_h e_h \end{aligned}$$

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 - Profits and policy functions homogeneous in $e_h \rightarrow \tilde{R}_{ih}(z, e_h) = R_{ih}(z)e_h$

Parent firm financing and investment allocation

Owners of a parent firm characterized by (i, z, a, ζ) solve:

$$\begin{aligned} v_i(z, a, \zeta) &= \max_{c, a', \{e_h\}_{h=1}^N, b^H} u(c) + \beta \mathbb{E} v_i(z', a', \zeta') \\ \text{s.t. } & \sum_h e_h = a + b^H \\ & -a \leq b^H \leq \lambda_i \cdot a \end{aligned}$$

$$c + a' = \sum_h \tilde{R}_{ih}(z, e_h) \eta_h - (1 + r_i^b) b^H$$

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- Total returns after paying back interest on borrowing are paid out as dividends (c) and reinvestment (a')

Aggregation

Policy functions $a'(z, a, \zeta)$, $c(z, a, \zeta)$, $b^H(z, a, \zeta)$ and $e_h(z, a, \zeta)$

Assumption

1) $u(c) = \log(c)$

2) ζ_h follows $G(\zeta_1, \dots, \zeta_N) = 1 - \sum_h \frac{1}{N} [\zeta_h^{-\theta}]$, for $\zeta_h \geq 1$, $\forall h$.

(Arkolakis, Rodríguez-Clare and Su, 2017)

- $u(c)$ CRRA $\Rightarrow \forall f \in \{a', c, b^H, e_h\} : f(z, a, \zeta)' = \hat{f}(z, \zeta) \cdot a$
- Assumption 2 \Rightarrow tractable aggregation over realization of ζ : $\hat{F}(z) \equiv \int_Z \hat{f}(z, \zeta) d\zeta$
- Assumption 1 \Rightarrow closed-form expressions for $\hat{F}(z)$
- Parameter θ governs elasticity of entry probability w.r.t. return from a host h .

Equilibrium

- Aggregate states

- The joint distribution over (z, a) across firms, $\Phi_{i,t}(z, a)$, for each country i
- Homogeneity of the problem \rightarrow tracking $\phi_{i,t}(z) \equiv \int_0^\infty a \Phi_{i,t}(z, a) da$ is sufficient

- Definition of sequential equilibrium

- Given $W_{i,0}$ and distribution $\phi_{i,0}(z)$, an equilibrium is a sequence of wage and interest rate, policy functions, and aggregate wealth and wealth share distributions such that:
- Firms optimize
- Labor markets clear in each country
- The global bond market clears (borrowing from parent and affiliates = idle parent supply)
- $\phi_{i,t}(z)$ is consistent with policy and the transition of z

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Extensions

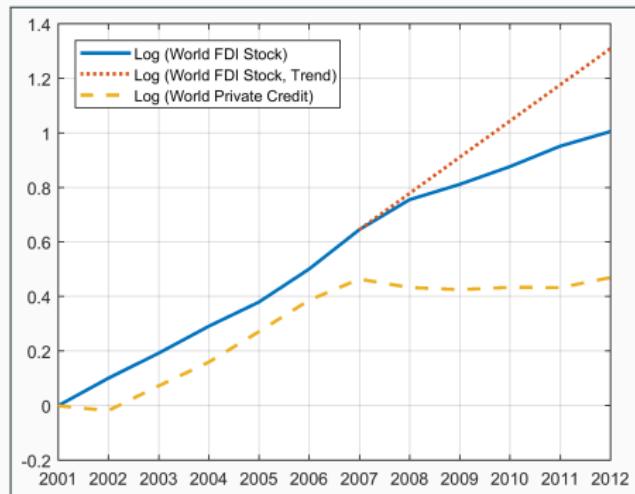
- Isomorphism to models with differentiated varieties
- Sunk cost \Rightarrow firm-level hysteresis
- Choice between greenfield entry versus M&A
 - Foreign firm meets with a representative local partner to determine equity shares; bargain to split the surpluses
 - Tradeoff: more local finance \Rightarrow less control (lower parent weight in affiliate productivity)

Financial development and FDI

- Host financial development (higher μ_h) increases inward FDI
- Home country financial development (higher λ_i) leads to higher outward FDI
 - Reallocation of capital to productive firms, which are more likely to be MNCs
 - Domestic wage increase drives investment abroad
 - (Dynamic) faster wealth accumulation; higher concentration of wealth in productive firms

Quantification

The accounting exercise: overview



Values in 2001 are normalized to 1.

- Calibrate the model to match bilateral FDI stocks and other relevant moments
- Inspect growth and cross-country difference in FDI via model counterfactuals

Calibration

A: Parameters Calibrated Independently

Parameter	Description	Target/Source	Value
β	Discount factor	Buera et al. (2011), Midrigan and Xu (2014)	0.9
α	Capital share	PWT	0.4
δ	Capital depreciation rate	PWT	4.5%
θ	Elasticity of FDI w.r.t. return	Wei (2000)	5
ρ_z	Firm productivity autocorrelation	Asker et al. (2014)	0.85
σ_e^2	Firm productivity innovation variance	Asker et al. (2014)	0.90
χ	Parent weight in affiliate productivity	Cravino and Levchenko (2017)	0.25;0.16
$\{L_i\}$	Effective employment	PWT	-

B: Parameters Calibrated in Equilibrium

Parameter	Description	Target/Source	Value
$\{\lambda_i\}$	Credit market conditions for parent companies	Credit/Capital ratio	-
$\{\mu_h\}$	Credit market conditions for affiliates	Share of affiliates balance sheet financed by parents	-
$\{\bar{\eta}_{ih}\}$	Return wedge for domestic and foreign direct investment	$\{K_{ih}\}$	
$\{\bar{\eta}_{ii}\}$	-	$\{K_{ii}\}$	
η_z	Relationship between MNC status and productivity	Estimated using Bloom et al. (2012) data	0.026
$\{\bar{z}_i\}$	Fundamental TFP	GDP	-



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$$\theta: \hat{e}_{ih}(z) = [\tilde{R}_i(z)/(1 + r_i^b)]^\theta \cdot \frac{1}{N} [\bar{\eta}_{ih} R_{ih}(z)/\tilde{R}_i(z)]^\theta$$

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- $\rho_z, \sigma_\varepsilon : \log(\hat{z}') = \rho_z \log(\hat{z}) + \varepsilon, \varepsilon \sim N(0, \sigma_\varepsilon^2); z = \hat{z} \bar{z}_i$

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- $\chi: z_{ih}(z) = z^\chi \cdot \bar{z}_h^{1-\chi}, \text{ for } i \neq h$

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- $\{\lambda_i\}$: country-specific, time-varying; pined down using private credit/GDP ratio

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$\{\bar{z}_i\}$	Fundamental TFP	GDP	-

- $\{\mu_h\}$: $\frac{\text{host country external finance}_h}{\text{total external finance}_h}$ for overseas affiliates of U.S. multinationals (BEA)

Calibration

A: Parameters Calibrated Independently

Parameter	Description	Target/Source	Value
β	Discount factor	Buera et al. (2011), Midrigan and Xu (2014)	0.9
α	Capital share	PWT	0.4
δ	Capital depreciation rate	PWT	4.5%
θ	Elasticity of FDI w.r.t. return	Wei (2000)	5
ρ_z	Firm productivity autocorrelation	Asker et al. (2014)	0.85
σ_ϵ^2	Firm productivity innovation variance	Asker et al. (2014)	0.90
χ	Parent weight in affiliate productivity	Cravino and Levchenko (2017)	0.25;0.16
$\{L_i\}$	Effective employment	PWT	-

B: Parameters Calibrated in Equilibrium

Parameter	Description	Target/Source	Value
$\{\lambda_i\}$	Credit market conditions for parent companies	Credit/Capital ratio	-
$\{\mu_h\}$	Credit market conditions for affiliates	Share of affiliates balance sheet financed by parents	-
$\{\bar{\eta}_{ih}\}$	Return wedge for domestic and foreign direct investment	$\{K_{ih}\}$	
$\{\bar{\eta}_{ii}\}$	-	$\{K_{ii}\}$	
η_z	Relationship between MNC status and productivity	Estimated using Bloom et al. (2012) data	0.026
$\{\bar{z}_i\}$	Fundamental TFP	GDP	-

- $\{\bar{\eta}_{ih}\}, \{\bar{\eta}_{ii}\}$: domestic and bilateral investment

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Parameter	Description	Target/Source	Value
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$\{\mu_a\}$	Credit market conditions for affiliates	Share of affiliates balance sheet financed by parents	-
$\{\bar{\eta}_{ih}\}$	Return wedge for domestic and foreign direct investment	$\{K_{ih}\}$	
$\{\bar{\eta}_{ii}\}$	-	$\{K_{ii}\}$	
η_z	Relationship between MNC status and productivity	Estimated using Bloom et al. (2012) data	0.026
$\{\bar{z}_i\}$	Fundamental TFP	GDP	-

- η_z : $\bar{\eta}_{ih}(z) \equiv \bar{\eta}_{ih} z^{\eta_z}$.

$$\log\left(\frac{Pr(MN|z)}{1-Pr(MN|z)}\right) = \log\left(\frac{\sum_{h' \neq i} [\bar{\eta}_{ih'} R_{ih'}(z)]^\theta}{[\bar{\eta}_{ii} R_{ii}(z)]^\theta}\right) + \theta \cdot \eta_z \log(z).$$

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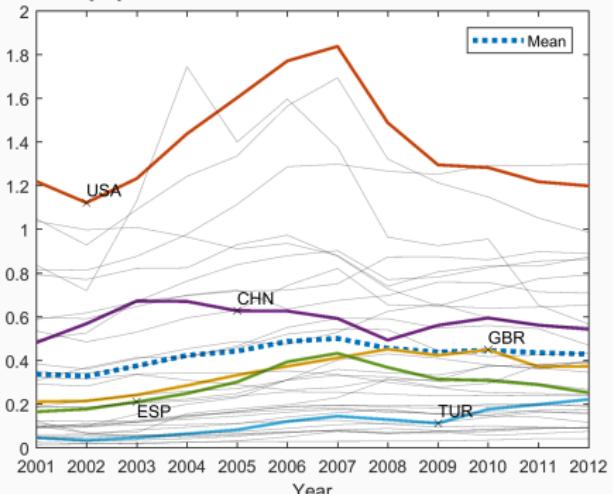
- \bar{z}_i : the residual in matching GDP per capita

Model validation

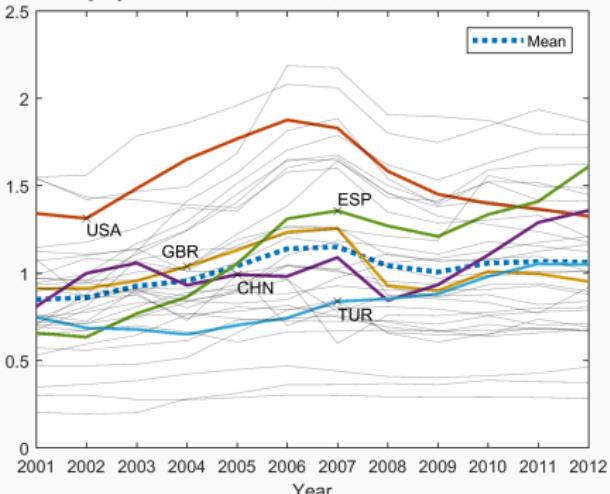
1. Relationship between MP and FDI [detail](#)
2. Bilateral return wedge and measurables [detail](#)
3. Relationship between λ_i and μ_h [detail](#)

Changing financial market conditions

(a) Calibrated λ over time

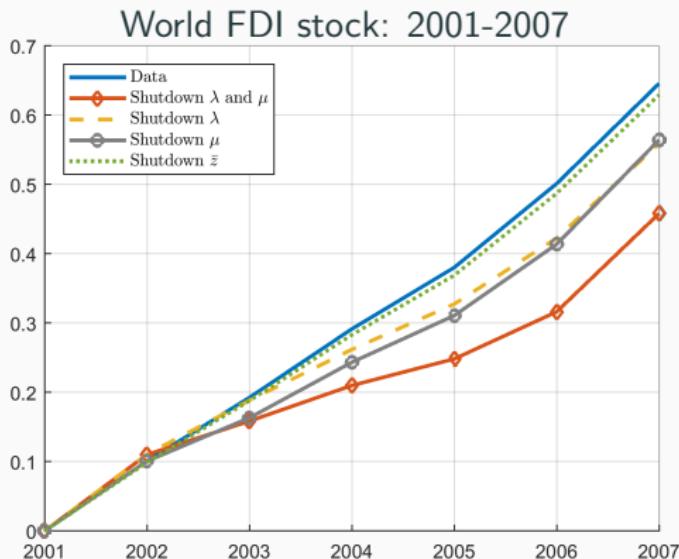


(b) Calibrated μ over time



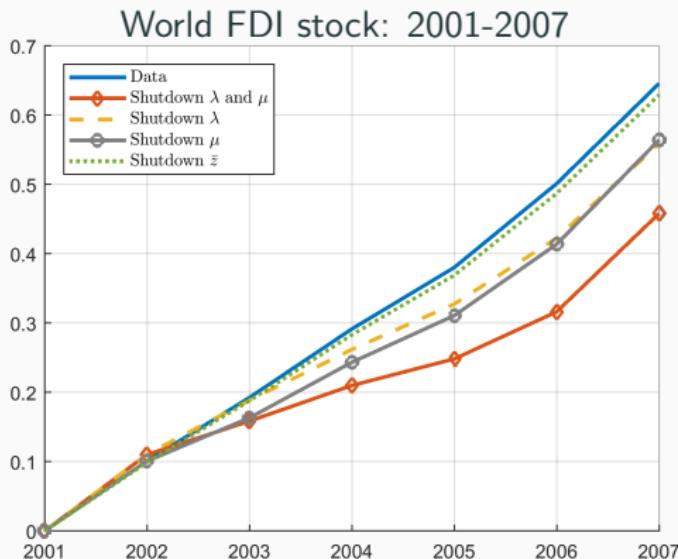
- Both λ and μ : upward trend before 2007, interrupted by the crisis
- We examine the extent to which they explain the rapid growth in world FDI and the growth slowdown

Accounting for FDI growth and collapse, world aggregate



- 2001-2007

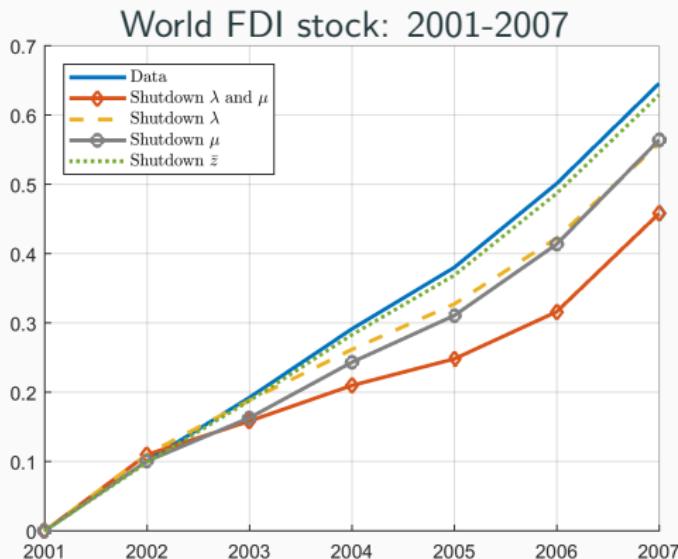
Accounting for FDI growth and collapse, world aggregate



- 2001-2007

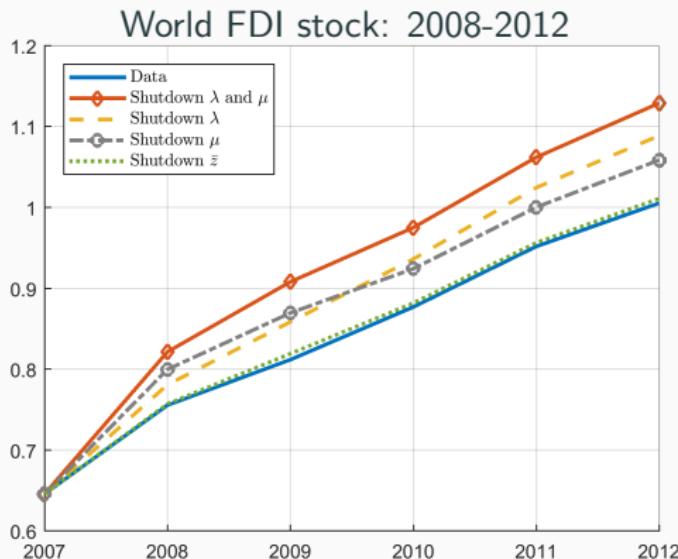
- aggregate: credit boom accounts for $1/3$ of FDI growth (equally from λ_i and μ_h)

Accounting for FDI growth and collapse, world aggregate



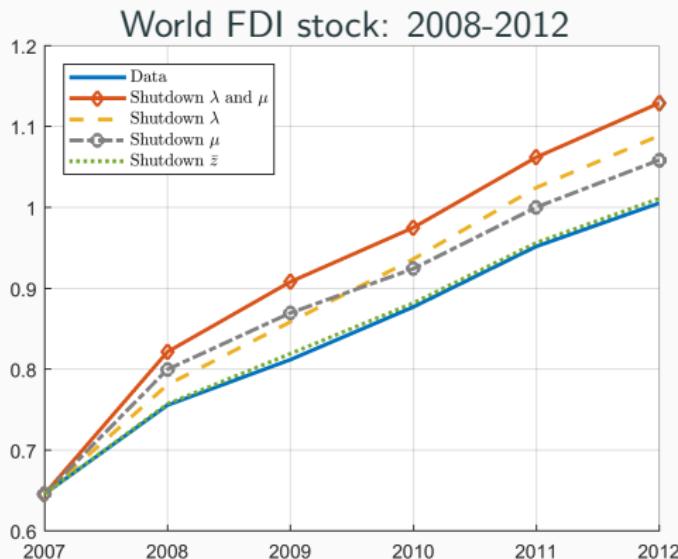
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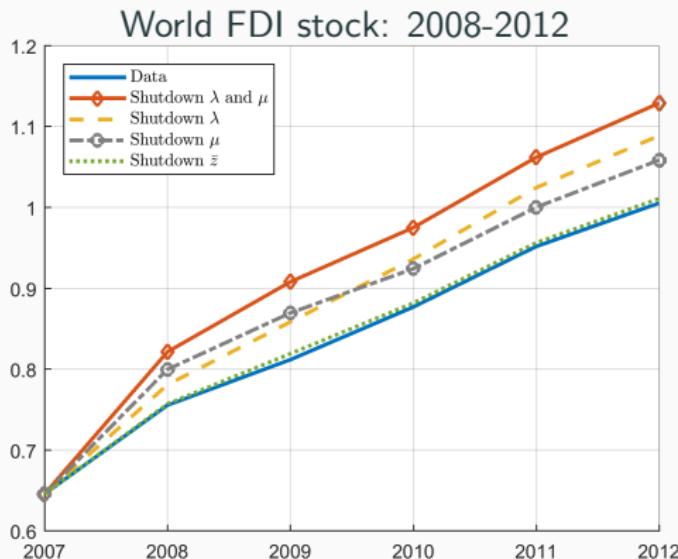
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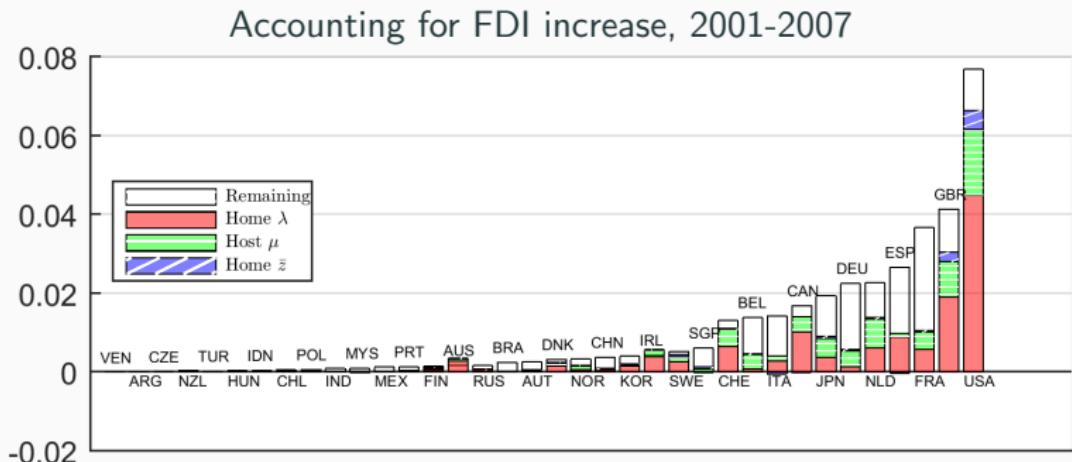
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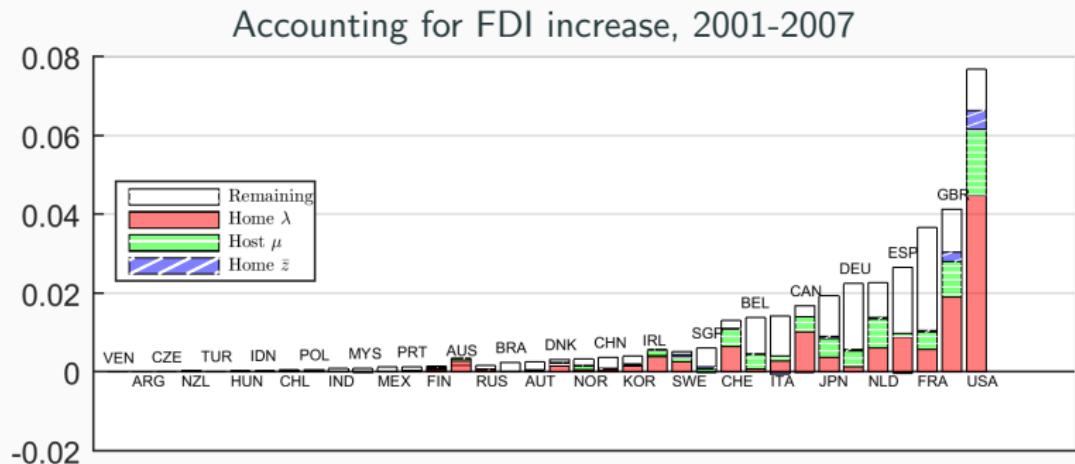
Accounting for the dynamics of FDI, individual countries



- 2001-2007

- Fix λ_i , \bar{z}_i at the 2001 value; fix μ_h for all host countries at the 2001 value

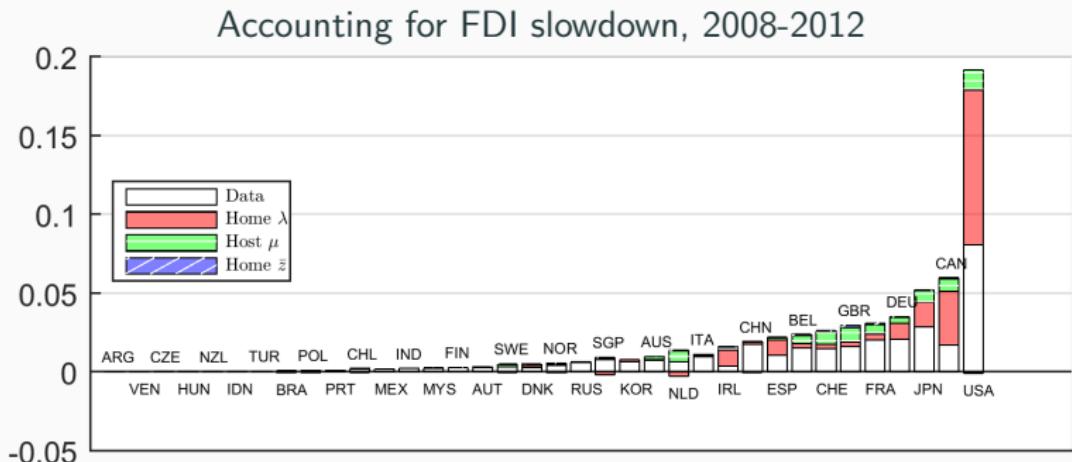
Accounting for the dynamics of FDI, individual countries



- 2001-2007

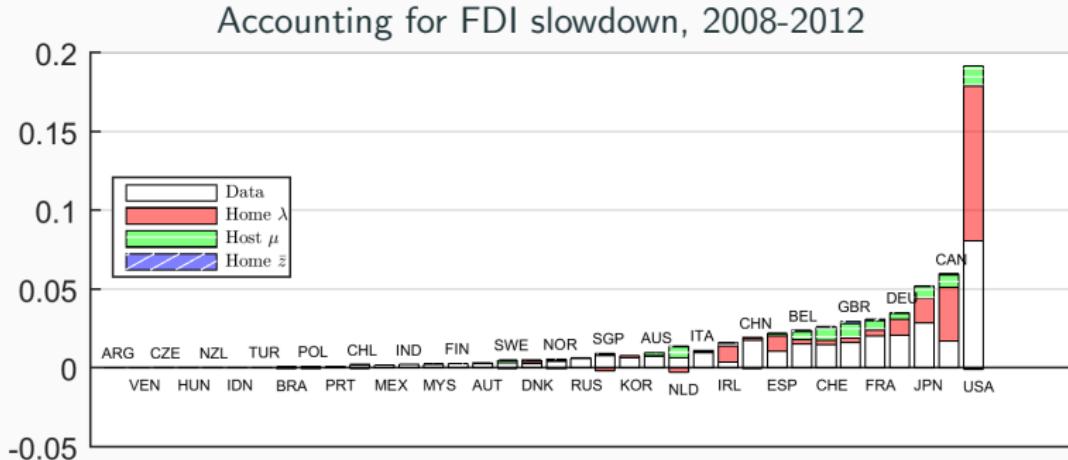
- Fix λ_i, \bar{z}_i at the 2001 value; fix μ_h for all host countries at the 2001 value
- λ_i accounts for 40% of the outward FDI growth; μ_h accounts for 20%

Accounting for the dynamics of FDI, individual countries



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 - Fix λ_i , \bar{z}_i at the 2001 value; fix μ_h for all host countries at the 2001 value
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- 2008-2012
 - Freeze λ_i , \bar{z}_i after 2007; freeze μ_h for all host countries after 2007

Accounting for the dynamics of FDI, individual countries



- 2001-2007
 - Fix λ_i , \bar{z}_i at the 2001 value; fix μ_h for all host countries at the 2001 value
 - λ_i accounts for 40% of the outward FDI growth; μ_h accounts for 20%
- 2008-2012
 - Freeze λ_i , \bar{z}_i after 2007; freeze μ_h for all host countries after 2007
 - Decline in λ_i reduces FDI growth by 50%; decline in μ_h reduces it by 5%

Cross-country variation lines up with diff-in-diff estimates

	Data		Model	
	(1)	(2)	(3)	(4)
$\Delta \ln(\text{Credit}/\text{GDP})$	0.698*** (0.155)		0.383*** (0.103)	
$\Delta \ln(\lambda_i)$		0.291** (0.129)		0.284*** (0.052)
Year FE	yes	yes	-	-
Observations	364	364	396	396
R ²	0.205	0.194	0.373	0.549

Note: This table reports the effect of home financial market conditions on outward FDI using panel data.

Standard errors (clustered by country) in parenthesis.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Accounting exercise summary

1. Evolving financial market conditions are first-order determinants for FDI
2. The level effect from reduced-form evidence might overstate the true effect

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 - domestic GE effect: 70%
 - third country effect: 40%

Accounting exercise summary

1. Evolving financial market conditions are first-order determinants for FDI
2. The level effect from reduced-form evidence might overstate the true effect
3. Accounting for discrepancies between partial and general equilibrium analysis
 - domestic GE effect: 70%
 - third country effect: 40%
 - correlation in financial market conditions: -10%

Welfare

Gains from inward FDI, general discussions

- Model parameterized with integrated world credit market. FDI policies still relevant for welfare because:
 - Foreign capital embodies technology
 - Domestic firms constrained by their net worth
- Thought experiment:
 - Moving between two equilibria with different inward FDI
- Consider both static and dynamic outcomes

Static wage gains: sufficient statistics

Proposition

The contemporaneous change in workers' wage in country h in response to a change in inward FDI policy is:

$$\Delta \log(w_h) = -\alpha \Delta \log \left(\frac{Y_{hh}}{Y_h} \right) + \alpha \frac{\gamma - 1}{\gamma} \Delta \log \left(\frac{K_{hh}}{W_h} \right)$$

$\frac{Y_{hh}}{Y_h}$: the share of production conducted by domestic firms

$\frac{K_{hh}}{W_h}$: the share of domestic net worth used by domestic firms

- MNC's production share (MP) captures the importance of foreign production
- Conditional on MP, higher FDI \Rightarrow less use of domestic capital \Rightarrow less crowd out

Decomposing static wage gains

The wage effect can be decomposed to

$$\Delta \log(w_h) = \alpha \Delta \log(K_h) + \alpha \Delta \log(A_h)$$

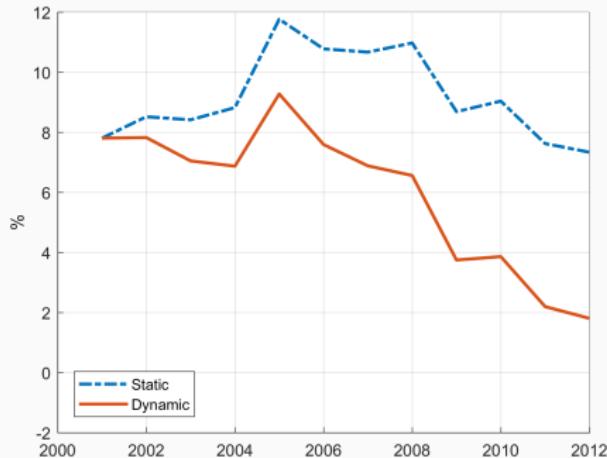
- $\Delta \log(K_h)$: ‘capital content’ of FDI, corresponding exactly to the welfare prediction if FDI is interpreted through the lens of a neoclassical model
- $\Delta \log(A_h)$: the ‘technology content’

Static gains from FDI and the source of gains

ISO	Decomposition of the Static Effect (2001)			Comparison Between Static and Dynamic	
	(1) MP Share	(2) $\Delta \log(w_h)$	(3) $\Delta \log(A_h)$ fraction (%)	(4) Static: Average	(5) Dynamic: Average
ARG	0.13	0.05	49.25	0.07	0.05
CAN	0.29	0.12	54.79	0.16	0.10
CHE	0.22	0.08	14.82	0.12	0.09
CHN	0.09	0.04	88.67	0.06	0.03
CZE	0.11	0.04	56.80	0.04	0.03
IRL	0.86	0.51	3.06	0.40	0.21
ITA	0.04	0.01	37.85	0.02	0.01
MEX	0.16	0.07	63.14	0.08	0.05
POL	0.17	0.07	65.06	0.11	0.07
PRT	0.08	0.03	43.64	0.04	0.03
USA	0.08	0.03	43.09	0.03	0.02
...					
Mean	0.13	0.08	48.89	0.09	0.06
Std	0.18	0.10	20.37	0.09	0.07

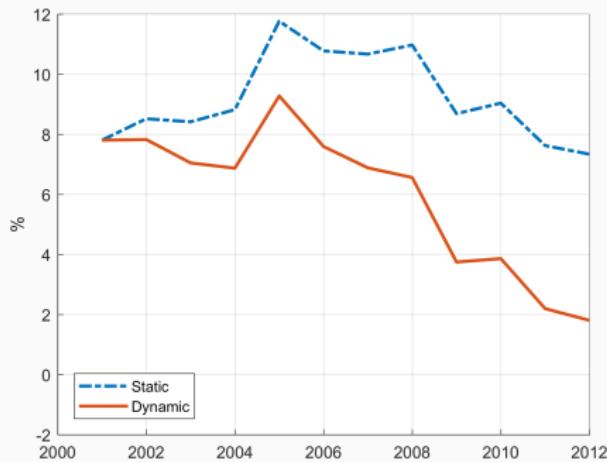
- ‘Technology’ content equally important compared to ‘capital’
- Focusing on capital underestimates the static effect by 50% on average...
- ... and underestimates especially for developing countries

Dynamic v.s Static gains, the case of Hungary



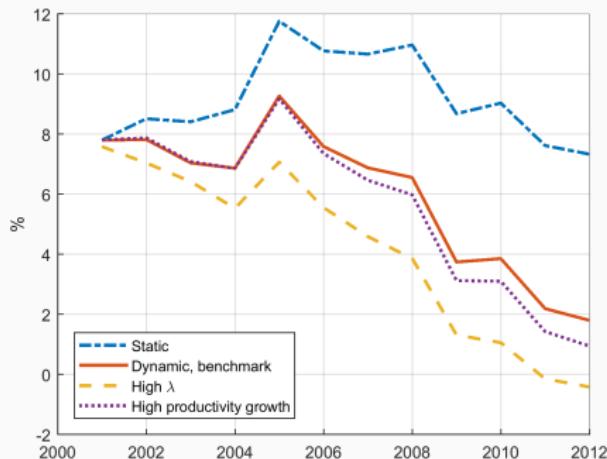
- Dynamic gains decline over time since foreign entry crowds out domestic firms
 - Competition suppresses growth of domestic firms, which are constrained by size
 - Despite full bond market integration (in contrast to e.g., Gourinchas and Jeanne (2006b))

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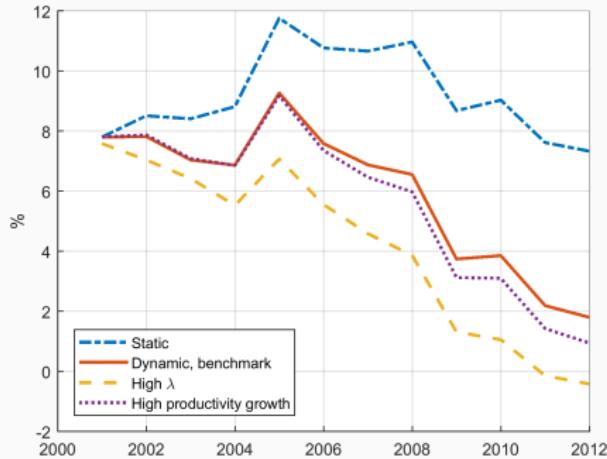
- Dynamic gains decline over time since foreign entry crowds out domestic firms
 - Competition suppresses growth of domestic firms, which are constrained by size
 - Despite full bond market integration (in contrast to e.g., Gourinchas and Jeanne (2006b))
- Further foreign entry not sufficient to bid up wages because
 - The elasticity of foreign entry w.r.t. investment return is finite
 - The capacity of foreign affiliates is constrained by capital from their parents

Dynamic gains: comparative statics



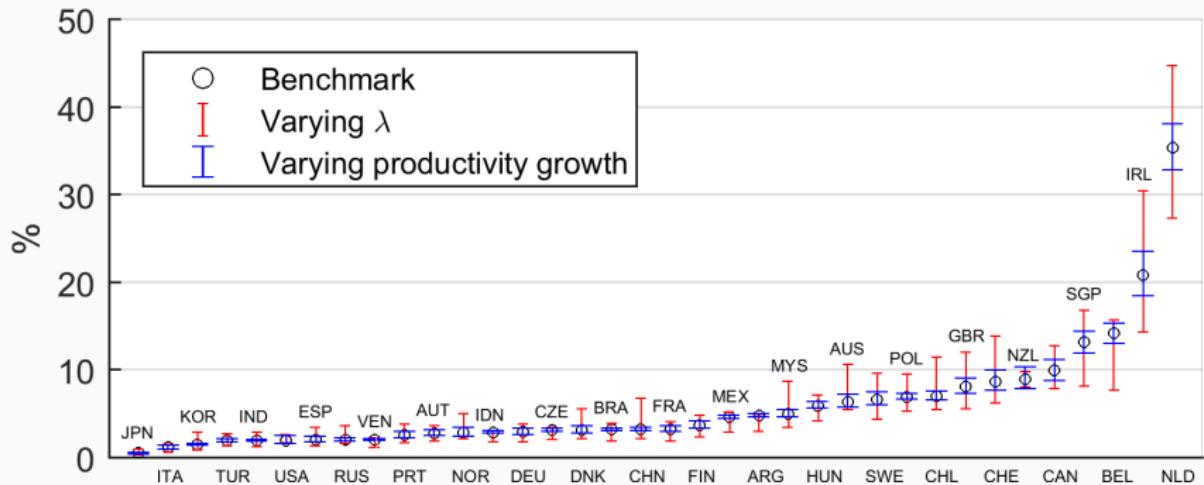
- The long-run short-run gap larger for
 - Countries with rapid productivity growth/more efficient financial market

Dynamic gains: comparative statics



- The long-run short-run gap larger for
 - Countries with rapid productivity growth/more efficient financial market
- Could potentially be negative:
 - Key elements: **financial constraint** and **technology-embedded capital**
 - Intuition: social planner would like future productive firms to be larger.
Incomplete market rules out borrowing on the prospect of future productivity

Dynamic gains: varying host country primitives



- Ignoring heterogeneity in host country primitives leads to biased estimates of dynamic welfare gains.

Conclusion and discussions

- Empirical facts supporting financial factors as important determinants for activities of MNCs
- A model of MNC with joint transfer of technology and capital
 - Changes in financial market conditions account for a sizable share of growth and slowdown of FDI during 2001-2012
 - Welfare gains from FDI depend on technology embedded in the capital flows
 - Dynamic gains differ from static gains and vary by host country primitives
- We haven't considered
 - Household savings \Rightarrow portfolio and direct investments in a unified framework
 - Technological spillovers \Rightarrow dynamic gains can be larger

Additional Materials

Correlation Between MP and FDI

3	(1)	(2)	(3)	(4)
Dependent Variable	Log (MP)			
log (FDI)	0.933*** (0.040)	0.589*** (0.047)	0.422*** (0.061)	0.432*** (0.062)
log (number of affiliates)		0.562*** (0.063)	0.495*** (0.061)	0.491*** (0.061)
Observations	2270	2092	1353	1349
R ²	0.736	0.878	0.978	0.980
Home country FE			Yes	Yes
Host country FE			Yes	Yes
Bilateral distance measures				Yes

Host Financial Institutions and MNC Activities

Dependent Variable	(1) Log (FDI)	(2)	(3)	(4)	(5) Log (MP)	(6)
Log (financial development index)	3.189*** (1.221)	0.589* (0.331)	0.420* (0.221)			0.257** (0.122)
Log (FDI)			0.584*** (0.064)	0.600*** (0.065)	0.586*** (0.065)	0.370*** (0.038)
Log (credit info depth)				0.246 (0.274)		
Log (creditors' right)					0.274* (0.156)	
Log (number of affiliates)						0.543*** (0.067)
Observations	2840	1833	982	915	982	793
R ²	0.250	0.850	0.962	0.960	0.963	0.979
Home country FE	yes	yes	yes	yes	yes	yes
Additional host characteristics		yes	yes	yes	yes	yes
Bilateral distance measures	yes	yes	yes	yes	yes	yes

- Financial development index from the World Bank as in Desbordes and Wei (2017)

Host Financial Institutions and MNC Activities

Dependent Variable	(1)	(2)	(3)	(4)	(5)
	Log (FDI)				Log (MP)
Log (financial development index)	4.102*** (1.586)	0.968*** (0.285)			0.290 (0.348)
Log (credit info depth)			0.172 (0.578)		
Log (creditors' right)				0.642*** (0.208)	
Log (FDI)					0.752*** (0.045)
Observations	2947	1717	1616	1717	998
R ²	0.249	0.882	0.873	0.885	0.965
Host country FE	yes	yes	yes	yes	yes
Additional home characteristics		yes	yes	yes	yes
Bilateral distance measure		yes	yes	yes	yes

Aggregation across ζ

Define $\bar{R}_i(z) \equiv \max_{h'} \bar{\eta}_{ih'} R_{ih'}(z)$, $\tilde{R}_i(z) \equiv \left(\frac{1}{N} \sum_{h'} [\bar{\eta}_{ih'} R_{ih'}(z)]^\theta \right)^{\frac{1}{\theta}}$:

Lemma

For firms with $\bar{R}_i(z) < 1 + r_i^b$, the fraction being active is $[\tilde{R}_i(z)/(1 + r_i^b)]^\theta$.

Among the active firms, the fraction investing in host h is

$$\hat{e}_{ih}(z) = [\tilde{R}_i(z)/(1 + r_i^b)]^\theta \chi_{ih}(z), \text{ where } \chi_{ih}(z) \equiv \frac{1}{N} \left(\frac{\bar{\eta}_{ih} R_{ih}(z)}{\tilde{R}_i(z)} \right)^\theta$$

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- θ governs the elasticity of FDI w.r.t. investment returns
 - The expected return to the net worth $\mathbb{E}[R_i^a(z, \zeta)|z]$ can be written in closed forms

Aggregation across ζ

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Among the active firms, the fraction investing in host h is

$$\hat{e}_{ih}(z) = [\tilde{R}_i(z)/(1 + r_i^b)]^\theta \chi_{ih}(z), \text{ where } \chi_{ih}(z) \equiv \frac{1}{N} \left(\frac{\bar{\eta}_{ih} R_{ih}(z)}{\tilde{R}_i(z)} \right)^\theta$$

For firms with $\bar{R}_i(z) \geq 1 + r_i^b$, the fraction being active is 1. The fraction investing in host h is... more

- θ governs the elasticity of FDI w.r.t. investment returns
 - The expected return to the net worth $\mathbb{E}[R_i^a(z, \zeta)|z]$ can be written in closed forms
 - For $\bar{R}_i(z) \geq 1 + r_i^b$, extra care should be taken of for the mass at the bottom truncation

Aggregation across η

Lemma

If $\bar{R}_i(z) \geq 1 + r_i^b$, the share of active firms is 1. If the set $\bar{\mathbb{H}} = \arg \max_{h'} \bar{\eta}_{ih'} R_{ih'}(z)$ is a singleton, the share of active firms investing in h is

$$\hat{e}_{ih}(z) = \begin{cases} 1 - [1 - \chi_{ih}(z)][\tilde{R}_i(z)/\bar{R}_i(z)]^\theta, & \text{if } h \in \bar{\mathbb{H}}, \\ \chi_{ih}(z)[\tilde{R}_i(z)/\bar{R}_i(z)]^\theta, & \text{if } h \notin \bar{\mathbb{H}}, \end{cases}$$

with $\chi_{ih}(z)$ defined before. The expected return to the net worth of these firms is

$$\begin{aligned} \mathbb{E}[R_i^a(z, \eta)|z] &= \left(1 - [\tilde{R}_i(z)/\bar{R}_i(z)]^\theta\right)\bar{R}_i(z)(1 + \lambda_i) \\ &\quad + [\tilde{R}_i(z)/\bar{R}_i(z)]^\theta \frac{\theta}{\theta - 1} \bar{R}_i(z)(1 + \lambda_i) - (1 + r_i^b)\lambda_i. \end{aligned}$$

Validation: MP-FDI linkages

Proposition (MP-FDI linkages in the model)

$$\frac{Y_{ih}}{Y_h} = \frac{[FDI]_{ih}}{K_h} \times lev_{ih} \times \frac{A_{ih}}{A_h}$$

Validation: MP-FDI linkages

Proposition (MP-FDI linkages in the model)

$$\frac{Y_{ih}}{Y_h} = \frac{[FDI]_{ih}}{K_h} \times \bar{lev}_{ih} \times \frac{A_{ih}}{A_h}$$

$$\Rightarrow \log\left(\frac{\text{MP Share}_{ih}}{\text{FDI Share}_{ih}}\right) = \log(\bar{lev}_{ih}) - \log\left(\frac{A_h}{A_{ih}}\right)$$

	(1) Model	(2) Data
Log (average lev)	1.540*** (0.168)	1.131* (0.579)
Log (dest TFP/source TFP)	-0.596*** (0.058)	-0.310 (0.218)
Observations	36	36
R ²	0.827	0.117

Robust standard errors in parenthesis.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Validation: model v.s external measures of financial development

	(1)	(2)	(3)	(4)
	$\bar{\lambda}_i$	$\bar{\mu}_h$	$\bar{\mu}_h$	$\Delta\mu_h$
log (financial development idnex)	0.453*** (0.153)	0.318** (0.155)		
$\bar{\lambda}_i$			0.275* (0.157)	
$\Delta\lambda_i$				0.365*** (0.105)
Observations	36	36	36	396
R ²	0.204	0.110	0.083	0.074

Robust standard errors in parenthesis.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Validation: return wedge v.s measurable outcomes

back

	(1)	(2)
	log($\bar{\eta}_{jh}$) in year 2001	
log(distance)	-0.227*** (0.013)	-0.183*** (0.021)
common border	0.009 (0.042)	0.053 (0.049)
colonial tie	0.253*** (0.046)	0.255*** (0.045)
common language	0.129*** (0.034)	0.185*** (0.060)
low tax country		0.367*** (0.058)
profit tax		0.002 (0.003)
log(FDI restriction)		-0.443*** (0.147)
log (host financial development index)		0.041 (0.108)
log GDP		0.022 (0.020)
TFP		0.864*** (0.171)
Observations	1048	1007
R ²	0.772	0.672
Host country FE	yes	
Home country FE	yes	yes

Notes: robust standard errors in parenthesis

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

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