
New Structural Economics: A Framework for Rethinking Development¹

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As strategies for achieving sustainable growth in developing countries are re-examined in light of the financial crisis, it is critical to take into account structural change and its corollary, industrial upgrading. Economic literature has devoted a great deal of attention to the analysis of technological innovation, but not enough to these equally important issues. The new structural economics outlined in this paper suggests a framework to complement previous approaches in the search for sustainable growth strategies. It takes the following into consideration.

First, an economy's structure of factor endowments evolves from one level of development to another. Therefore, the optimal industrial structure of a given economy will be different at different levels of development. Each industrial structure requires corresponding infrastructure (both "hard" and "soft") to facilitate its operations and transactions.

Second, each level of economic development is a point along the continuum from a low-income agrarian economy to a high-income industrialized economy, not a dichotomy of two economic development levels ("poor" versus "rich" or "developing" versus "industrialized"). Industrial upgrading and infrastructure improvement targets in developing countries should not necessarily draw from those that exist in high-income countries.

Third, at each given level of development, the market is the basic mechanism for effective resource allocation. However, economic development as a dynamic process requires industrial upgrading and corresponding improvements in "hard" and "soft" infrastructure at each level. Such upgrading entails large externalities to firms' transaction costs and returns to capital investment. Thus, in addition to an effective market mechanism, the government should play an active role in facilitating industrial upgrading and infrastructure improvements. JEL codes: L16, O10, O20, O21, O25, O40

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Several decades from now when economic historians look back on the story of the past hundred years, it is very likely that they will be intrigued by the mystery of diverging performances by various countries, especially during the second half of the twentieth century. On the one hand, they will be amazed by the rapid growth path followed by a small number of countries such as Brazil, Chile, China, Indonesia, India, Korea, Malaysia, Mauritius, Singapore, Thailand, and Vietnam, where the industrialization process quickly transformed their subsistence, agrarian economies and lifted several hundred million people out of poverty in the space of one generation. On the other hand, they will be puzzled by the apparent inability of many other countries, where more than one-sixth of humanity remained trapped in poverty. They will also notice that with the exception of a few successful economies, there was little economic convergence between rich and poor countries in spite of the many efforts made by developing countries and despite the assistance of many multilateral development agencies.

Long-term sustainable and inclusive growth is the driving force for poverty reduction in developing countries, and for convergence with developed economies. The current global crisis, the most serious one since the Great Depression, calls for a rethinking of economic theories. It is therefore a good time for economists to reexamine development theories as well. This paper discusses the evolution of development thinking since the end of World War II and suggests a framework to enable developing countries to achieve sustainable growth, eliminate poverty, and narrow the income gap with the developed countries. The proposed framework, called a neoclassical approach to structure and change in the process of economic development, or new structural economics, is based on the following ideas:

- First, an economy's structure of factor endowments evolves from one level of development to another. Therefore, the industrial structure of a given economy will be different at different levels of development. Each industrial structure requires corresponding infrastructure (both tangible and intangible) to facilitate its operations and transactions.
- Second, each level of economic development is a point along the continuum from a low-income agrarian economy to a high-income post-industrialized economy, not a dichotomy of two economic development levels ("poor" versus "rich" or "developing" versus "industrialized"). Industrial upgrading and infrastructure improvement targets in developing countries should not necessarily draw from those that exist in high-income countries.
- Third, at each given level of development, the market is the basic mechanism for effective resource allocation. However, economic development as a dynamic process entails structural changes, involving industrial upgrading

and corresponding improvements in “hard” (tangible) and “soft” (intangible) infrastructure at each level. Such upgrading and improvements require an inherent coordination with large externalities to firms’ transaction costs and returns to capital investment. Thus, in addition to an effective market mechanism, the government should play an active role in facilitating structural changes.

The remainder of the paper is organized as follows: the next section examines the evolution of development thinking and offers a critical review of some of its main schools of thought. I then outline the basic principles and conceptual framework of the new structural economics, the function of the market, and the roles of a facilitating state. In the next section I highlight similarities and differences between old and new structural economics, and discusses some preliminary insights on major policy issues based on this new approach.

A Short Review of Development Thinking and Experiences

The process of sustainable per capita income increase and economic growth, characterized by continuous technological innovation and industrial upgrading, is a modern phenomenon. From Adam Smith to the early twentieth century, most economists believed that laissez-faire was the best vehicle for achieving sustainable growth in an economy. It was assumed that in thriving economies all decisions about resource allocation are made by economic agents interacting in markets free of government intervention. The price system determines not only what is produced and how but also for whom. Households and firms pursuing their own interests would be led, “as if by an invisible hand,” to do things that are in the interests of others and of society as a whole. Although the laissez-faire approach was challenged by Marxist economists and others, it became the dominant intellectual framework for the study of growth in all countries and remained so for a long time. It certainly provided many good insights on the process of economic development but it missed the importance of the process of continuous, fundamental technological changes and industrial upgrading, which distinguishes modern economic growth from premodern economic growth (Kuznets 1966).

The study of economic development proceeds in two related but separate tracks: growth theories and development theories. While some of the key ingredients of modern growth theory such as competitive behavior, equilibrium dynamics, the importance of physical capital and human capital, the possibility of diminishing returns, and the impact of technological progress can be found in the work of classical economists (Ramsey 1928; Schumpeter 1934), systematic

modeling only started in the 1940s when some pioneers used primary factors to build generic models based on aggregate production functions. Harrod (1939) and Domar (1946) triggered extensive research along these lines. Following their initial work, the Solow-Swan model sparked the first major wave of systematic growth analysis. The objective was to understand the mechanics of growth, identify its determinants, and develop techniques of growth accounting, which would help explain changes in the momentum and role of economic policy. That first generation of growth researchers highlighted the centrality of capital. One important prediction from these models was the idea of conditional convergence, derived from the assumption of diminishing returns to capital—poor economies with lower capital per worker (relative to their long-run or steady-state capital per worker) will grow faster. While that assumption allowed the model to maintain its key prediction of conditional convergence, it also seemed odd: technology, the main determinant of long-run growth, was kept outside of the model (Lin and Monga 2010).

A new wave of growth modeling had to come up with a convincing theory of technological change. Endogenous growth theory, as it came to be known, maintained the assumption of nonrivalry because technology is indeed a very different type of factor from capital and labor—it can be used indefinitely by others, at zero marginal cost (Romer 1987, 1990; Aghion and Howitt 1992). But it was important to take the next logical step and to understand better the public good characterization of technology and think of it as a partially excludable nonrival good. The new wave therefore reclassified technology not just as a public good but as a good that is subject to a certain level of private control. However, making it a partially excludable nonrival good and therefore giving it some degree of excludability or appropriability was not sufficient to ensure that incentives for its production and use were socially optimal. The move away from perfect competition was therefore necessary. It has yielded high methodological payoffs. While neoclassical models of growth took technology and factor accumulation as exogenous, endogenous growth models explain why technology grows over time through new ideas and provide the microeconomic underpinnings for models of the technological frontier.

Another important question has been to understand how technological diffusion takes place across countries and generates or sustains growth—and why it does not take root in others. Various interesting possibilities have recently been explored in an attempt to answer that critical question (Jones 1998; Acemoglu, Johnson, and Robinson 2001; Glaeser and Shleifer 2002). Both on the theoretical and empirical fronts, progress has been made in our understanding of growth in recent decades. However, growth research still faces significant methodological difficulties and challenges in identifying actionable policy levers to sustain and accelerate growth in specific countries.

Intellectual progress has been even slower in the particular domain of development theories. It took a paper by [Rosenstein-Rodan \(1943\)](#) to bring development issues to the forefront of the discipline. The paper suggested that the virtuous circle of development depended essentially on the interaction between economies of scale at the level of individual firms and the size of the market. Specifically, it assumed that modern methods of production can be made more productive than traditional ones only if the market is large enough for their productivity edge to compensate for the necessity of paying higher wages. But the size of the market itself depends on the extent to which these modern techniques are adopted. Therefore, if the modernization process can be started on a very large scale, then the process of economic development will be self-reinforcing and self-sustaining. If not, countries will be indefinitely trapped in poverty.

Rosenstein-Rodan's framework sparked a wave of similar ideas ([Chang 1949](#); [Lewis 1954](#); [Myrdal 1957](#); [Hirschman 1958](#)) which came to be known as the structuralist approach to economic development. These early development theories held that the market encompassed insurmountable defects and that the state was a powerful supplementary means to accelerate the pace of economic development ([Rosenstein-Rodan 1943](#); [Nurkse 1953](#); [Hirschman 1958](#)). The slump of international trade in the Great Depression led to export pessimism in the post-War period. In Latin America, for instance, political leaders and social elites were influenced strongly by the deterioration in the terms of trade, the economic difficulty encountered during the Great Depression in the 1930s, and the thesis developed by [Prebisch \(1950\)](#) and [Singer \(1950\)](#). They believed that the decline in the terms of trade against the export of primary commodities was secular and led to the transfer of income from resource-intensive developing countries to capital-intensive developed countries. They argued that the way for a developing country to avoid being exploited by developed countries was to develop domestic manufacturing industries through a process known as import substitution. Moreover, the emergence of previous colonies or semi-colonies as newly independent states in Asia and the Middle East, and later in Africa, was accompanied by strong nationalist sentiments.

The results were disappointing in many cases. In many developing countries, well-intended government interventions failed. This was the case across Latin American, African, and South Asian countries in the 1960s and 1970s when import substitution and protection were essential features of the development strategy. One of the main reasons for the failure of many former socialist and developing countries to achieve dynamic growth in their transitional processes was the fact that they attempted to defy the comparative advantage determined by their endowment structures and gave priority to development of capital-intensive heavy industries when capital in their economies was scarce. In order to implement such strategies, developing-country governments had to protect

numerous nonviable enterprises in their priority sectors (Lin 2009a; Lin and Li 2009).

By shielding unsustainable industries from import competition, developing countries also imposed various types of other costs on their economies. Protection typically led to: (i) an increase in the price of imports and import-substituting goods relative to the world price and distortions in incentives, pushing the economy to consume the wrong mix of goods from the point of view of economic efficiency; (ii) the fragmentation of markets, as the economy produced too many small-scale goods, which resulted again in loss of efficiency; (iii) decreased competition from foreign firms and support for the monopoly power of domestic firms whose owners were politically well connected; and (iv) opportunities for rents and corruption, which raised input and transaction costs (Krueger 1974; Krugman 1993).

As government-led economic development strategies based on the structuralist teachings failed in many countries, the free market approach appeared to triumph and influence development thinking. This trend was reinforced by a new revolution in macroeconomics. The prevailing Keynesian macroeconomics was challenged by the stagflation in the 1970s, the Latin American debt crisis, and the collapse of the socialist planning system in the 1980s. The so-called rational expectations revolution emerged and refuted the structuralist theoretical foundation for the state's role in using fiscal and monetary policy for economic development.

The Latin American debt crisis began in 1982 when international financial markets realized that the collapse of the Bretton Woods system had put some countries with unlimited access to foreign capital in a situation where they could not pay back their loans. The crisis was precipitated by a number of inter-related exogenous shocks that toppled the Mexican and several other Latin American economies, which were already overburdened with a substantial percentage of the world's outstanding debt (Cardoso and Helwege 1995). It prompted multilateral lending institutions and bilateral lenders—especially the United States—to call for a comprehensive set of reforms of Latin American economies and to advocate a set of free-market policies that followed the canons of the neoclassical paradigm, later known as the Washington Consensus (Williamson 1990).

The Washington Consensus quickly came to be perceived as “a set of neoliberal policies that have been imposed on hapless countries by the Washington-based international financial institutions and have led them to crisis and misery” (Williamson 2002). It promoted economic liberalization, privatization, and the implementation of rigorous stabilization programs. The results of these policies in terms of growth and employment generation were at best controversial (Easterly, Loayza, and Montiel 1997; Easterly 2001). By the end of the 1990s and

parallel to the dismissal of structuralism and the prevalence of the free market approach, the development economics research community was witnessing the end of an era dominated by cross-country regressions, which attempted to identify growth determinants. That approach had been to focus on the independent and marginal effects of a multitude of growth determinants. This led to the linearization of complex theoretical models. Yet, the general view was that growth determinants interact with each other. To be successful, some policy reforms must be implemented with other reforms. There was a general perception that the policy prescriptions stemming from such regressions did not produce tangible results.

An alternative perspective on non-linearities was the Growth Diagnostics or Decision Tree approach suggested by Hausmann, Rodrik, and Velasco (2005). They recognized the central role of structural change in economic development and argued that there are “binding constraints” on growth in each country. These authors suggested that binding constraints can vary over time and across countries. They concluded that identification of *the* binding constraint was therefore key in practice. This framework highlighted pragmatically the inability of governments to reform everything and stressed the need to prioritize reforms, which should be done through the information revealed by shadow prices. It should be noted that the Growth Diagnostics approach is not operational unless one assumes away reform complementarities, which is the feature of linear growth regressions.

The divergence in growth performance between developed and developing countries, despite predictions of convergence from mainstream economic theory, has led to controversy. Some have concluded that the policy prescriptions, or expectations about their effectiveness, or both were wrong. Others have observed that growth researchers had paid limited attention to heterogeneity (the specific characteristics of each country). The suggestion that cross-country distribution may be multimodal (with the existence of “convergence clubs”) did not settle the debate about which new directions were needed for growth research. Instead, many basic questions have come back on the agenda: Are development economists looking in the wrong place in their quest for the determinants of growth? Should the focus be on institutions (institutional *outcomes*), instead of or in addition to policies? And, assuming that they are not reflecting other factors, how can good institutional outcomes be generated?

These unanswered questions were on the agenda for a long time. Starting in the 1980s, many development economists tried to understand better the causality of relationships and the various transmission channels through which policies, institutional changes, or foreign aid affect growth. They were also the rationale for an increased focus of growth research on microbehavior issues at the household and firm levels, with two goals: (i) allowing for heterogeneity in the

economy (across and within countries); and (ii) investigating how constraints to growth operate at the microlevel.

The growing disappointment and disillusionment with aid effectiveness also led to the quest for rigorous impact evaluation of development projects and programs. This has generated a new approach to development led by economists at the MIT Poverty Lab, whose goal is “to reduce poverty by ensuring that policy is based on scientific evidence” through the use of randomized control trials (RCT) or social experiments. Although RCT are good tools for understanding the effectiveness of some specific microprojects, they often do not start from a clear strategic assessment of how a particular method would fit the knowledge gaps of highest priority (Ravallion 2009). All too often, research looks for topics “under the light.” The positive outcomes for policymaking are more often the occasional by-products of research than its objective from the outset.

Recent microempirical studies may have indeed shed light on some important problems, such as the impact of the investment climate on firm performance or the impact of household behavior on productivity (Rosenzweig and Wolpin 1985). But “there is a risk the bulk of present-day research in development economics appears to be too narrowly focused and/or of too little generalizability to help much in the fight against poverty and to facilitate structural change and sustained growth” (World Bank 2010).

The time has come to reexamine the state of development economics, to learn from past experiences and previous knowledge, and to offer new thinking and a new framework. Drawing lessons from past experience and from economic theories, the next section presents the key principles of a new structural economics, which is a neoclassical approach to economic structure and dynamic change in the process of economic development.²

A Neoclassical Approach to Structure and Change

The starting point for the analysis of economic development is an economy's endowments. Endowments are given in an economy at any specific time and are changeable over time. Following the tradition of classical economics, economists tend to think of a given country's endowments as consisting only of its land (or natural resources), labor, and capital (both physical and human).³ These are in fact factor endowments, which firms in an economy can use in production. It should be noted that the analysis of new structural economics focuses on the dynamics of the capital/labor ratio. This is because land is exogenously given in any realistic discussion of a country's development and natural resources, such as mining resources, exist underground in fixed quantity and their discovery is often random.

Conceptually, it is useful to add infrastructure as one more component in an economy's endowments. Infrastructure includes hard (or tangible) infrastructure and soft (or intangible) infrastructure. Examples of hard infrastructure are highways, port facilities, airports, telecommunication systems, electricity grids, and other public utilities. Soft infrastructure consists of institutions, regulations, social capital, value systems, and other social, economic arrangements. Infrastructure affects the individual firm's transaction costs and the marginal rate of return on investment.

Countries at different levels of development tend to have different economic structures due to differences in their endowments. Factor endowments for countries at the early levels of development are typically characterized by a relative scarcity of capital and relative abundance of labor or resources. Their production activities tend to be labor intensive or resource intensive (mostly in subsistence agriculture, animal husbandry, fishery, and the mining sector) and usually rely on conventional, mature technologies and produce "mature," well-established products. Except for mining and plantations, their production has limited economies of scale. Their firm sizes are usually relatively small, with market transactions often informal, limited to local markets with familiar people. The hard and soft infrastructure required for facilitating that type of production and market transactions are limited and relatively simple and rudimentary.

At the other extreme of the development spectrum, high-income countries display a completely different endowment structure. The relatively abundant factor in their endowments is typically capital, not natural resources or labor. They tend to have comparative advantage in capital intensive industries with economies of scale in production. The various types of hard infrastructure (power, telecommunication, roads, port facilities, etc.) and soft infrastructure (regulatory and legal frameworks, cultural value systems, etc.) that are needed must comply with the necessities of national and global markets where business transactions are long distance and large in quantity and value.

Economic development requires continuous introduction of new and better technology to an existing industry. Most people in low-income countries depend on agriculture for their livelihood. Improvements in agricultural technology are key to increasing farmers' income and reducing poverty. However, economic development also requires continuous diversifying and upgrading from existing industries to new, more capital-intensive ones. Without such a structural change, the scope for sustained increase in per capita income will be limited. Therefore, the discussion in this paper will focus mostly on issues related to industrial upgrading and diversification.

Developing countries have the advantage of backwardness in the upgrading process and a whole spectrum of industries with different levels of capital intensity available for them to choose. However, they must first upgrade their factor

endowment structure, which requires their stock of capital to grow more rapidly than the labor force (see [Ju, Lin, and Wang 2009](#)). When they move up the industrial ladder in the process of economic development, they also increase their scale of production—because of the indivisibility of capital equipment. Their firms become larger and need a bigger market, which in turn necessitates correspondent changes in power, transportation, financial arrangements, and other soft infrastructure.

The process of industrial upgrading and diversification also increases the level of risk faced by firms. As firms move closer to the global technology frontier, it becomes increasingly difficult for them to borrow mature technology from advanced countries. They increasingly need to invent new technologies and products and thus face more risk. The idiosyncratic risk of a firm has three components based on risk sources: technological innovation, product innovation, and managerial capacity. At the early level of development, firms tend to use mature technologies to produce mature products for mature markets. At that level, the main source of risk is the managerial ability of firms' owner-operators. At a higher level of development, firms often invent new technologies to produce new products for new markets. In addition to managerial capacity, such firms face risks arising from the maturity of technology and markets. Therefore, while technological innovation, product innovation, and managerial capacity all contribute to the overall level of risk associated with firms, their relative importance varies greatly from one industry to another and from one level of economic development to another.

With changes in the size of firms, scope of the market, and nature of risk, along with the upgrading of the industrial structure, the requirements for infrastructure services, both hard and soft, also change. If the infrastructure is not improved simultaneously, the upgrading process in various industries may face the problem of x-inefficiency, a phenomenon discussed by [Leibenstein \(1957\)](#). Because the industrial structure in an economy at a specific time is endogenous to its given relative abundance of labor, capital, and natural resources at that time, the economy's factor endowment will change with capital accumulation or population growth, pushing its industrial structure to deviate from the optimal determined by its previous level.⁴

When firms choose to enter industries and adopt technologies that are consistent with the comparative advantage determined by changes in the country's factor endowments,⁵ the economy is most competitive.⁶ As competitive industries and firms grow, they claim larger domestic as well as international market shares and create the greatest possible economic surplus in the form of profits and salaries. Reinvested surpluses earn the highest return possible as well, because the industrial structure is optimal for that endowment structure. Over time, this approach allows the economy to accumulate physical and human capital,

upgrading the factor endowment structure as well as the industrial structure and making domestic firms more competitive over time in more capital and skill-intensive products.

Firms care about profits. For them spontaneously to enter industries and choose technologies consistent with the economy's comparative advantage, the price system must reflect the relative scarcity of factors in the country's endowment. This only happens in an economy with competitive markets (Lin 2009a; Lin and Chang 2009). Therefore, a competitive market should be the economy's fundamental mechanism for resource allocation at each level of its development. That kind of *comparative advantage-following* approach in economic development may appear to be slow and frustrating in countries with major poverty challenges. In reality, it is the fastest way to accumulate capital and upgrade the endowment structure, and the upgrading of industrial structure can be accelerated by better access to technology and industries already developed by and existing in more advanced countries. At each level in their development, firms in developing countries can acquire the technologies (and enter the industries) that are appropriate for their endowment structure, rather than having to reinvent the wheel (Gerschenkron 1962; Krugman 1979). This possibility to use off-the-shelf technology and to enter into existing industries is what has allowed some of the East Asian newly industrialized economies to sustain annual GDP growth rates of 8 and even 10 percent.

As a country climbs up the industrial and technological ladder, many other changes take place: the technology used by its firms becomes more sophisticated, and capital requirements increase, as well as the scale of production and the size of markets. Market transactions increasingly take place at arm's length. A flexible and smooth industrial and technological upgrading process therefore requires simultaneous improvements in educational, financial, and legal institutions, and in hard infrastructure so that firms in the newly upgraded industries can reduce transaction costs and reach the production possibility frontier (Harrison and Rodríguez-Clare 2010). Clearly, individual firms cannot internalize all these changes cost effectively, and spontaneous coordination among many firms to meet these new challenges is often impossible. Change in infrastructure requires collective action or at least coordination between the provider of infrastructure services and industrial firms. For this reason, it falls to the government either to introduce such changes or to coordinate them proactively.

Successful industrial upgrading in responding to change in an economy's endowment structure requires that the pioneer firms overcome issues of limited information regarding which new industries are the economy's latent comparative advantages determined by the changing endowment structure. Valuable information externalities arise from the knowledge gained by pioneer firms in both success and failure. Therefore, in addition to playing a proactive role in the

improvements of soft and hard infrastructures, the government in a developing country, like that in a developed country, needs to compensate for the information externalities generated by pioneer firms (Rodrik 2004; Lin 2009a; Lin and Monga 2011; Harrison and Rodríguez-Clare 2010).⁷

What is “New” About the New Structural Economics?

Like all learning ventures, economic development thinking is bound to be a continuous process of amalgamation and discovery, continuity, and reinvention. The existing stock of knowledge has been the result of many decades of work by thinkers from various backgrounds and disciplines and has come to light through several waves of theoretical and empirical research. It is therefore only natural that the proposed new structural economics has some similarities and differences with previous strands in the development economics literature. Its main value-added should be assessed on the new policy insights it provides and the pertinence of the research agenda ahead.

Difference with Earlier Literature on Structural Change

Earlier thinking on structural change in the context of economic development is mostly associated with Rostow (1990 [1960]) and Gerschenkron (1962). In trying to understand how economic development occurs and what strategies can be adopted to foster that process, the former suggested that countries can be placed in one of five categories in terms of their level of growth: (i) traditional societies, characterized by subsistence economy, with output not traded or even recorded, the existence of barter, high levels of agriculture, and labor-intensive agriculture; (ii) societies with preconditions to growth, where there is an increase in capital use in agriculture, the development of mining industries, and some growth in savings and investment; (iii) societies in take-off mode, with higher levels of investment and industrialization, accumulation of savings, and a decline in the share of the agricultural labor force; (iv) societies that drive to maturity and where wealth generation enables further investment in value adding industry and development—growth becomes self-sustaining, industry is diversified, and more sophisticated technology is used; and (v) mass-consumption societies that achieve high output levels and where the services industry dominates the economy.

Gerschenkron questioned Rostow’s proposition that all developing countries pass through a similar series of levels and its implication that it is possible to generalize the growth trajectory of different countries. For the new structural economics, economic development from a low level to a high level is a continuous

spectrum, not a mechanical series of five distinguished levels. Although the change in an economy's industrial structure reflects the changes in that economy's endowment structure, the development of industries in different countries with a similar endowment structure can be achieved in different and nonlinear ways. This is especially true with the increased globalization of markets, the rapid development of new products, and constant technological change, as countries can exploit opportunities that were not available in the past and specialize in industries that are likely to vary from one economy to another.

The new structural economics also provides a framework for understanding the endogeneity and exogeneity issues surrounding the key stylized facts of modern growth analysis that have been outlined by the [Growth Commission \(2008\)](#) and [Jones and Romer \(2009\)](#): an economy that follows its comparative advantage in the development of its industries will be most competitive in domestic and world markets. As a result, the economy will generate potentially the largest income and surplus for savings. Capital investment will also have the largest possible return. Consequently, households will have the highest savings propensity, resulting in an even faster upgrade of the country's endowment structure ([Lin and Monga 2010](#)).

Similarities and Differences with Old Structural Economics

In terms of similarities, the “new” and the “old” structural economics are both founded on structural differences between developed and developing countries and acknowledge the active role of the state in facilitating the movement of the economy from a lower level of development to a higher one. However, there are profound differences between these two approaches regarding their targets and the modalities of state intervention. The old structural economics advocates development policies that go against an economy's comparative advantage and advise governments in developing countries to develop advanced capital-intensive industries through direct administrative measures and price distortions. By contrast, the new structural economics stresses the central role of the market in resource allocation and advises the state to play a facilitating role to assist firms in the process of industrial upgrading by addressing externality and coordination issues.

The differences between the two frameworks derive from their dissimilar views on the sources of structural rigidities: old structural economics assumes that the market failures that make the development of advanced capital-intensive industries difficult in developing countries are exogenously determined by structural rigidities due to the existence of monopolies, labor's perverse response to price signals, and/or the immobility of factors. By contrast, the new structural economics posits that the failure to develop advanced capital-intensive industries in developing countries is endogenously determined by their endowments. The

relative scarcity in their capital endowment and/or the low level of soft and hard infrastructure in developing countries make the reallocations from the existing industries to the advanced capital-intensive industries unprofitable for the firms in a competitive market.

Old structural economics assumes a dual and restrictive view of the world, with a binary classification of only two possible categories of countries: “low-income, periphery countries” versus “high-income, core countries.” As a result, it views the differences in the industrial structure between developed and developing countries as expressing a dichotomy. Contrary to that vision, the new structural economics considers these differences as the reflection of a whole spectrum that includes many different levels of development. The new structural economics also rejects dependency theories. In an increasingly globalized world, it sees opportunities for developing countries to counter negative historical trends by diversifying their economy and building industries that are consistent with their comparative advantage so as to accelerate growth and achieve convergence by exploiting the advantage of backwardness in an open, globalized world.

Another major difference between the new and the old structural economics is the rationale for using key instruments of economic management. Old structural economics sees systematic government intervention in economic activities as the essential ingredient in the modernization objective. Among the key instruments used to move from “developing” countries to “industrialized” countries are generalized protectionism (such as government-imposed tariffs on imports to protect infant industries), rigid exchange-rate policies, financial repression, and the creation of state-owned enterprises in most sectors.

By contrast, the new structural economics recognizes that import substitution is a natural phenomenon for a developing country climbing the industrial ladder in its development process, provided that it is consistent with the shift in comparative advantage that results from changes in its endowment structure. But it rejects conventional import-substitution strategies that rely on the use of fiscal policy or other distortions in low-income, labor or resource-abundant economies to develop high cost, advanced capital-intensive industries, which are not consistent with the country’s comparative advantage. It also stresses the idea that the industrial upgrading process in a developing country should be consistent with the change in the country’s comparative advantage that reflects the accumulation of human and physical capital and the change in its factor endowment structure—this ensures the viability of firms in new industries. The new structural economics concludes that the role of the state in industrial diversification and upgrading should be limited to the provision of information about the new industries, the coordination of related investments across different firms in the same industries, the compensation of information externalities for pioneer firms, and the nurturing of new industries through incubation and encouragement of

foreign direct investment (Lin 2009a; Lin and Chang 2009; Lin and Monga 2011). The state also needs to assume effectively its leadership role in the improvement of hard and soft infrastructure in order to reduce transaction costs on individual firms and so facilitate the economy's industrial development process.

New Structural Economics: Some Policy Insights

The ultimate goal of development thinking is to provide policy advice that facilitates the quest for sustainable and inclusive economic and social progress in poor countries. Although specific policy measures to be derived from the new structural economics approach will require further research and depend very much on country context and circumstances, in this section I will make some conjectures about a few preliminary insights on various topics.

Fiscal Policy. Until Britain's very high unemployment of the 1920s and the Great Depression, economists generally held that the appropriate stance for fiscal policy was for governments to maintain balanced budgets. The severity of the early twentieth-century crises gave rise to the Keynesian idea of counter-cyclicality, which suggested that governments should use tax and expenditure policies to offset business cycles in the economy. By contrast, neoclassical economics offers doubts about the implicit assumption behind the Keynesian model of a multiplier greater than one⁸ and its implication that governments are able to do something that the private sector has been unable to do: mobilize idle resources in the economy (unemployed labor and capital) at almost zero social cost, that is, with no corresponding decline in other parts of GDP (consumption, investment, and net exports). Instead, they warn against the possibility of the so-called Ricardian equivalence trap and point to the fact that households tend to adjust their behavior for consumption or saving on the basis of expectations about the future. They suggest that expansionary fiscal policy (stimulus packages) is perceived as immediate spending or tax cuts that will need to be repaid in the future. They conclude that the multiplier could be less than 1 in situations where the GDP is given and an increase in government spending does not lead to an equal rise in other parts of GDP. The neoclassical paradigm even suggests the possibility of some rare instances where multipliers are negative, pointing to situations where fiscal contractions become expansionary (Francesco and Pagano 1991).

From the viewpoint of new structural economics, the effects of fiscal policy may be different in developed and developing countries due to the differences in opportunities of using counter-cyclical expenditure for making productivity-enhanced investments. Physical infrastructure in general is a binding constraint for growth in developing countries and governments need to play a critical role in

providing essential infrastructure to facilitate economic development. In such contexts, recessions are typically good times for making infrastructure investments, for three main reasons. First, such investments boost short-term demand and promote long-term growth.⁹ Second, their investment cost is lower than in normal times. And third, the Ricardian equivalence trap can be avoided because the increase in future growth rates and fiscal revenues can compensate for the cost of these investments (Lin 2009b).

If a developing country government follows the new structural economics approach of facilitating the development of industries according to the country's comparative advantage, its economy will be competitive and the fiscal position and the external account are likely to be sound, thanks to the likelihood of strong growth, good trade performance, and the lack of nonviable firms that the government has to subsidize. Under this scenario, the country will face fewer homegrown economic crises. If the economy is hit by external shocks such as the recent global crisis, the government will be in a good position to implement a counter-cyclical fiscal stimulus and invest in infrastructure and social projects. Such public investments can enhance the economy's growth potential, reduce transaction costs on the private sector, increase the rate of return on private investment, and generate enough tax revenues in the future to liquidate the initial costs.

In addition to its different stance on fiscal stimulus, the new structural economics approach also offers a different strategy for managing natural resource wealth. In resource-abundant countries, it would recommend that an appropriate share of revenues from commodities be used to invest in human capital, infrastructure, social capital, and compensation for first movers in new nonresource sectors so as to facilitate the structural transformation. To accomplish this with the greatest effect, these resources should finance investment opportunities that remove binding constraints on industrial diversification and upgrading, especially in the infrastructure and education sectors. Microeconomic analyses show that even when factory floor costs are comparable, inefficiencies in infrastructure can make it impossible for poor countries to compete on international markets. Freight and insurance costs in African countries are 250 percent of the global average,¹⁰ with road freight delays two to three times as long as in Asia. Lacking financial resources and the appropriate policy frameworks, many of these countries are often unable to sustain much needed investment and maintenance expenditures. In such contexts, the effective fiscal strategy would not be to keep natural resource revenues in sovereign funds and invest in foreign equity markets or projects but, rather, to use a substantial portion of the revenues for financing domestic or regional projects that facilitate economic development and structural change—i.e. projects that stimulate the development of new manufacturing industries, diversify the economy, provide jobs, and offer the potential of continuous upgrading.¹¹

Monetary Policy. Old structural economics suggested that monetary policy should be under government control (not independent central banks) and directed at influencing interest rates and even sector credit allocation. But it also acknowledged that many other factors that influence the investment demand-schedule in developing countries are too powerful for monetary policy alone to achieve sufficient levels of investment, channel resources in strategic sectors, and combat unemployment.

Building on lessons from the rational expectations revolution, neoclassical economists doubted the idea that monetary policy could be used to support industrial development. It recommended that its main goal be price stability, and advocated the use of short-term interest rates by independent central banks to maintain the general level of prices (or to control money supply growth), and not to stimulate economic activity and trigger inflation.

The new structural economics envisions the possibility of using interest rate policy in developing countries as a counter-cyclical tool and as an instrument to encourage infrastructure and industrial upgrading investments during recessions—measures that may contribute to productivity growth in the future. Monetary policy is often ineffective for stimulating investment and consumption in recessions and excess capacity situations in developed countries, especially when nominal interest rates hit the zero bound in a context of limited profitable investment opportunities, pessimistic expectations, high unemployment rates, low confidence about the future, and the likelihood of liquidity traps. It should be noted, however, that developing countries are less likely to encounter such liquidity traps. Even when faced with excess capacity in existing domestic industries, their scope for industrial upgrading and diversification is large. Their firms have incentives to undertake productivity-enhancing, industrial-upgrading investments during recessions if interest rates are sufficiently low. Furthermore, they tend to have many infrastructure bottlenecks. Lowering interest rates in such contexts would also encourage investments in infrastructure.

The objective of monetary policy should be much broader than traditionally conceived under neoclassical economics—in economic slumps, it should aim at encouraging investment that removes bottlenecks on growth. In practical terms, this implies not just that interest rates should be lowered in the slump, as would be the case in most circumstances under a standard Taylor rule. It also implies that monetary authorities should resort to temporary interest rate subsidies, flexible credit allocation rules, or similar time-bound devices, targeting infrastructure through development banks that are identified as binding constraints, preferably in specific geographic locations where the payoff is the largest and where political economy constraints can be more easily managed.

Financial Development. There is ample consensus that financial development is essential to sustaining economic growth. There is however much less agreement on the specific role it plays in that process. Starting with the observation that one of the major constraints facing developing countries was limited capital accumulation, old structural economics regarded the problems of the financial sector in underdeveloped economies as resulting from widespread market failures that could not be overcome by market forces alone.¹² They recommended that governments adopt a hands-on approach in that process, mobilize savings, and allocate credit to support the development of advanced capital-intensive industries. This very often led to financial repression (McKinnon 1973; Shaw 1973). In some countries, especially in Sub-Saharan Africa, the belief in soft-budget constraints led governments to accumulate deficits in state-owned financial institutions and created a pervasive business culture of self-repression not only for banks, but also for private enterprises (Monga 1997). Drawing consequences from such analyses, neoclassical economists advocated financial liberalization. They contended that bureaucrats generally do not have the incentives or expertise to intervene effectively in credit allocation and pricing, and that a well-defined system of property rights, good contractual institutions, and competition would create the conditions for the emergence of a sound financial system. They recommended that government exit from bank ownership and lift restrictions on the allocation of credit and the determination of interest rates (Caprio and Honohan 2001).

While agreeing with the need to address the deleterious effects of financial repression, the new structural economics would emphasize the fact that those distortions are often designed to protect nonviable firms in priority sectors in developing countries. It would then stress the importance of an appropriate sequencing of liberalization policies in domestic finance and foreign trade so as to achieve stability and dynamic growth simultaneously during transition. The new structural economics also posits that the optimal financial structure at a given level of development may be determined by the prevailing industrial structure, the average size of firms, and the usual type of risk they face, all factors that are in turn endogenous to the economy's factor endowments at that level. Observing that national policies frequently favor large banks and the equity market regardless of the structure of the economy, it would suggest that low-income countries choose small, local banks as the backbone of their financial systems, instead of trying to replicate the financial structure of advanced industrialized countries. This would allow small-scale firms in agriculture, industry, and the service sector to gain adequate financial services. As industrial upgrading takes place and the economy relies increasingly on more capital-intensive industries, the financial structure will change to give greater weight to large banks and sophisticated equity markets (Lin, Sun, and Jiang 2009).

Foreign Capital. In a world that they thought was characterized by the core–periphery relationship, old structural economists tended to view foreign capital mainly as a tool in the hands of industrialized countries and their multinational firms to maintain harmful control over developing countries. They rejected the idea that free capital movements among countries could deliver an efficient allocation of resources and considered foreign direct investment flows to poor countries as an instrument for foreign ownership and domination. They advocated tight restrictions on virtually all forms of international financial flows.

Neoclassical economic theory argues that international capital mobility serves several purposes: it allows countries with limited savings to attract financing for productive domestic investment projects; it enables investors to diversify their portfolios; it spreads investment risk more broadly; and it promotes intertemporal trade—the trading of goods today for goods in the future (Eichengreen and others 1999). Therefore, the theory generally favors open or liberalized capital markets, with the expectation of more efficient allocation of savings, increased possibilities for diversification of investment risk, faster growth, and the dampening of business cycles. It should be noted, however, that some neoclassical economists also argue that liberalized financial markets in developing countries can be distorted by incomplete information, large and volatile movements in and out of the system, and many other problems leading to suboptimal consequences that are damaging for general welfare.

The new structural economics approach considers foreign direct investment to be a more favorable source of foreign capital for developing countries than other capital flows because it is usually targeted toward industries consistent with a country's comparative advantage. It is less prone to sudden reversals during panics than bank loans, debt financing, and portfolio investment, and does not generate the same acute problems of financial crises as do sharp reversals of debt and portfolio flows. In addition, direct investment generally brings technology, management, access to markets, and social networking, which are often lacking in developing countries and are yet crucial for industrial upgrading. Thus, liberalizing inward direct investment should generally be an attractive component of a broader development strategy. By contrast, portfolio investment that may move in and out quickly, in a large quantity, tends to target speculative activities (mostly in equity markets or the housing sector) and create bubbles and fluctuations. It should not be favored.¹³ The new structural economics approach may also shed new light on the puzzle raised by Lucas (1990) about the flow of capital from capital scarce developing countries to capital abundant developed countries. Without improvement of infrastructure and upgrading to new comparative advantage industries, the accumulation of capital in a developing country may encounter diminishing returns, causing lower returns to capital in developing countries, and justifying the subsequent outflow of capital to developed countries.

Trade Policy. There have been various old structural economics approaches to external trade. But one constant feature is the belief that integration into the global economy is bound to maintain the existing world power structure, with Western countries and their multinational corporations dominating poorer countries and exploiting their economies. In order to break the dependency trap, old structural economics thinkers have suggested that priority be given to import-substitution strategies, with developing economies closed and protected until their modern industries can compete with advanced industrialized countries in world markets.

A radically different view was adopted by economists in the 1980s. Observing that macroeconomic crises in developing countries almost always have an external dimension, they considered that their immediate cause was the lack of foreign exchange to service debts and purchase imports. They recommended trade liberalization and export promotion as a solution to generate foreign exchange through export earnings. This was also consistent with the view that, in the long term, outward oriented development strategies are more effective than inward looking policies. This view was bolstered further by the argument that such a strategy would increase demand for unskilled labor and hence unskilled wages, as had happened in successful East Asian countries (Kanbur 2009).

The analysis from the new structural economics would be consistent with the view from neoclassical economics that exports and imports are endogenous to the comparative advantage determined by a country's endowment structure (they are essential features of the industrial upgrading process and reflect changes in comparative advantage). Globalization offers a way for developing countries to exploit the advantages of backwardness and achieve a faster rate of innovation and structural transformation than is possible for countries already on the global technology frontier. Openness is an essential channel for convergence. The new structural economics approach recognizes, however, that many developing countries start climbing the industrial ladder with the legacy of distortions from old structural economics strategies of import-substitution. It would therefore suggest a gradualist approach to trade liberalization. During transition, the state may consider providing some temporary protection to industries that are not consistent with a country's comparative advantage, while liberalizing at the same time entry to other more competitive sectors that were controlled and repressed in the past. The dynamic growth in the newly liberalized sectors creates the conditions for reforming the old priority sectors. This pragmatic, dual-track approach may achieve the goal of growth without losers in the transition process (Naughton 1995; Lau, Qian, and Roland 2000; Subramanian and Roy 2003; Lin 2009a).

Human Development. Old structural economics generally said little about the role of human development in economic growth. By contrast, neoclassical economics has shown that the continuing growth in per capita incomes of many countries during the nineteenth and twentieth centuries was mainly due to the expansion of scientific and technical knowledge that raised the productivity of labor and other inputs in production. Economic theory has demonstrated that growth is the result of synergies between new knowledge and human capital, which is why large increases in education and training have accompanied major advances in technological knowledge in all countries that have achieved significant economic growth. Education, training, and health, which are the most important investments in human capital, are considered to be the most important driving force for economic development (Becker 1975; Jones and Romer 2009).

The new structural economics considers human capital to be one component of a country's endowment. For economic agents, risks and uncertainty arise during the process of industrial upgrading and technological innovation that accompanies economic development. As various firms move up the industrial ladder to new, higher capital-intensity industries and get closer to the global industrial frontier, they face higher levels of risks. Human capital increases workers' ability to cope with risk and uncertainty (Schultz 1961) but its formation requires a long time. A person who loses the opportunity to receive education at a young age may not be able to compensate for that loss at a later age. In a dynamic growing economy, it is important to plan ahead and make human capital investments before the economy requires the set of skills associated with new industries and technologies. However, improvements in human capital should be commensurable with the accumulation of physical capital and the upgrading of industry in the economy. Otherwise, human capital will either become a binding constraint for economic development if it is under-supplied because of insufficient investment, or the country will have many frustrated highly educated youths if the industrial upgrading of the economy is not progressing fast enough to provide skilled jobs.

A well-designed policy on human capital development should be an integral part of any country's overall development strategy. The new structural economics goes beyond the neoclassical generic prescription for education and suggests that development strategies include measures to invest in human capital that facilitate the upgrading of industries and prepare the economy to make full use of its resources. The key components of such strategies should follow Lucas's (2002) suggestion to allow human capital to have both a quality and a quantity dimension. It should also include alternative policies for promoting skill formation that are targeted to different levels of the life cycle,¹⁴ with the government and the private sector working closely together to anticipate or respond to the skills needs in the labor market. Singapore, one of the 13 high-growth economies¹⁵ that have

been able to grow at more than 7 percent for periods of more than 25 years since World War II, provides a successful example of human capital development as a national strategy (Osman-Gani 2004), which goes beyond the schooling decision and recognizes that on-the-job training is an important component of aggregate human capital. Its human resource strategies have been continuously revised and adjusted in conjunction with other national strategic economic policies.

Concluding Thoughts

The new structural economics approach highlights the importance of endowments and differences in industrial structures at various levels of development and the implications of distortions stemming from past, misguided, interventions by policymakers whose belief in old structural economics led them to over-estimate governments' ability to correct market failures. It also points out the fact that policies advocated under the Washington Consensus often failed to take into consideration the structural differences between developed and developing countries and ignored the second-best nature of reforming various types of distortions in developing countries.

The proposed new structural economics attempts to develop a general framework for understanding the causality behind the observed stylized facts of sustained growth. Specifically, the new structural economics proposes to: (i) develop an analytical framework that takes into account factor and infrastructure endowments, the levels of development, and the corresponding industrial, social, and economic structures of developing countries; (ii) analyze the roles of the state and the market at each development level and the mechanics of the transition from one level to another; and (iii) focus on the causes of economic distortions and the government's strategies for exit from the distortions. It is not an attempt to substitute another ideologically based policy framework for those that have dominated development thinking in past decades, yet showing little connection to the empirical realities of individual countries. Rather, it is an approach that brings attention to the endowment structure and level of development of each country and suggests a path toward country-based research that is rigorous, innovative, and relevant to development policy. This framework stresses the need to understand better the implications of structural differences at various levels of a country's development—especially in terms of the appropriate institutions and policies, and the constraints and incentives for the private sector in the process of structural change.

The current state of development economics and the severe impact of the global crisis on the economies of developing countries have generated strong demand for a new framework for development thinking. The research agenda of

the new structural economics should enrich research and enhance the understanding of the nature of economic development. This would help assist low and middle-income countries in achieving dynamic, sustainable, and inclusive growth, and in eliminating poverty.

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Notes

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1. The paper was presented as the Kuznets Lecture at the Economic Growth Center, Yale University on March 1, 2011. The main arguments of this paper were first presented at DEC's fourth Lead Economists Meeting and at Lin's first anniversary at the Bank on June 2, 2009. A shorter version of the paper was presented at the conference on "Challenges and Strategies for Promoting Economic Growth," organized by the Banco de México in Mexico City on October 19–20, 2009, and at public lectures in Cairo University on November 5, 2009, Korean Development Institute on November 17, 2009, OECD on December 8, 2009, UNU-WIDER on January 19, 2010, Stockholm Institute of Transitional Economics on January 21, 2010, National University of Management in Cambodia on September 8, 2010, Bank of Italy on April 26, 2011, and University of Dar es Salaam on April 29, 2011.

2. I will refer to the early contributions by structuralist economists such as [Prebisch \(1950\)](#) and [Furtado \(1964, 1970\)](#) and recent contributions by structuralist economists such as [Taylor \(1983, 1991, 2004\)](#) and [Justman and Gurion \(1991\)](#) as old structural economics.

3. The total endowments at a specific time—the economy's total budgets at that time and the endowment structure, together with the households' preferences and firms' available production technologies—determine the relative factor and product prices in the economy. Total budgets and relative prices are two of the most fundamental parameters in economic analysis. Moreover, the endowments are given at any specific time and are changeable over time. These properties make endowments and the endowment structure the best starting point for analysis of economic

development. Except in Heckscher-Ohlin trade theory, the economic profession has not given sufficient attention to the implications of factor endowments and endowment structure.

4. The proposition that the industrial structure is endogenous to an economy's endowment structure at each level of its development has been the subject of extensive theoretical studies. For instance, [Lin and Zhang \(2009\)](#) develop an endogenous growth model that combines structural change with repeated product improvements to discuss the endogeneity of industrial structure, the appropriate technology, and economic growth in a less developed country (LDC) in a dynamic general-equilibrium framework. They use a two-sector model in which technological change in the traditional sector takes the form of horizontal innovation based on expanding variety as suggested in [Romer \(1990\)](#) while technological progress in the modern sector is accompanied by incessantly creating advanced capital-intensive industry to replace backward labor-intensive industry. This requires an intentional investment of resources by profit-seeking firms or entrepreneurs ([Grossman and Helpman 1994](#)). The model shows that: (i) the optimal industrial structure in LDCs should not be the same as that in developed countries (DCs); (ii) the appropriate technology adopted in the modern sector in LDCs ought to be inside the technology frontier of the DCs; and (iii) a firm in an LDC that enters capital-intensive, advanced industry (by DC standards) would be nonviable owing to the relative scarcity of capital in the LDC's factor endowment. [Ju, Lin, and Wang \(2009\)](#) develop a dynamic general equilibrium model to show that industries will endogenously upgrade toward the more capital-intensive ones as the capital endowment becomes more abundant. The model features a continuous inverse-V-shaped pattern of industrial evolution driven by capital accumulation: As the capital endowment reaches a certain threshold, a new industry appears, prospers, then declines, and finally disappears. While the industry is declining, a more capital-intensive industry appears and booms.

Capital is mobile in an open economy. It is unlikely that the mobility of capital will equalize the capital-labor ratio in high-income, capital-abundant countries and low-income, labor-abundant countries. This is because there are two main purposes for the capital to flow from a higher-income country to a lower-income country. The first one is to exploit the lower-income country's comparative advantage of abundant labor (or natural resources) so as to use the lower-income country as its export base. For this purpose, the industry must be consistent with the recipient, lower-income country's comparative advantage determined by its factor endowment, although the technology used by the foreign-invested firms may be somewhat more capital intensive than the indigenous firms. The second purpose of capital flow from a higher-income country is to get access to a lower-income country's domestic markets. For this type of capital flow, the foreign-invested industries will be more capital intensive than the indigenous firms but only the types of production activities that are consistent with the host country's comparative advantage, for example assembly of parts into final products, will be located in the lower-income country. Therefore, the theoretical insights derived from the assumption that the relative abundance of capital in a country is given at any specific time will hold even with capital mobility.

5. For nontradable goods and services, the nature of least-cost production technology will also be endogenously determined by the endowment structure. That is, as capital becomes relatively abundant, the technology used to produce nontradable goods and services will also become relatively capital intensive, just as what happens in the tradable goods sector. For simplicity, the discussion in the paper will focus on the tradable sector.

6. [Porter \(1990\)](#) made the term "competitive advantage" popular. According to him, a nation will have competitive advantage in the global economy if the industries in the nation fulfill the following four conditions: (1) their industries intensively use the nation's abundant and relatively inexpensive factors of production; (2) their products have large domestic markets; (3) each industry forms a cluster; and (4) the domestic market for each industry is competitive. The first condition in effect means that the industries should be the economy's comparative advantage determined by the nation's endowments. The third and the fourth conditions will hold only if the industries are consistent with the nation's competitive advantage. Therefore, the four conditions can be reduced to two independent conditions: comparative advantage and domestic market size. Of these two independent conditions, comparative advantage is the most important because if an industry

corresponds to the country's comparative advantage, the industry's product will have a global market. That is why many of the richest countries of the world are very small (Lin and Ren 2007).

7. Industries in advanced developed countries today are typically located on the global frontier and face uncertainty as to what the next frontier industries will be. This explains why government policy measures to support pioneer firms in such countries are usually in the form of general support to research in universities (which has externalities to private firms' R&D), patents, preferential taxes for capital investments, mandates, defense contracts, and government procurement. Support in the form of preferential taxes, defense contracts, and government procurement are industry or product-specific. Government support to basic research also needs to be prioritized for certain types of potential industries or products because of budget constraints. However, government support to pioneer firms in developing countries, especially low-income countries, often fails. One of the most important reasons is the attempt by low-income countries governments to support firms in industries that are inconsistent with the economy's comparative advantages (Lin 2009a; Lin and Chang 2009).

8. Barro (2009) calls active fiscal policy of the Keynesian type "the extreme demand-side view" or the "new voodoo economics."

9. Recent research suggests that *economic* returns on investment projects in developing countries averages 30–40 percent for telecommunications, more than 40 percent for electricity generation, and more than 200 percent for roads. In Thailand, production loss due to power outages represented more than 50 percent of the total indirect costs of doing business in 2006. Firms often rely on their own generators to supplement the unreliable public electricity supply. In Pakistan, more than 60 percent of firms surveyed in 2002 owned a generator. The cost of maintaining a power generator is often high and burdensome, especially for small and medium-size firms, which are important sources of employment. Yet, while these costs must be privately borne, their benefits are felt across the economy.

10. This is percentage of cost (UNCTAD Statistical Database).

11. The exploitation of natural resources can generate a large amount of revenues but it is generally very capital intensive and provides limited job opportunities. In a recent visit to Papua New Guinea, I observed that the Ok Tedi copper and gold mine in Tabubil generates almost 80 percent of the country's export revenues and 40 percent of government revenues but provides only 2,000 jobs. A proposed liquefied natural gas project will double Papua New Guinea's national income after its completion in 2012, but the project will only provide 8,000 jobs. The majority of Papua New Guinea's 6.5 million population still live on subsistence agriculture. The contrast between the standard of living of a few elite workers in modern mining and that of subsistence farmers is becoming a source of social tensions. A similar observation can be made about Botswana: the failure to diversify the economy from diamond mining and to generate employment opportunities may explain the widening disparity and deterioration of various human and social indicators, despite the diamond industry's great success in sustaining Botswana's growth miracle over the past 40 years.

12. Gerschenkron (1962) made a similar point, arguing that the private sector alone cannot effectively address the problems of access to finance in weak institutional environments.

13. A sudden large inflow of portfolio capital is most likely to be invested in speculative sectors rather than in productive sectors. The reason is twofold: a large increase in investment in existing industries may encounter diminishing returns to capital, and the potential for quick and large industrial upgrading is limited by human capital, as well as soft and hard infrastructure constraints.

14. Carneiro and Heckman (2003) have demonstrated the importance of both cognitive and noncognitive skills that are formed early in life in accounting for gaps in schooling among social groups and other dimensions of socioeconomic success. They have provided empirical evidence of a high return to early interventions and a low return to remedial or compensatory interventions later in life.

15. The list includes: Botswana; Brazil; China; Hong Kong SAR, China; Indonesia; Japan; Korea; Malaysia; Malta; Oman; Singapore; Taiwan, China; and Thailand.

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