

Smart Specialization
and
industrial policy
to avoid both target and design failures

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A Chapter by
Keun Lee & Franco Malerba
“Economic Catch-up as Evolutionary Process”

Definition) Catch-up = narrowing of a firm's or country's gap
vis-à-vis a leading country or firm.

=> Catch-up = not only learning and building capabilities
but also finding niches/entry points and sectoral specialization
because we are 'late entrants'
in the given international division of labor.

Two Related Issues

- 1) how to build up capabilities, 2) in which sector first (targeting);
capabilities are sector-specific;
sectors differ in learning and survival possibilities

=> Industrial Policy (IP) Issues

3 Failures as Justification for Industrial Policy

	Market failure (appropriation f)	System failure (coordination failure)	Capability failure
Focus	Market institutions	Interaction among actors	Actors (firms)
Source	Knowledge as public good	Cognition failure from tacitness of knowledge	historically given; No learning opportunity
Example problem	Sub-optimal R&D	R&D impact: low	No R&D
Solutions	R&D subsidies	Reducing cognitive distance	Access to knowledge and help in learning
School Analogy	Tuition support	Making more friends	Targeting student learning
Relevance	Developing and advanced countries	Developing and advanced countries	More unique to developing countries

From Keun Lee, a chapter in Stiglitz & Lin eds, 2013

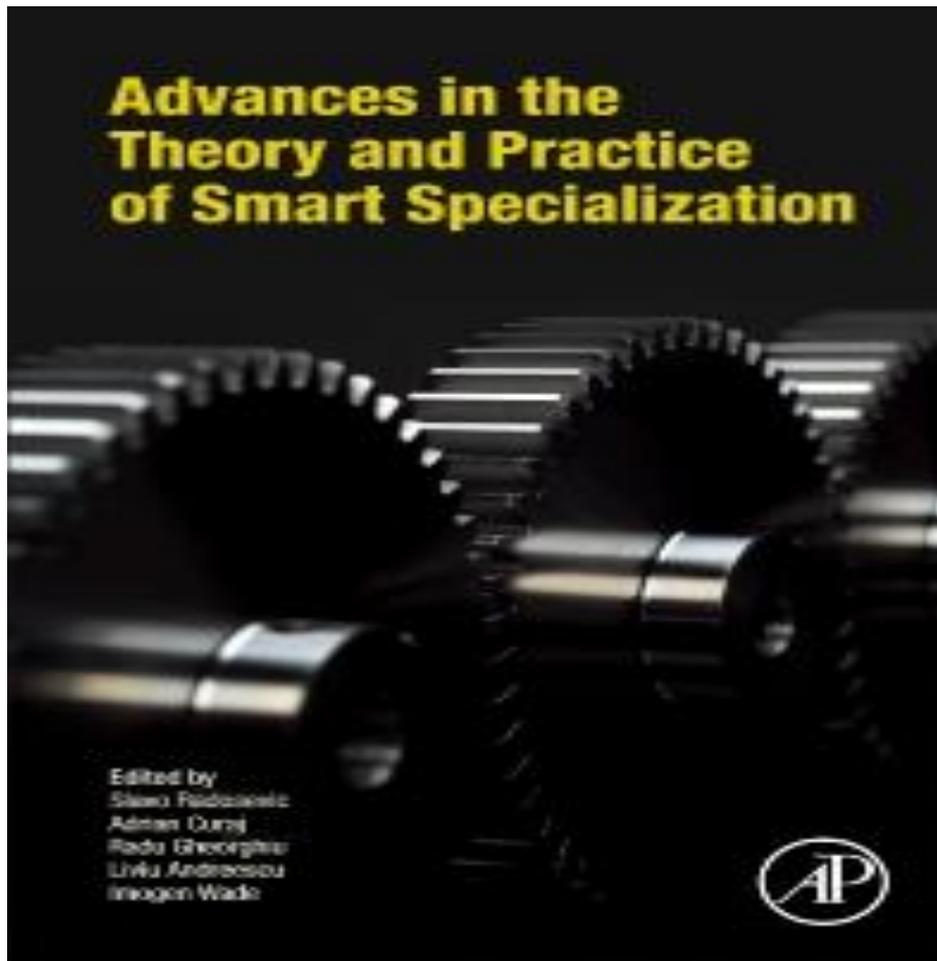
Where to
build it first

How to do it
better

Targeting vs. designing
in Industrial Policy

Where and how to specialize?

**A Talk relying on
Keun Lee's chapter in Slavo Radosevic, et al 2017,
on Smart Specialization**



Smart specialization (Foray 2015)

- A Policy concept to reconcile two logics
 - **Vertical** (not horizontal) prioritization
 - **Bottom-up** Dynamism and entrepreneurshipNeither sectors nor individual but *new* activities
Still, sector-non-neutral.
- Entrepreneurial discovery & *new* activities
 - Policy design matters
 - Discovery process = discovering which innovative activities a region should specialize,
 - based on interactions bet. gov't & private sector.

So, the Question is:

both **targeting and designing?**

With high uncertainty in supply (or high resource-constrained) and often weak entrepreneurial capabilities, we (esp. MICs) may need both.

**Is targeting really difficult?
esp when you are below frontier
or gov't driven discovery?**

Example Situation 1: a coordinated discovery?

1) Korea in the early 1990s,
faced the Three choices:

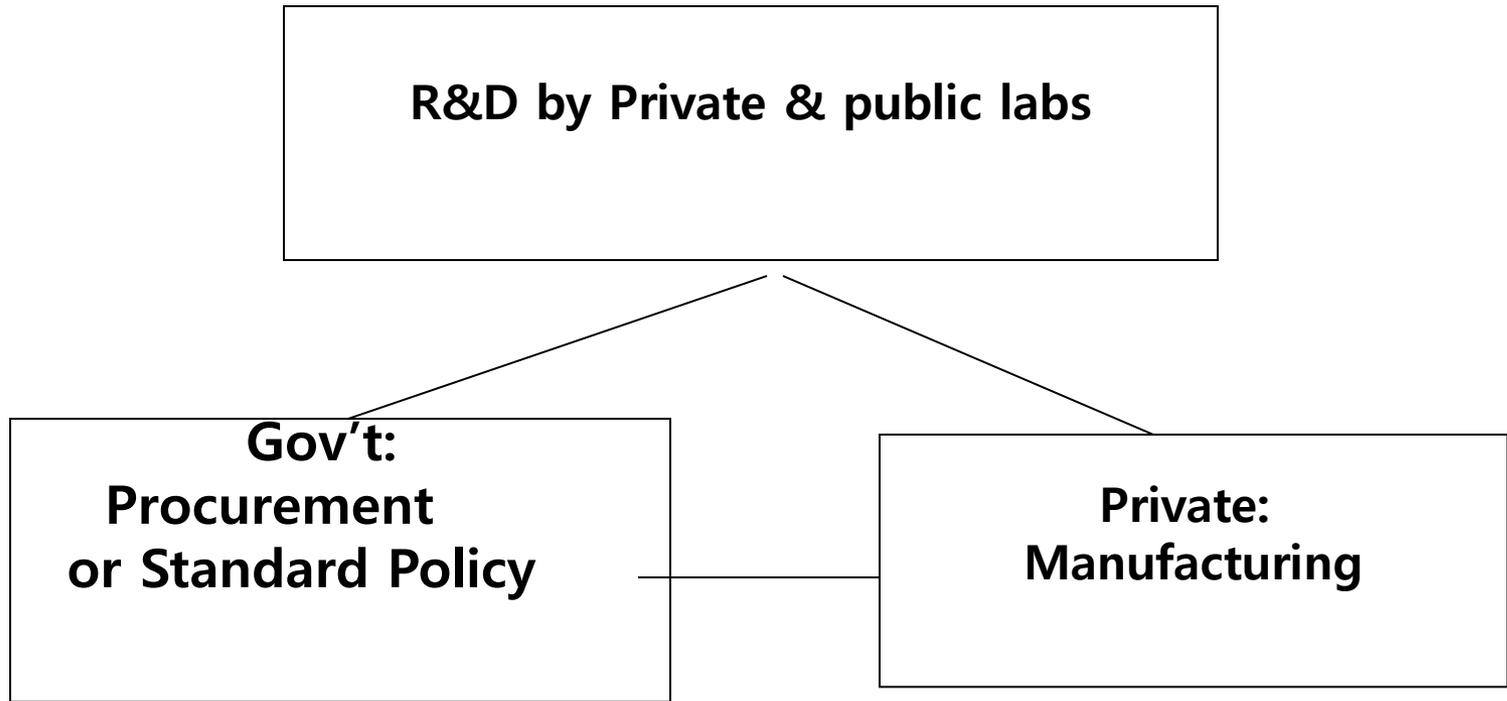
- a) keep making old analogue TV
- b) Follow Japan again to learn Analogue HD TV
- c) Leapfrog into Digital TV

=> Not necessarily market size uncertainty but
more uncertainty with technological (supply-side)
choices leading to different market competition

=> Not a matter of sectoral choice but how to
manage the risk with leapfrogging by designing well

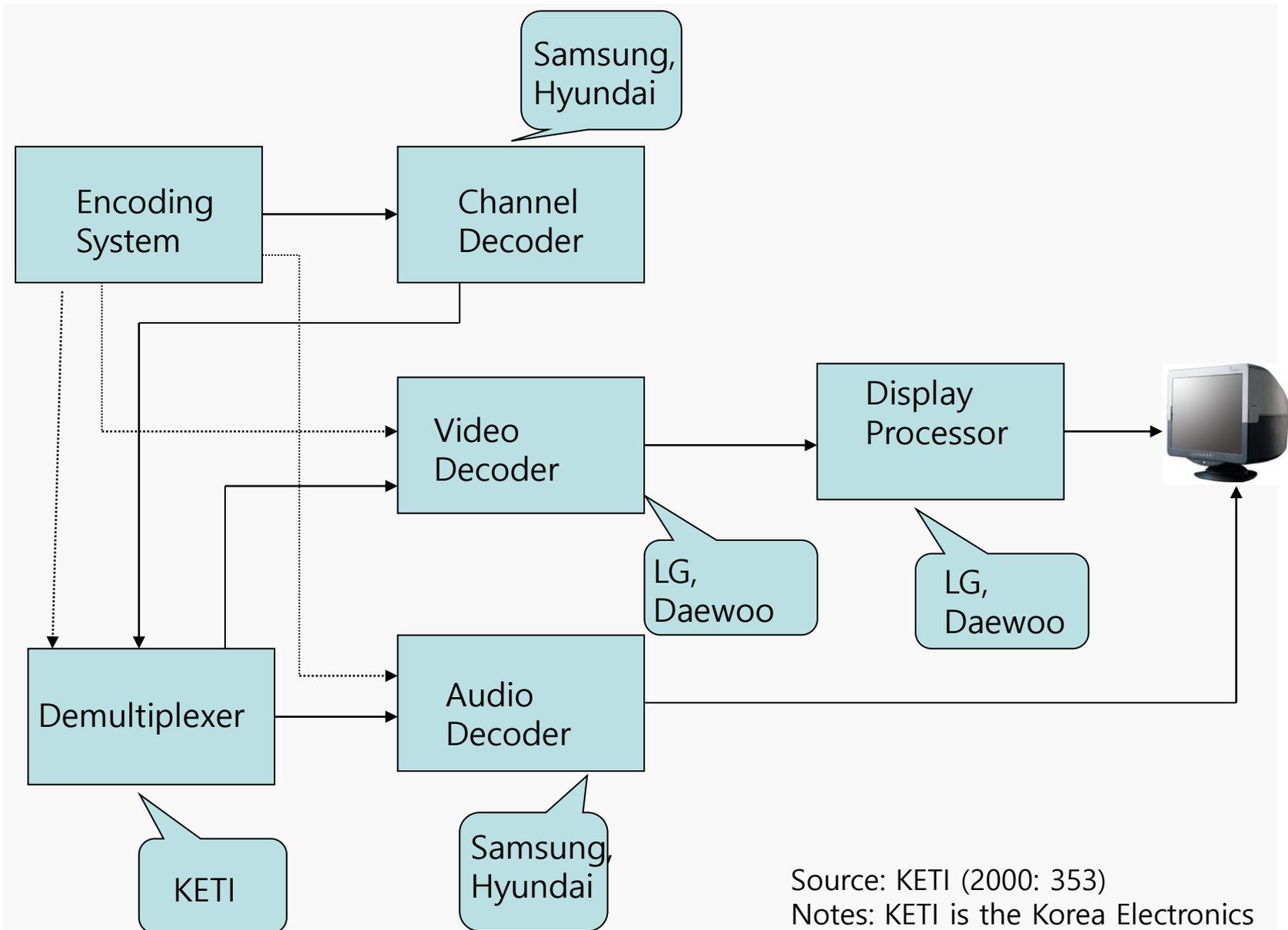
“Designing” Public-Private Joint R&D (not just subsidies but learning)

eg) Korean **Leapfrogging** : Digital TV, mobile phones (CDMA) ;
China: 3G TD-SCDMA, Photovoltaic; electric vehicles



**Policy tools: Standards policy matter,
eg), Gov't imposed exclusive
standards of CDMA standards in wireless.**

Figure 1 Digital TV System and the firms assigned to develop various ASIC chips (Lee et al 2005, RP)



Source: KETI (2000: 353)
Notes: KETI is the Korea Electronics
Technology Institute

Example Situation 2

Korea in the mid 1990s, on phones
faced the 4 choices:

- a) keep making old fixed line telephone
- b) Follow US/Motorola to make analogue cell phones
- c) Skip analogues but to follow Nokia to make digital (GSM) cell phones
- d) Leapfrog into CDMA (Qualcomm) cell phones

=> market is there

(choice by firms not by gov't; still uncertainty in tech choice)

=> Not a matter of sectoral choice but how to manage the risk with leapfrogging by designing well

Electric Car Project in South Africa: Swart (2015)

Not a target failure but design failure

- 1) South Africa developed their own electric cars called 'Joule'.
 - the South African government provided the initial funding and initiated the whole process of establishing in 2005 of a SOE called Optimal Energy.
 - Had an initial success by December 2010;
- 2) Given no firm for volume production, gov't stopped further funding for large scale production; closed in 2012/06,

3) Why failure: lack of involvement of private companies who would take the role in volume production and sales.

- Existing foreign MNCs and local auto companies did not want this new 'disruptive innovation,' SOE to grow as another rival.

4) Lesson: Should have formed a private-public consortium with the plan of volume production by the private actors.

=> A case of 'design failure,' not a 'targeting failure.

Targeting still matter for latecomer/MICs facing resource shortage & entry barriers

Hausmann and Rodrik (2006) :

" The idea that the government can disengage from specific policies and just focus on general framework conditions in a sector neutral way is an illusion "

Then, consider

**Smart Specialization
with cycle time Technologies
as a selection criterion**

Other Criteria of Specialization

1) Diversification by product space (Hausman; Hidalgo)

- but, which direction first among many low-hanging fruits (distance)? ;
- hard to make a Long jump (from periphery to core)
- also, tautology: you specialize what HICs do

2) high opportunity /high-V-added sectors

- but: how about competition/entry barriers

3) New Struct. Economics (Lin): Latent comp. advantage target mature (left-over) sectors of country above you'

- Makes sense; b/c to find a niche (lower entry barrier);
- but might need something more as get close to Frontier (leapfrogging)

4) Lee (2013) : short cycle time: more theoretical criteria & also more for upper middle C's

=> **Viable Criterion:** "entry/survival possibility with growth prospects"

**Criterion = (short) cycle time of technologies:
(Lee 2013 book)**

Cycle time = speed of change in the knowledge base of a technology
= mean citation lag (= how old patents you still cite)

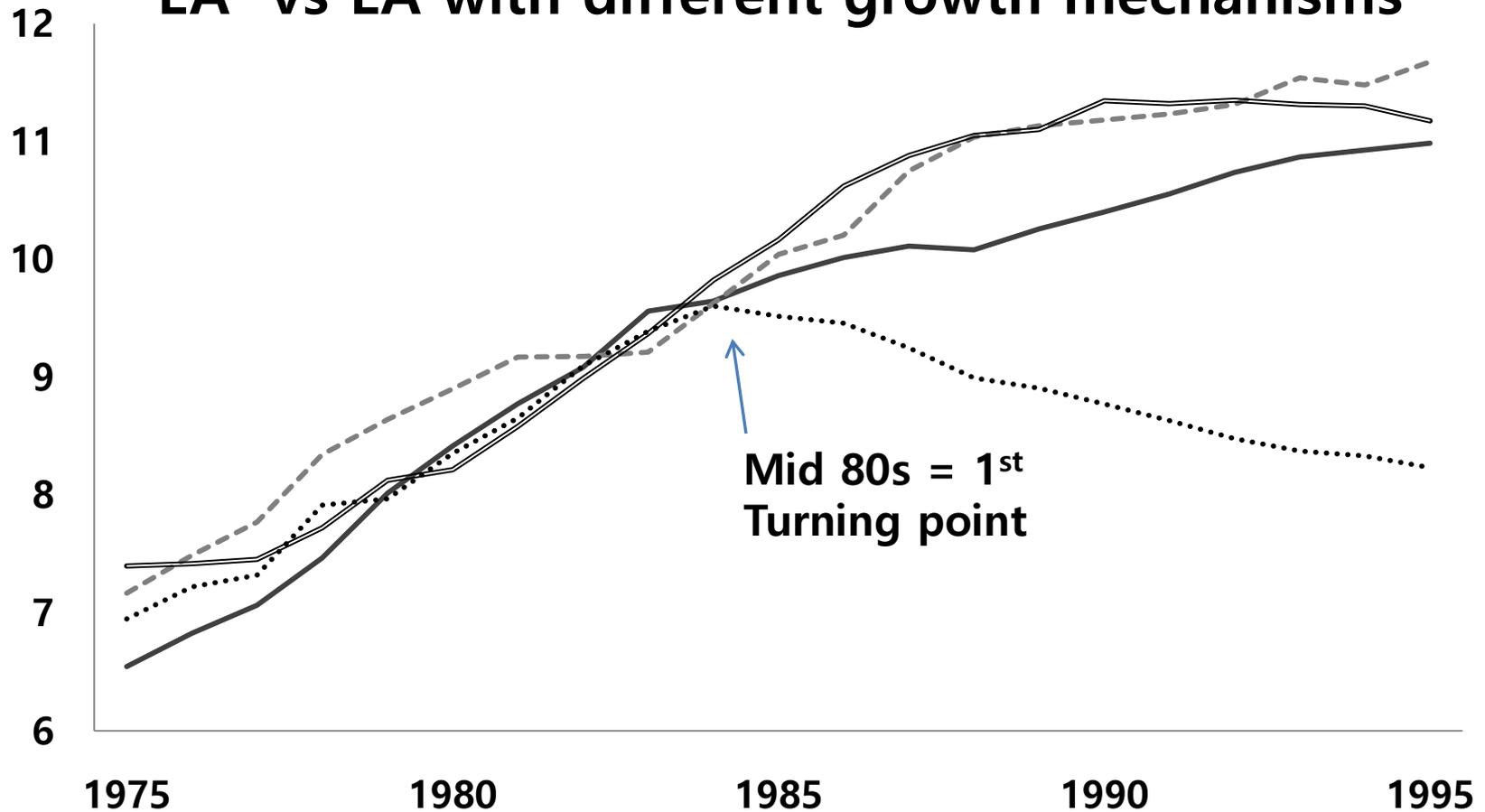
“To catch up, specialize in short cycle technology-based sectors“
because old knowledge quickly obsolete/useless
+ new knowledge tend to emerge more often
-> less disadvantageous for the latecomers (lower entry barrier)

=> technologies with greater growth opportunity
from frequent emergence of new technologies

→ You got to be different from the North, than trying to be similar from the beginning (opposite to Hausmann)

Short Cycle Technologies as a detour:

EA vs LA with different growth mechanisms



— High Income countries

--- Middle Income countries

..... Korea and Taiwan

— Brazil and Argentina

Top 10 Classes of European G5 vs Korea-Taiwan ->no overlap

G5	Class	Class Name	Patent count
1	514	Drug, Bio-Affecting and Body Treating Compositions	10349
2	428	Stock Material or Miscellaneous Articles	3883
3	73	Measuring and Testing	3789
4	123	Internal-Combustion Engines	3479
5	424	Drug, Bio-Affecting and Body Treating Compositions	3389
6	210	Liquid Purification or Separation	2853
7	435	Chemistry: Molecular Biology and Microbiology	2852
8	250	Radiant Energy	2639
9	264	Plastic & Nonmetallic Article Shaping or Treating	2349
10	324	Electricity: Measuring and Testing	2325

Korea-Taiwan	Class	Class Name	Patent count
1	438	Semiconductor Device Manufacturing: Process	1189
2	348	Television	712
3	439	Electrical Connectors	408
4	257	Active Solid-State Devices (Transistors, Solid-State Diodes)	374
5	362	Illumination	374
6	280	Land Vehicles	355
7	365	Static Information Storage and Retrieval	346
8	70	Locks	340
9	360	Dynamic Magnetic Information Storage or Retrieval	313
10	482	Exercise Devices	311

Understanding the idea of (short) Cycle Time of Technologies

- 1) It is not about sectors but more about technologies,
cf) similar to activities in SS

So, If you keep entering new short cycle tech. based business and then will end up diversified

so it is not about fixed list of sectors
but rather abstract/theoretical concept

- 2) Also, not just manufacturing, but include services
eg) IT services in India, Uruguay, Philippines

- 3) Practically, consistent with the idea of asking always
"what is next", seeking new industries/businesses
but opposite to the idea of keeping doing the usual businesses

Understanding 2: (short) Cycle Technologies

- 1) What matters fundamentally is not short or long cycle but low or high entry barriers
(eg) feasibility to enter to make money in niches):
 - Most of other criteria (except Lin's) missed this point, which is so critical for late-comers /entrants.

- 2) So, consistent with the idea of 'Window of opportunity' which enable 'leapfrogging' into new/emerging technologies/businesses;
 - = not only gradual entries/shortening but also radical jump (cf; long jump in Hidalgo et al. 2007);

 - Window of Opportunity = moment when entry barriers get low or entry ports are opened up;
 - can be both intra-sector and inter-sector entries.

Implementing SS with Short cycle tech.

how to choose 'activities'
out of sectors (long or short cycle)

- 1) Organize a **private-public joint taskforce**, and to conduct a survey to, and consultation with, private firms,
 - asking the types of business items or technological areas they see near-future potentials,
 - and what are the opportunities, risks, and bottlenecks in entering.

2a) to **identify those activities where private sectors see market potentials but facing some technological, financial and other environmental (regulations) uncertainties.**

2b) Usually could be the sectors or business items which corresponds to shorter (or longer) cycle technologies than the current businesses,

3) Then, policy intervention to promote these identified areas by mobilizing public and private resources, correcting market and coordination failures.

An example of Ent. Discovery in Korea?

Bottleneck technology Development for SMEs Industrial Base Technology Development Projects (IBTDPs, 1987-91)

- the shift
 - from the sector-sector
 - to functional promotion type industrial policy
- to develop the so-called bottleneck technologies common to the SMEs,
- preferably in the form of the tripartite joint R&D by the private-academic-public labs.
- To identify by surveys to firms.

Outcomes of the Survey to identify the 'needed' industrial technologies

		1986	'87	'88	'89	'90	'91
Number of technological areas		219	185	225	102	200	200
The number of experts involved the surveys		818	981	852	492	1,205	1,416
number of the participating firms		585	733	724	535	1,107	5,994
A Total number of technologies identified for projects	No of technologies identified to be developed	581	562	564	417	638	947
	No of technologies needing further guidance & assistance	118	168	117	56	105	217
	No of technologies to be imported	837	202	202	46	75	165
	total	1536	932	883	519	818	1,329

Small vs. Long Jump (leapfrogging): Near spaces vs. far spaces

- **With low levels of capa.**
 - **“small jump”** within existing sector or related fields.
 - intra-sector diversification
- **With higher capabilities, try Long jump/leapfrogging,**
esp with new windows of opportunities.
 - > inter-sector diversification (eg. Nokia)

Eg) Taiwanese firms: a long jump

from small calculators into notebooks in the 1980s;
with R&D done by ITRI (a public lab)

In sum, **Industrial Policy** is

1) Not picking winner but

a) picking winning markets and coordinating entries into that markets

b) but picking good students and matching them with good teachers

2) Should avoid both target and design failures; and balancing supply and demand side interventions

3) Not a zero but a positive sum game for global public goods

(like better environment-saving tech, with global market failure)

Thank you!

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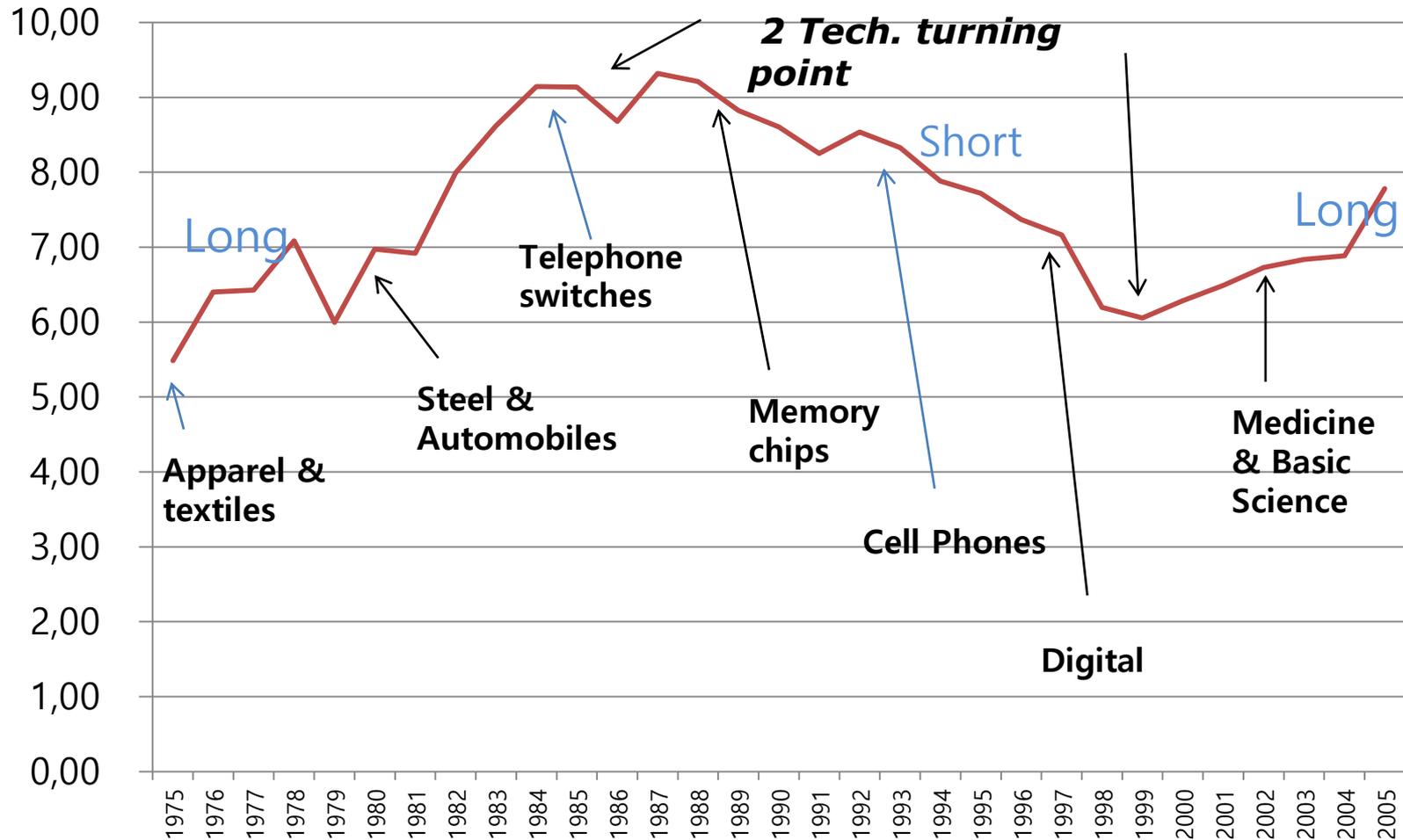
From Short cycle to Long cycle Technologies:

The 2nd Transformation of Industrial Structure

**at the Post-Catch-up Stage in Korea
eg) BioSimilar by Samsung**

**(b/c short cycle tech is easy to catch up
but also easy to be caught up (by China);
long cycle tech => still higher profit margine)**

Two Tech. Turning Points and the Korean Detour (path-creation)



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