

Global Innovation with Global Firms

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**World Bank
ECA Productivity
June 2024**

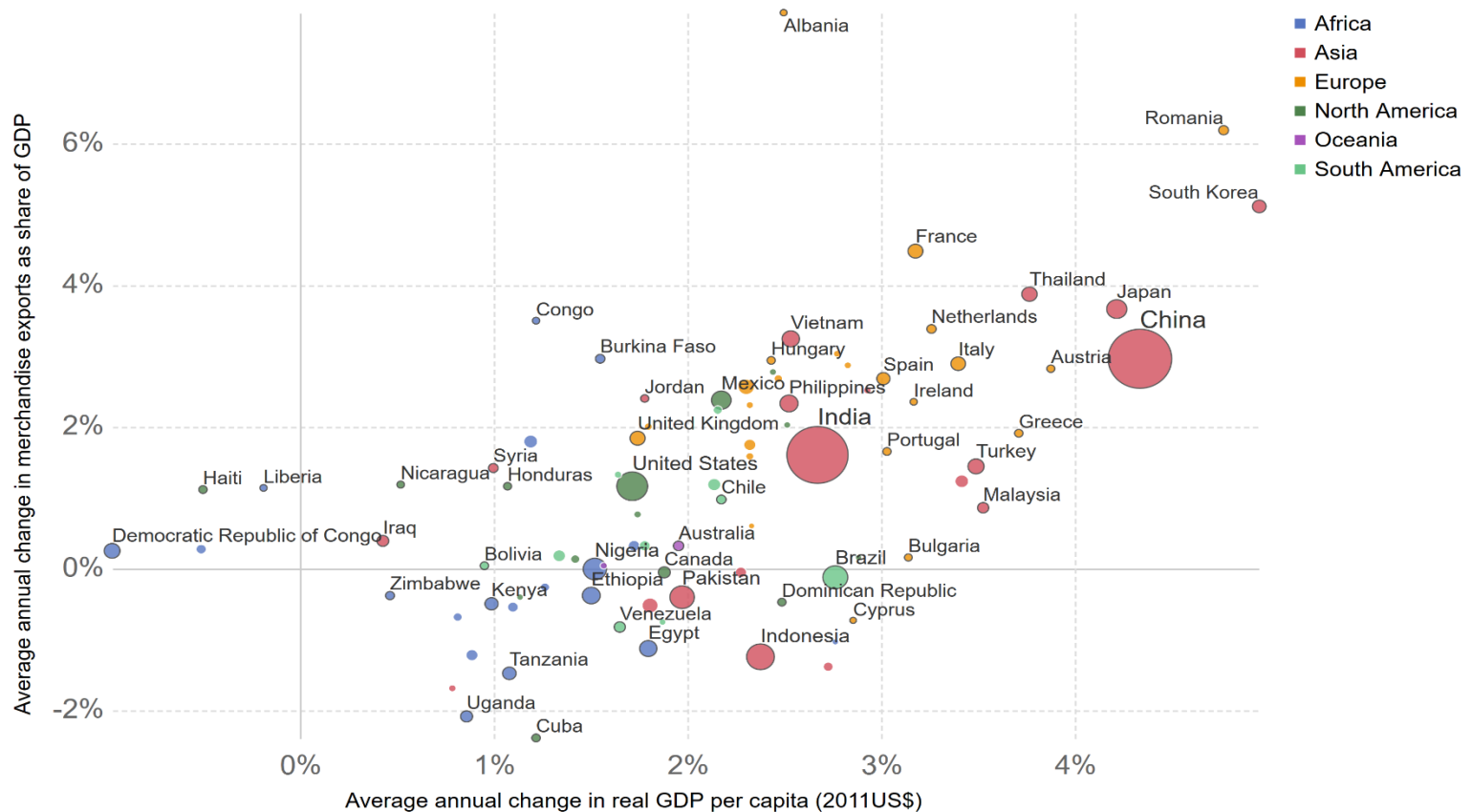


20thc. Globalization & Growth

Growth of income and trade, 1945 to 2014

Average annual change in real GDP per capita vs Average annual change in export volumes.

Our World
in Data



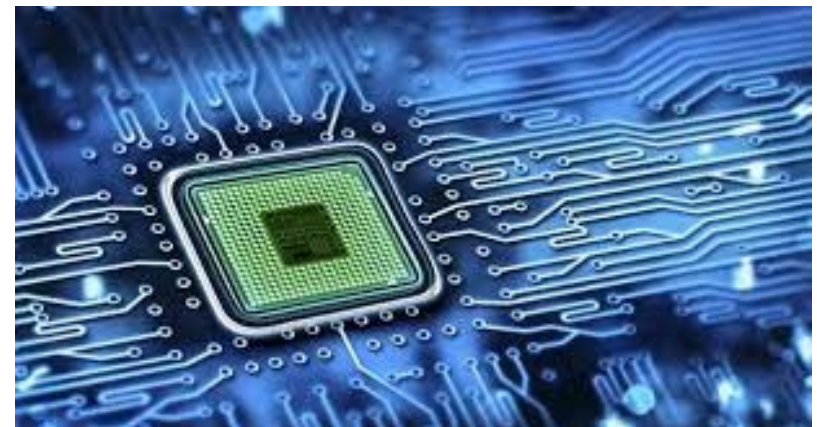
Source: Fouquin and Hugot (CEPII 2016), Maddison Project Database (2018), Population (Gapminder, HYDE(2016) & UN (2019))

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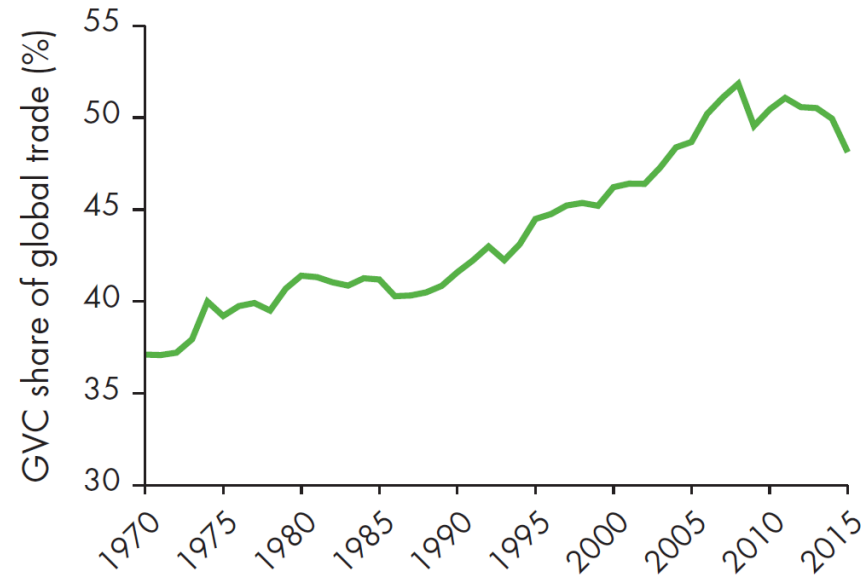
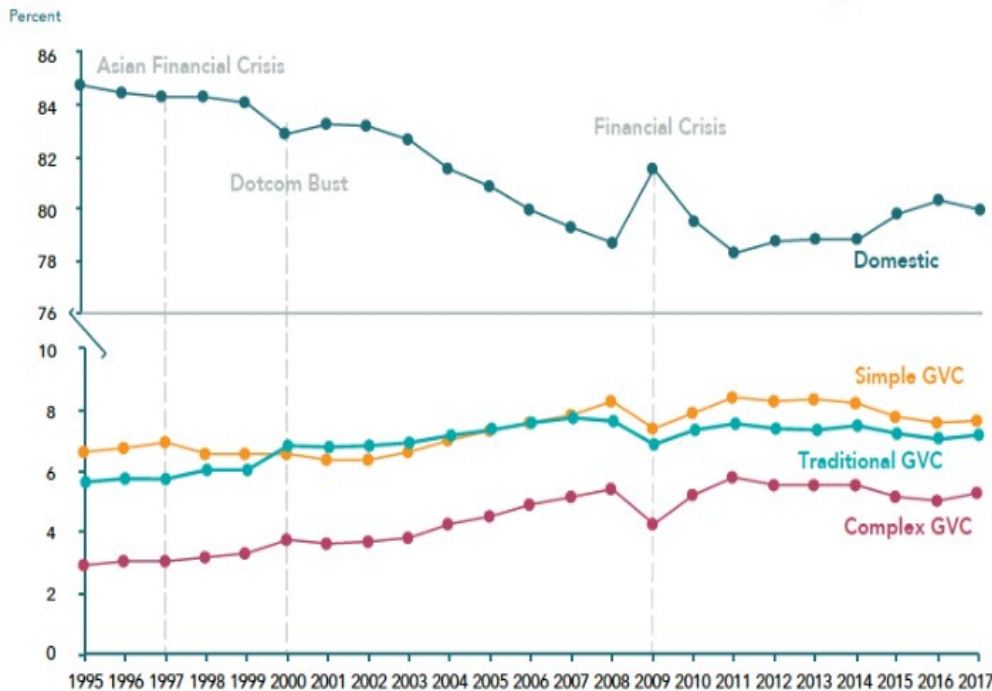
21stc. Globalization & Growth

- Technological change & trade policy have transformed international trade & investment
 - Rise of complex global value chains & multinational activity
 - Deeper financial & labor market integration
 - Asymmetric market structures & institutions

- Greater interconnectedness & interdependence
- Intensified policy debates
- Global cooperation under fire

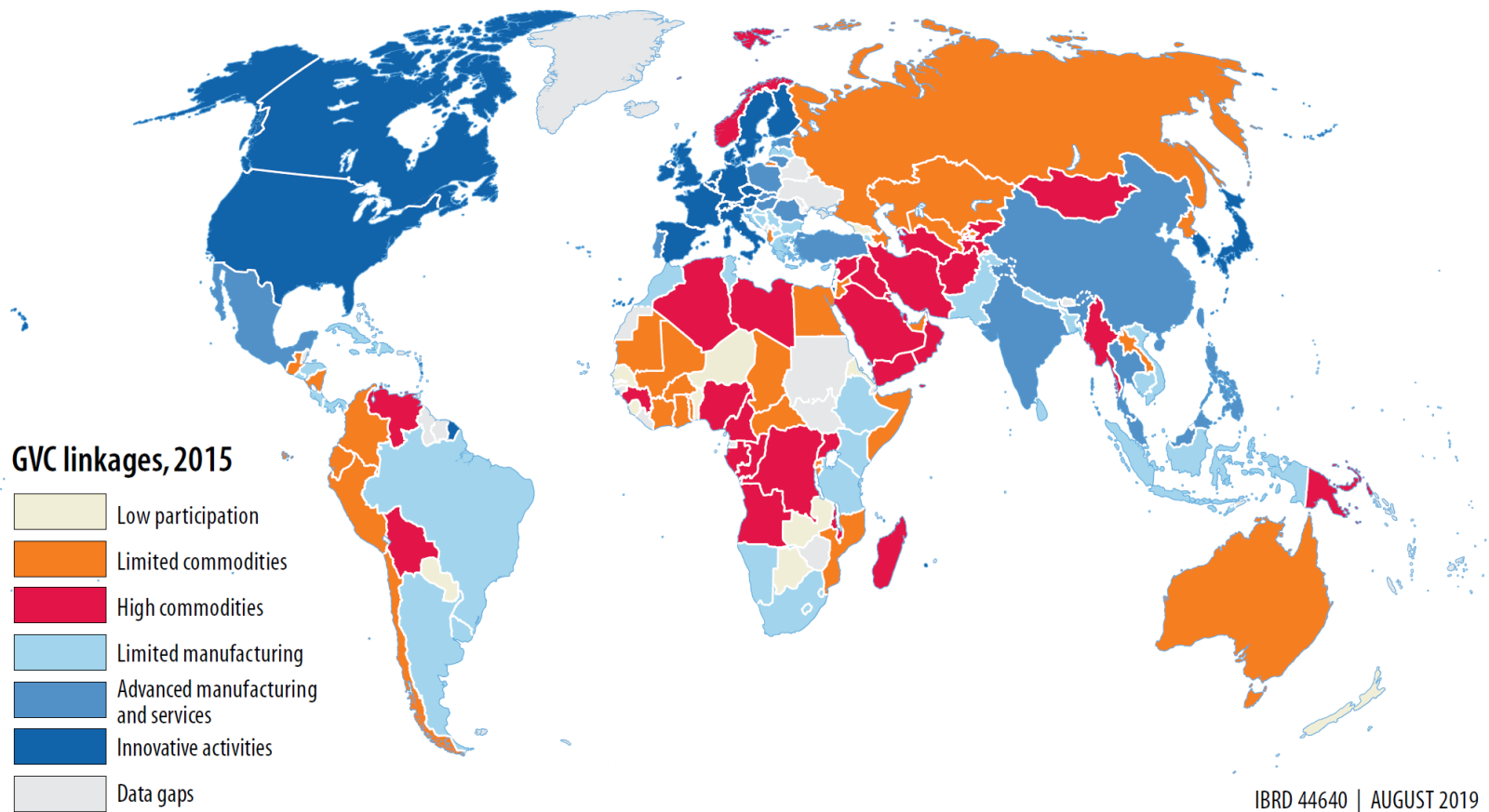


Wider & Deeper Global Value Chains



Sources: WDR 2020 team, using data from Eora26 database; Borin and Mancini (2015, 2019); and Johnson and Noguera (2017). See appendix A for a description of the databases used in this Report.

GVC Activity Varies Across Countries



Source: WDR 2020 team, based on the GVC taxonomy for 2015 (see box 1.3 in chapter 1).

Note: The type of a country's GVC linkages is based on (1) the extent of its GVC participation, (2) its sectoral specialization in trade, and (3) its engagement in innovation. Details are provided in figure 1.6 in chapter 1.

Global Production Network Complexity

- ❑ 70-80% trade in intermediates, 70-80% trade by MNCs
 - >60 mil workers in 3,500 processing zones in 130 countries
 - Sparse, multi-stage networks with huge buyer & seller heterogeneity
 - Costly search, match, financing & contracting across jurisdictions

20thc. GVC classic



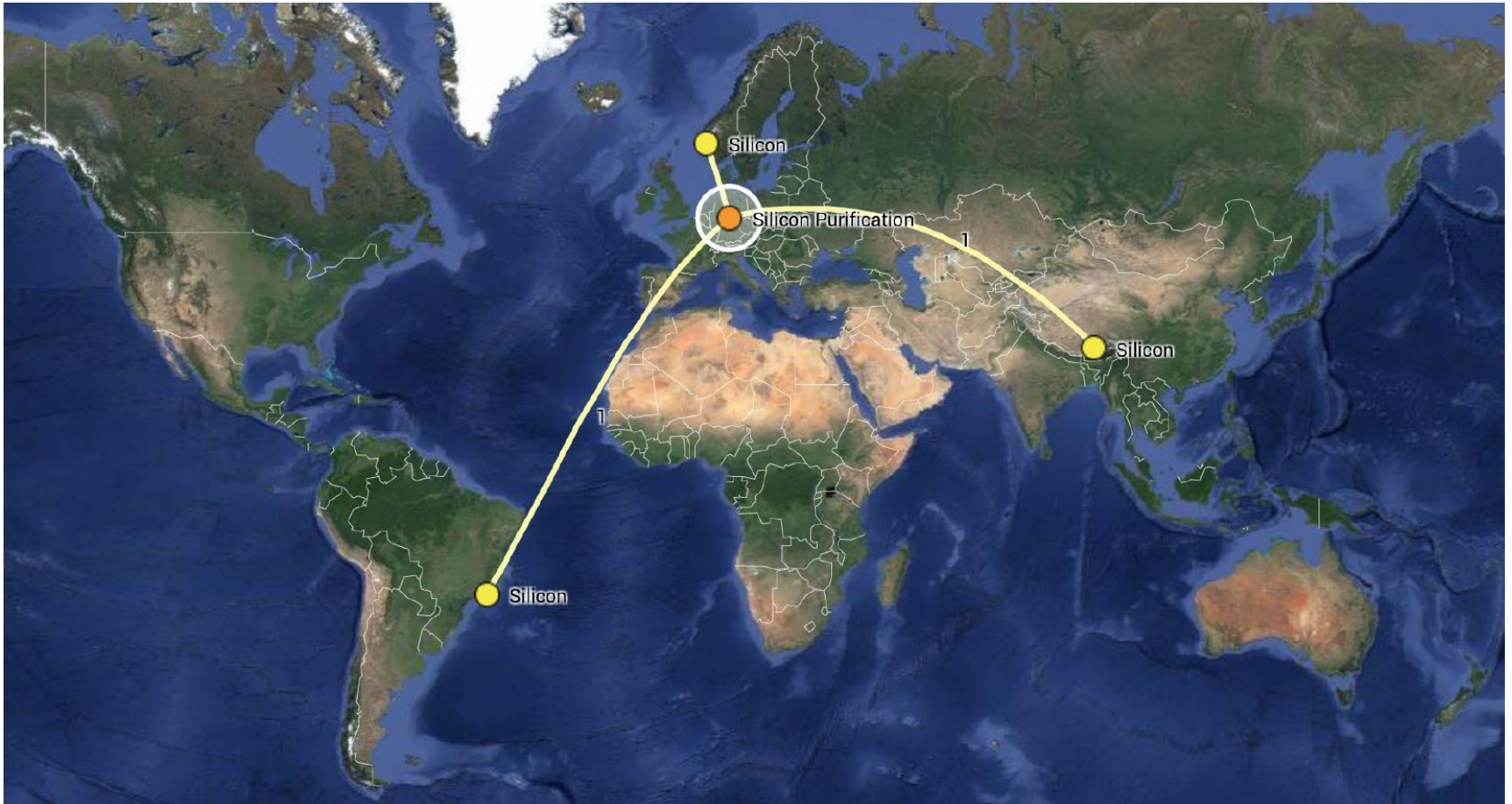
21stc. GVC classic



The Life of Electronic Chips



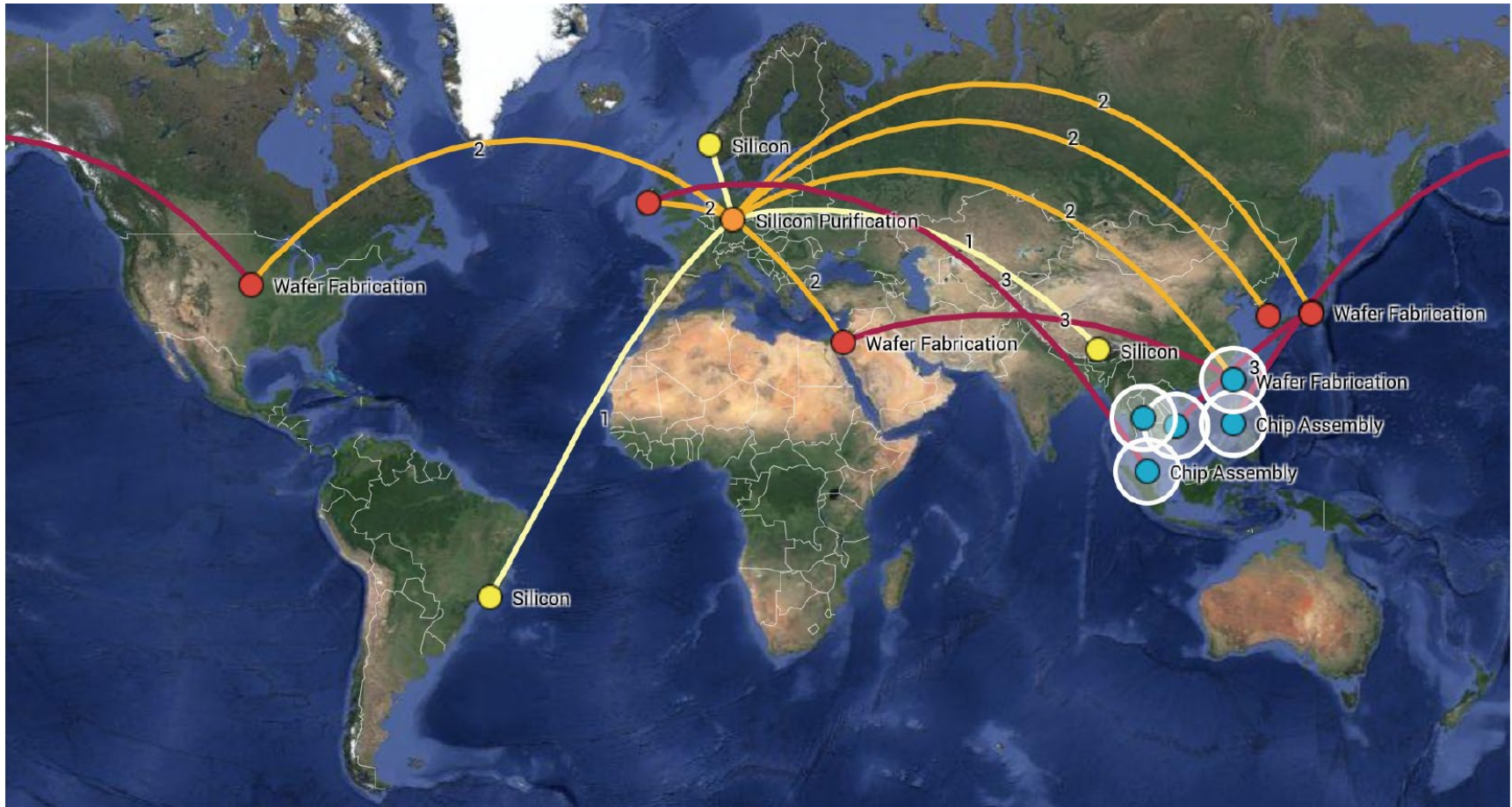
The Life of Electronic Chips



The Life of Electronic Chips



The Life of Electronic Chips





Globalization for Growth

Global production fragmentation can put firms on a steeper growth path

- ❑ Improve performance given current productivity & production practices
 - More/better/cheaper imported inputs/equipment → ↓ costs, ↑ quality
 - Export market access & import competition → ↓↑ scale economies

- ❑ Improve productivity through technological upgrading
 - Export market access & import competition → ↑ innovation & adoption
 - Active knowledge transfer & passive spillovers → ↑ production know-how, ↑ management practices, ↑ market expertise, ↑ follow-on innovation
 - GVC participation → Δ tasks, Δ worker mix, Δ management, Δ innovation



Challenges to Global Trade & Growth

- ❑ Capitalizing on global growth opportunities requires ...
 - knowledge of GVC & technology frontier
 - capability to participate in GVCs & to innovate/upgrade
 - incentives: costs of matching/transacting, inputs, distribution, innovation
benefits of competitiveness, tech leadership, market access
- ➔ Firm prerequisites
 - Knowhow, managerial competence, production efficiency, quality capacity
- ➔ Market & institutional prerequisites
 - Stable institutions & contract enforcement
 - Efficient capital, labor & product markets
 - Enabling logistics services

Autonomous vehicle startup AutoX lands driverless testing permit in California

Kirsten Korosec @kirstenkorosec / 9:35 PM GMT+1 • July 17, 2020

Jul 2020



AutoX becomes China's first to remove safety drivers from robotaxis

Rita Liao @ritacyliao / 3:56 AM GMT • December 3, 2020

Dec 2020



World B:

Global Innovators

- ❑ 20th c: West & Western MNCs pushing tech frontier, South adopting with a lag
- ❑ 21st c: Leapfrogging by pioneers in developing countries

Waymo launches robotaxi service in San Fr

Rebecca Bellan @rebeccabellan / 5:03 PM GMT+1 • August 24, 2021

Aug 2021



3



1. Production fragmentation improves firm performance given technology

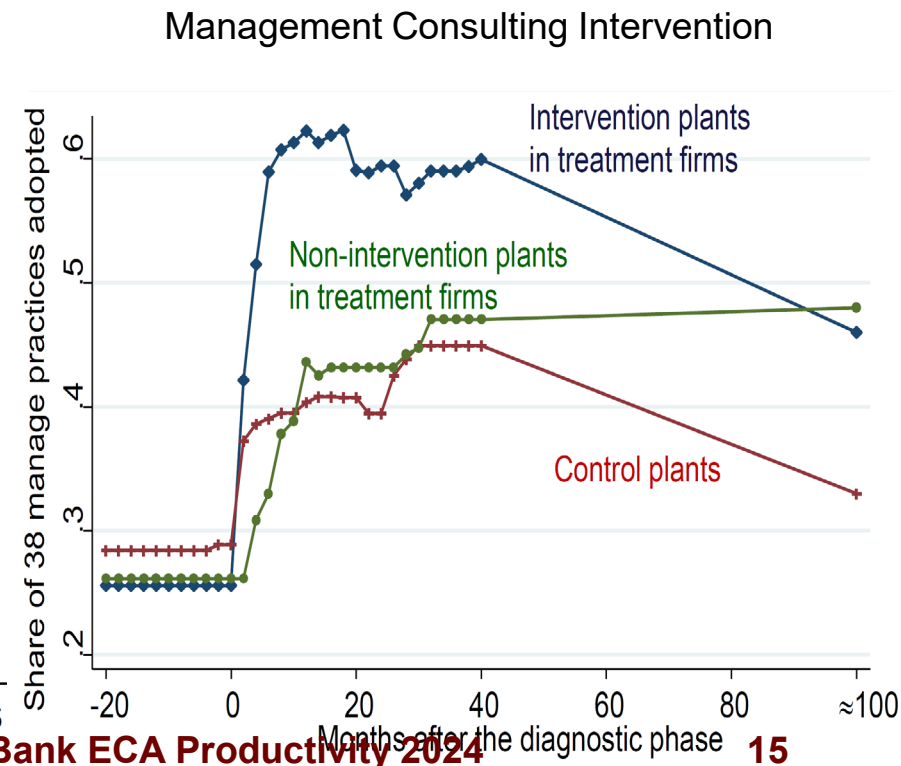
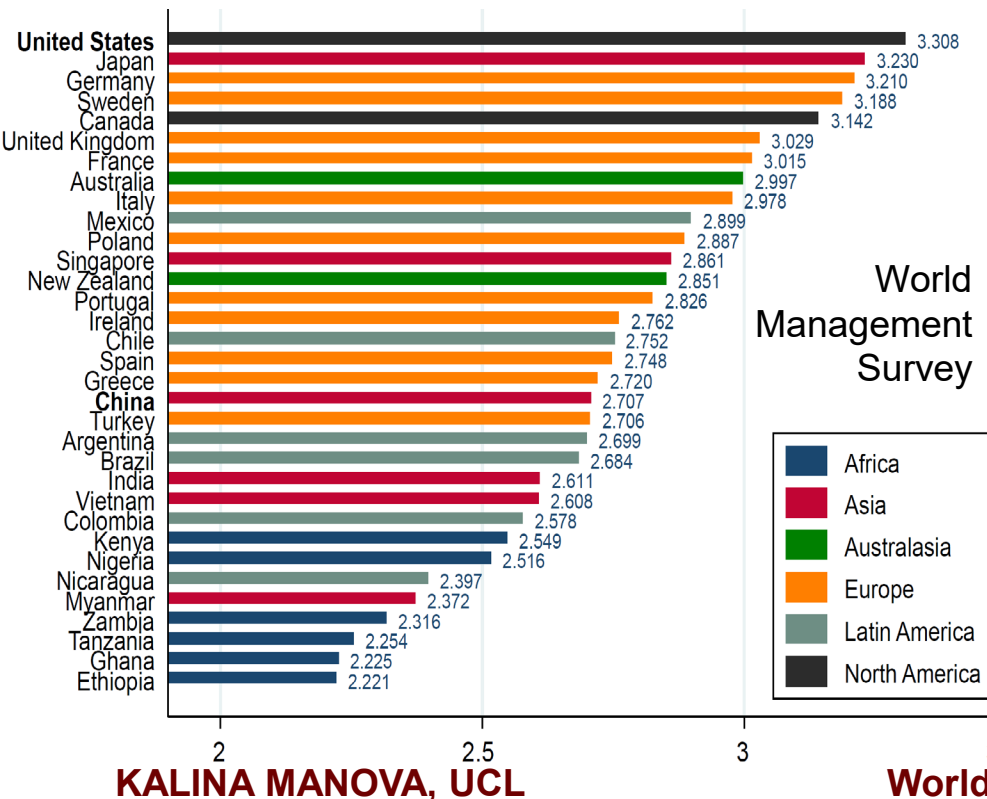
- ❑ Manova & Zhang (2012), Manova & Yu (2017): China
 - Successful exporters import high-quality inputs to produce high-quality goods
 - Multi-product firms follow a product quality ladder & vary quality across markets
 - ➔ Access to high-quality foreign inputs key to export success

- ❑ Bernard, Dhyne, Magerman, Manova & Moxnes (2022): Belgium
 - Domestic production fragmentation lowers input costs & raises profits
 - Larger firms transact bigger values, with more buyers & suppliers
 - ➔ Production networks explain vast share of firm size dispersion



1a. Management practices matter

- Bloom, VanReenan, Manova, Sun & Yu (2021): China & US, India
 - Better-managed firms use higher-quality inputs & more complex technology to produce higher-quality goods more efficiently for superior export performance
 - ➔ Management interventions work





1b. Institutions matter

□ Berthou, Chung, Manova & Sandoz (2019): Europe

- Efficient institutions, factor and product markets amplify productivity gains from import competition, but dampen gains from export expansion
- ➔ Trade reforms have theoretically ambiguous effects with resource misallocation

In Agg Prod (ikt)

Institution Measure:	Rule of Law (1)	(Inverse) Corruption (2)	Labor Market Flexibility (3)	Creditor Rights Protection (4)	(Inverse) Product Market Regulation (5)
^Exp Dem (ikt)	1.066*** (0.126)	0.850*** (0.096)	1.121*** (0.261)	0.718*** (0.158)	1.314*** (0.172)
^Imp Comp (ikt)	-0.113** (0.050)	-0.063* (0.038)	-0.202** (0.096)	-0.108* (0.061)	-0.045 (0.061)
^Exp Dem (ikt) x Institution (it)	-0.476*** (0.067)	-0.302*** (0.042)	-0.218*** (0.069)	-0.048** (0.019)	-0.769*** (0.130)
^Imp Comp (ikt) x Institution (it)	0.136*** (0.031)	0.095*** (0.020)	0.083*** (0.027)	0.028*** (0.009)	0.085* (0.046)
N	2,777	2,777	2,777	2,777	2,777
R2	0.792	0.797	0.747	0.811	0.825
Ctry*Year FE, Controls	Y	Y	Y	Y	Y



1c. Trade finance matters

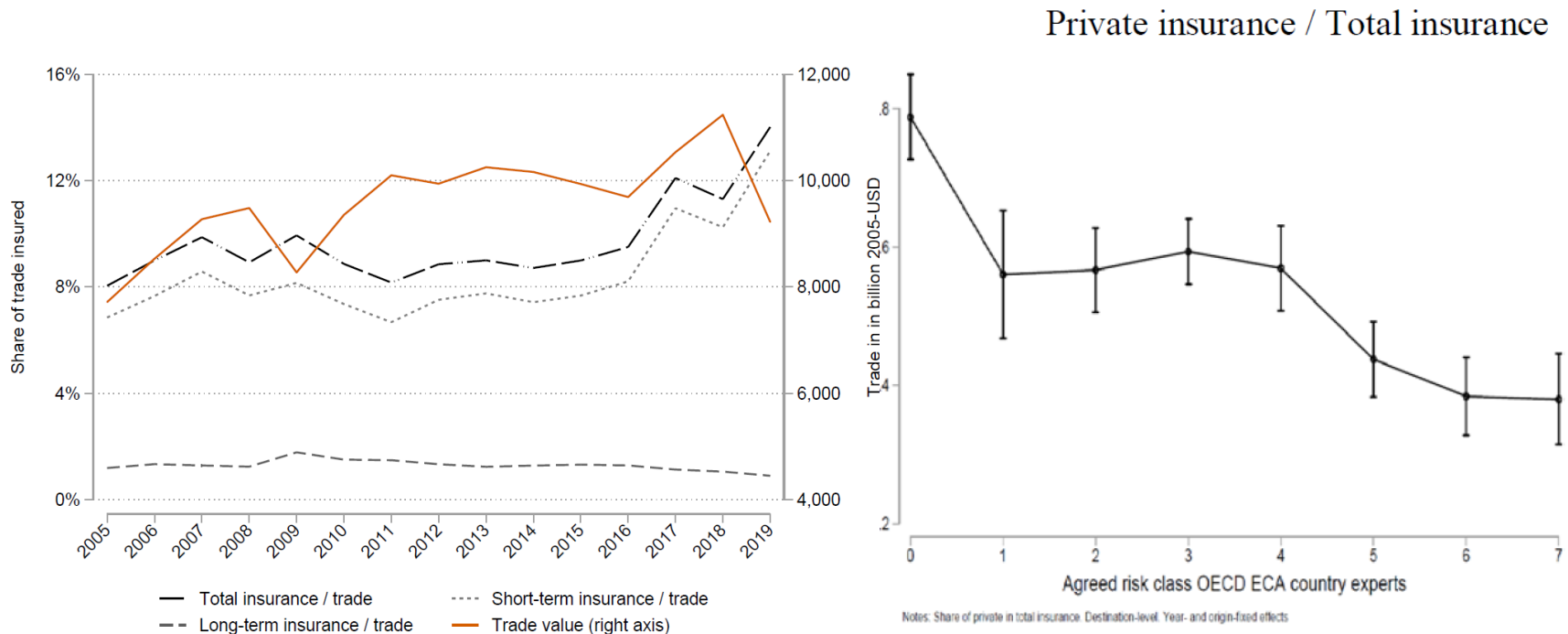
- ❑ Financial frictions severely impede aggregate trade & GVCs: World, China
 - Manova (2013), Manova & Yu (2016), Chor & Manova (2012)
 - Limited firm export entry, export volumes & value-chain position
 - Effects concentrated on smaller firms & financially sensitive sectors
 - Trade effects far exceed output distortions & acute during financial crises

- ❑ Financial conditions shape multinational activity: World, China, US MNCs
 - Manova, Wei & Zhang (2015), Bilir, Chor & Manova (2019), Manova (2008)
 - MNCs only partially arbitrage capital costs across countries
 - Host financial market influences MNC entry, ownership, sales & financing
 - Foreign capital flows can compensate for weak local financial development



1c*. Trade finance insurance matters

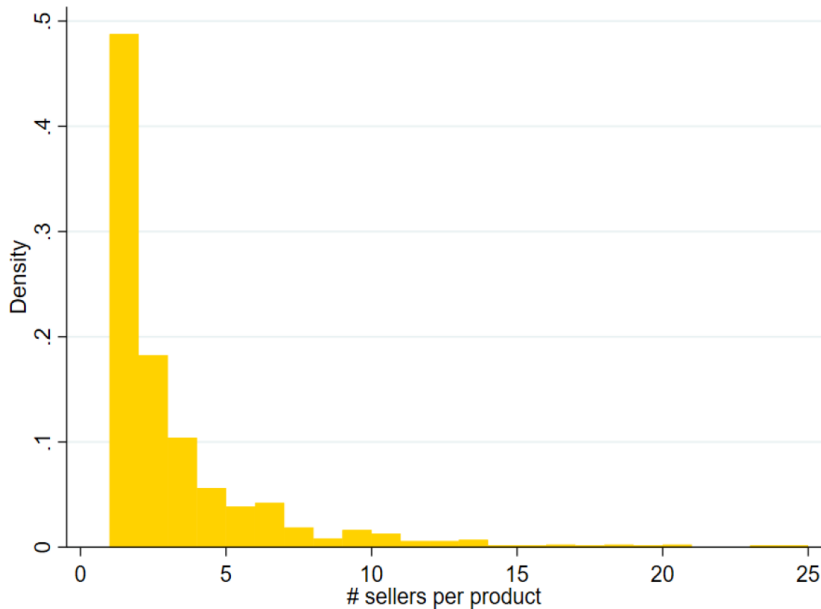
- Buus, Kroeger, Manova & Munch (202?): world, Denmark
 - Economic & political risk raises trade finance costs & hinders trade activity
 - ➔ Private insurers & Export Credit Agencies both key for trade with risky markets



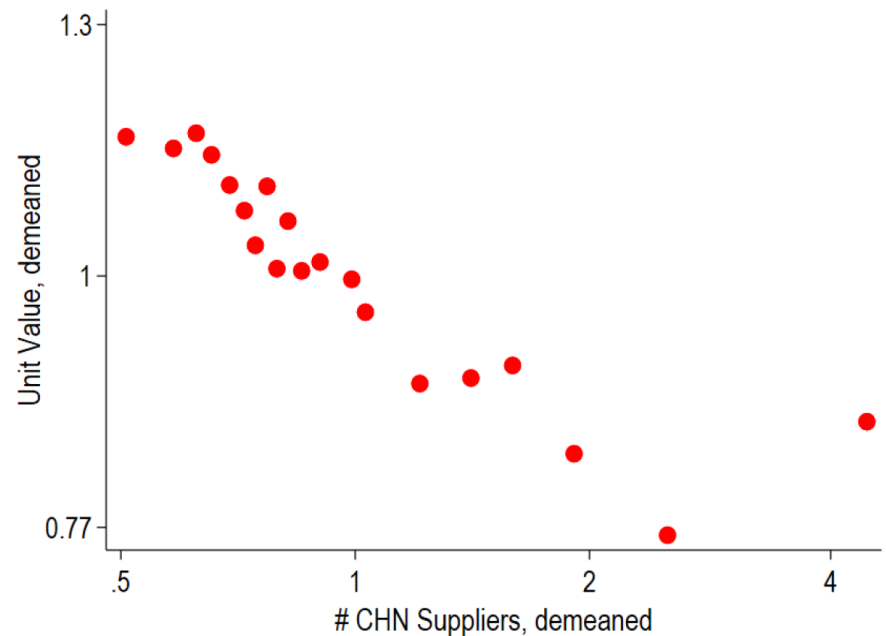


1d. Market competition matters

- Huang, Manova, Perello & Pisch (2021): China, Chile, France
 - Upstream competition lowers input prices, improves downstream performance and profits, and raises consumer welfare
 - ➔ National market regulation & industrial policy have international spillovers



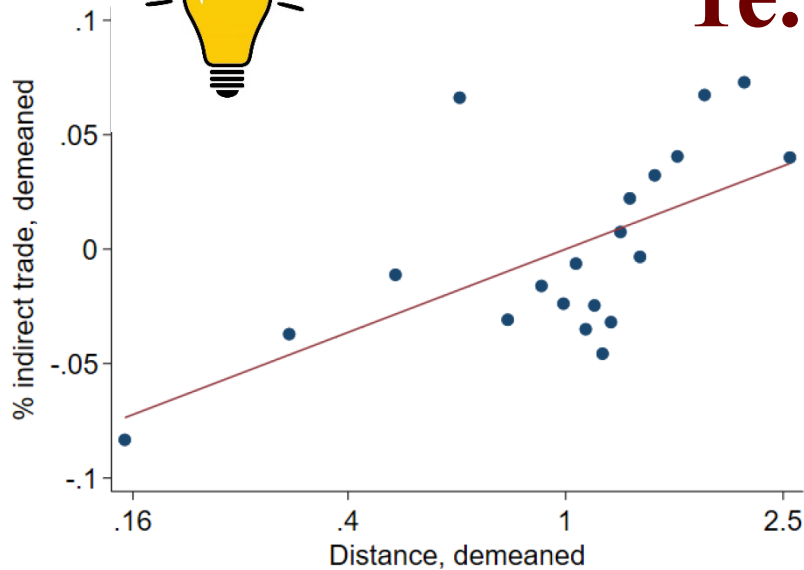
(a) CHN sellers to CHL



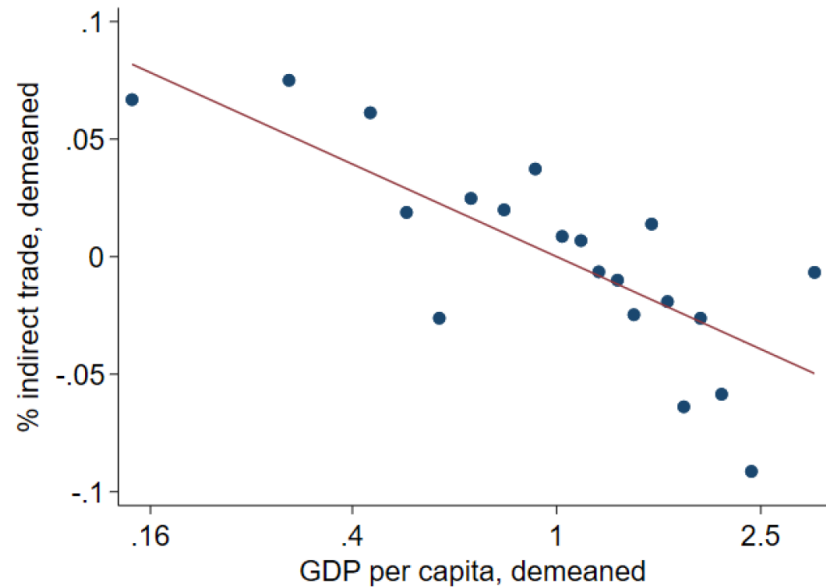
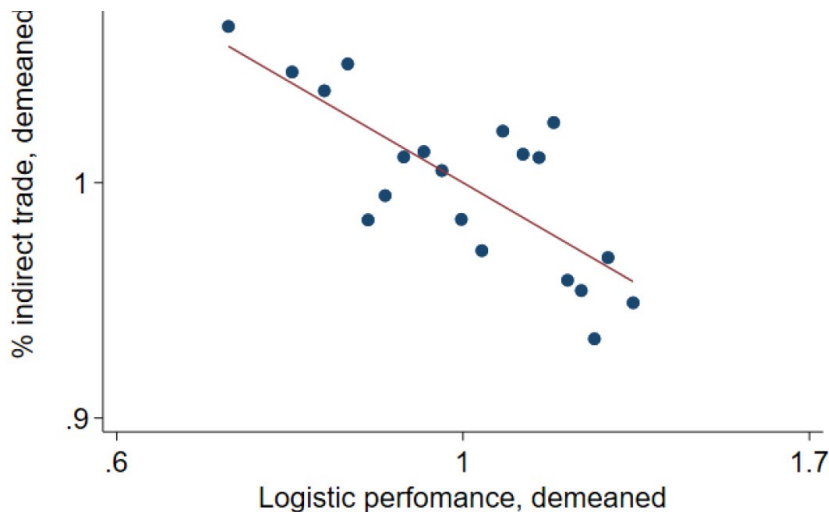
(b) Input price across CHL buyers



1e. Market makers matter



- Manova, Moxnes & Perello (202?): Chile
- Trade intermediaries widen & deepen production networks to benefit buyers, suppliers, consumers
- ➔ Intermediaries help firms overcome search, match & transaction costs





2. Production fragmentation enables technology change within firms

- ❑ Chor, Manova & Yu (2021): China
 - Firms expand into more production stages and earn higher profits as they grow bigger, more productive & more experienced
 - ➔ Product transitions & firm dynamics may differ in developed countries

- ❑ Bakker, Dyevre, Manova, Moxnes & De Paula (202?): Brazil
 - Production fragmentation changes task complexity & employment structure inside firms, enabling reorganization & efficiency gains
 - ➔ Production networks can influence wage distribution & labor share



3. MNCs lead innovation frontier, but increasingly offshore R&D worldwide

- ❑ MNCs manage complex global production networks, conduct majority of world R&D, and mediate technology transfer across borders

Mercedes-Benz Opens R&D Lab In Seattle

The new digital hub is planning on expanding to 150 people.

By Press Release Desk, News Partner
Nov 14, 2017 4:33 pm PT



Opening of the new Shanghai Research & Development Center as part of BMW's Innovation Day China.

15.06.2019 Press Release ARCHIVE

Shanghai/Munich. Today opened the newly BMW Group Shanghai R&D Centre as part of BMW's Innovation Day China. The event showcased BMW's latest developments in the areas of innovation, digital services, autonomous driving and automotive design.

#Technology

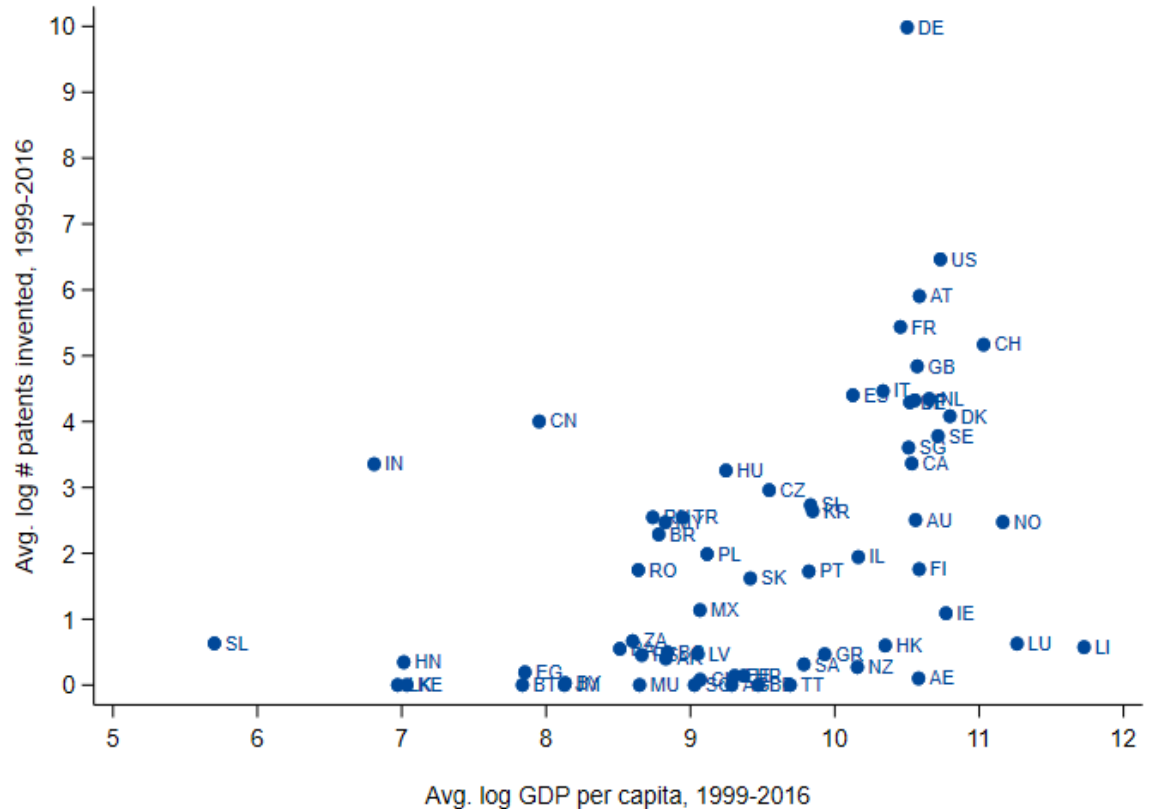




3. MNCs' global innovation follows countries' comparative advantage

□ Gumpert, Manova, Rujan & Schnitzer (202?): German MNCs

- 30% hold EU patent(s), of which 43% innovate abroad
- Top-5 hubs: USA, Austria, France, Switzerland, UK
- China & India in top 15
- Top-3 tech areas:
 - DE: org chem, energy, trans
 - US: med tech, IT, telecom
 - CH: org chem, measure, med tech

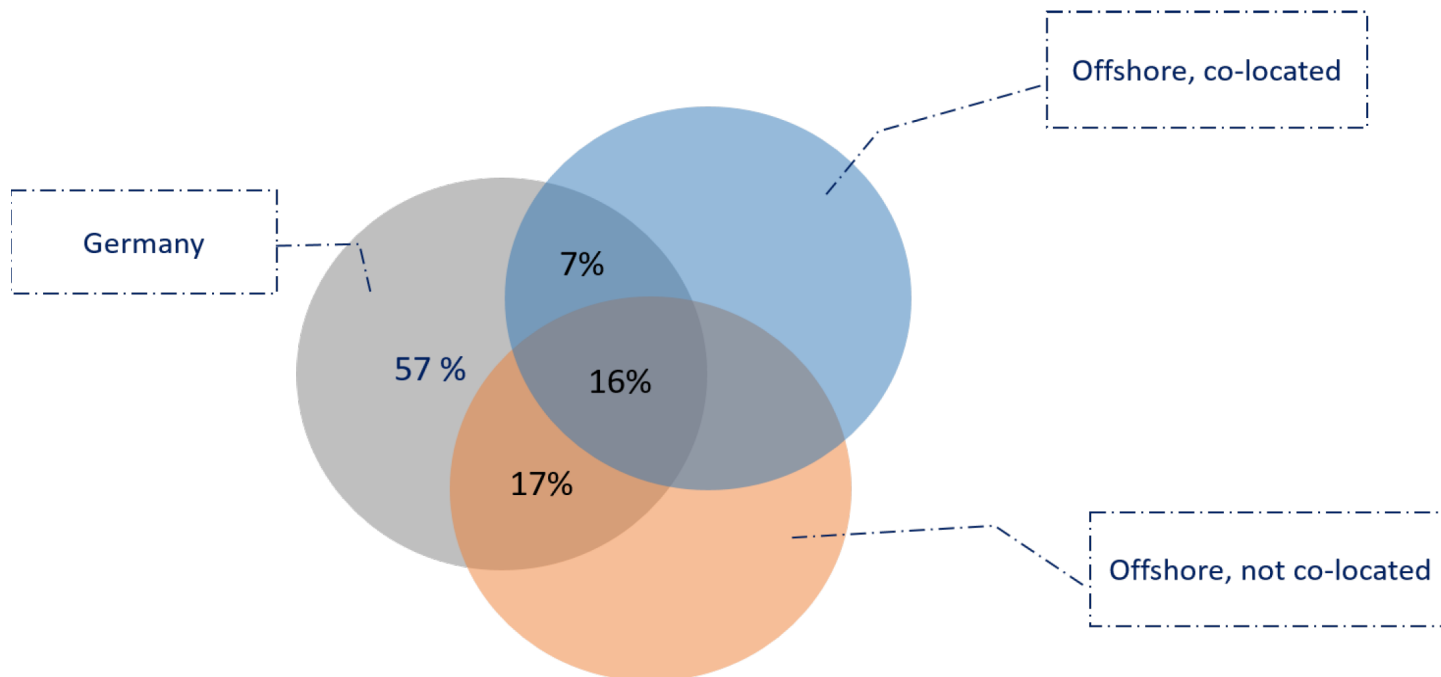




3. MNCs offshore basic R&D to rich countries, bundle applied R&D with production in developing

→ Complementarity in innovation across locations allays policy concerns

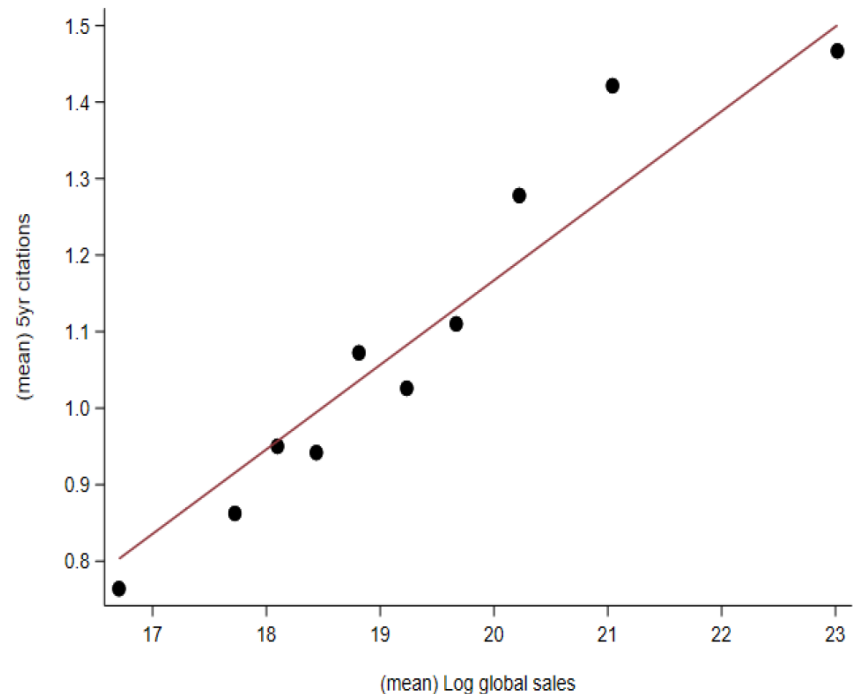
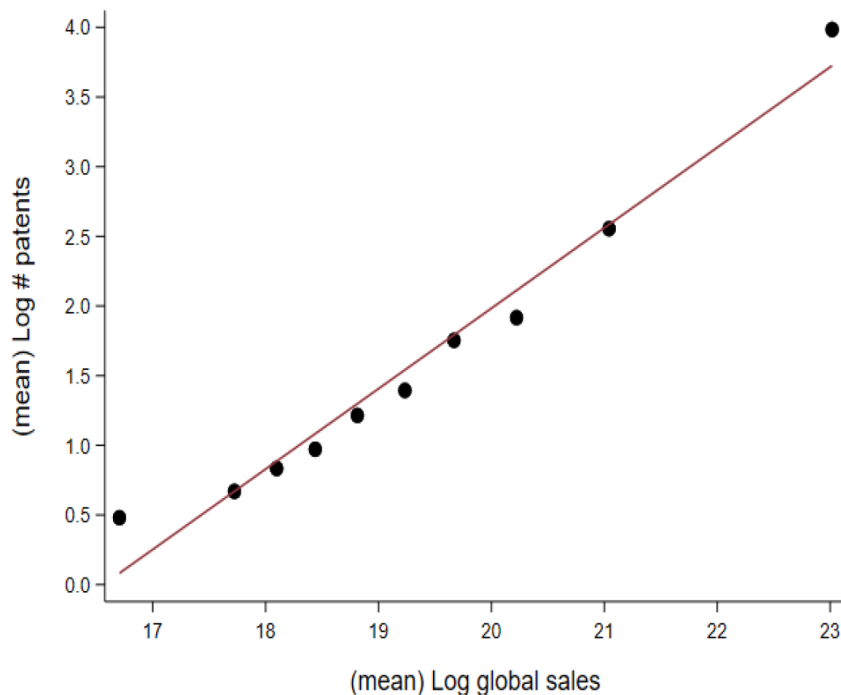
Share of **patenting MNC parents** that file patents with inventors in...



N = 2,374



3. Larger MNCs innovate more intensively



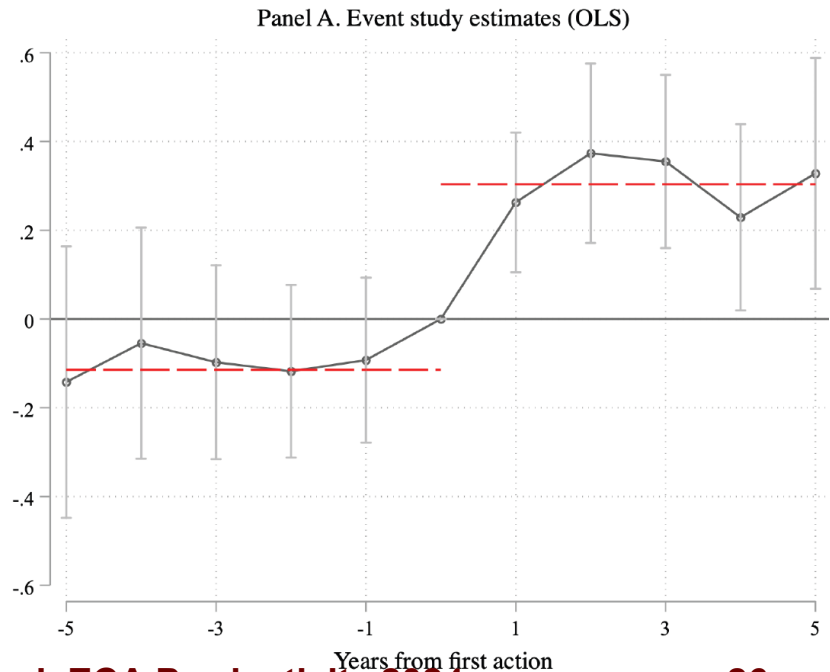
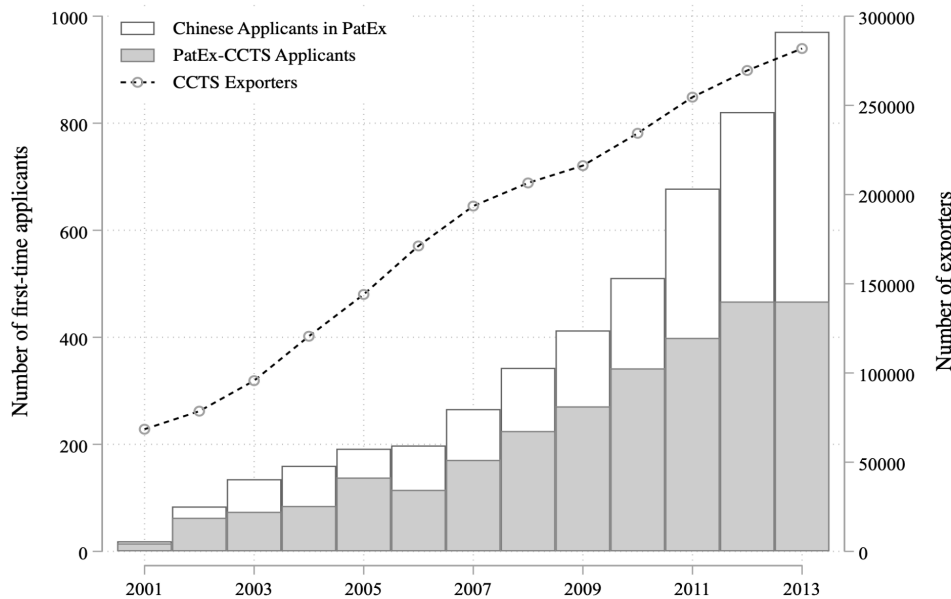
We assign firms into 10 bins based on their yearly log global sales (N=6,800). We plot the average log number of patents and average patent citations against the average log global sales per bin. Year fixed effects included.



4. Emerging-economy pioneers increasingly innovate, but need global stamp of approval

- Gong, Li, Manova & Sun (2022): China
 - US patent award expands Chinese firms' global sales by signaling quality capacity & contract credibility
 - ➔ Low IPRs in developing countries may deter both inbound FDI & host R&D

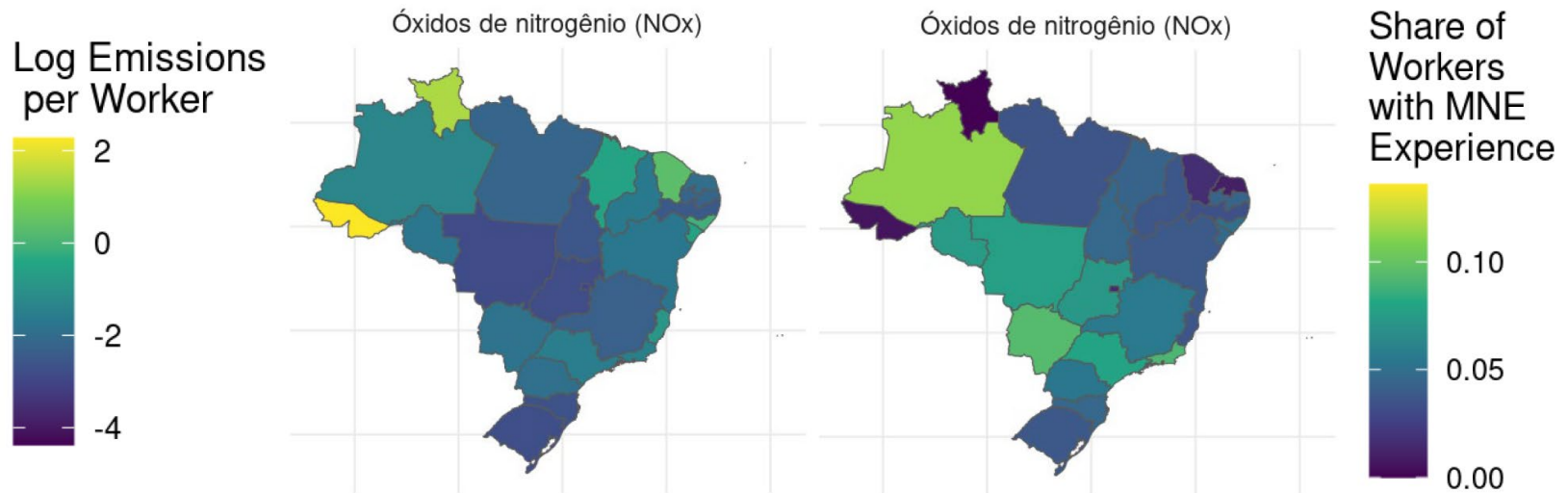
Figure 2: Chinese Trade and USPTO Patent Activity Over Time





5. Familiar MNC knowledge spillovers extend to environmental practices

- ❑ Carballo, Manova, Volpe & Steinwender (202?): Brazil
 - MNCs are cleaner & help local firms get cleaner
 - Ex-MNC employees transfer knowledge & implementation capacity
 - ➔ Rationale for joint trade, investment & climate policy





Open Questions

- ❑ Developed & developing countries occupy different GVC segments & engage differently with innovation & adoption

- ❑ Growth+++ objectives beyond economic growth
 - Multifaceted inclusivity: intersectional equality
 - Multifaceted resilience: stable output, lasting growth
 - Multifaceted sustainability: stable institutions, social cohesion, climate health

- ❑ Synergies or trade-offs between growth & growth+++?
- ❑ Optimal national trade/invest/innovate policies?
- ❑ Scope for multilateralism & deep integration?





Multilateralism for Growth & Growth+++

- ❑ The world is more interconnected & interdependent than ever
 - This amplifies some global challenges & creates new ones
 - But it also creates unique opportunities for global action

- ❑ The appeal of multilateral deep integration
 - Global challenges require global action & align incentives
 - Growth+++ objectives require broad action
 - Global broad action requires coordination





Thank you!