

Multinational Production and Innovation in Tandem

Jin Liu (Princeton)

Discussion by Natalia Ramondo (BU & NBER)

Women in International Economics 2024

The Internationalization of R&D and MNEs

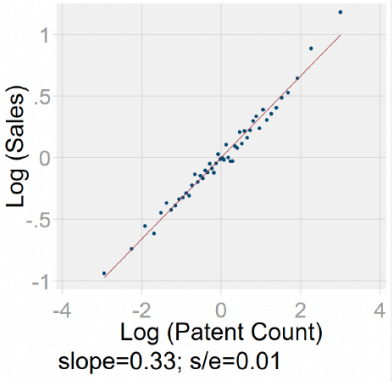
- R&D offshoring has increased in the last decades and is linked to MNEs
 - BEA: US affiliates abroad-to-parent R&D expenditure (1997-2015):
13% to 20% (all); 0% to 1.5% (China)
 - UNCTAD World Investment Report, 2005 "The Internationalization of R&D"
- Trend has slowdown since 2018 (16% in 2022) — Trade war, CHIPS, IRA, ...

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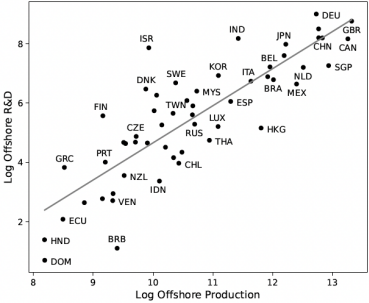
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Evidence on MNE Colocation of Production and Innovation

Affiliate sales (ORBIS) vs Patents (PATSTAT), 2011-2016



US Affiliate sales (BEA) vs US Affiliate R&D (BEA), 2017



All: 38% of revenue is offshore; 15% of patents are offshore (Fan, 24)

US: 35% of revenue is offshore; 19% of R&D is offshore (Liu, 24)

This Paper

- Evidence: Offshore MNE innovation follows offshore MNE production
 - US Census: Business R&D&I Survey (BRDIS); LFTTD; CMF/ASM
 - Tariffs shift-share approach; Trump tariffs event-study approach
- Combinatorial discrete-choice dynamic problem
 - Complementarities between production and innovation activities
 - Algorithm's solution uses the super-modularity property
- Main result: The externality matters for co-location
 - Prob of offshoring production drops by 1% < Prob of offshoring R&D drops by 86%

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Colocation of Production and Innovation

- Motives

- Comparative advantage motives (vicinity, human capital, talent, ...)
- Cost correlation (i.e. both flows follow gravity)
- Complementarities between production and innovation activities

- Natural question arises

- What happens with innovation when production gets re-shored?

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Close-Relative Papers

- Location of innovation vs production: Comparative advantage & costs' correlation
 - Fan (24): HQ country \neq innovation country
- Location of innovation vs production: Externalities
 - Fort, Keller, Schott, Yeaple, and Zolas (20): colocation in the US
 - Firms with mfg and R&D plants have higher patenting when these plants are nearby
- Bilir and Morales (20): Return of R&D within the MNE
 - Innovation of the parent increases productivity of the affiliate
 - Complementarity between parent and affiliate R&D
- Liu (24): Co-location externalities in the context of MNEs
 - Comment: Evaluate the importance of externalities vs country characteristics!

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The Approach In the Literature

- Combinatorial discrete-choice problems (CDCP) with super-modularity
 - Production in location j increases return of production in other locations
 - Complementarities within and across locations (within the MNE)
- Algorithm's solution
 - Jia (08): Use lattice theory to solve (+) interdependence in market entry
 - Ántras et al. (17): Application of Jia's algorithm to international sourcing
 - Arkolakis et al. (23): Static CDCP with (+) or (-) complementarities (MNEs)
 - Alfaro-Ureña et al. (23): Dynamic CDCP with (+) complementarities (exports)
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Team Macro vs Team IO

- Team IO: Firm-level dynamic models (Liu, 24)
 - Fixed and sunk costs of production/innovation → hard computational problem
 - Partial equilibrium → can evaluate effect of policy on firms' behavior
 - Colocation through complementarities
- Team Macro: Static spatial models (Arkolakis et al., 18; Fan, 24; ...)
 - No fixed production costs; frictions to decouple R&D/production → aggregation
 - General equilibrium → can evaluate effect of policy on aggregates and welfare
 - Colocation through costs' correlation (i.e. gravity in production and R&D)
- What would we miss in Team Macro? E.g. Fan (24) + within-location spillovers?

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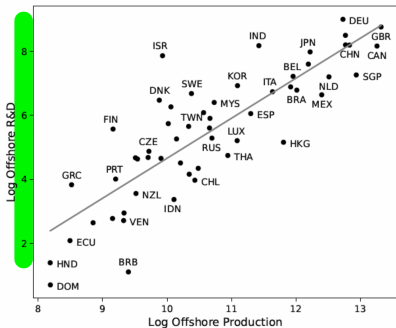
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Horizontal vs Vertical FDI and R&D: Problematic?

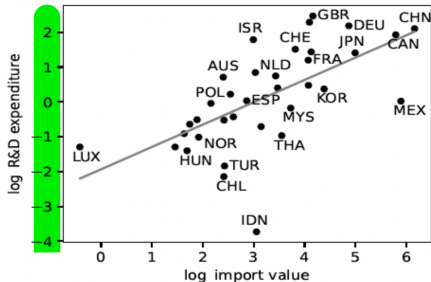
- Restriction: collocation of R&D and imports

- Production offshoring = US imports from host country of affiliate reporting R&D

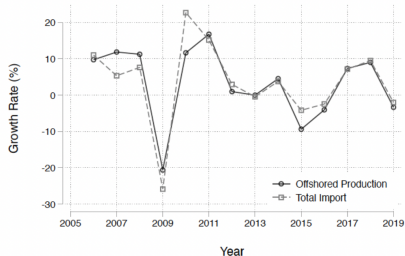
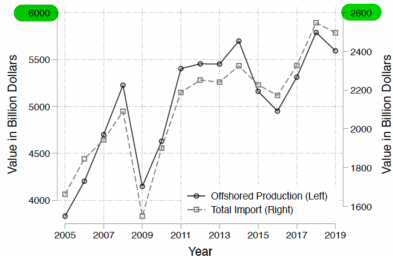
Affiliate sales vs R&D, BEA



US imports vs Offshore R&D, Census



Horizontal vs Vertical FDI and R&D: Problematic?



- All the R&D vs part of the affiliate production (exports)...

- Median affiliate directs 1/3 of sales to third markets (including US)
- Median affiliate directs 0 sales to the parent

More On Measurement

- US MNEs abroad vs Foreign MNEs in the US
 - e.g. Toyota US shipping goods from HQ in Japan (where R&D happens)
 - Foreign and US firms are not distinguishable in Census data
 - This may be important – Recall Bilir and Morales (20) on HQ innovation...
- Use ORBIS!
 - Very good coverage of US affiliates abroad
 - Firm identifiers, easy to link, already done!
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More Comments

- Evidence is conditional on firms that report R&D expenditures?
 - Firm-country-year obs: "94% of R&D in countries from which the firm imports."
 - Be clear on the treatment of zeros (i.e. firms reporting no R&D abroad)
 - Identify (better) MNE affiliates with no R&D through related-party trade
 - This will also make fact on interdependencies across countries more convincing
 - Bias: Affiliates with R&D are large and more likely to ship goods to US (parent)
Probability of having affiliate production and R&D in a location
= 0.37% (all countries; 2011-2016), Fan (20) ; = 1.12% (US, 2008-2019), Liu (24)
- Third-country effects
 - e.g. Higher US tariffs on China shifts expenditure towards Vietnam —MNE production shifts to Vietnam
 - "Allowing for cross-country **interdependencies** in firm decisions is **necessary** for understanding [] third-country effects"
 - I don't think so ... a non-CES demand system is the natural candidate (Adao et al., 17); Fajgelbaum et al., 20)!

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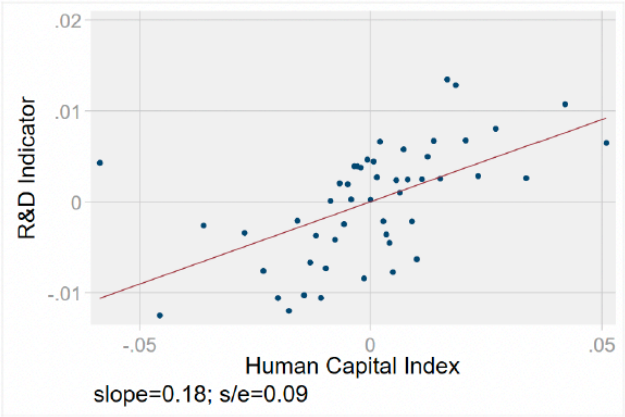
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Final Remarks

- Relevant paper; reveals strong technical skills!
 - Role of synergies in co-locating production vs R&D for MNEs
- Can answer relevant policy questions:
 - The effect of (IRA, CHIPS, tariffs) on re-shoring of firms

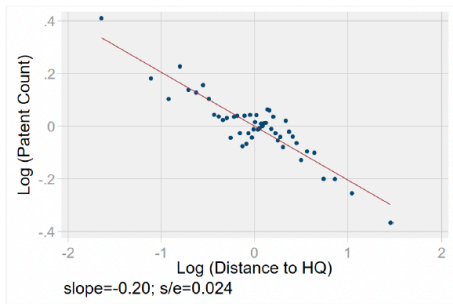
Country Characteristics and Co-Location (Fan, 2024)

Host Talent and Affiliate R&D Presence

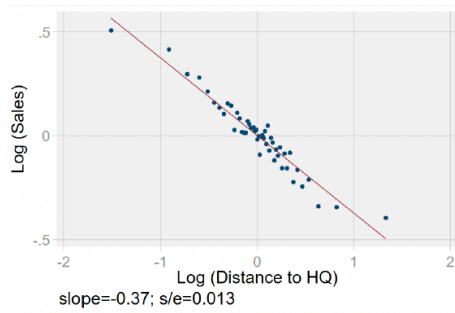


Gravity and Co-Location (Fan, 2024)

Affiliate R&D and Distance to HQ



Affiliate Sales and Distance to HQ



- Comment: Evaluate the importance of externalities vs country characteristics!