Productivity Gains from Foreign Direct Investment Micro and Macro Approaches

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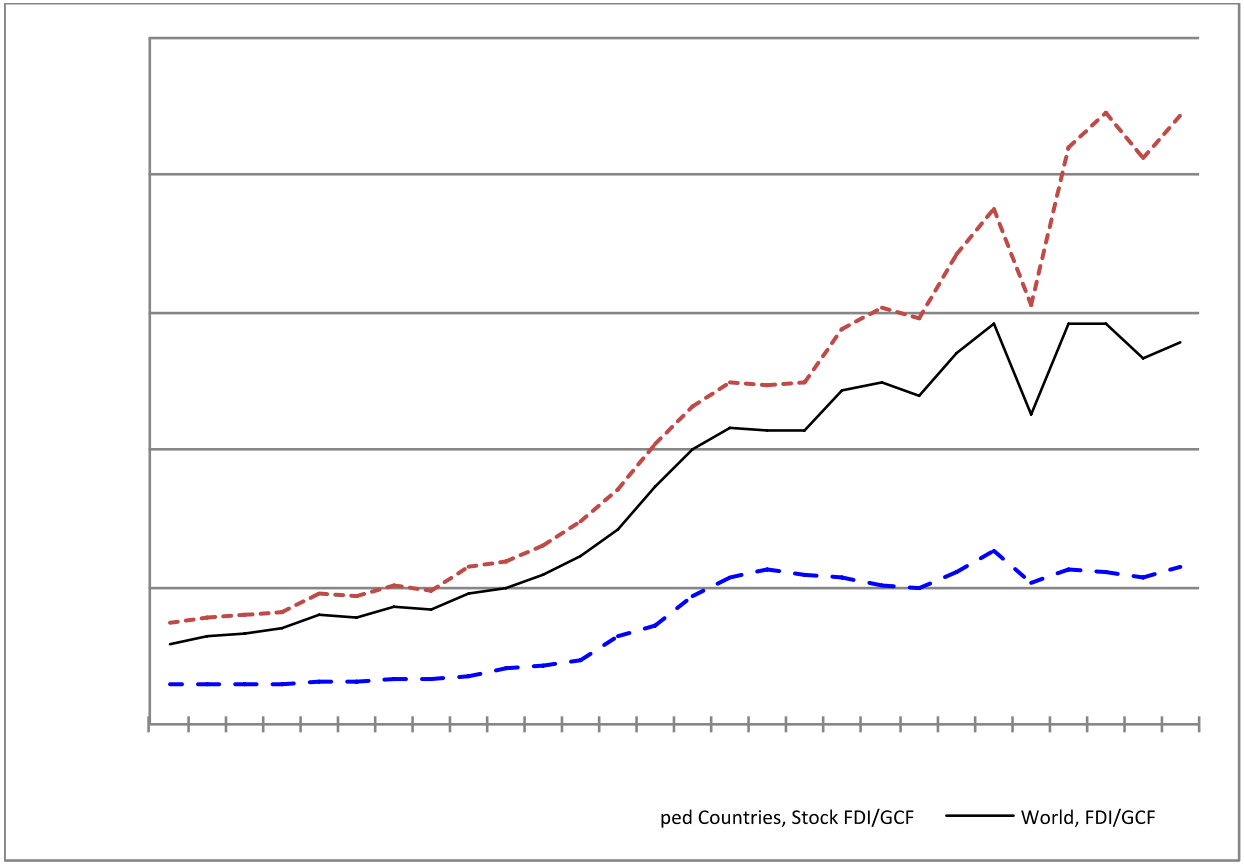
Foreign Direct Investment as a % of Gross Capital Formation

(Source: UNCTAD)



FDI: Potential Positive Effects

Capital + Technology + Management Skills

- Capital/Jobs
- Productivity gains
- Accelerated diffusion of new technologies
- Introduction of new products and processes
- Employee Training

- International Production Networks
- Access to new markets
- Linkages
- Low volatility compared to other Capital Flows

Road Map

- Examine the relationship between foreign direct investment (FDI) and growth/productivity in host countries, particularly developing countries.
- Macro Approach:

  The role of complementary local conditions conducive to reaping the benefits of FDI
- Micro Approach:

  S*ources* of effects and gains
- Theoretical Framework:

  Guide research

Empirical Evidence on Benefits?

…remains ambiguous, in particular for developing countries.

- Micro level: Aitken and Harrison (1999): FDI raises productivity within plants with the foreign investment but lowers that of domestically owned plants (Venezuela)

- Macro level: Alfaro et al. (2004), Borensztein, De Gregorio, and Lee (1998), Carkovic and Levine (2000) find little support that FDI has an exogenous positive effect on economic growth

Role of Local Conditions…

While FDI has the potential to contribute to the development efforts of a country, domestic conditions (institutions) matter as well:

- Productive assets available
- Policy environment
- … and *the development of local financial markets*, which can limit the economy's ability of taking advantage of potential FDI spillovers.
  - ✓ Increase absorptive capacities of a country with respect to FDI

The Role of Financial Markets and FDI... How?

- Although FDI by its very nature relies on capital from abroad … FDI uses local funds and financial markets - Kindleberger (1969)

- To take advantage of new knowledge: local firms reorganize their structure, buy new machines, and hire new managers and skilled labor: internal financing + external financing.

- Well-functioning financial markets, by increasing the spectrum of sources of finance for entrepreneurs, play an important role in creating linkages between domestic and foreign investors.

The Role of Local Financial Markets

To summarize:

- The development of financial institutions may be a decisive factor in determining whether foreign firms operate in isolated enclaves with no links with the domestic economy (beyond hiring labor—Chiquita).

- Or ….they become the catalysts for technology transfers and other benefits that economists long have argued these firms should be

> *"In countries where there is little money to lend, enterprising traders are long kept back, because they cannot at once borrow the capital, without which skill and knowledge are useless."*
>
> Bagehot, 1873

FDI, Financial Markets and Growth

- Alfaro, Chanda, Kalemli-Ozcan, and Sayek (2004) and Alfaro, Kalemli-Ozcan and Sayek (2009) empirically examine whether economies with better-developed financial markets are able to benefit from FDI to promote their economic growth

- Findings:
  - FDI alone plays an ambiguous role in contributing to economic growth
  - However …. countries with well-developed financial markets seem to gain significantly more from FDI

- Results are robust:
  - Controlling growth determinants
  - Numerous financial market indicators
  - Endogeneity

Data: Credit Markets and Stock Market

- *Liquid Liabilities of the Financial System* (*LLY*): currency + demand + interest-bearing liabilities of banks and non-financial interm. / GDP
- *Commercial-Central Bank Assets (BTOT):* ratio of commercial bank assets divided by commercial bank plus central bank assets
- *Private Credit (PRIVCR):* value of credits by financial intermediaries to the private sector divided/ GDP
- *Bank Credit (BANKCR):* equals the credits by deposit money banks to private sector as a share of GDP
  - ✓ 71 countries for 1975-95 (20 industrialized)

- *Value Traded (SVALT)* of Domestic Shares/GDP: stock market liquidity.
- *Capitalization (SCAPT)*: Value Listed Domestic Shares/GDP: relative size of stock market
  - ✓ 50 countries for 1980-1995 (20 industrialized)

Sources: King and Levine (1993), Levine and Zervos (1998), and Levine et al. (2000)

Empirical Analysis

- Examine the capital markets channel through which FDI may have additional growth effects

$$Growth_i = \beta'_0 + \beta_1 FDI + \beta'_2 (FDI*FINANCE) + \beta'_3 FINANCE + \beta_4 CONTROLS_i + v_i$$

Table 3: Growth and FDI
Dependent Variable—Average annual per capita growth rate

	(1)	(2)	(3)	(4)
Period	1975-95	1975-95	1980-95	1980-95
Observations	71	71	49	49
log (Initial GDP)	-0.009	-0.011	-0.007	-0.016
	(-2.55)	(-3.87)	(-2.80)	(-3.51)
FDI/GDP	0.16	-0.076	0.347	0.063
	(0.48)	(-0.25)	(2.31)	(0.27)
Schooling	0.014	0.011	-0.006	0.0001
	(3.23)	(2.62)	(-1.41)	(0.02)
Population Growth	-0.805	-0.192	-0.948	-0.265
	(-2.51)	(-0.61)	(-3.59)	(-0.91)
Government Consumption	0.0001	-0.0003	0.008	-0.003
	(0.02)	(-0.07)	(0.98)	(-0.35)
Sub-Saharan Africa Dummy	-0.007	-0.017	-0.021	-0.021
	(-1.15)	(-2.63)	(-4.78)	(-3.80)
Institutional Quality	--	0.005	--	0.011
	--	(2.62)	--	(2.82)
Black Market Premium	--	-0.006	--	0.007
	--	(-1.68)	--	(2.00)
Inflation	--	-0.018	--	-0.003
	--	(-1.86)	--	(-0.25)
Trade Volume	--	0.000005	--	0.008
	--	(0.000)	--	(1.25)
R^2	0.37	0.59	0.34	0.60

Table 4: Growth and FDI: The Role of Financial Markets
Dependent Variable—Average annual real per capita growth rate

	(1) BTOT	(2) BANKCR	(3) LLY	(4) PRIVCR	(5) SCAPT	(6) SVALT
Period	1975-95	1975-95	1975-95	1975-95	1980-95	1980-95
Observations	71	71	71	71	49	53
log (Initial GDP)	-0.013	-0.012	-0.01	-0.012	-0.017	-0.017
	(-4.00)	(-3.81)	(-3.18)	(-3.76)	(-3.60)	(-4.22)
FDI/GDP	0.154	0.917	0.504	0.588	0.121	0.341
	(0.45)	(2.01)	(1.67)	(1.56)	(0.68)	(1.83)
(FDI/GDP)*Financ. Markets	0.899	0.893	1.169	0.777	0.335	0.169
	(1.91)	(2.85)	(3.08)	(2.68)	(2.61)	(1.89)
Financial Markets	-0.0003	-0.004	-0.004	-0.002	0.00007	0.0005
	(-0.00)	(-1.00)	(-0.77)	(-0.55)	(0.03)	(0.26)
R^2	0.62	0.64	0.66	0.64	0.67	0.68
F-statistic for Financial Mkts	2.35	4.31	6.31	3.94	3.67	3.17
(Prob>F)	(0.10)	(0.018)	(0.003)	(0.024)	(0.035)	(0.052)
F-statistic for FDI	2.29	4.37	4.82	3.88	4.08	2.32
(Prob>F)	(0.11)	(0.017)	(0.011)	(0.026)	(0.025)	(0.11)

Endogeneity

- IV $\rightarrow$ Instruments

Financial markets: Origins of a country's legal systems and creditor rights:

- La Porta, Lopez-de-Silanes, Shleifer and Vishny (1998) (LLSV variables)
- Levine, Loayza and Beck (2000): high priority to creditors rights + legal systems that enforce *laws* and good accounting standards $\rightarrow$ better developed financial markets

FDI (Micro Literature): Real exchange rates and lagged values of FDI

- Real exchange rates, either through altering relative costs or relative wealth, impact FDI's decisions. Froot and Stein (1991)
- Wheeler and Mody (1992) find that existing stock of FDI is a significant determinant of current investment decisions

Table 7: Growth and FDI: The Role of Financial Markets—Endogeneity (IV)
Dependent Variable—Average annual per capita growth rate

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Period	1975-95	1975-95	1980-95	1980-95	1980-95	1980-95	1980-95
Observations	73	73	50	50	36	48	32
log (Initial GDP)	-0.01	-0.013	-0.011	-0.012	-0.013	-0.01	-0.006
	(-2.58)	(-2.15)	(-1.90)	(-2.16)	(-2.57)	(-2.17)	(-0.82)
FDI/GDP	2.75	1.585	0.213	0.148	-0.178	0.243	1.525
	(1.92)	(1.60)	(0.89)	(0.62)	(-0.75)	(0.79)	(1.84)
(FDI/GDP)*Financ.	2.51	1.918	0.552	0.514	0.441	0.68	1.221
	(2.04)	(1.85)	(2.47)	(2.41)	(1.77)	(1.69)	(1.89)
Financial Markets	-0.014	-0.009	-0.0009	0.002	0.011	-0.003	0.001
	(-0.92)	(-0.50)	(-0.09)	(0.24)	(1.67)	(-0.37)	(0.13)
Schooling	0.014	0.012	-0.007	-0.002	-0.007	0.001	-0.016
	(2.66)	(1.99)	(-0.08)	(-0.28)	(-0.71)	(0.10)	(-1.46)
OIR Test	0.175	0.028	0.311	0.291	7.22	3.477	1.42
(Prob > χ^2)	(0.915)	(0.989)	(0.855)	(0.571)	(0.30)	(0.481)	(0.83)

Alfaro, Chanda, Kalemli-Ozcan and Sayek (2010) Exploring the Mechanism

- Objective:
  - Formalize one mechanism through which the trickle down effect of FDI depends on the extent of local conditions.
  - A framework consistent with micro and macro evidence.
- Focus interaction:
  - FDI ↔ Market Structure / Financial Markets ↔ Linkage Effects
  - Additional local conditions: human capital endowments; cost of doing business.
- Illustrate quantitative properties of the model for realistic parameters.

Benefits: Backward Linkages

- FDI spillovers more likely to be inter-industries:
  - Multinationals would like to prevent information leakage to potential local competitors but would benefit from knowledge spillovers to their local suppliers.
    - Javorcik (2004), Alfaro and Rodriguez-Clare (2004): evidence in favor of backward linkages: i.e., contacts between domestic suppliers of intermediate inputs and their multinational clients.

+… Role of Local Conditions…

While FDI has the potential to contribute to the development efforts of a country, domestic conditions (absorptive capacities) matter as well:

- Market structure: interaction foreign – local firms.
- Productive assets available: e.g. human capital; Borensztein et al. (1998).
- Local financial markets: e.g. the absence of well-developed financial markets can restrict entrepreneurs from taking advantage of potential backward/forward linkages from/to foreign firms; ACKS (2004).

Key Elements of the Model

- Final Sector: foreign and local firms may be complements or substitutes.
- Local Intermediate Good Firms: backward linkages.
- Growth from Innovation in the Intermediate Goods Sector;
  - Entrepreneurs: produce intermediate goods in a monopolistic market,
    - Engage in innovation… and incur startup capital expenditures which must be borrowed from the domestic financial institutions at a positive cost.

The Financial Markets

- Entrepreneurs are resource constrained: If they choose to develop a new variety, they have to borrow the initial setup cost in the domestic financial market.
  - Only then can they manufacture the intermediate good.
- The domestic markets intermediate foreign funds at a cost (reflecting inefficiencies in the financial sector)
  - There is a wedge between the lending rate, r, and the borrowing rate, i, ($i>r$).
- An individual chooses to become an entrepreneur if the present value of profits of running an intermediate good firm exceed the setup costs.
  - If the local financial markets are good enough, more entrepreneurs will start their own firm: positive effects to the final good sector.

Benchmark Case: Increase in Foreign Presence

μ	Growth Rate High Fin.	Growth Rate Medium Fin.	Growth Rate Low Fin.	Relative Output pfYf/pd Yd
0.1	**3.10**	**2.13**	**1.42**	**0.065**
	1.25	0.88	0.61	
0.2	**4.35**	**3.01**	**2.03**	**0.155**
	1.83	1.29	0.89	
0.3	6.17	4.29	2.92	0.257
0.4	8.74	6.10	4.17	0.369
0.5	12.25	8.57	5.88	0.487
0.6	16.97	11.89	8.18	0.612

Quantitative Implications of the Model

- For the same share of foreign production in total output, countries with more developed financial markets: twice as high growth rates.
- Increases in the amount of FDI (or the technology gap between foreign-owned firms and domestically owned firms), additional growth effects generated in the financially well-developed countries 3 x those financially poorly-developed countries.
- Differences in growth rates increase when domestic firms and MNEs are substitutes rather complements.
- Differences in higher growth rates increase by varying the relative skill ratios while assuming that MNEs use skilled labor more intensively.

FDI and Growth:
The Role of Local Financial Markets

- FDI plays an important role in contributing to economic growth
    - Local conditions matter,
        - Empirical/Simulation results.
        - Heterogeneity.

MNC Activity: Macro and Micro Data

- Researchers tend to use industry level MNC activity or FDI flows from the Balance of Payments statistics as proxy for MNC activity.
- MNC activities are best measured by firm-level data (Barba Navaretti and Venables, 2005).
  - Few countries have firm level data.
    - U.S. BEA: confidential
- Solution:
  - Find other sources of business “compilations” (registries, tax sources).
  - Many sources do this (e.g. UNIDO, Amadeus, D&B, BHS): not census.

The D&B Data

- Worldbase data: database of both public and private companies in more than 205 countries and independent territories in 2004. Complied by Dun and Bradstreet.
- The unit of record is the ‘establishment’ rather than the firm.
- 4-digit SIC-1987 code of the primary industry in which firm operates; for several countries, SIC codes of up to 5 secondary industries listed in descending order of importance.
- Detailed ownership information: including information about the firm’s family members (no of family members, its domestic parent and its global parent).
- Information about the firm’s status (joint-venture, corporation, partnership) and its position in the hierarchy (branch, division, head quarters).
- Sales, employment, export, age.

Foreign Ownership

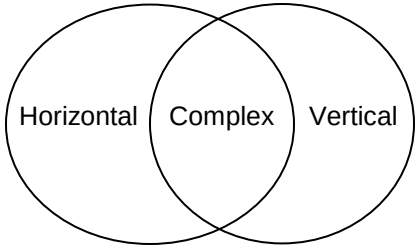
- Establishment: foreign owned if it satisfies two criteria:
  - Foreign owned: must report a global parent firm and that parent firm must be in a different country.
  - Parents are defined in the data as entities which have legal and financial responsibility for another firm.
- Combining the location and ownership information it is possible to identify 650 000+ firms in the database which are owned by a foreign parent.

Alfaro and Charlton (2009)

- Study patterns of vertical and horizontal multinational activity: large new data set of 650,000 multinational subsidiaries in 90+ countries (close to population of MNCs).
- Traditionally, the literature has distinguished between two forms of—and motivations for—multinational activity.
  - "Horizontal" FDI: locating production to be closer to customers and avoid trade costs (Markusen, 1984; Brainard, 1993),
  - "Vertical" FDI: firm's attempts to take advantage of cross-border factor cost differences (Helpman, 1984; Helpman and Krugman, 1985).
    - Most research has found that the bulk of FDI is horizontal.
- Our results suggest that, due to data limitations, the literature has systematically under-estimated vertical FDI.

Measuring Horizontal and Vertical

- We calculate bilateral horizontal and vertical FDI using firm ownership data and U.S. input output matrix.
  - Horizontal FDI: activity of those foreign owned subsidiaries in the same industry as their parent.
  - Vertical FDI: activity of foreign owned subsidiaries in industries which are upstream from their parent's industry (according to the US input output matrix).
  - Complex FDI: firms satisfy both.
  - None: If they satisfy neither of these criteria.



Patterns

- Consistent with conventional wisdom,
  - The bulk of multinational activity occurs between the rich nations.
  - At the 2 digit industry level: horizontal FDI (subsidiaries in the same industry as their parent) > vertical FDI (subsidiaries which supply their parent with inputs).
- But …
  - At the 4 digit level, more vertical activity.

    → Many of the foreign subsidiaries in the same 2 digit industry as their parent are in fact producing highly specialized inputs into their parents' production.
  - This pattern prevails even within developed countries.

Discrepancy: Misclassification of Vertical FDI

- Significant amount of vertical FDI was misclassified as horizontal:

  1. Most vertical FDI is north-north, it has been assumed to be market seeking (horizontal)
     - Firm level data indicates that these are vertical relationships.
  2. Skill differences between parent and subsidiaries are small (even within vertical FDI):
     - This also lends support to horizontal motivations.
  3. The vertical nature of these relationships is missed at the 2 digits:
     - Many subsidiaries are vertical sectors to their parents but both the input and the final good are in the same 2 digit SIC.

Intra Industry FDI

- We call these subsidiaries unveiled at higher levels: '*intra*-industry vertical' FDI.
  - Qualitatively different to vertical subsidiaries which cross two-digit industry codes ('*inter*-industry vertical FDI').
    - High-skill products
    - Mostly located in high-skill countries.
- Patters are consistent with trade data documenting large flows of intra-firm trade in intermediate inputs between rich countries, Bernard et al. (2006).

Why does this Matter? Effects of FDI

- Different motivations for FDI differ on how multinational activity affects factor incomes within and across countries.
- Horizontal FDI: substitutes for trade
  - Multinational activity may raise income in each country without necessarily changing its distribution.
- Vertical FDI: complement to trade
  - Multinational activity may reduce absolute wage differences across countries and alter relative wages within countries.
- Intra-industry FDI: subtle effects on income distribution
  - Driven primarily by ownership considerations rather than cross-border factor cost differences: tendency of multinational firms to own certain stages. Ownership patters: Alfaro, Antràs, Chor and Conconi (2015).

Why does this Matter?
Effects of FDI

- Resilience to Shocks
  - The Global Financial Crisis: MNC Performance
    - Production Linkages (Vertical, Horizontal)

  Alfaro and Chen (2012a,b).

Global Financial Crisis and MNC activity Using Micro Data

- The severity of the Global Financial Crisis led many economists to explore its macro patterns and causes: mixed evidence.
  - Eaton et al. (2009), and Chor and Manova (2011), among others, find manufacturing demand, vertical specialization, and credit conditions to play important role in the great trade collapse.

- Less explored in this debate is the pattern of micro economic responses to the recent global financial crisis.

Alfaro and Chen (2012a, b)
Objective

- We examine the differential performance of establishments during the global crisis with particular emphasis on the role of foreign ownership.
  - We exploit how multinational subsidiaries around the world responded to the crisis relative to local establishments and the underlying mechanisms that led to the differential impact.
  - We explore the time variation of the data and separately consider the non-crisis (2005-2007) and the crisis (2007-2008) periods.

Challenges

- It is difficult to disentangle the effect of foreign ownership from other establishment-level characteristics (size, productivity, and macroeconomic factors (market demand, credit conditions).
- Different aspects of foreign ownership can exert different, and even opposing, impact on establishment performance, resulting in an ambiguous net effect.
  - The footloose nature of multinational production can lead to more volatile performance while financial market diversification can lend stronger stability.
- Foreign ownership can affect establishment performance in both crisis and non-crisis periods.

How Do We Address the Question?

- To disentangle the effect of foreign ownership from establishment and macroeconomic factors,
  - Matching technique: create a missing counterfactual for each MNC subsidiary with a local establishment that shares similar attributes and operates in the same country and industry.
- Matching on the basis of characteristic similarity helps control for observable and unobservable differences MNC subsidiaries and local establishments.
- Drawing the match from the same country and industry helps control for macroeconomic factors:
  - Foreign ownership effect is inferred from the divergence in the performance paths between MNC subsidiaries and their local matches.

Empirical Results:
Estimated Average Effect of Foreign Owenship

	(1) Crisis	(2) Non-crisis	(3) Diff.
Performance difference b/w	0.03***	0.002*	0.028**
MNC subsidiaries and local matches	(0.01)	(0.001)	(0.01)
Number of matched pairs	43,513	43,513	43,513

Notes: This table reports MNC subsidiaries' average performance difference from their local matches in crisis and non-crisis periods. Performance is measured by the annual percentage change in sales. Propensity score matching is employed to identify the matches of MNC subsidiaries. Standard errors are bootstrapped with industry clustering and reported in the parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

MNC subsidiaries responded on average better than local controls with similar economic characteristics.

-Advantage clearly pronounced during the crisis, while relatively muted during non-crisis years.

Linkages

- Production linkages (Alfaro and Charlton, 2009).
  - Vertical
  - Horizontal
    - Subsidiaries sharing stronger vertical production linkages with the parents are expected to exhibit more resilience during the crisis.
      - Bernard et al. (2009) have shown that intra-firm trade fell less than unrelated-party trade during the Asian financial crisis.
- Financial linkages
  - MNCs' internal capital markets enable financial market diversification and lower MNC subsidiaries' dependence on host-country credit conditions, an advantage particularly important when host countries experience credit crunches.

Production Linkages

Table 2: Estimated Average Effect of Foreign Ownership by Type of Production Linkages

	(1) Crisis	(2) Non-crisis	(3) Diff.
Performance difference: Horizontal	0.02	0.002**	0.018
	(0.013)	(0.001)	(0.01)
Performance difference: Vertical	0.23**	-0.001	0.23**
	(0.10)	(0.01)	(0.10)
Performance difference: Neither	0.03	0.003	0.027
	(0.04)	(0.002)	(0.02)

Notes: This table reports MNC subsidiaries' average performance difference from their local matches, by type of production linkages, in crisis and non-crisis periods. Performance is measured by the annual percentage change in sales. Propensity score matching is employed to identify the matches of MNC subsidiaries. Standard errors are bootstrapped with industry clustering and reported in the parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Findings

- Establishments sharing stronger vertical production linkages with foreign parent firms exhibited more resilient performance during the crisis.
  - Horizontally linked establishments responded less positively.
- The role of vertical production linkages is found exclusive to the crisis period and absent in non-crisis years.
- Foreign ownership plays a significant and complex role in micro economic responses to economic crises.
  - Foreign ownership can either exacerbate or alleviate the adverse impact of the crises depending on the nature and the intensity of the linkages between MNC subsidiaries and parent firms.

Sources of Gains: Productivity, Spillovers, and Selection

- The positive correlation between MNC activity and productivity, when established casual, is often attributed to *within-firm productivity gains*, e.g. when foreign multinationals generate positive productivity externalities to domestic firms:
  - Knowledge transfer through partnerships, sharing inputs, interaction and movement in labor markets, etc.

- There is, however, a less stressed, alternative explanation, centering on *between firm selection and market reallocation*
  - Greater multinational activity leads to tougher competition and market reallocation, and allows only the most productive domestic firms to survive (Melitz, 2003).

MNC Activity and Productivity

- All imply a positive relationship between MP and productivity; their implications for domestic economies are different.
  - Within-firm productivity ("intensive margin"): foreign firms raise the productivity of continuing domestic firms:
    - expansion of domestic industries; stimulates local tech development.
  - Between firm selection and market reallocation ("extensive margin)"
    - contraction of domestic industries and may hinder domestic entrepreneurship.
- Disentangling the two effects is crucial for evaluating the effects of foreign investment and setting economic policies.
  - If within-firm improvements due to spillovers are the primary source of gains, special treatment to foreign MNCs may be justified;
  - If productivity increases arise also from firm selection and market reallocation: improve domestic factor market conditions to facilitate gains from reallocation.

Alfaro and Chen (2013)

- Distinguish the roles of reallocation and within-firm productivity in determining the aggregate productivity gains from multinational production.
- We develop an empirical framework based on an augmented model of heterogeneous firms to identify the two effects:
  - Exploring their distinct predictions on distributions of domestic productivity and revenues, employment and survival.
    - *Between-firm reallocation*: Greater competition from MP leads to higher factor prices and reallocation, an increase in the cutoff productivity and revenue and a leftward shift of revenue;
    - *Within-firm Productivity e.g.* from spillover results in a rightward shift of the productivity and revenue distributions.

Overview of Findings

- Using a large cross-country firm panel dataset (Orbis), we find productivity spillover and market reallocation are two significant but distinct sources of gains of MP.
  - Market reallocation: Entry of multinationals raises the cutoff productivity and revenue of domestic firms, and shift the revenue distribution leftward;
  - Spillover: Surviving domestic firms' productivity increases at different percentiles,
- Robustness: Employment distributions, wage effects; different measures of TFP; subsample of homogenous products; countries with better coverage; backward and forward linkages, related industries (labor and capital requirements), other controls.

Theoretical Framework: Setup

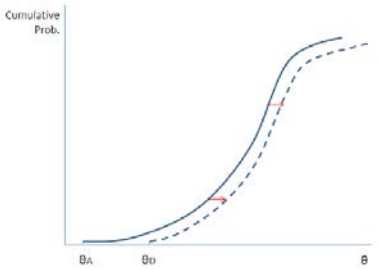
- Model of monopolistic competition with heterogeneous firms (Melitz, 2003 and Helpman, Melitz and Yeaple, 2004)
- *n+1* symmetric countries and two sectors, homogeneous (numeraire) and differentiated.
- Continuum of firms in each country, each producing a different variety of the differentiated product and drawing a distinct productivity level θ.
- Firms can serve foreign markets via exports or (MP), or domestic market.
- Fixed costs of serving foreign markets: cf_M/ϕ (MP), cf_X/ϕ (export), where c is the unit capital cost, ϕ is a firm-specific fixed-cost shifter governed by $H(\phi)$, Iceberg trade cost: *d;* and $d^{\varepsilon-1}f_X < f_M$; cutoff productivities.

Market Clearing Conditions: Labor and Capital

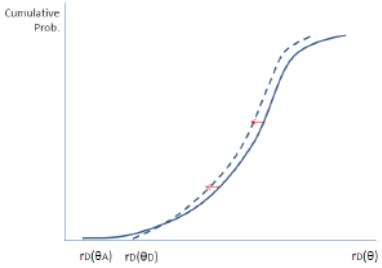
- Firms must make and initial investment cf_E.
  - Free entry condition: expected value of future profits = fixed entry cost.
- Labor
  - Total demand for labor in the domestic market = supply of labor
  - Domestic firms, N_D, foreign firms N_F, and exporting firms, N_X.
- Capital
  - Firms finance a constant share of their fixed foreign investment cost in home countries and the rest abroad (empirical evidence).

The Impact of Multinational Production

- Productivity Distribution:
  - a) spillovers enhance productivity of domestic firms (rightward shift of the distribution)
  - b) increase in the domestic cutoff productivity level θ_D (assuming spillovers do not offset market reallocation through factor competition).



- The Revenue Distribution.
  - Increase in the average productivity and in the number of firms serving the market: a decrease on revenues; while the spillover from foreign firms exerts a positive effect.



- If spillovers are small, firms incur a loss in domestic sales in the open economy.

Data: Orbis

- Cross-country firm-level panel dataset, drawn from Orbis: comprehensive financial, operation, and ownership information. .
  - Ownership information, time-series financial information; broad country coverage.
- Four categories of information:
  - Industry information Ownership information including domestic and global parents and domestic and foreign subsidiaries;
  - Location information;
  - Financial information including revenue, employment, asset, and material cost.
- Over 1 million manufacturing firms in 33 countries, 36,000 foreign owned manufacturing subsidiaries in NAICS 4-digit industries.
- Two sub-periods: 2002-2004 and 2005-2007: how changes in multinational production between the two periods affect host-country domestic firms.

Empirical Evidence—Stage 1
The Self-Selection of Multinational Firms

- Estimate the following equation:

$$\Pr\left[entry_{kijs}=1\right]=\left[\ln\theta-\ln\underline{\theta}_{M}>0\right]=\Phi_{\theta>\theta_D}\left[\ln\theta_{ki}+\frac{1}{\varepsilon-1}\ln\varphi_{kijs}+FE_{ijs}>0\right]$$

  - $entry_{kijs}$ represents *k* foreign multinationals' (HQ in country *i)* binary decision to enter a given host country *j* in industry *s* in 2005-2007,
  - θ_{ki} is the lagged productivity of multinational firms (estimated based on headquarters activities in 2002-2004)
  - ϕ_{kijs} is the change in firms k HQ cash flow in host country PPP value.
  - FE_{ijs} is a vector of country-pair industry dummies.

Table 1: The Entry Decision of Multinational Firms (Firm-Country Level)

Dependent variable:	(1) MNC entry	(2) MNC entry
HQ TFP	0.002***	0.001*
	(0.001)	(0.000)
Financial shock	0.002***	0.003***
	(0.001)	(0.001)
Host-country-ind FE	Yes	Yes
Country-pair-ind FE	No	Yes
Firm cluster	Yes	Yes
Obs	405,728	405,728
R square	0.04	0.33

Notes: (i) Linear probability (LP) estimates are reported; (ii) standard errors clustered at the firm level are reported in the parentheses; (iii) ***, **, and * represent statistical significance at 1, 5, and 10 percent, respectively.

- More productive firms/positive cash shock exhibit a greater likelihood of entering foreign countries, consistent with Helpman et al. (2004).

Table 2: Multinational Entry and Change in Average Productivity

Dependent variable:	(1) Change in ave TFP	(2) Change in ave TFP
MNC entry	0.01***	
	(0.004)	
MNC entry (predicted)		0.02**
		(0.01)
Beta coefficients	0.05	0.02
Host country FE	Yes	Yes
Industry FE	Yes	Yes
Obs	3,730	3,730
R square	0.52	0.52

Notes: (i) Columns (1) and (2) report OLS and instrumented estimates, respectively; (ii) bootstrapped standard errors are reported in the parentheses; (iii) ***, **, and * represent statistical significance at 1, 5, and 10 percent, respectively.

- Multinational activity exerts, on average, a positive and significant effect on the average productivity of domestic firms.
- But is the gain due to knowledge spillovers, selections, or both?

Empirical Evidence—Stage 2
Within-Firm Productivity Improvement

$$\ln \theta'_{js}(q) - \ln \theta_{js}(q) = \beta_0 \hat{z}_{Mjs} + FE_j + FE_s$$

Depdendent var.:	(1)	(2)	(3)	(4)	(5)
Change in TFP	All	Bin 1 (<25%)	Bin 2 (25-50%)	Bin 3 (50-75%)	Bin 4 (>75%)
MNC entry (predicted)	0.021***	0.029***	0.017***	0.020***	0.019***
	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)
Host-country FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Obs	397,618	99,997	99,104	100,068	98,449
R square	0.05	0.06	0.07	0.06	0.06

Notes: (i) Bootstrapped standard errors are reported in the parentheses; (ii) ***, **, and * represent statistical significance at 1, 5, and 10 percent, respectively.

-log change of productivity of the qth bin of domestic firms in host country j and industry s, on the predicted number of new multinational;

- A higher probability of new multinational firms: 0.2, percent rightward shift of the productivity distribution when new entry increases by 10 percentage points.

Empirical Evidence—Stage 2
Between-Firm Selection: Survival

- Survival of individual domestic firms by estimating

$$\Pr\left[survival_{kjs}=1\right]=\Phi\left[\beta_0+\beta_1\ln\theta_{kjs}+\beta_1\ln\underline{\theta}_{Djs}+\beta_Z\hat{z}_{Mjs}+FE_j+FE_x\right]$$

- $survival_{kjs}$: whether a domestic firm *k* in industry *s* and country *j* continues production in 2005-2007,
- θ_{kjs} is the lagged cutt-of productivity in country *j* and industry *s*, $\hat{z}_{Mjs}$ is an the predicted number of new multinationals.
- Country and industry dummies to control for time variant and invariant country and industry factors and country-industry clustering to allow for correlations within each cluster.

Table 4: The Survival of Domestic Firms

Dependent variable:	(1) Survival	(2) Survival
MNC entry (predicted)	-0.0004***	-0.001***
	(0.0001)	(0.0003)
Cutoff TFP (lagged)	-0.0001***	-0.0001***
	(0.0000)	(0.0000)
Firm TFP (lagged)	0.001***	
	(0.0001)	
Firm Revenue (lagged)		0.003***
		(0.0001)
Host country FE	Yes	Yes
Industry FE	Yes	Yes
Obs	407,975	616,270
R square	0.06	0.10

Notes: (i) Linear probability estimates are reported; (ii) bootstrapped standard errors are reported in the parentheses; (iii) ***, **, and * represent statistical significance at 1, 5, and 10 percent, respectively.

- Domestic firms are more likely to exit the market in the presence of new multinational entry.

Empirical Evidence—Stage 2
Between-Firm Selection: Cutoff Productivity

Dependent variable:	(1) Change in cutoff TFP
MNC entry (predicted)	0.83***
	(0.09)
Host country FE	Yes
Industry FE	Yes
Obs	3,730
R square	0.37

$$\ln \underline{\theta}'_{Djs} - \ln \underline{\theta}_{djs} = \beta_D \hat{z}_{Mjs} = \left(\frac{1}{\varepsilon - 1} \ln \frac{c'}{c} + \ln \frac{P}{P'} \right) \hat{z}_{Mjs}$$

- Higher probability of multinational entry leads to a significant increase of the cutoff productivity: $\beta_D = 0.83$.

Empirical Evidence—Stage 2
Between–Firm Market Reallcoation:
Revenue Distribution

Table 7: The Shift of Domestic Revenue Distribution

Depdendent var.:	(1)	(2)	(3)	(4)	(5)
Change in revenue share	All	Bin 1 (<25%)	Bin 2 (25-50%)	Bin 3 (50-75%)	Bin 4 (>75%)
MNC entry (predicted)	-0.035***	-0.069***	-0.021***	-0.035***	-0.009
	(0.006)	(0.017)	(0.006)	(0.011)	(0.008)
Host-country FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Obs	407,145	103,233	101,245	102,181	100,486
R square	0.20	0.24	0.10	0.26	0.14

Notes: (i) Bootstrapped standard errors are reported in the parentheses; (ii) ***, **, and * represent statistical significance at 1, 5, and 10 percent, respectively.

$$\ln\left(\frac{r'_{Djs}(q)}{E}\right)-\left(\frac{r_{Djs}(q)}{E}\right)=\beta_c\hat{z}_{Mjs}=\left(\varepsilon-1\right)\left(\ln\frac{P_A}{P}+\ln\tau_\theta\right)\hat{z}_{Mjs}=\left(\varepsilon-1\right)\left(\beta_P+\beta_\theta\right)\hat{z}_{Mjs}$$

Higher likelihood MNC entry leads to a decrease in the average revenue share of domestic firms, in particular the least productive.

Between-Firm Market Reallocation: Labor Market Reallocation -- Employment Distribution

Table 8: The Shift of Domestic Employment Distribution

Depdendent var.:	(1)	(2)	(3)	(4)	(5)
Change in employment share	All	Bin 1 (<25%)	Bin 2 (25-50%)	Bin 3 (50-75%)	Bin 4 (>75%
MNC entry (predicted)	-0.037***	-0.067***	-0.027***	-0.038***	0.002
	(0.007)	(0.022)	(0.008)	(0.013)	(0.008)
Host-country FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Obs	388,704	98,498	97,089	97,839	95,278
R square	0.22	0.29	0.19	0.22	0.16

Notes: (i) Bootstrapped standard errors are reported in the parentheses; (ii) ***, **, and * represent statistical significance at 1, 5, and 10 percent, respectively.

Shifts of the employment distribution. Relatively smaller domestic firms are crowded out in the labor market by the new multinational firms: evidence of labor market reallocation.

Between-Firm Market Reallocation: Labor Market Reallocation – Wages

Table 9: Changes in the Average Wage Rate of Domestic Firms (Country-Industry Level)

Dependent variable:	(1) Change in ave wage
MNC entry (predicted)	0.033***
	(0.003)
Host country FE	Yes
Industry FE	Yes
Obs	3,407
R square	0.33

Notes: (i) Weighted least square estimates are reported; (ii) bootstrapped standard errors are reported in the parentheses; (iii) ***, **, and * represent statistical significance at 1, 5, and 10 percent, respectively.

Increase in wage rate as a result of increased labor demand by foreign firms.

Decomposition

$$\theta_t^w = \sum_i s_{it}\theta_{it} = \overline{\theta}_t + \sum_i (s_{it} - \overline{s}_{it})(\theta_{it} - \overline{\theta}_t)$$

$$\Delta\theta_t^w = \Delta\overline{\theta}_t + \Delta\sum_i (s_{it} - \overline{s}_{it})(\theta_{it} - \overline{\theta}_t)$$

$$\Delta\theta_t^w = \underbrace{(\overline{\theta}_t^{surviving} - \overline{\theta}_{t-1}^{surviving})}_{within-firm} + \underbrace{(\overline{\theta}_t^{surviving} - \overline{\theta}_{t-1}^{all})}_{selection} + \underbrace{\Delta\sum_i (s_{it} - \overline{s}_{it})(\theta_{it} - \overline{\theta}_t)}_{reallocation}$$

- Change in weighted average productivity (θ^w): unweighted aggregate productivity + total covariance between a firm's share of the industry output (s_{it}) and its productivity (θ_{it})
  - 10-percent point higher probability of multinational entry leads to on average 0.2 increase in within-firm productivity.
  - Average productivity of surviving firms is 1.2 percent higher than that of exiting firms.
  - Covariance at country-industry level, 0.2 greater when there is 10 percentage higher probability of MNC entry.
- Ignoring the role of reallocation can lead to significant bias in understanding the nature of gains from multinational production.

FDI Promotion Policy

Table 9: Correlations between Estimated TFP Gains and FDI Promotion Policies

	Aggregate	Multinational	Domestic	Spillover	Reallocation
Any incentives	0.001	**-0.23****	0.01	0.01	**-0.001***
	(0.01)	(0.11)	(0.01)	(0.01)	(0.00)
Financial incentives	0.01	0.08	0.01	0.001	**-0.001***
	(0.02)	(0.12)	(0.02)	(0.01)	(0.00)
Tax holiday	0.03	**-0.35*****	**0.04***	**0.04****	**-0.001***
	(0.03)	(0.11)	(0.02)	(0.02)	(0.00)
Tax reduction	-0.003	**-0.22***	-0.001	0.01	-0.000
	(0.01)	(0.12)	(0.01)	(0.01)	(0.00)
Regulation exemption	**-0.02****	**-0.17***	-0.01	-0.001	**-0.001***
	(0.01)	(0.10)	(0.01)	(0.004)	(0.00)
Number of incentives	-0.004	**-0.06****	-0.001	-0.000	**-0.0002***
	(0.01)	(0.03)	(0.01)	(0.004)	(0.00)

Notes: The table reports the correlations between estimated TFP gains, including both the aggregate and the decomposed, and countries' FDI promotion policies. The first 5 policy variables are dummies that indicate the existence of any or a specific type of incentives and the last policy variable measures the number of types of incentives offered by a country.

FDI and Productivity: Micro and Macro Approaches

- FDI plays an important role in contributing to economic growth
  - Local conditions matter
- Sources of Gains differ- within and between.
- Heterogeneity

Policy Implications:

- Fiscal and Fiscal incentives can be effective in attracting FDI, but local conditions can limit FDI benefits
  - Seek to improve domestic conditions

    $\rightarrow$Attract foreign companies + allow host economies to maximize the benefits of foreign investment.

    $\rightarrow$ Heterogeneity: “once size fits all” ?

Thanks