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The Latecomer Advantages and Disadvantages:

A New Structural Economics Perspective[1]

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[1] Published in Martin Andersson and Tobias Axelsson eds. *Diverse Development Paths and Structural Transformation in Escape from Poverty*, Cambridge: Cambridge University Press, 2016, pp. 43-67.

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Justin Yifu Lin

I. Introduction

The world was quite stagnant and flat in terms of the speed of growth and difference in per capita income across countries before the industrial revolution in the 18th century. Most countries lived on agriculture and poor. According to Maddison's estimates it took about 1400 years to double per capita income in Western Europe before the 18th century and the per capita GDP of Netherlands, the richest and trading power country, at the beginning of 18th century was 2130 international dollar, about 5 times of the average of 421 international dollar in Africa (Maddison 2011).[2] The industrial revolution, referred as the only event in human history by historian Clark (2007), started in the UK in the mid-18th century, marking a dramatic turning point in the economic progress of nations. Rapid technological innovation after the advent of industrial revolution created new tools with higher productivity and new industries with higher values that made the possibility not only for breaking the Malthusian trap but also for a dramatic increase in per capita income (Kuznets 1966). During the nineteenth century, a number of industrial revolution pioneers in Western Europe and North America leapt ahead of the rest of the world. By 1851 the UK overtook Netherlands to become the richest country in the world and at the beginning of the 20th century, its per capita GDP reached 4492 dollar, 8.2 time of that in China, the poorest country in the world at that time on Maddison's table of historical statistics of the world economy.

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[2] Unless indicated otherwise, all estimates of GDP and per capita GDP, cited in this paper, are taken from Maddison (2010) and measured in 1990 Geary-Khamis PPP adjusted dollars.

It is the dream of every backward country to become an advanced industrialized country. Gerschenkron's seminal studies of the industrialization in continental Europe and Russia found that the latecomer countries have the advantage of backwardness in industrialization because a backward country can borrow from a large backlog of technological innovations from the advanced country and can adopt the latest technology without facing the resistance from users of old technologies (Gerschenkron 1962)[3].

Gerschenkron also summarizes his findings in six propositions for countries starting industrialization with different degrees of backwardness (Gerschenkron 1962, pp. 353-4):

1. The more backward a country's economy, the more likely was its industrialization to start discontinuously as a sudden great spurt proceeding at a relatively high rate of growth of manufacturing output.
2. The more backward a country's economy, the more pronounced was the stress in its industrialization on bigness of both plant and enterprise.
3. The more backward a country's economy, the greater was the stress upon producers' goods as against consumers' goods.
4. The more backward a country's economy, the heavier was the pressure upon the levels of consumption of the population.
5. The more backward a country's economy, the greater was the part played by special institutional factors designed to increase supply of capital to the nascent industries and, in addition, to provide them with less decentralized and better informed entrepreneurial guidance; the more backward the country, the more pronounced was the coerciveness and comprehensiveness of those factors.
6. The more backward a country, the less likely was its agriculture to play any active role by offering to the growing industries the advantages of an

[3] Gershenkron's first article, "Economic Backwardness in Historical Perspective," was published in 1952. A collection of 14 related essays, together with an introduction, a postscript and three appendixes, was published in 1962 with the same title of the first article "Economic Backwardness in Historical Perspective".

expanding industrial market based in turn on the rising productivity of agricultural labor.

From the advantage of backwardness point of view, the government of a backward country can adopt various institutional arrangements to mobilize capital to develop advanced industries and make the country grow faster than the high-income countries. The country will achieve convergence by tapping into that potential. Indeed, there was a small group of countries achieving "catch-up" in continental Europe and Western European countries' colonial offshoots in the late 19th century and in East Asia in post WWII. However, for most backward countries the twentieth century was instead an unfortunate period of continued and accelerated divergence in income level and living standards between them and the advanced countries. Instead of the advantage of backwardness, there seems to be in reality a disadvantage of backwardness in catch up.

This historical record provides a challenge for economists to rethink the issue of industrialization and convergence. This paper is organized as follows: The next section provides a history of 20th century divergence. This is followed by a critique of two previous waves of development thinking, structuralism and neoliberalism, examining their failures for guiding developing countries to catch up with the developed countries in Section III. Section IV introduces the new structural economics as an alternative of previous thinking. Section V discuss how the government applies new structural economics to realize the advantage of backwardness. Section VI concludes with a few remarks.

II. The Challenge of Economic Development: Historical Antecedents and 20th Century Divergence[4]

Before the industrial revolution, there was little growth in the world economy and the income gap between countries was extremely small. In 1820, the

[4] This section draws on Lin and Rosenblatt (2012).

between-country income differences represented less than 15 percent of income inequality across people in the world, whereas the between-country share rose to well over half of global inequality by 1950[5], and the richest country's per capita GDP was only less than four times higher than the poorest (Maddison 2011). The industrial revolution led to the Great Divergence: world growth was driven by a few Western industrialized countries before WWII, and similarly after WWII--with the exception of Japan that joined the group of advanced industrialized nations.

Prior to the industrial revolution, the global economic landscape was dramatically different. Economies were largely based on agriculture and scientific progress was largely divorced from technological innovation in production (Lin 1995). Growth was driven mainly by population expansion and frequently threated by Malthusian trap (Kuznets 1966).

All of this changed with the industrial revolution. Scientific progress began to be applied to the means of production as machines were developed that both increased productivity in firms, but also dramatically reduced transportation costs. This created the possibility for the countries that developed those technologies, or those that adapted the technologies first, to grow much faster than less technologically advanced countries.

In the case of Britain, the Industrial Revolution generally refers to the period "that witnessed the application of mechanically powered machinery in the textile industries, the introduction of James Watt's steam engine, and the 'triumph' of the factory system of production" (Cameron, 1997, page 166). It was the outcome of the idea born during the Middle Ages and developed thereafter that science should be applied to industry and the practical affairs of humankind. As Azariadis and Stachurski (2005) point out, "While the scientific achievements of the ancient

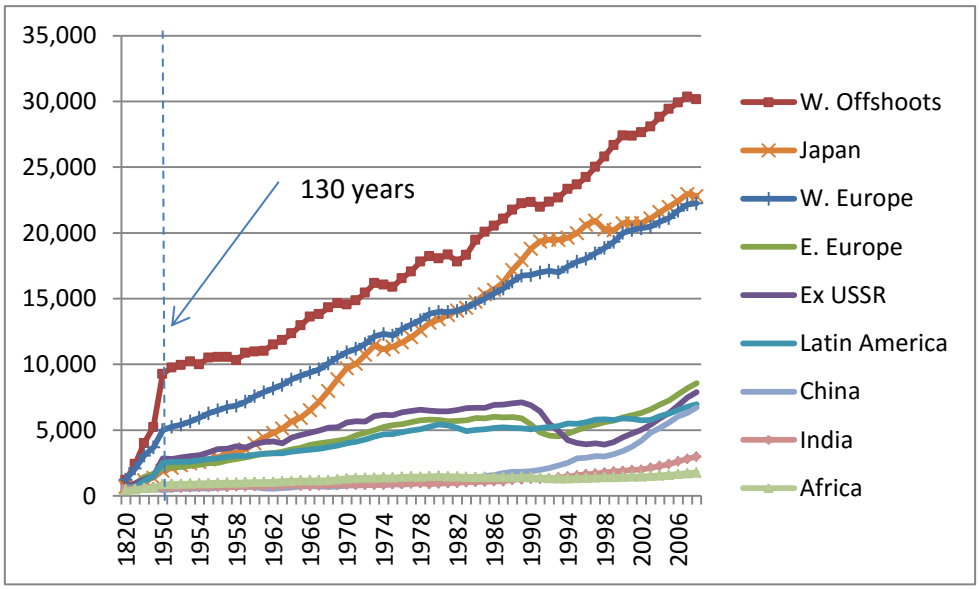
[5] See Bourguignon and Morrisson (2002) for a calculation of global inequality since the start of the industrial revolution and a decomposition between within country and between country inequality. The figures referred to here are from Theil Index and Mean Logarithmic Difference measures. The between country share is larger for the "standard deviation of logarithm" method; however, the same trend is followed: a lower share of between-country differences that then grows dramatically in the twentieth century. See Table 2 of Bourguignon and Morrisson for more details.

Mediterranean civilizations and China were remarkable, in general there was little attempt to apply science to the economic problems of the peasants. Scientists and practical people had only limited interaction." Lin (1995) argues that the transition from innovation based on the experiences of artisan/farmers in the pre-industrial revolution period to innovation based on controlled experiments guided by science after the industrial revolution was the key factor. Societal incentives embedded in civil service examination in pre-modern China did not encourage the human capital accumulation needed for the new system of innovation, disenabling the industrial revolution to originate in China, .

The result of this process was that (at least prior to the year 2000) the global economy was dominated by the few industrialized economies that existed in the world, and most of these few economies had become industrialized either as leaders or earlier followers of the nineteenth century industrial revolution.[6] Historical data (figure 1) dramatically reveal the divergent pattern of growth across country groupings. In the late nineteenth century, the western European countries and their colonial "offshoots" began to experience a historic take-off in incomes per capita. This was later matched by Japan in the middle of the twentieth century. The world economy was driven by several large Western European countries (Germany, France, Italy, the United Kingdom) and Anglophone "offshoots" (Australia, New Zealand, the United States, and Canada), plus Japan. Many other countries, including the former Soviet Union, were able to rise to middle-income status and experience levels of average economic welfare that far surpassed prior centuries; however, these standards of living still lagged badly behind the leading countries.

[6] There is a tectonic shift in the pattern of global growth after 2000. China and other emerging market economies become the main growth drivers in the world (Lin and Rosenblatt 2012).

Figure 1: Development since the Industrial Revolution

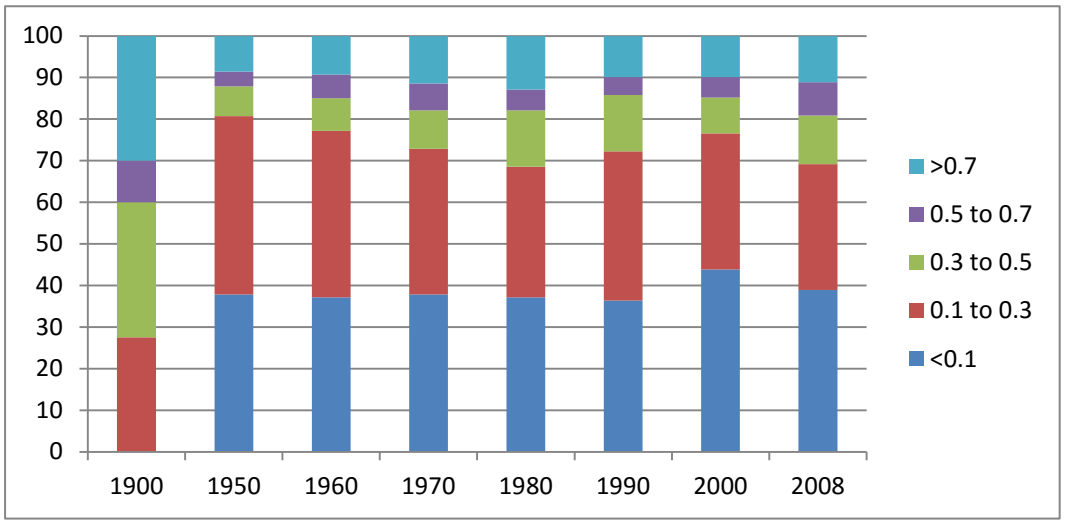


Source: Maddison (2010) database

In theory, based on Gershenkorn's advantage of backwardness hypothesis, one would expect, and certainly hope, that the poorer countries in the world can catch up with the richer countries in the world. In really, there seems to be a disadvantage of backwardness. Few countries have experienced "convergence" on a sustained basis. A famous paper that discusses the performance during the twentieth century is entitled: "Divergence, Big Time" (Pritchett 1997).

One approach to measuring relative progress is to look at per capita GDP relative to the United States, which has been the symbol of advanced industrialized countries after WWII. Figure 2 shows that the shares of countries in each ratio range has been fairly stable, with some growth in the percentage of countries in the upper MIC range (say, roughly 0.3-0.7), but really not much expansion of the share of countries that are at 0.7 of the US level of per capita GDP. At the bottom end, the share at 0.1 or less of US levels remains stuck near 40 percent. Persistently, over 80 percent of the countries in the world have GDP per capita levels that are half or less than half of the level in the United States.

Figures 2: Distribution of Countries by (Relative) Income Classification, 1900-2008, %



Source: Maddison (2010) data and World Bank for 2008 country thresholds.

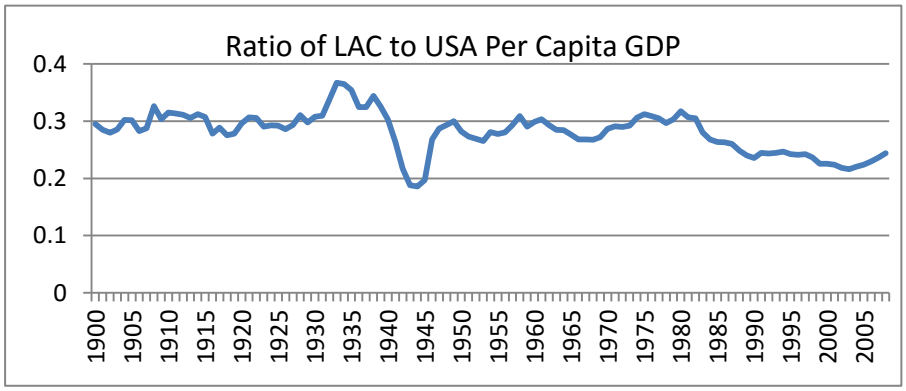
There is also some "churning" where countries not only converge up the ladder, but also diverge down the ladder. This is the case of some former colonies in Africa: many have gone from being lower MICs at independence to LICs in 1980. Since then, some have climbed back up to MIC status. There are also countries at the HIC end of the distribution that have fallen back to MIC status, by this measure.

Many middle-income countries face the risk of falling into a middle income trap. Even some previously high growth Asian economies, like Malaysia and Thailand,[7] experienced a substantial deceleration of growth following the Asian financial crisis. The Latin America and Caribbean region, however, probably provides the classic example of MICs failing to progress to high income country status. Figure 3 below reveals the persistent lack of convergence of the Latin America region with the living standards in the United States. Periods of mild catch-up were followed by periods of declining relative incomes. More recently, most of the economies of Latin America have stabilized and there has been a strong upturn in growth, led by the largest

[7] Post 1997 crisis GDP per capita growth rates were roughly half the level of pre-crisis growth rates. Malaysia's average growth of 6.4 percent from 1988-1997 fell to 3 percent from 1999-2010, and Thailand's average of 7.2 percent over 1988-1997 fell to 3.4 percent for 1999-2010. (GDP per capita growth rates are from *World Development Indicators*.) On the other hand, this would still imply convergence—albeit at a slower pace--given HIC per capita growth rates of around 2 percent.

economy of the region—Brazil. It remains to be seen whether the recent improved growth performance in Brazil and several other Latin American economies can be sustained into the future.

Figure 3: Latin American Economic Performance over the Last Century



Source: Maddison (2010) database.

The net result is that, during the 20th century, very few countries managed to progress from low income status to middle income status and then to high income status. The table 1 below summarizes how only a handful of developing countries have succeeded in reaching high levels of prosperity and many of them are in Western Europe. The few developing economy success stories – with the exception of a few small oil rich countries[8]--are generally located in East Asia and achieved rapid industrialization (Lin 2009).

[8] This is the case for Equatorial Guinea, Trinidad and Tobago and Oman.

Table 1: Rare Cases of Catch-Up

(Economies with a greater than .10 increase in relative GDP per capita with respect to the United States)

	1950	1980	2008	Change 1950-2008
Hong Kong SAR, China	0.23	0.57	1.02	0.78
Singapore	0.23	0.49	0.90	0.67
Equatorial Guinea	0.06	0.08	0.71	0.65
Taiwan, China	0.10	0.28	0.67	0.58
S. Korea	0.09	0.22	0.63	0.54
Ireland	0.36	0.46	0.89	0.53
Japan	0.20	0.72	0.73	0.53
Spain	0.23	0.50	0.63	0.40
Austria	0.39	0.74	0.77	0.39
Norway	0.57	0.81	0.91	0.35
Finland	0.44	0.70	0.78	0.34
Greece	0.20	0.48	0.52	0.32
T. & Tobago	0.38	0.67	0.68	0.30
Israel	0.29	0.59	0.58	0.28
Italy	0.37	0.71	0.64	0.27
Germany	0.41	0.76	0.67	0.26
Puerto Rico	0.22	0.44	0.48	0.26
Portugal	0.22	0.43	0.46	0.24
Mauritius	0.26	0.24	0.47	0.21
Oman	0.07	0.22	0.27	0.20
Thailand	0.09	0.14	0.28	0.20
Belgium	0.57	0.78	0.76	0.19
France	0.54	0.79	0.71	0.17
China	0.05	0.06	0.22	0.17
Malaysia	0.16	0.20	0.33	0.17
Netherlands	0.63	0.79	0.79	0.16
Botswana	0.04	0.09	0.15	0.12
Bulgaria	0.17	0.33	0.29	0.11

Table 1 (continued)

Memo/

Former Soviet Union/E. European countries with data only since 1990

	1990	2008	Change
Estonia	0.47	0.64	0.17
Slovenia	0.47	0.58	0.11
Armenia	0.26	0.37	0.11
Belarus	0.31	0.40	0.09
Slovakia	0.33	0.42	0.08
Bosnia	0.16	0.23	0.07
Azerbaijan	0.20	0.26	0.06
Latvia	0.43	0.48	0.05
Kazakhstan	0.32	0.36	0.04
Czech Rep.	0.38	0.41	0.03
Lithuania	0.37	0.36	-0.01
Uzbekistan	0.18	0.17	-0.01
Turkmenistan	0.16	0.14	-0.02
Croatia	0.32	0.29	-0.03
Macedonia	0.17	0.13	-0.04
Russia	0.34	0.29	-0.04
Kyrgyzstan	0.16	0.09	-0.06
Tajikistan	0.13	0.05	-0.08
Ukraine	0.26	0.16	-0.10
Serbia/Montenegro/Kosovo	0.22	0.12	-0.10
Georgia	0.33	0.19	-0.14
Moldova	0.27	0.11	-0.15

Source: Maddison (2010).

To make matters worse, there are over dozen countries that suffered a greater than 0.10 decline in relative GDP per capita over the same period. Table 2 displays the list. Many of these countries are middle-income countries that failed to keep pace with the 2 percent GDP per capita growth of the United States over this period. In addition, several oil producing countries failed to diversify their economic base, and as a result, have experienced large declines in their relative income per capita.

Table 2: Divergence "leaders"
(Countries suffering a .10 or greater decrease in relative GDP per capita with respect to the United States)

	1950	1980	2008	Change 1950-2008
Bolivia	0.20	0.14	0.09	-0.11
Iraq	0.14	0.34	0.03	-0.11
Lebanon	0.25	0.19	0.14	-0.11
South Africa	0.27	0.24	0.15	-0.11
Nicaragua	0.17	0.12	0.05	-0.12
Djibouti	0.16	0.09	0.04	-0.12
Switzerland	0.95	1.01	0.81	-0.14
Argentina	0.52	0.44	0.35	-0.17
Uruguay	0.49	0.35	0.32	-0.17
Gabon	0.33	0.36	0.12	-0.20
N. Zealand	0.88	0.66	0.60	-0.29
Venezuela	0.78	0.55	0.34	-0.44
UAE	1.65	1.49	0.50	-1.15
Kuwait	3.02	0.71	0.41	-2.61
Qatar	3.18	1.55	0.56	-2.62
Memo/				
Saudi Arabia	*0.23*	***0.71***	*0.27*	*0.04*

Source: Maddison (2010) dataset.

III. Rethinking of economic development

The findings elaborated in the preceding section challenge the economics community to rethink the existing development theories. Why was there so little convergence in the twentieth century in spite of the promise of advantage of backwardness for the developing countries in their industrialization drives? What was special about the few countries that "escaped" low and middle income status? Can their success be replicated in the laggard countries?

Development economics became a subfield of modern economics after WWII to guide the reconstruction of war-ravaged countries and the nation-building of newly independent former colonies. The first wave of development thinking was

structuralism (Rosenstein-Rodan 1943, Prebisch 1950, Singer 1950). There may be a natural tendency in human nature to try to imitate success. The dominance of the few advanced countries that emerged from the industrial revolution was based on their advanced manufacturing industries. Many developing countries' economies, however, were still based on natural resource intensive agriculture and mining, and these were seen as "backward" rather than advanced sectors. The structuralism advised the developing countries to adopt an import substitution strategy with direct state intervention to create institutions, including financial repressions, distortions of resources prices and administrative allocation of resources, to mobilize capital to develop **capital-intensive, large scale manufacturing industries similar to those in advanced countries** (Lin 2009). These measures resembled those adopted by extreme backward continental European countries in their industrialization drives in the 19th century, summarized in Gerschenkron's six propositions..

Structuralism rejected the notion that the invisible hand of the free market could guide the process of development. The term "structuralism" itself comes from the notion that structural rigidities are present in most economies, and in particular in countries at low levels of development. Structuralism believed that structural rigidities in developing countries would prevent the process of industrialization, and "self-sustained" growth could not become a reality without more interventionist government policies, as Gershenkron had found based on his historical studies of "moderate backward" and "extreme backward" countries in continental Europe and Soviet Union.

The underlying logic of state interventions in structuralism was convincing. All socialist countries as well as most capitalist countries followed the state-led, import substitution strategy advocated by structuralism in post WWII (Chenery 1961). But countries that adopted this strategy typically fell into a pattern of rapid growth driven by large-scale investments, similar to the experience of countries in Europe in the 19th century studied by Gershenkron, but followed by long periods of stagnation and frequent crises (Lin 2009). The overall results were universal development failure

(Krueger and Tuncer 1982; Lal 1994; Pack and Saggi 2006).

The failures of the structuralist approach led to the second wave of development thinking—neoliberalism, encapsulated in Washington Consensus policy package.[9] The original ten tenets of the Washington Consensus were: (i) fiscal discipline, (ii) reordering public expenditure priorities; (iii) tax reform (broad base with moderate rates); (iv) liberalizing interest rates; (v) competitive (not overvalued) exchange rates; (vi) trade liberalization; (vii) liberalization of inward foreign direct investment; (viii) privatization; (ix) deregulation; and (x) property rights (for the informal sector). In many ways, the Washington Consensus was a reaction to the complex web of distortions, summarized in Gerschenkron's fifth proposition, that had to be created to try to support competitive advantage defying import substitution. In fact, each of the ten items on the list responded to a particular distortion perceived to exist – particularly in Latin American countries.[10]For example, there was the perception that debt-financed overinvestment in low productivity activities had created fiscal sustainability problems and wasteful public expenditure patterns. There was the perception that complex tax breaks had led to an inefficient tax system with low revenue mobilization. There was the perception that interest rate caps lead to financial repression and low levels of financial intermediation, and that protectionism led to overvalued exchange rates. The Consensus critiqued public enterprises that had become inefficient and created a high cost for public services (as well as a fiscal drain). The Consensus also noted that restrictions on FDI had limited the potential for investment, and that a lack of property rights had locked out many poor people from access to formal credit markets.

The Washington Consensus was also a direct denial of the pervasive export pessimism that permeated the import substitution industrialization strategy. The focus was on liberalizing markets and balancing budgets – given that the end of the import substitution era coincided with sovereign debt defaults in a variety of

[9] See Williamson (2004, 1990).

[10] The original formulation was inspired by a meeting of high level Latin American policy makers in Washington.

developing countries. In the international development institutions, it became associated with structural adjustment lending where the multilateral development institutions provided financial support conditional on market-oriented reforms.

In the end, the Washington Consensus advised the developing countries to **adopt the "idealized" advanced countries' institutions**, that is, establishing a strong system of property rights, opening the economy to trade, privatizing state-owned enterprises and establishing broadly free markets through deregulation, focusing from trying to copy industries to trying to copy the idealized market institutions of the high-income countries.[11] Again, the logic seemed sound. But growth rates of developing countries were lower and economic crises more frequent under Washington Consensus policies in the 1980s and 1990s than under the structuralist policies of the 1960s and 1970s. Some economists referred to this period as the "lost decades" for developing countries (Easterly 2001).

The few countries that successfully accelerated their growth and closed the gap with developed countries did not follow the approaches proposed by the dominant development thinking of that time. In the 1950s and 1960s, Japan and the four Asian tigers—Korea, Taiwan, Singapore, and Hong Kong—were quietly catching up with developed countries. These newly industrializing economies grew rapidly from the 1950s to the 1970s by following an export-oriented development strategy based initially on labor-intensive, small-scale industries and gradually climbing the industrial ladder to larger, more capital-intensive industries (Amsden 1989; Chang 2003; Lin 2009; Wade 1990), contradicting the prevailing structuralism, which advocated import substitution to build up large heavy industries immediately.

In the 1980s and 1990s, under the sway of the Washington Consensus, economists branded planned economies as less efficient than market economies and called for transforming them into market economies through shock therapy: removing all economic distortions by ending government interventions and by leaping in a

[11] In fact, not all those policies recommended by the Washington Consensus were rigorously followed in the high-income countries. In the 1990s during the heydays of the Washington Consensus, many policy advisors for the high-income countries advised the developing countries to "do as what we say but not as we do."

single bound from a planned economy to a market economy. The mainstream idea at that time believed that separating the transition into two or three steps, as China was doing, would only lead to failure. China's dual-track reform continued to protect and subsidize nonviable state-owned firms in the old prioritized capital-intensive industries while liberalizing the market for labor-intensive industries, which had been repressed. Many economists predicted rampant rent-seeking and deteriorating resource allocation (Murphy, Schleifer and Vishny 1992; Sachs, Woo an Yang 2000). In reality, however, economies that experienced stability and rapid growth in the transition, like Cambodia, China, and Vietnam, and Mauritius all followed the gradual, dual-track reform approach.

The few success economies have something in common: they were market economy or transiting to a market economy, as emphasized by neoliberalism, while their governments also intervened actively in the economy, as emphasized by structuralism.

Policies based on structuralism and neoliberalism failed to achieve their intended goals of helping developing countries achieve convergence and they also failed to explain the rare economic development successes. These failures suggest the need for a third wave of development thinking.

IV. The new structural economics as the third wave of development thinking

When I started to promote the new structural economics as the third wave of development thinking (Lin 2011), I called for a return to Adam Smith, but not to *The Wealth of Nations,* a short-hand way of referring to the ideas advocated by Smith based on his research findings, but to Smith's methodology exemplified in the full title, ***An Inquiry into the Nature and Causes*** *of the Wealth of Nations*. I proposed following Smith in analyzing the nature and causes of economic development, asking: what is the nature of economic development, and what are its causes?

As discussed in the introduction, rapid, sustained economic growth is a modern phenomenon, emerging only in the 18th century. Before then, average annual growth

of per capita income in Western Europe was just 0.05%; at that rate it would take an economy 1,400 years to double per capita income. From the 18th century to the mid-19th century, annual growth in per capita income in Western European countries accelerated to 1%, enabling per capita income to double in just 70 years. From the mid-19th century to the present, per capita income growth accelerated to 2% a year, shrinking the doubling time to 35 years (Maddison 2006). The impetus for accelerating growth was the industrial revolution of the mid-18th century: continuous technological innovations and industrial upgrading made possible the acceleration of labor productivity and income growth that boosted per capita income.[12]

In other words, modern economic growth is a process of continuous technological innovation, which raises labor productivity, and industrial upgrading, which moves an economy from low value-added industries to higher value-added ones. But taking advantage of the potential of technologies and new industries requires well-functioning hard infrastructure to provide power, raw materials, and various inputs from domestic and foreign sources and sell products to large domestic and foreign markets. As the scale of trade increases, market exchanges are at arm's length, thus requiring contracts and contract-enforcing legal systems. And as the scale and risk of investment increase with the upgrading of technology and industries, the financial structure has to adapt too. Thus, as argued by Marx in his voluminous writings, the entire soft infrastructure of institutions needs to improve accordingly (Kuznets 1966, Lin 1989, Lin and Nugent 1995, Harrison and Rodriguez-Clare 2010).

Therefore, while modern economic growth appears to be a process of ever increasing in per capita income driven by rising labor productivity, it is actually a process of continuous structural changes in technologies, industries, and hard and soft

[12] The industrial revolution was still in its infancy when Adam Smith was writing *An Inquiry into the Nature and Causes of the Wealth of Nations* Consequently, Smith paid little attention to technology innovation and industrial upgrading; rather, he focused on trade and specialization with given technologies and industries. Technological innovation is one of the main themes in Marxism, but it did not become a focus in mainstream economics until the notion of creative destruction made popular by Schumpeter (1942).

infrastructure. The new structural economics uses a neoclassical approach to study why different countries have different structures in technologies, industries, soft and hard infrastructures, and what causes the structure in a country to change (Lin 2011). By convention such studies should be referred as “structural economics”. It is called “new” structural economics to distinguish it from the structuralism, the first wave of development thinking.

The new structural economics proposes that a country’s economic structure at any specific time is endogenous to its given factor endowments, that is the amounts of capital, labor, and natural resources, at that time. Countries at different development stages differ in the relative abundance of factor endowments. In developing countries, capital is generally relatively scarce, while labor and natural resources are relatively abundant. In developed countries, capital is relatively abundant, while labor is relatively scarce. Though an economy’s factor endowments are given at any particular time, they can change over time. The new structural economics posits an economy’s factor endowments as the starting point for development analysis for two reasons: first, they are an economy’s total budget at that time, and second, the structure of endowments determines the relative prices of factors: prices of relatively abundant factors are low, while prices of relatively scarce factors are high.

The relative factor prices determine a country’s comparative advantages. Thus a prerequisite to achieving competitive advantage is for a country to develop its industries according to its comparative advantages (Porter 1990). For example, countries with relatively abundant labor and relatively scarce capital would have a comparative advantage in labor-intensive industries because factor costs of production will be lower than in countries with relatively scarce and more expensive labor.

In developed countries, income and labor productivity are high because their industries and technologies are capital intensive, which in turn because of the countries’ relative capital abundance. If a developing country wants to catch up to the income and industrial structure of developed countries, it first needs to increase the relative abundance of capital in its factor endowment structure to the level in

advanced countries. The ultimate goal of economic development is to raise a country's income, the intermediate goal is to develop capital-intensive industries, and the immediate goal should be to accumulate capital quickly, so that the country's comparative advantages changes to more capital-intensive industries. In other words, boosting a country's income requires industrial upgrading, and industrial upgrading requires changing a country's endowment structure (Ju, Lin and Wang 2009).

How can a country accumulate capital quickly? Capital comes from saving economic surpluses. If a country's industries are all consistent with its comparative advantages, as determined by its endowment structure, the country will be competitive in both domestic and international markets and generate the largest possible surplus. If all investments are made in industries that are consistent with the comparative advantages determined by a country's endowment structure, the returns to investment will be maximized and the propensity to save will be at its highest. With the largest possible surplus and the highest incentives to save, capital will be accumulated in the fastest way possible. The changes in endowment structure and comparative advantages pave the way for upgrading industrial structure and the accompanying improvements in hard and soft industrial infrastructure. In the upgrading industrial structure, the developing countries can benefit from the advantage of backwardness as argued by Gershenkron.

But comparative advantage is an economic concept. How is it translated into the choices of technologies and industries made by entrepreneurs? Entrepreneurs care about profits. They will invest in industries in which a country has a comparative advantage if relative factor prices reflect the relative scarcities of factors in the country's endowments (Lin 2009; Lin and Chang 2009). If capital is relatively scarce, the price of capital will be relatively high; if labor is relatively scarce, the price of labor (wages) will be relatively high. Under an unfettered price system, profit-maximizing entrepreneurs will use a relatively inexpensive factor to substitute for a relatively expensive factor in their choice of production technologies, investing in industries that require more of a relatively inexpensive factor and less of a

relatively expensive factor. A price system with these characteristics can arise only in a competitive market. And that is why successful economies are either market economies or on their way to becoming one.

If markets are so important, what is the government's role in economic development? Economic development is a process of structural change with continuous technological innovations, industrial upgrading, and improvement in infrastructure and institutions. When the factor endowment structure changes, economies need first movers that are willing to enter new industries that are consistent with changing comparative advantages and that are eager to use the new technologies. The risks for first movers are high. If they fail, they bear all the losses, and if they succeed, other firms will immediately follow them into the industry. The resulting competition will eliminate any monopoly profits (Aghion 2009; Romer 1990). There is an asymmetry between the losses of failures and the gains of successes for the first movers (Hausmann and Rodrik 2003).

No matter whether the first movers succeed or fail, they provide society with useful information. The government should encourage first movers and compensate them for the information externality they generate. Otherwise, there will be little incentive for firms to be first movers in technological innovation and industrial upgrading (Rodrik 2004; Lin 2009; Lin and Monga 2011; Harrison and Rodriguez-Clare 2010). In addition, the success or failure of first movers also depends on whether improved hard and soft infrastructure match the needs of the new industries. Improving infrastructure and institutions is beyond the capacities of individual firms. Therefore, as argued by Gerschenkron and structuralists, the government needs to play an enabling role to facilitate the industrial upgrading. The government may either coordinate firms' efforts to improve infrastructure and institutions or provide those improvements itself. By spontaneous market forces alone without the government taking a facilitating stand, the structural change will not happen at all or will happen very slowly.

The new structural economics helps in understanding why Gerschenkron's prediction of convergence did not occur and structuralism and neoliberalism did not work. Gerschenkron and structuralism failed to recognize the endogeneity of economic structure and sources of market failures. The import-substitution catch-up strategy required governments to give priority to capital- and technology-intensive industries, thus defying developing countries' comparative advantages. Firms in those industries were not viable in open and competitive markets. Entrepreneurs would not voluntarily invest in those industries, which were doomed to fail in competitive markets, without government protection and subsidies and help in mobilizing required capital for investment. Structuralism mistakenly regarded market failures arising from structural rigidities as the cause of developing countries' inability to develop advanced, capital-intensive industries and called on the government to protect and subsidize nonviable firms in comparative advantage–defying industries. It is the violation of comparative advantage causing the failure of structuralism despite it advised the government to implement the desirable interventions in line with Gerschenkron's six propositions to facilitate industrial upgrading.

The new structural economics also helps in understanding why neoliberalism did not work. Washington Consensus policy failed to recognize the endogeneity of government interventions caused by structuralism and the need for the government to facilitate structural change. In developing countries, market distortions were endogenous to the government's need to protect and subsidize nonviable firms that had been promoted by the government's previous import-substitution strategies. Eliminating protections and subsidies would doom nonviable firms, resulting in large-scale unemployment, social and political unrest, and slow economic growth. To avoid those consequences and to continue to prop up nonviable capital-intensive industries that were still considered the cornerstone of modernization and national defense, governments often continued to protect them through new and less visible means after removing previous protections and subsidies in line with the precepts of the Washington Consensus. While the new protections and subsidies were

necessitated by avoiding the collapse of nonviable firms in the old comparative advantage-defying industries, they are usually less efficient than the old ones, especially in the transition economies of the former Soviet Union and Eastern Europe (World Bank 2002). In addition, neoliberalism threw the baby out with the bath water, vehemently opposing any role for governments in facilitating structural change. Chile was a typical example. A model student of Washington Consensus reform, Chile diligently implemented the Washington Consensus reforms in the 1980s and then removed all government protections, subsidies, and interventions to facilitate industrial upgrading in spite of the previous success of Chilean government's supports to diversify the economy from mining to commercial agriculture and salmon farming. Chile ranks high among developing countries on the World Bank's Doing Business Index, based on indicators of the ease of doing business and investing. However, Chile has not seen dynamic structural change for more than 30 years after implementing the Washington Consensus reform, and as a result unemployment is high, income gaps have widened, and Chile remains mired in "the middle-income trap."

The new structural economics also justifies the gradual, dual-track approach to reform that conventional economic thought labeled the wrong approach to transition. Dual-tracking calls for maintaining stability during the transition and stimulating dynamic and sustainable economic growth by continuing transitory protection of the nonviable firms in the old priority sectors while removing restrictions to entry and facilitating the development of previously repressed industries that are consistent with the country's comparative advantages. The dynamic growth of sectors consistent with comparative advantages helps the economy rapidly accumulate capital and changes the factor endowment structure. That makes some formerly nonviable firms in capital-intensive industries viable and creates jobs for workers who were unemployed because of the shut-down of nonviable firms. Once firms in the new sectors are viable, the transitory protection and subsidies can be eliminated, bringing the transition to a

market economy to a smooth end (Naughton 1995; Lau, Qian and Roland 2000; Subramanian and Roy 2003; Lin 2009 and 2012a).

Lin (2009) derives five testable hypotheses related to the above discussions:

1. A country that adopted a structuralist comparative advantage defying (CAD) strategy will require various government interventions and distortions in its economy.
2. Over an extended period a country that adopts a CAD strategy will have poor growth performance.
3. Over an extended period a country that adopts a CAD strategy will have volatile economy.
4. Over an extended period a country that adopts a CAD strategy will have less equitable income distribution.
5. In the transition to a market economy a country's overall economic performance will be improved if it creates conditions to facilitate the development of formerly repressed labor-intensive industries.

Lin uses a dataset of 102 countries over the period 1963-1999 to test the above hypotheses. The results are consistent with the prediction of the hypotheses.

V. Latent Comparative Advantage, Advantage of Backwardness and Industrial Policy

From the new structural economics point of view, the government needs to play a proactive role of externality compensation and coordination of infrastructure improvement, both of which require resources and are often industry specific, to achieve dynamic structural change and economic growth in the economy. The government's resources are limited. To have the largest impact on economic growth, the government needs to use its limited resources strategically. That is, the government needs to have industrial policies, which identify priority industries and improve infrastructure and institutions to facilitate their growth as encapsulated in Gerschenkron's propositions.

In practice, as discussed, industrial policies have largely failed in developing countries, tainting their reputation in mainstream economics. They failed not because the government's proactive facilitation is not necessary in industrial upgrading but because in many cases the developing country's government, with all the best intentions, tried to be too ambitious in supporting advanced industries similar to those in advanced countries, as stipulated by the structuralism. Not understanding that a country's industrial structure is endogenous to its endowment structure, the targeted industries were inconsistent with the country's comparative advantages. That meant that the firms in priority industries were not viable in open and competitive markets, so governments had to protect and subsidize them, grant them monopoly rights, or provide low-price capital, raw material, and land. Such distortive interventions created economic rents that stimulated rent-seeking, embezzlement, and corruption (Krueger 1974; Krugman 1993). Haste makes waste. The backwardness became a disadvantage.

An effective industrial policy should aim instead to facilitate the growth of industries with latent comparative advantages, enabling them to become the country's competitive advantage in the market quickly. Latent comparative advantage in new structural economics refers to an industry in which firms have low factor costs of production because of the industry's congruence to the comparative advantage determined by the country's endowment structure. But the industry is not yet competitive in domestic and international markets because firms operating in the industry have high transaction costs due to the inadequacy of broadly defined hard infrastructure or soft infrastructure. Such an industry will have difficult becoming the country's competitive advantage spontaneously without the government's facilitation, because of the innate coordination failures in required improvements in hard and soft infrastructure and the externality issue faced by pioneer firms. Externality compensation and improvements in hard and soft infrastructure are often industry specific and require resources. A government that wants to facilitate economic development through industrial policies must help industries with latent comparative

advantage ease their specific bottlenecks of infrastructure, the financial constraint, the administrative red tapes and the legal system to reduce transaction costs. If the government does so, there will be the advantage of backwardness in industrial upgrading.

How can governments identify industries with latent comparative advantages? History offers many clues of what to do and what to avoid. Since the 16th and 17th centuries countries succeeded in catching up have shared a common feature: first, they all adopted industrial policies to support industrial upgrading, and second, their industrial policies aimed to help firms enter industries that had flourished in dynamically growing countries that were slightly more developed than they were. Compared to the countries they wanted to catch up they were "moderately backward" instead of "extremely backward" in Gerschenkron's category and the governments did not have to resort to serious distortions in the market to support the new industries. For example, the Netherlands was the most developed country in the world at the time in the 16th and 17th centuries, with a highly developed wool textile industry. The British wool textile industry was immature by comparison. The British government implemented policies to encourage imports of machinery and skilled workers from the Netherlands. Those policies worked. At the time per capita income in Great Britain was at 70% of the Dutch level. That meant that their endowments and comparative advantages were not too different.

Following the Industrial Revolution, Great Britain became the most advanced economy in the world. In the late 19th century France, Germany, and the United States used similar policies to catch up with Great Britain. They were moderately backward compared to Britain as their per capita incomes at that time had already been about 60%–75% of the British level. In the 1950s and 1960s, Japan imitated industries in the United States at a time when its per capita income exceeded 40% of the U.S. level. Later, the four Asian tigers (Korea, Taiwan, Singapore, and Hong Kong) succeeded by imitating Japan's industries. Their per capita incomes were about 30%–40% of Japan's at the time (Akamatsu 1962; Chang 2003; Kim 1988; Ito 1980).

Most other countries also targeted and tried to imitate industries in the United States after the Second World War but failed. On reason was that their income levels were less than 20% of the U.S. level and thus fell into Gerschenkron's category of extreme backwardness at the time of their catching up. For example, in the 1950s China targeted and tried to imitate U.S. industries even though its per capita income was just 5% of the U.S. level. With the government's efforts to build up advanced industries, China was able to test atomic and the hydrogen bombs in the 1960s and launch satellites in the 1970s, the achievements came at a very high price to the economy. In 1979, when China began its transition to a market economy, its per capita income was less than one-third the average in Sub-Saharan African countries (Lin 2012a).

Drawing on the experience of successful economies and the idea of targeting latent comparative advantage so as to tap into the advantage of backwardness in industrial upgrading, the new structural economics proposes a Growth Identification and Facilitation framework as a new framework for industrial policy (Lin and Monga 2011). This framework has two tracks and six steps.

(1) The government in a developing country should identify a list of mature tradable goods and services that have been produced for about 20 years in dynamically growing countries with similar endowment structures and per capita income that is about 100 percent higher than its own or 20 years ago the country and the dynamic growing countries had a similar per capita income level. That is, compared to the benchmark countries, the country attempting to catch up is moderately backward in Gerschenkron's terminology.

(2) If some private domestic firms are already present in those industries, the government should identify constraints to technological upgrading or further firm entry, and take actions, resembling those in Gerschenkorn's fifth proposition, to remove such constraints.

(3) In industries where no domestic firms are present or only a small number of domestic firms are doing exports, the government may try to attract foreign direct

investment (FDI) from benchmark countries in step 1, or organize new firm-incubation program.

(4) In addition to the industries identified in step 1, the government should also pay attention to spontaneous self-discovery by private enterprises and support the scaling up of the successful private innovations in new industries so as to benefit from the unique endowments in the country or opportunities made possible by rapid technological changes in the world.

(5) In countries with poor infrastructure and a bad business environment, special economic zones or industrial parks may be used to create localized good environment in a pragmatic way to overcome barriers to firm entry and FDI and encourage the formation of industrial clusters.

(6) The government should be willing to compensate pioneer firms in the industries identified above with tax incentives for a limited period, co-financing for investments, or access to foreign exchange to compensate for the externality.

The industries identified through the above process should be consistent with the country's latent comparative advantage. Once the pioneer firms come in successfully, many other firms will enter these industries as well. The government's facilitating role is mainly restricted to provision of coordination of hard and soft infrastructure improvement, and compensation for externalities. Government facilitation through the above approach is likely to help developing countries tap into the potential of the advantage of backwardness in industrial upgrading, realize dynamic and sustained growth, and avoid backwardness becoming an disadvantage due to either over ambition of the industrial policy or the inaction of the government in coordinating hard and soft infrastructure improvement and compensation for externalities in industrial upgrading.

VI. Concluding Remarks

Modern economic growth is characterized by a continuous structural transformation in technology, industry, as well hard and soft infrastructure. Gerschenkron is right to

postulate that a developing country has an advantage of backwardness as they can borrow from a large backlog of technological innovations from the advanced country and can adopt the latest technology without facing the resistance from users of old technologies. If a developing country uses that advantage right, they will have faster technological innovation, industrial upgrading and economic growth than advanced country and achieve convergence to advanced country in one or two generations. The precondition for a country to use that advantage right is to follow the comparative advantage determined by its own factor endowment in the industrial upgrading and technological innovation. That is, they should borrow technologies from countries not too far ahead of them in development ladders. Regrettably, most developing countries attempted to defy their comparative advantages and jump directly to develop the advanced industries prevailing in the high-income countries. Their economies became uncompetitive, growth was unsustainable, and crises hit frequently. Instead of advantage, the backwardness becomes disadvantage in achieving rapid, sustained growth.

The fallacy lied in the development thinking of using high-income countries' industries and institutions as reference for developing countries' development policy, focusing on what developing countries did not have and could not do well and advised the developing countries to correct those shortcomings, for example, the development of advanced heavy industries in the import-substitution strategy advocated by structuralism and adoption of institutions prevailing in high-income countries advocated by neoliberal Washington Consensus. Results of various efforts based on those negative thinking by the developing countries themselves and international development communities were disappointing. Instead of exploiting the potential of advantage of backwardness to accelerate their growth, most developing countries encountered the disadvantage of backwardness and were trapped in low-income or middle-income status.

The new structural economics proposes to have a change in the development mindset. The government in a developing country should identify and scale up what they can do well (that is, their comparative advantages) based on what they have now

(that is, their endowments). By this approach, they can benefit from the advantage of backwardness, as argued by Gerschenkron, in industrial upgrading, grow faster than the advanced countries and achieve convergence.

If developing countries follow the above approach of new structural economics, there will be a golden era for their industrialization in the coming decades. The pattern of flying geese is a useful metaphor to explain the idea of advantage of backwardness. Beginning in the eighteenth century, the less-developed West European and East Asian countries followed their more successful neighbors, emulating a flying-geese pattern, benefiting from the leaders' tailwind as they first industrialized, and then became advanced countries themselves. Large emerging-market economies, especially China, have performed dynamically and industrialized quickly offer an unprecedented opportunities for other developing economies that can emulate their success and jumpstart their industrialization process. China – once a "follower goose" – is on the verge of becoming a leader, with the potential to relocate 85 million low-skilled manufacturing jobs in the coming decade. The scale of this shift is huge when compared with the 9.7 million jobs that Japan had in the modern sector in the 1960s, or South Korea's 2.3 million modern jobs in the 1980s (Lin 2012b). And a similar trend will arise in other emerging-market economies. If the governments in the low-income countries in the world play the right and desirable facilitating role recommended in new structural economics to incentivize industrial upgrading and to improve hard and soft infrastructure, the promise of Gershenkron's advantage of backwardness may finally realize, helping backward countries to have a sustainable and dynamic industrialization and achieve convergence in the coming decades.

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