

COPY
IMITATE
INFUSE
~~INNOVATE~~

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2/28/24

R&D Subsidy and Import Substitution



- Novel data: firm-level information on innovation, R&D subsidy applications, exports, imports, and employment
- What does an R&D subsidy do? -- > firms create a local version of foreign products
 - Enables entry into high-tariff markets with domestically produced versions of foreign goods.
- Facing weak competition – domestic incumbents gain market share
- Infant industry protection –sure – but advancing technological progress – can't be sure
 - What's the local knowledge externality?

Why did Brazil switch from imitation to innovation?

- Skill mismatch between technologies developed in rich countries and adopted in poorer countries (Acemoglu and Zilibotti 2001)
 - But firms were choosing to import the technologies even knowing this fact
- Were Brazilian firms over-leasing foreign technologies? Were licensing costs increasing? Were Brazilian firms doing better version of products using foreign technologies?
- What's the government's objective function?
 - Good old fashioned infant industry production?
 - Nationalism?

10 - 1 mL Single Use Vials

NDC 55513-530-10

AMGEN[®]

Neupogen[®]

Filgrastim

A Recombinant Granulocyte Colony Stimulating Factor (rG-CSF) derived from *E Coli*

**300
mcg**

300 mcg/1 mL (3 x 10⁷ Units/1 mL)

For Subcutaneous or Intravenous Use Only
Sterile Solution - No Preservative

Refrigerate at 2° to 8°C (36° to 46°F). Avoid Shaking.

Amgen Inc. Thousand Oaks, CA 91320 U.S.A. U.S. License No. 1080

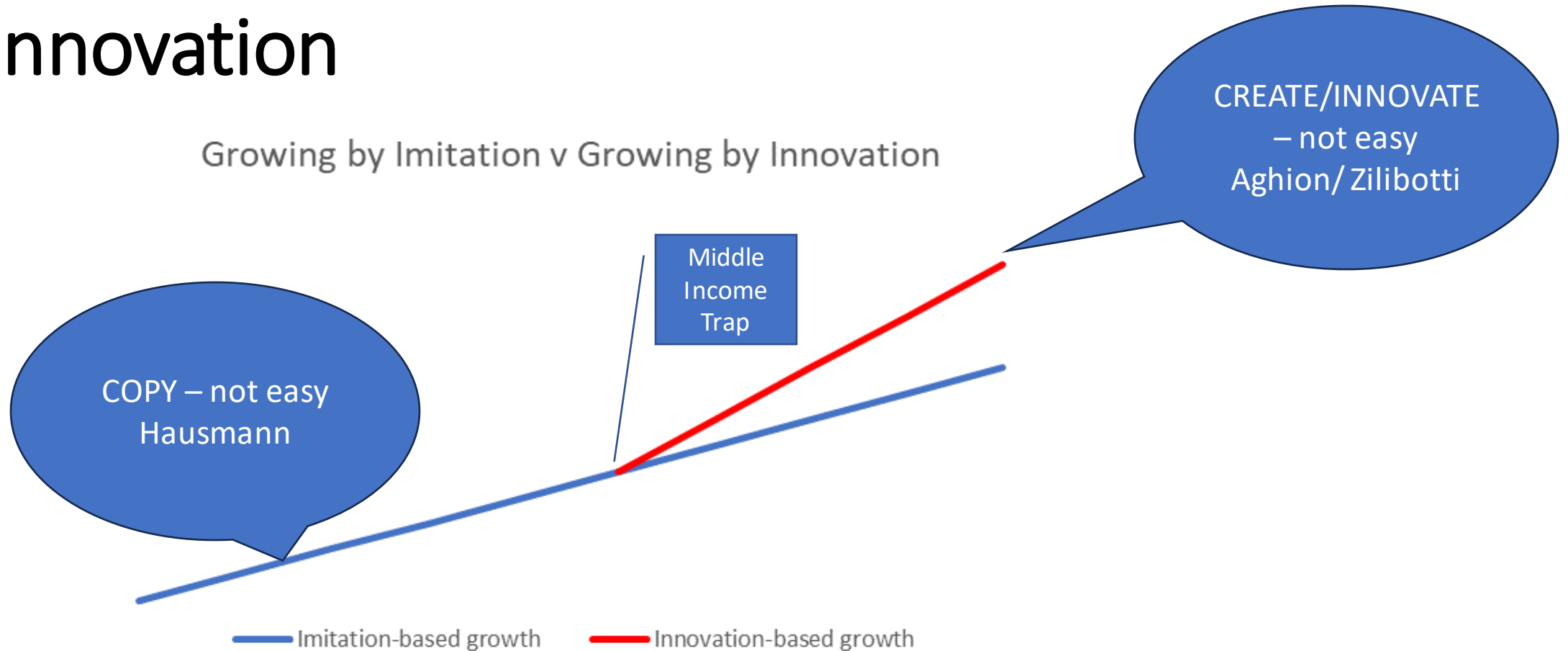
Eurofarma –

Flourishing
behind walls

© 2005 GS

Important to switch from imitation/infusion to innovation

Growing by Imitation v Growing by Innovation



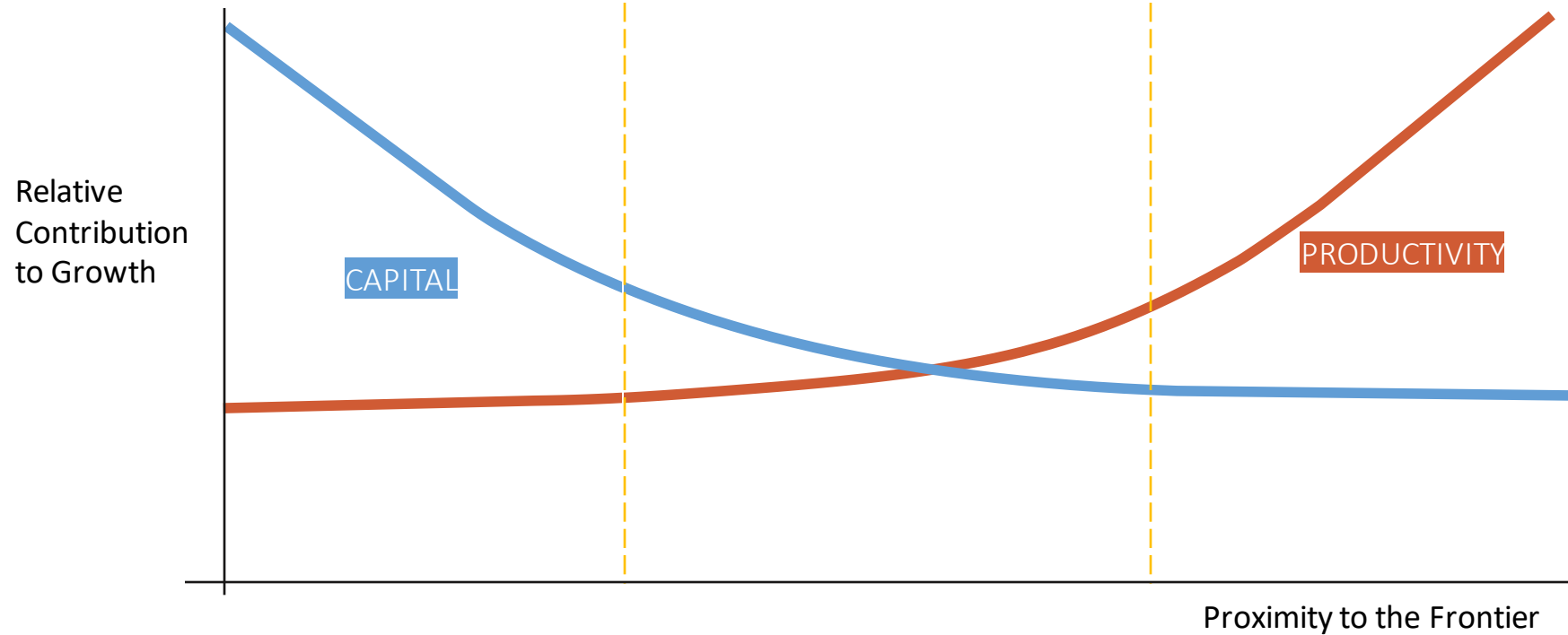
GROWTH IN MIDDLE-INCOME COUNTRIES IS DIFFERENT



GROWTH STRATEGY:

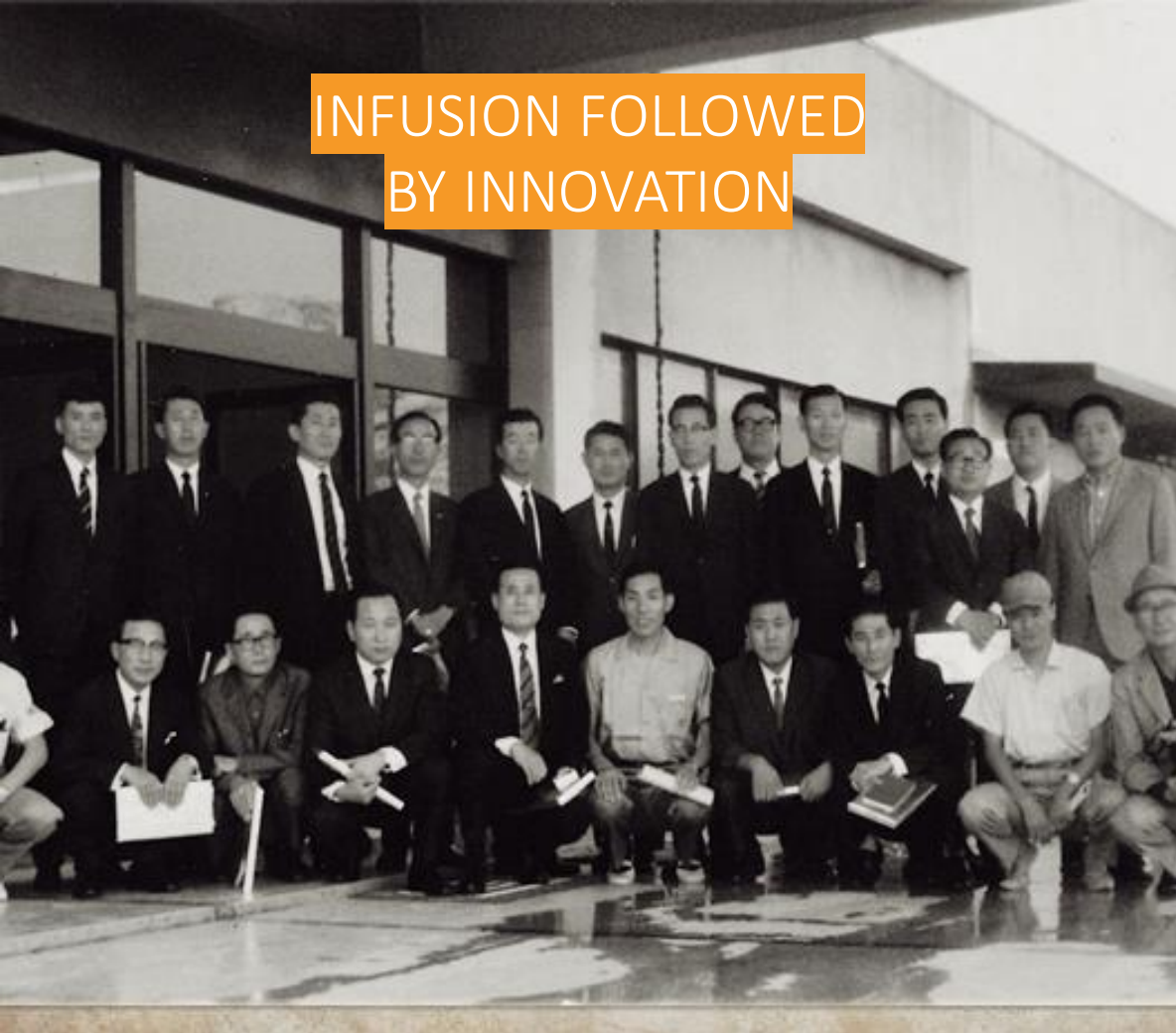
Add Infusion to Investment

Add Innovation to Infusion and Investment

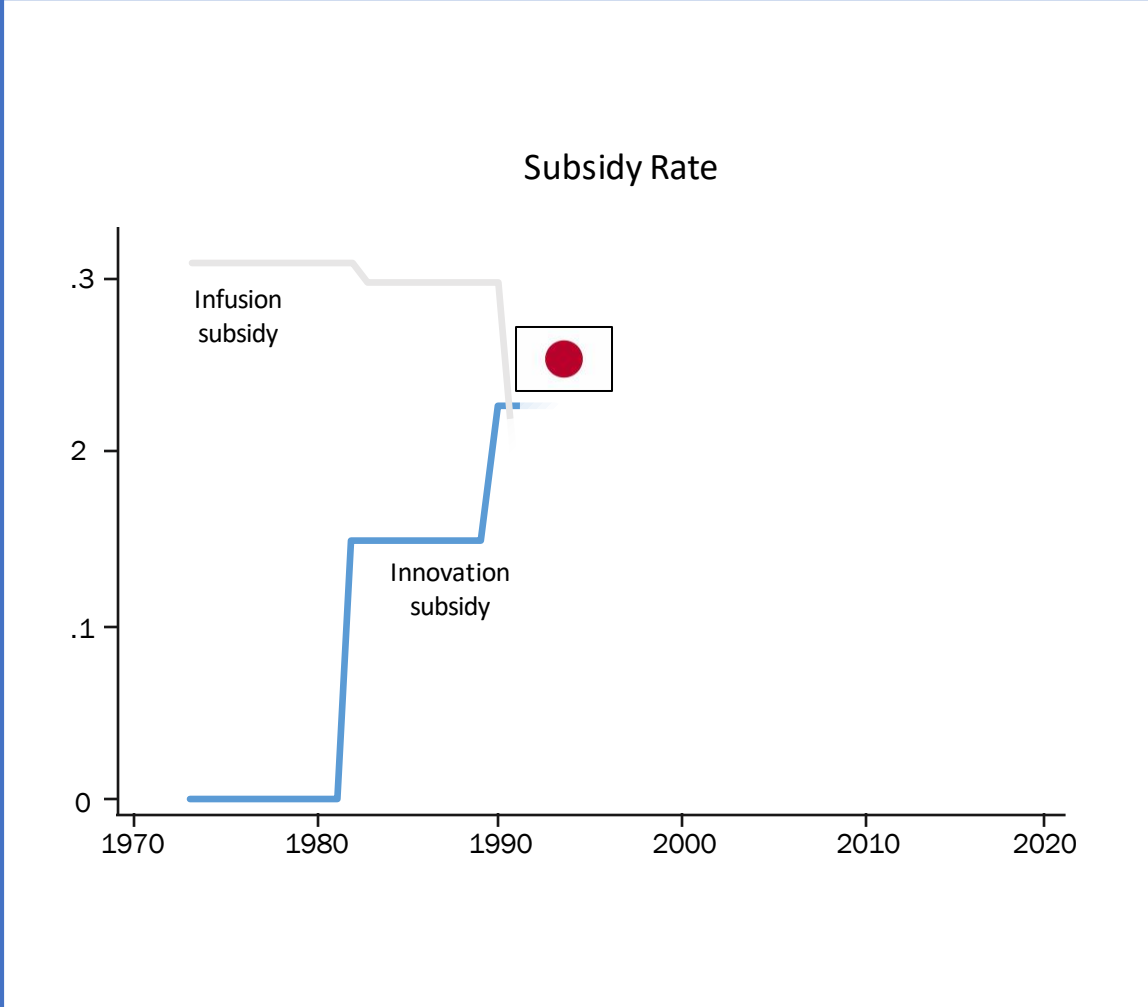




KOREA: TWO SUCCESSIVE TRANSITIONS



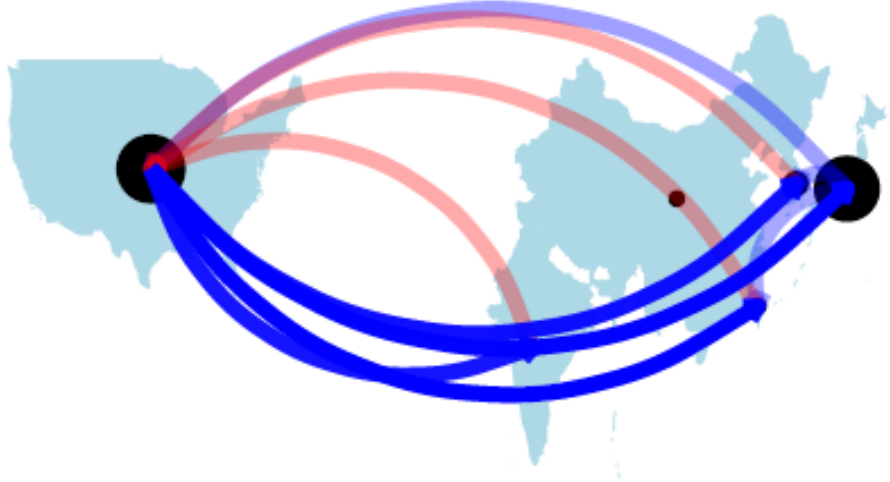
INFUSION FOLLOWED BY INNOVATION



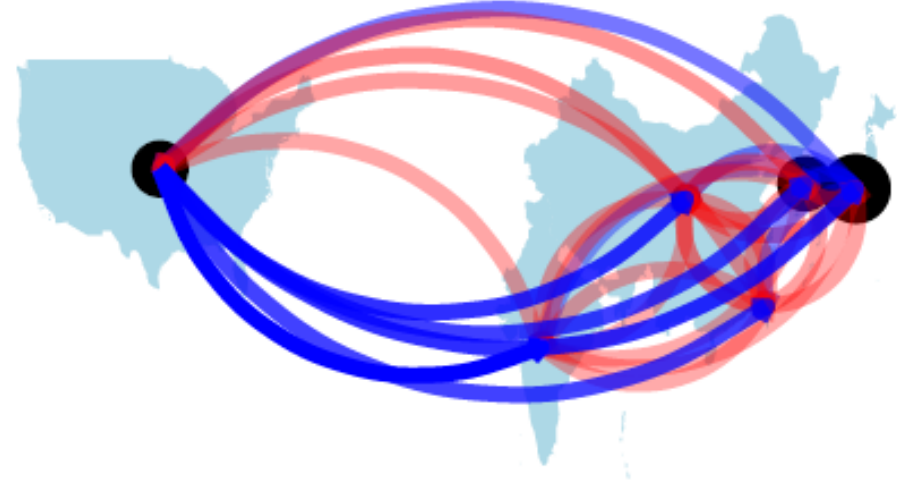
Source: <https://news.samsung.com/global/the-history-of-samsung-electronics-1-paving-a-new-path-19681970>

Brazil – does it look like Asia in the 1970s – cites frontier technology, but is not cited

Downstream knowledge flow



Convergence



(a) Citations from the frontier—Asia, 1970-1979.

(b) Citations from the frontier—Asia, 2010-2019.

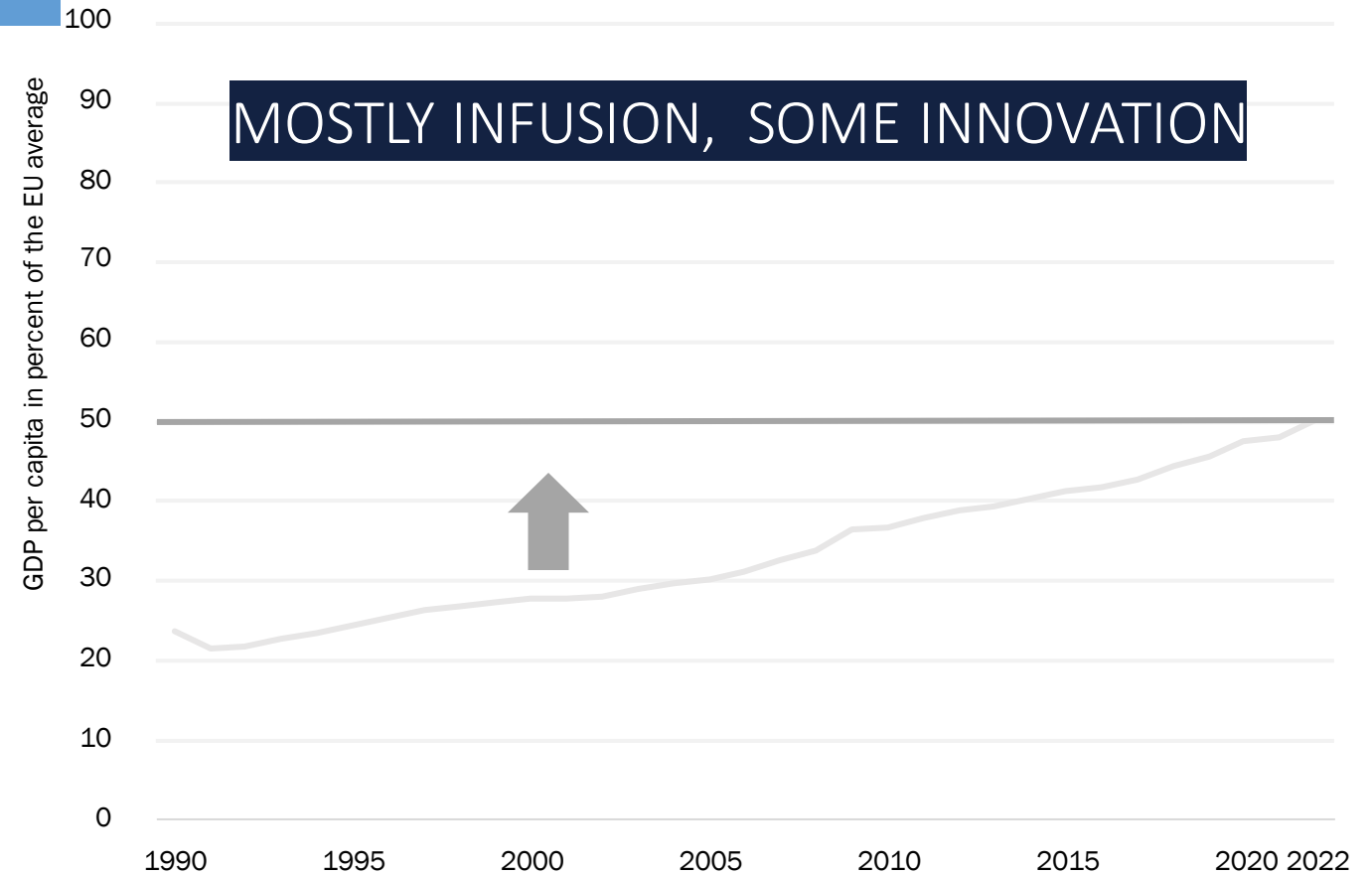
Figure 4: Global citations flows, Asian development. Arrows represent “exports” of citations: more darkly shaded arrows correspond to a larger proportion of citations are being exported to the focal country. Black dots correspond to the country’s share of world patents.

• Chikis, 2023



Iwakura Mission

POLAND -- FROM 22 PERCENT OF AVERAGE EU PER CAPITA INCOME IN THE 1990S TO 50 PERCENT IN 2022



CHILE: FIRST IN LATIN AMERICA TO REACH HIGH-INCOME



PROMOTING TECHNOLOGY TRANSFERS



EXPANDING PROFESSIONAL EDUCATION

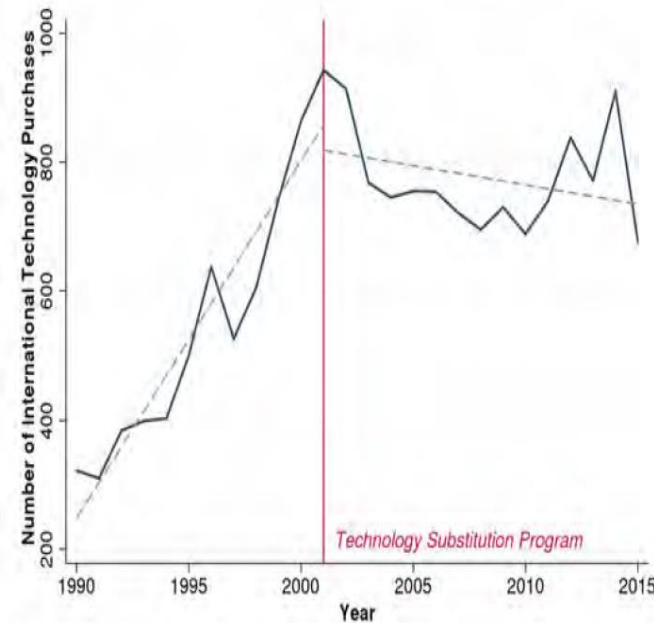


ENERGY SECURITY AND COMPETITIVENESS

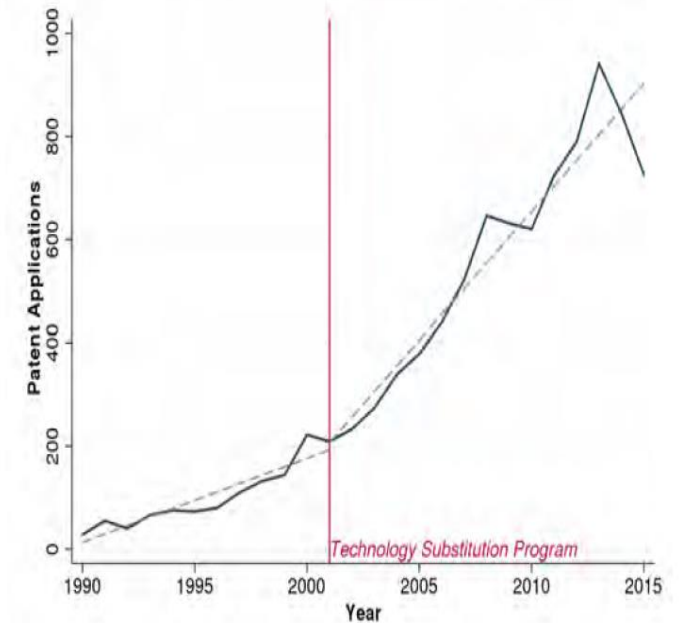
Brazil –
harder to
copy, easier
to
innovate??

Figure 1: Technology Substitution Program and Innovation

(a) Int. Technology Lease

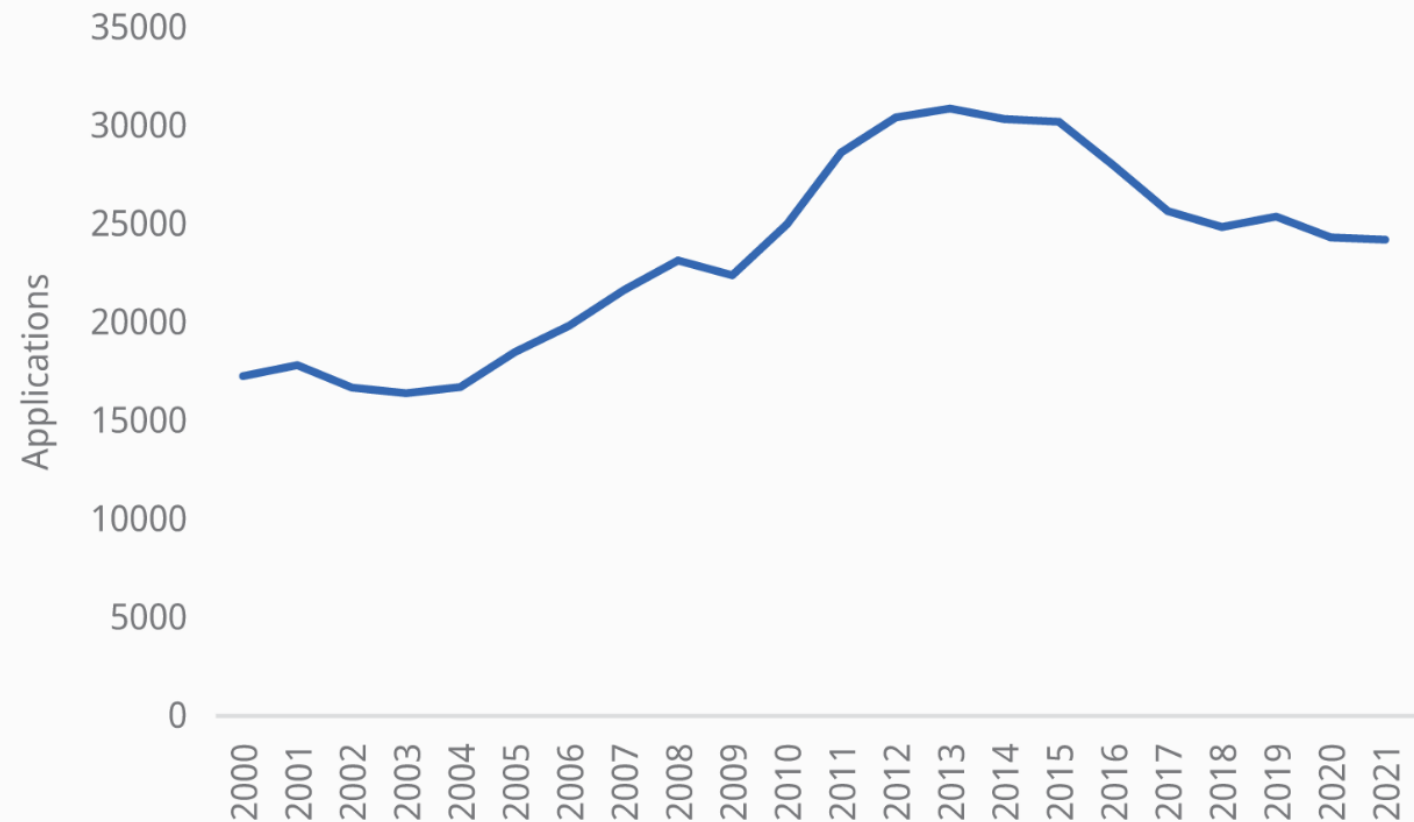


(b) PCT Patent Applications



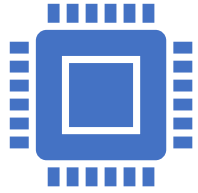
Patenting in Brazil

Figure 3.1 Patent applications filed in Brazil, 2000-2021



Source: WIPO IP Statistics Data Center, available at www3.wipo.int/ipstats/index.htm?tab=patent

What is being patented in Brazil?



A technically superior 'product' –
advancing 'state of art' → **No such
requirement – and patent office does not
have the capability to assess**



Evergreening? (by pharmaceutical
companies?) -- India stopped this!

- (1) all new uses of substances already known;
- (2) new forms of known substances, even if a new use and surprising new effect are shown; and
- (3) new uses of known processes unless such process results in a new product or employs at least one new reactant.



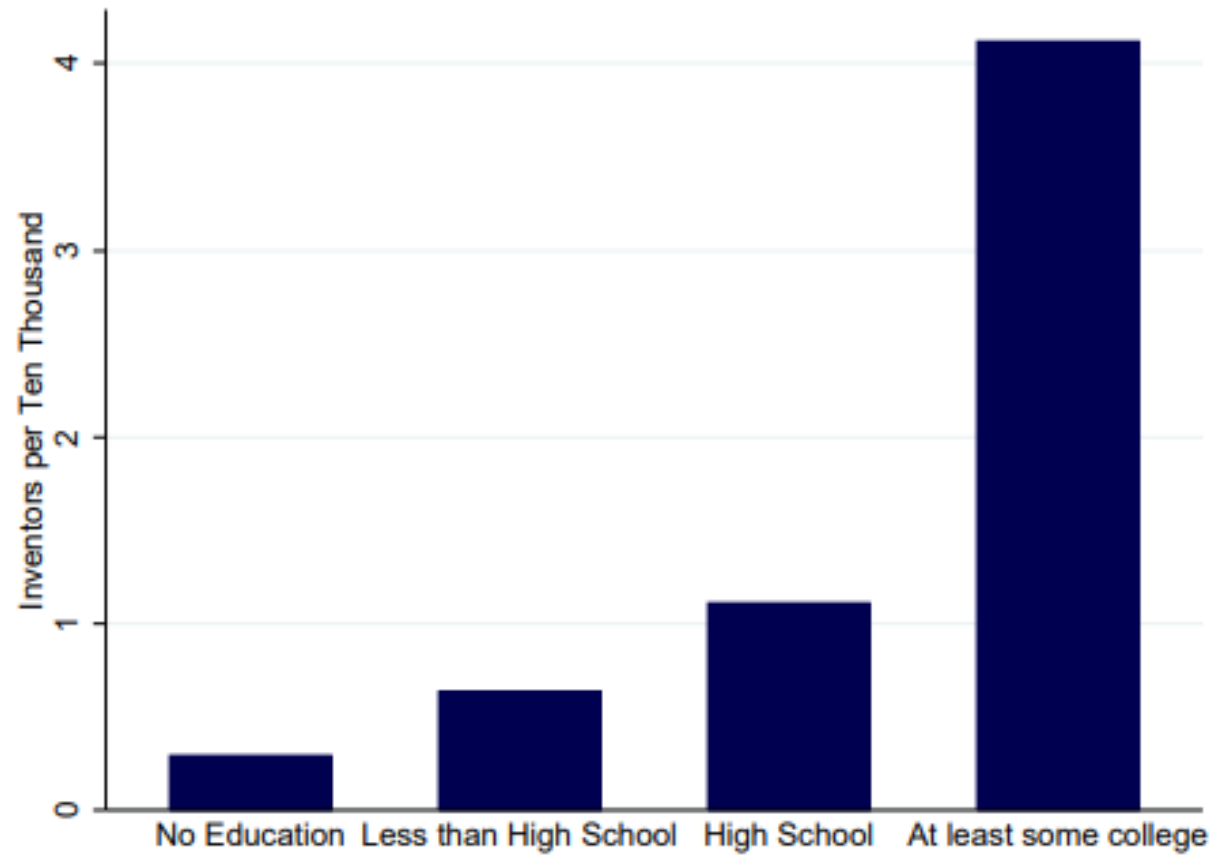
Patenting of inventions not superior to
the prior state of art -- >detering
competition / creating artificial barrier to
market entry

High tech ideas
with low tech
production!!!

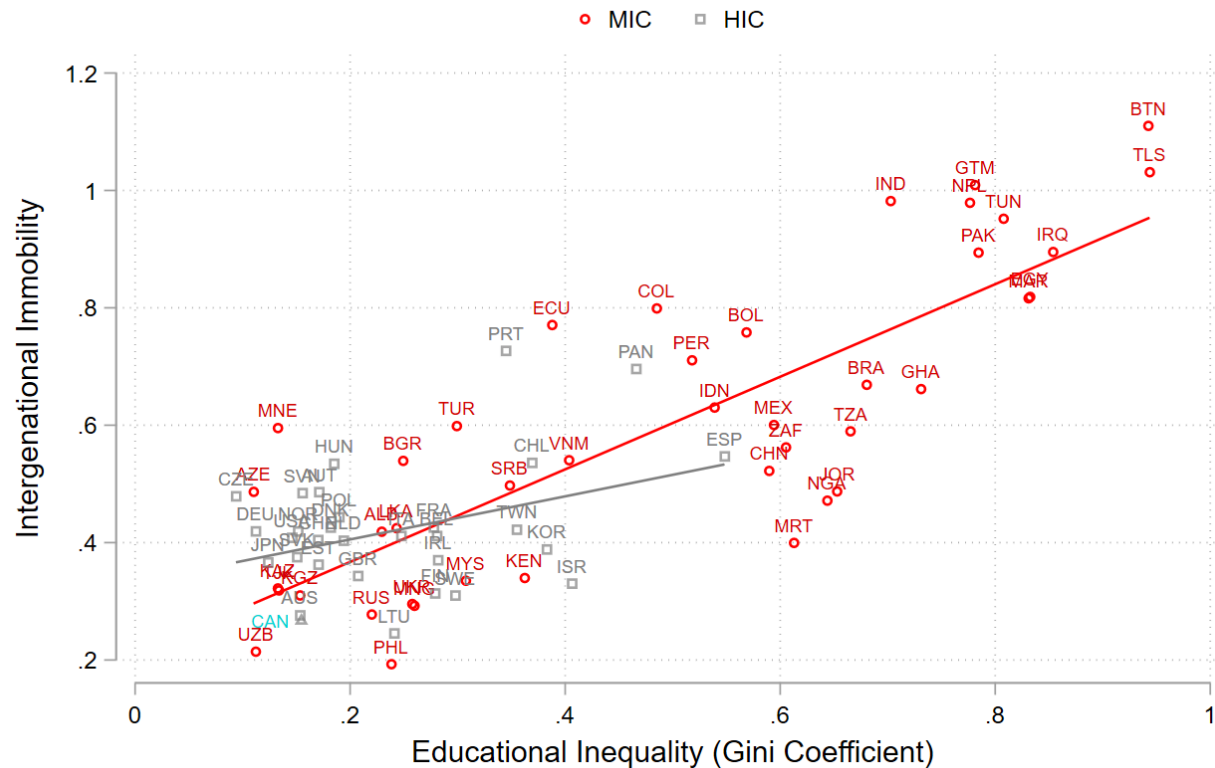
Country	Country Code	WB Income Group (GNI pc)	2022		Enterprise Dynamics				
			GDP pc, PPP (current int'l \$)	Percentile	ECI	Change in Economic Complexity Index since 2000	Percentile	Technology Index	Percentile
India	IND	LM	8,379	31.6	0.5	0.2	57.5	77.0	55.1
Argentina	ARG	UM	26,505	64.4	-0.2	-0.3	24.5	79.9	65.5
Brazil	BRA	UM	17,822	53.0	-0.2	-1.0	3.7	85.8	72.4
China	CHN	UM	21,476	59.0	1.3	HC	100.0	95.1	81.0
Colombia	COL	UM	20,287	57.3	-0.1	-0.3	32.0	75.4	47.1
Chile	CHL	H	30,209	67.2	-0.3	-0.3	28.3	79.9	66.0
Croatia	HRV	H	40,380	74.3	0.8	0.1	55.6	91.8	78.1
United States	USA	H	76,399	95.6	1.4	HC	100.0	130.7	99.4

Need training
to invent –
USA in the
1940 census

Panel A: INVENTORS PER 10,000 BY EDUCATION



Inequality
is
compatible
with social
mobility



- Let's not get carried away with skill bias and growing inequality