

Accessing knowhow for development

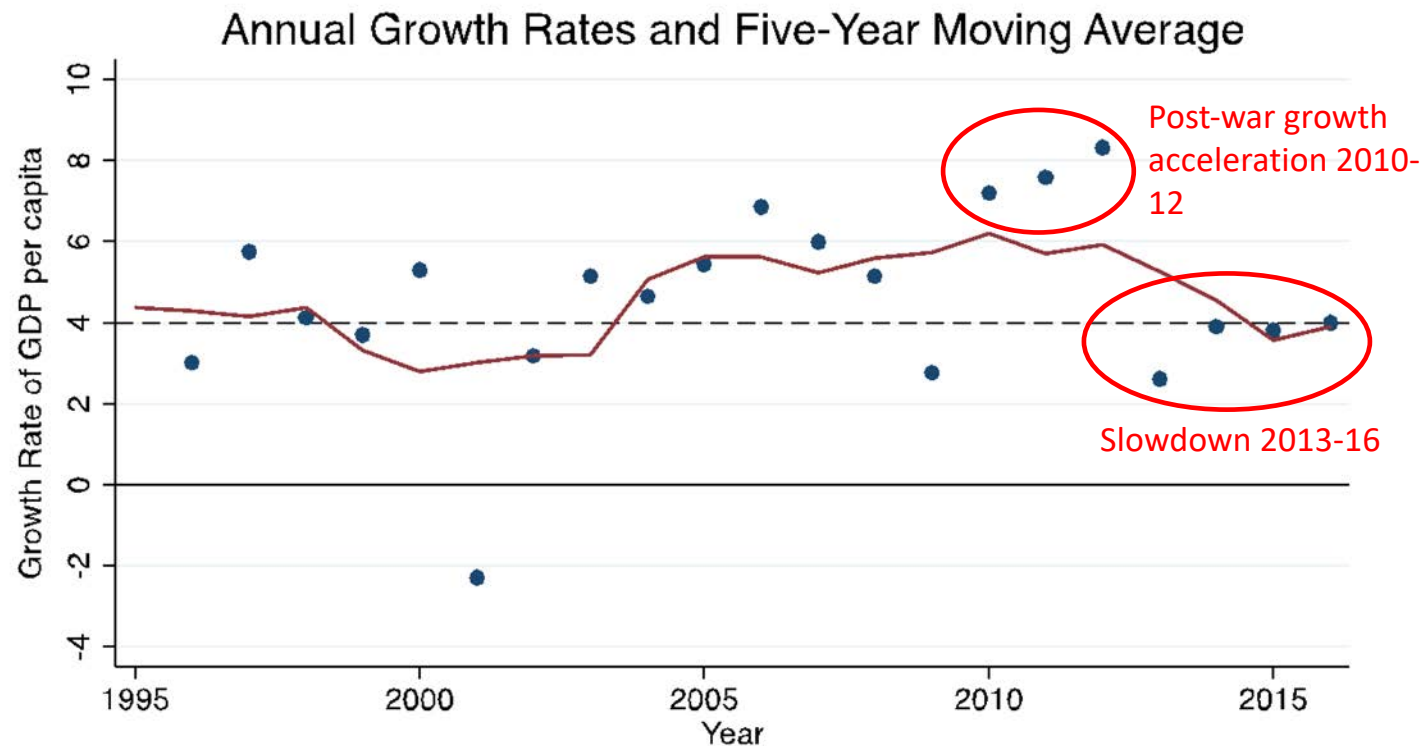
Ricardo Hausmann

Harvard Kennedy School

Center for International Development

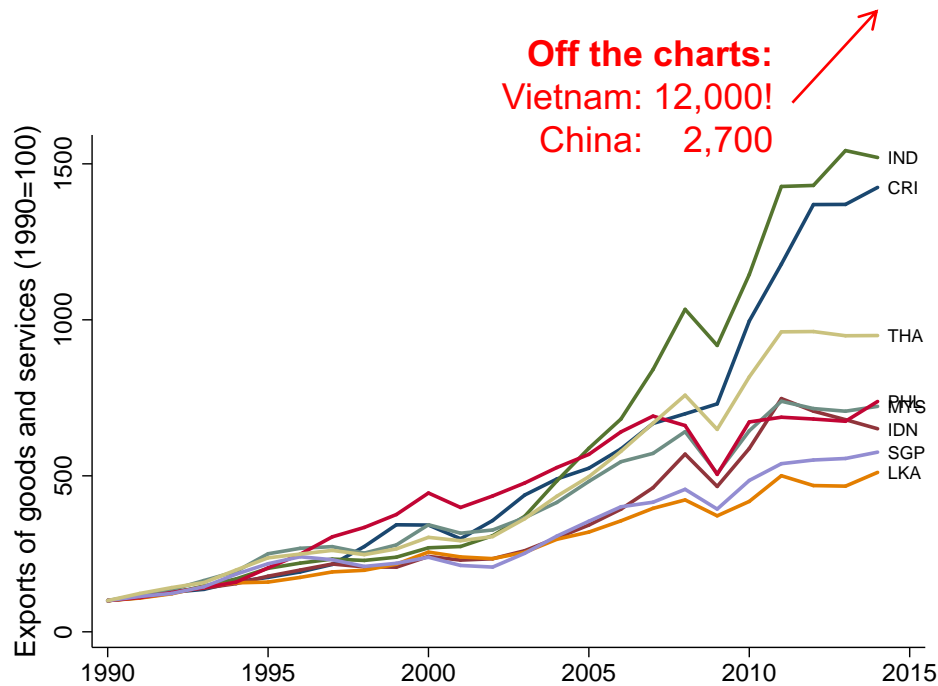
Harvard University

Growth has slowed down

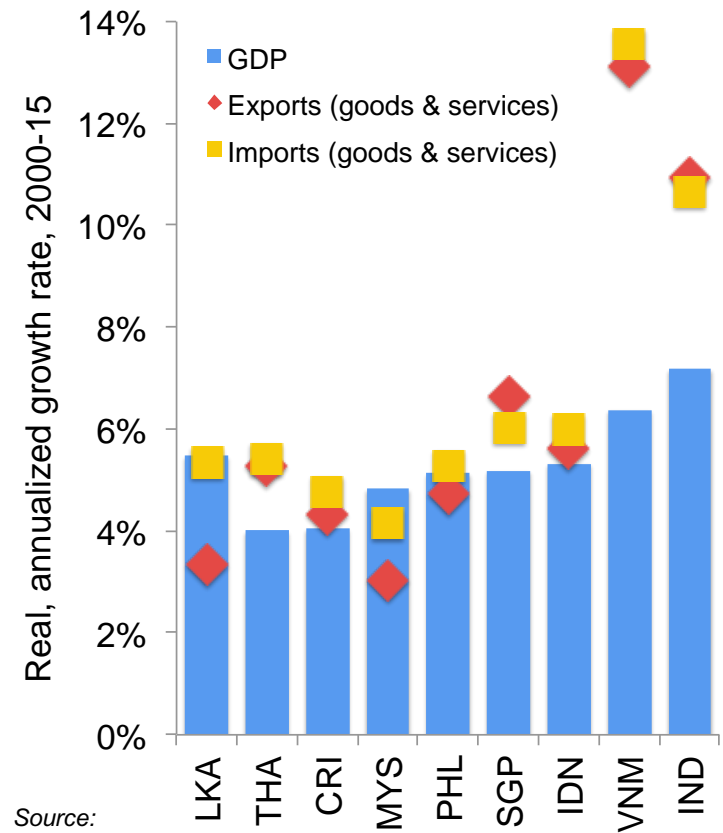


Note: GDP per capita as measured in constant 2010 US\$
Data sources: World Development Indicators through 2015 & predicted value for 2016 based on CBSL projections

Export growth has been very slow

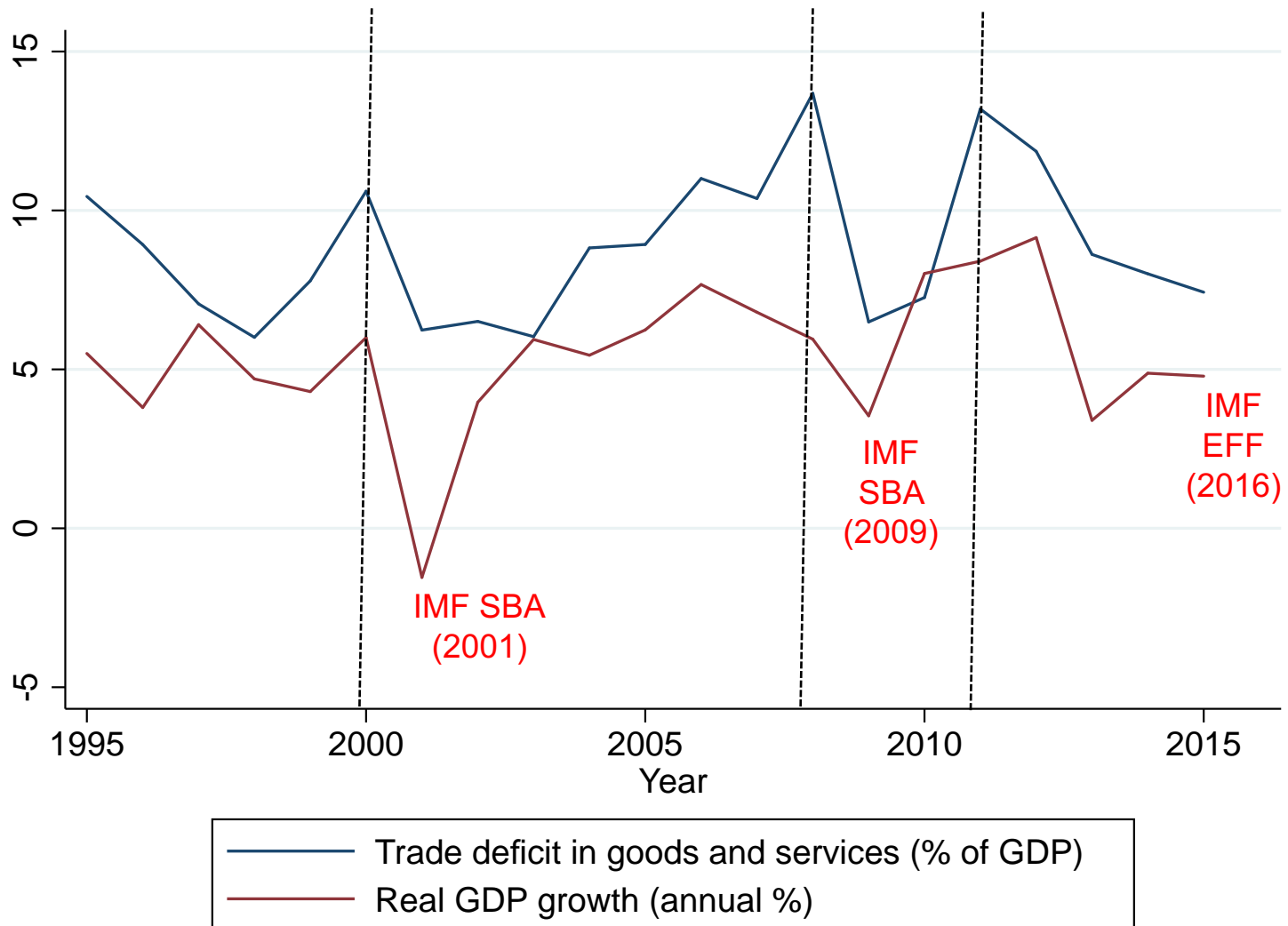


Source: UN COMTRADE, via CID. Not adjusted for inflation.

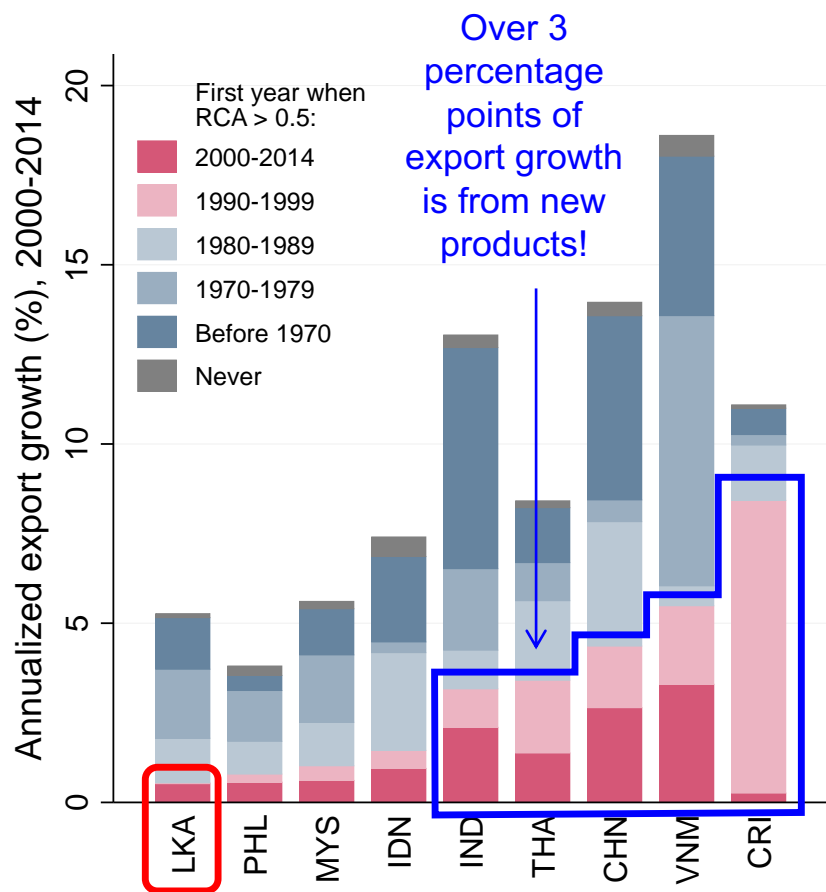


Source:
WDI

Leading to recurrent balance of payments crises



Why no export growth? No new exports

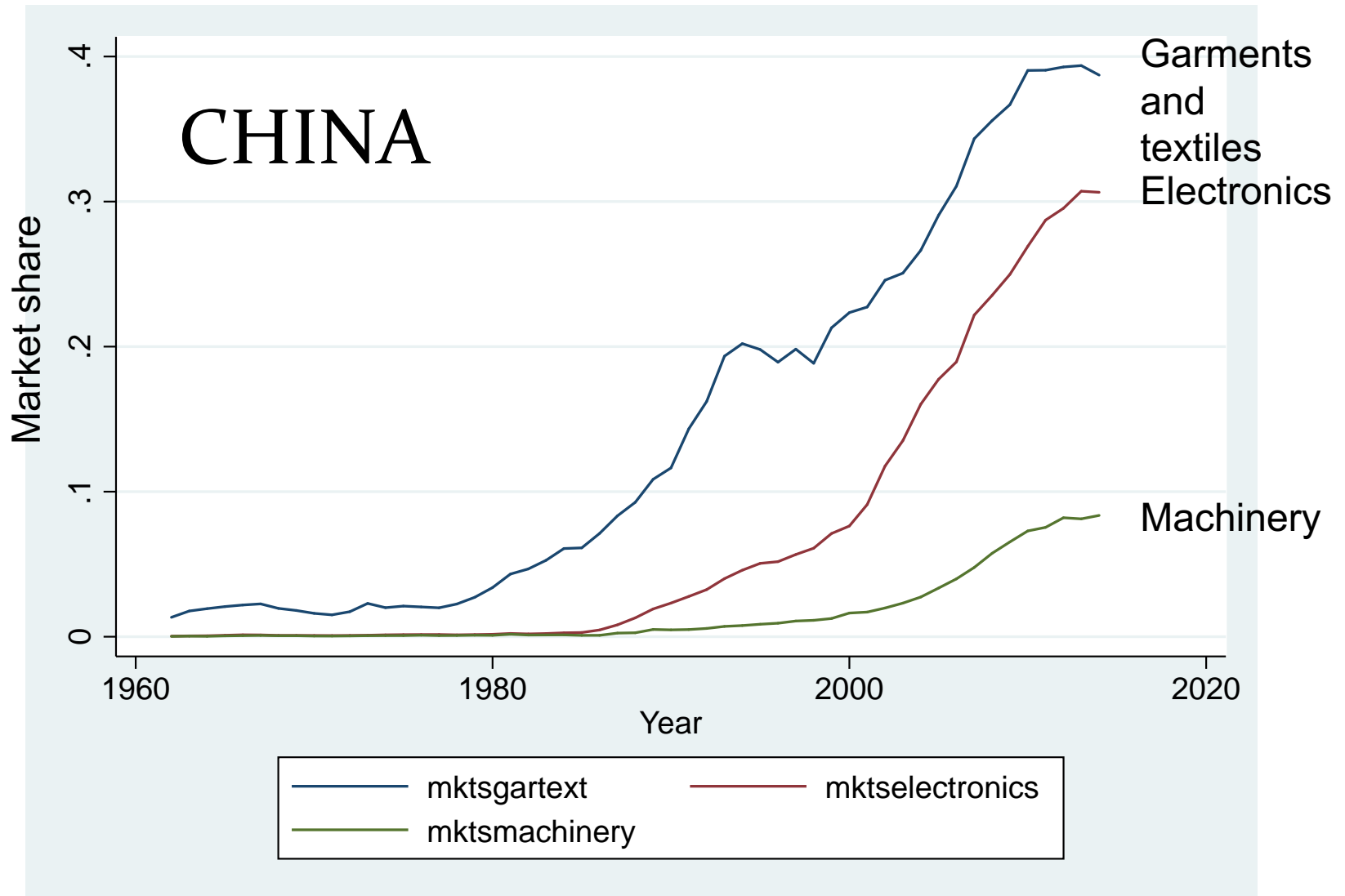


New export products, 2000-2015

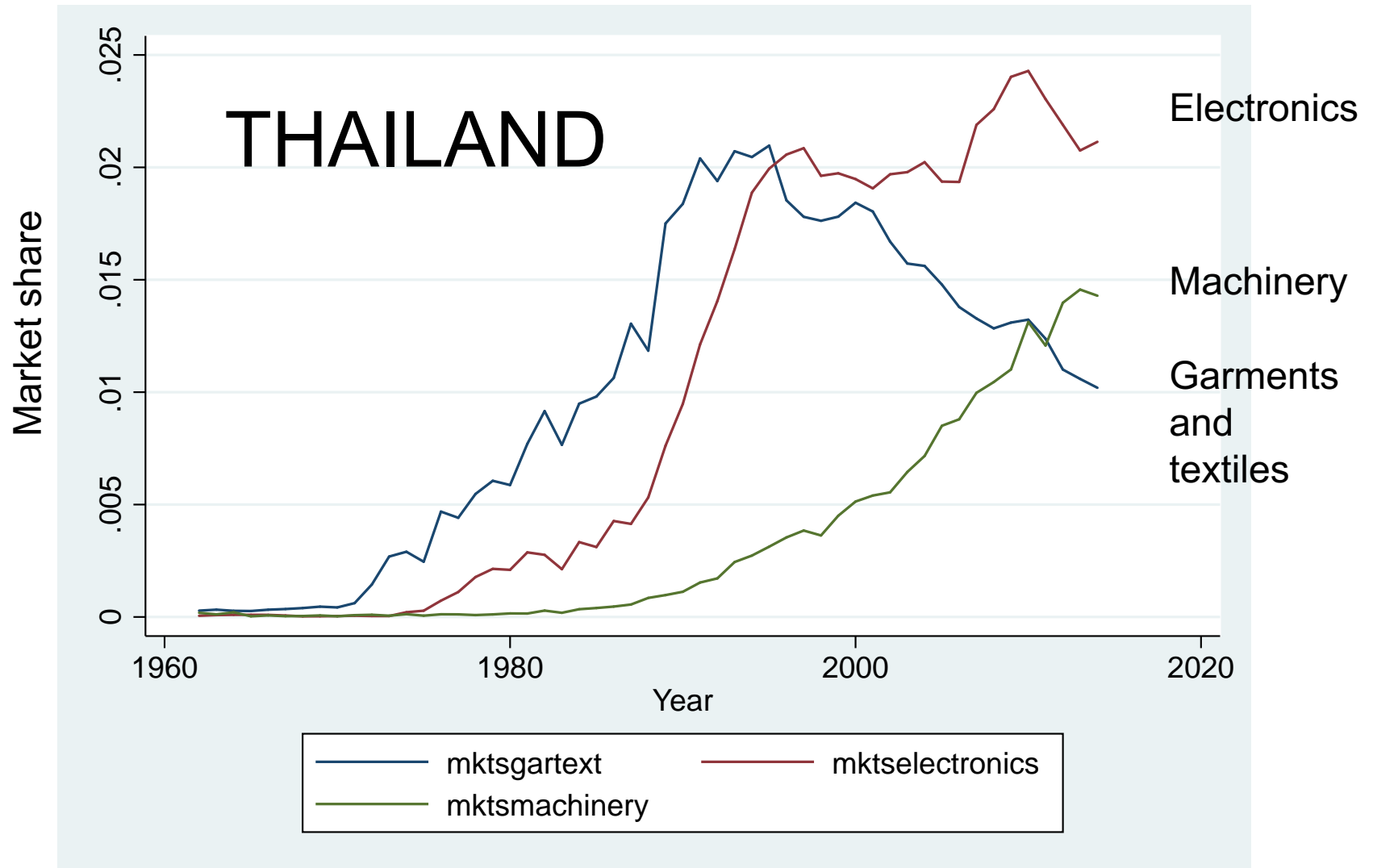
Country	Value of new export products		Number of new export products
	Per capita (USD)	Total value (USD billions)	
Vietnam	545	50.4	48
Thailand	326	21.8	70
China	245	331.6	76
Malaysia	149	4.7	10
Costa Rica	139	0.7	6
Philippines	12	1.2	11
Sri Lanka	5	0.1	7
Indonesia	3	0.8	4

Source: CID calculations, based on COMTRADE data

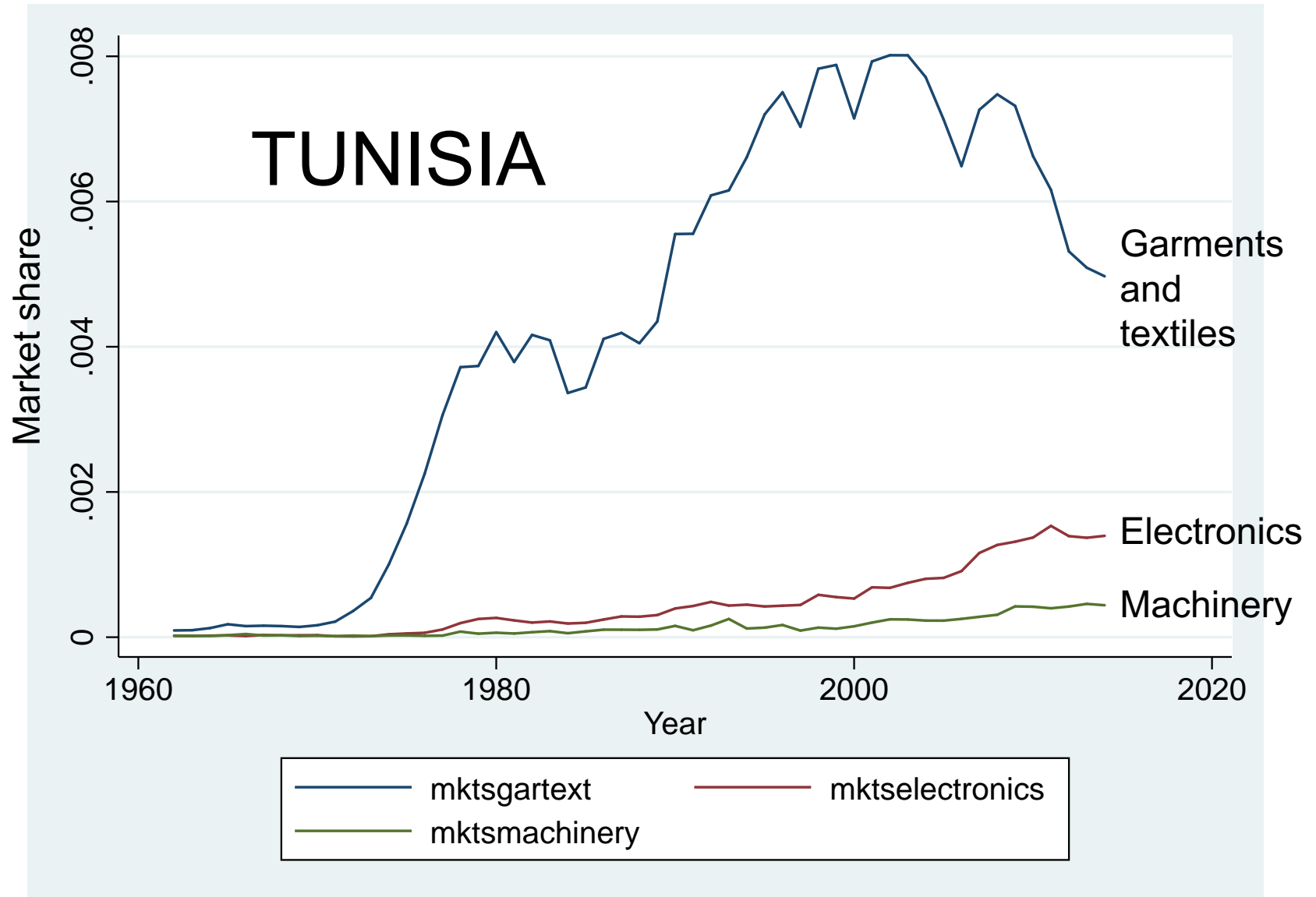
Countries often first diversify into garments,
followed by electronics and then machinery



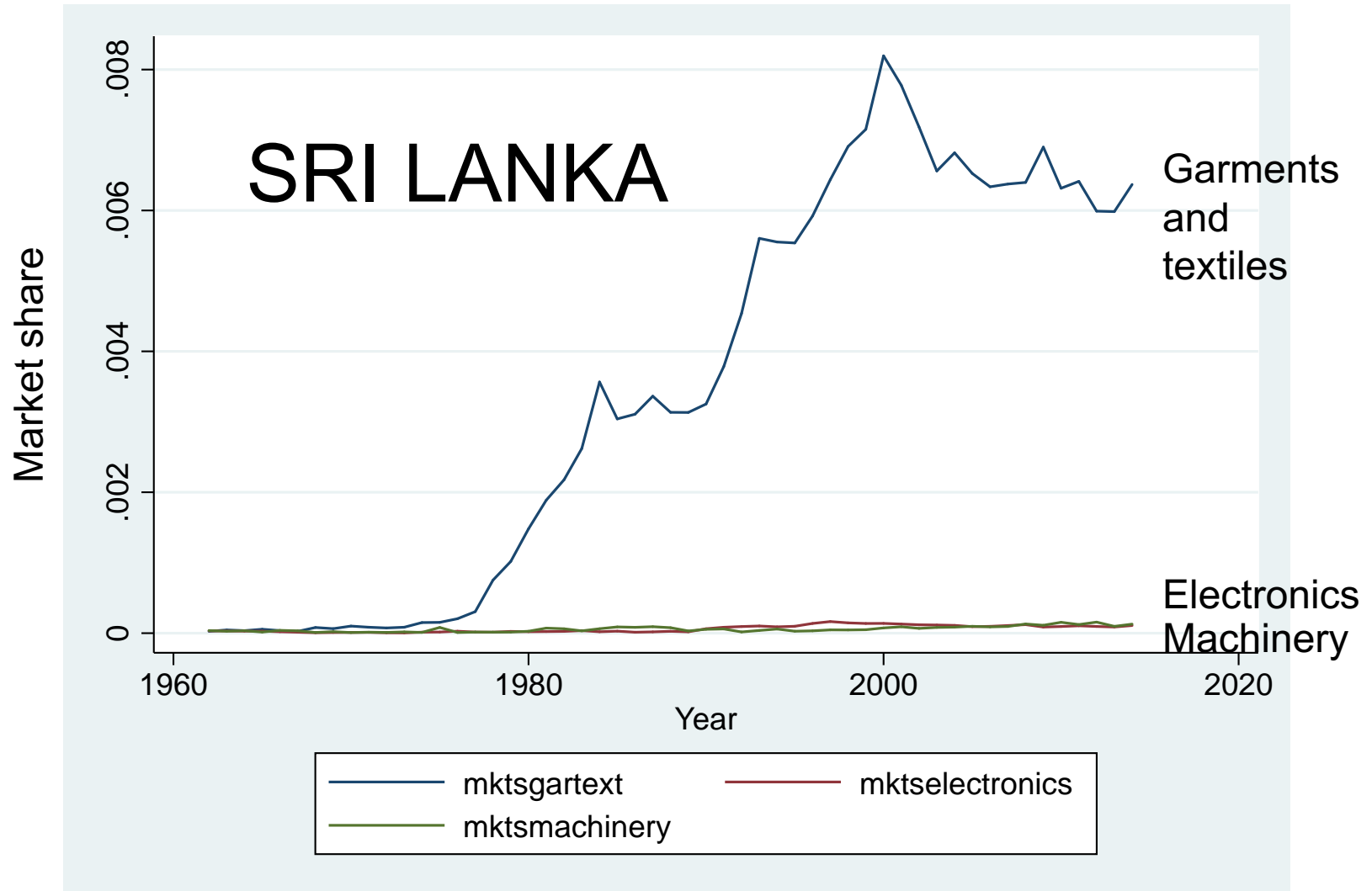
Over time, the market share of garments tends to peak as growth in other industries picks up



...but sometimes countries get stuck in the garments phase

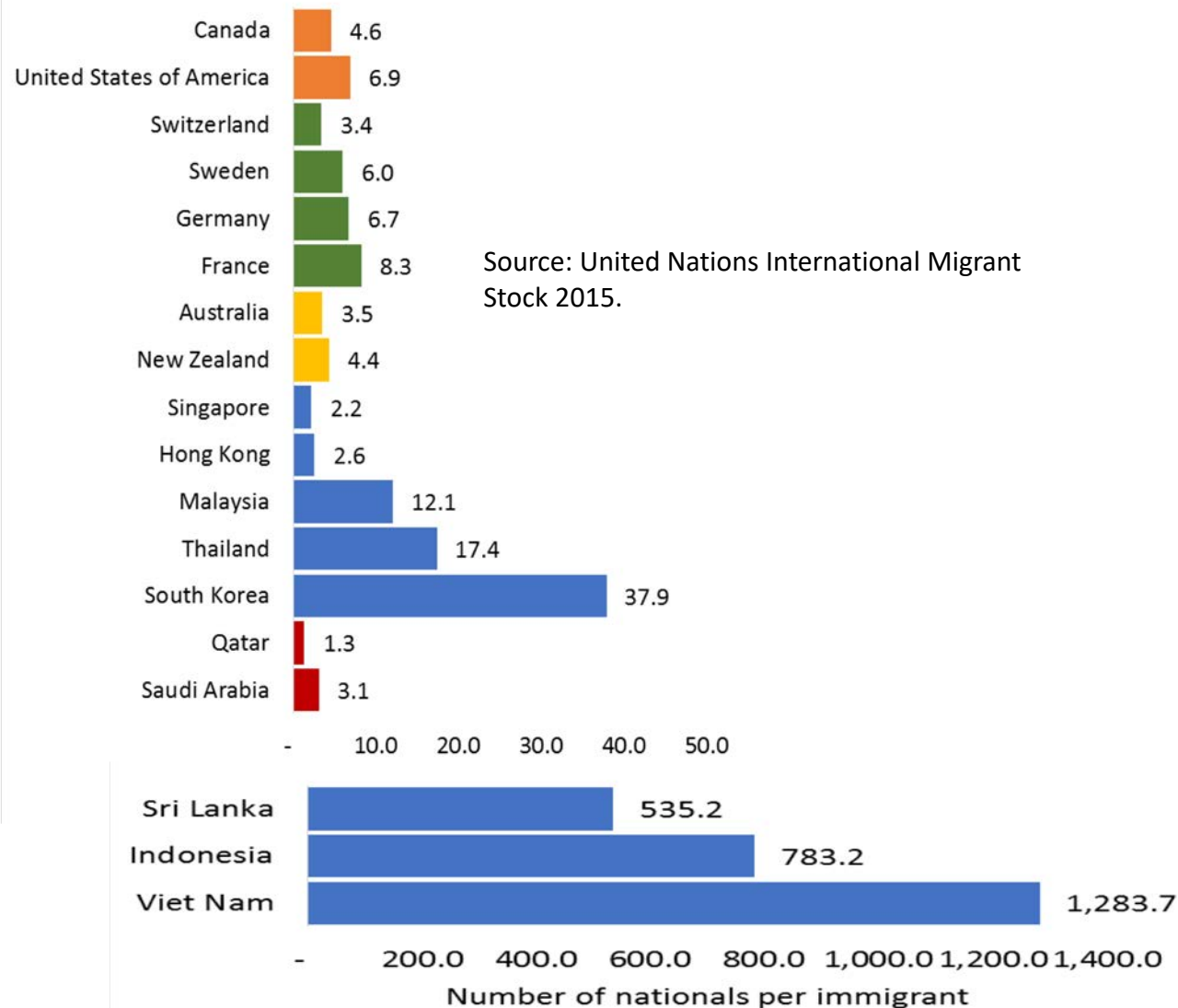


...this is what has happened in Sri Lanka



Number of nationals per immigrant in selected countries

Immigration is very low

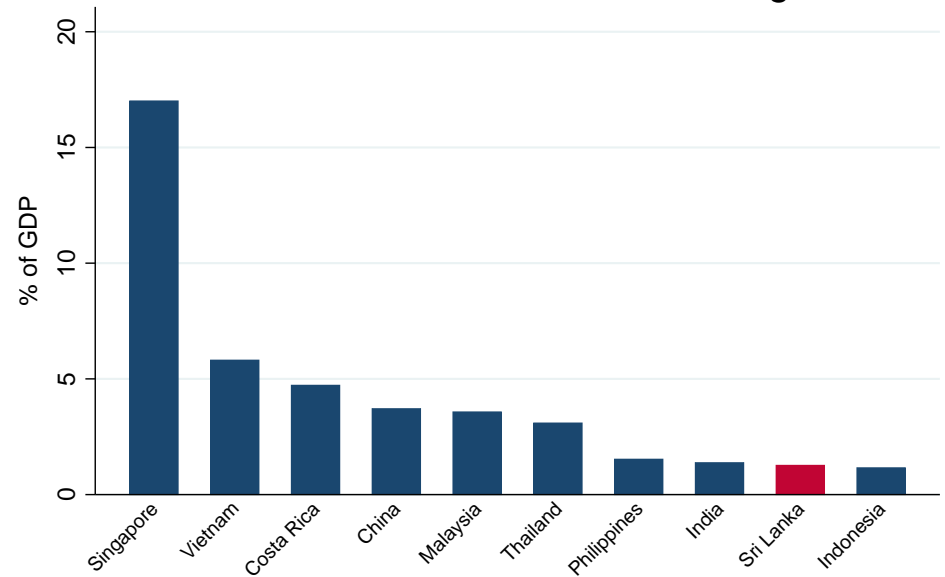


FDI has been
very low

Sri Lanka has seen
little FDI over last 20
years.

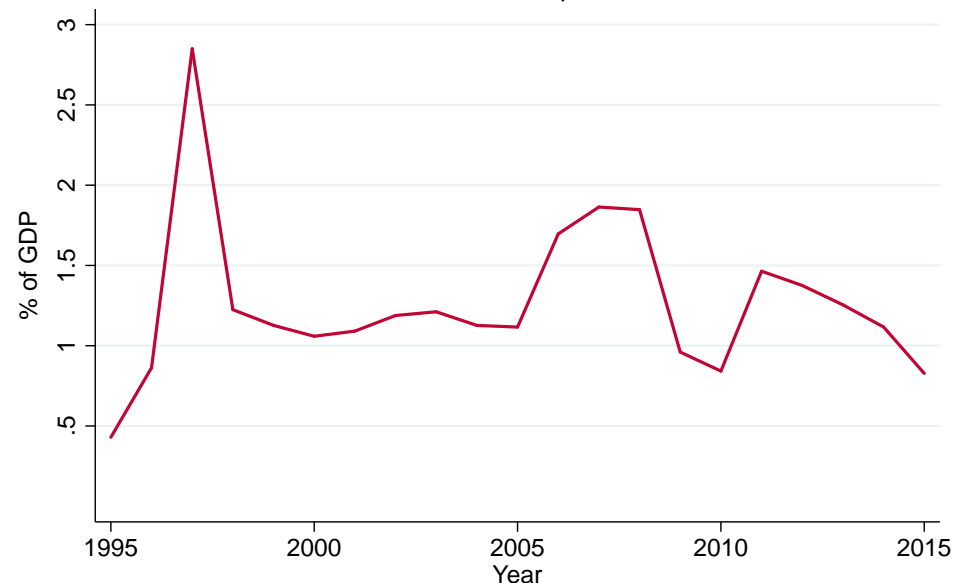
And no sustained
increase in FDI after
the conflict.

FDI Net Inflows, 1995-2015 Avg.



Source: WDI

FDI Net Inflows, Sri Lanka



Source: WDI

Are these things related?

- Low GDP growth
- Low export growth
- Balance of payments problems
- Low transformation of the export basket
- Low immigration
- Low FDI

**What is the
secret of
growth?**



*Presented to the H. Austell Public Library
by Mr. P. H. Smith of H. Austell*



AN

INQUIRY

INTO THE

NATURE AND CAUSES

OF THE

WEALTH OF NATIONS.

By ADAM SMITH, L.L.D. F.R.S.

WITH

A LIFE OF THE AUTHOR.

ALSO,

A VIEW OF THE DOCTRINE OF SMITH, COMPARED WITH THAT OF THE
FRENCH ECONOMISTS; WITH A METHOD OF FACILITATING THE
STUDY OF HIS WORKS; FROM THE FRENCH OF M. GARNIER.

IN THREE VOLUMES.

VOL. I.

LONDON:

PRINTED FOR J. MAYNARD, PANTON STREET, HAY-
MARKET; AND F. ZINKE, 448, STRAND.

1811.

According to the latest World Development Indicators

- GDP per capita at purchasing power parity in the world is:
- Burundi 777
- Ethiopia 1,734
- Bangladesh 3,335
- India 6,571
- Sri Lanka 12,552
- Panama 23,009
- Canada 44,644
- Singapore 87,832









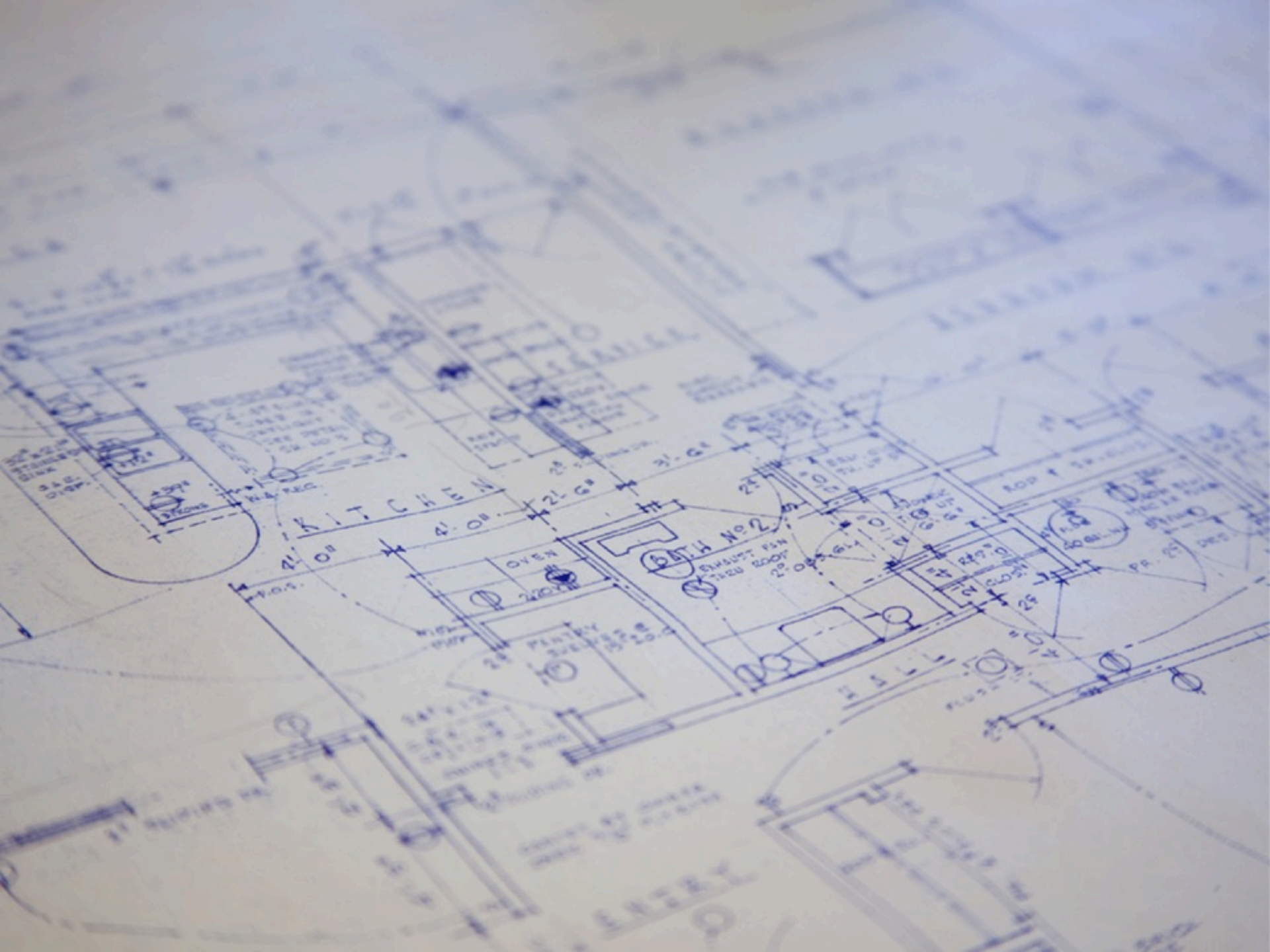
















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Lift (force)

From Wikipedia, the free encyclopedia

For other uses, see [Lift \(disambiguation\)](#).

A **fluid** flowing past the surface of a body exerts a **force** on it. **Lift** is the **component** of this force that is **perpendicular** to the **oncoming** flow direction.^[1] It contrasts with the **drag** force, which is the component of the surface force **parallel** to the flow direction. If the fluid is air, the force is called an **aerodynamic force**. In water, it is called a **hydrodynamic force**.

Contents [hide]

- Overview
- Simplified physical explanations of lift on an airfoil
 - Flow deflection and Newton's laws
 - Limitations of deflection/turning
 - Increased flow speed and Bernoulli's principle
 - Conservation of mass
 - Limitations of explanations based on Bernoulli's principle
- Basic attributes of lift
 - Pressure differences
 - Angle of attack
 - Airfoil shape
 - Air speed and density
 - Lift coefficient
 - Pressure integration
- A more comprehensive physical explanation
 - Lift involves action and reaction at the airfoil surface and is felt as a pressure difference
 - The airfoil affects the flow over a wide area around it
 - The pressure differences and the changes in flow speed and direction support each other in a mutual interaction
- The understanding of lift as a physical phenomenon
- Mathematical theories of lift
 - Navier-Stokes (NS) equations
 - Reynolds-Averaged Navier-Stokes (RANS) equations
 - Inviscid-flow equations (Euler or potential)
 - Linearized potential flow
 - Circulation and the Kutta-Joukowski theorem
 - Momentum balance in lifting flows
- Lift of three-dimensional wings
- Viscous effects: Profile drag and stalling

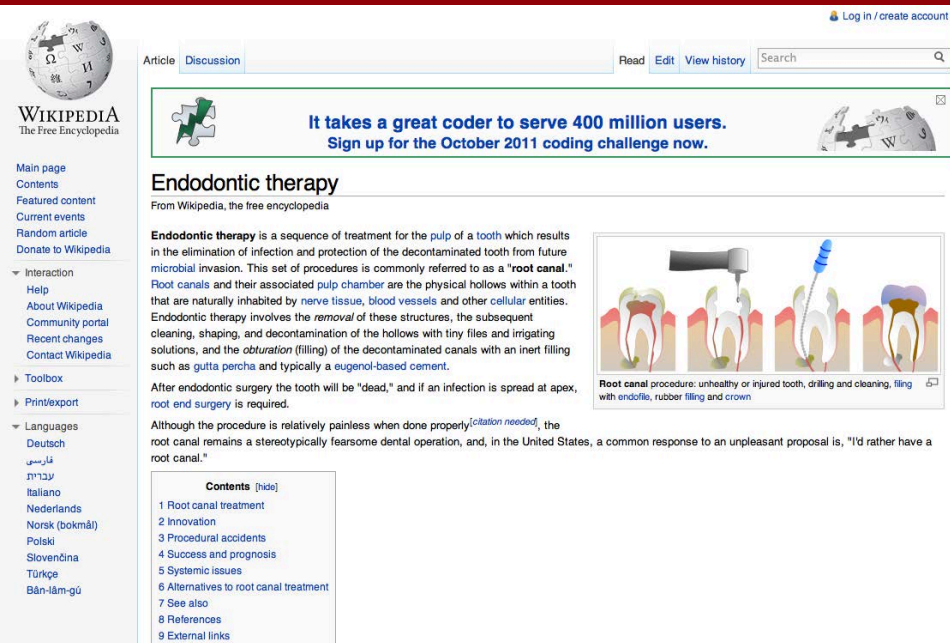


Boeing 747-8F landing



What do you do when your tooth hurts?

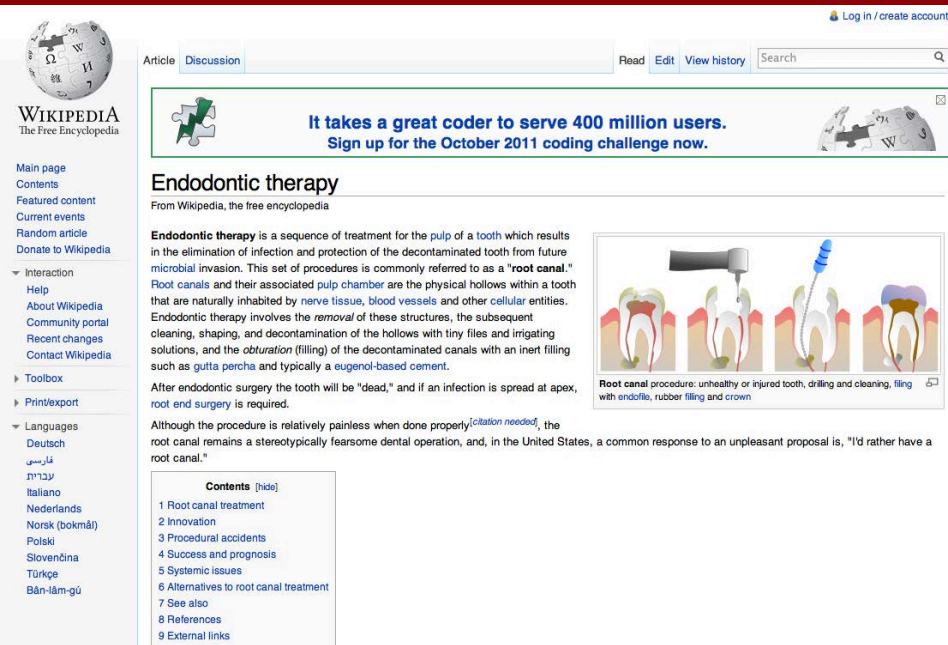
What do you do when your tooth hurts?



The screenshot shows the Wikipedia article for "Endodontic therapy". At the top, there's a banner for a coding challenge: "It takes a great coder to serve 400 million users. Sign up for the October 2011 coding challenge now." The article title "Endodontic therapy" is prominently displayed, followed by the subtext "From Wikipedia, the free encyclopedia". The main text explains that endodontic therapy is a sequence of treatment for the pulp of a tooth, aiming to eliminate infection and protect the tooth from future microbial invasion. It mentions that root canals and pulp chambers are physical hollows within a tooth, naturally inhabited by nerve tissue, blood vessels, and other cellular entities. The procedure involves the removal of these structures, followed by cleaning, shaping, and decontamination of the hollows with tiny files and irrigating solutions, and finally obturation (filling) with an inert filling like gutta percha and eugenol-based cement. A diagram illustrates the root canal procedure in four stages: 1. An unhealthy or injured tooth. 2. Drilling and cleaning. 3. Filling with endofilo, rubber filling, and crown. 4. The final result. Below the diagram, a caption reads: "Root canal procedure: unhealthy or injured tooth, drilling and cleaning, filling with endofilo, rubber filling and crown". The article also notes that after endodontic surgery, the tooth will be "dead," and if an infection is spread at the apex, root end surgery is required. A final paragraph states that although the procedure is relatively painless when done properly, the root canal remains a stereotypically fearsome dental operation, and in the United States, a common response to an unpleasant proposal is, "I'd rather have a root canal." A table of contents is visible on the left side of the article text, listing sections from "1 Root canal treatment" to "9 External links".

Search the web and fix it
yourself?

What do you do when your tooth hurts?



The screenshot shows the Wikipedia article for "Endodontic therapy". At the top, there's a banner for a coding challenge: "It takes a great coder to serve 400 million users. Sign up for the October 2011 coding challenge now." The article title is "Endodontic therapy" with the subtitle "From Wikipedia, the free encyclopedia". The main text explains that endodontic therapy is a sequence of treatment for the pulp of a tooth, involving the elimination of infection and protection of the decontaminated tooth. It mentions that root canals and their associated pulp chamber are physical hollows within a tooth, naturally inhabited by nerve tissue, blood vessels, and other cellular entities. The procedure involves the removal of these structures, followed by cleaning, shaping, and decontamination of the hollows with tiny files and irrigating solutions, and the obturation (filling) of the decontaminated canals with an inert filling such as gutta percha and typically a eugenol-based cement. A diagram illustrates the root canal procedure: an unhealthy or injured tooth is drilled and cleaned, then filled with endofilo, rubber filling, and a crown. Below the diagram, it states: "After endodontic surgery the tooth will be 'dead,' and if an infection is spread at apex, root end surgery is required." A table of contents is visible on the left side of the article.

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It takes a great coder to serve 400 million users. Sign up for the October 2011 coding challenge now.

Endodontic therapy

From Wikipedia, the free encyclopedia

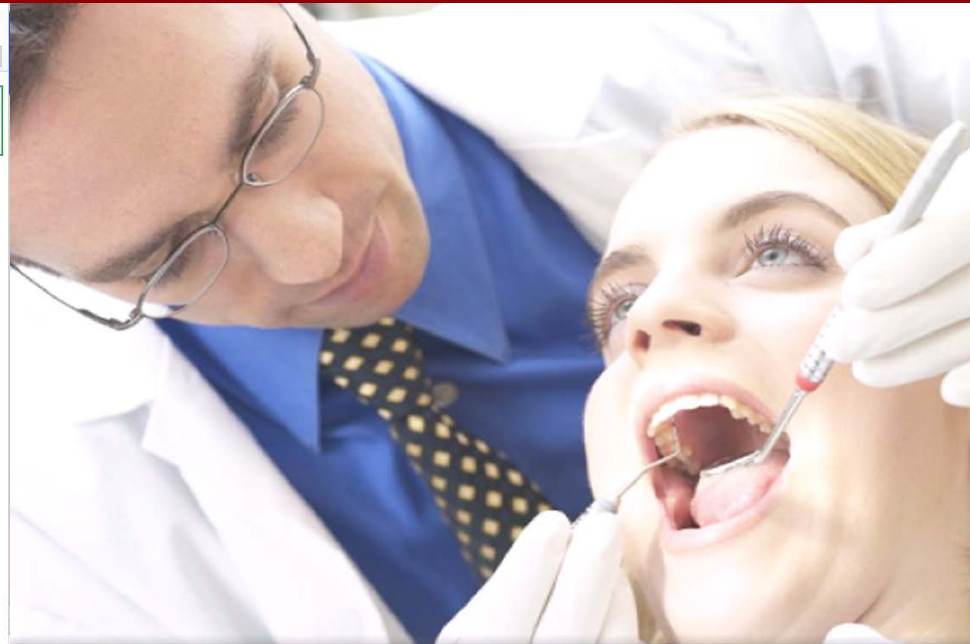
Endodontic therapy is a sequence of treatment for the pulp of a tooth which results in the elimination of infection and protection of the decontaminated tooth from future microbial invasion. This set of procedures is commonly referred to as a "**root canal**." Root canals and their associated pulp chamber are the physical hollows within a tooth that are naturally inhabited by nerve tissue, blood vessels and other cellular entities. Endodontic therapy involves the removal of these structures, the subsequent cleaning, shaping, and decontamination of the hollows with tiny files and irrigating solutions, and the obturation (filling) of the decontaminated canals with an inert filling such as gutta percha and typically a eugenol-based cement.

After endodontic surgery the tooth will be "dead," and if an infection is spread at apex, root end surgery is required.

Although the procedure is relatively painless when done properly^[*citation needed*], the root canal remains a stereotypically fearsome dental operation, and, in the United States, a common response to an unpleasant proposal is, "I'd rather have a root canal."

Contents [hide]

- 1 Root canal treatment
- 2 Innovation
- 3 Procedural accidents
- 4 Success and prognosis
- 5 Systemic issues
- 6 Alternatives to root canal treatment
- 7 See also
- 8 References
- 9 External links



Search the web and fix it
yourself?

...or look for a dentist









Division of knowledge *now*



Who has more knowhow?













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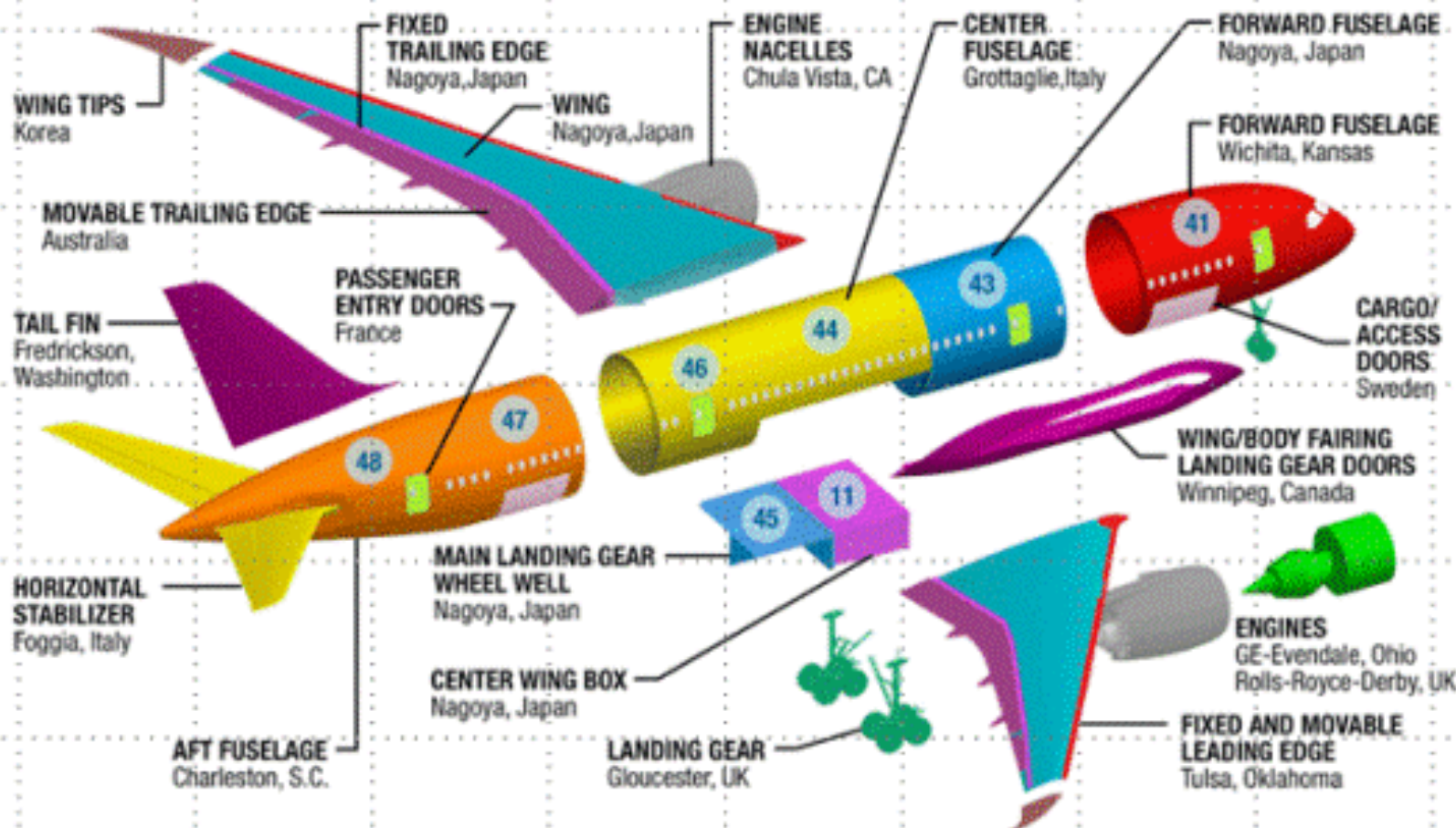
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Mitsubishi
Fuji

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AMERICA'S FAVORITE WORD GAME

The

DELUXE TURNTABLE

SCRABBLE

CROSSWORD GAME

FEATURING
ROTATING
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*Theory of Economic
Development...*



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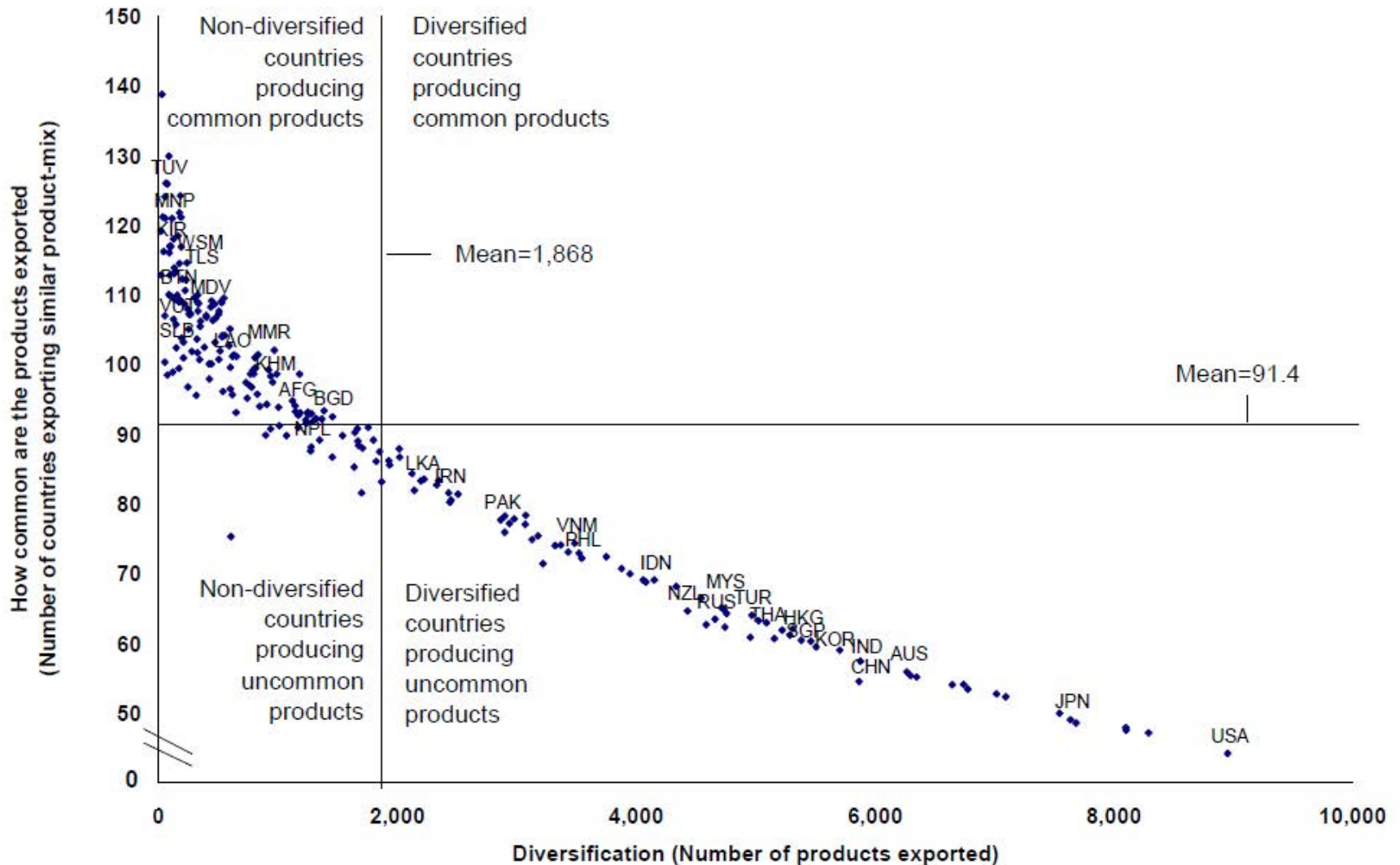
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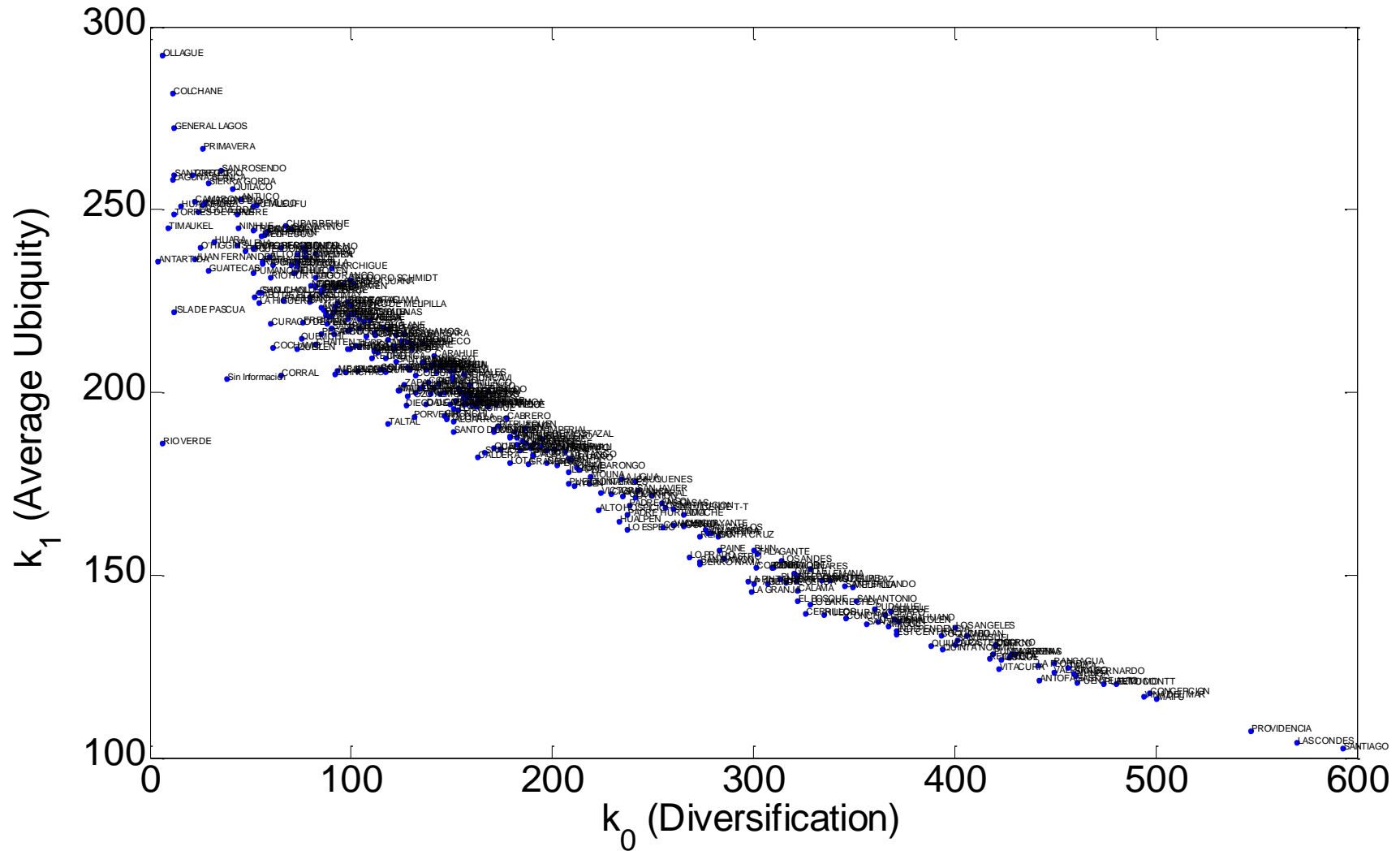
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Diversification and ubiquity - 2009

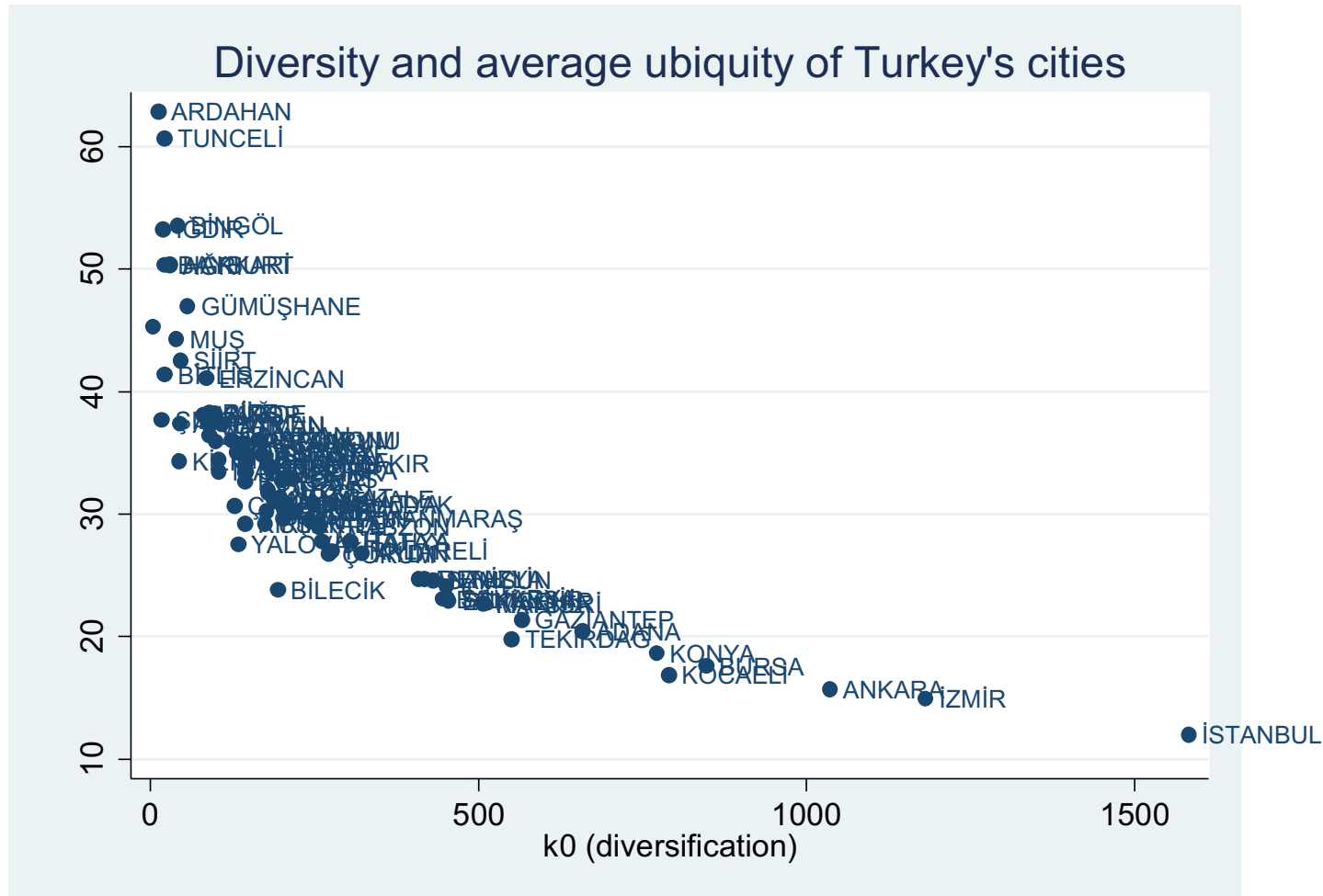


It also works within countries: Chile

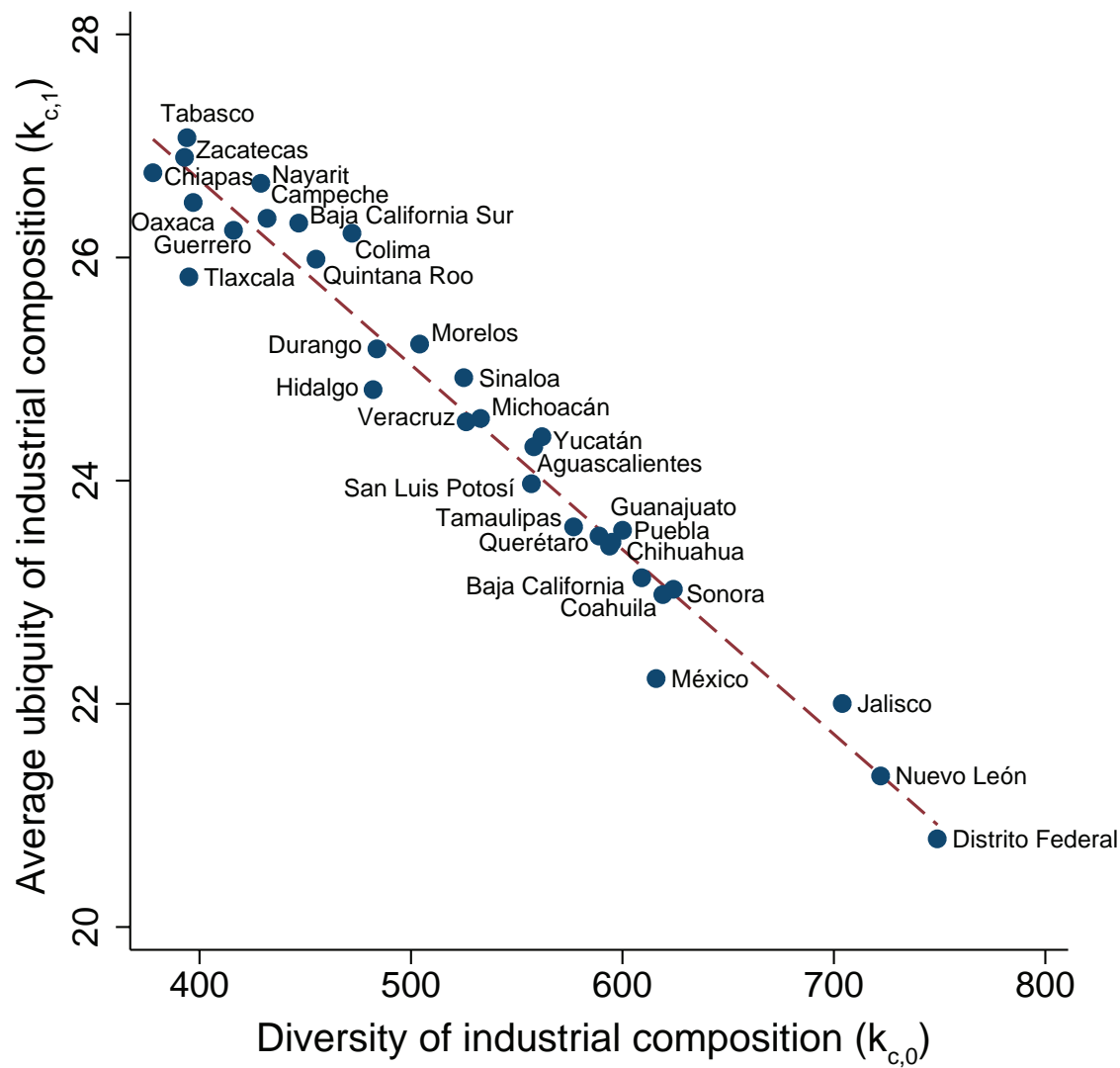
Diversity-Average Ubiquity Municipalities



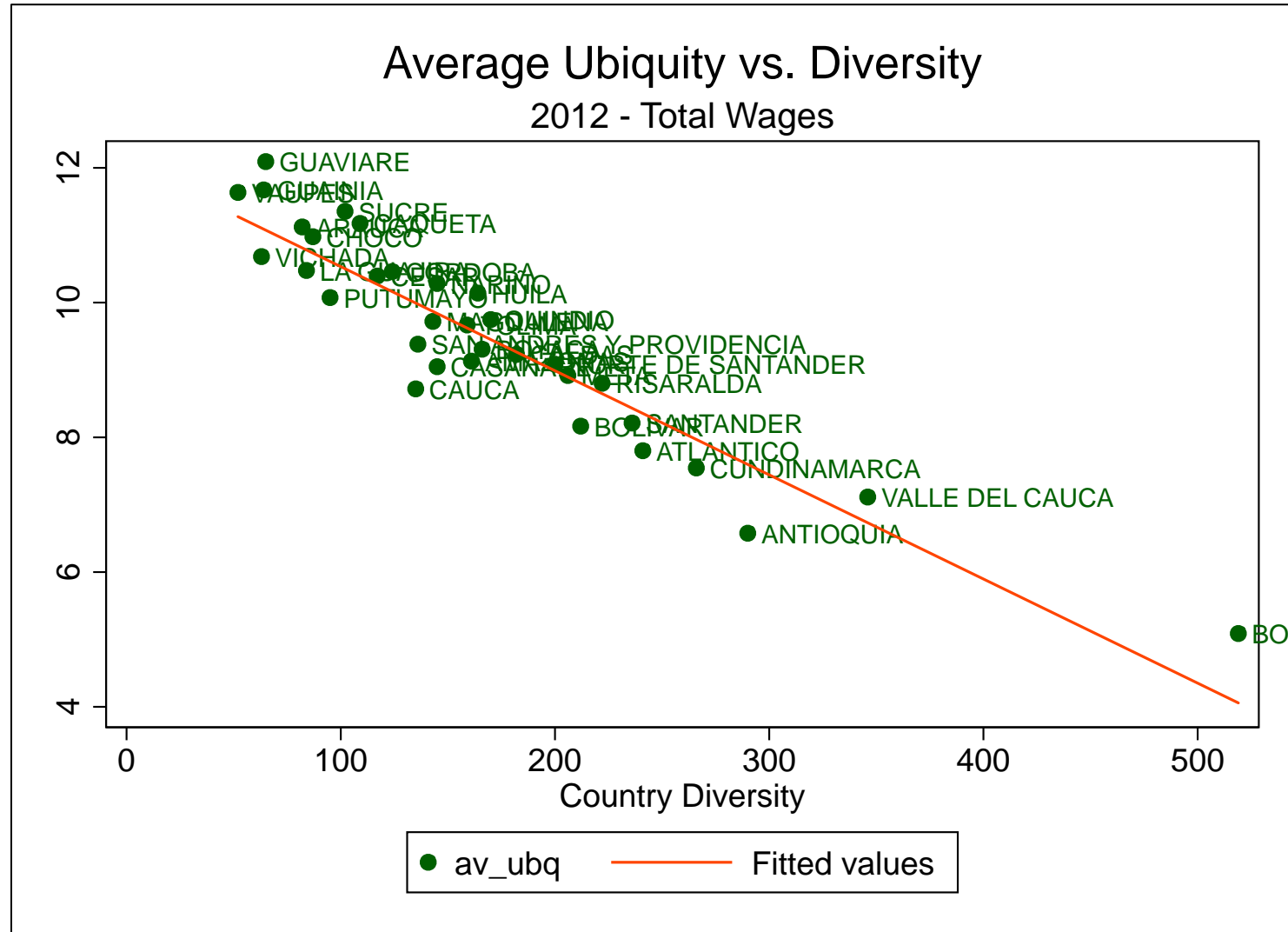
...Turkey



Mexican states

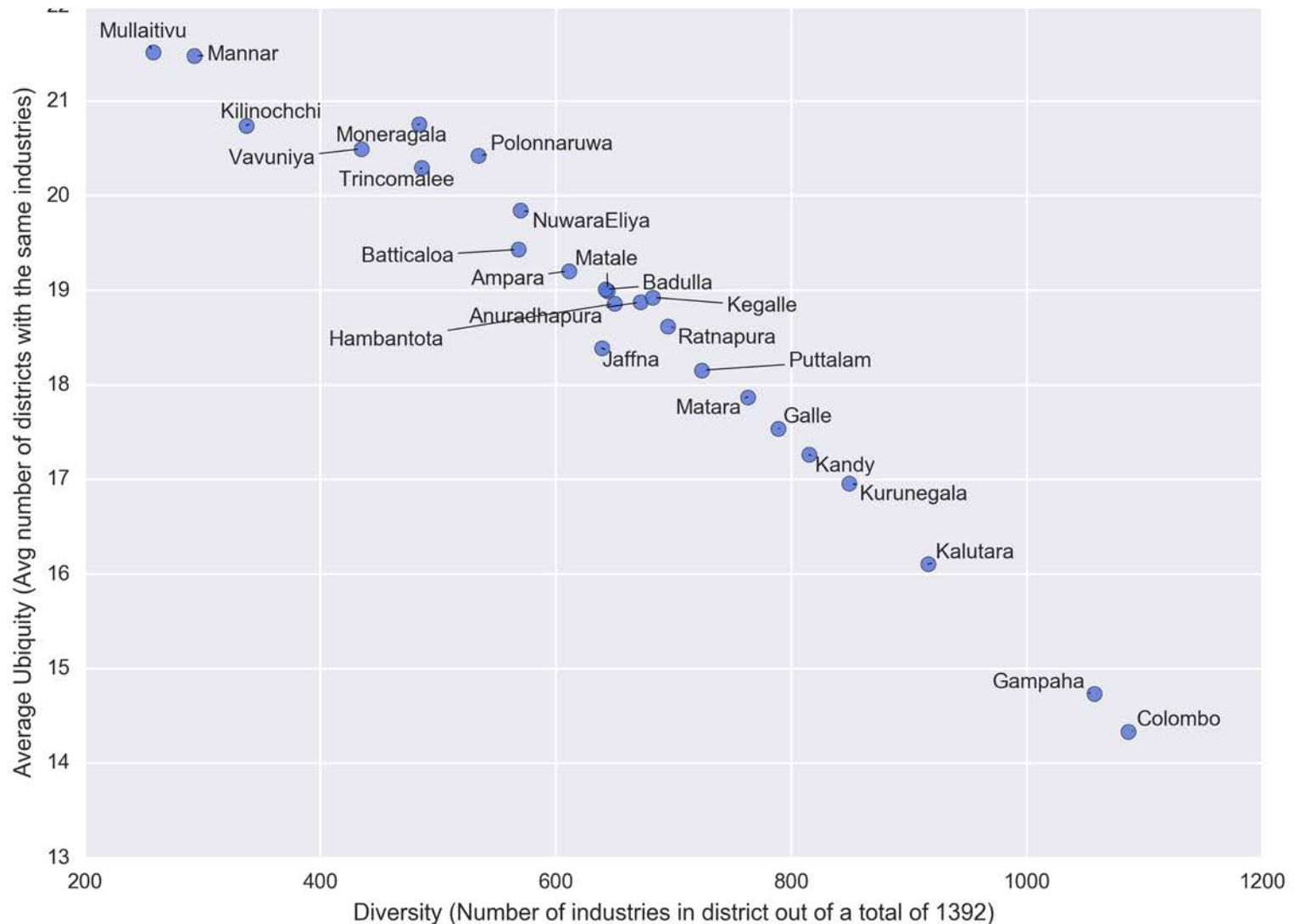


Colombian departments



And Districts in Sri Lanka

Diversification vs. Ubiquity



Complements, not substitutes

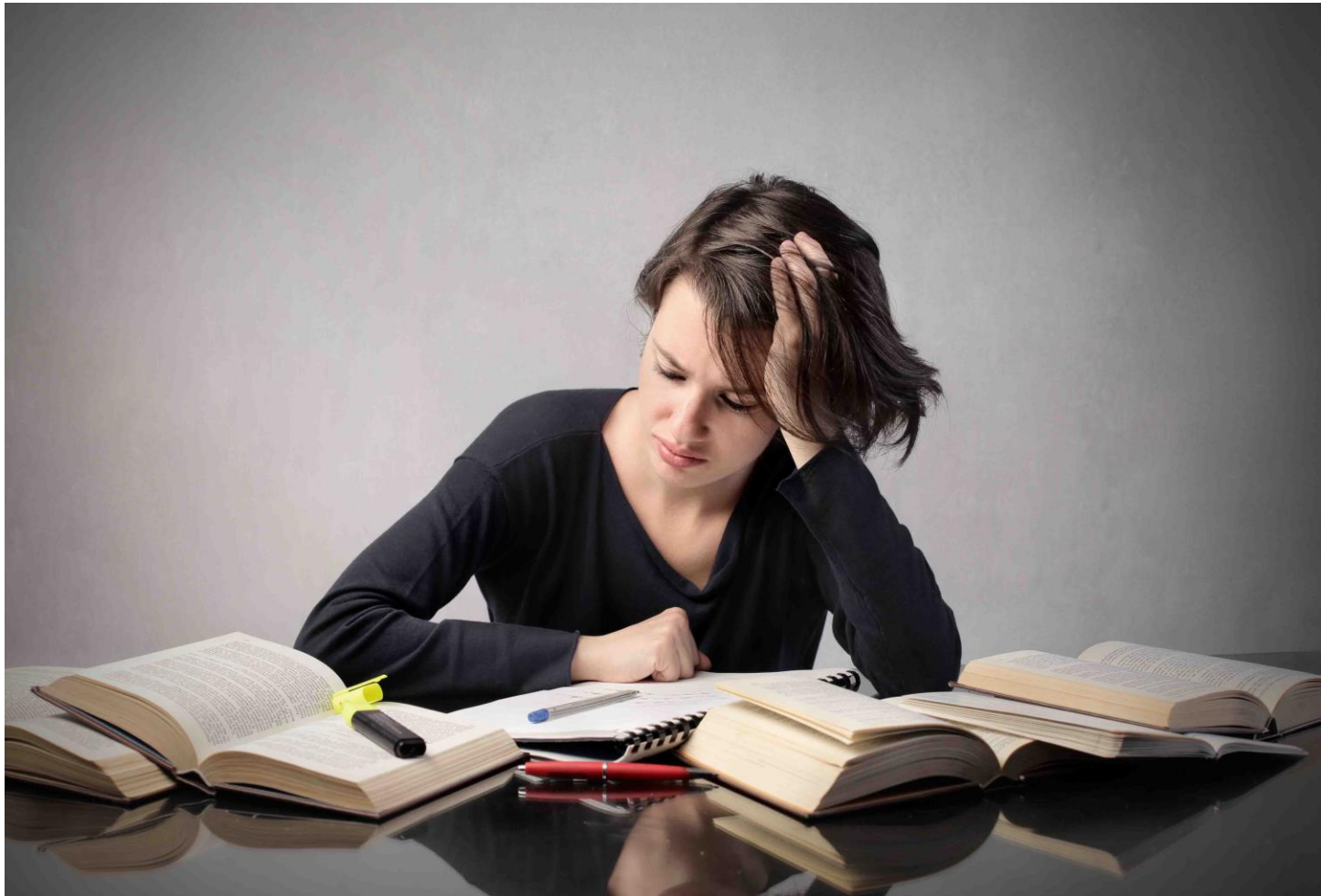


- Like tea and sugar or like tea and coffee
- Anesthesiologists working alone

How does knowhow move?

Diffusion of industries

Moving knowledge into brains is hard work...



It is much easier to move brains:
Diffusion through mobility



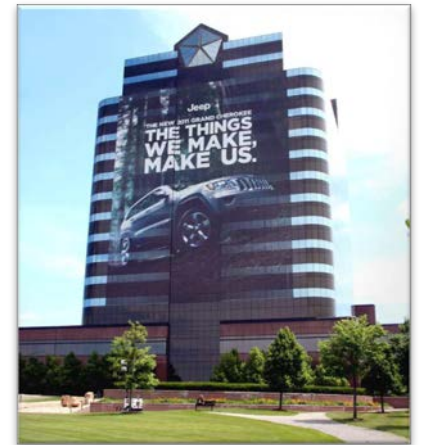
Different mechanisms of diffusion

- Labor mobility between firms
- Immigration
- Diaspora networks
- Foreign Direct Investment
- All of these have one thing in common: **human mobility**

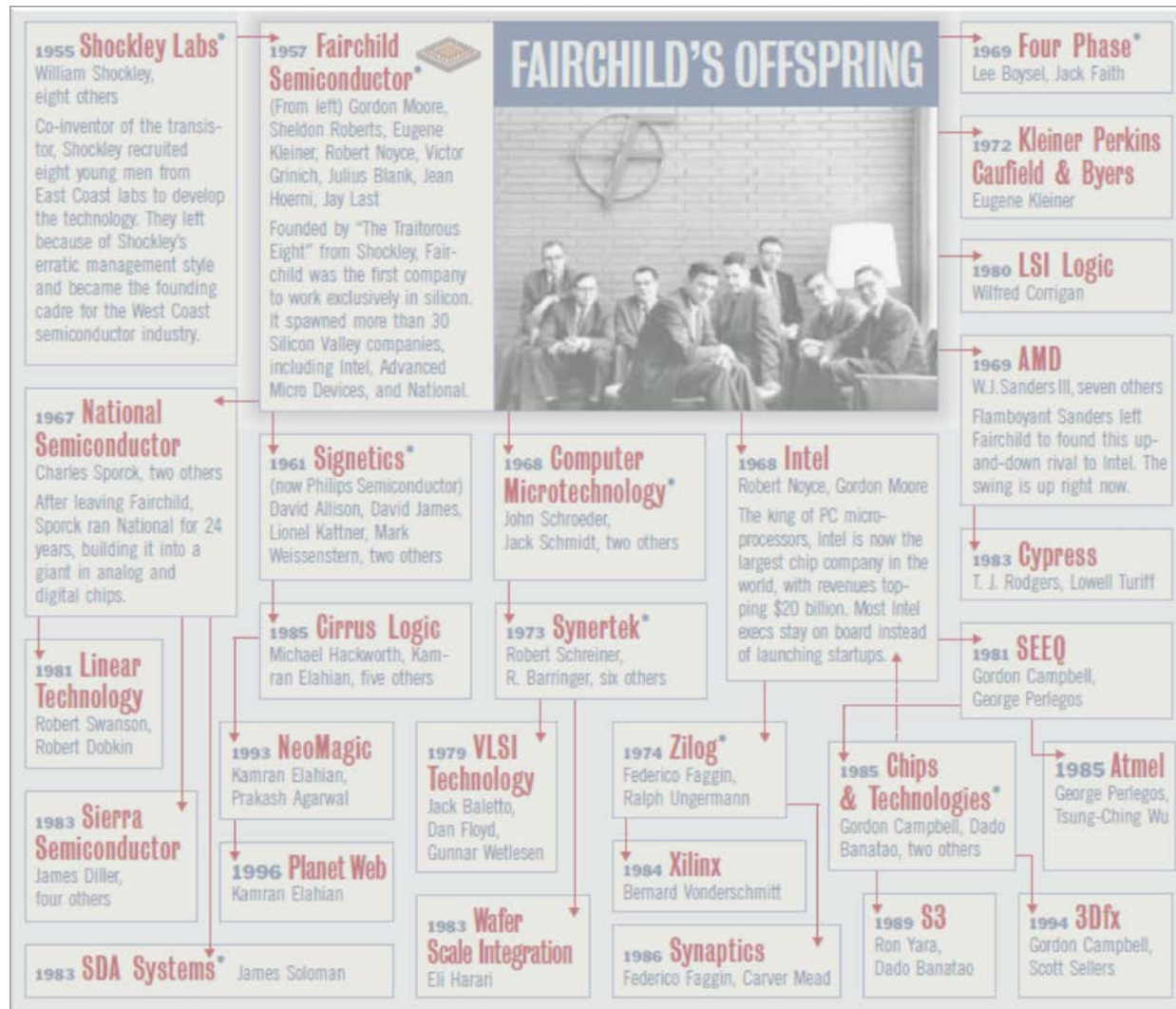
Example 1: DETROIT



All successful car firms in Detroit came out of Olds Motor Works



Example 2: SILICON VALLEY



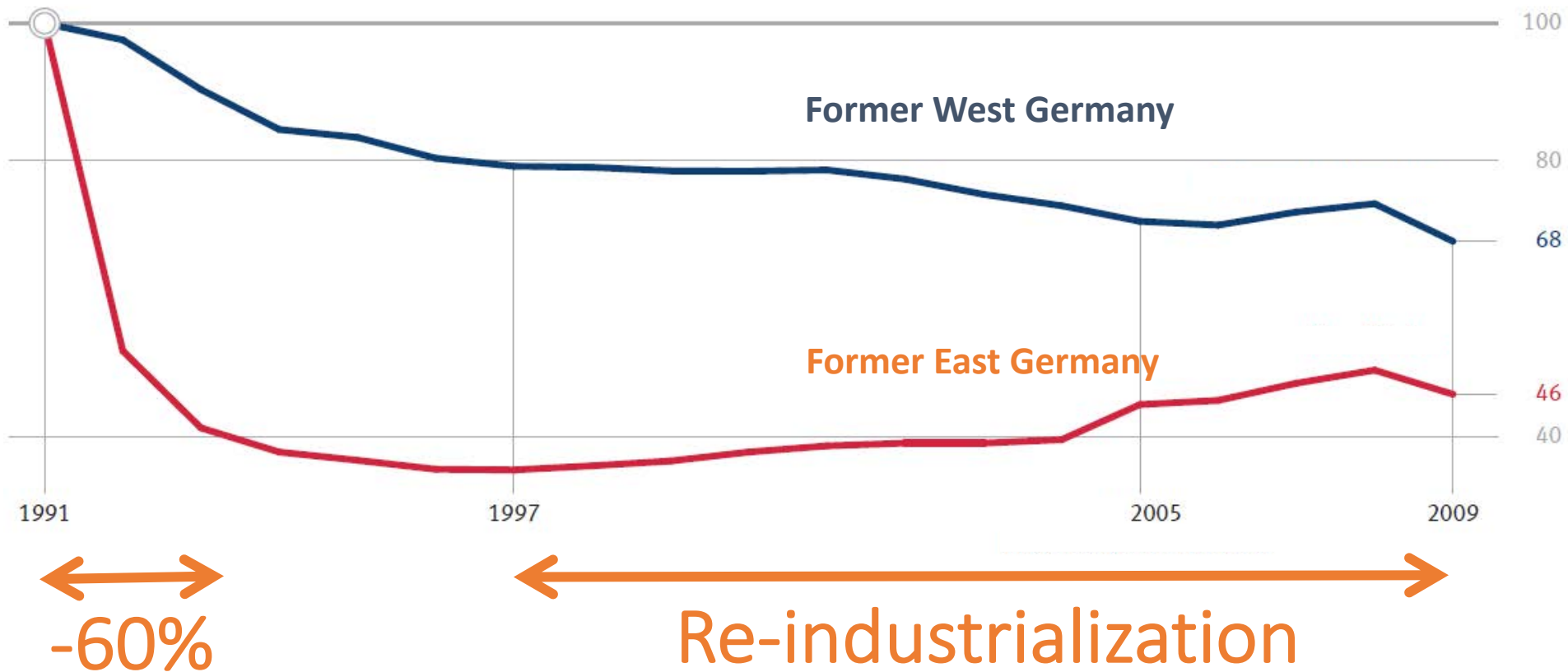
Silicon Valley consists almost exclusively of Fairchild Semiconductor renegades

Structural Change



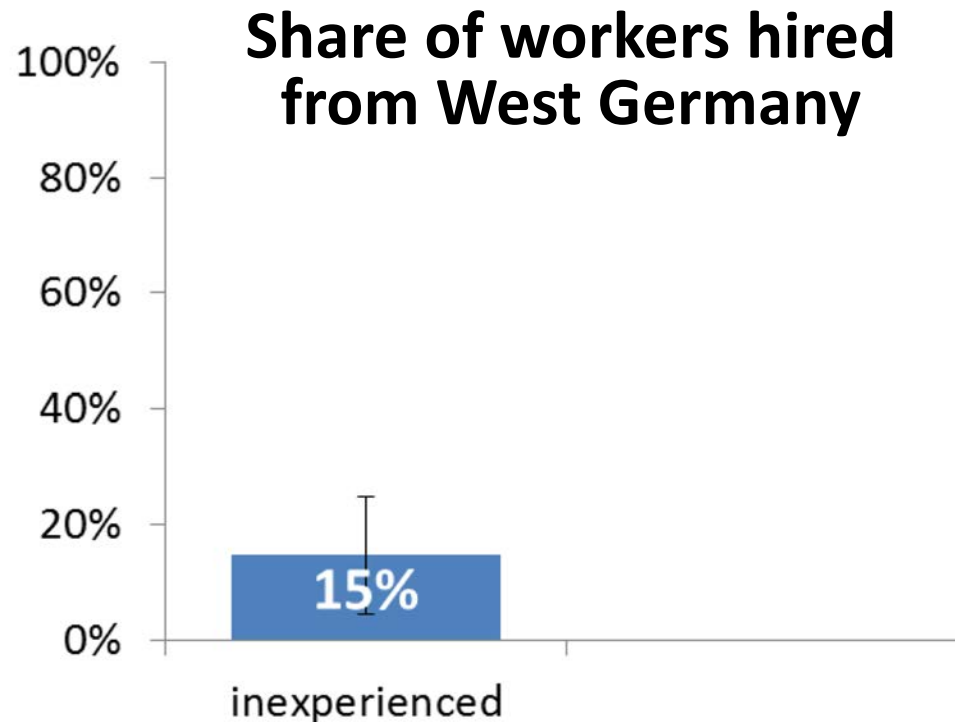
Photo Credit: Lear 21 at English Wikipedia

Collapse of East German manufacturing



Reindustrialization of East Germany

The workforce of manufacturing pioneers in the East



Reindustrialization of East Germany

The workforce of manufacturing pioneers in the East



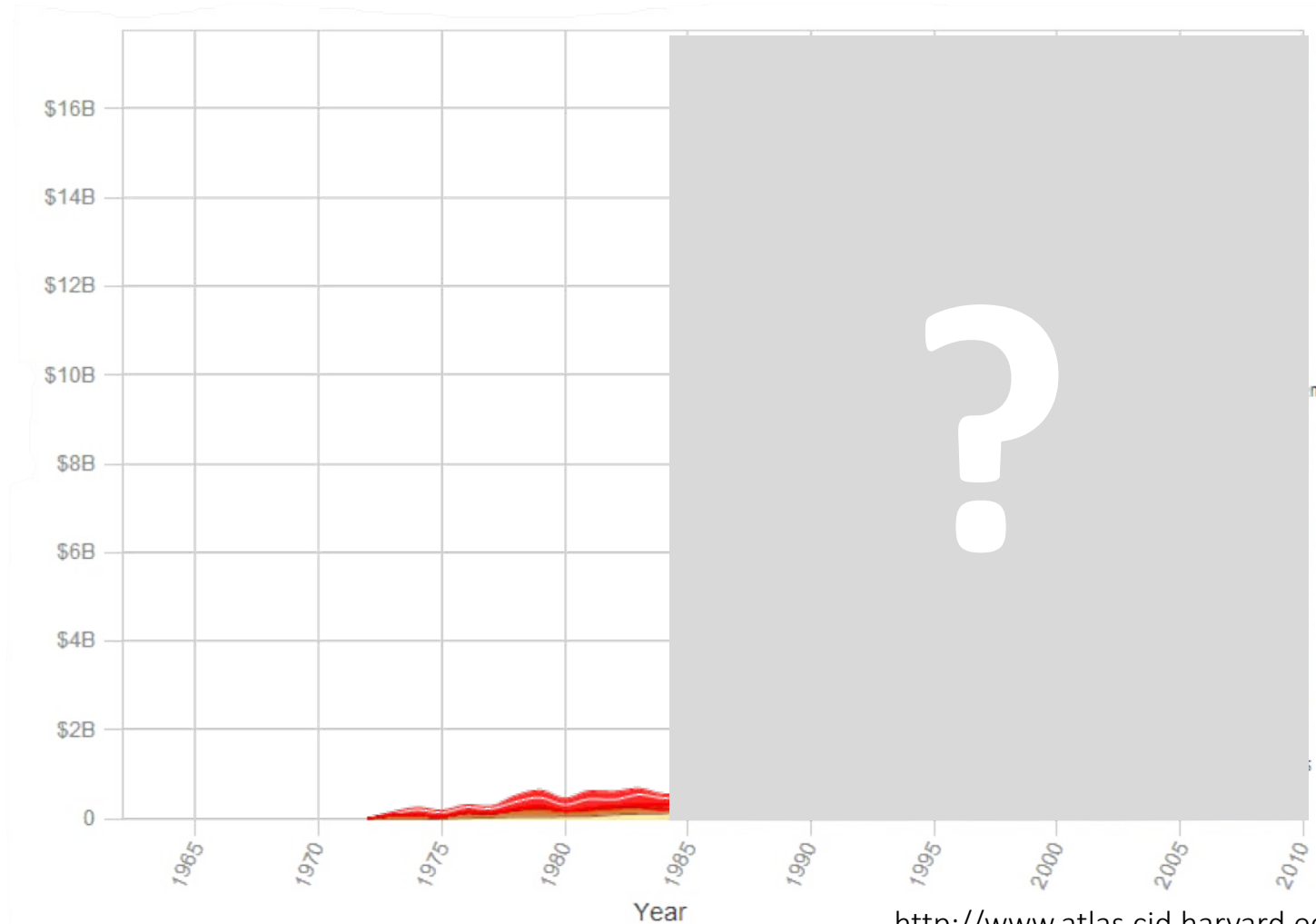
II. Diffusion of knowhow between firms across countries

Example 3: The garment exports of Bangladesh
(Klepper and Mostafa, 2011)



Bangladesh

What did Bangladesh export between 1962 and 2010?



The garment industry of Dhaka

(Klepper and Mostafa 2011)



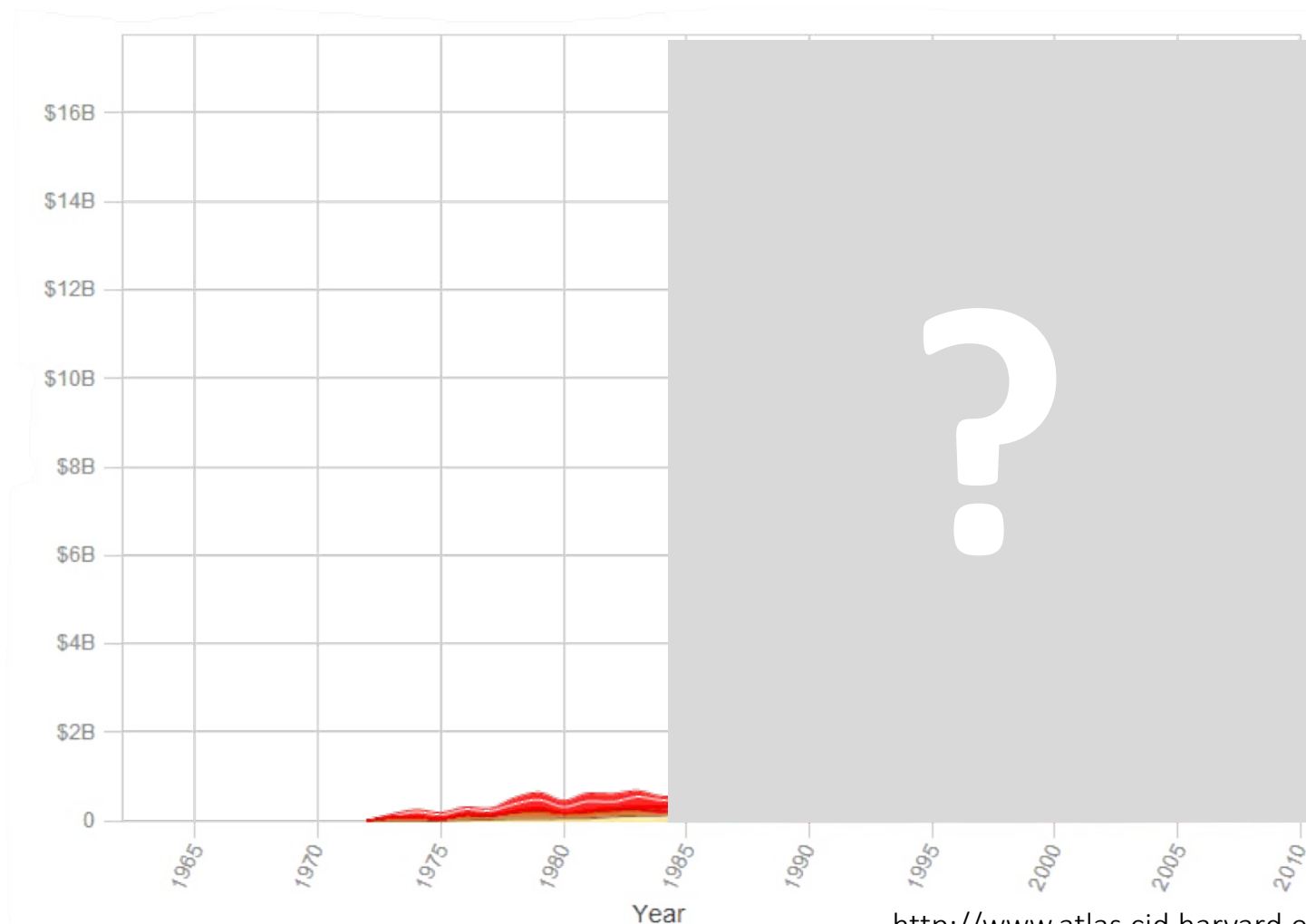
M. Noorul Quader,
founder Desh Group



- 1979: Desh sends 126 Bangladeshi workers for a 6 month intensive training in Korea
- 1988: 56 spin-off companies by Desh workers

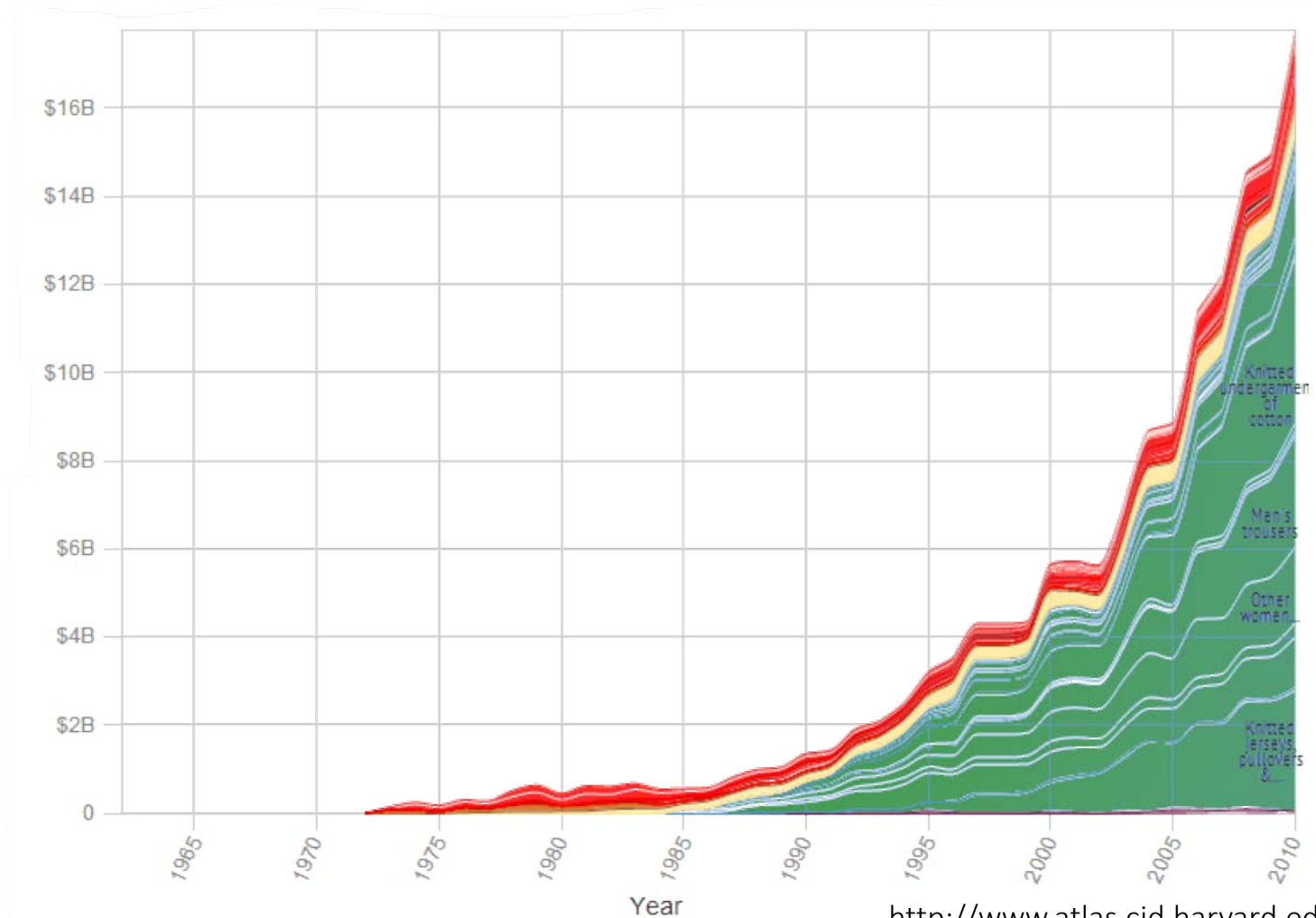
Bangladesh

What did Bangladesh export between 1962 and 2010?



Bangladesh

What did Bangladesh export between 1962 and 2010?

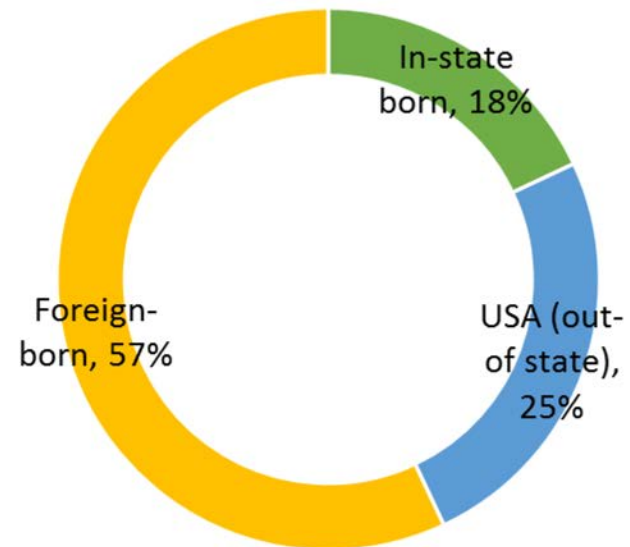


Migration and return-migration

The tricks that other countries use to attract knowhow



Origin of Silicon Valley's STEM workers

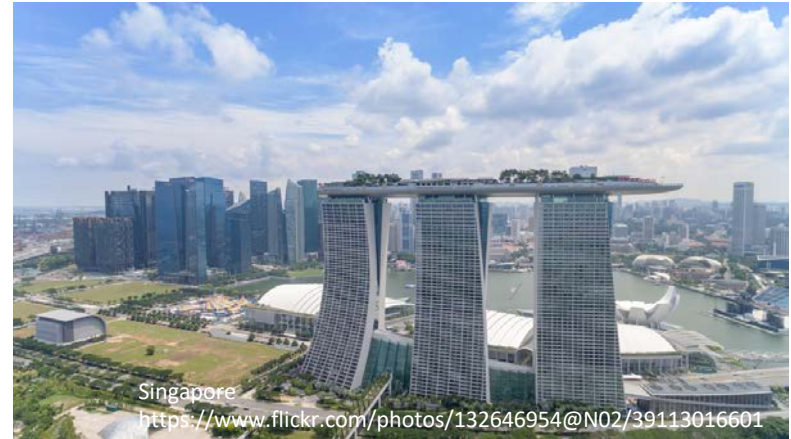


Source: Silicon Valley Competitiveness and Innovation Project - 2017 Report

- The Silicon Valley does not pretend to build excellence with domestic talent only.

Foreign expertise through immigration

- Singapore: 46% of population is foreign born;
- Hong Kong: 40% of population is foreign born.



Many companies in SL were started by immigrants, or with connections made while living abroad



Accessing the expertise of your diaspora

- **Bangalore and Hyderabad:** Indian diaspora networks help spur strong home tech base.



Knowhow inflow through FDI

- **Vietnam:** 25 years of +6% FDI inflows as a share of GDP.



Saigon center. Wiki Commons 2011



So Albanian unemployment is up and wages are down?

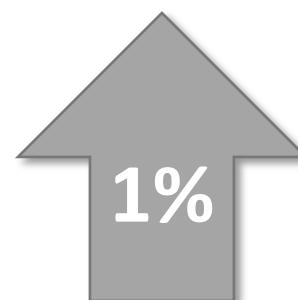


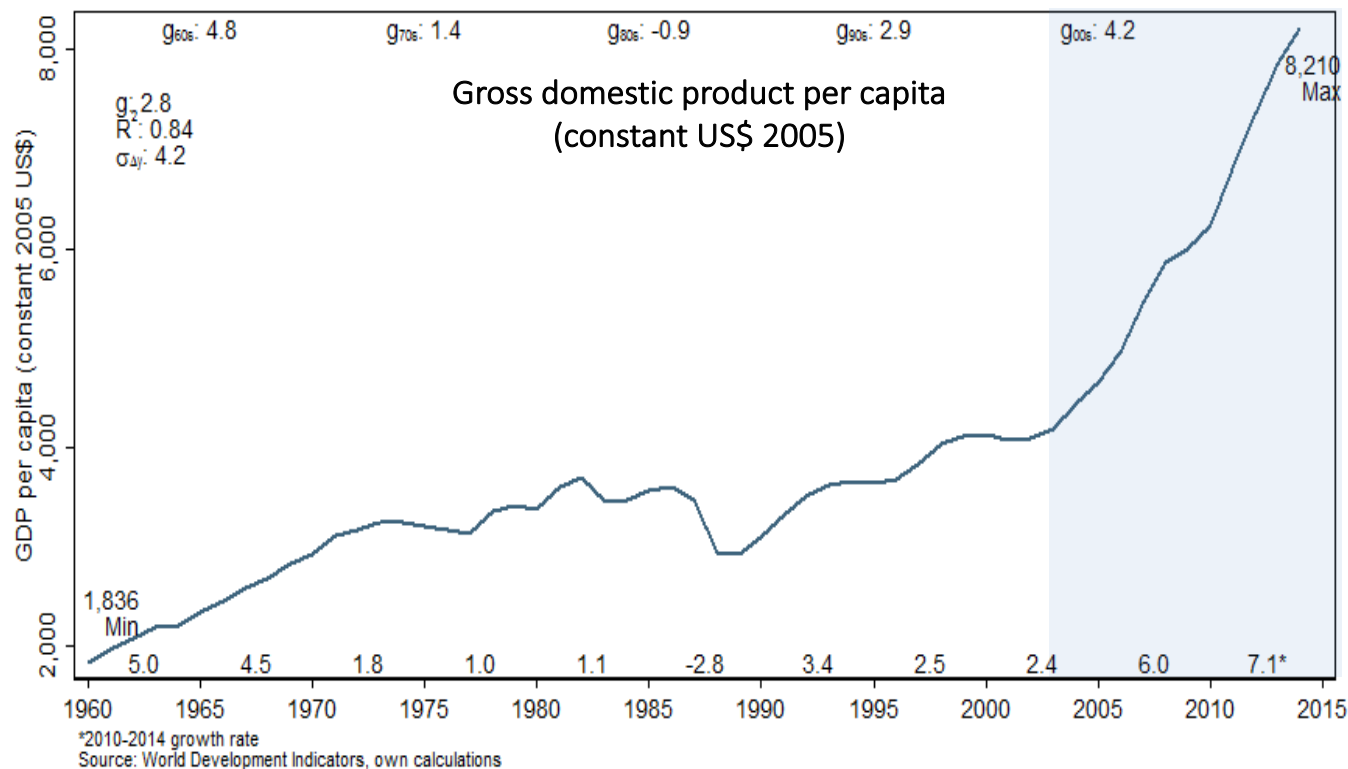


Photo Credit: Clare Masson, USAID Albania, <https://blog.usaid.gov/>

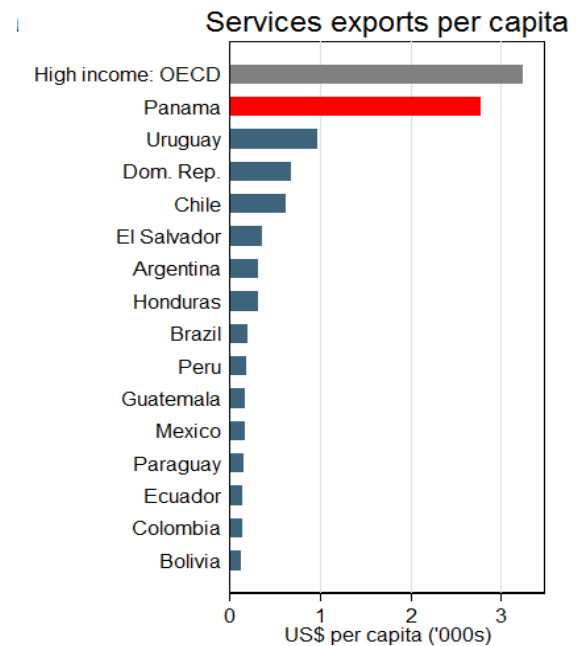
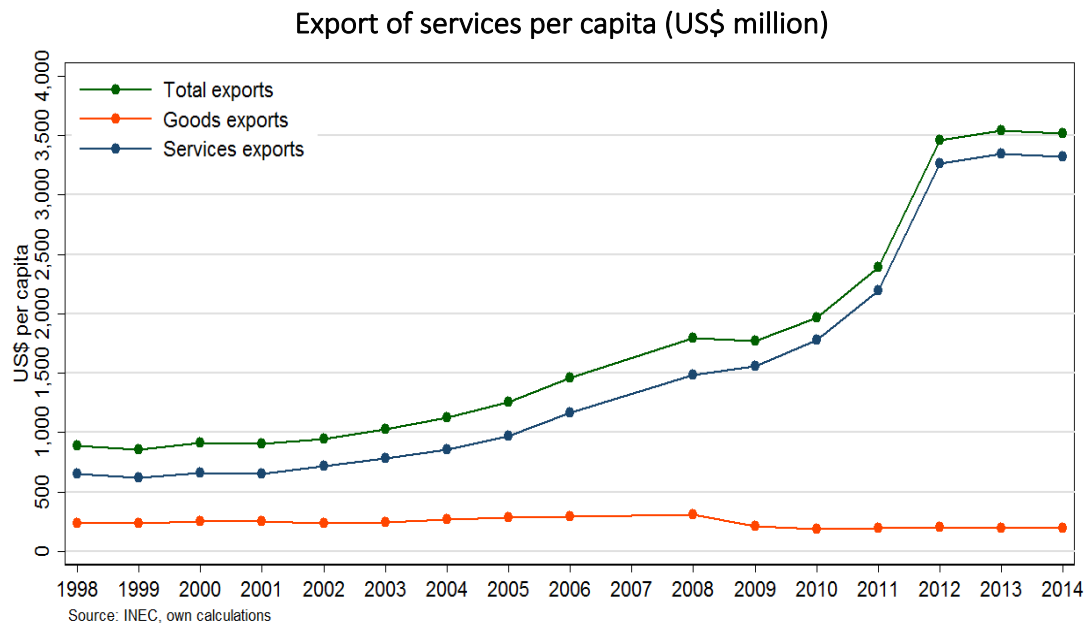


Panama:

One of the top-ten fastest growing economies between 2005-2015

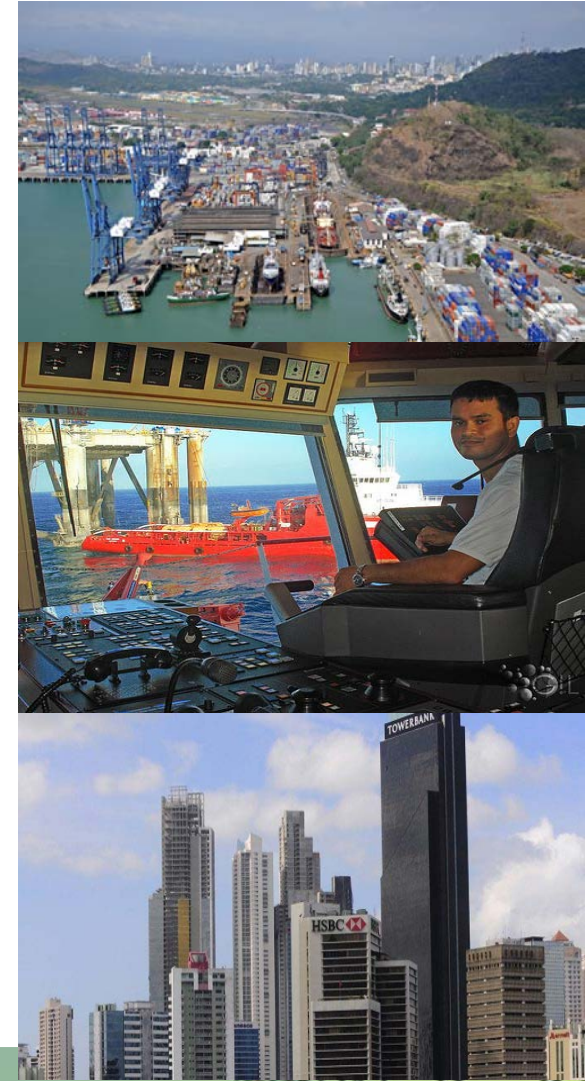
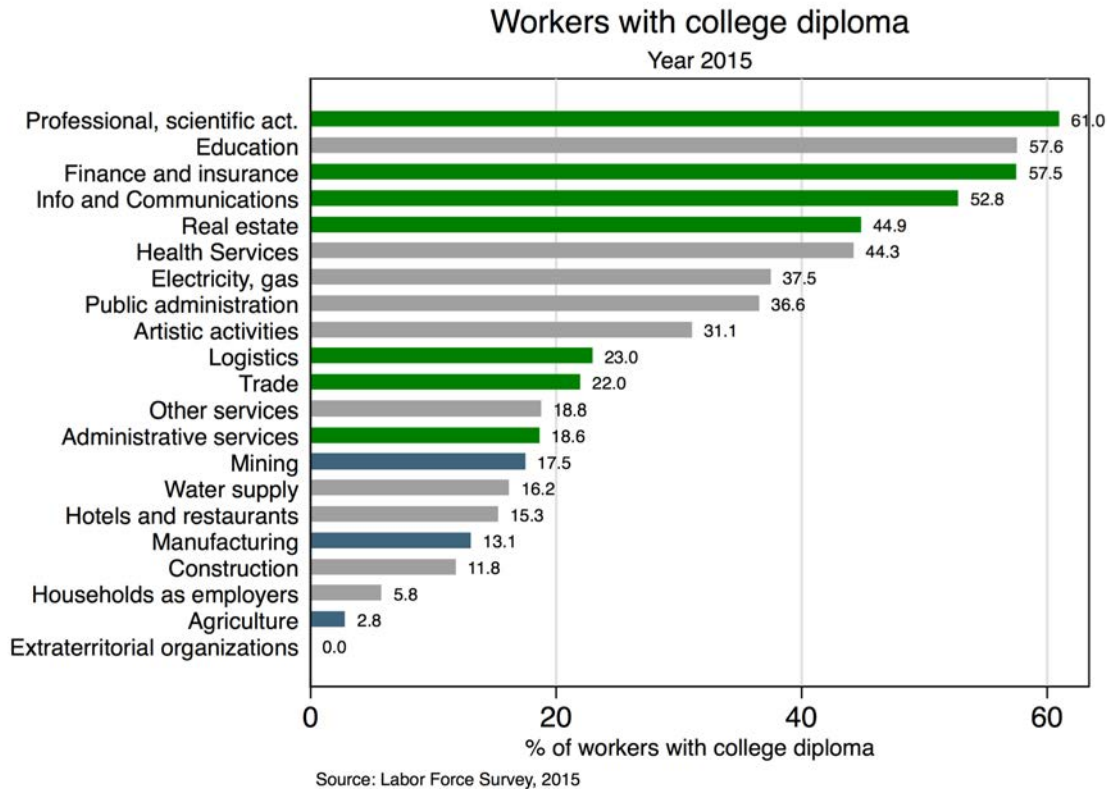


Panama: Growth has been driven by a modern exportable service sector



Panama:

The modern service sector is skill-intensive



Ley de Sede de Empresas Multinacionales (Law 44) attracted more than 120 regional headquarters

Special Economic Zones

Panamá-Pacífico
Industrial Park (2007)



Ciudad del Saber
Technology Park (2000)



Immigration regulations keep know-how locked into MNC and SEZ and prevent the diffusion of know-how and technology spillovers

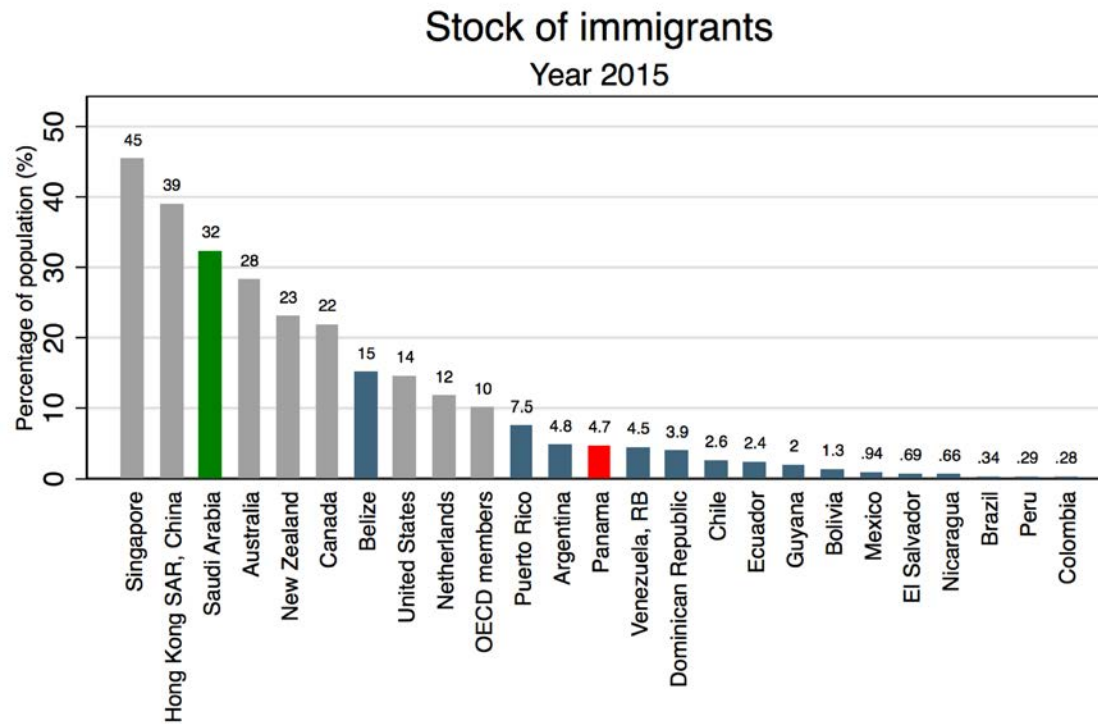
Restrictions to potential Immigrants

- 27 occupations legally restricted to immigrants
- List of 50 countries considered national security concerns subject to (*“Authorized visa”*)
- 10% cap of foreigners in the payroll (out of the SEZ and MNC)

Restrictions to Knowledge diffusion

- Years spent on MNCs under Law 44 and SEZ do not count for residence purposes
- Visas revoked the moment the expat ceases to work in the MNC
- Expats dependents do not have work permit
- Firms moving on from innovation to commercialization risk being expelled from City of Knowledge

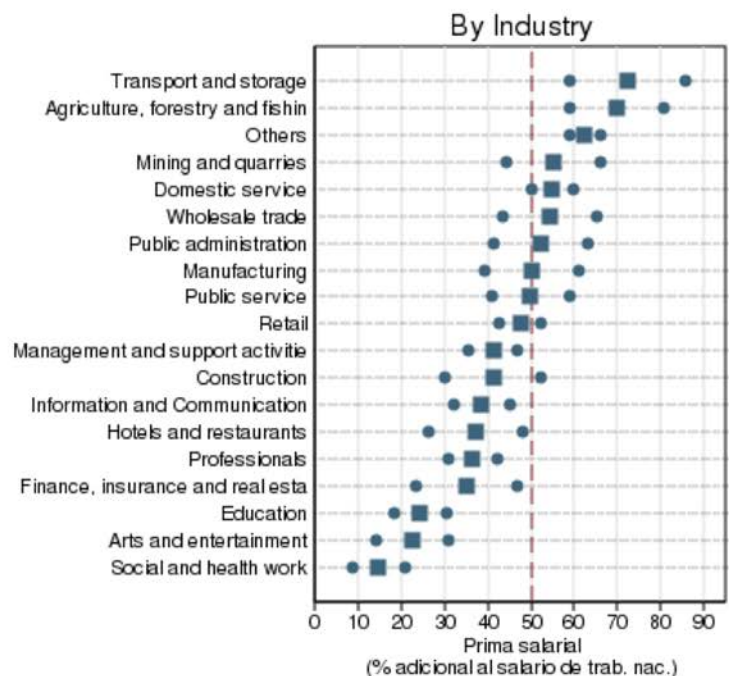
Panama wants to be like Hong-Kong and Singapore, but seems unwilling to support the levels of immigration of these countries



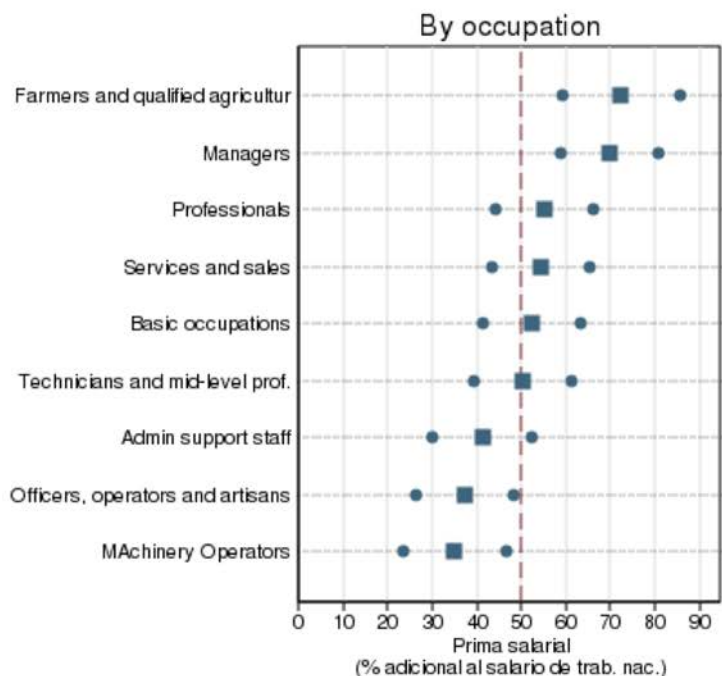
Fuente: World Development Indicators, World Bank

High wage-premiums to foreigners across all industries/ professions indicate that talent is one of the most binding constraints to growth

Wage-premium to foreign workers



Nota: controlando por años de escolaridad, años de experiencia, género, etnicidad y ocupación

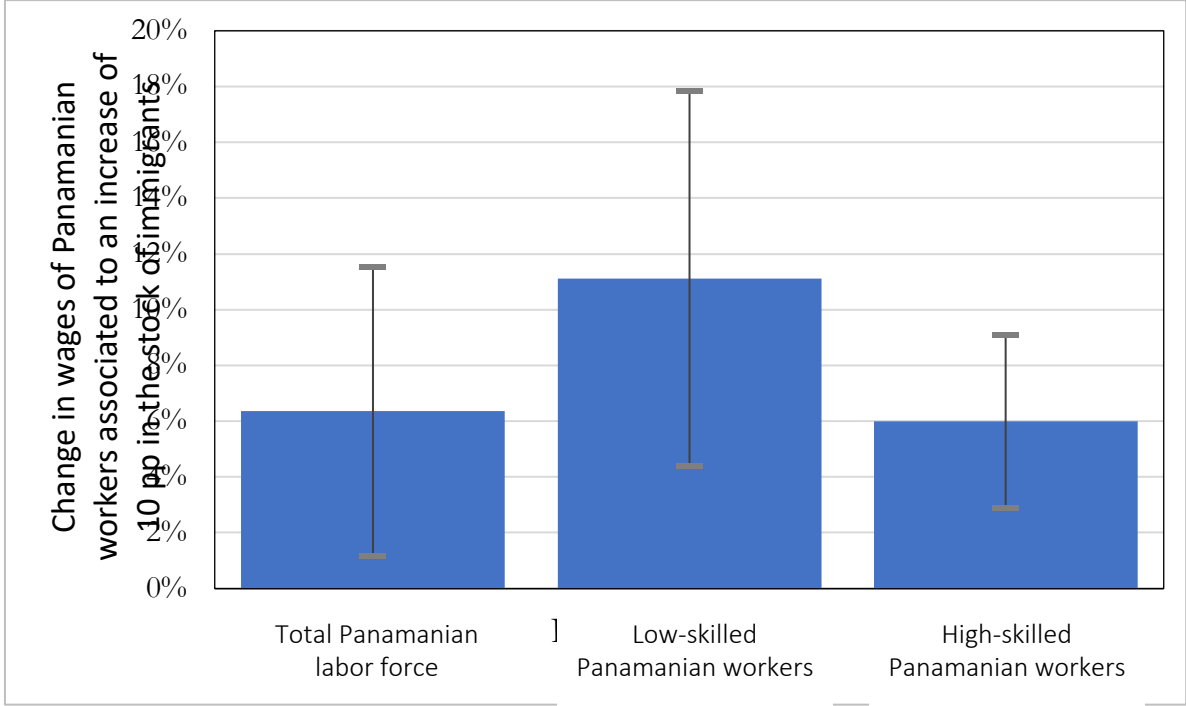


Nota: controlando por años de escolaridad, años de experiencia, género, etnicidad y ocupación

Source: Own calculations based on Population Census 2010 (INEC)

Restrictions to high-skilled immigrants and knowledge diffusion are not helping the Panamanian workers

Immigrants flows and Panamanian wages

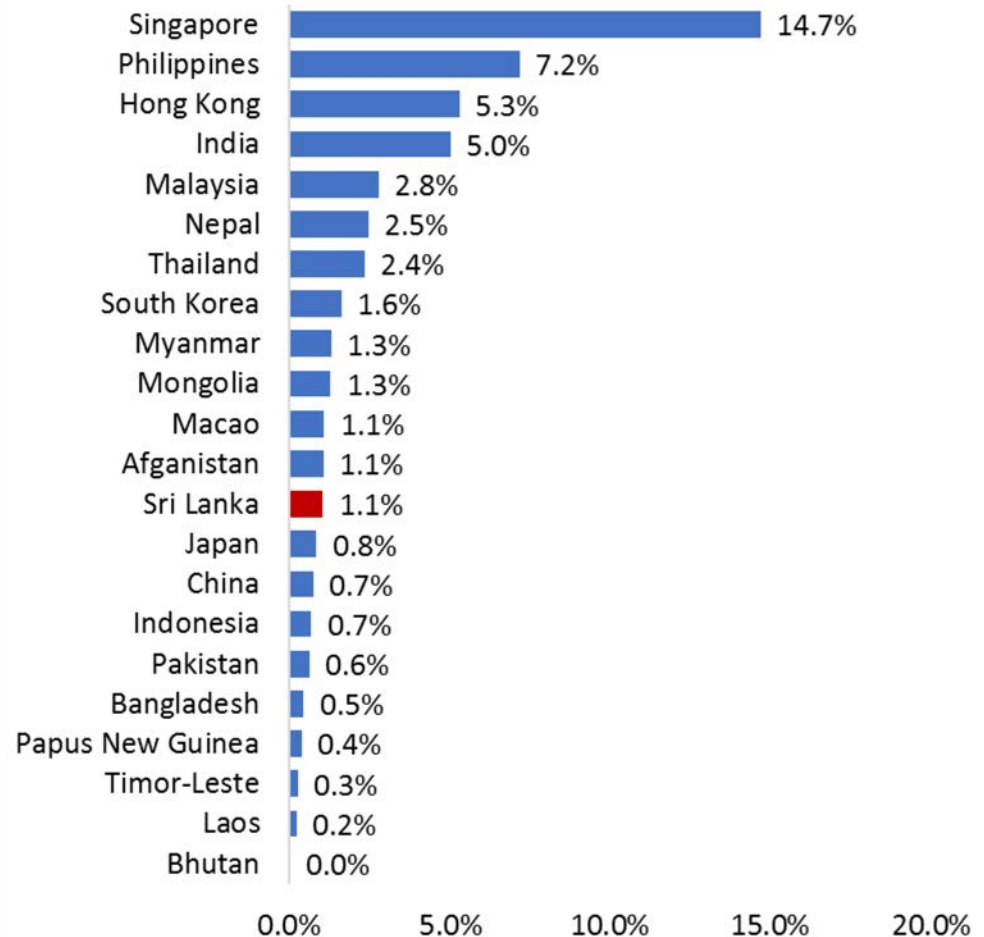


Example: Can Sri Lanka grow its ICT sector by itself?

Sri Lanka's ICT sector is not large

- Sri Lanka's share of ICT services exports in GDP is only about 1%;
- Singapore, Hong Kong and India, all managed to grow their ICT exports by accessing knowhow from abroad.

ICT service exports as a share of GDP in Asia and the Pacific



Source: GDP from WDI 2018, ICT services exports as reported by Statista 2018: <https://www.statista.com/statistics/638564/ict-service-exports-asia-pacific-by-country/>

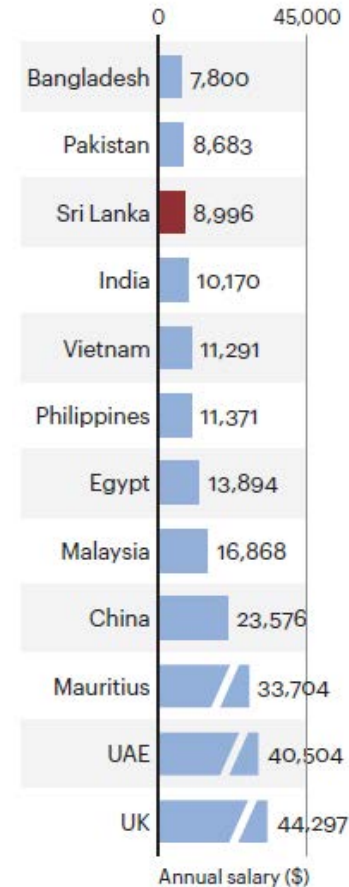
Sri Lanka pays low wages in the sector

- Wages in the sector are low because the sector is kept small and uncompetitive.

Source: Economist Intelligence Unit 2011. Mercer HR Consulting 2011, Watson Towers 2011. A.T. Kearney analysis

Note: Compensation includes base salary plus benefits, tax, and bonuses; estimates are used when data is not available.

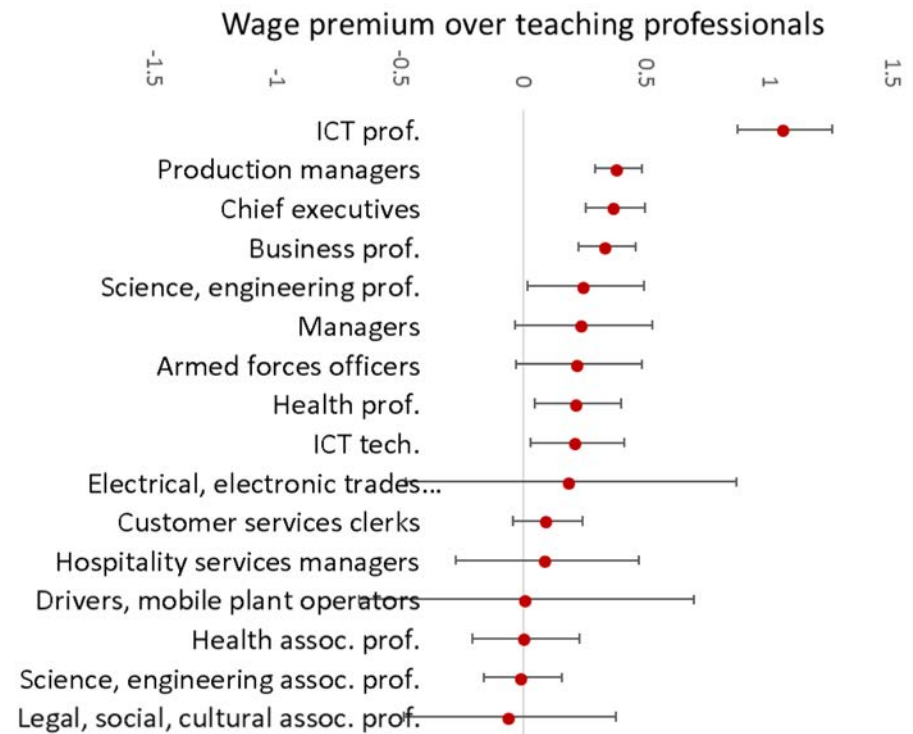
Annual salaries of IT programmers



Although IT professionals earn high wage premiums in Sri Lanka ...

- Despite wages of IT professionals being low in international comparison, they are high compared to other professionals in Sri Lanka;
- This, together with high employment rates of students from IT majors in Sri Lanka suggests that **IT professionals are in short supply.**

Wage premiums by occupation in Sri Lanka

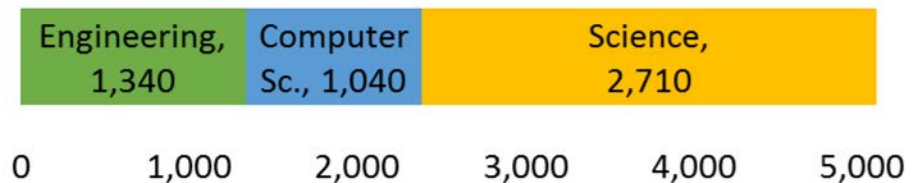


Source: Nedelkoska, O'Brien and Stock (2018).
<https://srilanka.growthlab.cid.harvard.edu/blog/does-sri-lankan-economy-need-more-university-graduates>

The University System produces few STEM graduates

- We estimate that it would take another decade for the university system to significantly expand the offer for STEM students.

Numbers of STEM Bachelor's degree graduates in 2015



Source: University Grants Commission Sri Lanka

Note: Includes Universities and HEIs established under the Universities Act

Recent STEM Graduates (2016) in other countries:

- China: 4.7m
- India: 2.6m
- Indonesia: 206,000

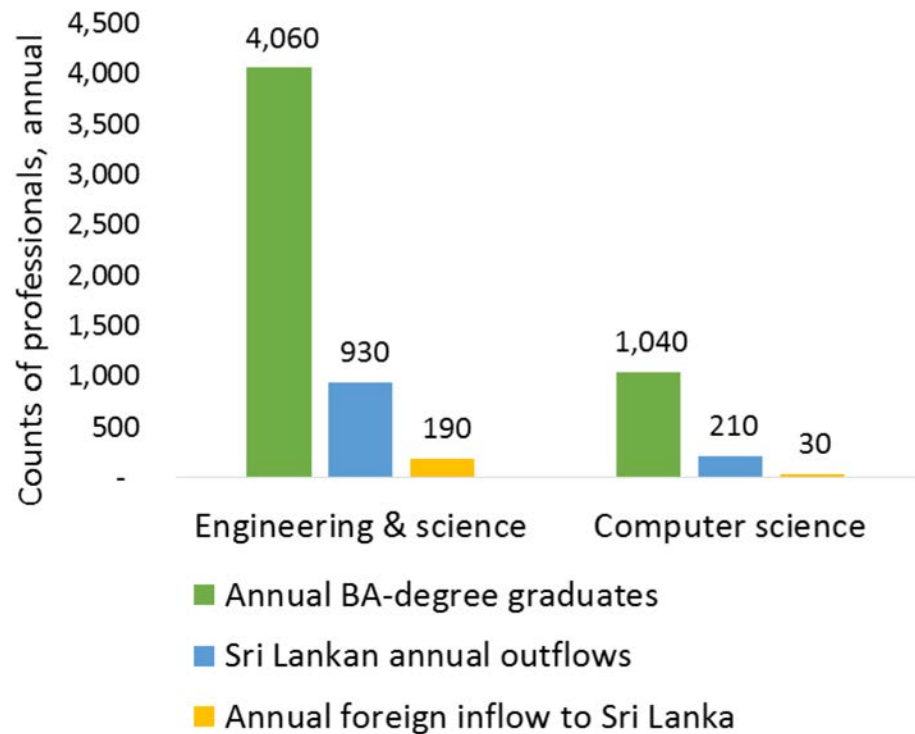
Source: World Economic Forum as cited in

<https://www.statista.com/chart/7913/the-countries-with-the-most-stem-graduates/>

Sri Lanka is net exporter of STEM workers

- In spite of low numbers of STEM graduates ...
- On average, 23% of the Engineering and Science graduates and 20% of the Computer Science graduates leave Sri Lanka each year to work abroad;
- The low inflow of foreign STEM workers to Sri Lanka does not compensate for the outflow.

Inflows and outflows of Sri Lankan STEM workers

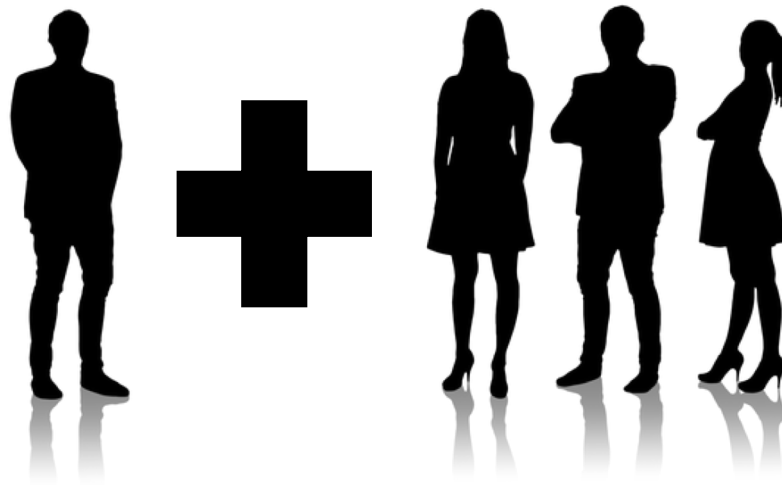


Source: Sri Lankan emigration data from the Ministry of Foreign Labor (2005-2015 averages). Foreign workers data from the Sri Lankan Bureau of Investment (BOI) (2006-2016 averages).

How attracting foreign workers
can help grow the sector, grow
wages, and discourage
outflows

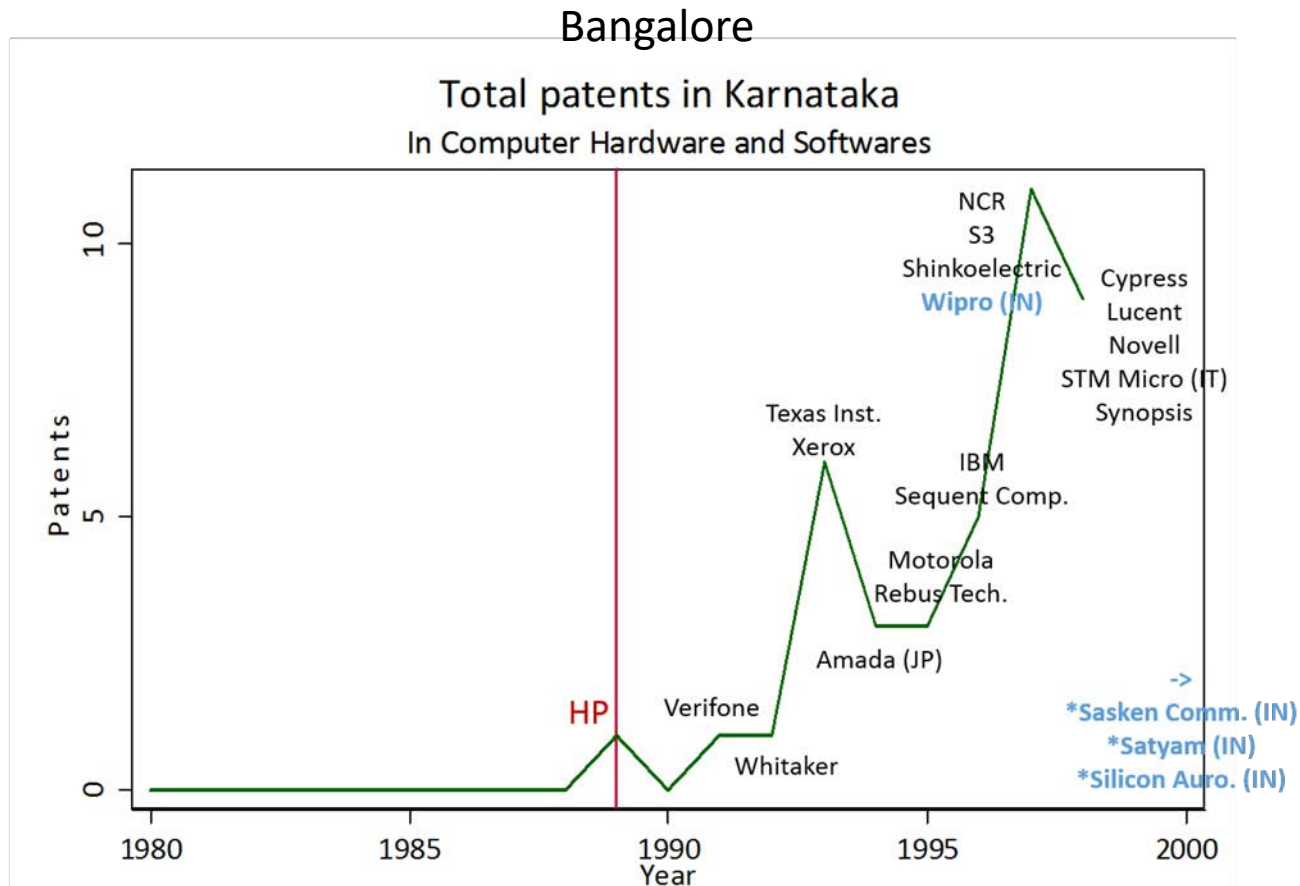
Employment multipliers play important role

- For each new job created in the IT sector, 4 other local jobs are created outside the sector
 - through supplier (input-output) linkages;
 - through spending on local services.
- Every foreign-born worker in the United States with a U.S. STEM degree creates 2.62 jobs for U.S.-born workers



High tech jobs breed more high tech jobs

- High-tech companies prefer to cluster near other high-tech companies.



Still, hiring foreign professionals in Sri Lanka is difficult

- As foreign (BOI) investor you can hire foreign professionals, but:
 - Spouses are not allowed to work (at least not without ministerial permission);
 - Cannot choose a different company in Sri Lanka;
 - Cannot aspire permanent residence, let alone citizenship.
- As non-BOI company, it is much harder

Comparative study findings

What can Sri Lanka learn from the immigration systems of other countries in the region?

- CID Harvard conducted a comparative study, reviewing the immigration regimes of six countries in Southeast Asia and the Pacific: Malaysia, Hong Kong, Singapore, Indonesia, Thailand, and Vietnam.
- Main findings:
 - Immigration reform should be a part of an overall effort to attract knowhow, talent, skills, and diversified FDI.
 - Countries can and do use immigration policies as an active tool to attract the workers, investors and entrepreneurs that the economy needs to grow and thrive.
 - More economically advanced countries have more sophisticated immigration systems: they allow for more nuanced distinctions of visa categories, and have transitioned from *systems that strictly authorize* the entry of foreign workers, talent, and capital, to *systems that promote their entry*.

Singapore: A role model for Sri Lanka?

- Singapore's immigration system embraces a number of organizing principles that Sri Lanka could “borrow” for its own system.
- For workers:
 - Variety of employment visa categories (from unskilled and semi-skilled foreign workers to visas for trainees, managers and professionals);
 - Dependents' permits allowing dependents to seek employment;
 - Path to permanent residency and citizenship;
- For investors/employers:
 - Investor visas
 - Entrepreneur visa
- For talent:
 - Start-up talent work permit ([enhanced EntrePass scheme](#))*

Some recommendations resulting from the comparative study

- **Streamlining and simplifying procedures.**
- **More visa categories.** Visas for investor, entrepreneur, talent, innovators, professionals, artists/performers, training
- **Path to Permanent residence.** Not only for former Sri Lankans
- **Dependents' rights.** Allow dependents to live freely, enroll in educational institutions, and work

How to move forward?

- Sri Lanka may have the talent and the people for the current economy, but does it have the talent and the people for the economy it wants to have?
- To get there, Sri Lanka will need to open up for more inflow of foreign know-how the way all prosperous countries have done already. This means more FDI, more return diaspora and higher inflow of foreign workers.
- Sri Lanka can use the current reform: Immigration Reform, BOI's Investment Promotion Strategy to expand its access to foreign knowhow.

Thank you!!
