From Global-Local Interface to Innovation systems for Catch-up by Latecomers

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3 Episodes of Global-Local Interface

Episode 1
Fast vs. Slow Catching up
among IT clusters in Taipei, Shenzhen, and Penang in Asia
(Kim, and Lee 2021, Tech Forecasting & Social Change)

Episode 2
Auto Sectors in China, Malaysia, & Thailand, compared with Korea
(Lee, Qu, and Mao, 2021, European J of Dev. Research)

Episode 3
Resource-based development
by Industrial Policy under local ownership in Chile and Malaysia
(Lebdioui, Lee, Pietrobeli, 2020, J of Tech Transfer)

Episode 1

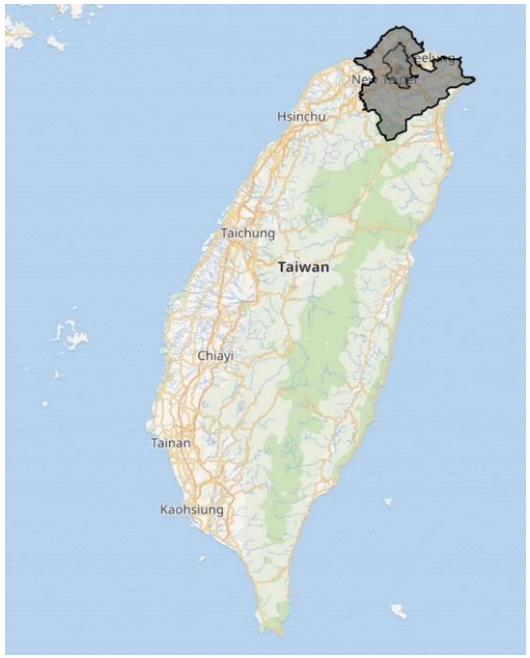
Local-Global Interface as a key factor in Catching up of Regional Innovation Systems:

Fast vs. Slow Catching up among Taipei, Shenzhen, and Penang in Asia

(+ Cluster Analysis RIS of 24 regions around world)

Thee Three: fast vs. slow catching up: despite a common initial conditions

Taipei

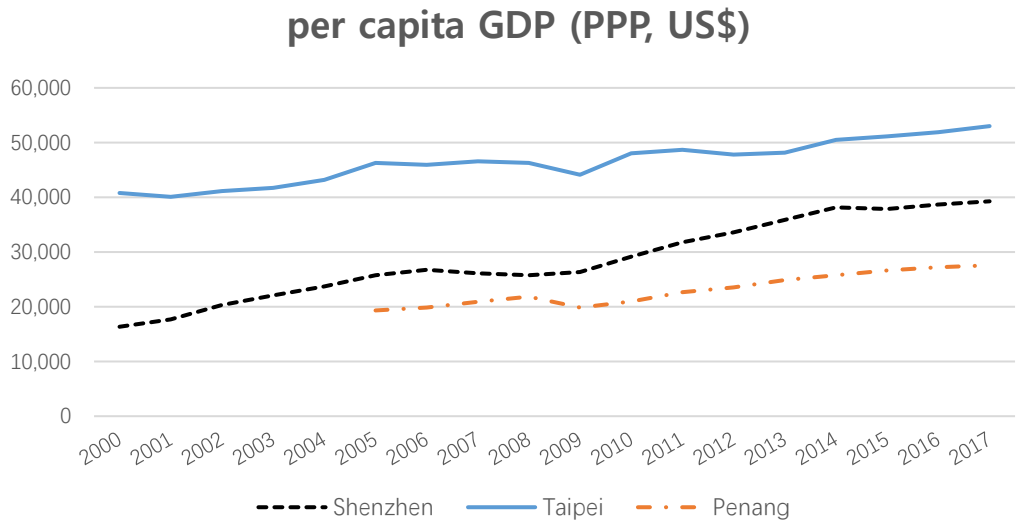


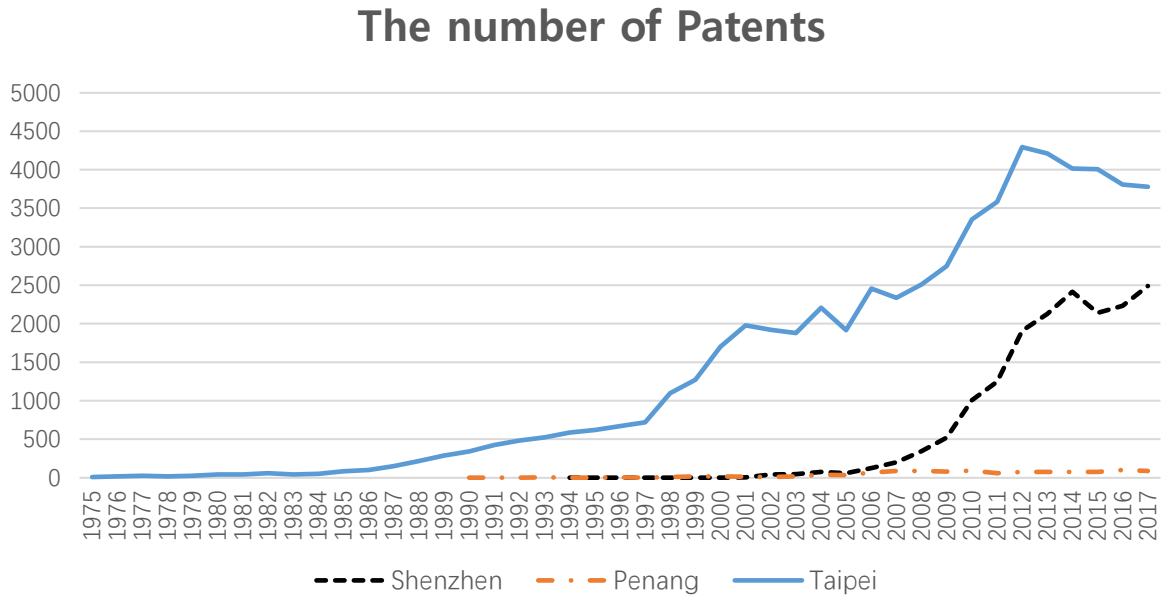
Shenzhen

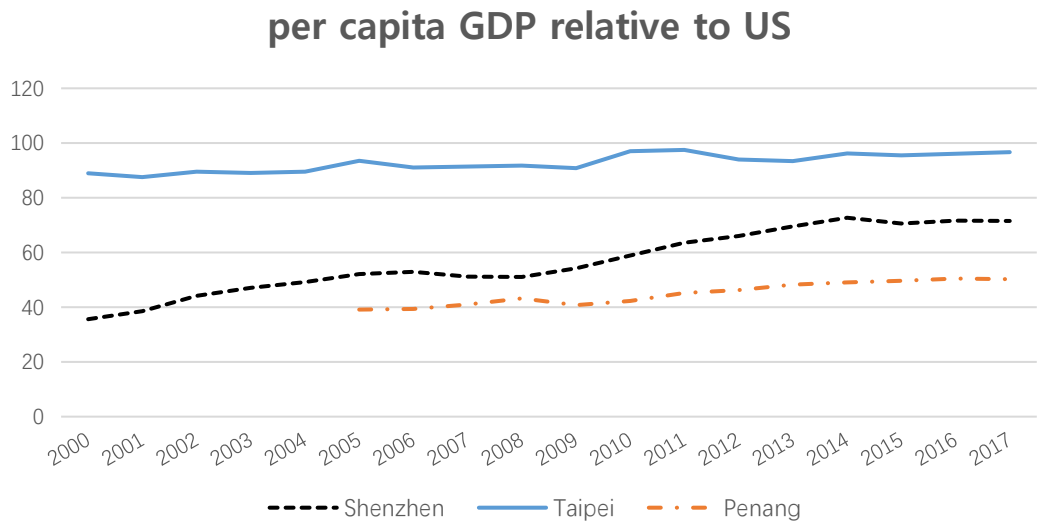
Penang

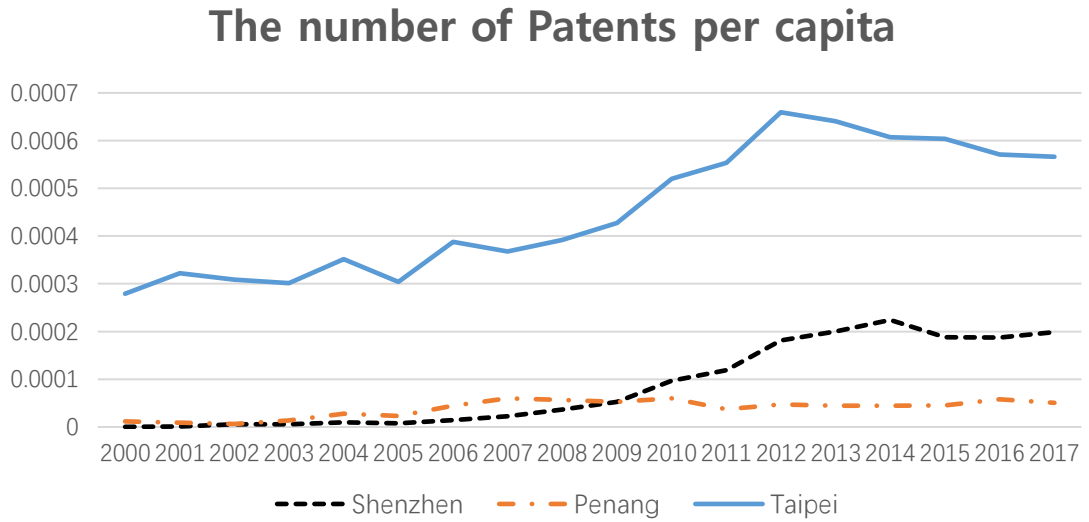
- share common take-off by promoting foreign direct investment (FDI) by MNCs; industrial parks,
  - Export Processing Zones (EPZs) in Taipei in 1960s,
  - the Special Economic Zones in Shenzhen in 1980,
  - the Free Industrial Zone in Penang in1972 (Hsu, 2005; UNDP, 2006).
- economic performance and catching up show some variance: esp. Shenzhen and Penang.

Different speed of Catching up in same short cycle cluster









A key aspect of Catch-up = Localization of knowledge & ownership

- Peripheral or immature RIS = heavily relying on external knowledge given its lack of indigenous knowledge base, and low level of regional embeddedness (Rodriguez et al. 2014; Asheim et al. 2019: 73; Park and Markusen 1995; Hassink 2001).
- Latecomers' reliance on foreign knowledge makes sense given that typical latecomer economies tend to achieve economic growth by relying on FDI and learning from foreign MNCs (Bernardes and Albuquerque, 2003; Lebdioui et al 2021; Amsden and Chu 2003).
- Such characterization of RIS in emerging economies in terms of low level of indigenous knowledge is consistent with the NIS of emerging or catching-up economies (Lee 2013; Lee et al. 2021a).
  - From low level of knowledge localization at the early stage to an increasing trend.

- The importance of acquiring indigenous technological capabilities or knowledge ownership is emphasized when it comes to catching up or at the later stage of development (Mazzoleni and Nelson 2007; Lebdioui et al. 2020)

Hypotheses 1: decreasing role of foreign knowledge;
=> Intra-region, Inter-region, Inter-national knowledge diffusion

- Intra-regionalization: how many patents invented in region x cite patents invented in its own region.
- Inter-regionalization: how many patents invented in a region cite patents invented in other regions in the same nation
- Internationalization: how many patents invented in region x cite patents invented in other countries.
- The more advanced economies, the less dependent on foreign knowledge
  (⇔ high intra-regionalization, low internationalization).

Hypo: Taipei would show a high and increasing level of intra-regional knowledge localization and, at the same time, a low and decreasing level of internationalization (less relying on foreign knowledge).

- Shenzhen:= to be similar to Taipei. Cf) Penang : no such trend

- Inter-regionalization: a more advanced or catching up region would show a high or increasing level of inter-regionalization (a high or increasing citations to patents by other regions).

Three measures: (Jaffe et al., 1993; Lee and Yoon, 2010; Lee, 2013)

- Intra-regionalization.
  - $Intra-regionalization_{xt} = \frac{n_{xxt}}{n_{xt}}$,

  : the ratio of region x citing its own region invented patents.

- Inter-regionalization
  - $Inter-regionalization_{xt} = \frac{n_{xx't}}{n_{xt}}$, *where* $x+x' = c$, *and* x *means a region located in country* c.

  : the ratio of citation made from patents invented in region x to patents invented in other regions than region x (but in the same country).

- Internationalization
  - $Internationalization_{xt} = \frac{n_{xdt}}{n_{xt}}$, *where* $\boldsymbol{x}$ *means a region located in country* $\boldsymbol{c}$ *and* $\boldsymbol{d}$ *means other countries than country* $\boldsymbol{c}$.

  : the ratio of citations made by region x to other countries (d)

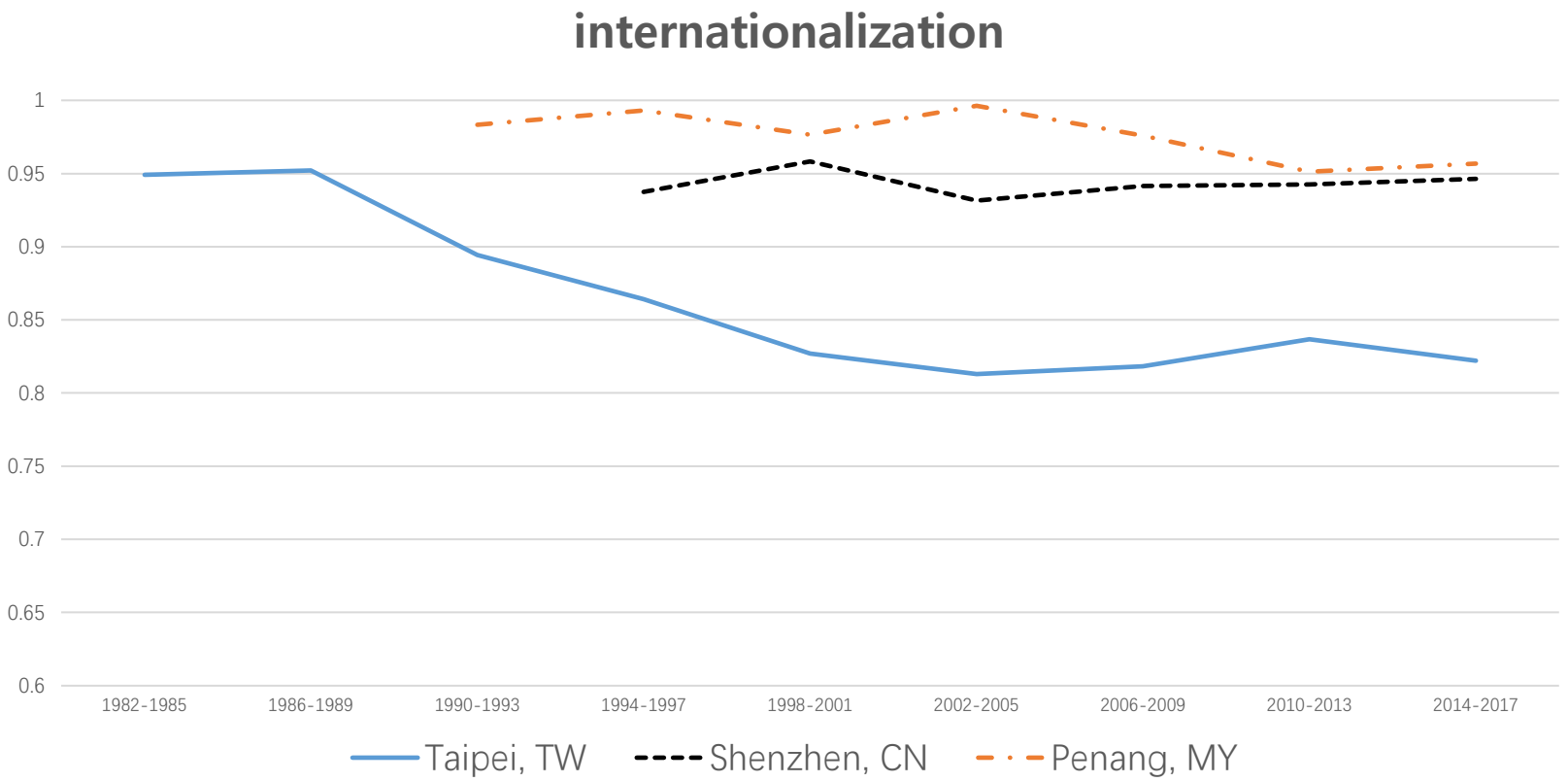
n_{xxt} : the number of citations made to region x's patents by region x's granted in year t .

n_{xt} : the number of all citations made by region x's patents granted in year t

$n_{xx't}$: the number of citations made from patents invented in region x granted in year t to patents invented in region x' granted in year t, where region x' means other regions than region x and is located into the same country with region x.

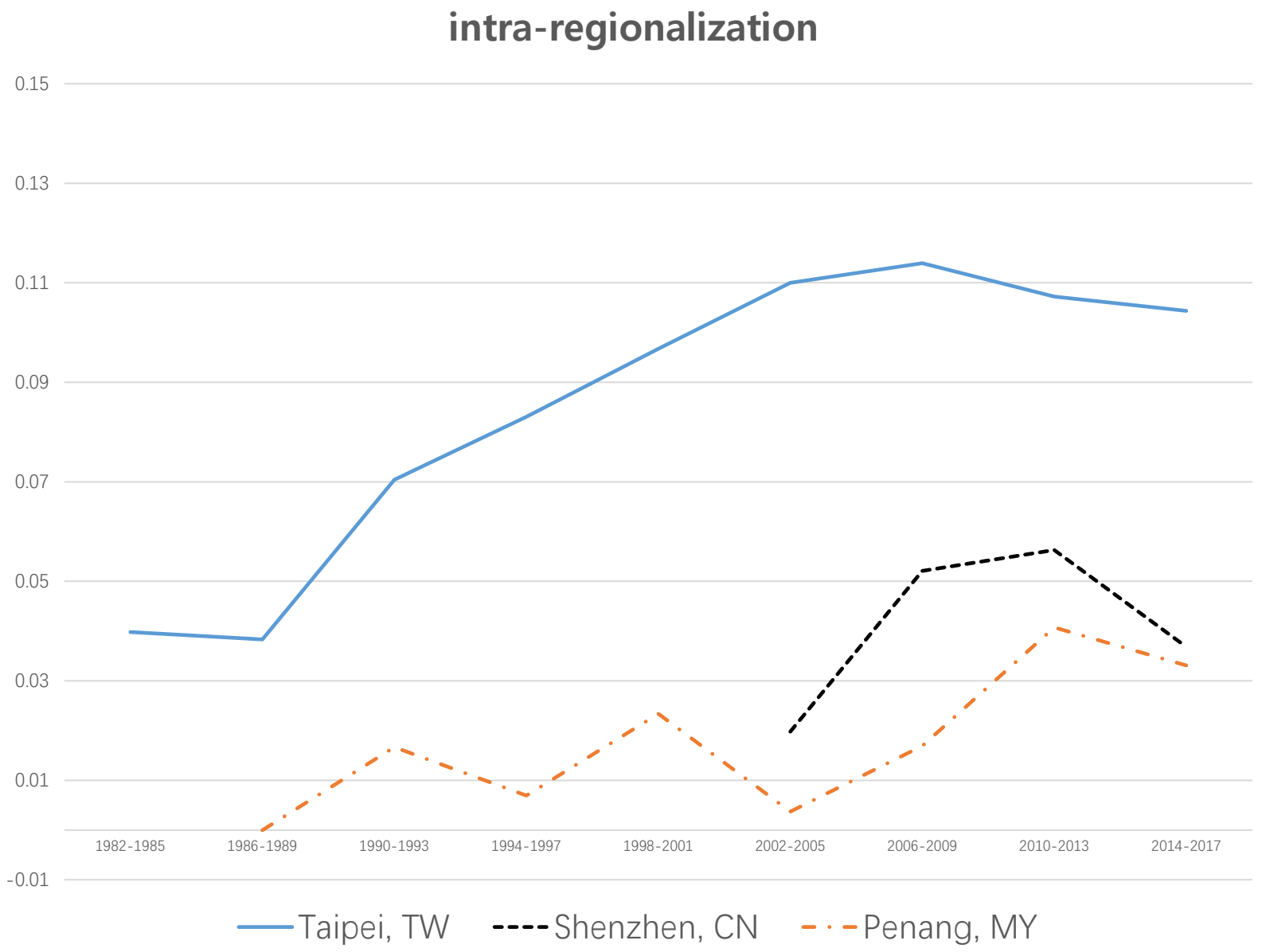
n_{xdt} : the number of citations made to country d by region x's patents granted in year t, where country d is different from the country that region x belongs to.

Order of Internationalization => Opposite to level of Per capita Income

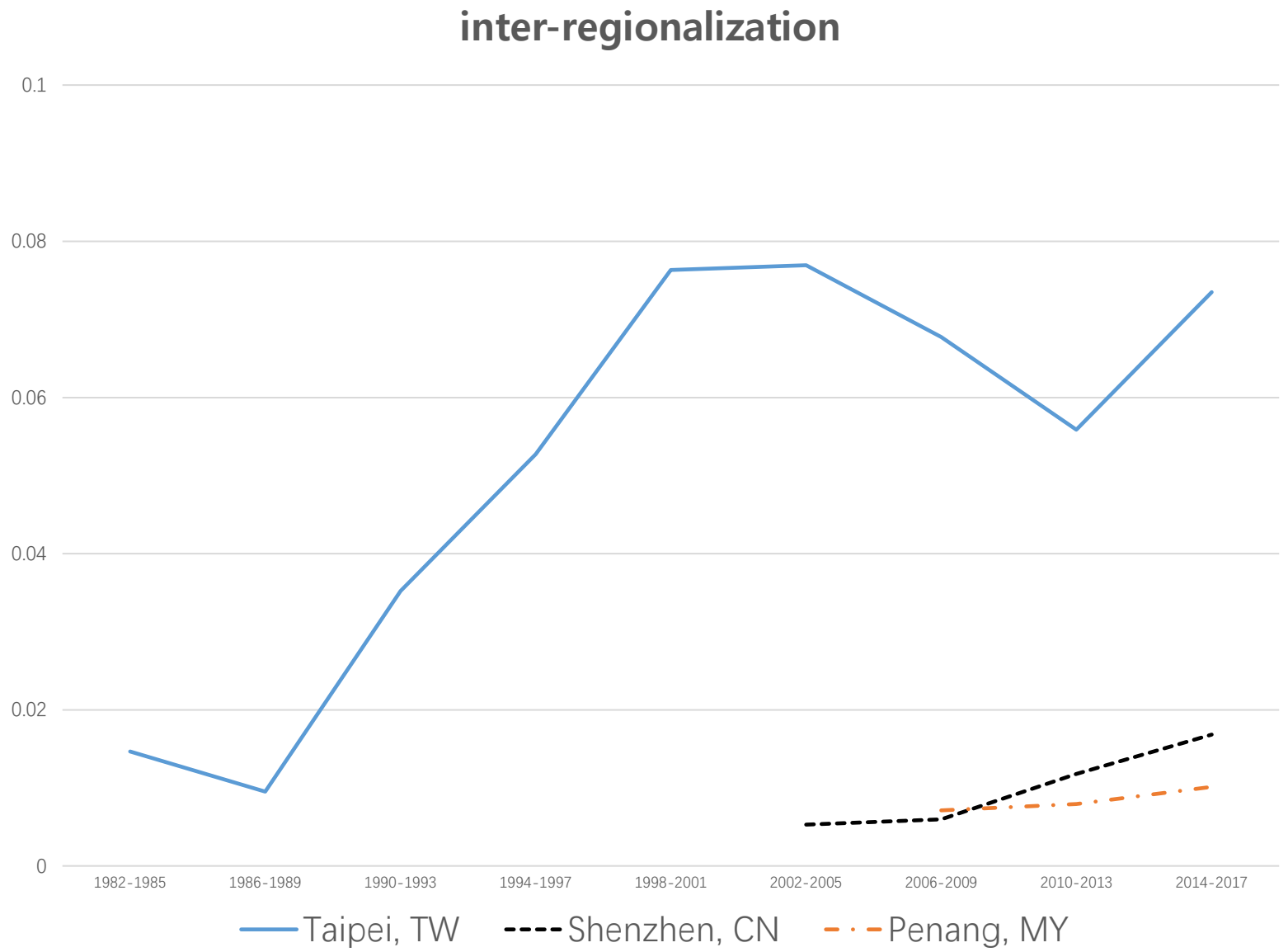


- **Taipei** shows a clear trend of reducing the internationalization or the reliance on foreign patents, which reflects the enhancement of its own indigenous technological capabilities and of the RIS.
  - 95% in the early 1980s to less than 82% in the early 2000s despite slight increase in 2010s
- **Shenzhen or Penang** with level of internationalization still higher than 90%.
- Shenzhen's level is lower than that of Penang,

Intra-regionalization



Inter-regionalization



Hypotheses 2: role of local/foreign ownership of patents

- Relying on foreign-owned knowledge (patents) is not enough to sustain the catch-up up to the later stage because foreign firms would become increasingly reluctant to transfer or sell their technologies to latecomers gettting close to the frontier (Lebdioui et al 2021: Lee 2005).
  - Amsden and Chu (2003) : Taiwan = increasing locally-owned firms.
  - Mazzoleni and Nelson (2007) : South Korea and Taiwan, successfully catching-up countries, as acquiring indigenous technological capability.

⇒ Hypo: Taipei has a high level of local ownership of patents (high share of patents filed by locally-owned firms);

⇒ Shenzhen : a trend of increasing share of locally-owned patents, compared to Penang.

Hypotheses 3: high originality from foreign ownership

- Originality (Hall et al. (2001; Trajtenberg et al. (1997) = degree that an innovation (patent) combines knowledge from diverse fields.
  - = a degree of knowledge convergence and combination

NIS: Originality tend to be high in advanced economies but not that high in catching up economies;
no robust relationship between high originality and economic growth of countries (Lee 2013: ch.3).

- If a region's economy and innovation is dominated by foreign MNCs from advanced economies, its level of originality would be higher

- **Hypo: Penang with continuing dominance by MNCs** would show a high level of originality than Taipei or Shenzhen as these latter two regions are now increasingly dominated by indigenous firms..

Hypo 2.3: Local firm ownership/Originality

3. Local firm ownership on knowledge : Indigenous knowledge

$$Local\ ownership = \frac{N_{cxt}}{N_{xt}},$$

N_{cxt} : the number of patents invented in a region x and assigned to a firm with its nationality in the host country c.

N_{xt} : the total number of patents assigned to any firms invented in a region with the first inventor address located in region x, granted in time t.

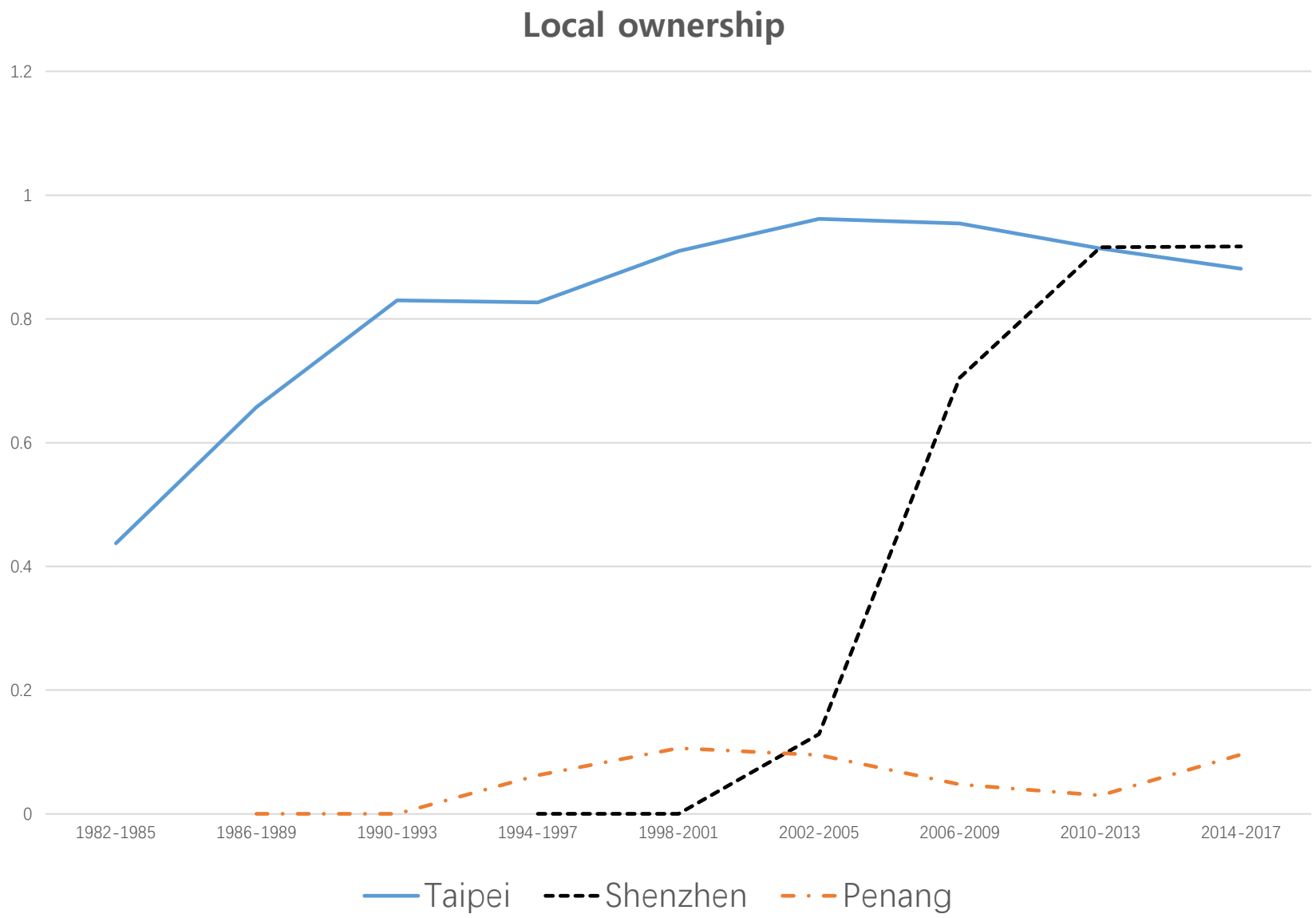
4. Originality (Hall et al., 2001; Trajtenber et al., 1997)
: how many various fields(classes) of knowledge are used, and thus cited to invent a patent.

$$Originality_i = 1 - \sum_{k=1}^{N_i} \left(\frac{NCITED_{ik}}{NCITED_i}\right)^2,$$

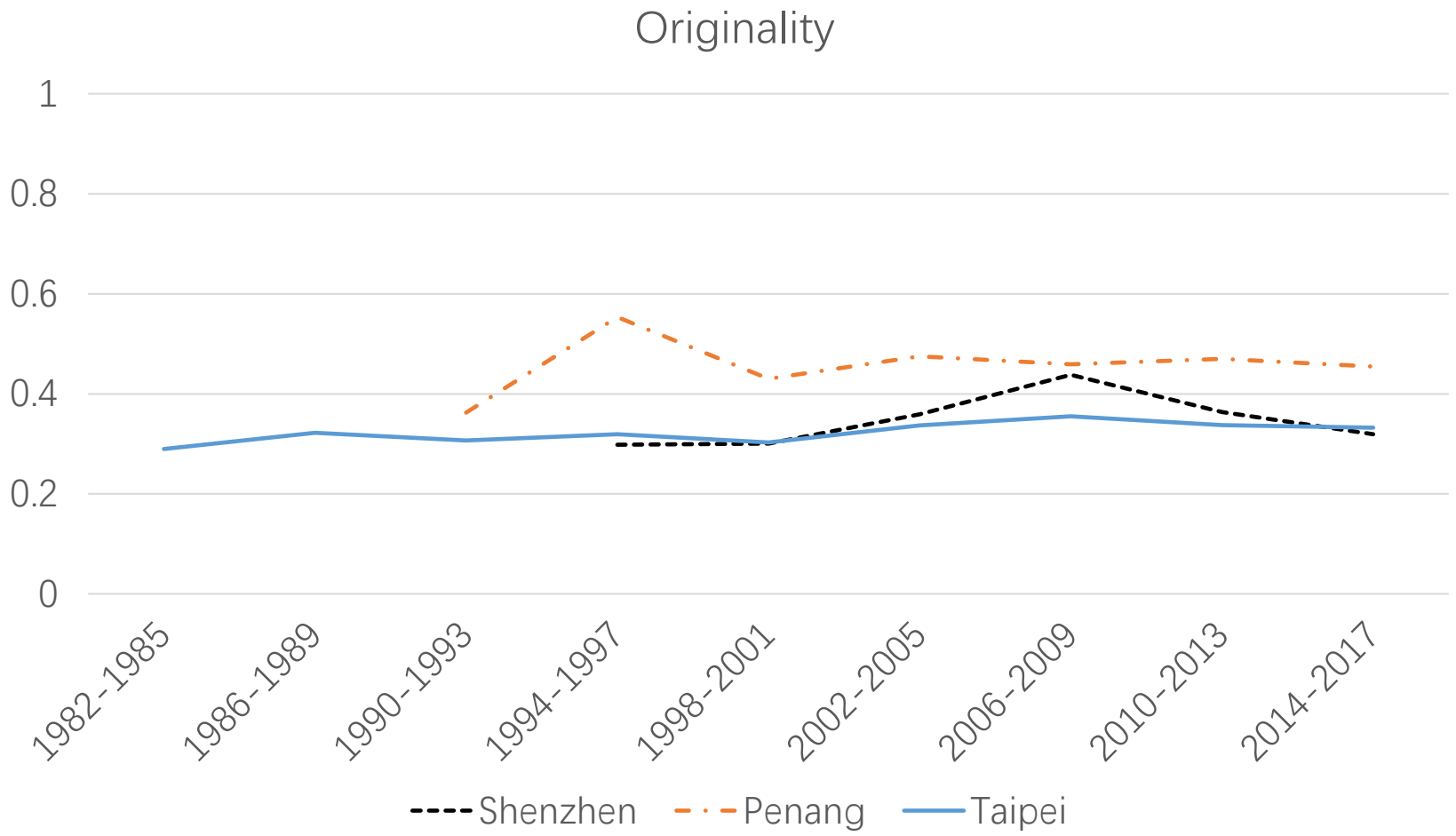
where k is patent class, $NCITED_{ik}$ is the number of citations made by the patent i to patents belonging to patent class k, and $NCITED_i$ is the total number of citations made by patent i.

- To transform this variable into a regional level variable, after calculating the originality of each patent, we average the values of originality over all the invented patents in a region.

Local firm ownership of knowledge: catching up Shenzhen

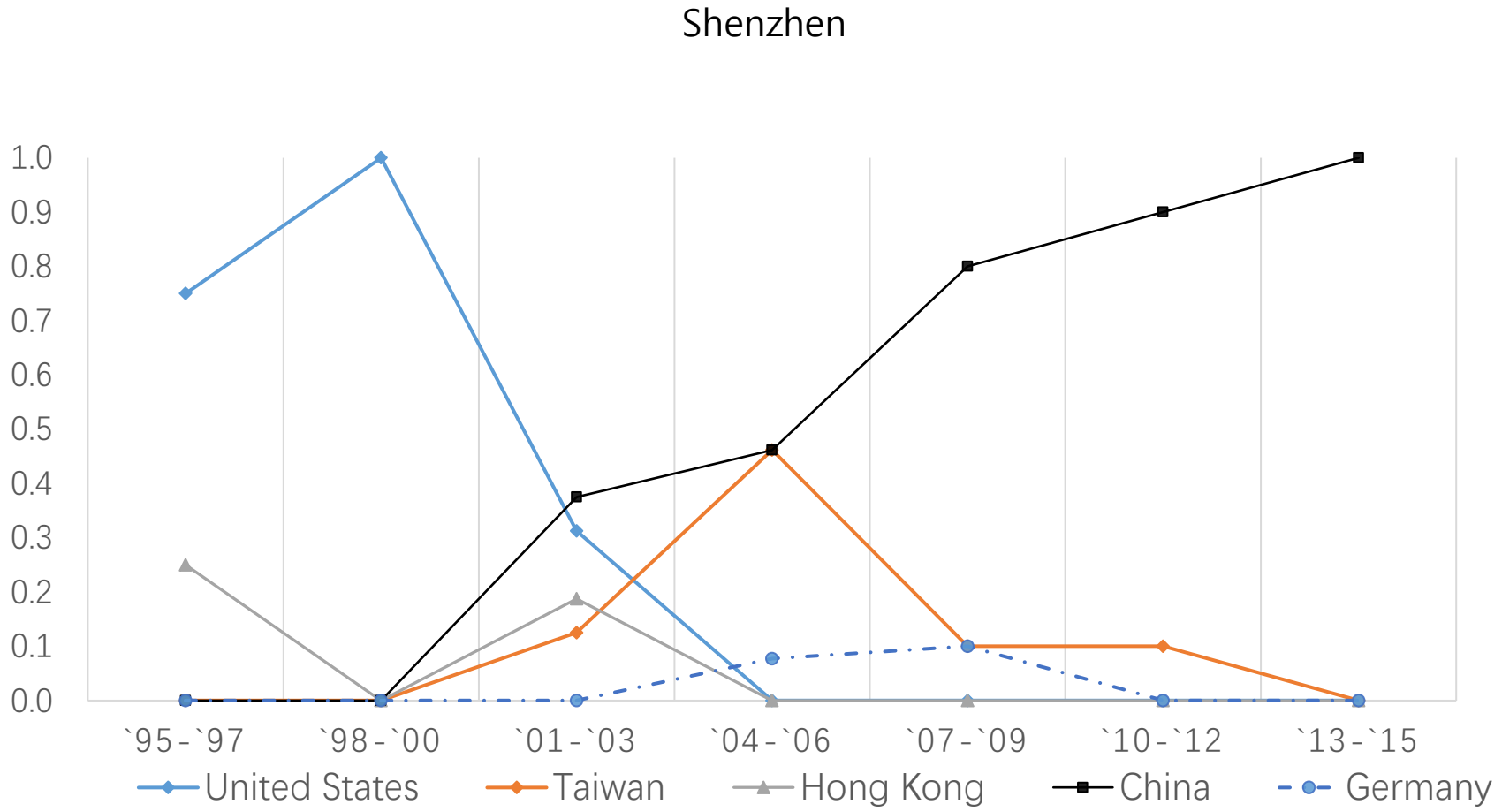


Originality; highest in Penang with foreign ownership



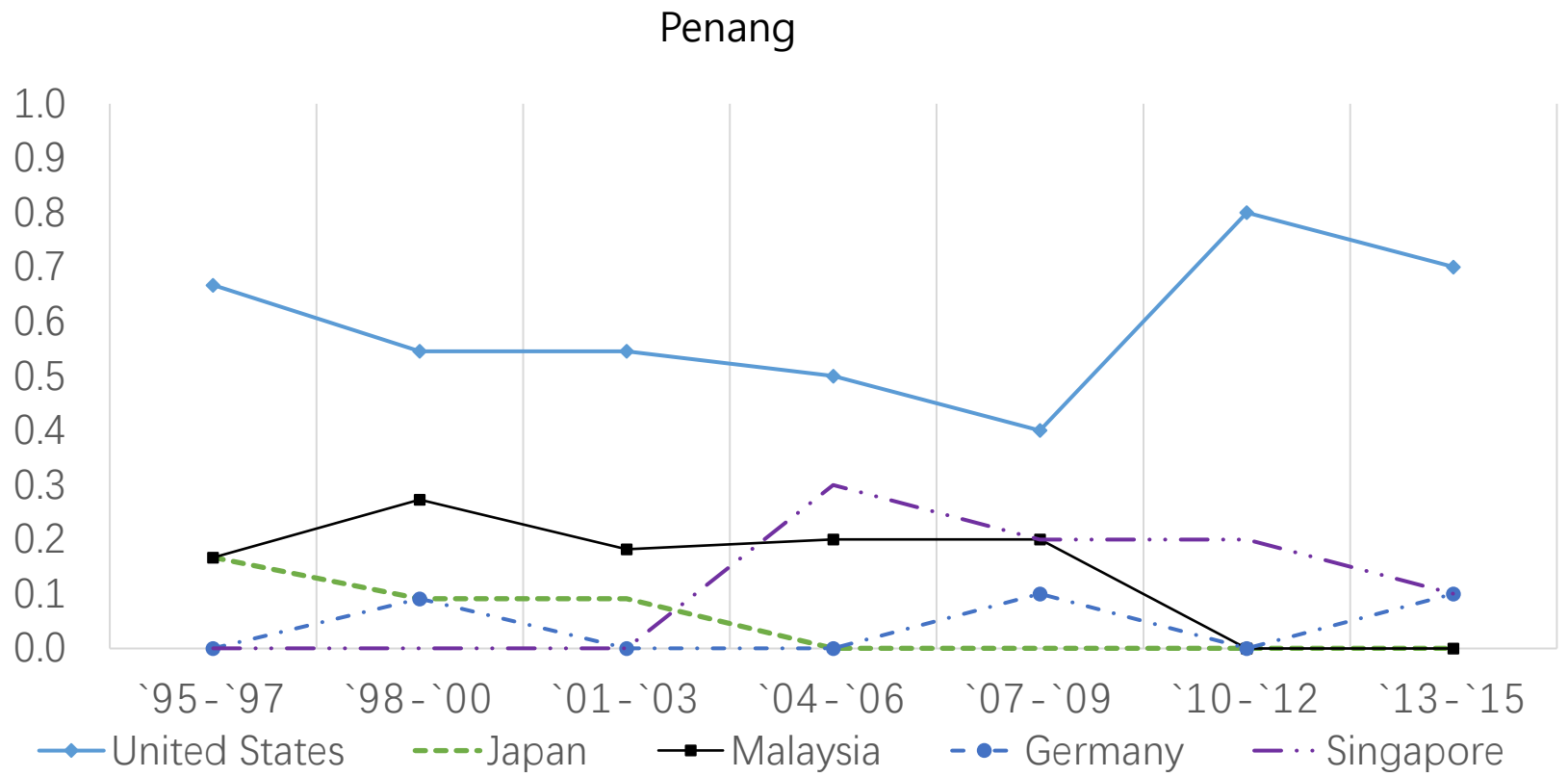
- Dominance of foreign MNCs in Penang seems to be related to the fact that the degree of originality is highest in Penang, compared to Shenzhen or Taipei.

The ratio of firms' nationality in top 10 assignee firms:
increasing share by locals in Shenzhen



- :kept increasing since the late 1990s; reached almost 100% during the 2013-2015.

The ratio of firms' nationality in top 10 assignee firms:
no increase of local ownership in Penang



- **Penang**: has remained dominated by the US firms with 50 to 70% shares since the 1990s to present
  - decrease of the shares by the Malaysian firms from 20% to zero in the mid 2010s.

Summary: models of catching up RIS in terms of the local-global interface

▪**Taipei and Shenzhen: a mode of eventually creating indigenous firms,**

-in contrast to the Penang model of continuing reliance on MNCs.

-The former not easy to realize, but leading to a faster catching-up than Penang.

▪To promote locally-owned firms eventually, Taipei and Shenzhen have been more aggressive in terms of the degree of public intervention than Penang (which just worked on human capital for FDI)

▪**Various policy initiatives in Taipei and Shenzhen to promote indigenous innovation**

-a) promote technology transfer from foreign to domestic firms,

-b) private and public joint R&Ds, and in-house R&D center by the local firms,

-C) attract branches of universities; encourage academic spinoffs / venture financing for them.

▪**If a latecomer ‘s fast catching up, got to promote *localization of innovation and its ownership*,**

after the initial stage of learning from foreign knowledge sources.

Varieties of RIS

- Taking a Schumpeterian perspective, the paper has tried to find the answer from the divergent nature of RIS in three regions, focusing on the local-global interface.
- RIS variables help us to identify and differentiate the mature versus immature RIS.

	Mature/advanced RIS in HICs	Immature/ backward RIS	Catching-up RIS/ upgrading of RIS
Intra-regional localization	High	Low	Increasing
Inter-regional localization	High	Low	-
Inter-nationalization	Low or medium	High	Decreasing
Local firm ownership of innovations	Mostly strong	Low	Increasing

Episode 2

GVC, Industrial Policy, and Upgrading in East Asia

Auto Sectors in China, Malaysia, & Thailand, compared with Korea

Puzzles and Questions about industrial upgrading:

- Why Malaysia (eg :Proton) auto sector failed despite active industrial policy
- Is Thailand really succeeding as agued by Baldwin (2016)
- Why and How China is succeeding?

- Owing to or despite Industrial policy?

- Try to answer these Q's by comparing the Three with Korea
- Using 3 Indicators of upgrading in GVCs

What is LCRs and How to assess them

- Local content requirements (LCRs) = an industrial policy
- that require manufacturers to use domestically manufactured goods or services in their producing process.
- Either indigenous firms or local FDI/foreign-owned firms (Kuntze and Moerenhout, 2013, p.4).
- Question: how LCRs worked in different countries or what factors affect their success or failure?

What would make LCR success? 3 factors
Local ownership; Competition; firm-level effort

1) Without local ownership, nothing can be accumulated; need to bring indiginous firm after learning from FDI firms (Amsden & Chu 2003; Lee, Gao and Li, 2016; Lee and Lim 2001)

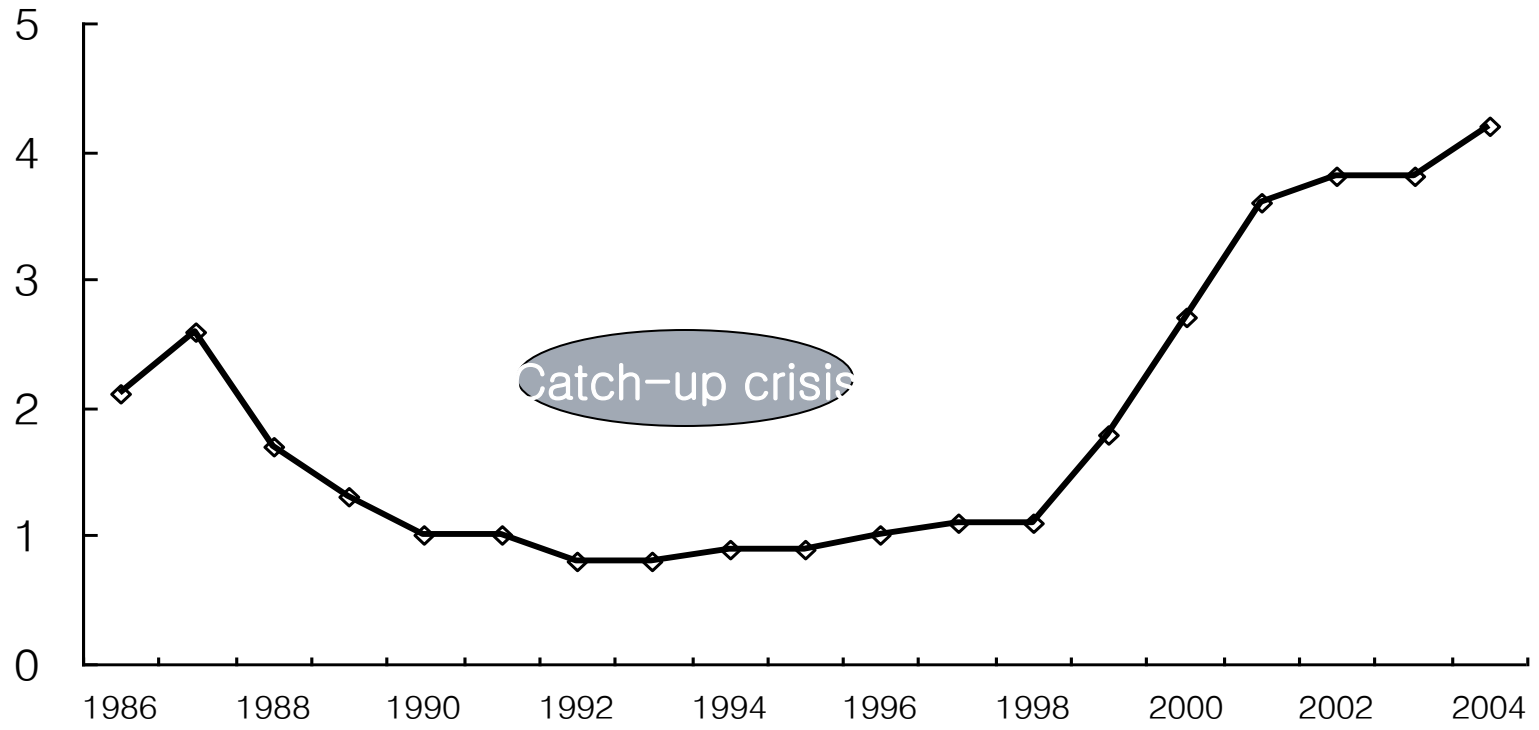
2) Discipline from Competition as a precondition of an effective LCR/industrial policy, (Aghion et al., 2015; Greenaway, 1992; Jung & Lee 2009)

3) firm-level effort and strategies to build technological capabilities, combined with complementary policies

(Lee &Malerba 2017; Belderbos, et al 2002;);

--eg) localization of engines and key components;

Korean Firms' Market Shares in US Car Markets (%)



Source: The automobile Association of Korea,

Korean Case in terms of the 3 Conditions

1) Ownership:

-- Korean auto producers began in form of JVs but minor foreign ownership which was also bought out later

- Hyundai learned from its Mitsubishi (20% share)
- Kia's foreign partner is 17%
- Daewoo started as JV (50%) with GM but the cooperation was dissolved in 1993 due to GM's unwillingness to support Daewoo's foreign expansion plans and local R&D effort (Auty, 1994; Ravenhill, Études and Ifri, 2005).

2) Competition: domestic Oligopoly market ; discipline from world markets

3) firm-level effort to localize engines/transmission in Hyundai;

plus carrots & sticks

- heavy tariffs on assembled cars: eg as high as 100% in the 1970s;
- but lower tariffs for importing auto parts and supplies
- any supports linked to firms' export performances

Overview of Auto Industry : Malaysia, Thailand, China

1) Malaysia's automotive industries started from 1960s

- Malaysia; only one with its own national brand in ASEAN,

-- their first national car brand—Proton has occupied their domestic market,

-- but failed to become export industry; finally sold to Japan and China Geely later

2) Thailand

-- automotive industries started around 1960s;

-- there are about 14 auto makers; all foreign majority owned

thus, became the biggest exporter among ASEN countries.

- Highly liberalized and competitive markets

3) China

- foreign car makers entered China through JVs in 1980s;

- the industry has got rapid development, with indigenous car makers great achievements

- became the world biggest producer with a annual production of more than 20 million。

- huge competition exists among JVs and self-owned brand since self-owned brand rise quickly after 2000. (Xiaopeng, 2009)

Comparative Story of 3 Countries

- Failure in Malaysia => lack of competition in the domestic market
-
- Thailand mixed success in promoting their local auto industry while performed well

  => no local ownership -> low local value-added

- China : restricted foreign ownership (50% max);

  implemented protective policies;

  and competition in the domestic market;

LCRs in Malaysia in auto industry:
abolished in 2004 ; request of WTO;

	Passenger Vehicles (Displacement volume)		Commercial vehicles
	1,850cc or less	1,850 to 2,850cc	2.5tons or less
1992	30%	20%	20%
1993	40%	30%	30%
1994	50%	35%	35%
1995	55%	40%	40%
1996	60%	45%	45%

- Reached localization ratio of 70 before it was abolished

LCRs in Thailand in auto industry:
(also abolished after joining WTO in 2000)

	Passenger Vehicles	Commercial vehicles
1975	25%	20%
1980	35%	20%
1981	40%	25%
1982	45%	30%
1983	45%	35%
1984	50%	40%
1987	54%	51%
1994	54%	72%(diesel); 60%(gasoline)

Some vehicles, the Soluna model, and pick-up truck, the Hilux model produced by Toyota, had achieved over 70 percent localization rates in 1999

LCRs combined with Tariffs: auto in China

- Also, abolished after China's accession to WTO after 2001

- LCRs in China's auto industry is related to import tariffs.
- Higher level of localization => a lower import tariff ;

1. If localization rate: between 40% and 60%, tariffs of 75%.
2. If Localization rate: 60% up to 80%: import tariffs of 60%
3. If localization rate exceeds 80%: rate of 40%
4. If more than 20% annual growth of localization rate after 80%, tariffs exemption for 3-5 years:

Localization rate of leading manufacturers in China in 2011

	Honda	Toyota	Shanghai Volkswagen	FAW Volkswagen	Nissan	Dongfeng Honda	Beijing Hyundai
Model	Accord	Corolla	Lavida	Audi	TIIDA	CIVIC	ELANTRA
Rate	90%	80%	95%	90%	60%	72%	91%

•Have LCR led to upgrading in GVCs?

Answer by Using OECD-TiVA Data

- downloaded on the website:

http://stats.oecd.org/DownloadFiles.aspx?HideTopMenu=yes&DatasetCode=TIVA_2016_C1

- Data from TiVA : only available 1995-2011;
- Data before 1995: national I-O table

The Hope on GVC (Baldwin 2016) but its limitations

1) The Hope (Baldwin 2016)

What matter is not to develop domestic industries that would capture all the segments of production or the whole value chain.

- Rather it is to identify the country's best position in the GVC and the most competitive supply of tasks or business functions

2) Limitations

What matter is who captures the 'best' part of the Value in GVC.

- There can be a battle for this.
- If you get only the minor value, you will be stuck in the middle income trap.

Detour in GVC (Lee et al 2017; Lee 2019) for demetic VADD
More GVC->Less GVC for more DVC-> More GVC again

What matter is not more participation at GVC (Gloval Value Chain)
but creating more domestic value-added
based on learning from the GVC,
and that is the way out of the middle income trap

after some domestic value-chains, you can be more global again as you send your factories abroad due to rising wages rates

Alternative to the linear view on GVC (the more the better)

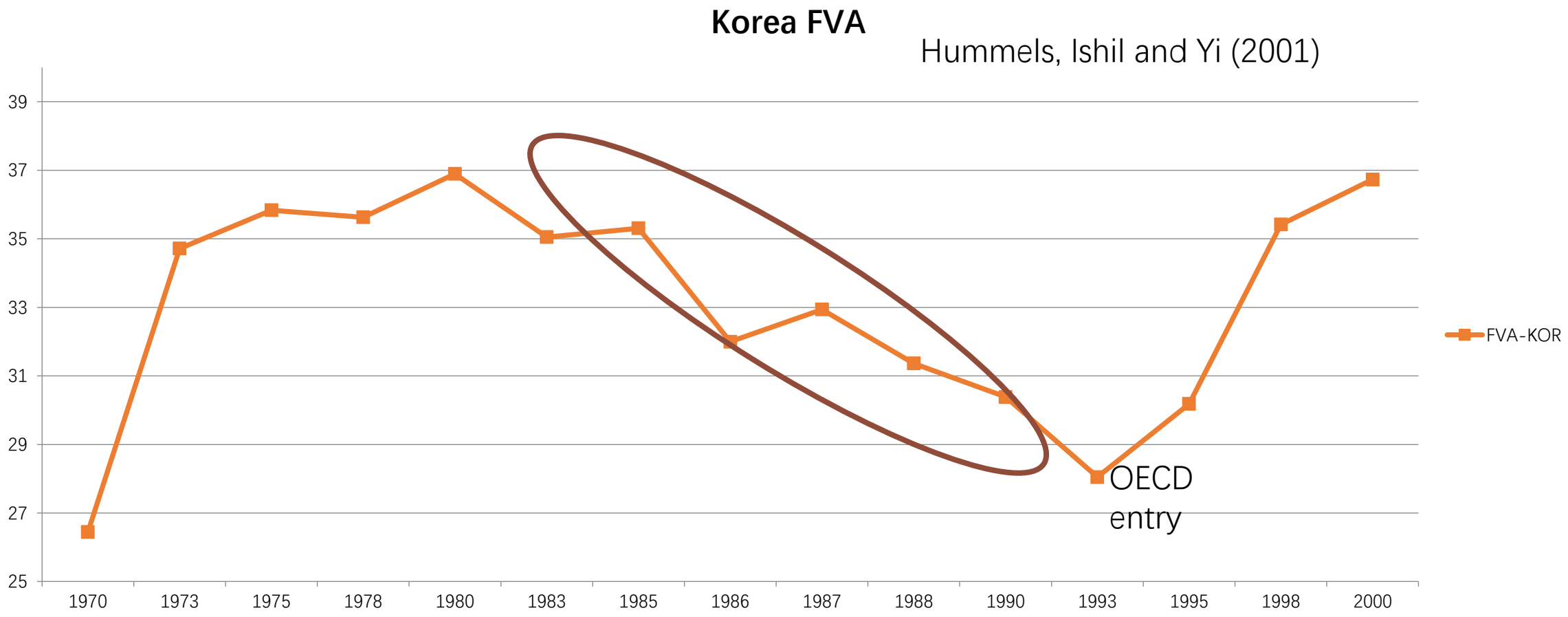
My view: Non-linearity:
=> more GVC-> stage of less GVC (creating domestic V-add) -> again more GVC (internationalization of production).

=> Lee et al, 2017, ***European J of Development Research,*** **" From the GVC (Gloval Value Chain) to Innovation Systems for Local Value Chains and Knowledge**

Trend of GVC participation in Korea (Lee et al 2017):

In-out-in; about 10 years of OUT: from 35% in 1980 to 28% in 1993

Measured by FVA = share of foreign value-added in gross exports

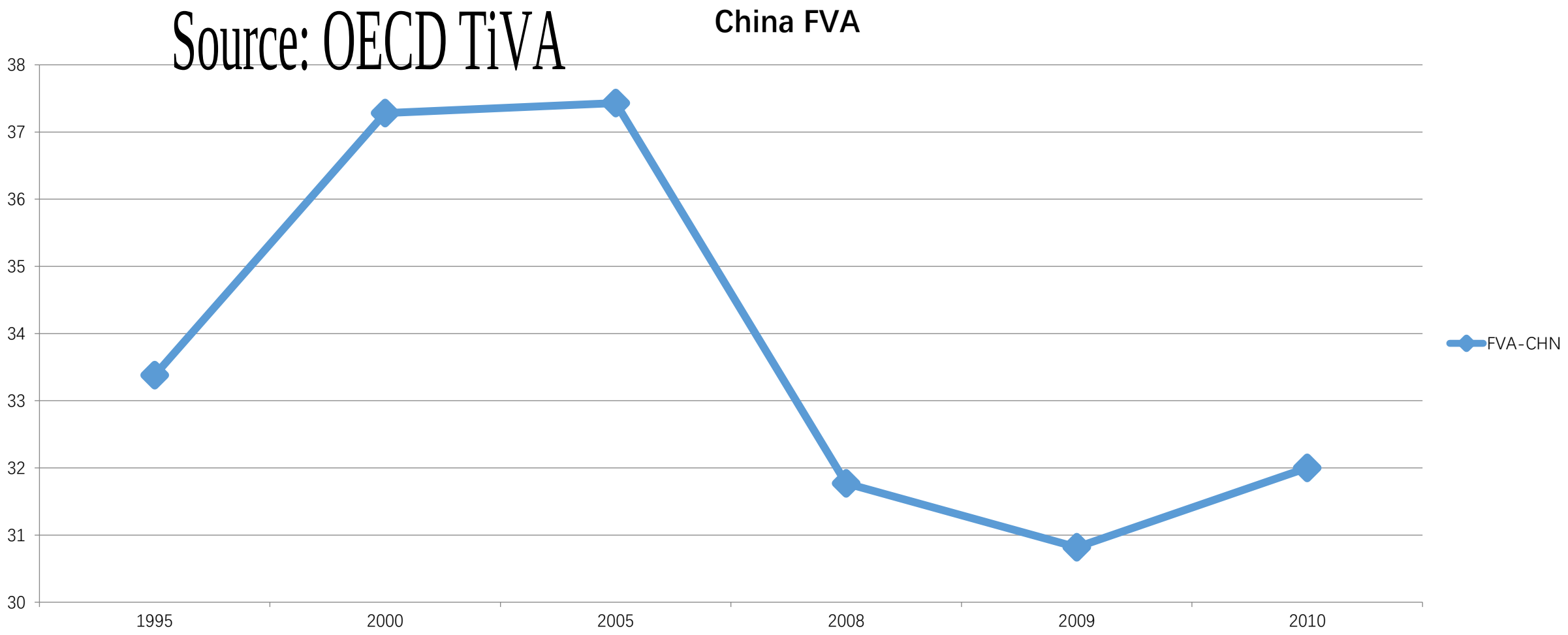


Trend in China: similar but bottom at later than Korea:

Peak at 37% in early 2000s to 31% In late 2000s

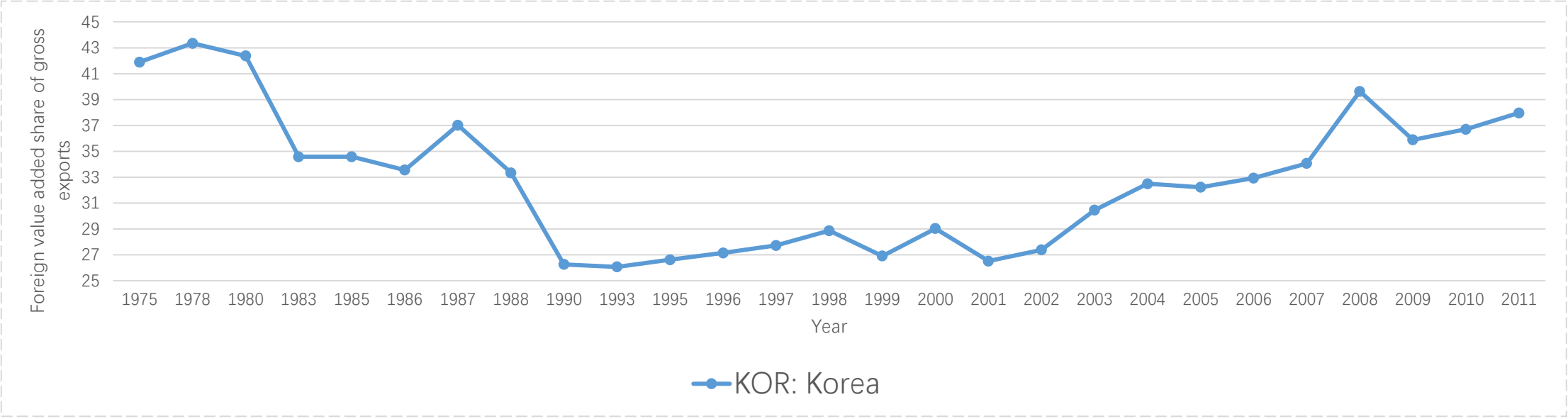
Korea ('93)->China (2009)

Source: OECD TiVA



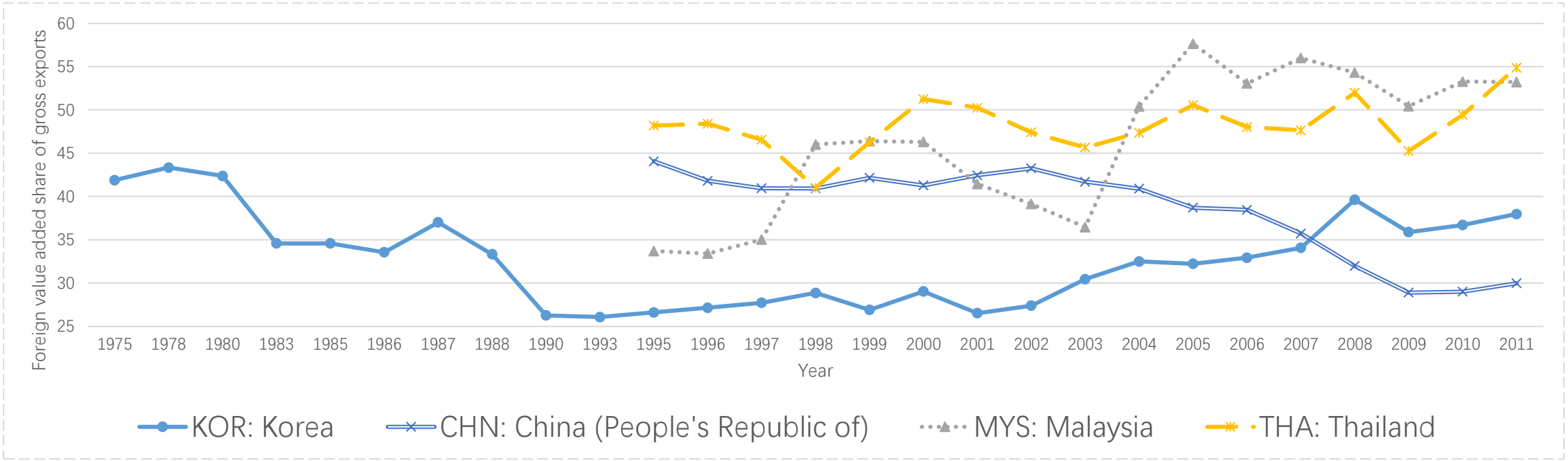
Auto sector: GVC indicator 1: (backward linkage 1): FVA = Share of Foreign Value-added in gross exports in Korea

- Foreign value added of gross exports captures the value of imported intermediate goods and services that are embodied in a domestic industry's exports (OECD, 2017.p,8).
- If LCR succeed, this value show a decreasing trend



Outcome 1: FVA

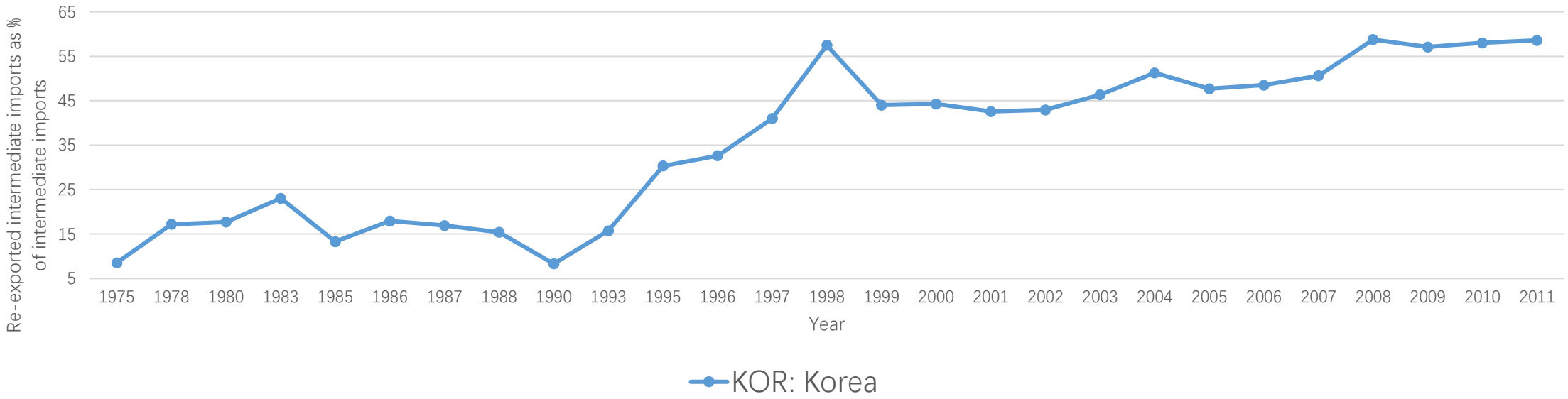
EXGR_FVASH: Foreign value added share of gross exports in Korea, Malaysia, Thailand and China's transport sector



1. Thailand always high: not show a decreasing trend
2. Malaysia is only low for a period during 1998-2003, but does not last long after LCRs were abolished;
   - they failed to build their own local value chain.
3. China has showed a decreasing trend: succeeded in their independence development through LCRs.

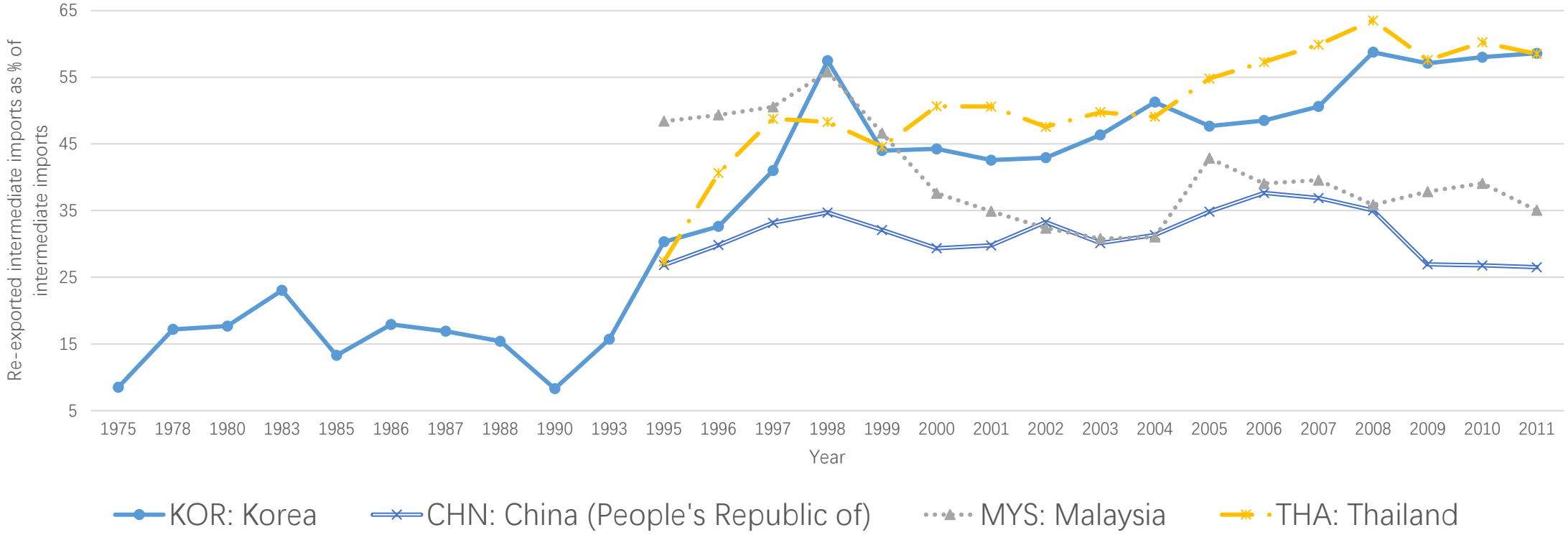
GVC indicators 2 (Backward linkage 2): REII
Share of re-exported Intermediate Imports in total Intermediate Imports

- Refers to imported products which are used as inputs into production processes and then exported again
- If Industrial policy for export promotion (eg LCRs) succeed, REII should show an increasing trend (Banga, 2013.p,14).



Outcome 2: REII

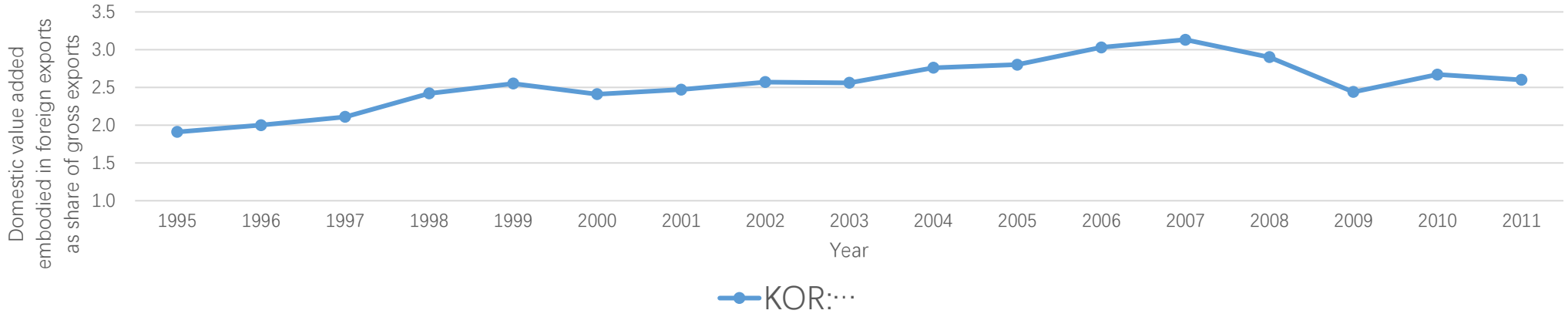
Re-exported intermediate imports as a % of total intermediate imports : Malaysia, Thailand and China



1. Thailand as high as Korea, but the exports are made by foreign car makers
2. Malaysia is low; they do not export in auto industry
3. China is also not that high; maybe to increase soon as they start to export more.

GVC indicator 3 (Forward linkage): DVAFXSH: Domestic value added embodied in foreign exports as share of gross exports of that foreign country

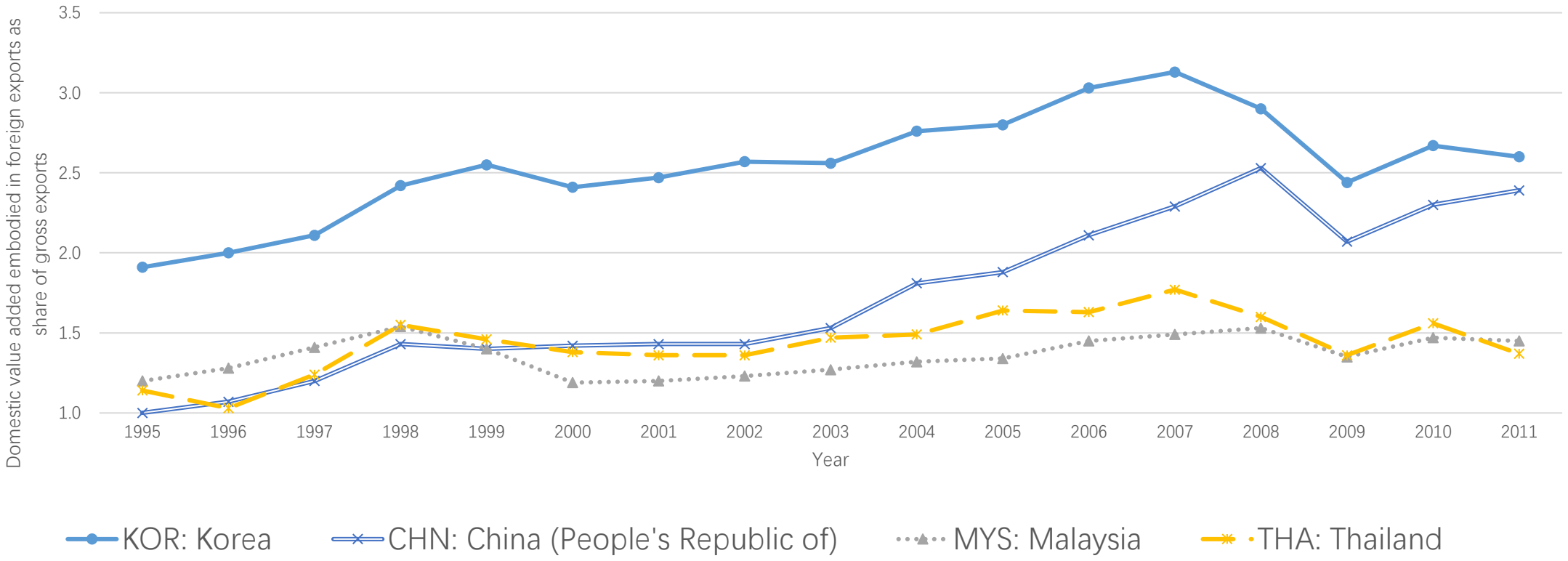
- It links a country to GVC through forward linkage
- where the country provides inputs into exports of other countries and measures domestic value-added which goes into other countries' gross exports (Banga, 2013.p,14). -> competitiveness of intermediate goods
- A success means: this indicator to show an increasing trend: that they are also globalizing their production just like what Korean firms did.



Korea's auto industry: has globalized their production;
eg) Hyundai's exports of intermediate parts to its factories abroad:

Outcome 3: DVAFXSH

Share of Domestic value added embodied in foreign exports ：
Malaysia, Thailand and China’s transport sector



1. Thai is low because it is the assembly plant and almost only export CBU(completely built-up)
2. Malaysia is also not high; still marketing their own products domestically; did not globalize.
3. China is increasing following Korean path: have started to produce cars in foreign factories or globally.

Why Failure in Malaysia:
no competition even between Indigenous Makers

1) Ownership:

- Proton and Perodua's majority equities held by Malaysian, 70% and 68% respectively.

2) No Competition (and no exports)

- Proton and Perodua : both JV with Japan
- the government forbid other manufacturers to produce the models which could result in direct competition with Proton.(Tai and Ku, 2013 p.62; Athukorala, 2014 p.116)
- Not to compete with Proton; Perodua only produce cars with an engine capacity of less than 1,000cc,(Athukorala, 2014 p.118)

3) No firm-level strategies to localize high-tech parts, such as engines

no export promotion to achieve economy of scale

⇒Eventually, lost competition in domestic market too after opening;

⇒ a 49.5% of share of Proton sold to Geerly in China

Why Mixed Success in Thailand:

No local ownership ; no need to increase local value-added;
and supportive policies not sustained

1) Ownership :

- Foreign dominance in both parts suppliers and final assemblers.

  Toyota : 86.4% of Toyota Motor Thailand

  - Mazda Powertrain Manufacturing(Thailand) : 100% held by Mazda.

- Among assemblers Japanese firms were dominated with 91% market share (Busser, 2008), and the JVs among the first level suppliers took 77% of the total (Natsuda and Thoburn, 2013 p.31)

2) Policies not sustained

- Used to require majority ownership by domestic sides;
- But, foreign ownership restriction loosened after 90s; In 1997, further removed ;
- Tariffs also somewhat low (lower than Malayisa)

Different China: Policies, local ownership and competition

1) Foreign Ownership Less than 50% share, + new entries by Chery, Geerly, and etc

- Chinese part of JVs shall hold more than 50% of shares,
- Further, Joint ventures are requested to establish R&D centers

=> Fierce competition in domestic markets

2) Supportive Policies: 3 categories:.

a) Import Restriction: <Auto Industry Policy> in 1994, import quota to regulate import of cars and parts.

- Either used cars or parts for car assembly are forbidden, which means no imports in SKD or CKD

b) Investment/Business Regulation:

- Foreign firms are not allowed to have more than two JVs .
- .For investment projects with regard to CBU and engines, foreign firms to work with local manufacturers.
- .Joint ventures are requested to establish R&D centers.

c) Discrimination in Consumption):

registration fees/taxes higher for imported cars (Xiushan, Chen Bo, 2007).

3) Firm-level effort to localize production of engines, etc and to acquire foreing technology (by M&A)

Summary and Concluding remarks

- Three factors for successful LCR/Industrial Policy:
  = Competition/discipline; local ownership; firm-level strategies/complementary policies

1) Failure in Malaysia,

- despite local ownership and supportive policies; lack of competition
- neither exporting domestic value-added nor globalize their production abroad.

2) Mixed success Thailand

- perform better than Malaysia in the export market (high REII),
- No local ownership and protective policies,
  => weak domestic value-added (high FVA) and no globalization (low forward GVC)

3) China = most successful case;

- while protecting local manufacturers through restricting foreign ownership and policies, the government did not prevent competition in the domestic market,
- increased domestic value-added (decreasing FVA) although still low in REIM (less export oriented) but high forward linkages as they expand abroad (indigenous globalization) following the Korean path.

Episode 3

How Chile and Malaysia are escaping the Middle Income Trap (MIT):

Resource-based development by Industrial Policy under local ownership

The Middle Income Trap (MIT)

Def)
a situation where middle-income economies tend to face a decelerated growth and fail to join high-income status
-- Gill and Kharas (2007), Eichengreen et al.(2012, 2013),
Ito (2017); Lee, (2013), World Bank (2010).

Cause)
Middle-income economies get caught between low-wage manufacturers and high-wage innovators;
-- their wage rates are too high but the level of their technological capability is too low to enable them to compete

-> somewhat manufacturing based discussions

Some Questions and Puzzles

1) The global phenomenon of middle income trap (MIT):
   cf) Success with manuf.-based catch-up in East Asia
   => Is that only model for latecomer development

2) Some signs: Chile and Malaysia getting out of the Trap;
   by not manuf. But by resource-based sectors

3) Malaysia:
   despite the failure of industrial policy in Auto?
4) Chile:
   Owing to or despite free market neo-liberalism?

Key Messages of the Paper

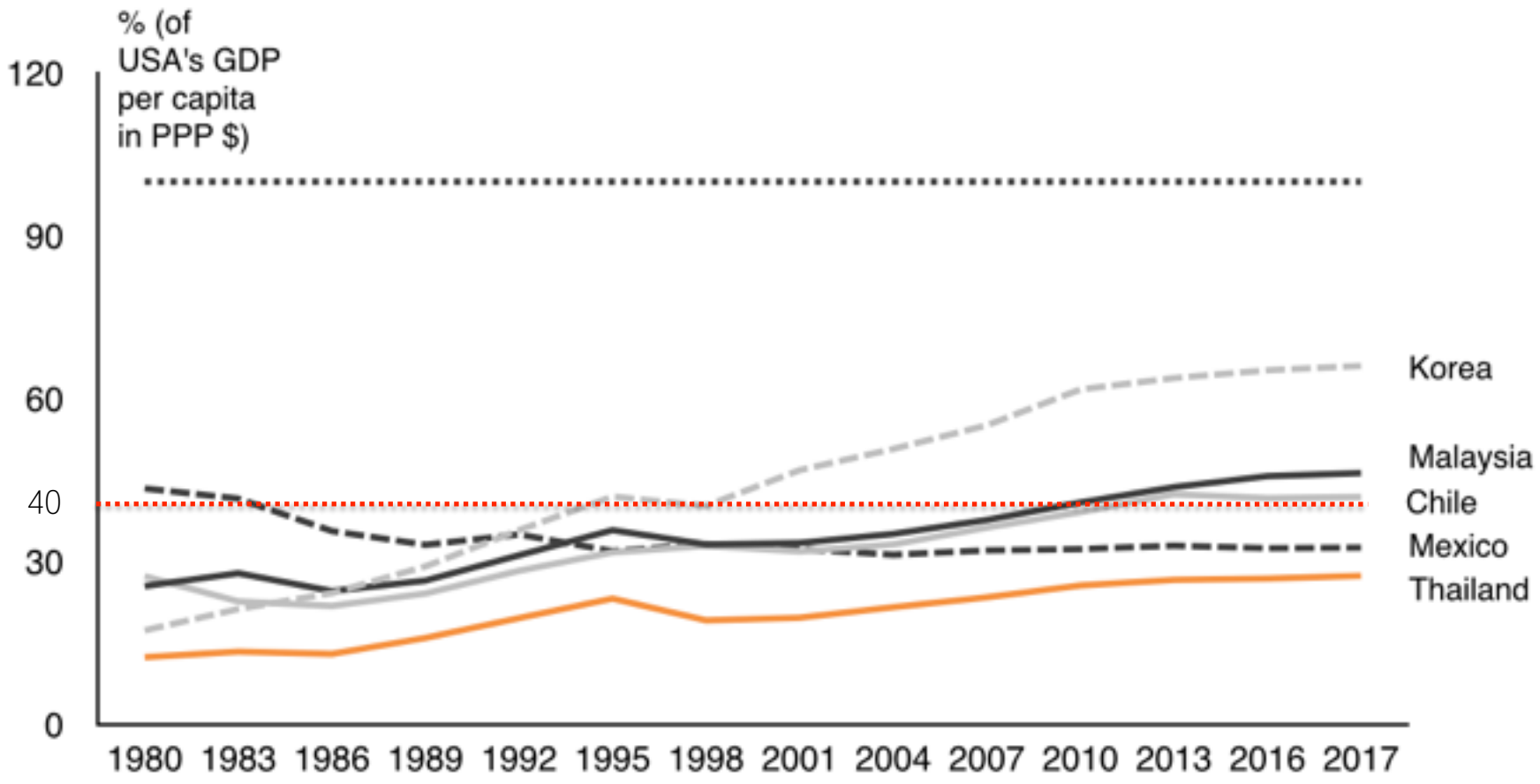
1) Chile and Malaysia
both reaching beyond the 40% bar of the MIT

2) Leading sectors,
= not manufacturing but resource-sectors
Malaysia: not Electronics (E&E) = example of MIT)
but palm oil, rubber and petroleum products
Chile: Not copper but Fruits, Wine, Salmon, Forestry

3) Success factors:
not free market but active industrial policy
for capability building in vertical value-chains,
based on local ownership

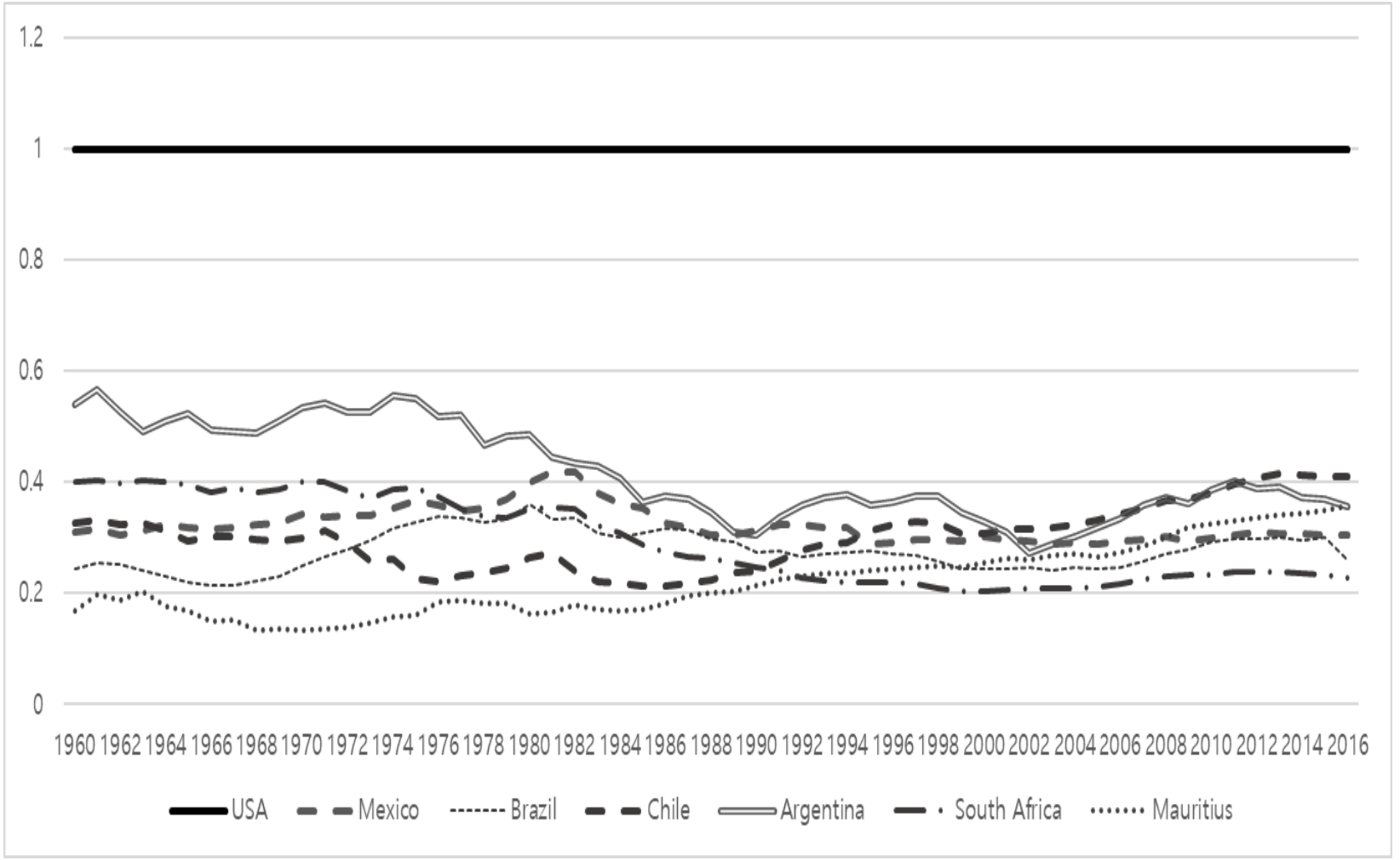
Chile and Malaysia's growth in perspective

Figure 3: GDP per capita as share of USA GDP per capita in selected countries



Source: International Monetary Fund (2017)

MIT in Mexico, Brazil, Chile, Argentina, South Africa, and Mauritius:
Middle income Trap: Per capita Income less than 40% of the US
=> Only Chile above the 40% line



Conditions for Growth-Engines = Competitive Exports

Chile:

- Salmon
- Fruits
- Forestry
- Wine

Malaysia:

- Palm Oil
- Rubber
- Petroleum

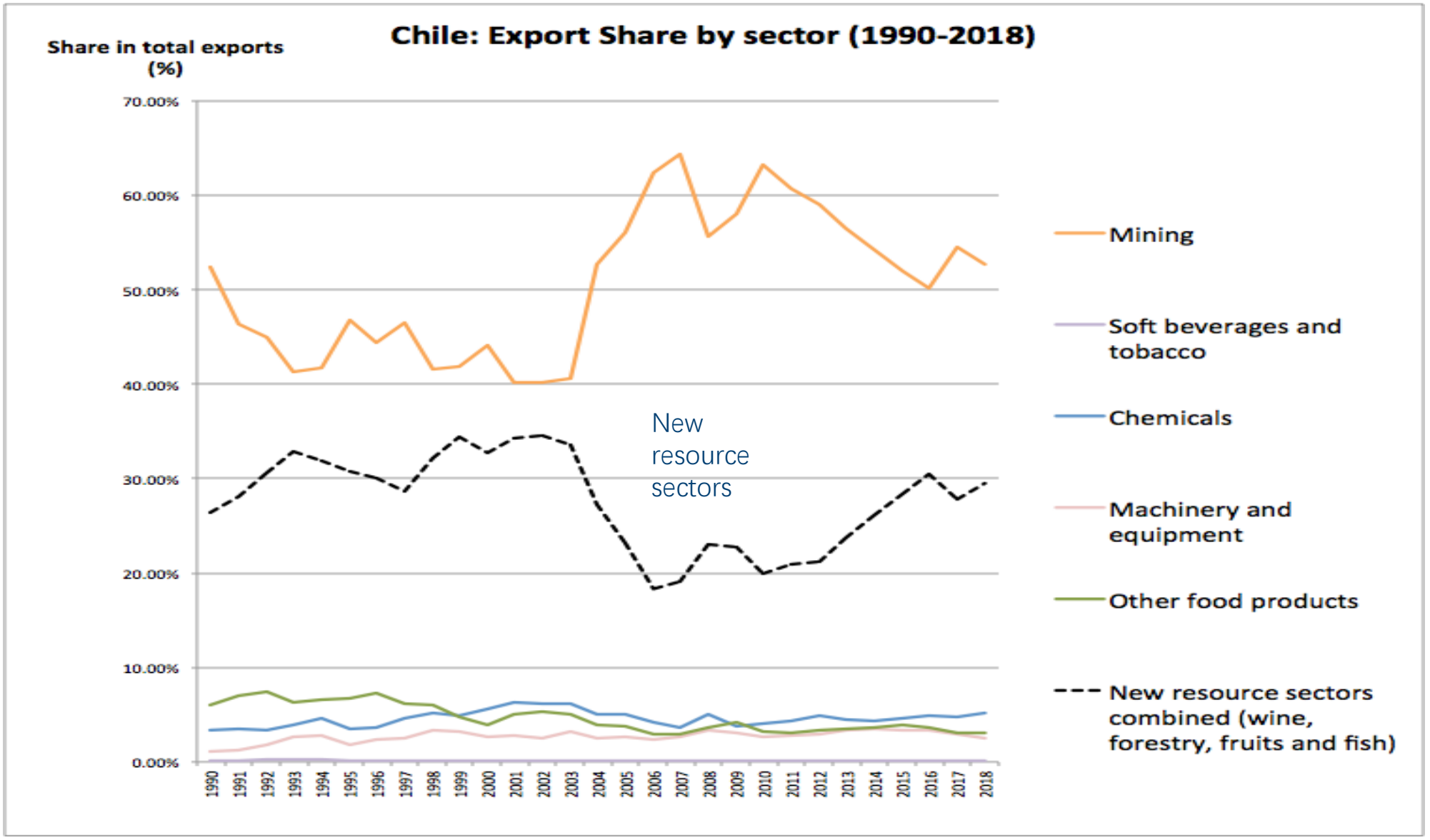
Let us look at how these sectors are doing: in terms of

1) share in total exports

2) trade surplus

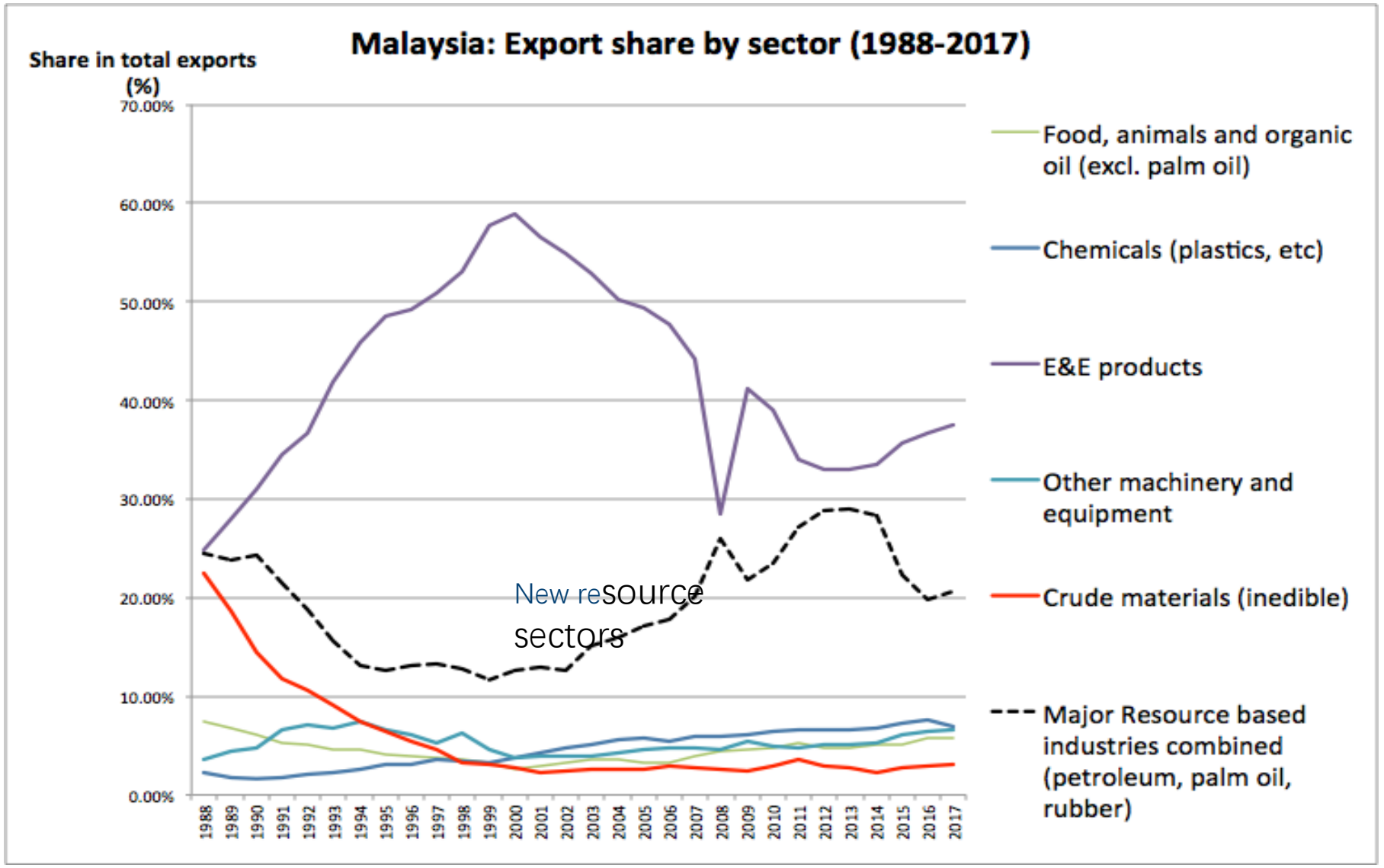
3) RCA = revealed comparative advantages: higher than 1 or not?

Export Performance of the Leading Sectors in Chile : their shares= close to 30%



Source: UN Comtrade

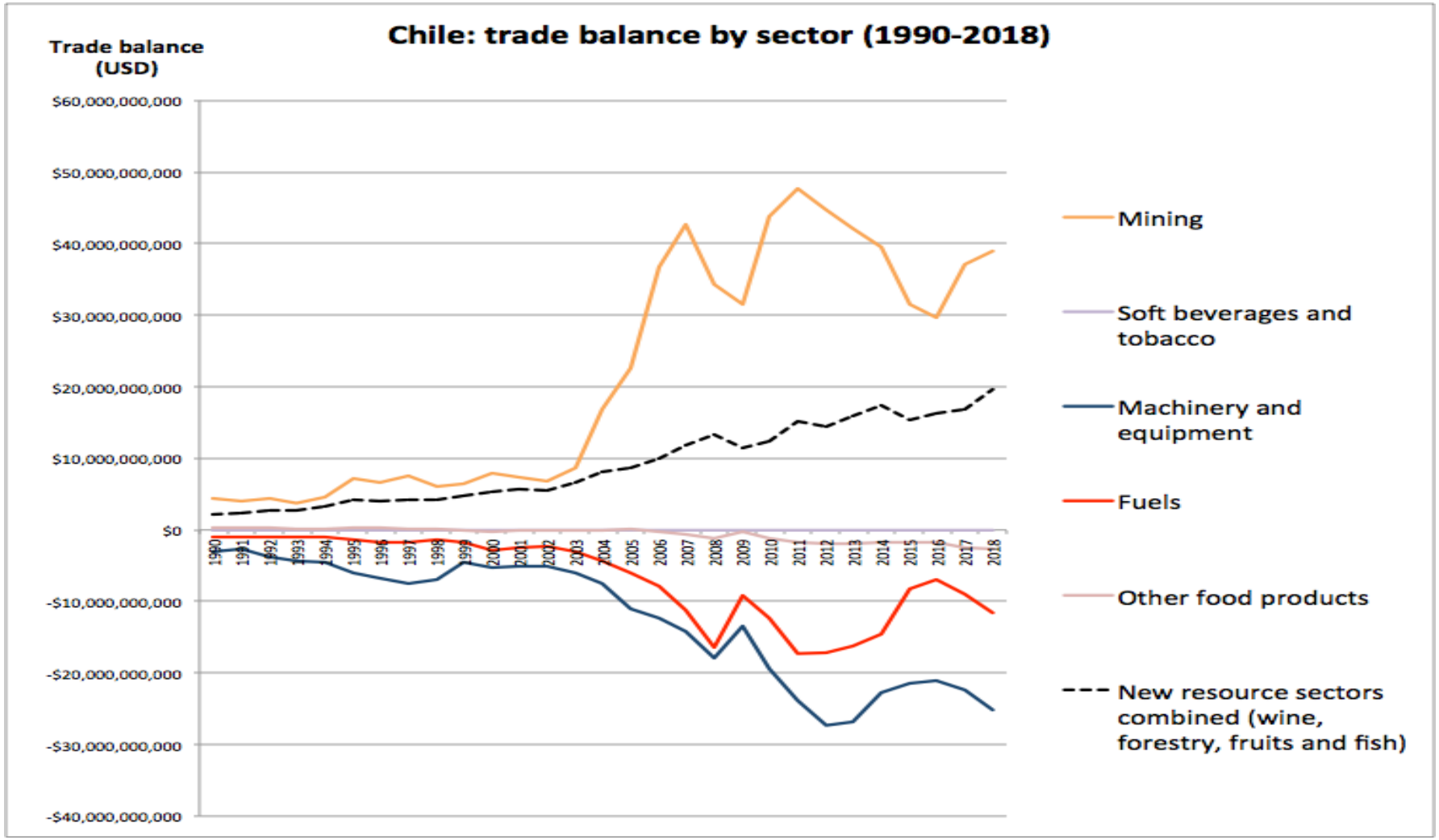
Export Performance of the Leading Sectors in Malaysia



Source: UN Comtrade

Contribution to earning dollars (trade surplus) in Chile

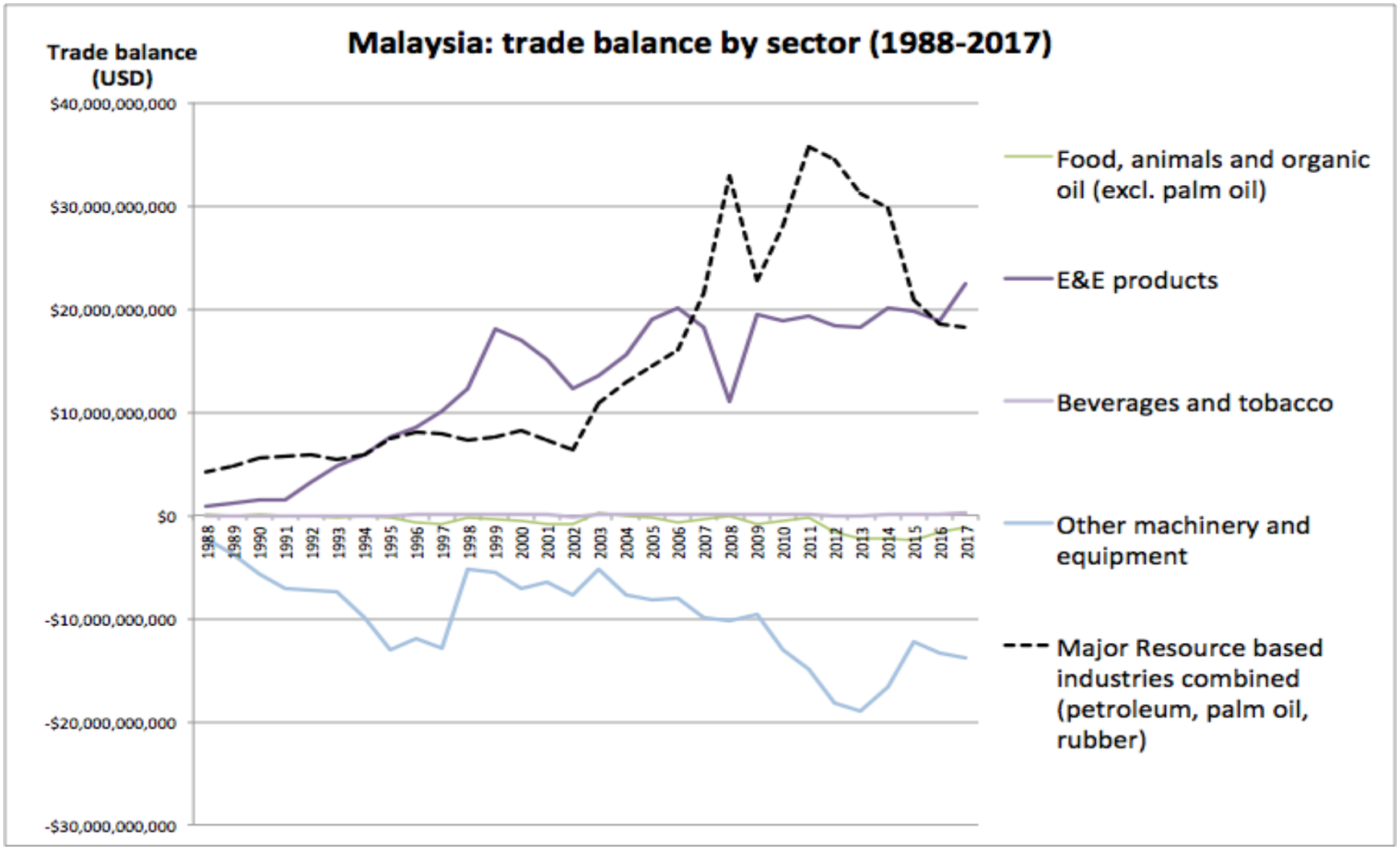
This figure shows that new resource sectors have had a steadily rising contribution to the country's trade balance, in contrast to the volatile contribution of the mining sector.



Source: UN Comtrade

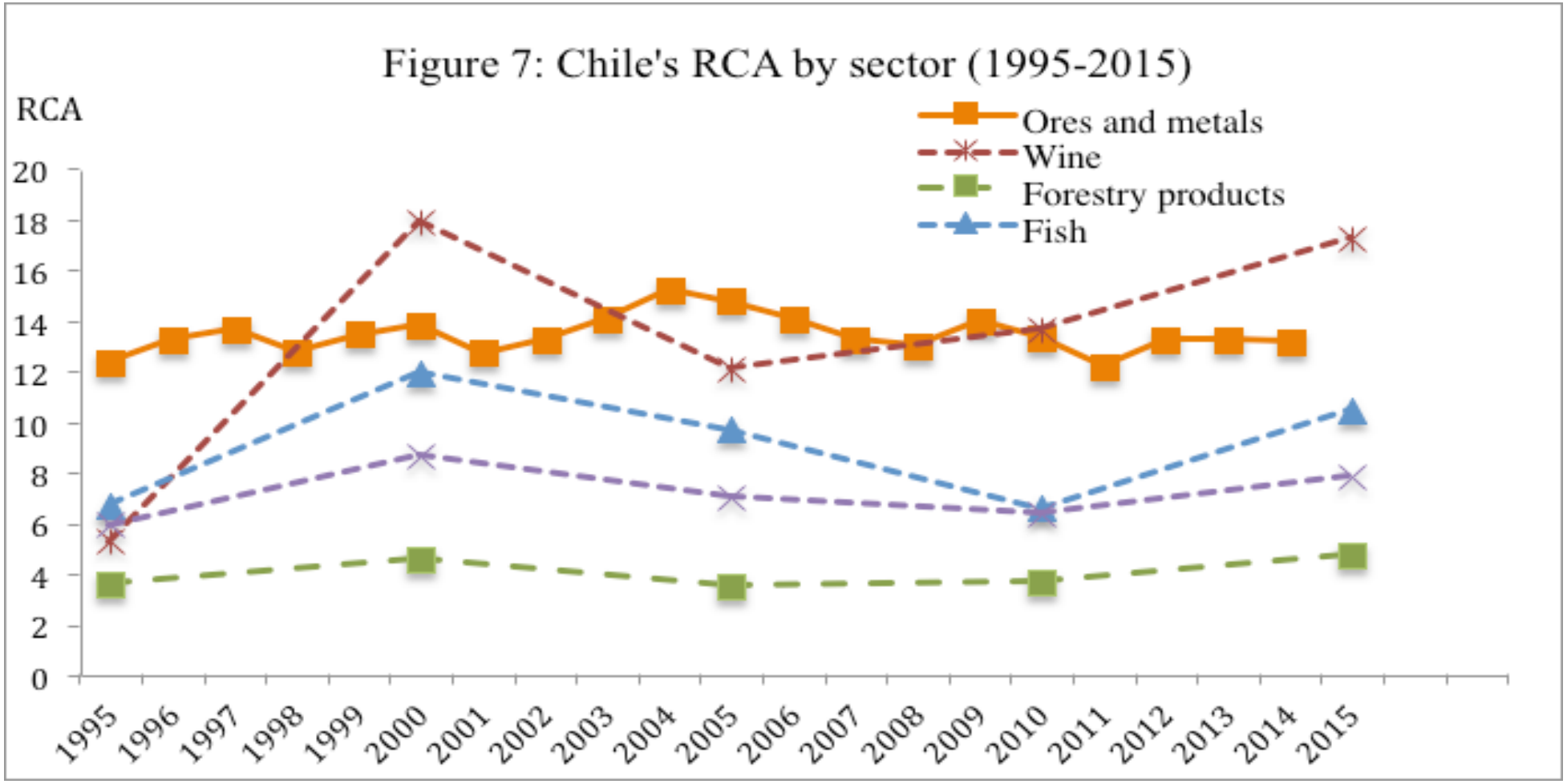
Contribution to earning dollars (trade surplus) in Malaysia

larger surpluses than E&E sector, especially since 2006.



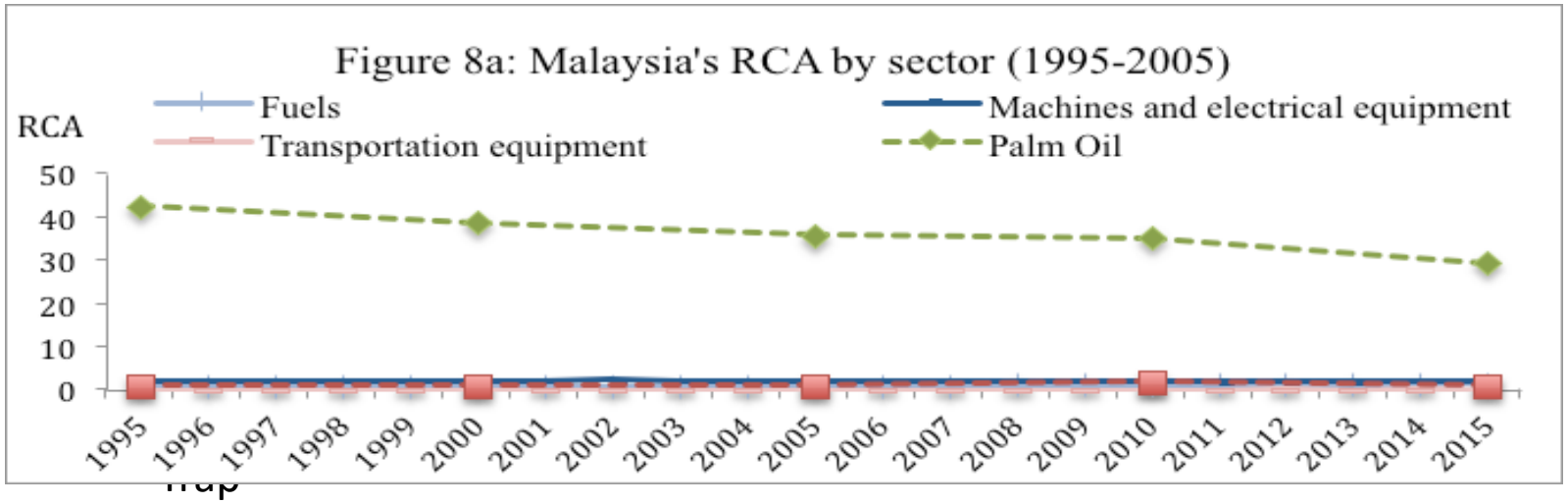
Source: UN Comtrade

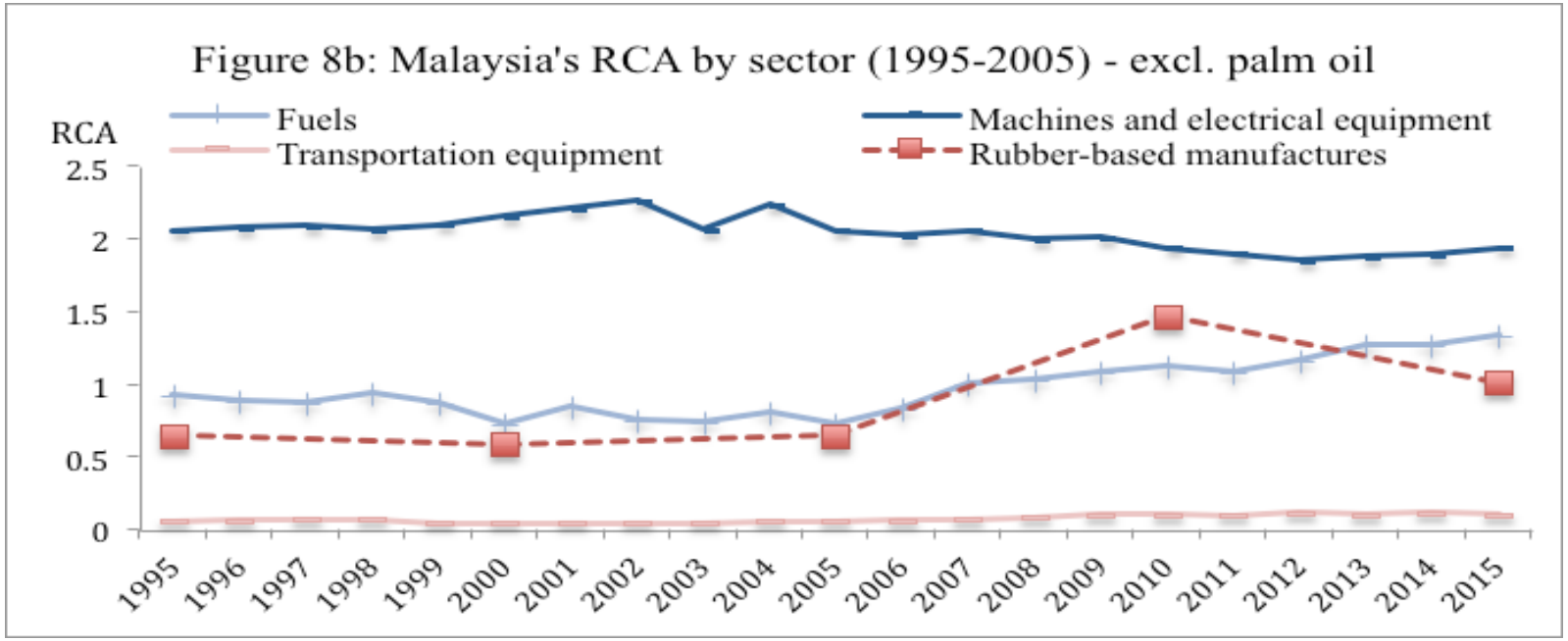
RCA by sector in Chile:
Rapid increase in Wines = faster& higher than mining



Source: UN Comtrade, WITS and the Observatory of Economic Complexity.

RCA by sector in Malaysia:
very high in pal oil; auto close to 0





Source: UN Comtrade, WITS and the Observatory of Economic Complexity.

Malaysian Story

Main features of Malaysia's transformation
from commodity dependent to a diversified industrialised economy:

Vertical integration in commodity sectors (palm oil, rubber, petroleum)

Local Ownership in these sectors

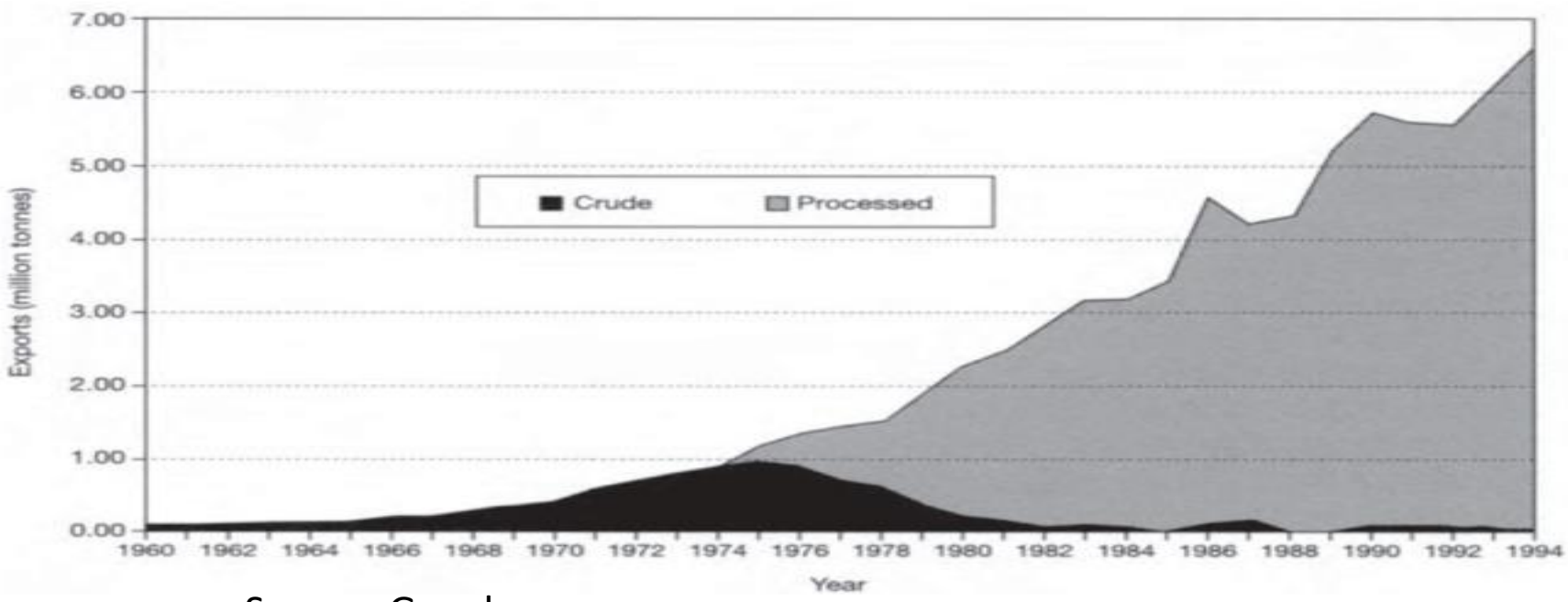
Key role of industrial policies
to accumulate capabilities and encourage horizontal diversification and vertical integration

Upgrading in Palm Oil in Malaysia: from crude to processed: cf) Indonesia's' crude oil exports

- The palm oil industry = second largest contributor to trade;
  fourth-largest contributor to gross national income.
- Export earnings : from USD15 million in 1960 to USD27 **bil.** in 2011.

- **share of processed exports in total palm oil product exports;**
- **from 0% in 1974 to 99% by 1994.**

Figure 5: Malaysia: exports of palm oil products, 1960–94



Source: Gopal

Industrial policy and local ownership to overcome latecomers' disadvantages in Palm Oils:

1) trade promotion

(to counter the European tariffs not on crude but on processed palm oil);

Export duties on crude palm oil

2) Nationalisation and takeover of foreign ownership:

Hostile takeover in the London stock exchange

of British owned plantations in Malaysia in 1981

3) R&D support and fiscal incentives for value addition

Palm oil Research Council; Oil Palm Genetics Laboatory (OPGL)

Tax incentives for the utilisation of oil palm biomass

Tax incentives for reinvestment in resource-Based industries

ownership by sector during periods of value addition: Malaysia

Sector	ownership	Comments
Petroleum	Local	The state-owned company remains the majority shareholder in petroleum extraction operations with production sharing agreements with MNCs
Palm oil & rubber	Local	Used to be foreign owned but underwent a de facto nationalization through a hostile takeover in the London Stock Exchange in the 1980s.
Electronics & electrical (E&E)	Foreign	E&E output is dominated by MNCs and the overwhelming majority of investments in the sector are still FDI (see MITI, 2017).

The Story of Chile

Main features of Chile's shift towards a relatively diversified commodity-based economy:

Horizontal Diversification
towards the salmon, wine, fruits and forestry sectors

Local Initiative after learning from foreigners

Key role of industrial policies
to accumulate capabilities and encourage horizontal diversification

Salmon farming in Chile:
2nd largest export of Chile; 2nd largest salmon exporter globally.

- Chile's The government crucial in several ways from the late 1960s onwards,
  - through bi-lateral cooperation; Japan–Chile Salmon Project
  -- pro-active intervention from semi-public agencies such as Fundación Chile,

1) Early efforts by an American firm (Domsea Farms) to develop Salmon in Chile.
2) In 1981, Fundación Chile acquired Domsea Farms,
   -- transferred technology from Norway to Chile
   -- experimented farming of various salmonid species.

3) Fundación Chile played a key role in the diffusion of knowledge, experience, and technology and even offered consulting services (for instance on how to obtain a mariculture license, how to produce wooden fish cages).

4) 'copied' by a number of nascent firms,
   which increased from 4 in 1980 to 219 companies in 1997.

cf) Mining: foreign dominance: weak domestic linkage, not export oriented

Ownership by sector during periods of value addition: Chile

Sector	ownership	Comments
Mining	Foreign	Although the sector was nationalized in the 1970s, foreign firms now produce two thirds of Chile's mining output.
Forestry	Local	Since the mid nineties, foreign investment in the sector continues to exist, but on a small scale, compared to the large domestic companies (Borregaard, 2008)
Salmon	foreign to local	FCh's efforts have been the most successful, Early efforts to develop salmon farming by a foreign firm
Wine	Local	In 2004, 15% of vineyards in Chile under foreign ; also 15% of the exports (Bustos et al. 2007).
Fruits	Local	foreign firms only about 23.6% of fresh fruits exports in 1984 and 30.5% in 1991 (Korzeniewicz et al. 1995).

Summary: Chile and Malasia

1) Possibility of escaping the middle-income trap through resource-based development;

2) Appear different from the short cycle technology based catch-up in East Asia (Lee 2013). ---- but consistent with Lee's (2013) : latecomers should identify low entry barriers sectors for export promotion ;

- these resource-sectors = low entry barrier sectors for Chile and Malaysia.

3) Not free-market but industrial policy has played a key role in building capabilities in the sectors.

- Chile: active promotion in Salmon cf) Copper timid intervention

4) Domestic ownership important:

-without local ownership, nothing can be accumulated (Amsden & Chu 2003)

cf) In Malaysia, E&E = MNC dominated

Auto = locally owned but not for export markets (hence no discipline).

Conclusions from the 3 Episodes

Episode 1: IT clusters in Taipei, Shenzhen, and Penang:
=> Local ownership matter!

Episode 2: Auto Sectors in China, Malaysia, & Thailand (Korea):
=> Local ownership should be combined with global market discipline (export-orientation matter)

Episode 3: Resource-based development in Chile and Malaysia:
⇒ 1) Marker forces alone cannot do the magic but industrial policy has a role;
⇒ 2) not necessarily manufacturing but resources sector can be the engine for catching up

Overall Conclusion: global-local interface very important.
But only when strategically managed, can led to creation of domestic value-added (&jobs), based on local ownership and knowledge

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Gracias! *ස්තූතියි !*

Obrigado!

Thank you! *Tak!*

amesege'nalo’

謝謝大家

감사합니다

Danke shon!

ありがとう

Key References

1) Kim, J. and Lee, K. (2022). Local–Global Interface as a Key Factor in the Catching Up of Regional Innovation Systems: Fast versus Slow Catching Up among Taipei, Shenzhen, and Penang in Asia. *Technological Forecasting and Social Change*. Accessible at https://doi.org/10.1016/j.techfore.2021.12127.

2) Lee, K., Qu, D. and Mao, Z. (2021b). Global Value Chains, Industrial Policy, and Industrial Upgrading: Automotive Sectors in Malaysia, Thailand, and China in Comparison with Korea, *European Journal of Development Research*, 33: 275-303.

3) Lebdioui, A., Lee, K. and Pietrobelli, C. (2020). Local-foreign technology interface, resource-based development, and industrial policy: how Chile and Malaysia are escaping the middle-income trap, *Journal of Technology Transfer*, 46: 660–685.