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Is There Economic Convergence in Asia?

by

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Abstract

This paper opens up a study of economic convergence in Asia. This convergence refers to the ability of developing economies to catch up with the developed ones in terms of levels and growth rates of real per capita GDP. The study uses the lens of neoclassical growth models, both the basic models of Robert Solow and Trevor Swan, along with the models of Robert Lucas Jr. and Paul Romer in endogenous growth theory to interpret observed growth in Asia. Data are taken from the 45 developing member countries of the Asian Development Bank. The study supports conditional convergence but not absolute convergence. That is the lagging economies can catch up with the leading economies provided the former can adopt advanced technologies, such as, those that feature human-capital investments, learning-by-doing and increasing returns from knowledge accumulation.

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1. Introduction

Looking at a large cross-section of economies in Asia, one striking observation pertains to the differences in levels and growth rates of real per capita gross domestic product (PCGDP) and per capita gross national income (PCGNI). Asia is home to the four richest economies that emerged as newly industrializing economies (NIEs) in East and Southeast Asia starting in the 1970s, namely, Singapore; Hong Kong, China; South Korea; and Taiwan, China. At the same time, Asia hosts many of the poorest economies, such as, Afghanistan, Nepal, and Bangladesh in South Asia; Cambodia and Myanmar in Southeast Asia.

The usual question that economists who study the growth of nations and city states is whether the poor countries can grow and catch up with the rich ones (see, for example, Romer, 1986; Lucas, 1988; Barro, 1991; Young, 1992; and Mankiw, 1995). This concern, referred to as economic convergence, pertains primarily to the ability of lagging economies to catch up with the leading ones in terms of growth rate and level of PCGDP and PCGNI. The issue has motivated the resurgence of interest in economic growth in both theoretical and empirical macroeconomics, as well as in development economics. In the latter, many studies have focused on explaining inter-country income differences, while analyzing policy approaches, institutional arrangements, and implementation mechanisms in various settings.

This paper studies economic convergence using as data points 45 member economies of the Asian Development Bank (ADB), excluding Japan, but including the four NIEs. In over 50 years of existence, the ADB has built a large data base consisting of socio-economic indicators of its member economies capable of answering questions like: what do Afghanistan and Bangladesh, for example, need to do to break out of poverty and catch up with South Korea and Taipei?[2] In addition, considering the four NIEs, can their growth experiences serve as models of successful industrialization to middle-income countries that are still aspiring to be industrializing at this juncture? Are there lessons from the NIEs that middle-income economies can adopt to cross over to a higher per capita product and income level?

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[2] Both South Korea and Taipei came out of internal-country conflicts before they could start their industrialization drives. They also needed to overcome a predominantly large agricultural sector, an industrial structure shared by many developing countries at the beginning of their push for industrialization.

The paper opens up an investigation of convergence and poverty traps with a preliminary look at levels of PCGNI and average annual growth rates of PCGDP. Using down-to earth measures of means and average annual growth rates, do the figures suggest convergence? We turn next to theoretical models and the perspectives they offer, starting with the neoclassical Solow-Swan (SS) growth model, followed by endogenous growth theory, which has produced a large body of theoretical and empirical work relevant to development economics. How far can the SS model and endogenous growth theory go in answering the questions: Can poor economies escape poverty traps? Can middle-income ones cross over to high- income NIEs?

The paper is organized as follows: The next section presents some growth facts in Asia. Section 3 examines convergence through the lens of neoclassical growth models and of some extensions stemming from endogenous-growth theory. Section 4 looks at the experience of the poorest countries and examine some factors that keep them trapped in poverty. Section 5 reviews the experience of the Asian NIEs, and the lessons they impart to aspiring NIEs. Section 6 discusses empirical approaches. Section 7 makes concluding remarks.

2. Growth Facts in Asia

The economies in Asia at present exhibit a high degree of diversity, particularly, in terms of the level and growth rate of PCGDP and PCGNI. The interplay across time of several factors, including, economic, social, and political, has brought these economies to their varied current income levels. They are classified as poor, middle income, and high income. Many of them gained political independence after World War II, but during the age of colonialism, they were greatly influenced by the norms and values that the colonial masters imposed on them; for instance, some masters introduced mass public education systems, but others did not. Some production techniques of the colonial powers in agro-processing were introduced, with the colonies supplying intermediate agricultural and extractive products to the colonialists. In addition, the governance and political institutions that the colonial masters introduced were already in retreat then in Europe, taken down by revolutions in some, such as, the centralization of powers, with hardly any regard for self-governance in the periphery. In other words, the colonialists to a great extent did not practice decentralization and devolution of political powers and governance at the sub-national level. The colonialists gave large land grants to their appointed local leaders, resulting in unequal distribution of land endowments.

Many of the former colonies gained political independence after World War II; in the aftermath, the urge for economic independence became strong, an aspiration that did not come easy. A major hindrance stemmed from having a very narrow physical and human capital base, particularly, in the former colonies wherein mass education was not deemed of prime importance. In addition, the policies and the way they were implemented were not conducive to increasing productivity and growth. Furthermore, there were ethnic rivalries and warring tribes, with little regard for unification and nation building. The latter tasks required a critical mass of highly trained and educated personnel.

The major challenge was transforming a largely agricultural economy into one that can be considered industrializing.[3] Subsistence agriculture was predominant. It was like the development of a Robinson-Crusoe economy.[4] Early on, Crusoe planted crops and caught fish using only his own hands and labor, producing just enough for his personal consumption. Crusoe then took time out to build some farm implements and fishing nets, which raised the acreage planted to crops and the yields from farming and fishing. Once Crusoe realized that there were activities more remunerative than farming and fishing, his thoughts turned to industrial activities, say, manufacturing capital goods that enhance productivity. He also contemplated trading his farm and fishery surplus by venturing out to other inhabited islands.

In their push for industrialization, the former colonies adopted different strategies. Most of them embraced import substitution at the start. Products that were formerly imported began to be manufactured locally. This approach ran into several constraints. One was a human-resource constraint; the manpower base was not sufficiently skilled. In addition, there was a tight foreign-exchange constraint; fixed capital equipment and intermediate products had to be imported while the locally manufactured final products were sold only domestically. Moreover, an elaborate system of tariff and non-tariff barriers was put up to protect the import substitutes from the competition posed by imported products. The trade protectionism compounded the inefficiencies under import substitution. Intermittent balance-of payment (BOP) difficulties intervened. Moreover, agriculture and its workers were penalized. Famers paid more than world prices for industrial products like fertilizer and pesticides, which were domestic industries protected by foreign-trade policies from competing imports. Food prices were kept low for urban industrial workers in further support of the import-substituting industries. These policies succeeded in keeping many small landless farmers poor. To this day, majority of the poor are still trapped in subsistence agriculture.

In view of the difficulties brought about by import substitution, some of the economies found it well-advised to abandon it. For example, Hong Kong, Singapore, Taiwan, and South Korea shifted to export-led industrialization. Differing industrialization strategies and relative dominance of skilled human capital yielded different growth rates of output and income across time.

Casual empiricism indicates a mixed record in terms of economic-growth performance in a large sample of consisting of the member economies of ADB. The richest is Singapore with PCGNI of US$51,880 in 2019 expressed in 2016 US$. The poorest is Afghanistan, a conflict-affected area with a PCGNI in the same period of US$570.

Table 1 shows levels of PCGNI in 2019 expressed in 2016 US$, and the average annual growth rates of PCGDP for the period 2017-2019 in 45 economies. The sample consists of the

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[3] A long line of economic thinkers has observed this development problem (see, for example, Johnson, 1963). Schultz's work (1964) drew attention to the relevance of neoclassical thinking in transforming traditional agriculture.

[4] Barro (1994) has used a Robinson Crusoe economy as a model of a simple economy in laying down the microfoundations of macroeconomics, particularly, labor-supply decisions.

45 developing member countries (DMCs) of the ADB, including the four NIEs for some comparative analysis. Since its establishment in 1965, the ADB has accumulated useful economic and social information about its 45 DMCs. All figures, unless otherwise stated, are taken from the annual *Key Development Indicators* (ADI) of ADB.

Table 1. 2019 PCGNI and Average Annual Growth Rate of PCGDP, 2017-2019

Economy	AAGRPCGDP (in %)	2019 PCGNI (2016 US$)
Central Asia	2.6	
Armenia		3,770
Azerbaijan		4,760
Georgia		3,830
Kazakhstan		3,810
Kyrgyz Rep.		1,100
Tajikistan		1,100
Turkmenistan		6,670
Uzbekistan		2,220
East Asia	5.5	
Hong Kong		43,240
Mongolia		3,590
China		8,250
Rep. of Korea		27,600
Taipei		23,015
South Asia	5.2	
Afghanistan		570
Bangladesh		1,330
Bhutan		2,510
India		1,670
Maldives		10,630
Nepal		730
Pakistan		1,500
Sri Lanka		3,780
Southeast Asia	4.1	
Brunei Darussalam		32,860
Cambodia		1,140
Indonesia		3,400
Lao PDR		2,150
Malaysia		9,860
Myanmar		1,190
Philippines		3,580
Singapore		51,880
Thailand		5,640

Vietnam		2,100
The Pacific	0.03	
Cook Islands		16,398
Micronesia		3,550
Fiji		4,780
Kiribati		2,270
Marshall Islands		4,630
Nauru		10,750
Palau		12,330
Papua NG		2,680
Samoa		4,120
Solomon Islands		1,880
Timor Leste		2,060
Tonga		4,060
Tuvalu		5,090
Vanuatu		3,395

Source: Website, ADB, *Asian Development Indicators* (ADI), Downloaded April 1, 2020
Notes: PCGNI, Per Capita Gross National Income in 2016 US$
        AAGRPCGDP, Average Annual Growth Rate of Per Capita GDP, 2017-2019

Casual observation readily shows large differences in inter-country PCGNI. To lend some quantitative flavor to the diversity, levels of 2019 PCGNI expressed in 2016 US$ and average annual growth rates (AAGR) of real per capita GDP in 2017-2019 are shown in Table 1. The four rich NIEs stand out. In contrast are 10 countries with PCGNI still less than US$2,000 in 2019. The co-existence of rich and poor economies in Asia among the DMCs of ADB calls for explanations, to help find answers to how the poor countries can escape the poverty they are at present mired.

It is important to note that at an AAGR of per capita income of 6.9%, it takes 10 years for per capita income level to double. The NIES lead the group with a per capita income growth rate of 5.5%. if all the ADB member economies maintain their average annual growth rates of per capita income shown in Table 1, they will continue to lag behind the NIEs. Member economies in Central Asia and in the Pacific with AAGRPCGNI of 2.6% and 0.03% will not be able to catch up with the NIEs and convergence will not take place. Meanwhile, the NIEs are able to preserve their growth rate that is averaging 5.5% each year; they continue to adopt technological advancements, hereby ensuring positive growth rate in the long run.

For expository purposes, Tables 2 and 3 below show the PCGNI in 2019 of the poorest DMCs and richest NIEs, respectively, expressed in 2016 US$. What did the four Asian economies do to achieve NIE status? What, meanwhile, should the poorest member economies do to escape a poverty trap? The search for answers brings us to a review of analytical models. This starts with a review of the SS growth model below to help organize thinking about within-

country growth. To explain long-run growth in the economically advanced economies, we rely on the contributions of endogenous growth theory to development economies.

Table 2. Poorest Countries among DMCs in Asia

Country	AAGRPCGDP, 2017-2019	2019 PCGNI (2016 US$)
Kyrgyz Rep.	2.2	1,100
Tajikistan	4.6	1,100
Afghanistan	0.7	570
Bangladesh	5.8	1,330
Nepal	4.4	730
Pakistan	1.3	1,500
India	5.9	1,670
Myanmar	6.0	1,190
Cambodia	5.4	1,140
Solomon Islands	0.3	1,850

Source: Website ADB, *ADI*, Downloaded April, 1,2020

Table 3: Richest Countries (NIEs)

Economy	AAGRPCGDP, 2017-2019	2019 PCGNI (2016 US$)
Singapore	2.5	51,880
Hong Kong	2.6	43,240
South Korea	2.8	27,600
Taipei	2.2	23,015
Average	2.7	

Source: Website ADB, *ADI*, Downloaded, April 1, 2020

Looking at Asia's poorest and richest countries in Tables 2 and 3, respectively, one can imagine the wide divide in living standards between, for example, Afghanistan and Singapore. The difference invites the question: what explains the gap and what can Afghanistan do to overcome its very low per capita income. Afghanistan is the poorest with a 2019 per capita income of USD 570, and an average annual growth rate of 0.7%. At this growth rate, it takes 99 years for per capita income to double. Afghanistan will be in a poverty trap for nearly a century. Meanwhile, Singapore has a per capita income of USD 51,880 and growing at 2.5%. The per capita income at this growth rate doubles in 27 years.

After looking at the facts on growth and poverty traps, we explore possible ways to escape poverty traps. We adopt the perspective derived from neoclassical growth models, starting with the SS model, followed by extensions inspired by endogenous growth theory.

3. Convergence in Neoclassical Growth Models

Growth models saw a resurgence in the 1980s, after a pause of about two decades that saw business-cycle studies dominate studies in macroeconomic theory and policy, and macroeconometrics. The new growth studies took off from the neoclassical model of Solow (1956) and Swan (1956), which featured a production function exhibiting constant returns to scale (CRS) and diminishing marginal product each of labor and capital. The limitations of the SS model in accounting for growth in the long run of developed countries inspired endogenous growth theory, which now consists of a large body of studies and has informed modern development economics.

Solow-Swan Model

The production function written in per capita terms takes the form

(1) $y = f(k)$, $f'(k) > 0$ and $f''(k) < 0$

where $y = Y/K$ and $k = K/L$. Equation (1) is said to be expressed in intensive form. The variable Y is national output or real GDP, K is physical capital, and L is labor employed. Both K and L exhibit positive but diminishing marginal productivity. The assumption of CRS yields equation (1) in per capita terms. With these assumptions, the production function f is said to be well behaved.

Capital accumulation is the main driver of growth in the SS model. The dynamic model of capital accumulation takes the form

(2) $dk/dt = s\,f(k) - (n + d)\,k$

where the left-hand side is the rate of change of k, s is the exogenous saving rate, n is the growth rate of labor, assumed equal to the growth rate of the population, and d is the depreciation rate. Technological level is for expository purposes assumed fixed initially.

A steady state is defined as the point where the variables on interest Y, K, and L are all growing at the same rate, n, thereby rendering dy/dt = o. Denoting by k* the steady-state value of k, eq. (2) yields

(3) $s\,f(k^*) = (n + d)\,k^*$.

Equation (3) equates savings out of output to capital investment adjusted for population growth and depreciation. New entrants to the labor force are equipped with capital. Allowance for wear and tear is represented by d.

The steady-state output per worker y* is obtained by substituting k* in the production function given by equation (1). The steady state is denoted as (k*, y*). The latter can change if any of the exogenous values s, n, and d are allowed to change. For instance, if s rises, holding all

others constant, then k* and y* move to a new steady state with higher values. And if n increases, while all others are held fixed, then k* and y* both decline.

If a developing country is still below its steady state, increasing s permits movement to a higher steady state, leading to convergence. This assumes that the lagging economy has access to the same technology as the legging economy. This is known as absolute convergence. But if there is a developed country still below its steady state and also raises its savings, it moves to a higher steady state, too, leaving behind the developing country in terms of the steady state. This is referred to as conditional convergence.

Moreover, suppose technology is allowed to vary exogenously, and a developed country embraces the new technology while the developing country does not, then the latter continues to lag behind the developed country in terms of per capita income. As a result, the developed country continues to grow in the long run, instead of resting in a steady state with constant growth rates for K, L, and Y, and hence, zero per capita growth rates. Choice of technology thus matters for growth, a situation that has inspired the birth of endogenous growth theory.

To sum up, the basic SS model assumes the saving rate as well as technology to be exogenous, opening up the possibility of convergence. One of the important extensions of the SS model is making saving rate endogenous (see Ramsey 1928). However, to explain the positive growth rate of modern industrial countries in the long run, macroeconomists have proposed endogenous growth theory.

Endogenous Growth

The prototype model of endogenous growth is the Y = A K model where A represents the level of technology. The production function involves CRS and can be re-written in the form y = A k. The model shows constant, not diminishing, marginal productivity of capital equal to A. Additional output per worker grows without limits.

Using the insight from the above model, Lucas (1988) adopts a production function that involves human capital. It is assumed to be labor augmenting. Investing in human capital raises the efficiency of every labor unit. It is shown that this results in non-diminishing marginal product of capital. Human capital takes many forms, such as, investment in education and health (see Becker, 1964). The role of on-the-job training is also an important source of human capital (see Mincer, 1962).

Meanwhile, Romer (1986) exploits increasing returns from learning-by-doing (see Arrow, 1958). Knowledge is not diminished from use by one agent. Once knowledge spreads from one firm to all other firms in the industry without diminution, increasing returns in production takes place as a matter of course. Romer departs from the assumption of CRS to obtain endogenous growth.

In an open-economy setting, growth emanates from product diversification, whether intermediate or final products (see Grossman and Helpman, 1989, 1990). Agricultural exports, for example, benefit from the development of modern seed varieties, such as, corn and rice see, for instance, Schultz, 1964). In the industrial sector, production of spare parts and components that can be manufactured and reassembled under separate stages of production open up opportunities for multi-product trade based on comparative advantage. Manufacturers in developed countries, for example, subcontract the labor-intensive stages of production in developing countries, taking advantage of low wages in the latter. Assembly, for example, of semi-conductor chips on a computer plane is subcontracted in a developing country, then re-exported to the developed countries for assembly into laptops and personal computers.

4. Poverty Traps: Policies, Governance, and Institutions

Conditional convergence in a neoclassical construct of the world, such as, in the SS model, is widely accepted. A lagging economy that has not reached its steady state can catch up with the leading economies provided it can access the production technology of the latter, address significant market failures, and invest in capital, broadly defined to include human capital. In doing so, the lagging economy increases its effective capital per worker and its productivity. Its real per capita product and income grow at a more rapid rate, thereby raising national product and income while coming closer to the real per capita income of leading economies. In contrast, a low-income economy that cannot navigate market failures and fails to invest in the policies and institutions that matter for productivity and growth is liable to be trapped in poverty.[5]

There are many forces at work that keep nations in poverty traps (see Azariadis and Stachurski, 2005). In the SS growth model, market imperfections and outright failures, starting with financial markets, force some countries and the economy to languish in poverty. Lack of capacity to navigate financial-market limitations prevent them from crossing the line to a world with high living standards.

Financial markets and the corresponding institutions emerge as a matter of choice by market agents in a variety of economic situations under scarcity. Generally, there are agents with projects that are expected to be profitable, but who lack the financial wherewithal to carry them out. They are willing to pay a price to obtain loanable funds supportive of their projects. Call them borrowers. At the same time, there are agents with surplus funds but no projects, the savers who are willing to lend their savings, but for a price. They are willing to forego current consumption for later provided they are compensated for the utility they forego in the present period. The interest rate and amount to be lent and borrowed are determined; a financial market emerges. Banks are financial institutions that are established in the process; they pool

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[5] Defective policies and weak institutions hinder growth and generate poverty. Acemoglu and Robinson (2012) have emphasized this point. However, Sachs (2005) argues that poverty does not necessarily create weak institutions; it's the latter that cause poverty.

savings through deposits, conduct credit investigations, and write the loan contracts. Savers and borrowers need not meet directly; banks mediate the transactions.

The banking industry generally has a limited number of participating institutions. They accept deposits and lend these deposits at an interest rate. Banks write both deposit and loan contracts and derive net profits from the process. Taking deposits is an activity that is imbued with public interest. Bank regulation is mandated as a result, a process that has been evolving and undergoing refinements across time. Regulators, for example, impose minimum reserve requirements (MRRs) on various types of deposits. If the MRR is 20%, that means the bank can only lend 80% of every unit of local currency deposited with it. In addition, there is a system of deposit insurance. In case a bank fails, depositors are guaranteed to get back a minimum amount of their deposits. The regulations in place are intended to encourage the public to deposit its savings in banks.

Financial-market failures, however, may emerge in some cases. Savers have a rate of time preference, demanding an interest rate as compensation for the foregone utility in the present period. If the asking interest rate is so high that potential borrowers are not willing to absorb it, no transaction takes place, a veritable market failure.

In other instances, information is limited and asymmetric. Limited information does not prevent agents from transacting. They write contracts contingent on the occurrence of a state of nature. Under risk and uncertainty, financial markets serve to allocate resources across states of nature. However, if the information is asymmetric, meaning, it is not equally distributed between agents, market failures may also occur.

Two information problems arising from asymmetric information are adverse selection and moral hazard. These concepts originated from the economics of insurance markets. The insurance premium is the price that buyers and sellers of insurance agree on for an insurance policy to be written, a protection against the occurrence of an unfavorable state of nature. A car figuring in a mishap and a house getting burned down are illustrative of insurance contracts or policies.

Adverse selection is an ex-ante information problem. Potential buyers of insurance are heterogeneous, differing in degrees of risk aversion. Some are less risk averse than others. Preferably, an insurance company would want to charge buyers deemed high risk a higher premium. To be able to do such premium discrimination, the firm must adopt an information-gathering device that tends to be costly. To avoid incurring the information-gathering cost, the firm may just charge a uniform premium. Low-risk clients end up subsidizing the high-risk buyers who are likely to make frequent claims. Eventually, only the high-risk buyers buy insurance policies, a case of adverse selection. An insurance firm may be driven out of business from the frequent claims of high-risk clients, and so may choose not to write an insurance policy. Firms try to mitigate this problem by charging, for instance, potential risky buyers a higher premium if they exhibit some socio-demographic characteristics deemed high risk, such as, teen-agers who drive muscle cars and living in high-crime areas. In addition, co-insurance

and co-payments are standard features of insurance policies. Insurance markets may not fail but they tend to be limited.

Moral hazard, viewed as the inability to distinguish between true risk and deliberate action, is an ex-post information problem. The fundamental idea is this: some buyers become careless once insured. And so if an insured house burns down, the question is whether it's a genuine accident or arson. No payment is made if it's proven that the burning of the house is deliberate. Ascertaining the real cause of an accident, protection against which insurance has been bought, is costly. If the cost of investigation is prohibitive, a similar contract will not be written in the future.

Limited financial markets mean that some needs of people are not being met. People's choices are circumscribed with loss of human welfare. These limitations impact adversely on other sectors of the economy wherein decisions are made under uncertainty. In the aggregate, they are effective in keeping some nations mired in poverty. Financial-market transactions are freighted with risk and uncertainty. Some of the risks are insurable while others are not; hence, insurance markets tend to be limited, too. Limited financial and insurance markets also inflict adverse effects on families' human capital investments.

For example, investment in education, particularly higher education, is an important form of human-capital accumulation. The latter is largely financed internally by families. Banks generally do not offer loans for higher education. Families must thus have an initial endowment of wealth or savings to enable them to invest in their children's higher education. Normally, investment in higher education yields a real rate of return that makes the investment worth undertaking. Unfortunately, in the absence of credit markets for education, only rich households can have access to higher education for their children.

The absence of a loan market for higher education is partly traceable to moral hazard. The loan is payable only after graduation once the graduate has landed a job that can support debt servicing. But if the graduate is unable to service his or her debt, the question arises whether the failure stems from an unwillingness to exert sufficient effort in searching for a well-paying job.

Limited financial markets also hamper opportunities for enhancing productivity and getting out of poverty. Some workers caught in dead-end jobs may want to transit from employment to self-employment or entrepreneurship. If there are no credit markets to finance the transition, these workers forego opportunities to move to a high-income occupation. They must save first to be able to finance the desired occupational shift. Both intensive job search and occupational shifts cannot be undertaken by low-income workers, trapping some workers in deadend jobs and poverty.

There are financial-market limitations that impede transition to a higher standard of living. Such limitations prevent productivity and growth-enhancing investments, such as, higher

education, job search, and occupational shifts, all of which tend to trap low-income economies in the aggregate in poverty.

As poverty persists, governments intervene with policies and institutions aimed at providing social safety nets to disadvantaged workers. In the labor market, the government enacts minimum wage legislation (MWL) to assist unskilled workers. These interventions tend to fail as some low-productivity workers covered by MWL are laid off and seek jobs in the uncovered sector, such as, the informal urban labor market and in rural agriculture engaged in subsistence farming. Wages get depressed in the uncovered sector worsening poverty therein.

Similarly, unionization, an institution in labor markets designed to protect workers' welfare during negotiations with management, ends up having the same wage effects as MWL. Workers laid off from the unionized sector may search for jobs in the non-unionized sector, characterized by freedom of entry and exit. Wages in the non-unionized get depressed as a result.

Some governments offer free higher education to expand access. But the policy normally runs against a tight budget constraint in the public sector of developing countries, which cannot afford to invest in raising quality of higher education. Efficiency units per graduate does not increase as a result, hindering productivity and growth.

Poor economies encounter problems putting up enterprises that have increasing returns, such as, water and power. Set -up costs are high. Each enterprise needs a large output to deliver normal profits. Given low demand levels, enterprises are forced to operate below their break-even output. Government intervenes by regulating water and power rates. Average-cost-plus pricing is resorted to in order for the enterprises to realize just and reasonable rates of returns from their investments. However, some government regulators may seek under-the-table commissions, effectively reducing the public service delivered per household. Government institutions that are corrupt regulate poorly, keeping the economy poor in the aggregate. Corruption yields inequality and vice versa; both corruption and income inequality are harmful to growth.

In line with development policy consistent with neoclassical growth models, many developing and emerging economies have embraced the importance of market reliance in coordinating a variety of economic activities. "Get prices right" is normally advised. And when markets guided by a decentralized price system fail to deliver outcomes that are expected to be efficient and equitable, good governance is counselled in the delivery of public goods aimed at correcting market failures and other limitations. Good governance is multidimensional and normally underscores the importance of peace and order, a legal system conducive to contractual performance, along with timely and credible adjudication of any contractual dispute that emerges. Institutions, such as, the police, military and the courts, are set up as a matter of course to enforce the "rules of the game" and referee the "play of the game." Poverty tends to persist if these institutions are corrupt and weak.

In the neoclassical parlance, peace and order, external security, and the legal system are pure public goods; no private individual will put them up amid massive negative externalities and preponderance of free riding. And so the government steps in to provide the requisite institutions.

Asia still witnesses civil wars, and wars of aggression waged by foreign powers; there also exist threats of foreign aggression, evidenced by territorial boundary disputes. Such wars reinforce the forces that trap nations in poverty. Wars destroy human capital and rebuilding lost human capital takes time. Doctors lost, for example, in the battlefronts or in the war against Covid-19 entail high replacement cost, involving at least six years of medical training. Human capital per unit of physical capital remains low, resulting in low productivity and slow growth. Threats of foreign aggression, meanwhile, dampen investment. Investors will be reluctant to invest if after doing so, an invading foreign aggressor changes the rules of the game, ignores property rights, and seizes accumulated capital. Two major crises grip Afghanistan, for example. It's conflict affected and Covid-19 vulnerable. Both factors succeed in trapping the country in poverty.

All exchanges are governed by contracts; some are explicit while others are implicit. Trade in normal goods involve implicit contracts. With trust, mutually beneficial exchanges are consummated. For an example of an implicit contract, buyers expect a butcher to sell them quality cuts of meat; if the latter doesn't, no one will buy in the future and the butcher will be driven out of business. Implicit contracts run on trust, a major dimension of social capital. However, purchases involving large amounts, such as, procuring a government infrastructure project involve explicit contracts. Some contractual disputes, however, may emerge. At the time of writing the contract, information about the possible states of nature is incomplete. Contract reopeners are, therefore, standard features. But the contracting parties may disagree on whether a particular state of nature stipulated in the contract has occurred, resulting in a dispute. The courts may have to intervene to resolve the dispute. Depending on the perceived status of the legal system, the parties may put an arbitration provision in the contract to avoid lengthy court battles.

In this context, a credible legal system is essential for development, in the sense of moving developing countries out of poverty traps. The courts must have well-paid judges of high integrity, backed by highly trained and well-paid lawyers, also imbued with unquestioned integrity. Likewise, the legal system should be able to count on an incorruptible police force that will enforce court decisions. Honest and well-trained lawyers and law enforcers are critical to making the legal system work effectively in any jurisdiction.

Modern industrial countries come to the fescue of developing countries trapped in poverty through foreign aid, also known as official development assistance (ODA). The latter generally comes in two forms, namely, technical assistance designed to help the client country manage economic development and capital assistance for public development projects like transport. Grants largely finance technical assistance while loans back capital assistance. Examples of institutions responsible for ODA management are multilateral agencies like the

World Bank (WB) and regional ones like the ADB. There are also bilateral agencies like the US Agency for International Development (USAID) and Japan International Cooperation Agency (JICA) that disburse ODA. It seems clear that the development approaches of ODA agencies are also inspired by the neoclassical models of growth anchored on market reliance and good governance. ODA lending is conditional lending; the conditions are underpinned by good governance.

Record of success in escaping poverty traps is, however, mixed. And so, efforts continue to be exerted to determine what factors are essential for growth and what economists can advise low-income countries to overcome poverty traps beyond the usual investments in socio-economic factors like education, health, and strong institutions. Failure to overcome these other factors, such as, a high dependency ratio in families, malnutrition, and inability to upgrade production techniques deepens poverty traps and restrains additional accumulation of human capital, generating a vicious cycle of poverty and weak human-capital base. The importance for growth of other factors, such as, health and demography, has led to the adoption of the Millennium Development Goals (MDGs), with climate-change mitigation as an added goal, on a global basis under the auspices of the United Nations.

Table 2 above shows the poorest countries in Asia. There are 10 countries, with gross per capita income in 2018 less than USD 2,000. These countries are Kyrgyz Republic and Tajikistan in Central Asia; Afghanistan, Bangladesh, Nepal. Pakistan, and India in South Asia; Cambodia and Myanmar in Southeast Asia; and Solomon Islands in the Pacific. Afghanistan and Solomon Islands have woefully depressed average annual growth rates of per capita income; at these growth rates, they'll never come close to escaping poverty in the foreseeable future.

The SS and endogenous growth models draw attention to the importance of human capital for growth of per capita output and income, along with some social indicators. A comparison of some of the latter for the 45 DMCs, such as, educational attainment, reveal that the poorest countries pale in comparison to the other countries with per capita income greater than USD 2,000.

5. The Rise of the NIES: Embracing Modern Technology

This section dwells on the factors that propelled Hong Kong, Singapore, Taiwan, and South Korea into the rank of NIEs. In the 1960s, these four economies vigorously pursued an export-led industrialization strategy and by the 1970s became exporters of manufactured products on a global scale. Based on neoclassical growth models, this achievement is made possible by abandoning old techniques of production and adopting modern ones. We explore this view in this section.

At the start of the NIEs' export-led industrialization, they took advantage of the existence of production techniques that allowed separable stages of production. A variety of products lent themselves to these techniques, including, garments, footwear, and computer chips. Cut garments from manufacturers in developed countries were shipped to these East and

Southeast Asian economies for sewing and re-exported to the manufacturers. Similarly, components of sports shoes were sewn and fused in Asia while computer chips were mounted on a computer plane and re-exported to the developed-country manufacturers for assembly into personal computers, laptops, and consumer electronics. The labor-intensive stages of the production process were undertaken in Asia under an international subcontracting of labor. When the four economies launched their industrialization drives, they had labor as their relatively abundant factor of production, which enabled them to keep labor cost low.

The NIEs were introduced to new intermediate products from developed countries for manufacturing a variety of final products, although in the beginning, the value-added of the NIEs came purely from labor inputs. Sewn garments were shipped back for packaging, branding, and retailing in the developed-country markets. Export trade in these new products grew as a matter of course. Least-cost manufacturing was made possible by subcontracting to the NIEs the labor-intensive stages of production, without encountering immigration issues. As a result, manufacturers in the developed countries succeeded in making their product prices globally competitive.

Over time, the value-added of the NIEs in new products grew. In addition to labor, new intermediate inputs, such as the various spare parts and components, were manufactured, which increased value-added from the subcontracted stages of production. Eventually, the NIEs were able to develop their own product brands in, for example, consumer electronics. In short, the NIEs were able to embrace new technologies not by developing the latter themselves, but by concentrating at the start on the labor-intensive stages of production as manufacturers in developed countries sought least-cost production techniques worldwide. This approach based on separable stages of production fits in with endogenous growth; mastery of a given stage of production of several inputs and outputs facilitates moving up to new and additional stages of production, resulting in an accumulation of knowledge over time in support of long-run growth.

This is specialization of an activity in an assembly-line process, an idea dating back to the pin factory-example of Adam Smith (1776). The subcontracting firms hired workers who through some skill training reduced the risk of underutilizing the capital equipment developed in the industrial countries. Even unskilled workers after a short training period were able to master the subcontracted activities, such as, speed sawing of garments and mounting computer chips on a plane. The needed complementarity of skills to capital equipment was achieved.

Full employment was achieved. The marginal rate of return to labor of varying skills increased, thereby increasing wage rates. The wage hikes prodded manufacturers in the developed countries to look for new developing countries that can subcontract the labor-intensive stages of production. Low-end garments, such as, towels and hand gloves, migrated to Bangladesh. Meanwhile, designer clothes stayed, a phenomenon that some Japanese economists have described as "flying geese."

It seems clear that at the start, the economies referred to as NIES today did not develop new production techniques themselves. The innovations came from the developed countries, and what the NIEs did was technology adaptation. In embracing the technologies from the industrial countries, labor in the NIES, whether skilled or unskilled, was able to master the labor-intensive stages of production. As a result, full employment was reached, with increasing wages for both skilled and unskilled workers, as a result of international subcontracting.

An early economic perspective from international subcontracting and division of labor noted above emanates from Adam Smith (1776). Exporting means expanded market access, which enhances division of labor on a global scale. The productivity gains from division of labor increase the marginal products of both labor and capital, thereby inviting more foreign investments. That set the stage for venturing into deeper stages of the production process with higher value added.

The importance of division of labor for growth and development and inducing increasing returns with international trade has not gone unnoticed (see, for example, Ethier, 1982; Grossman and Helpman, 1989; and Rodriguez-Clare, 1996). Rodriguez-Clare has proposed a model in which division of labor and proximity of suppliers and users of specialized inputs are central; this is highly useful in organizing thinking about the experience of the NIEs.

From a theoretical standpoint, the growth experiences of the NIEs is consistent with early endogenous growth models that stress the role of human capital, thereby influencing development economics, without abandoning perfect competition (see, for example, Lucas, 1988). The general competitive equilibrium model is possibly the most developed part of neoclassical economics (see Arrow and Debreu, 1954; Arrow, 1970). Of course, this early endogenous growth model does not touch base with other important concerns in development economics, such as, the role of weak institutions in trapping economies in poverty. To enrich the early growth models, models under imperfect competition have been formulated.

Romer (1986), for example, explored learning-by-doing with increasing returns. The act of investing yields knowledge that accumulates over time. Use of knowledge by one firm does not diminish the knowledge available to other firms in the industries. As knowledge gets transmitted from one firm to another without diminution, the process yields increasing returns. Growth is generated across time, which may be termed as dynamic positive externalities.

Growth models under imperfect competition have enabled endogenous growth models to touch base with trade and development, particularly, the phenomenon of intra-industry trade. Growth comes not from producing more of the same product over time but by developing new products (see, e.g.' Grossman and Helpman, 1989, 1990). For example, Apple Company grows not by selling the original Mackintosh or iPhone but by producing higher quality versions of laptops and smart phones. Moreover, R&D, which underpin technological advances, do not involve competition among several small firms, but by a few firms placed in a game situation.

South Korea and Taipei overcame a large agricultural sector in the early stages of their industrialization. Agricultural productivity was raised with modern production techniques and adoption of modern seed varieties and fish fry. The rise in agricultural productivity rendered some agricultural workers redundant. Capital accumulation in the non-agricultural sector increased at a sufficiently rapid rate and absorbed labor released from agriculture. International subcontracting facilitated labor absorption in the developing countries. Over time, the share of agriculture in national product and employment declined while the shares of industry and services, the two more productive sectors, went up. Productivity in the non-agricultural sector rose so high that South Korea and Taiwan emerged as global exporters of manufactured products.

We dwell a bit more here on how Korea and Taiwan set the stage for their export-led industrialization. There is consensus on the role of foreign trade in putting these two economies on a sustained high growth path (see Krueger, 1995).

South Korea was able to launch its industrialization drive only after the end in 1953 of its war against North Korea. It had to devote a large proportion of its budget resources for defense spending although it received a good deal of support from the US government. Similarly, Taiwan's export-led push for industrialization started in the 1960s amid national security concerns from mainland China. It had to allocate much of resources to defense spending and also received financial support from the US.

In terms of macroeconomic policies, both Korea and Taiwan saw to it that they were able to close their government budget deficits through tax reforms and succeeded in suppressing inflation. In addition, they unified a regime of multiple exchange rates, and liberalized imports, thereby setting the stage for a strong current account in their BOP. They then took advantage of the emerging international subcontracting of labor with salutary effects on exports.

It is widely acknowledged that South Korea gave a big role to its industrial conglomerates (called chaebols) in the process of growth. In contrast, Taiwan relied on small exporting companies, compared to Korea.

Singapore and Hong Kong, meanwhile, did not have large agricultural bases. From the start, they engaged in entrepot trade. They subcontracted garments and consumer electronics from the developed countries and re-exported the sewn garments and electronic products. They're national incomes increased, and very effective family planning programs helped per capita real income to rise tremendously. They reached full employment with rising productivity, transforming their economies into global exporters of manufactured products.

6. Cross Section Differences in Per Capita Income: Empirical Evidence

This section reviews some of the empirical approaches suggested by the SS model and the endogenous growth models in explaining inter-country income differences in the DMCs of

ADB. The SS model, for example, has inspired sources-of-growth accounting. Growth rate of output is attributed to increases in the factors of production. Many studies, however, show that after accounting for the respective contributions of labor and capital, much of real GDP growth rate still remains, which is the residual in the growth-decomposition analysis (see, e.g., Solow, 1957). This residual is interpreted as the contribution of technological progress and is termed total factor productivity or TFP. Subsequent empirical work in endogenous growth models has focused on squeezing out the residual.

Following the emergence of endogenous growth theory, Barro (1991) and Barro and Sala-i-Martin (1992), proposed estimation models based on an environment of conditional convergence. Panel data from a cross-section of economies over time are assembled. In the regression estimation, the variables that proxy for the target steady-state output are held constant. Per capita income growth is then regressed on initial values of per capita income to test the hypothesis of convergence. A negative coefficient means convergence: countries starting from a low per capita income grow faster.

7. Concluding Remarks

This paper has opened up an investigation of whether or not there is economic convergence in a large cross-section of economies in Asia. All the figures are taken from the 45 DMCs of the ADB, bar Japan. Since the ADB's establishment in the 1960s, it has put together a large array of socio-economic indicators.

Asia hosts both poor and rich countries. At the highest per capita income ladder are the four NIES, namely, Singapore, Hong Kong, Taiwan, and Singapore. Among the poor ones are Afghanistan, Nepal, Bangladesh, Cambodia, and Myanmar.

We adopt perspectives from the neoclassical SS growth models and some endogenous growth models to identify factors that trap some economies in poverty while some others become NIEs. Both models yield testable hypotheses, many of which support conditional convergence.

Absolute convergence is ruled out, but conditional convergence is a real possibility. That is, economies that are currently caught in poverty traps must learn how to adopt modern technologies to be able to catch up with the NIEs. This entails investing in human capital, particularly education and health; coordinating investments, whether public and private, that lead to realization of scale economies in key industries like water and power; and embracing open trade.

References

Acemoglu, Daron and James Robinson (2012), *Why Nations Fail: The Origins of Power, Prosperity, and Poverty*, Currency, New York.

Arrow, Kenneth (1962), "The Economic Implications of Learning-by-Doing," *Review of Economic Studies*, Vol. 29, No. 3, 155-173.

_____ (1970), "Political and Economic Evaluation of Social Effects and Externalities," in J. Margolis (ed.), *The Analysis of Public Output*, MA., Cambridge: NBER.

_____ and Gerald Debreu (1954), "Existence of an Equilibrium for a Competitive Economy," *Econometrica*, Vol. 22, No.3, 265-290.

Azariadis, Costas and J. Stachurski (2005), "Poverty Traps," Chapter 3 in *Handbook of Economic Growth,* Volume 1A, Edited by P. Aghion and S. Durlauf, Elsevier B.V.

Barro, Robert ((1991), "Economic Growth in a Cross Section of Countries," *Quarterly Journal of Economics*, Vol. 106, 407-443.

_____ and X. Sala-i-Martin (1992), "Convergence," *Journal of Political Economy (JPE)*, Vol. 100, No. 2, 223251.

Becker, Gary (1964), *Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education*, NBER, University of Chicago Press.

Ethier, Wilfrid (1982), "National and International Returns to Scale in the Modern Theory of International Trade," *American Economic Review*, Vol. 72, 389-405.

Grossman, Gene and Elhanan Helpman (1989), "Product Development and International Trade," *Journal of Political Economy*, Vo. 97, No. 6, 1261-1283.

_____ and _____ (1990), "Comparative Advantage and Long-Run Growth," *American Economic Review*, Vol. 80, No. 4, 196-815.

Krueger, Anne (1995), "East Asian Experience and Endogenous Growth Theory," In *Growth Theories in Light of the East Asian Experience*, Vol. 4, Takatoshi Ito and A. Krueger (eds.), University of Chicago Press.

Lucas, Robert Jr. (1988), "On the Mechanics of Economic Development," *Journal of Monetary Economics*, Vol. 22, 3-42.

Mankiw, Nicholas; D. Romer, and D. Weil (1992), "A Contribution to the Empirics of Economic Growth," *Quarterly Journal of Economics*, Vol. 107, No. 2, 407-437.

Mincer, Jacob (1962), "On-the-Job-Training: Costs, Returns, and Implications," *Journal of Political Economy*, Vol. 70, No.5, 50-79.

Ramsey, Frank (1928), "A Mathematical Theory of Saving," *Economic Journal*, Vol. 38 (Dec.), 69-75.

Rodriguez-Clare, Andres (1996), "The Division of Labor and Economic Development," *Journal of Development Economics*, Vol. 49, 3-32.

Romer, Paul (1986), "Increasing Returns and Long-Run Growth,", *JPE*, Vol. 94, No.5, 1002-1037.

Sachs, Jeffrey (2005), *The End of Poverty: Economic Possibilities for Our Time*, New York, Penguin Books.

Schultz, Theodore (1964), *Transforming Traditional Agriculture,* New Haven, Conn.: Yale University Press.

Solow, Robert (1956), "A Contribution to the Theory of Economic Growth," *Quarterly Journal of Economics*, Vol. 70, 65-94.

_____ (1957), "Technical Change and the Aggregate Production Function," *Review of Economics and Statistics*, Vol. 39, No. 3, 312-320.

Swan, Trevor (1956), "Economic Growth and Capital Accumulation," *Economic Record*, Vol. 32, 334-361.

Young, Alwyn (1992), "Tale of Two Cities: Factor Accumulation and Technical Change in Hong Kong and Singapore," *NBER Macroeconomics Annual*, NBER, Cambridge, Ma.