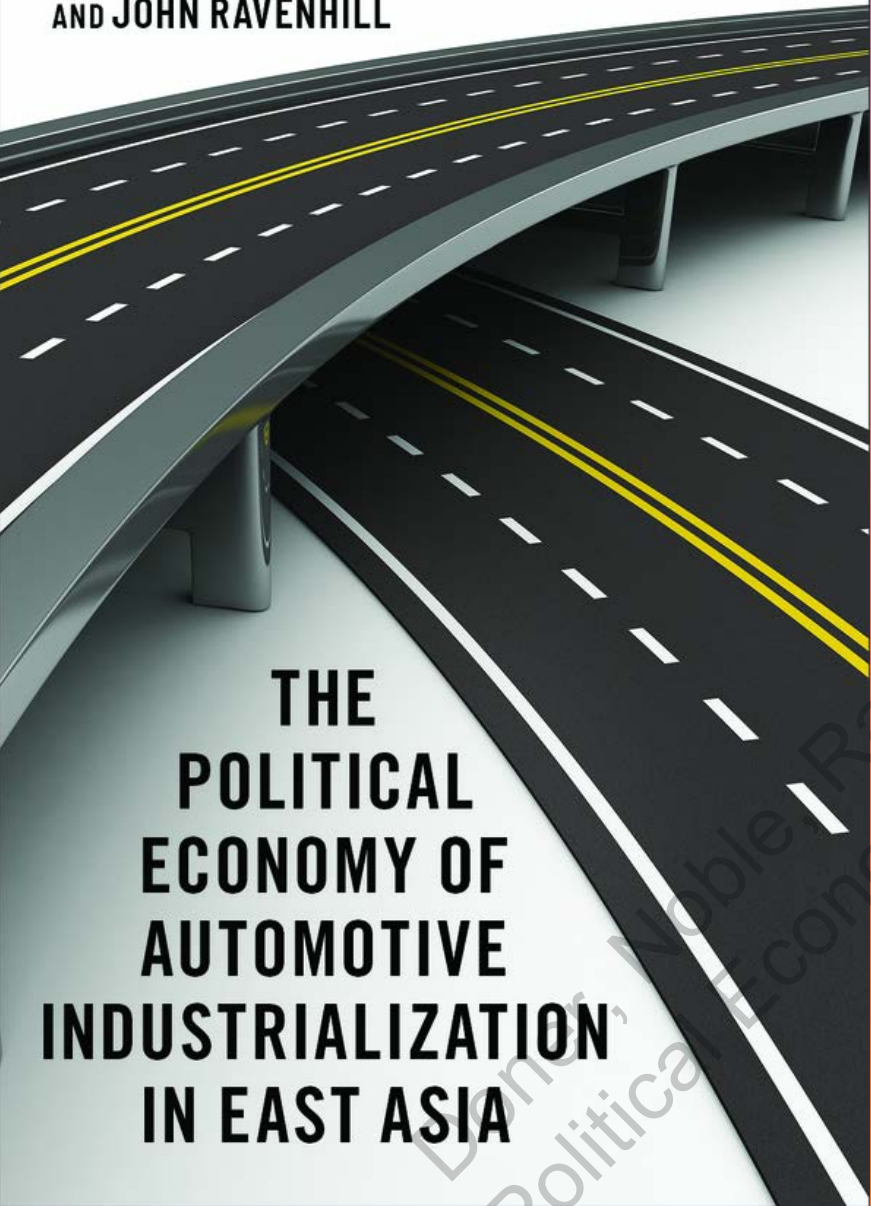


**RICHARD F. DONER, GREGORY W. NOBLE,
AND JOHN RAVENHILL**



**THE
POLITICAL
ECONOMY OF
AUTOMOTIVE
INDUSTRIALIZATION
IN EAST ASIA**

- Oxford University Press, 2021

Structure of the Presentation

Our Question & Our Cases

Distinguishing Extensive and Intensive Growth

How have our countries performed?

Why the variance in strategy and performance?

Examining the requirements for success in greater detail

Thailand: A Successful Extensive Approach

A Brief Comparison with Malaysia: A Failed Intensive Approach

Relevance of our study for other countries & the future



Our Question

What makes for variation in strategies and outcomes in the automotive industry?

Why have some countries pursued (and succeeded at) "extensive" growth whereas others have pursued (and succeeded at) "intensive" growth?

Our focus is both on strategies and institutions, and on *why* governments have chosen different approaches

Our Cases

China

Indonesia

Korea (Republic of)

Malaysia

The Philippines

Taiwan

Thailand

Donec
Political
Noble, Ravenhill
Economy of Automotive Industrialization

Common Starting Points: Different Destinations

	China	Indonesia	Korea	Malaysia	Philippines	Taiwan	Thailand
Initial Economic Conditions	Medium	Weak	Weak	Medium	Medium	Medium	Weak
National Champion Strategy	Abandoned mid-1980s	Abandoned 1997	Consistent	Largely abandoned 2017	No—ASEAN BBC	Abandoned mid-1980s	Abandoned early 1990s; shift to “product” champions

Doner, Noble, Ravenhill
Political Economy of Automotive Industrialization

Extensive vs Intensive Growth

Extensive growth is principally characterized by simple economic diversification, i.e., changes in a country's economic structure through shifts in the allocation of labor and other resources out of the primary sector and into industry. But productivity gains from sectoral shifts typically do not on their own lead to increases in local value added based on inputs from national producers and on national technical capabilities.

**“Add successively as many mail coaches as you please, you will never get a railway thereby”
(Joseph Schumpeter 1983: 62).**

Intensive Growth

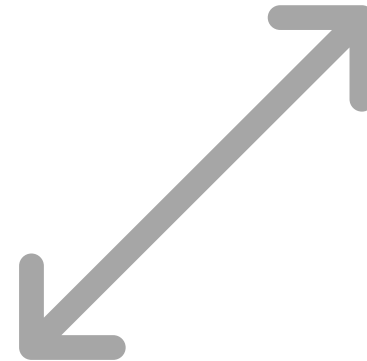
intensive growth is innovation-driven. It involves learning – identifying, absorbing and adapting -- technologies and practices new to firms, especially domestic firms.

Such learning is difficult, involving its own coordination challenges both within the firm and to counter market failures inherent in technology markets

Successful pursuit of either strategy brings economic gains:



Extensive: employment, domestic output, exports



Intensive: The above plus **upgrading** of domestic technological capabilities; substantial increase in domestic value-added

Doner, Koble, Ravenhill
Political Economy of Automotive Industrialization

Extensive
Growth
Indicators

	China	Indonesia	South Korea	Malaysia	Philippines	Thailand	Taiwan
Vehicle Production (Total Units)	29,015,434	1,216,615	4,114,913	460,140	116,868	1,988,823	291,563
Vehicle Export (Units)	463,288	177,210	2,481,460	13,596	33,757	4,569,140	161,937
Vehicle Import (Units)	1,062,506	66,364	404,602	196,345	3,926,781	46,229	167,491
Auto Trade Balance (Value in USDm)	-39,581	1,372	28,180	-1,621	-3,928	10,679	-3,568
Parts Export (Value in USDm)	41,240	3,198	21,449	1,486	2,949	6,675	6,896
Parts Import (Value in USDm)	32,641	3,085	7,867	3,190	663,664	7,841	3,119
Auto Parts Trade Balance (Value in USDm)	8,600	113	13,582	-1,704	2,286	-1,166	3,778
Percentage Share of Auto Products in Export Trade	2.18	3.99	11.9	0.9	5.29	8.56	3.02
Auto employment as percentage of manufacturing industry	4.31	1.99	10.98	4.18	6.47	6.1	1.21
Value added as percentage of manufacturing industry	5.17	8.86	11.06	3.86	3.89	13.61	2.66

Intensive Growth Indicators

	China	Indonesia	Korea	Malaysia	Philippines	Thailand	Taiwan
Auto R&D/sales	1.82%	NA (Negligible)	2.17%	2% (assemblers) 0.14% (suppliers)	NA (Negligible)	0.3% (suppliers)	1.09%
Corporate R&D institutes	Yes	Minimal	Yes	Yes	No	Minimal	Yes
Ability to design and export new parts	Medium	Low	High	Low	Low	Low	High
Ability to design and engineer whole vehicles	Yes	No	Yes	Yes	No	No	Yes
Global center of excellence (independent or for an MNC)	Yes, for some "infotainment" parts	No	Yes	No	No	No	Yes, for a very few electronics parts (Ford)
Extensive use of domestic capital equipment	Yes	No	Yes	No	No	No	Yes
Major effort to develop EV/HV	Yes	No	Yes	Yes	No	No	Yes
Locally-owned brands	Yes	No	Yes	Yes (Proton)	No	No	Yes (Yulon)
Overseas assembly	Yes	No	Yes	Yes (barely)	No	No	Yes
Outward FDI for parts	Yes	No	Yes	No	No	Yes (a bit)	Yes
Overseas R&D posts	Yes	No	Yes	Yes	No	No	Yes

Our Cases:

PERFORMANCE	STRATEGY	
	<i>Extensive</i>	<i>Intensive</i>
Strong	Thailand	S. Korea, Taiwan, China
Weak	Indonesia (but gradual improvement) The Philippines	Malaysia

Essence of our argument

Extensive and Intensive approaches require different combinations of policies that in turn rest on different domestic institutions

The key to a successful intensive strategy is the fostering of relevant domestic institutions specific to the development of the automotive sector

Our argument would be falsified if there were an instance of successful intensive growth without strong domestic institutions specific to the auto sector

Politics: Institutions are a response to political pressures/ opportunities faced by political leaders

Framework and Arguments (Chapter 3 of book)

- *Overall contribution:*
 - Goes beyond descriptions and generic policies.
 - Links variation in automotive developmental outcomes to institutions, and politics
- *Development outcomes:* more differentiated than growth/no growth; extensive/intensive
- *Tasks:* Different industry goals (extensive vs. intensive) involve different policy tasks which vary in difficulty
- *Institutions:* Different policy tasks require different kinds and strengths of institutions
- *Politics of institutional origins:* Institutions are function of political pressures / opportunities faced by political leaders. Need to provide a *demand-side* explanation.

Our Value Added: Contending or Alternative Explanations

Neoclassical and related

- National market size (Indonesia vs. China)
- National economic growth → sectoral growth
- Washington Consensus (“Sound Money / Free Markets”)

Institutional accounts

- Bureaucratic capacity / “good governance”
- Bureaucratic capacity / education-STEM
- Nat’l innovation systems
- Global Value Chains
- Developmental states – closest to our account, but...
 - Development/lacks specificity, neglects sectoral variations
 - “Thin politics”: What are the political underpinnings of good institutions (see Haggard 2018)

Different Policy Requirements for Different Development Strategies

Policy Types	Extensive	Intensive
Macroeconomic stability	x	x
Trade		
Liberalization / foreign market promotion	x	x
Reconcile up- and downstream		x
Finance		
Sector-specific	x	x
Capacity-specific		x
Property rights		
General	x	x
IP		x
Education		
Basic	x	x
Technical		x
FDI promotion		
General – for jobs and forex	x	x
Technology/managerial spillover to domestic firms		x
Infrastructure		
Physical	x	x
“Quality” (e.g. MSTQ, testing-research)		x

Automotive Development Policies Vary in Difficulty

Extensive growth

- Emphasizes capital mobilization and allocation into new activities
- Little emphasis on firm learning
- Clear risks of moving into “wrong” sectors

Intensive growth involves technology absorption by firms

- Market imperfections
 - Imperfect information about most appropriate technology and best sources
 - Imperfect information about technology sources
 - Imperfectly developed capital markets
 - Imperfect information about returns to trial-error tinkering
- Market failures
 - Lack of complementary assets (coordination)
 - Labor market externalities (poaching)
 - Long development time / gestation period of R&D / D&D

Complexities of Technology Absorption

Table 3.1 Illustrative Matrix of Technological Capabilities

	Pre-Investment	Project Execution	Process Engineering	Product Engineering	Industrial Engineering	Linkages
<i>Simple Routine (experience based)</i>	Feasibility studies, site selection	Civil construction, ancillary services	Debugging, quality control, preventive maintenance,	Assimilation of product design, minor adaptation to market needs	Work flow scheduling, time-motion studies, inventory control	Local procurement of goods and services, info exchange with and monitoring of suppliers
<i>Adaptive, Duplicative (search based)</i>	Search for technology source, contract negotiation	Equipment procurement, detailed engineering, training and recruitment of skilled personnel	Equipment stretching, process adaptation and cost saving, licensing new technology	Product quality improvement, licensing and assimilating new imported product technology	Monitoring productivity, improved coordination	Technology transfer of local suppliers, coordinated design, S&T links
<i>Innovative, Risky (research based)</i>		Basic process design, equipment design/supply	In-house process innovation, basic research	In-house product innovation, basic research		Turnkey capability, cooperative R&D, licensing own technology to others

Source: Adapted from Lall (1992: 167).

Dimensions of Policy Difficulty: Implementation

Policy	Dimensions of Difficulty				
	Information (technical, site-specific)	Length of implementation chain - #s of actors required	Distribution – winners / losers	Visibility (bricks and mortar?)	Intertemporality (time to completion)
FDI promotion only for jobs / forex (extensive growth)	Low	Low: few actors beyond investment boards officials	Medium: who gets incentives – mainly MNCs	Low: # factories, jobs, \$\$	Low -medium: faster than tech absorption
FDI promotion for tech promotion / local spillovers (intensive growth)	High: what kind of tech appropriate for local conditions	High: Investment board officials + extension agents, business assoc's etc.	Medium: Local firms benefit;	Medium-high: results emerge only in local production	High – at least initially
Standards / testing / MSTQ (intensive)	High	High	Medium	Medium-high	High

Going Beyond “Institutions Matter:” What Kind and for What?

Extensive

- Efficient financial institutions (banks, MoF)
- Boards of Investment with rudimentary knowledge

Intensive

- Sectoral / automotive institutes
- Institutions combining finance and technology acquisition / deepening (MITI)
- Testing, research and standards bodies
- University-industry linkages
- Investment boards with expertise and links to organized private sectors

Crucial Functions

- Consultation
- Credibility of enforcement: rewards / sanctions
- Monitoring

Table 3.9 Capacity of Sectoral Institutions

Institutions	Korea	Taiwan	China	Malaysia	Thailand	Indonesia	Philippines
Investment boards	High	High	High	Medium	Medium	Low	Low
Automotive institutes	High	High	High	Low	Low	Low	Low
Business associations	Medium	High	Medium	Low	Low	Low	Low
Public testing-research institutes	High	High	Medium	Low	Low	Low	Low
Standards agencies	High	High	High	Low	Low	Low	Low
Tech-Vocat education and training	High	High	Medium	Low	Low	Low	Low
University-industry linkages	High	Medium	High	Low	Low	Low	Low
Resistance to clientelism	High	High	Medium	Low	Low	Low?	Low

Source: Case chapters.

From Institutional Design and Capacity to Institutional Origins: Centrality of Politics

- Effective institutions don't come out of nowhere.

Why would political leaders expend time and resources (including support for cronies, ethnic groups) on institutions that require time, money, etc.?

- Identify pressures on leaders
 - Threats: external security
 - Threats: internal – bottom-up pressure
 - Inadequate resources

Thus countries facing intense threats with few easily accessible resources, *ceteris paribus*, tend to promote domestic technological capacities (“techno-nationalism”)

>> Towards a **demand-led** theory of developmental institutions (see Doner-Schneider 2016 “Middle-Income Trap...”)

Thailand: Successful Extensive Automotive Strategy

Table 2.3 Domestic Vehicle Production 2019 and 2005

	World Ranking 2019	Cars 2019	Commercial Vehicles 2019	Total Vehicles 2019	Cars 2005	Commercial Vehicles 2005	Total Vehicles 2005	Ratio 2019 Total Vehicles to 2005 Total
World		67,149,196	24,637,665	91,786,861	47,046,368	19,673,151	66,719,519	137.5
China	1	21,360,193	4,360,472	25,720,665	3,941,767	1,775,852	5,717,619	449.8
USA	2	2,512,780	8,367,239	10,880,019	4,321,272	7,625,381	11,946,653	91.1
Japan	3	8,328,756	1,355,542	9,684,298	9,016,735	1,782,924	10,799,659	89.8
India	4	3,623,335	892,682	4,516,017	1,264,111	374,563	1,638,674	275.6
Germany	5	4,661,328	0	4,661,328	5,350,187	407,523	5,757,710	81
Mexico	6	1,382,714	2,604,080	3,986,794	846,048	838,190	1,684,238	236.7
South Korea	7	3,612,587	338,030	3,950,617	3,357,094	342,256	3,699,350	106.8
Brazil	8	2,448,490	496,498	2,944,988	2,011,817	519,023	2,530,840	116.4
Spain	9	2,248,019	574,336	2,822,355	2,098,168	654,332	2,752,500	102.5
France	10	1,675,198	527,262	2,202,460	3,413,961	436,047	3,549,008	62.1
Thailand	11	795,254	1,218,456	2,013,710	377,562	845,150	1,122,712	179.4
Canada	12	461,370	1,455,215	1,916,585	1,356,271	1,331,621	2,687,892	71.3
Russia	13	1,523,594	196,190	1,719,784	1,068,511	285,993	1,354,504	127
Turkey	14	982,642	478,602	1,461,244	453,663	425,789	879,452	166.2
Czech Rep.	15	1,427,563	6,400	1,433,963	596,774	5,463	602,237	238.1
UK	16	1,303,135	28,270	1,381,405	1,596,356	206,753	1,803,109	76.6
Indonesia	17	1,045,666	241,182	1,286,848	332,590	168,120	500,710	257
Slovakia	18	1,100,000	0	1,100,000	218,349	0	218,349	503.8
Italy	19	542,007	373,298	915,305	725,528	312,824	1,038,352	88.1
Iran	20	770,000	51,060	821,060	923,800	153,390	1,077,190	76.2
Malaysia	23	534,115	37,517	571,632	404,571	158,837	563,408	101.5
Taiwan	31	189,549	61,755	251,304	323,819	122,526	446,345	56.3

Source: International Organization of Motor Vehicle Manufacturers, "Production Statistics", <<http://www.oica.net/category/production-statistics/2019-statistics/>> (Accessed 15 October 2020). Our case study countries are in boldface.

Thailand: Successful *Extensive* Automotive Strategy (2)

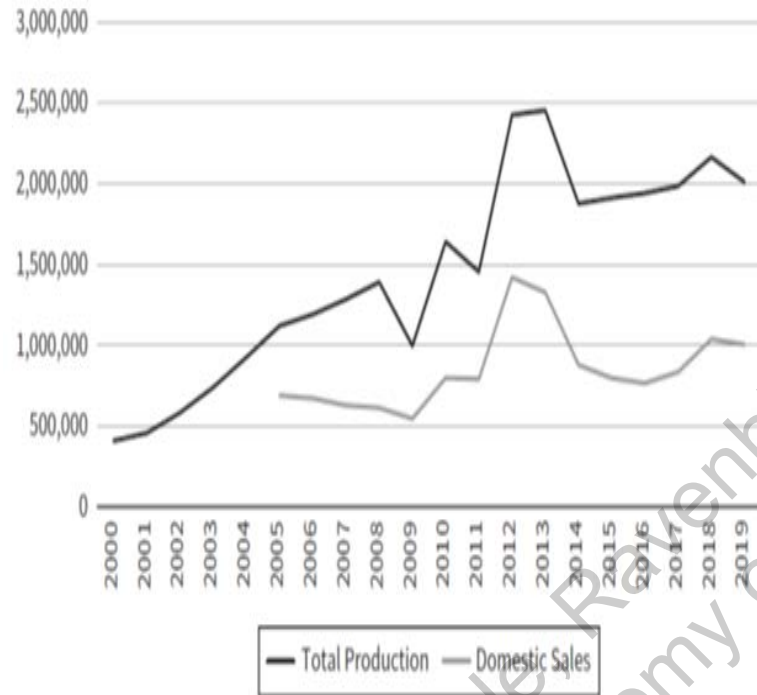


Figure 4.1 Thailand's Total Auto Production and Domestic Sales.

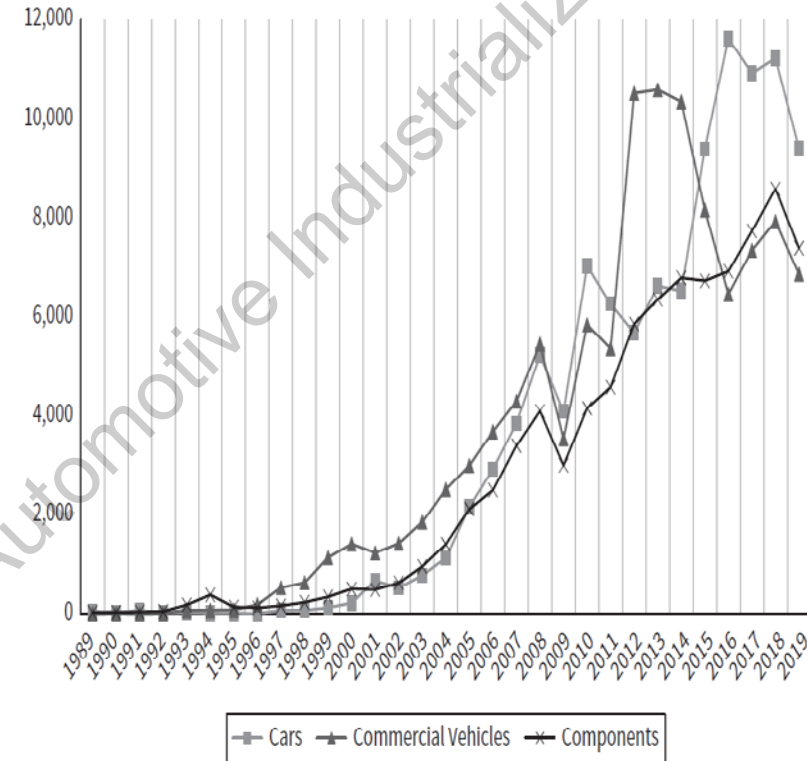


Figure 4.2 Thailand Exports of Vehicles and Components (\$m).

Thailand: Surprisingly Weak at Intensive Growth

Table 2.8 Intensive Growth Indicators

	China	Indonesia	Korea	Malaysia	Philippines	Thailand	Taiwan
Auto R&D/sales	1.82%	NA (Negligible)	2.17%	2% (assemblers) 0.14% (suppliers)	NA (Negligible)	0.3% (suppliers)	1.09%
Corporate R&D institutes	Yes	Minimal	Yes	Yes	No	Minimal	Yes
Ability to design and export new parts	Medium	Low	High	Low	Low	Low	High
Ability to design and engineer whole vehicles	Yes	No	Yes	Yes	No	No	Yes
Global center of excellence (independent or for an MNC)	Yes, for some "info-tainment" parts	No	Yes	No	No	No	Yes, for a very few electronics parts (Ford)
Extensive use of domestic capital equipment	Yes	No	Yes	No	No	No	Yes
Major effort to develop EV/HV	Yes	No	Yes	Yes	No	No	Yes
Locally owned brands	Yes	No	Yes	Yes (Proton)	No	No	Yes (Yulon)
Overseas assembly	Yes	No	Yes	Yes (barely)	No	No	Yes
Outward FDI for parts	Yes	No	Yes	No	No	Yes (a bit)	Yes
Overseas R&D posts	Yes	No	Yes	Yes	No	No	Yes

Weakness of Thai Parts Producers

Thailand historically leader in local supplier base	But expansion, especially after 1997, led to weakening of indigenous supply base	Especially disappointing in areas of expected strength	Takeaways
<ul style="list-style-type: none">• High local content• Large # of parts producers• Largest # of Japanese suppliers in SEA (500 vs 170/Indo, 100/Malaysia, 15/Vietnam)	<ul style="list-style-type: none">• Assemblers shifted to full blown export strategy after AFC reduced domestic market• End of local content requirements in 2000 ; end of 49% foreign ownership ceiling 1999• ‘Silent policy of transnationalization’: most local suppliers not prepared for export requirements – PQD (price, quality, delivery)• Actual “local” content dominated by foreign parts affiliates	<ul style="list-style-type: none">• Stamped parts• Rubber-based parts• Mold and die• Replacement market (contrast with Taiwan)	<ul style="list-style-type: none">• Extensive growth does not necessarily or even usually lead naturally to intensive growth• Best practices by one firm do not diffuse naturally through competitive emulation• MNC/FDI will not automatically generate technology and management spillovers

Accomplishing Extensive Growth

Trade, taxes and related investment measures

- Reduce local content requirements; ended restrictions on models etc.
- Actively promoted regional trade agreements (AFTA, FTAs)
- Reduced duties on imported machinery and materials
- Excise tax reform tax rebates favoring “product champions”: 1-ton Pickup; Eco Car.
- Impressive shift / flexibility to EOI in 1990s, esp. post AFC
- But: little if any attention to active labor market policies (workforce development) or targeted tariffs to improve local firms’ productivity

Physical infrastructure / clusters

- Eastern Seaboard / Industrial Estates
 - Impressive cluster growth
 - but main function *logistical*, not promotion of spillovers
- Eastern Economic Corridor forward-looking but unclear benefits for foreign firms.

Falling Short on Intensive Growth: Weak Quality Infrastructure

- Testing and standards
 - Auto-specific test center late and modest (esp. tires)
 - Rubber: Overall late and modest R&D center (contrast Thai Rubber Authority 2017 vs. Malaysia Rubber Board)
- Technical–vocational training only recently
- Innovation financing: low compared to neighbors
- FDI tech promotion via BOI – only in 2017

Development Institutions: Quantity vs. Quality

Table 4.1 Upgrading-Related Institutions: Thai Automotive Industry

Private Sector	Public Sector	Educational Institutions	Public-Private Intermediaries	Projects/Initiatives
FTI: Federation of Thai Industries	MOI: Ministry of Industry (Office of Industrial Economics, Dept. Indust. Promotion)	Chulalongkorn University	TAI: Thailand Automotive Institute	AHRDP/AHRDA: Automotive Human Resources Development Program / Academy (FTI, TAI, Japanese firms)
TAPMA: Thailand Auto Parts Mfg. Assoc. (FTI)	BOI: Board of Investments	KMUTT: King Mongkut's University of Technology—various campuses)	MIDI: Metal Industries Development Institute	Graduate programs in automotive engineering (Chulalongkorn, KMUTT TNI)
TAIA: Thai Automotive Industry Assoc. (FTI)	IEA: Industrial Estates Authority of Thailand	KMUTL: King Mongkut's University of Technology, Lad Krabang	TPI: Thailand Plastics Institute	Consulting services (TPA and Dept. of Indust. Promotion)
RPIC: Rubber Products Industry Club (FTI)	MOL: Ministry of Labor (Dept. of Skills Formation)	RTEC: Rubber Technology Center	TSI: Thailand Steel Institute	Collaborative research (KMUT campuses/ Suzuki; TRF/RTEC)
TATMA: Thai Automotive Tire Mfgs. Assoc.	NSTDA: National Science and Technology Development Agency	Prince of Songkla University		
TGI: Thai German Institute	STIPI: Science, Technology and Innovation Policy Institute	TNI: Thai-Nichi Institute of Technology		
TP: Technology Promotion Association (Thai-Japan)	TRF: Thailand Research Fund Rubber Research Institute of Thailand			

Flurry of Recent Development Initiatives, But....

Table 4.2 Recent Innovation-Related Initiatives

-
- (1) 13 newly established government committees; focus includes development of “a scientific and technological workforce for sustainable national development” (Patthana 2017).
 - (2) High-level working group meetings to “Develop Technology Roadmap to Drive National Research and Innovation System” organized by National Science and Technology Development Agency (author interviews and participation, November 2017).
 - (3) Science, Technology and Innovation Policy Institute (STIPI), established by NSTDA as source of proposals on human resource development and sectoral strategies (including next-generation vehicles) to escape middle-income trap. Linked to Eastern Economic Corridor www.kmutt.ac.th/stipi/main/en/
 - (4) Center for Robotics Excellence (CoRE). Partnership between Thai-German Institute and numerous public institutions. To develop automation-related human resources in support of technology transfer and integration of robotics and automation with AI, smart sensors, etc. (Thai German Institute [TGI] 2018).
 - (5) Thai Research Fund partnership with several Thai universities to foster innovation in support of local tire producers (author interview, Rubber Products Industry Club official, November 5, 2017).
 - (6) Automotive Human Resource Academy, created 2015, to develop curricula for each level of automotive employee backed up by national certification framework; based on German dual vocational education system (Chalassathien 2016a; author interview with Chalassathien, November 2017)
 - (7) Automotive Testing and Research Center.
 - (8) BOI merit-based incentive scheme to promote closer links between MNCs and local firms (Intarakumnerd 2018: 19).
-

... If Past Is Prologue....

- Effective Office of Industrial Economics - led network devoted to expanding exports and scale economy via 1-ton Pickup, Eco Car, EVs...But
- On innovation and local firm development most comprehensive study of Thai innovation institutions: *Mismanaging Innovation Systems: Thailand and the Middle-Income Trap* (Patarapong 2018)
- Fragmentation
 - Inter-ministry fragmentation (e.g. MoI vs. MoC vs MoF, MoAC)
 - Lack of integration of technology promotion with export promotion and finance (MoF lacks industry-specific expertise)
 - No Coordinating Ministry
- Time inconsistency - “innovation blips”
 - Ministerial turnover (TAI head had to deal with 14 different industry ministers in 11 years)
 - Political influence
 - Industrial Restructuring Committee and MITI 1997-98, dropped after devaluation-led export growth
 - Innovation efforts occur only in the face of pressures on elites, esp. forex problems, but these (forex problems) have been short-lived

Political
Origins of
Uneven
Institutions:
Thailand at
Intermediate
Position on
“Vulnerability
Continuum”

Conditions more challenging than for Malaysia, Indo, and Phils but less threatening than Korea, Taiwan, China

- **Threats**

- External: Few if any since Vietnam War
- Internal / popular pressures on political elites: Still weak, fragmented...beginning to change?
- Good news for extensive growth (e.g., for MNCs)
- Bad news for intensive growth

- **Ease of access to revenues:**

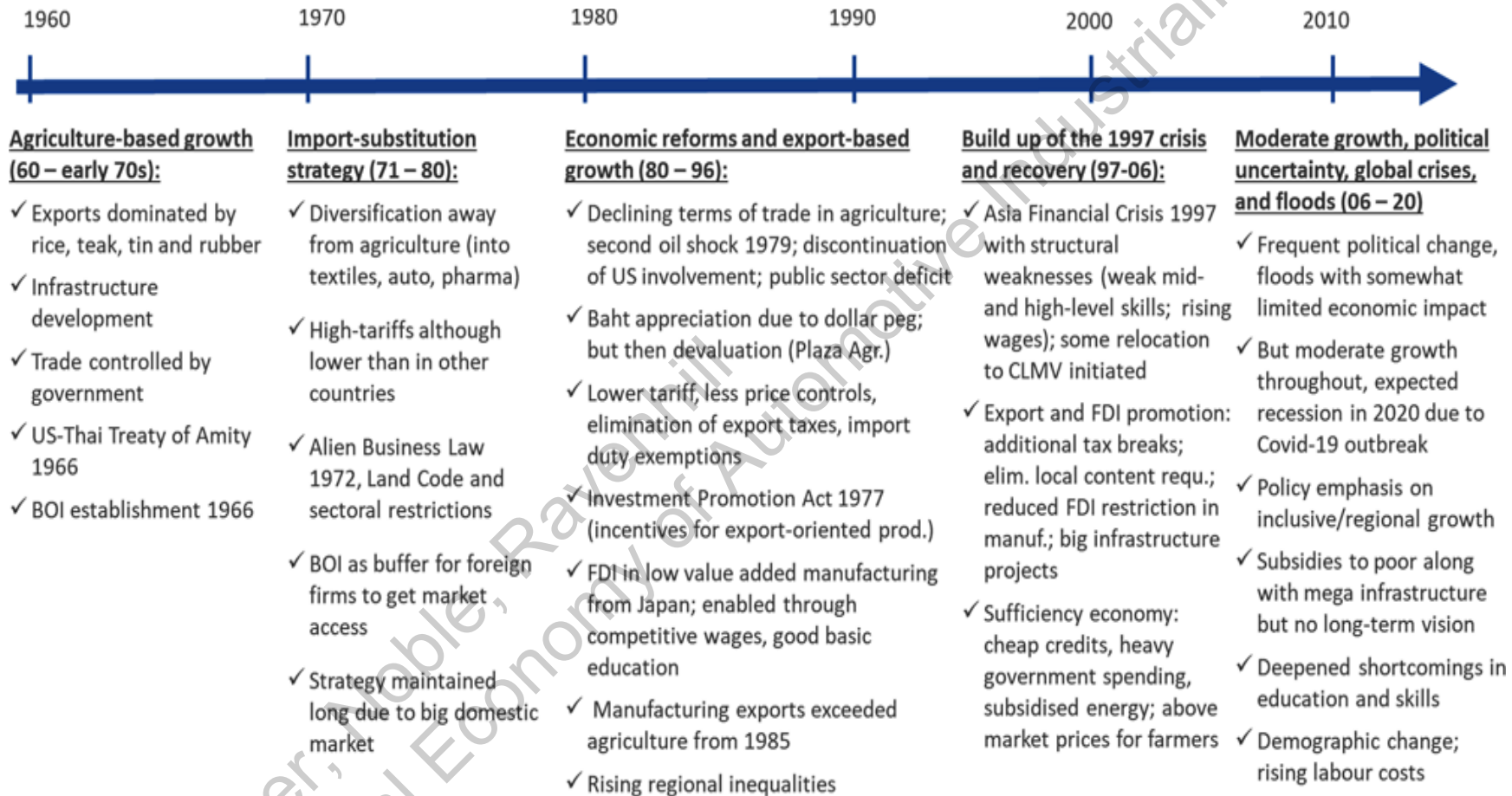
less well endowed than SEA neighbors, but...

- Successful exporter of natural resources (rubber, rice, casava, aquaculture)
- Foreign \$\$ (e.g., Miyazawa Fund after 1997 AFC)
- Labor: informal >50% of workforce; migrant labor

Result:

- Focus on forex and jobs through extensive growth
- Unstable, episodic, weak efforts at upgrading / intensive growth
- “Quick Wins” key

Thailand's Development Trajectory (OECD)



Doner, Noble, Raver, and Autonomy: Political Economy of Agricultural Industrialization

Malaysia: Failed Intensive Development

- Positive starting conditions
- But after 1969 race riots, government prioritized ethnic considerations in development
- This undermined explicit attempt to emulate Japan and Korea through “Look East” policy
- Limited external threat. Plentiful resources
- (contrast some success in intensive development in electronics in Penang)
- Proton created May 1983 as the “Malaysian Hyundai”



The Proton Saga:
“Japanese technology
and Malaysian style”



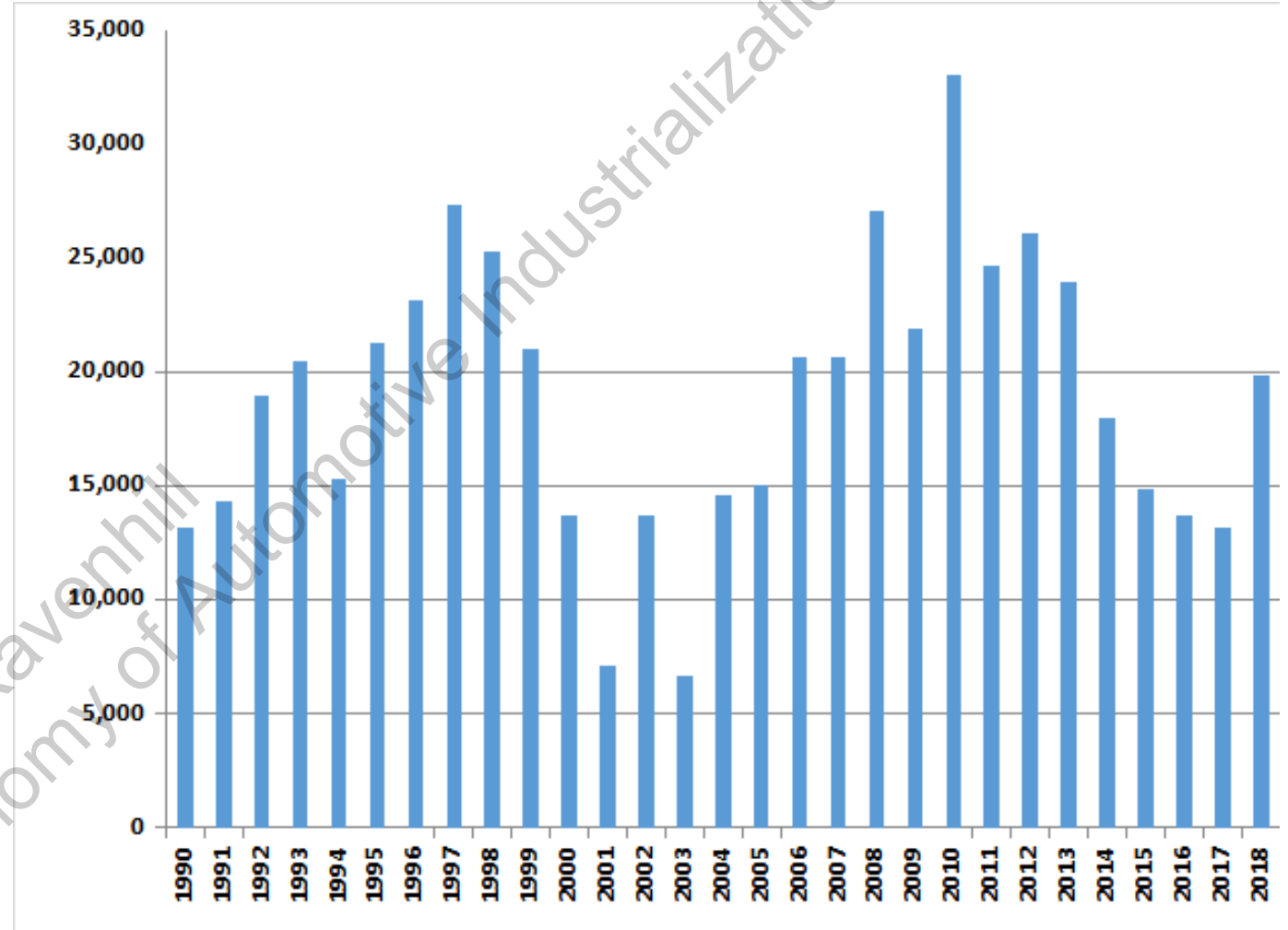
Doner, Noble, Ravehill
Political Economy of Automotive Industrialization



Malaysian Policies

- Government insisted Proton purchase from ethnic Malay component producers
- High levels of (unconditional) protection for assemblers and for component producers (>>proliferation of inefficient producers)
- Able to subsidize auto industry because of natural resource revenues (state investment arm a significant shareholder in Proton)
- Although general education in Malaysia good, few tertiary courses in auto engineering until recently
- No automotive institute established until 2010—in 2015 only 20 staff

- Malaysia: Stagnant Export of Passenger Vehicles



Doner, Noble, Ravenhill
Political Economy of Automotive Industrialization

Figure 7.1: Exports of Automotive Products from Southeast Asian Economies (\$US millions)

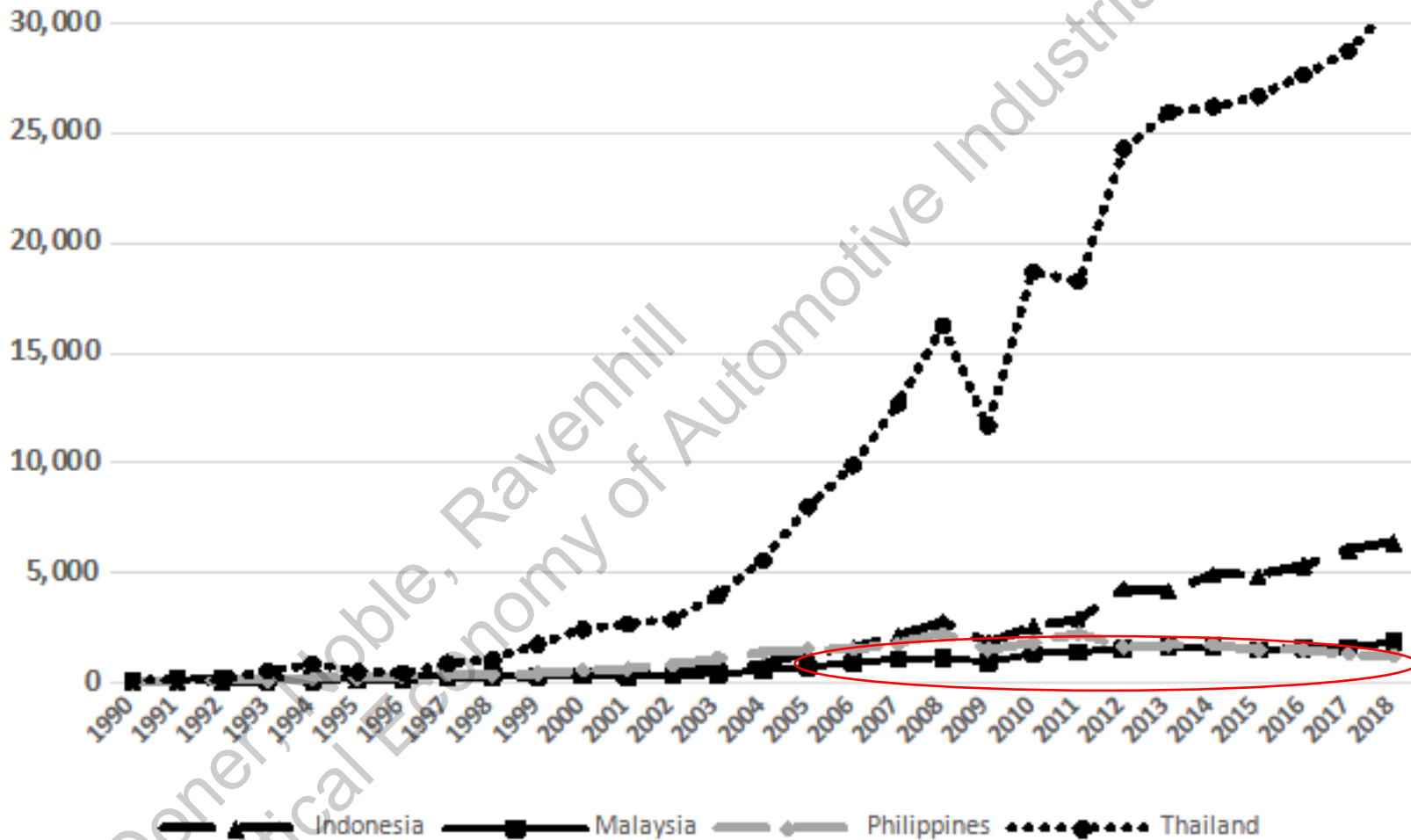
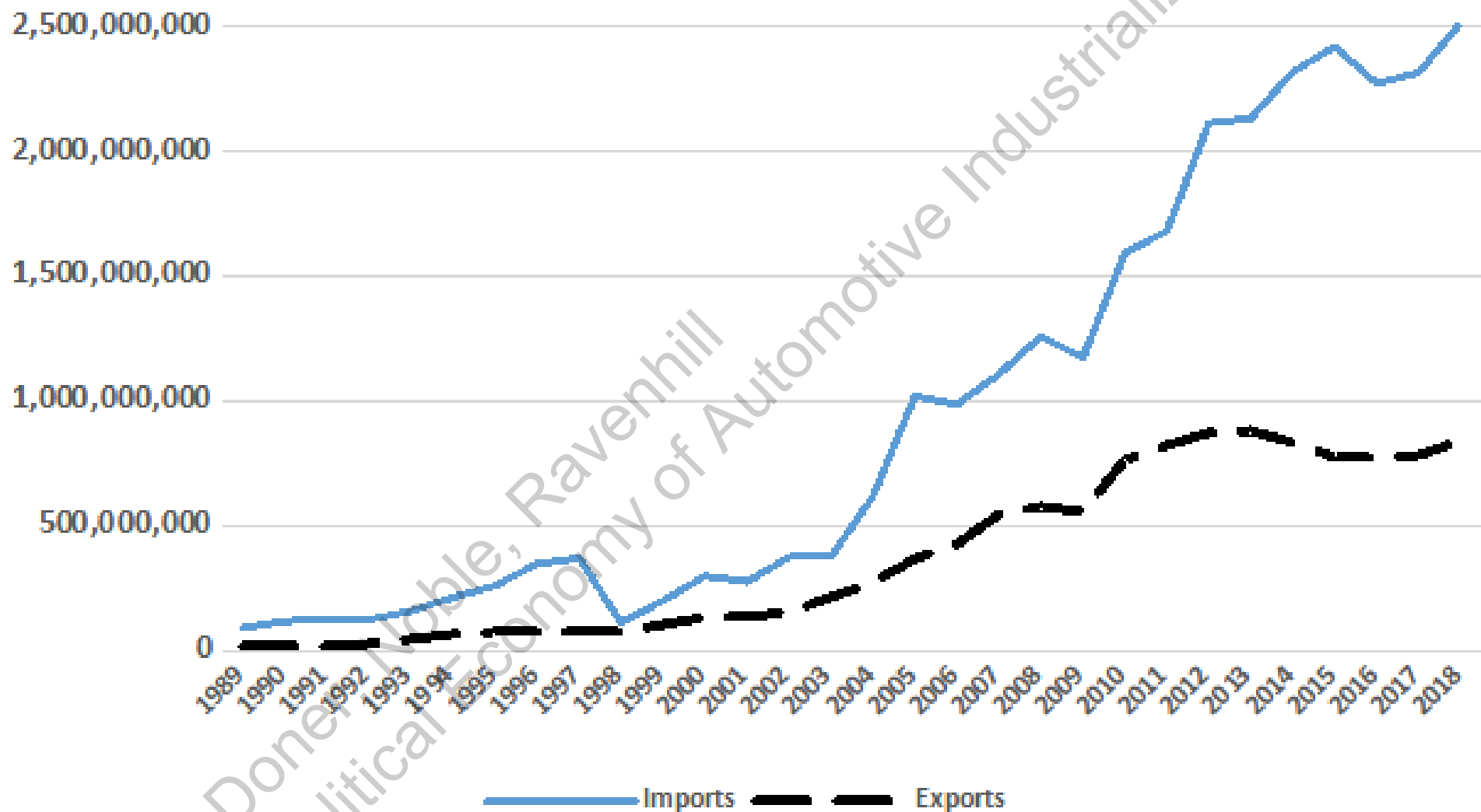


Figure 7.3: Malaysia: Imports and Exports of Auto Components (\$US millions)





The End of Intensive Development?

- Proton privatized 2012; 49.9% sold to Chinese assembler Geely in 2017 for paltry \$40m (plus \$130m for Lotus subsidiary)

“They say Proton is my brainchild. Now the child of my brain has been sold. Yes. I am sad. I can cry. But the deed is done. Proton can no longer be national.” Former PM Mahathir

- New national cars?
- Attempt to emulate Thailand?



Implications and Prospects



Demand

- Continuing shift of demand to developing world
- Impediments to further growth in sales
 - Oil: availability and price
 - Congestion, especially in major cities
 - Ambient pollution
 - Global warming
 - Uncertain transition to new power plants (battery EV; hybrid; fuel cells?)
- But increase in buying power in developing countries likely to continue to propel growth

Challenges

- Transition to new power plants: dual development, “Valley of Death”
- Continuing industrial consolidation (assemblers, parts makers) and competition from new EV-related entrants
- Decreased demand for parts after transition to EVs (engines, exhaust, etc.)
- But if predictions about growing demand prove correct, NOT a net decrease in employment
- Problem: skills and training mismatch
 - Decrease in demand for low-skilled manufacturing jobs
 - Increased demand for sophisticated skills, especially in software, chemicals → need for automotive-relevant training, especially at smaller companies, by firms, universities, and other institutions



Intensive strategy: Still a viable path?

Intensive Champions:

- Large, growing market
- Industry established before WTO entry
- External threat + constrained resources

Examples

- CHINA
- India
- Korea (but independent, export-led growth model not replicable post-WTO)

China and India:
Limited overseas
expansion but China
is global leader in
EV production

Country	2019 light vehicle production	2019 vehicle exports	2019 overseas production	2018 EV Production
China	25.7 million	1.0 million	NA	1.1 million
India	4.6 million	0.8 million (2018-19)	NA [Jaguar Land Rover 0.5 million 2019-20]	0.0 million (1,000)
Japan	9.7 million	4.8 million	18.9 million	0.2 million (181,000)
South Korea	4.0 million	2.4 million	3.9 million	0.1 million (84,000)

Intensive
candidates/
wannabees:
Motivations and
aspirations, but...

Iran

Vietnam

Poland??

Turkey??

Extensive Strategy: Evolving Challenges

Modest wages + basic competence + large market (domestic, *neighboring*)

- **Faded stars**

- Spain: long stagnation
- Brazil: stagnant and MNCs still moving to even lower-cost regions
- Argentina: shrinking even before Covid-19

- **Still expanding, for now...**

- Mexico: still growing, partly because wages are nearly stagnant, but pressure from USMCA
- Thailand
- Indonesia
- Morocco
- Slovakia

Gradual build-up of manufacturing capabilities but limited to enclaves

And very limited research, design, engineering and branding

Questions

With transition to EVs, will much of value-added return to rich countries (and China and India) even as demand keeps shifting south?

- Japan: motors and inverters
- Korea: (LG Chemicals, Samsung): batteries
- Israel: sensors and radar

Can developing countries implement a hybrid intensive/extensive strategy?

Key: skills and training for both workers and institutions