

Working Paper No. 04/2014

**Tigers Trapped: Tracing the Middle-income Trap through
the East and Southeast Asian Experience**

Veerayooth Kanchoochat

Patarapong Intarakumnerd

February 2014

In cooperation with

 **DAAD partnership**
on **economic development studies**

htw.

**Hochschule für Technik
und Wirtschaft Berlin**
University of Applied Sciences

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Veerayooth Kanchoochat¹ and Patarapong Intarakumnerd²

Abstract

The “middle-income trap” has recently become a powerful buzzword in the international development community. Despite using the same phrase, the existing literature varies considerably. The objective of this paper is twofold. First, it represents one of the earliest attempts at reviewing this burgeoning area of research. Based on differences in theoretical underpinnings and policy implications, the literature is classified into three groups: (1) getting education and institutions right; (2) changing export compositions by following comparative advantage; and (3) industrial upgrading by the proactive state. Second, it examines the validity of these three bodies of literature through catching-up experiences of selected newly industrializing economies in East and Southeast Asia. It argues that each strand falls into a different trap: the causal, the historical, and the practical. In discussing these three traps, this paper provides six propositions based theoretically on old-school development economics and innovation literature.

Keywords: middle-income trap, Asian Newly Industrializing Economies (NIEs), state intervention, industrial policy, structural transformation

JEL classifications: O14, O25, O53

¹ Corresponding author, Assistant Professor, National Graduate Institute for Policy Studies (GRIPS), 7-22-1 Roppongi, Minato-ku, Tokyo 106-8677, Japan. Email: kanchoochat@grips.ac.jp.

² Professor, National Graduate Institute for Policy Studies (GRIPS).

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Introduction

The term “middle-income trap” (henceforth MIT) is a relatively new phrase invented by Gill and Kharas in their *East Asian Renaissance* report (2007). It is, however, appealing and perhaps ambiguous enough to become a powerful buzzword in the international development community within a short period of time. Whether or not a country is in the “middle-income” level depends on the definition provided by the World Bank.³ But the debate over the “trap” is another matter. Despite using the same phrase, the MIT literature varies considerably in the cases studied, the research methods employed, the underlying causes of the trap asserted, and the policies suggested.

The objective of this paper is twofold. First, it represents one of the earliest attempts at reviewing this burgeoning area of research. Based on in theoretical and policy differences, we classify the MIT literature into three groups: that is, (1) getting education and institutions right; (2) changing export composition by following comparative advantage; and (3) industrial upgrading by the proactive state. Second, we examine the validity of these three bodies of literature through catching-up experiences of newly industrializing economies (NIEs) in East and Southeast Asia. It then argues that the three groups of literature provide different empirical and policy insights; however, they are problematic in different ways. The first strand is caught in the *causal trap* by mixing up factors contributing to improvements at the individual level with those at the national level. The second strand suffers from the *historical trap*, as it cannot explain the long-term trajectories and successful catching up of East Asian NIEs. The third strand falls into the *practical trap* by downplaying detailed policy discussion and yardstick problems, prevalent in Southeast Asian NIEs. In discussing the three traps of MIT literature, we also provide our six

³ According to the country’s level of gross national income (GNI) per capita in 2012, countries have been classified as follows: low income, \$1,035 or less; lower middle income, \$1,036–\$4,085; upper middle income, \$4,086–\$12,615; and high income, \$12,616 or more. Nonetheless, the Bank’s measures and categories have been adjusted time and again after the official World Bank classification started in 1989.

propositions to make our argument tractable and falsifiable.

There are three remarks regarding the scope of this study. First, our review of MIT literature is illustrative rather than comprehensive. Moreover, it is limited only to those that explicitly use the term “middle-income trap”. Seemingly related works, such as those on middle-income countries or Asian political economies, are not included if they have not used that specific term. Second, there is a limitation in terms of country coverage. The paper mainly examines detailed policy experiences of selected NIEs. While “first-tier” NIEs, namely, Taiwan Province of China (henceforth Taiwan), the Republic of Korea (henceforth Korea), and Singapore, offer a representative sample of those who already succeeded in sailing over the trap to reach higher-income levels, the “second-tier” ones, namely, Malaysia, Thailand, and the Philippines, represent those stuck in the trap. Finally, our discussion of the first-tier NIEs is mainly, albeit not exclusively, confined to their catching-up period, approximately between the 1960s and the 1990s, because it is most relevant to the debate over the transition from middle to high income levels.

The Middle-income Trap: One Term, Three Thrusts

We classify the existing MIT literature into three groups: that is, (1) getting education and institutions right; (2) changing export composition by following comparative advantage; and (3) industrial upgrading by the proactive state. Table 1 summarizes their differences in the major causes of the MIT analyzed, the role the state should play, and some exemplary works in each body.⁴

⁴ There is also a definitional debate about the “trap”. One group sees the trap as growth slowdowns (e.g. Eichengreen *et al.* 2013; Felipe *et al.* 2012), another focuses more on the catching-up problems (e.g. Lin and Rosenblatt 2012; Paus 2012; Ohno 2009). Our paper falls more under the latter definition.

Table 1. A summary of three bodies of the middle-income trap literature

	Major causes of MIT	The role the state should play	Exemplary works
(1) Getting education and institutions right.	Inadequate quality of education and institutions.	<i>Minimum.</i> To make the right incentive systems; investing more in education and R&D.	Jimenez et al. (2012) Jitsuchon (2012) Tran (2013) Aiyar <i>et al.</i> (2013)
(2) Changing export composition by following comparative advantage.	Inadequate capabilities to produce and export higher-technology products.	<i>Facilitating.</i> To support industries in which a country possesses comparative advantage.	Felipe <i>et al.</i> (2012) Eichengreen <i>et al.</i> (2013) Lin and Treichel (2012)
(3) Industrial upgrading by the proactive state.	Inappropriate and insufficient role of the state in enhancing capabilities to produce and export higher-technology products.	<i>Proactive.</i> To focus on capability accumulation and deliberate attention to advancing industrial upgrading.	Ohno (2009); Paus (2012); Prime (2012); Caldenteu (2012); Sánchez-Ancochea (2012); Abugattas-Majluf (2012).

Source: The authors.

1. Getting Education and Institutions Right

Studies in this group analyze middle-income countries with special reference to their quality of education and institutions. For example, Jimenez *et al.* (2012, p. 16) explore Thailand and Malaysia in comparison to Korea, and argue that human capital formation is fundamental to sustaining per capita income growth, as it equips workers with marketable skills. The list of MIT problems in Jitsuchon (2012, p. 16) is longer and summarized as “Thailand’s institutional weaknesses”. In addition to poor educational quality, an incomplete market in skills training, a low level of research and development (R&D) activities and spending, and flawed tax structure are included. A more comprehensive study through probit regressions covering 138 countries from 1955 to 2009 was conducted by Aiyar *et al.* (2013). High-quality institutions – defined as: strong rule of law; small government; and light regulation – are among significant factors contributing to change in

growth slowdowns of middle-income countries.

As for policy suggestions, Jitsuchon (2012, p. 19) proposes that the Thai government should not interfere with the market but should “devise the right incentive system so that economic agents would want to pursue their own prosperity...Providing public research infrastructure and tax benefits for implementing innovation and R&D activities is an example”. For Aiyar *et al.* (2013, p. 32), reforms should cover “[p]rudential regulation to limit the build-up of excessive capital inflows..., measures to enhance regional trade integration, public investment in infrastructure projects, and deregulation in areas where red tape is stifling private activity”. In short, the state should aim at making the right incentive systems and investing more in education, institutions, and R&D.

2. Changing Export Composition by Following Comparative Advantage

Rather than education and institutions, the second strand points to a country’s export composition as being particularly critical to its catching-up success and failure. Some studies in this group draw underlying theory from “old-school” development economics.

Felipe *et al.* (2012, p. 33) argue that development and growth should be seen as “a process of structural transformation of the productive structure, whereby resources were transferred from activities of lower productivity into activities of higher productivity”. Using a data set of 124 countries from 1950 to 2010, it finds that not all products have the same consequences for economic development. Successful catching up is found in the ones with a “diversified, sophisticated, and non-standard level export basket”. For example, while Korea was able to gain comparative advantage in a significant number of sophisticated products, Malaysia and the Philippines were able to gain comparative advantage only in electronics. Specific to Latin American and the Caribbean countries, Lin and Treichel (2012) argue that they have been caught in the MIT because of their inability to upgrade from low to high value-added production. Although not following the above underlying theory, the econometric findings in Eichengreen *et al.* (2013, pp. 11–12) also underline the importance of export compositions, among other contributing factors:

“Countries accumulating high quality human capital and moving into the production of higher tech exports stand a better chance of avoiding the middle income trap”.

Policy suggestions vary in this group, but generally prefer the state to function as a facilitator who supports a country’s transformation toward higher value-added exports. For example, Lin and Treichel (2012) assert that the government should play a crucial role in helping firms overcome information, coordination, and externality problems. Elsewhere, Lin (2012, p. 397) clearly proposes that: “The best way for a developing country to achieve sustained, dynamic growth is to follow comparative advantage in its industrial development and to tap into the potential of advantages of backwardness in industrial upgrading”.

3. Industrial Upgrading by the Proactive State

Similar to the second group, this body of literature emphasizes exports and production structures. Nevertheless, it explicitly supports the role of the state in acquiring indigenous technology for latecomers. For example, Ohno (2009) maps out four stages of catching-up industrialization: that is, (1) having simple manufacturing under foreign guidance; (2) developing supporting industries but keeping production under foreign management; (3) internalizing skills and knowledge by accumulating industrial human capital; and (4) acquiring the capabilities to create new products and leading global market trends. The MIT is defined as the “glass ceiling” between the second and third stages. Proactive industrial policy, with strong commitment to global integration and private-sector-driven growth, is accorded the key role in solving the problem (Ohno 2009, pp. 29–30).

Learned from the small-countries perspective,⁵ the special issue on the MIT in *Studies in Comparative International Development* emphasizes the competitive squeeze from the low and the high end, highlighting the intense pressures on middle-income countries in the current globalization process. In there, Paus (2012, p. 130) demonstrates that: “Sustained

⁵ Five cases include Chile, Dominican Republic, Ireland, Jordan, and Singapore.

broad-based upgrading happens where there is a proactive government with an overall focus on capability accumulation and deliberate attention to advancing social capabilities in sync with the needs of private sector upgrading.”

In summary, this section has classified the existing MIT literature into three groups, labeled by their policy standpoints, particularly the role the state should play. After assessing the validity of these three groups through both catching-up experiences of the NIEs, we argue that each strand falls into a different trap: the causal, the historical, and the practical.

The Causal Trap

The “getting education and institutions right” strand is caught in the causal trap by mixing up factors contributing to improvements at the individual level with those at the national level.

Proposition 1: Education Alone Is No Guarantor of Successful Catching Up.

To begin with, a number of cross-country studies find the relationships between education and economic growth to be weak or even irrelevant. Among the most influential works in this line are Benhabib and Spiegel (1994) and Pritchett (2001), which assert that increases in human capital, resulting from improvements in the educational attainment of the workforce, have not positively affected economic growth and the rate of growth of output per worker. Even though the positive correlation between education and economic growth is palatable, the causal relationship is likely to run in the opposite direction. In other words, it is economic growth that leads to higher quality and quantity of education (Bils and Klenow 2000).

Most of the existing MIT literature that accords education the key role in enhancing economic growth bases its analyses on recent statistics of NIEs, without paying sufficient

attention to either the initial condition or historical intricacies. As shown in Table 2, in terms of the initial condition, the literacy rates of all countries were below the Philippines. In 1960 the Philippines had a literacy rate of 72%, while it was 71% for Korea, 68% for Thailand, 54% for Taiwan, and 53% for Malaysia. It was almost the same picture for the average years of schooling in 1960, for which the Philippines was the highest. Even as late as 1994, the average years of schooling of Indonesia, Malaysia, and even Singapore were lower than that of the Philippines. But the Philippines' catching up has been least successful among these NIEs.

Table 2: Literacy rate and average years of schooling in NIEs

	Literacy rate (%)	Average years of schooling (years)	
	1960	1960	1994
Singapore	50	3.0	6.1
Taiwan	54	3.2	8.2
Korea	71	3.2	9.7
Malaysia	53	2.3	7.0
Thailand	68	3.5	7.5
Philippines	72	3.8	7.4
Indonesia	39	1.1	5.0

Source: Sarel (1996, Table 3); Collins *et al.* (1996, able 3).

Why might that be? It is because, despite having value on its own, much of the knowledge gained in education is not necessarily relevant for productivity enhancement. Not only because many subjects have almost no impact on most workers' productivity (such as literature, history, and philosophy), but also because education tends to promote individual betterment to a greater extent than national prosperity (Chang 2010, p. 189). The causal link from (more or higher quality) education to (higher, more continuous) growth is at best indirect, and requires many more things in the casual process.

To make education contribute substantially to economic growth, education policy has to be tailored to support the national development strategy, rather than simply increasing literacy rates, average years of schooling, or even gross tertiary enrolment. For example, in Singapore, the human resource system was considerably restructured in 1981 when the country decided to shift from import-substitution to export-oriented industrialization. The new system was aimed at *specific* industrial goals, rather than enhancing the enrolment or literacy rates. It encompassed not only improving formal education provided by education institutes, but also upgrading abilities of existing workforce in the industry through training. On the one hand, several vocational training institutes and polytechnics were opened, along with a new university (the Nanyang Technical University) to provide foreign investors with skilled labor. On the other hand, to encourage firms to continuously invest in skill enhancement, the Skills Development Fund was introduced in 1982 to provide an economic incentive for skills development in bigger firms as well as subsidizing skills formation in smaller firms, which were unable to contribute to the fund (Kuruville 1996; Chew and Chew 1995).

In contrast, despite having relatively high rates of literacy and schooling years, the university–industry linkages have been very low in the Philippines (Yusuf and Nabeshima 2010). Moreover, in an age of globalization, if a country’s human capital has been developed without relevant job markets and well-supported manufacturing sectors, the country will eventually face a “brain drain” problem. This is the critical problem that Malaysia now faces, as the country’s diaspora is about one million, with one-third being highly educated people (Woon 2012). Meanwhile, Taiwan has witnessed the “reverse brain drain”: well-qualified leaders and technologists from high-tech firms in the US have moved back to work in vibrant industrial estates based in Taiwan (Wong 1999).

Proposition 2: The “Good Governance” Agenda Is Theoretically And Empirically Flawed.

Institutional quality is also considered to be the key to escaping from the MIT by the first

body of literature. Yet, the definition of institutions varies greatly among their supporters. However, most of them, particularly Aiyar *et al.* (2013),⁶ are influenced by the so-called “good governance” agenda, which, we argue, is theoretically and empirically flawed.

First of all, that “good governance” is a prime determinant of economic performance has been challenged on various methodological grounds, especially the measurement errors (Glaeser *et al.* 2004) and missing-variable considerations (Bardhan 2005). Socio-economic conditions, policies, and even the results of policies are usually treated as “proxies” for institutions in cross-country regressions, but the studies seldom provide evidence that these variables should be seen as proxies rather than direct determinants of growth (Keefer and Shirley 2000). Even assuming away the proxy problems, we still lack good aggregate measures of complex institutional interaction within specific country characteristics (Shirley 2008; Kanchoochar 2012).

Second, the orthodox “good” institutions typically imply that “liberalized” institutions are better for economic development. In Aiyar *et al.* (2013), better institutional quality is meant to be: less government ownership of enterprises; lower income tax rate; fewer regulatory restrictions on the sale of real property; and fewer trade taxes and non-tariff trade barriers. Nonetheless, there have been numerous theoretical and empirical arguments asserting that such liberalized institutions are less good at generating growth than are properly regulated institutions and markets (e.g. Nelson and Winter 1982; Lall and Teubal 1998; Cimoli *et al.* 2009).

The experience of East Asian NIEs shows us that they could catch up with more advanced countries despite their institutions being highly deficient by modern standards – in such areas as democracy, bureaucracy and judiciary, property rights, western-style corporate governance, and financial institutions (Chang 2002). In Korea, the evidence

⁶ Aiyar *et al.* (2013, pp. 16) use five institutional variables: that is, size of government; rule of law index; trade freedom; regulation index; and financial openness.

suggests that corruption was rife throughout the high-growth period under the Park Chung Hee regime. Amsden (1989) pointed out the coexistence of *economic efficiency with corruption* along the use of various industrial policy tools. The assumption that rents and rent-seeking are always damaging to growth, and therefore should be eliminated at all costs is misleading. The so-called “Schumpeterian rents” are necessary for firms in upgrading their capabilities and investing in risky and innovative activities. The East Asian NIEs demonstrate that it is more about how such rents have been created and managed that matter for consequent economic performance (see Khan and Jomo 2000; Kang 2002).

In summary, education and certain institutions might be desirable on their own, but to evaluate their impact upon long-term economic growth we need to put them into context. To escape from the trap and succeed in catching up, we should begin by learning more from history. Both the history of economic thought and the history of economic development are indispensable, to which we now turn.

The Historical Trap

The second trap entails the questions of “what” and “how” with regard to economic development: what economic development is, and how the economy has (been) developed. Both the answers lie in history. In contrast to the first body of MIT literature, the “changing export composition by following comparative advantage” strand considers economic development as a transformation of productive structure. However, also a lesson from history, we further argue that this strand understates the role of the state in the transformation processes.

Proposition 3: A Transformation of Productive Structure Is the Crux of Economic Development.

The definition of “development” has always been subject to controversial debate. The current UNDP’s human development index may underscore non-income dimensions of

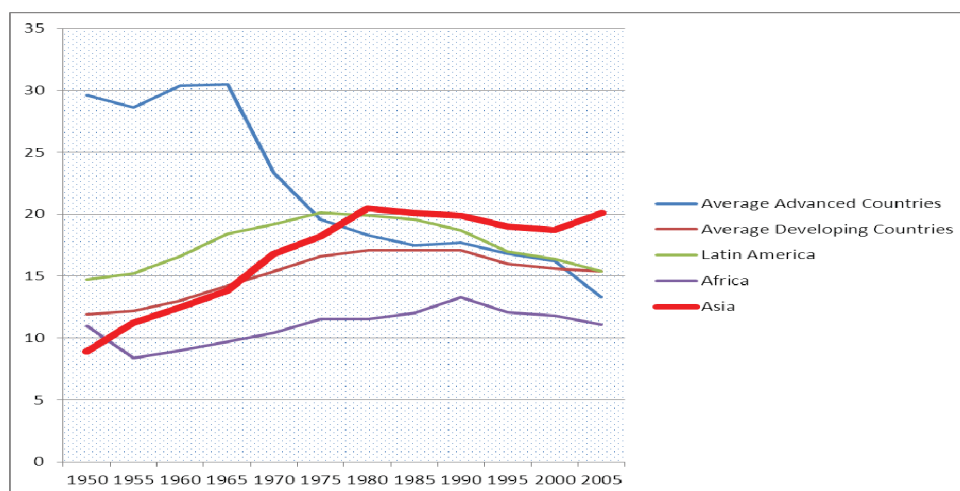
human welfare, such as health and gender equality. However, another group of development economists has tried to draw academic attention back to the “old school” cannon in the tradition of, inter alia, Arthur Lewis, Simon Kuznets, Nicholas Kaldor. Before the rise of neo-liberalism, there was a general consensus that development is largely about the transformation of the productive structure. The emphasis is placed on manufacturing as the source of national prosperity because it offers greater returns to scale and spillovers from learning and productivity potential (e.g. Rodrik 2007; Cimoli *et al.* 2009; UNIDO 2013). In human history, only few countries have achieved the high-income status without industrializing – but because they were endowed with an extraordinary abundance of natural resources.

This “productionist” tradition of development is based on the world history of industrialization. As illustrated in Figure 1, in 1950 manufacturing constituted around 30% of GDP in advanced economies and only 12% in developing countries. Among the catching-up economies, Latin America remained the most industrialized region until 1975, while Africa has been the least industrialized region. But the most transformative change took place in Asia, whose manufacturing continuously surged throughout the last half of the century, particularly from 1965 to 1980. And by 2010 the three most successful economies in East Asia, namely China, Korea, and Taiwan, taken together accounted for about one-fifth of world manufacturing’s value-added share and world manufactures trade (Szirmai 2012; UNIDO 2013).

In addition to reviving the old definition of development, the second body of MIT literature brings a fresh empirical insight by shifting the focus from *export expansion* to *export composition* as the crucial determinant of sustainable structural transformation. For example, Felipe *et al.* (2012) find that countries attaining upper-middle-income (jumping from lower-middle-income) status or high-income (jumping from upper-middle-income) status had more diversified, sophisticated, and non-standard export baskets at the time they were about to make the jump than the countries stuck in the MIT today. In sharp contrast, most of the sub-Saharan African countries depend heavily on merely two or three

commodities for most of their export earnings.

Figure 1: Worldwide manufacturing development paths
(changes in the shares of manufacturing in GDP at current prices, 1950–2005)



Source: Authors' calculation from Szirmai (2012, Table 3).

Even among export-led growth countries, there is subtle difference between Latin America and East Asia, caused by dissimilar export compositions. The study by Palma (2009) finds that between the 1960s and the 1990s, the capacity to move into the “high-tech” products of Latin American countries was significantly lower than that of the East Asian ones.⁷ Even though in the 1990s Latin American countries managed to reach East Asian levels of market penetration in OECD markets (matching export expansions), they did so only in their traditional export products, while NIEs were able to remarkably increase the share of high-tech products in their exports to the same markets (different export compositions).

Nevertheless, while the share of high-tech products in export composition could be used as a tentative indicator of a country's structural transformation, it should be used with some caveats. This is because the division between high-tech and low-tech industries can be

⁷ High-tech products are defined as products with high content of R&D (see Palma 2009).

misleading, as pointed out by innovation scholars like Smith (2005) and Lundvall (2004). This is because a lot of innovation is progressing in the so-called “low technology” industries. Denmark, for example, has a long tradition of an industrial focus on low-tech industries, especially in food industries (Edquist and Lundvall 1993). Therefore, unlike scholars in the second group of MIT literature, our proposition that a transformation of productive structure being the crux of economic development is not only about moving production and export composition from low-tech to high-tech products *but also* from those of low value-added products to higher ones, even in “low-tech” industries.

Proposition 4: Successful Structural Transformation Required Proactive State Intervention.

It is the question of “how” such a structural transformation can be achieved that marks the disparity between the second and third strands of MIT literature. Our proposition is that successful structural transformation requires proactive state intervention.

To begin with, the concept of comparative advantage, which underlies Lin’s policy advice, is based on totally *unrealistic* assumptions including: (a) the “no” conditions, such as no externalities; no increasing returns to scale; no factor mobility between countries; no technological change; and (b) the “necessary” conditions, such as the perfect competition in all markets in both countries (see Fine and Waeyenberge 2013).

Quite the contrary, there is no shortage of theoretical underpinnings for the proactive state, as conventionally assumed. Most commonly known are the neoclassical theories of market failure, which endorse the limited role of the state in “correcting” what markets cannot attain. However, in achieving a structural transformation, the role of the state is required to a greater extent than market corrections because of the existence of information and coordination externalities (Rodrik 2007, pp. 104–109; Chang 1994, pp. 65–79). First, the diversification of productive structure requires what Hausmann and Rodrik (2003) call the “self-discovery” of entrepreneurs, who need to experiment with new or imported technologies for production and services. Such a process will engender great value for the

whole economy (social gain), but entrepreneurs themselves bear the full cost of experiment and failure (private cost). Furthermore, many new industries, particularly ones with scale economies, can fail to develop unless upstream and downstream investments, alongside supporting institutions, are built and coordinated simultaneously. The establishment of this new coordination structure necessarily requires state involvement, because only the state has the power and legitimacy to legalize the new property rights and new power relations, required to provide an institutional reality to the new coordination structure.

Beyond the above two externalities, there are what scholars from the “system of innovation” approach call the “systemic failures” in national innovation systems. These failures entail the following: (a) transitional failures (firms being less capable of foreseeing the emergence of new technological paradigms); (b) lock-in failures (firms being locked into acquired existing technologies and technology systems); (c) network failures (too weak knowledge intensity of exchange or too strong linkages leading to blindness to what happens outside the network); (d) capability and learning failures (the insufficient competencies of firms limiting their capacity to learn, adopt, or produce new technologies over time) (see Smith 2000; Woolthuis *et al.* 2005; Intarakumnerd and Chaminade 2011). Put together, to generate the diversity of innovatory sources in the economy, the state is required to play a role in the “socialization of risk” processes, involving coordinating changes, encouraging experimentation, and preserving a diversity of the sources of knowledge.⁸

Finally, successful catching up, not only in East Asian NIEs, but also in almost all of today’s high-income countries, was due to various mixtures of proactive state intervention. Historically, the now-developed countries did not develop on the basis of free trade policy and laissez-faire. Western industrialization had seen the prevalence of tariff protection, export subsidies, tariff rebates on inputs used for exports, cartel arrangements, directed

⁸ As asserted by Rosenberg and Birdzell (1986: 332–333), the West had grown rich by giving its citizens the freedom to innovate in products, processes and organizations, summarized as the socialization of risk.

credits, investment planning, manpower planning, and so on.⁹ With regard to Japan and first-tier NIEs, it is also held that successful structural transformation required proactive state intervention to solve externalities and systemic failures. At the general level, there were significant similarities. All three NIEs and Japan deployed industrial policies aimed at upgrading their industrial structures. But, most importantly, the tools and mechanisms are designed differently to suit their socio-political specificities, as summarized in Table 3. Before a detailed discussion in the Practical Trap section, it should be noted here that despite typically being referred to as the “East Asian model”, there is neither industrial policy template nor a recipe for a magic bullet. Variations across the theme deserve close attention. For example, in terms of trade policy, Singapore is much less interventionist than Japan and Korea. But Singapore and Taiwan are far more interventionist than Japan and Korea when it comes to the role of state-owned enterprises (SOEs). Of course, many other developing countries, including second-tier NIEs, already tried to deploy some of these policies, but relatively, and in some cases dramatically, have failed. The explanations for different outcomes of industrial policy lie in the details of policymaking, or what we call the practical trap.

⁹ The exceptions to this historical pattern are Switzerland and the Netherlands. However, both were already on the frontier of technological development by the eighteenth century and did not require much protection (Chang 2002).

Table 3. The various mixtures of state intervention in Japan and first-tier NIEs

	Japan	Korea	Taiwan	Singapore
Policy				
Infant industry protection	Very strong	Very strong	Very strong	None
Export promotion	Strong	Very strong	Very strong	Strong, but mostly indirect
State-owned enterprises (SOEs)	Not used	Used in some critical industries	SOEs ran most key upstream industries	SOEs ran some key industries
Large private-sector firms	Strongly promoted	Strongly promoted	Discouraged (most large firms were SOEs)	Not promoted (large firms were either SOEs or TNCs)
Local contents	Stringent local content rules, creating support industries	Stringent local content rules, creating support industries	Strong pressures for raising local content and subcontracting	None
Transnational corporations (TNCs)	Strongly discouraged	Strongly discouraged outside selected sectors	Discouraged outside selected sectors	Aggressive targeting and screening of high value-added TNCs
R&D	Private-sector-led	Private-sector-led	Government-led	Government-led
Policy implementation				
Centralization in policymaking	Strong	Very strong	Very strong	Strong
Government–private sector relationship	Two-way cooperation, systematic	Top-down direction, less systematic than in Japan	Mixture of antagonism, benign neglect, and central control	Local private sector unimportant
Role of private-sector associations	Very important	Important, but controlled by the government	Important, but controlled by the government	Local private sector unimportant

Source: Lall (2004, Table 2) and Chang (2006, Table 3).

The Practical Trap

Even though we are in agreement with the third body of MIT literature that successful structural transformation required proactive state intervention, the Achilles heel of the state-centric approach is its lack of detailed discussion and pragmatic guidelines on how state intervention can be effective in practice.

Before turning to the empirical discussion, there are two conceptual issues that should give grounds for thinking of industrial policymaking. First, industrial policymaking should be posited on the same level as other types of policymaking, be it education, health, or social policies, in the sense that it will certainly be confronted with problems and difficulties in terms of implementation, needless to say wasteful outcomes. But the tasks of policymakers and academics are to minimize such problems and to maximize the benefits. Second, the debate over the “functional/general” intervention versus “selective/sectoral” intervention is almost meaningless at the operational level. Those who support functional intervention of the state may draw the line of intervention at education, R&D, and infrastructure that benefits all industries equally. Nonetheless, almost all interventions in reality *inevitably* favor some sectors and actors over others, and therefore have discriminatory effects that amount to targeting (Rodrik 2008; Chang 2011).¹⁰ Accordingly, designing a systemic selective policy *ex ante* should be a more productive and accountable enterprise than deploying it with blind prejudice.

Building on the above two conceptual grounds, in this section we further propose that the first-tier NIEs have pursued dynamic “selective” industrial policy both horizontally and vertically, and their government support has had an explicit yardstick and exit strategy. Horizontal policies are policies for supporting selected socially desirable activities, while

¹⁰ For example, granting R&D subsidies implicitly favor R&D-intensive high-tech sectors. Building railways (instead of roads) implicitly favors the steel industry (more than the auto industry). Among a few policies that could be regarded as “general” are basic education and healthcare (Chang 2011).

vertical policies are those for supporting particular sectors, clusters, technologies or even products. Selective policy designed with the “carrot-and-stick” approach is the key character that determines the level of catching-up success among NIEs.

Proposition 5: First-tier NIEs Have Pursued Dynamic Selective Industrial Policy both Horizontally and Vertically.

Defined as “a policy aimed at particular industries (and firms as their components) to achieve the outcomes that are perceived by the state to be efficient for the economy as a whole” (Chang 1994, p. 60; also in Lindbeck 1981), industrial policy formulated in NIEs involved a lot more than subsidies and trade protectionism.

At the macro level, there are various mixtures of state intervention operated in first-tier NIEs. The wide range of measures includes: (a) coordination of complementary and competing investments through entry regulation, investment cartels, and negotiated capacity cuts; (b) policies to ensure economies of scale such as licensing conditional upon production scale, state-mediated mergers and acquisitions; (c) regulation of technology imports such as screening for obsolete technologies; (d) regulation of foreign direct investment (FDI) such as ownership restrictions, local contents and technology transfer requirements; (e) mandatory worker training for firms above a certain size; (f) export promotion such as export subsidies, export loan guarantees, marketing support; and (g) government allocation of foreign exchanges, with high priority given to capital goods imports and low priority to luxury consumption goods imports (Chang 2011).

At the micro level, these countries also used a wide assortment of recipes that suit the socio-political contexts of horizontal and vertical targets at a given time. Socially desirable horizontal targeted activities of firms supported by NIEs are, for example, production in 1960s, design and engineering in the 1970s and the 1980s, and advanced R&D from the 1990s. Vertically, these countries specifically targeted selected sectors, clusters, technologies and even products. The summary of targeted industries is provided in Table 4.

Table 4. Targeted industries of NIEs from the 1950s to the 1990s

	1950s	1960s	1970s	1980s	From 1990s
Taiwan	Consumer electronics, cotton textiles	Automobiles, plastics, artificial fibers	Semiconductors, shipbuilding, metals	Semiconductors, computer software, machine tools, automobiles, metals	Notebook, Green biotechnology
Korea	Cement, fertilizer, and oil refining	Chemical, steel, and machinery	Heavy and chemical industry, non-ferrous metals, shipbuilding, and electronics	Semiconductor, new materials, biotechnology	Mobile devices, software games, digital contents, films
Singapore	–	Petroleum refining, radio receivers and televisions industries	Electronics, machinery, transportation equipment	Disk drive, semiconductors	Biotechnology, digital contents, health services, entertainment, water

Source: Authors' compilation from, inter alia, Wade (1990); Chang (1993); Lee (1997).

Taiwan. Taiwan differed from Japan and Korea by not promoting large, private conglomerates and by less supporting the heavy industries. Concerning horizontal government intervention, the earlier schemes between the 1960s and the 1980s focused on facilitating the development of “absorptive capacity” in order to take advantage of existing foreign technologies. Taiwan’s R&D support system sets a compelling example, as it has been designed and redesigned in accordance with the dynamics of indigenous firms. Teeming with SMEs during its early catching-up period, the state played an important role in diffusing *process technology* to the SMEs before moving to the establishment of various *product technology* consortia in the later stages (Wong 1999). Initially, the Taiwanese government supported R&D activities by trusting non-profit research institutes to perform targeted projects and passing the results on to industry for commercialization. Taiwan’s integrated circuit industry is one successful example of a high-tech industry that makes use of R&D projects supported by the Ministry of Economic Affairs. Technologies in notebook computer and semiconductor wafer fabrication firms have been strongly generated by the Industrial Technology Research Institute (ITRI) (Wong 1999; Hsu and Chiang 2001).

With regard to vertical government intervention, the targeted industries have been changed over time to suit the country's condition at varying stages. For example, in the 1960s Taiwanese policymakers agreed to push the country toward more export orientation. The multiple exchange rate system was replaced with a unitary rate, tariffs and import controls were gradually reduced, and the Bank of Taiwan offered low-interest loans to exporters. State control and leadership was focused on upstream industries such as synthetic fibers, plastics, basic metals, and advanced electronics. The Taiwanese attempted to ensure that export profits and resources of indigenous firms would be reinvested in further productive activity. In the 1990s the Program for Leading Product Development was established to subsidize costs in R&D for high-tech products and technologies such as information and communication technology. Around 800 out of 1,600 cases were approved. The share of approved projects between SMEs and large firms was about 50:50. Results of the program were quite impressive, as one Taiwanese dollar of grant induced approximately an additional 10 dollars investment in R&D, 21 dollar investment in production, and 42 dollars in sales. On average, one project generated 3.7 patents and 2.9 derivative products (Liu and Wen 2011).

South Korea. State intervention in Korea was generally stronger than in Taiwan. The lion's share of financial resources was also directed towards targeted sectors by the government. One of the most important means was the "policy loans", which accounted for 57.9% of total bank loans made approximately between 1962 and 1987 (Heo 2001). In the very early years of Korean development, the targeted industries were cement, fertilizer, and oil refining, before moving to chemical, steel, and machinery in the late 1960s. More ambitious, technology-intensive projects were launched in the 1970s with the heavy and chemical industry (HCI) program, non-ferrous metals, shipbuilding, and electronics. While Taiwan focused on its SMEs, large family-own conglomerates, the *chaebol*, were strongly supported by the Korean state with an attempt at concentrating resources on entrepreneurs with proven track records and encouraging technological and organizational economies of

scale. During the catching-up period, what concerned Korean policymakers were “excessive competition” and the resulting “social waste”. Individual firms in targeted sectors needed to be large enough for the minimum efficient scale of production. If firms were considered to be smaller than the minimum efficient scale, the state would step in to implement mergers. The laws were endorsed to control entry restrictions and capacity expansion, while, when necessary, macroeconomic policy was aimed at creating an expansionary environment even through inflationary measures (Chang 1994; Amsden 1989). Korean SOEs also played a role in the oil, coal, gas, steel and utilities sectors to control important industrial inputs (Wade 1990).

In the horizontal dimension, since the 1980s Korea has promoted socially desirable activities of R&D through its national R&D programs, composed of such diversified projects as: the Highly Advanced National Project (the HAN Project), Creative Research Initiative, National Research Laboratory, Biotechnology Development Program, Space and Aeronautics Program. A survey reported that firms participating in government R&D programs acquired portions of technological skills and knowledge from their partners. Government R&D programs also helped to solve “network failures” by linking participating firms with public R&D centers and partner companies and “lock-in” and “transition” failures by opening up new technological and market opportunities for participating firms to pursue (Lee 2006).

Singapore. Despite maintaining the free trade regime, Singapore still adopted highly interventionist policies to promote and deepen its industries. As for the vertical intervention, beginning as entrepôt trading, FDI in the petroleum industry in the 1960s accounted for 63.1% of total foreign investment. However, in 1965 the government re-focused its target to FDI in the radio receiver and television industries, and in the 1970s the machinery, transportation equipment, and electronics industries (Lee 1997). Singapore strategically attracted high value-added activities from FDI in return for tax concessions, infrastructure, education and skills training, and a stable business environment, usually

given in a tailor-made manner. For example, the Singaporean government responded to the flourishing electronics FDI in the 1970s by ensuring that all supporting industries, transport and communication infrastructure, as well as the relevant skill development programs, were in place to attract leading electronics companies (Lall 2004).

Concerning horizontal policies supporting desirable activities, in the 1970s and 1980s, when the Singapore government wanted to promote technological diffusion from transnational corporations to local enterprises, schemes such as the Local Industry Upgrading Program was initiated. In the 1990s, when firms in the country needed to increase their R&D capability, the government had a grant scheme to leverage Israeli's R&D capability by funding feasible R&D projects under collaborations of firms in the two countries. There exists deliberate attempt at mitigating "network failures" between transnational and local companies. For example, the Economic Development Board (EDB) subsidized a percentage of the salary of a manager sent by a transnational corporation to work in a local enterprise for two years (Wong and Singh 2012). Less well known is the pivotal role of SOEs, particularly Temasek Holdings. Temasek holds *majority shares* in a wide range of areas including Singapore Airlines; telecommunications; financial services; energy and natural resources; transport; shipping; semiconductor; health care; engineering. As a result, the public sector share of gross fixed capital formation in Singapore was: 35.6% in the 1960s, 26.7% in the 1970s, and 30.3% in the 1980s, which were even far higher than that in Korea (Shin 2005). Singapore is therefore just one among the neglected cases which demonstrate that well designed SOEs can take a vital part of a country's economic driver.

Proposition 6: Government Support Demands an Explicit Yardstick, Exit Strategy, and Policy Learning.

Not only have the first-tier NIEs pursued dynamic industrial policy horizontally and vertically, but their government support has also had an explicit yardstick and exit strategy. Despite variation in policy orientation and design, Taiwan, Korea, and Singapore share a

carrot-and-stick approach to industrial policymaking. Only a relatively small number of activities were supported at a given time, and the effects of protection were offset by strong export orientation. Policy learning was also prevalent. Ineffective policies were rectified or scrapped timely, with more effective policies being introduced when needed. In other words, East Asia's industrial policy entails desirable features of all incentive programs: that is, conditionality, sunset clauses, built-in program reviews, monitoring, benchmarking, and periodic evaluation (Rodrik 2008). These features clearly differentiate them from unsuccessful latecomers, including Southeast Asian NIEs whose infant industry protection was open-ended and non-selective, with no required performance in exchange for policy support.

East Asian NIEs. With regard to the yardstick, the first-tier NIEs used export performance and the discrepancy between domestic costs and international prices to guide subsequent government policies for the targeted industries. The recipients of policy support in Taiwan were threatened with a penalty if the prescription were not followed. Taiwan's control instruments include quantitative import restrictions and export licensing, foreign investment screening (incoming and outgoing), approval for capital goods imports for new plants (until 1980), no non-governmental borrowing of foreign funds, and restrictions on entry to certain sectors (Wade 1990). Korea strongly deployed the tight performance monitoring system, set by the firms and industry associations in concert with the government. Its punitive measures included: access to subsidized credit and import licenses; income tax audits; even prison sentences could be put in place for some serious issues. Moreover, the Korean state usually set up SOEs to accomplish the task that it could not make the private firms do (Lall 2004; Chang 1994). Singapore is less punitive than Taiwan and Korea, given its FDI-led strategy. However, only prioritized activities or critical capabilities necessary for future industrial upgrading at the time were given "additional" incentives, for example, the introduction of automation technologies, precision engineering, environmental friendly technologies, design and R&D. Policy learning is most

illuminating in the case of Singapore, in which the results of policy implementation have been periodically monitored, benchmarked, and evaluated by implementing agencies, especially EDB (Wong and Singh 2012). The intensity of the above carrot-and-stick measures is in marked contrast to industrial policymaking in Malaysia, Thailand, and the Philippines.

Malaysia. The industrialization and poverty reduction record of Malaysia is relatively successful when compared to most developing countries. But the government approach toward private sectors differs considerably from that of East Asian NIEs. Malaysia has fostered rapid upgrading in the technological content of foreign manufacturing, but Malaysian-owned industry has remained marginal in most manufacturing industries. Since the late 1960s, its incentives to attract substantial export-oriented manufacturing investments had been more generous than those of East Asian NIEs. Technology transfer in Malaysia was not involved any *ex post* monitoring and appraisal, while the *ex ante* screening was poorly managed. Neither explicit performance requirements nor measures to ensure more value-added manufacturing were put in place (Rasiah 1996; Doraisami and Rasiah 2001). Such an approach is exemplified by the case of Proton, the “national car” project launched in 1983. Proton and inexperienced *Bumiputera* parts suppliers have been granted substantial protection through high tariffs and excise duties.¹¹ After almost three decades of protectionism, however, Proton has still been unable to develop independent engine manufacturing capability. Meanwhile, the Malaysian government has no rigorous mechanisms to monitor and improve performance in order to adjust tariffs downwards according to levels of efficiency (see Jomo *et al.* 2003).

However, it is worth noting that the situation has improved in the 2000s, as Malaysia tried to learn more from East Asian NIEs. The Ministry of Science, Technology, and

¹¹ However, a lion’s share of profits generated by Proton has remained in the hands of its foreign technology suppliers, mainly Mitsubishi, its joint-venture (Jomo *et al.* 2003: 144).

Innovation has started to provide various types of grants covering the whole spectrum, ranging from basic and applied research, prototype development (Science Fund), to development of technology for commercialization (TechnoFund) and innovation (InnoFund). The Ministry of International Trade and Industry has supplied several matching grants schemes to SMEs for business start-ups, product and process improvement, productivity and quality improvement. All of these schemes can be seen as Malaysia's attempts at enhancing technological and innovative capabilities in the private sector, and at forging closer relations between industries, universities, and public research organizations. Despite these endeavors, the weakness in terms of administration, monitoring, and evaluation remain there (see Thiruchelvam *et al.* 2012).

Thailand. Prior to the 2000s Thailand never had an explicit industrial policy (Intarakumnerd 2011; Siroros *et al.* 2003). The international development community praised Thailand for its hands-off approach and macroeconomic priority (World Bank 1993, p. 7). The exceptions were only the local contents restriction in automobiles used between 1974 and 2000, and support for scale economies in petrochemicals in the 1980s (see Kanchoochat 2012). However, such measures were never designed in a strategic, long-term manner, and there were no clear performance requirements.

Not until the Thaksin government (2001–6) were explicit vertical industrial policies tailored to specific sectors deployed for the first time. The government declared five targeted sectors: food, automotive, fashion, software, and tourism. Clear corresponding visions were given to them: Kitchen of the World, Detroit of Asia, Asia Tropical Fashion, World Graphic Design, and Animation Centre, and Asia Tourism Capital. Eligible firms in these sectors are not only final product makers but also suppliers in the value chains. Moreover, a special investment package to promote skills, technology and innovation (STI)

was initiated by the Board of Investment.¹² Nonetheless, the Thaksin government largely failed to create consistency and continuity of those policies and set up mechanisms to enforce, monitor, and evaluate the outcomes of those policies. In sum, despite a promising start, policy learning was poor. The Thaksin government largely failed to sustain an effective and long-lasting learning process in the country's national innovation system (see Intarakumnerd 2011).¹³

The Philippines. Like other NIEs, the Philippines followed import-substitution industrialization in the 1960s before shifting to export orientation in the 1970s. However, compared to the five countries discussed above, the Philippines has least successfully expanded the country's export production. In terms of structural transformation and export compositions, while such a shift to an export-led economy took approximately three years in Singapore, it took almost twenty years in the Philippines (Kuruvilla 1996). Even in areas like physical infrastructure, the Philippines did not deliver well, with the exception of the transport facilities at Subic Bay. It is worth noting that from the 1950s to at least the 1960s the Philippines performed very well on paper; its *formal* records of democratic institutions, a system of checks and balances, and levels of education were all better than any other NIEs. But informal institutions, particularly the concentration of political power in the hands of land-owning elites, have played a crucial role (Crouch 1985). Powerful domestic business interests, under the weak and fragmented state structure, have usually obstructed substantive reforms. Even when some reforms toward openness in trade and production were implemented, resources and rents have largely been channeled to favor its old oligarchy in the end (Doner 1991; Hamilton-Hart and Jomo 2003). Most science,

¹² Firms are eligible for extra tax incentives if they undertake the following: spending at least 1%-2% of their sales on R&D or design; ensuring that at least 5% of their workforce comprise scientists or engineers; spending at least 1% of their total payroll on employee training; and spending at least 1% of total payroll on training the personnel of their local suppliers (Patarapong 2011).

¹³ There are also political-economic conflicts between Thaksin and the traditional elites that have impeded the country's structural transformation (see Kanchoochat 2012).

technology and innovation policies are rather generic such as increasing R&D budget, number of trained scientist and technology parks. Selected policies aiming at strengthening particular sectors or clusters were not there. Only recently has the government tried to target biotechnology and promote innovation under the brand Filipinovation. But its implementation and evaluation is far from satisfaction (see Velasco 2010).

Conclusion

This paper has two objectives, namely, to review the existing MIT literature, and to assess its validity through the contrasting experiences of first-tier and second-tier NIEs. We have classified this burgeoning area of research into three groups, labeled by their policy standpoints: that is, (1) getting education and institutions right; (2) changing export composition by following comparative advantage; and (3) industrial upgrading by the proactive state. We then pointed out the theoretical and empirical problems of each group. Our six propositions have been provided in the meantime, as summarized below.

BOX I: The article's six propositions

P1: Education alone is no guarantor of successful catching up.

P2: The “good governance” agenda is theoretically and empirically flawed.

P3: A transformation of productive structure is the crux of economic development.

P4: Successful structural transformation required proactive state intervention.

P5: First-tier NIEs have pursued dynamic selective industrial policy both horizontally and vertically.

P6: Government support demands an explicit yardstick, exit strategy, and policy learning.

Our propositions have begun with the debunking of educational and institutional myths. First, it is argued that education alone is no guarantor of successful catching up. For education to be directly supportive of economic growth, it needs to be closely linked with national development strategy. Second, the so-called “good governance” agenda is fundamentally flawed. It not only rests on shaky theoretical grounds, but is also unable to explain East Asian NIEs, all of which possessed “bad governance”, during their rapidly growing periods. The debate over the MIT should begin with the more relevant definition of economic development, and learn more from the real-world history. This is why we have drawn attention to the old-school tradition of development economics and innovation literature. Our third proposition is that a transformation of productive structure is the crux of economic development, whereby production and export composition of high local value-added should be at the core of policymaking. In so doing, our fourth proposition suggests that the role of the state should not be confined to only functional intervention and comparative advantage following. Yet, to avoid practical difficulties arising from state intervention, the experience of first-tier NIEs indicates the pivot of dynamic selective industrial policy with an explicit yardstick, exit strategy, and policy learning. As discussed in our fifth and sixth propositions, East Asian NIEs periodically restructured their targeted industries and incentives to upgrade countries’ positions in the global value chains. Despite pursuing state-led industrialization, policies made in Southeast Asian NIEs, at least until recently, did not possess such characters. This carrot-and-stick approach to industrial policymaking draws the fine line between the successful and mediocre catching up of NIEs – a salutary lesson not only for Southeast Asia but also other developing countries in the mission to escape from the middle-income trap.

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Publisher: Competence Center "Money, Finance, Trade and Development "
HTW-Berlin – Treskowallee 8, 10318 Berlin
Prof. Dr. Sebastian Dullien, Prof. Dr. Jan Prieue

<http://finance-and-trade.htw-berlin.de>

ISSN: 2192-7790

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