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Growth Horizons for a Changing Asian Regional Economy

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ABSTRACT

After two generations of economic growth, the next phase of structural transformation for Asia will have several salient features. Our results suggest that no single policy orientation, pathway, or even destination will apply to all economies. The main driver for each economy's structural change will be demand, both domestic and external. These demand sources can have very different sector emphasis, however, and drive domestic resource allocation in different directions. Asian economies with high export shares will be drawn to more intensive primary and industrial resource allocation, while those with larger domestic demand shares will become more service-oriented. Our long-term forecasts for the Asian economies suggest that factor productivity growth continues to be essential to improving livelihoods generally and promoting regional convergence in particular. Of particular importance is potential for reducing regional inequality through more inclusive growth—productivity improvements are more cost-effective in lower-income countries and they have a bigger relative income dividend. Our research also reveals that services are essential contributors to average living standards in high-, medium-, and even low-income Asian economies. For this reason, policies that improve the efficiency of service sector labor allocation, as well as skill and productivity improvements via determined education and training programs, will be essential to sustaining higher living standards and transition to long-term growth sustained by demand from an ever-expanding middle class.

Keywords: structural transformation, factor productivity, Asian financial integration, service sector

JEL Classification: C53, C51, E37, F17, F18, O47

I. INTRODUCTION

Two generations of sustained growth have transformed the Asian regional economies, making pervasive contributions to improved living standards and changing Asia's relationship to the global economy. As this economic transition matures, structural adjustment will continue in the more developed ADB member countries (AMCs) and opportunities for growth-oriented structural change in the developing member countries (DMCs) will proliferate. The prospects for sustaining and expanding this regional dynamism are very bright, but they need to be supported by determined domestic and multilateral commitments to productivity growth and regional economic integration. Fortunately, the region can draw upon policy lessons from two generations of successfully improving living standards and modernization.

To strengthen the basis of evidence for regional policy making, this study presents a set of long-term forecasts for Asian regional growth, highlighting the roles of factor productivity and policies that can facilitate private sector support for more sustained and inclusive regional growth. Asia is comprised of very diverse economies, and this diversity presents both challenges and opportunities. Challenges include institutional differences that can undermine regional policy coherence and escalate both costs and risks for regional investors. Also impeding growth are limited domestic savings resources in lower-income DMCs, which hinder investment and technological progress. Another constraint from the same source is limited fiscal capacity, which leads to very different levels of per capita public goods and services across the region.

On the positive side, economic diversity presents many opportunities for more efficient regional specialization. Faster-growing economies can confer growth externalities upon their neighbors and countries with relatively abundant low-cost resources (including labor) can offer higher and more diversified investment returns to countries with relatively abundant capital resources and more advanced commercial institutional development. Conversely, countries with high net savings can facilitate growth by investing in savings-constrained DMCs, supporting higher employment, technology transfer, and export market access for their partners.

Long-term forecasts for the Asian economies suggest that factor productivity growth continues to be essential to improving livelihoods generally and promoting regional convergence in particular. Our findings support the notion that productivity improvements are not only more cost-effective in lower-income countries, they have a bigger relative income dividend for recipient than for investing countries. Looking at a variety of policies that facilitate productivity growth by promoting private sector development, our results offer three main insights. First, the potential benefits of further regional tariff reductions are limited, and Asian economies should expand their trade policy dialog to address more structural barriers to trade. Second, trade-facilitating investments in hard infrastructure can significantly enhance growth in the region, particularly for lower-income economies.

Finally, the biggest growth dividend we have identified comes from deeper Asian financial integration. In the past, successful Asian economies have been technology driven and continually striving to upgrade the skills of their population. The benefits of this human resources approach to growth and development become even more pronounced with the application of regional policies that facilitate trade and capital flows. With more effective Asian regional integration, including much more efficient regional capital allocation, Asia's prosperity can accelerate significantly and reach out to the majority of its population, over half of humanity. This second, and perhaps greatest, stage of modern Asian economic emergence, growth through regionalism, could make the greatest contribution to livelihood improvement in modern times.

II. MODELING FRAMEWORK

The research reported here is based on application of a multicountry dynamic model that captures detailed trade and domestic market interactions between and within Asia and in its relationship to the rest of the world. Generally speaking, the complexities of today's global economy make it very unlikely that policymakers relying on intuition or rules-of-thumb will achieve anything approaching optimality in either the domestic or international arenas. Market interactions are so pervasive in determining economic outcomes that more sophisticated empirical research tools are needed to improve visibility for both public and private sector decision makers.

The preferred tool for detailed empirical analysis of economic policy is now the calibrated general equilibrium (CGE) model. It is well suited to growth analysis because it can detail structural adjustments within national economies and elucidate their interactions in international markets. The model, based on a prototype global trade model developed by the World Bank, is technically summarized in the Appendix and fully documented elsewhere (Roland-Holst and Sugiyarto 2013).[1] For the present discussion, a few general comments will facilitate interpretation of the scenario results that follow.

Models, like the one used here are intended to capture the extended linkages and indirect effects that follow from specific policies and external shocks. The complexities of today's global economy make it very unlikely that policymakers relying on intuition or rules-of-thumb will achieve optimality. Market interactions are so pervasive in determining economic outcomes that more sophisticated empirical research tools are needed to improve visibility for both public and private sector decision makers.

Technically, a CGE model is a system of simultaneous equations that simulate price-directed interactions between firms and households in commodity and factor markets. The roles of government, capital markets, and other trading partners are also specified, with varying degrees of detail and passivity, to close the model and account for economywide resource allocation, production, and income determination.

The role of markets is to mediate exchange, usually with a flexible system of prices, the most important endogenous variables in a typical CGE model. As in a real market economy, commodity and factor price changes induce changes in the level and composition of supply and demand, production and income, and the remaining endogenous variables in the system. In CGE models, an equation system is solved for prices that correspond to equilibrium in markets and satisfy the accounting identities governing economic behavior. If such a system is precisely specified, equilibrium always exists and such a consistent model can be calibrated to a base period data set. The resulting calibrated general equilibrium model is then used to simulate the economywide (and regional) effects of alternative policies or external events.

The distinguishing feature of a general equilibrium model, applied or theoretical, is its closed form specification of all activities in the economic system under study. This can be contrasted with more traditional partial equilibrium analysis, where linkages to other domestic markets and agents are deliberately excluded from consideration. A large and growing body of evidence suggests that indirect effects (e.g., upstream and downstream production linkages) arising from policy changes are not only substantial, but may in some cases even outweigh direct effects. Only a model that consistently

[1] Roland-Holst and Sugiyarto 2013.

specifies economywide interactions can fully assess the implications of economic policies or business strategies. In a multicountry model like the one used in this study, indirect effects include the trade linkages between countries and regions which themselves can have policy implications.

III. BASELINE AND POLICY SCENARIOS

The starting point for this Asian regional trade analysis is a global trade database for 2007, which we extrapolate forward to 2030 with a dynamic CGE model.[2] The extrapolation is carried out as a dynamic calibration to baseline aggregate growth forecasting obtained from growth accounting exercises. The calibrated baseline then serves as a reference point to evaluate policy scenarios and other counterfactual events, but it is also of independent interest as an indicator of changing long-term economic conditions. In this section, we review some of the economic fundamentals from the baseline projection and compare them with scenarios for alternative trade regimes and changing conditions for regional trade and transport.

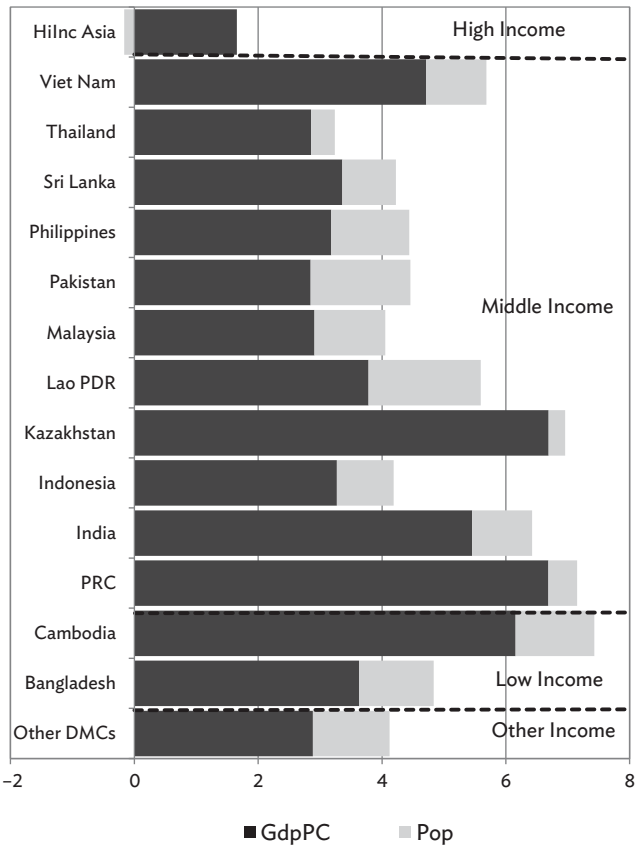
Figure 1 presents the average forecasted growth rates for Asian economies over the period of analysis. In this figure, we use a "league table" layout to highlight the ranking of per capita gross domestic product (GDP) growth rates and the effect of population growth on per capita real incomes. Note that we do not take account of purchasing power parity or shifts in nominal exchange rates, so these results are subject to some qualification. In our baseline, the main characteristics of Asian growth are expected to persist in a relatively stable regional and global policy environment. We also must assume no exogenous shocks (SARs, tsunami, avian flu, recession, etc.) are of sufficient magnitude to derail baseline growth more than temporarily.

Having made these caveats, we see that because of its economic momentum (growth times absolute size), the People's Republic of China (PRC) is expected to continue providing growth leadership in the region. For other economies, improvements in real living standards will depend on the interaction between growth in real economic activity and in population. Bangladesh, India, Malaysia, the Philippines, Viet Nam, and other economies will all experience significant per capita income discounts because of high population growth, while high-income Asia will actually experience higher per capita income because of shrinking populations.

While GDP trends over the baseline are calibrated from independent forecasting estimates, structural adjustments within the regional economies are projected by our dynamic CGE model. As we shall see in the detailed results, beneath the smooth veneer of aggregate Asian growth there will be pervasive structural adjustments. These include shifting industrial structure, employment, and trade patterns, all of which must evolve as Asia takes fuller advantage of its expanding and maturing internal market.

[2] See comments and references in the Appendix for more about the data source and model specification.

Figure 1: Real Gross Domestic Product Growth by Country and Region 2007–2030
(baseline, annualized % change)



DMC = developing member country, GdpPC = per capita gross domestic product, HiInc Asia = high-income ADB members, Lao PDR = Lao People's Democratic Republic, PRC = People's Republic of China, Pop = population.

Sources: International Monetary Fund (2012), and the World Bank (2012).

The baseline is a status quo or "business-as-usual" scenario where national and multilateral policy regimes are assumed unchanged and no external shocks occur. Under these conditions, steady aggregate growth and moderate structural change are to be expected, yet modern history of the Asian region has been much more dynamic. The difference has been due to a combination of public and private agency, with the former providing reformist guidance and the latter responding quickly to changing opportunities and challenges. To capture these events in a forecasting framework, we specify counterfactual policy scenarios we are interested in, using simulation analysis to predict how private actors across the region will respond according to the economic theory embodied in the CGE model.

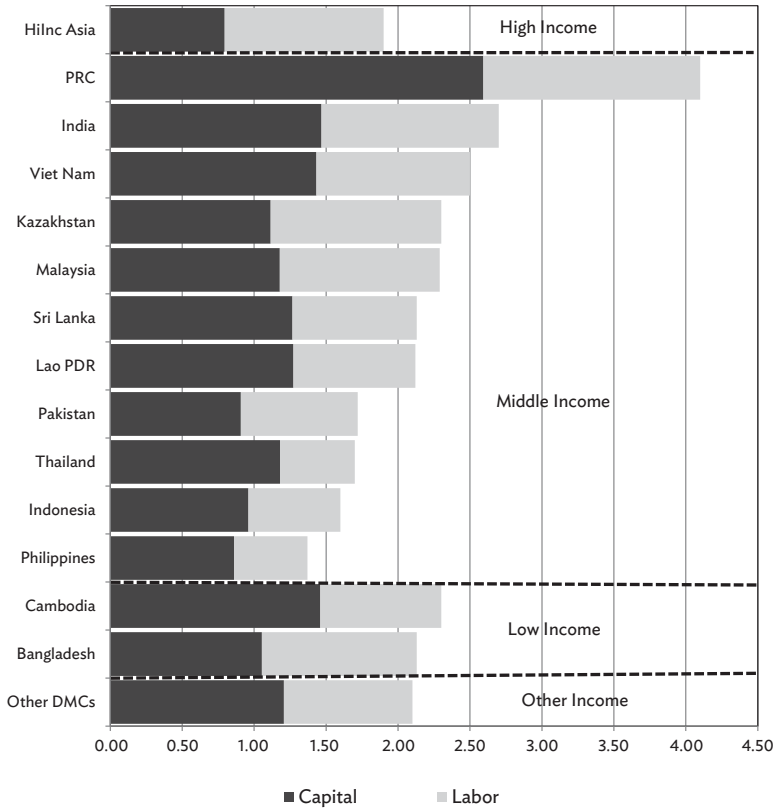
To examine how national and regional policy initiative can advance and expand long-term Asian prosperity, we consider six generic policy scenarios, summarized in Table 1. These fall into two general categories, productivity improvements and private sector promotion, discussed in greater detail below.

Table 1: Policy Scenarios

Scenario	Name	Description
1	Capital Productivity Growth	Assume that the Asian economies sustain growth rates of capital productivity as indicated in Figure 2, with rates for all countries converging to the regional average by 2030.
2	Labor Productivity Growth	Assume that the Asian economies sustain growth rates of labor productivity as indicated in Figure 2, with rates for all countries converging to the regional average by 2030.
3	Total Factor Productivity Growth	Assume that the Asian economies sustain growth rates of total factor productivity as indicated in Figure 2, with rates for all countries converging to the regional average by 2030.
4	Trade Liberalization	In addition to Scenario 3, assume that Asia achieves abolition of nominal trade distortions (import taxes and subsidies) across the region
5	Infrastructure Investment	In addition to Scenario 4, assume that investments and institutional changes effect a 50% reduction in trade, transport, and transit margins for lower-income Asian countries.
6	Asian Financial Integration	In addition to Scenario 5, assume that, for developing member countries, the stock of foreign direct investment rises to at least 10% of gross domestic product by 2030.

Source: Authors' framework.

Figure 2: Factor Productivity Growth in Asia, 1999–2008
(% per annum)



DMC = developing member country, HiInc = high-income ADB members, Lao PDR = Lao People's Democratic Republic, PRC = People's Republic of China.

Sources: International Monetary Fund (2012), and the World Bank (2012).

A. Productivity Scenarios

One of the hallmarks of Asia's modern growth experience has been technological progress and skill development. The most dynamic regional economies have all promoted productivity growth effectively, achieving some of the world's highest rates of total factor productivity growth (Figure 1). Capital productivity was generally advanced through public–private partnerships for industrial modernization and technology transfer. At the same time, the most dynamic economies intensified and extended their early commitments to education and promotion of skill-intensive employment, first in manufacturing and eventually in higher value-added service sectors. The product of these strategies, in the most successful cases, has been a dramatic expansion of the middle classes, with their attendant capacity for self-sustaining domestic growth and expanding public goods and services.

To see the potential for expanding this growth dynamic around the region, our first three scenarios assume that Asian economies stay on their pre-recession trajectories of productivity growth. These are relatively high by historical standards, but we assume they reflect an underlying policy determination to more fully realize the region's vast economic potential. We also assume that long-term growth disparities decline, and in these scenarios all national productivity levels are assumed to converge linearly to regional averages by 2030.

Finally, we decompose total factor productivity growth in the first two scenarios, attributing capital productivity growth to technological change and labor productivity growth to the usual three sources (education, training, technology). Note that capital productivity includes total factor productivity growth attributable to land.[3]

B. Policy Scenarios

As has already been observed, the most successful Asian growth economies may be diverse geographically, demographically, and even structurally, but they share a domestic legacy of effective public–private partnership that has secured their rapid and sustained growth. Indeed, to a significant extent the potential for all of Asia to advance may depend on its ability to extend these institutional models more widely and deeply across the region. To assess the potential for promoting private sector development in a regional context, we consider three generic policy scenarios.

Trade liberalization. Successive rounds of World Trade Organization negotiations, combined with an alphabet soup of regional trading agreements, have achieved dramatic expansion of global trade and accelerated economic growth in most countries.[4] In Asia, this linkage has been dramatically positive, with the most prosperous economies being the most trade-intensive. This experience suggests that further trade liberalization could unlock more growth potential across the region. For this reason, we wanted to include a policy scenario for regional trade liberalization. Unfortunately, reliable data on trade barriers is generally confined to tariff collections, but by this measure Asian economies are relatively open, with quite low national average real tariff rates. Despite this limitation, we still consider one scenario (trade liberalization) where the ADB member economies remove tariff barriers

[3] The productivity estimates we use were gleaned from vast literature on growth accounting, beginning with the seminal work of Solow and Barro and extended by hundreds of authors. Our own results are a synthesis of official and academic estimates.

[4] The composition of these trade-induced growth impacts can be controversial, but there is a strong consensus that trade and aggregate growth are strongly linked. See, for example, Aghion and Howitt (2009), Dollar and Kraay (2001), and Bardhan (1997).

with respect to imports from other ADB member economies. Thus, the trade liberalization scenario represents regional, but not global, tariff abolition.

Infrastructure investment. Asia's regional landscape poses many challenges to economic integration. Because of geographic realities, realizing the growth potential of the region will depend critically on infrastructure. For example, the two most populous countries in the region are separated by a extremely challenging set of mountain ranges and deserts. For this reason, the entire Asian region has an important stake in expanded Southeast Asian trade infrastructure. This is particularly true for many of the region's poorest economies, which would be directly in the path of many new transport axes under consideration. Cambodia, Lao People's Democratic Republic, Myanmar, and (to a lesser extent) Viet Nam have long been at the margins of the more dynamic East and South Asian growth experience, yet they could become central pillars of any comprehensive bridging infrastructure between the PRC and India. Asia's early prosperity was based on maritime linkages, but fuller regional integration and more inclusive growth can only be achieved by more determined investments in infrastructure. For the present exercise, we evaluate such a scenario, assuming infrastructure commitments that lower regional trade, transport, and transit margins 50% by 2030.[5]

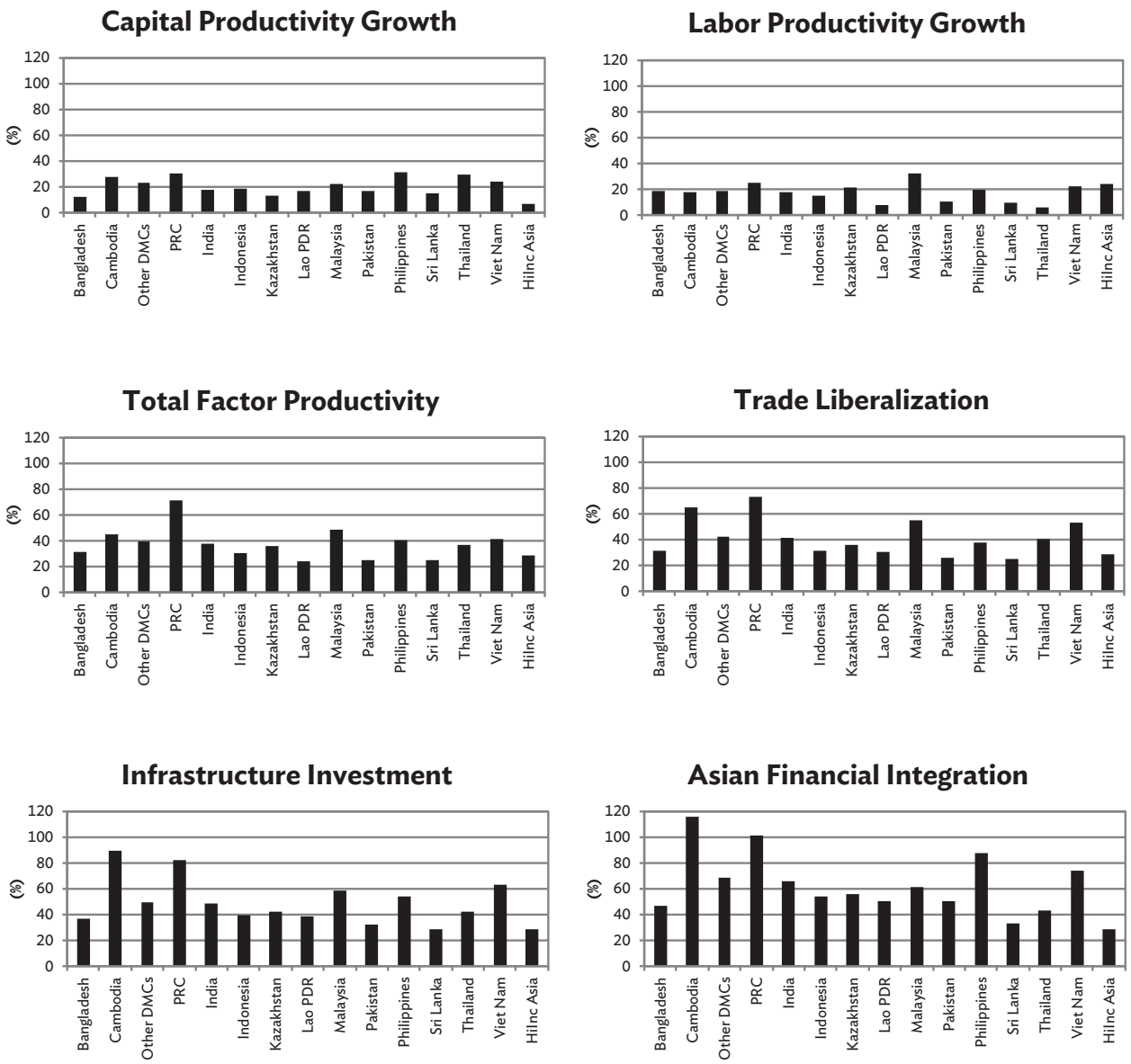
Financial liberalization. Asia's economies exhibit many forms of diversity, many beneficial but others, like poverty rates, public health conditions, etc., less so. In terms of growth potential, one kind of diversity could be leveraged for the benefit of the entire region. This takes the form of sharp regional differences in average per capita savings. One of the defining characteristics of low-income economies everywhere is limited reserves of domestic savings, which in turn limits the progress of development by restricting investment in productive assets and enterprise expansion. The era of globalization has changed the nature of this constraint, however, with the advent of transboundary or foreign direct investment (FDI) that permits low-income countries to leverage foreign savings for domestic investment, technological change, and growth. To help low-income Asian economies achieve their economic potential in the timeliest fashion, while offering higher real returns to regional investors, FDI can be an essential catalyst. To capture the phenomenon of more open regional financial flows, we assume that for developing member countries, the stock of FDI rises to at least 10% of GDP by 2030.

IV. MACROECONOMIC RESULTS

All the policy scenarios considered here have significant potential to advance the Asian regional economies, particularly those associated with factor productivity and financial integration. Aggregate growth effects for each of the member country are listed in Tables 2 and 3 and illustrated in Figure 3.

[5] These margin reductions are consistent with independent economic estimates. See, for example, Anderson and Winkoop (2004). For more in the aggregate economic returns to infrastructure investment, see, for example, Gramlich (1994) pp. 1183–1184 and Florio (1997) pp. 39–64. The latter compiles data from 200 benefit–cost studies submitted to the European Commission and cites analogous data from the World Bank, but those data have limited relevance for the United States.

Figure 3: Real Gross Domestic Product by Country
(% change from baseline in 2030)



DMC = developing member country, HiInc Asia = high-income ADB members, Lao PDR = Lao People's Democratic Republic, PRC = People's Republic of China.

Note: Countries/regions are listed in order of increasing per capita income.

Source: Authors' estimates.

A. Real Gross Domestic Product Growth

The most important macroeconomic findings for each scenario can be summarized as follows:

Improvements in production technology. For most ADB member countries, capital is the binding constraint on rapid economic growth. For this reason, improvements in production technology, as reflected in capital productivity growth, have a significant impact on regional and country-specific growth prospects. In nearly every country, capital productivity contributes more than labor productivity to aggregate growth, the only exceptions being Bangladesh, whose exports are especially labor intensive, and high-income economies, which are relatively capital abundant. Clearly, sustained commitments to technological change in the region can support higher growth rates, averaging nearly 20% higher real GDP by 2030 and 30% or more for several countries.

Improvements in labor productivity. In many ways, labor has been the original source of comparative advantage for dynamic Asian economies. This is still true in the region, even though it has become much more capital intensive because of high accumulated domestic and external savings (i.e., FDI). Indeed, labor productivity growth in the most capital-intensive economies (high-income Asia) is essential because labor represents such a large share of value added in these economies. Thus, even though capital constrained economies are more numerous in Asia, the labor component of factor productivity remains more essential for the region as a whole. The essential policy implication of this is that no single productivity policy will fit every case. Lower-income economies need technological change as a first priority, labor productivity second. Higher-income countries need to make labor productivity a higher priority. One exception again is Bangladesh, whose reliance on labor-intensive exports increases the importance of policies that can improve labor productivity.

Total factor productivity growth. This scenario combines the last two, and here we get a real sense of how potent productivity can be as a growth catalyst. If the region can merely sustain the last decade's total factor productivity trends, real GDP for Asia as a whole would be nearly 30% higher by 2030 and many countries would see improvements exceeding 40%.

Trade liberalization. It has long been understood that, despite their appeal from a political economy perspective, import tariffs are price distortions that reduce economic efficiency and undermine aggregate growth potential. Thus the results of this scenario are consistent with intuition (i.e., generally positive), but the gains vary significantly according to initial conditions. For some countries with relatively high tariff protection or who export toward protected markets, growth gains from regional tariff reduction can be considerable. Only high-income Asian economies experience a small adverse impact, the result of moderate regional trade diversion, but this would be more than offset by any of the other policies considered. For the region as a whole, however, gains from further tariff reduction appear relatively negligible, suggesting that nontariff barriers might be a higher priority for future negotiations to open and more fully integrate regional markets.

Infrastructure investment. The results of Tables 2 and 3 indicate that regional infrastructure improvements can make significant contributions to long-term Asian growth, particularly those with limited initial infrastructure. Figure 4 illustrates the sharp regional disparities in existing Asian infrastructure, and regional commitments to improve this would benefit all countries, but especially lower-income developing member countries (DMCs).

Table 2: Real Gross Domestic Product by Country
(% change from baseline in 2030)

Country/Region		KProd	LProd	TProd	TLib	Infr	FLib
High Income	HiInc Asia	7	24	29	28	28	29
Middle Income	China, People's Rep. of	30	24	71	73	82	101
	India	18	18	38	41	49	66
	Indonesia	18	15	31	32	39	54
	Kazakhstan	14	22	36	36	42	55
	Lao PDR	16	8	24	30	38	49
	Malaysia	22	32	49	55	59	61
	Pakistan	17	10	25	26	33	50
	Philippines	32	19	40	38	54	87
	Sri Lanka	15	10	25	25	28	33
	Thailand	30	6	37	40	42	43
	Viet Nam	24	22	41	52	63	73
Low Income	Bangladesh	13	19	31	31	37	47
	Cambodia	28	18	45	66	90	116
Other income	Other DMCs	23	19	39	42	50	69
	All Asia	18	22	46	47	52	63

DMC = developing member country, FLib = financial liberalization, HiInc Asia = high-income ADB members, Infr = infrastructure investment, KProd = improvements in production technology, LProd = improvements in labor productivity, Lao PDR = Lao People's Democratic Republic, TLib = trade liberalization, TProd = total factor productivity growth.

Note: Countries/regions are listed in order of increasing per capita income.

Source: Authors' estimates.

Table 3: Real Gross Domestic Product by Country
(cumulative difference from baseline, 2012–2030, $ billions)

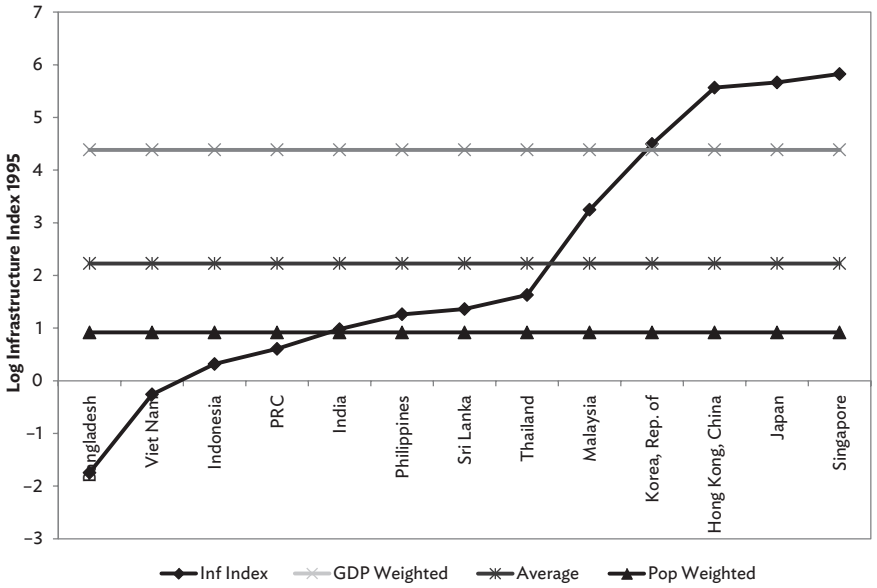
Country/Region		KProd	LProd	TProd	TLib	Infr	FLib
High Income	HiInc Asia	1,307	4,174	5,139	5,141	5,136	5,146
Middle Income	China, People's Rep. of	4,138	3,946	9,815	10,066	10,447	13,127
	India	789	828	1,716	1,892	1,965	2,695
	Indonesia	264	218	415	432	465	672
	Kazakhstan	42	65	107	108	115	156
	Lao PDR	3	2	5	6	7	7
	Malaysia	191	227	339	383	400	414
	Pakistan	97	57	143	146	151	187
	Philippines	171	103	204	194	219	381
	Sri Lanka	18	11	28	28	30	29
	Thailand	217	40	258	297	310	315
	Viet Nam	87	81	136	183	202	225
Low Income	Bangladesh	51	62	108	106	114	143
	Cambodia	12	9	18	27	32	43
Other income	Other DMCs	98	84	159	172	176	250
	All Asia	7,484	9,907	18,589	19,177	19,768	23,790

DMC = developing member country, FLib = financial liberalization, HiInc Asia = high-income ADB members, Infr = infrastructure investment, KProd = improvements in production technology, LProd = improvements in labor productivity, Lao PDR = Lao People's Democratic Republic, TLib = trade liberalization, TProd = total factor productivity growth.

Note: Countries/regions are listed in order of increasing per capita income.

Source: Authors' estimates.

Figure 4: Aggregate National Indexes of Infrastructure Resources



GDP = gross domestic product, Inf = infrastructure, Pop = population, Wgtd = weighted population, PRC = People's Republic of China.

Source: Calderon and Serven (2004).

Regional financial liberalization. More intensive use of FDI within Asia would sharply increase long-term growth prospects in the region. More extensive Asian FDI significantly increased real growth rates, particularly in lower-income DMCs, in some cases more than doubling the benefit of total factor productivity growth. Overall, they contributed about $4 trillion to regional real GDP. Clearly, more open and extensive regional allocation of investment resources can be a potent catalyst for growth, particularly in lower-income countries where domestic savings are a serious constraint to development.

B. Gross Domestic Product Components and Welfare Impacts

Tables 4–9 give more detailed macroeconomic results for six productivity and policy scenarios. These help to elucidate both the actual welfare impacts and the structural adjustments that regional economies might experience under each counterfactual. For example, real GDP benefits discussed above actually understate welfare gains to Asian households, more accurately reflected in the equivalent variation income effects of the last column. Households gain primarily because of rising average wages, shifting value added in the direction of workers and final consumption. Although consumption price indexes (CPIs) usually increase because of enhanced growth against an established resource base, productivity growth and more liberal multilateral policies income opportunities more than offset this. Significantly, if not surprisingly, trade volumes increase sharply for member countries, further accelerating regional integration and real income growth.

Table 4: Technological Progress, Macroeconomic Impacts
(% change from baseline in 2030)

Country/Region		GDP	Output	Exports	Imports	Cons	CPI	EV Inc
High Income	HiInc Asia	7	8	19	23	12	2	12
Middle Income	China, People's Rep. of	30	30	44	47	39	2	37
	India	18	17	26	24	21	3	22
	Indonesia	18	16	31	43	24	3	24
	Kazakhstan	14	14	16	18	18	1	18
	Lao PDR	16	17	17	30	26	3	28
	Malaysia	22	25	28	32	38	–2	30
	Pakistan	17	17	24	26	21	4	23
	Philippines	32	32	47	62	42	10	43
	Sri Lanka	15	18	24	25	21	4	21
	Thailand	30	33	35	40	40	1	40
	Viet Nam	24	20	25	36	37	1	38
Low Income	Bangladesh	13	12	12	12	15	0	15
	Cambodia	28	26	29	37	34	–1	34
Other income	Other DMCs	23	21	36	36	31	3	32
	All Asia	18	21	32	35	23	2	24

CPI = consumer price index, Cons = consumption, DMC = developing member country, EV Inc = equivalent variation in income, FLib = financial liberalization, GDP = gross domestic product, HiInc Asia = high-income ADB members, Infr = infrastructure investment, KProd = improvements in production technology, LProd = improvements in labor productivity, Lao PDR = Lao People's Democratic Republic, TLib = trade liberalization, TProd = total factor productivity growth.

Note: Countries/regions are listed in order of increasing per capita income.

Source: Authors' estimates.

Table 5: Labor Productivity Growth, Macroeconomic Impacts
(% change from baseline in 2030)

Country/Region		GDP	Output	Exports	Imports	Cons	CPI	EV Inc
High Income	HiInc Asia	24	24	33	37	36	0	37
Middle Income	China, People's Rep. of	24	24	37	41	32	1	30
	India	18	17	24	23	22	1	22
	Indonesia	15	14	25	40	21	2	21
	Kazakhstan	22	22	21	25	28	–1	28
	Lao PDR	8	8	12	20	14	3	15
	Malaysia	32	34	34	43	51	–1	42
	Pakistan	10	9	12	12	12	–2	13
	Philippines	19	18	29	44	28	6	29
	Sri Lanka	10	8	11	16	14	0	15
	Thailand	6	7	10	15	12	0	12
	Viet Nam	22	18	24	34	32	2	34
Low Income	Bangladesh	19	18	24	23	22	0	23
	Cambodia	18	17	24	30	22	1	22
Other income	Other DMCs	19	17	27	33	27	2	28
	All Asia	22	22	32	36	31	1	31

Cons = consumption, CPI = consumer price index, DMC = developing member country, EV Inc = equivalent variation in income, GDP = gross domestic product, HiInc Asia = high-income ADB members, Lao PDR = Lao People's Democratic Republic.

Note: Countries/regions are listed in order of increasing per capita income.

Source: Authors' estimates.

Table 6: Total Factor Productivity Growth, Macroeconomic Impacts
(% change from baseline in 2030)

Country/Region		GDP	Output	Exports	Imports	Cons	CPI	EV Inc
High Income	HiInc Asia	29	29	41	47	44	0	45
Middle Income	China, People's Rep. of	71	74	87	90	91	–1	88
	India	38	38	46	41	46	2	48
	Indonesia	31	29	46	62	40	3	41
	Kazakhstan	36	36	35	38	47	–1	47
	Lao PDR	24	25	27	41	37	5	40
	Malaysia	49	54	54	64	80	–1	64
	Pakistan	25	25	31	30	31	1	33
	Philippines	40	40	58	76	54	10	55
	Sri Lanka	25	27	31	33	34	2	35
	Thailand	37	40	43	50	51	1	51
	Viet Nam	41	37	42	56	61	1	63
Low Income	Bangladesh	31	31	32	29	36	–1	37
	Cambodia	45	43	52	61	51	0	52
Other income	Other DMCs	39	38	53	55	53	2	55
	All Asia	46	52	61	65	58	2	60

Cons = consumption, CPI = consumer price index, DMC = developing member country, EV Inc = equivalent variation in income, GDP = gross domestic product, HiInc Asia = high-income ADB members, Lao PDR = Lao People's Democratic Republic.

Note: Countries/regions are listed in order of increasing per capita income.

Source: Authors' estimates.

Table 7: Trade Liberalization
(% change from baseline in 2030)

Country/Region		GDP	Output	Exports	Imports	Cons	CPI	EV Inc
High Income	HiInc Asia	28	29	56	71	45	1	46
Middle Income	China, People's Rep. of	73	74	113	116	91	0	88
	India	41	40	113	119	48	–2	49
	Indonesia	32	30	63	85	42	4	43
	Kazakhstan	36	36	31	33	47	–2	47
	Lao PDR	30	27	61	71	43	4	46
	Malaysia	55	61	74	86	82	–3	67
	Pakistan	26	26	25	19	30	–4	32
	Philippines	38	38	52	65	50	7	51
	Sri Lanka	25	27	24	24	32	–2	34
	Thailand	40	46	83	97	57	0	57
	Viet Nam	52	48	104	136	70	3	73
Low Income	Bangladesh	31	30	23	15	35	–6	36
	Cambodia	66	54	109	148	81	3	81
Other income	Other DMCs	42	42	101	108	59	1	60
	All Asia	47	53	86	94	59	0	61

Cons = consumption, CPI = consumer price index, DMC = developing member country, EV Inc = equivalent variation in income, GDP = gross domestic product, HiInc Asia = high-income ADB members, Lao PDR = Lao People's Democratic Republic.

Note: Countries/regions are listed in order of increasing per capita income.

Source: Authors' estimates.

Table 8: Infrastructure Development
(% change from baseline in 2030)

Country/Region		GDP	Output	Exports	Imports	Cons	CPI	EV Inc
High Income	HiInc Asia	28	30	68	81	47	3	47
Middle Income	China, People's Rep. of	76	77	140	154	98	2	95
	India	43	42	139	155	51	1	53
	Indonesia	34	33	87	132	51	9	52
	Kazakhstan	38	38	44	52	53	1	53
	Lao PDR	34	30	80	107	54	11	58
	Malaysia	58	67	87	101	91	–2	74
	Pakistan	27	25	40	36	33	0	35
	Philippines	43	42	67	86	60	11	61
	Sri Lanka	26	28	42	49	39	2	40
	Thailand	42	49	97	122	67	3	67
	Viet Nam	59	56	130	186	97	8	101
Low Income	Bangladesh	33	31	53	46	39	–2	41
	Cambodia	81	67	134	209	115	5	115
Other income	Other DMCs	43	47	132	150	69	3	71
	All Asia	49	55	106	121	63	4	65

Cons = consumption, CPI = consumer price index, DMC = developing member country, EV Inc = equivalent variation in income GDP = gross domestic product, HiInc Asia = high-income ADB members, Lao PDR = Lao People's Democratic Republic.

Note: Countries/regions are listed in order of increasing per capita income.

Source: Authors' estimates.

Table 9: Asian Financial Integration
(% change from baseline in 2030)

Country/Region		GDP	Output	Exports	Imports	Cons	CPI	EV Inc
High Income	HiInc Asia	29	30	73	90	47	5	48
Middle Income	China, People's Rep. of	101	98	91	218	128	6	124
	India	66	60	70	252	77	10	79
	Indonesia	54	49	67	201	74	14	76
	Kazakhstan	55	53	24	93	70	7	71
	Lao PDR	49	46	42	148	73	16	77
	Malaysia	61	73	96	111	97	1	79
	Pakistan	50	47	19	96	62	11	65
	Philippines	87	84	85	166	107	15	108
	Sri Lanka	33	33	26	66	48	9	49
	Thailand	43	50	100	128	69	5	70
	Viet Nam	73	64	124	211	112	10	116
Low Income	Bangladesh	47	36	23	80	55	8	57
	Cambodia	116	96	127	266	144	5	145
Other income	Other DMCs	69	68	125	203	95	8	97
	All Asia	63	68	82	162	79	8	81

Cons = consumption, CPI = consumer price index, DMC = developing member country, EV Inc = equivalent variation in income GDP = gross domestic product, HiInc Asia = high-income ADB members, Lao PDR = Lao People's Democratic Republic.

Note: Countries/regions are listed in order of increasing per capita income.

Source: Authors' estimates.

All three productivity scenarios have analogous structural implications, but some differences emerge because of different initial relative abundance of factors. In countries with substantial unskilled labor populations, capital productivity growth induces higher labor productivity indirectly, leading to higher household income effects than direct labor productivity enhancement. In the case of countries with a greater proportion of skilled workers, this effect is attenuated by diminishing returns (economies like high-income Asia are already capital-intensive), and indirect labor gains from capital productivity development are smaller than direct benefits of labor productivity improvements.

As is apparent in Table 6, the GDP component impacts of combined factor productivity growth are nearly additive. The reason for this is in microeconomic theory. More than additive effects arise from factor complementarity, where one factor's productivity enhances that of another. As mentioned above, skilled labor is generally a complement for technology or more advanced capital goods. By contrast, productivity interactions can be less than additive if factors are substitutes, as is often the case with unskilled labor and technology (the "automation problem"). In any case, across all three scenarios the simple message is that productivity is good for growth, regardless of its source. Different countries, however, could optimize productivity policy by preferentially targeting different factors.

The results in Tables 7 and 8 show more clearly how trade facilitation via reduced tariff barriers and infrastructure development can promote regional integration and with it more rapid and sustained Asian growth. In addition to the GDP results, dramatic increases in national exports and imports show that reduced trade and transport margins can be a potent catalyst for wider economic participation, promoting private, individual agency as a means of poverty alleviation and more rapid growth among the poorest regional economies. These results elucidate the role of trade policy and infrastructure as a way to stimulate demand, as a means of reducing trade costs, and as agents of productivity growth.

Policy complementarity is also plainly evident in the financial liberalization results of Table 9, where we see very strong growth across the entire region and generally more so among lower-income, more saving-constrained economies. FDI is of course only a temporary income transfer, but it is more importantly an agent for productive investment, technology transfer, and access to export opportunities. All three of these features act in synergy with domestic resources, especially those that are relatively abundant and low cost in comparison to the country of investment origin. For this reason, reallocation of Asian financial reserves from lower-growth, high-income economies can be expected to yield higher absolute returns, returns that can benefit both the investors and those in the destination countries. It remains an ironic fact that some of the destination countries of the last great race for emerging market investment (1990–2010) are now in a position to join the other side of this process, yet they have left large financial reserves at the starting gate.

In any case, increasing the depth and scope of Asian FDI should be a high priority for regional policymakers, particularly in an era of global growth uncertainty. Taken together, Asian economies are no longer small relative to their historical destination markets, and it is not realistic to expect high growth rates via rapid expansion of domestic market share in slow-growing Organisation for Economic Co-operation and Development (OECD) economies. For this reason, Asia represents a logical source of investment diversification for itself not only for the usual portfolio risk reduction benefits, but because the region represents most of the world's superior national growth rates already.[6]

[6] See Roland-Holst and Weiss (2004, 2005); and Roland-Holst et al. (2010) for extensions of these arguments.

V. MODERNIZATION AND CHANGING ECONOMIC STRUCTURE

As the aggregate results suggest, the primary Asian regional and national growth benefits in these scenarios relate to more efficient recruitment of underutilized resources in the lower-income economies. This logic has a corollary that the policies should be pro-poor across Asia. It also implies that such policies will arouse sectoral resource competition as labor opportunities are stimulated by a combination of productivity, trade, and investment effects. This resource shifting is part of a seemingly universal structural transformation through the three fundamental stages of economic development: agrarian, industrial, and postindustrial. At each stage one of three generic categories—primary resource development, manufacturing, and services—asserts its dominance in national GDP and employment. In this section, we look at structural impacts for the member economies in terms of these structural characteristics. The hallmarks of economic modernization—steady progression and induced structural change from agrarian to industrial, industrial to postindustrial—do become apparent across much of Asia over the next 2 decades, and we can see these forces playing out in varying degrees in our regional forecasts.

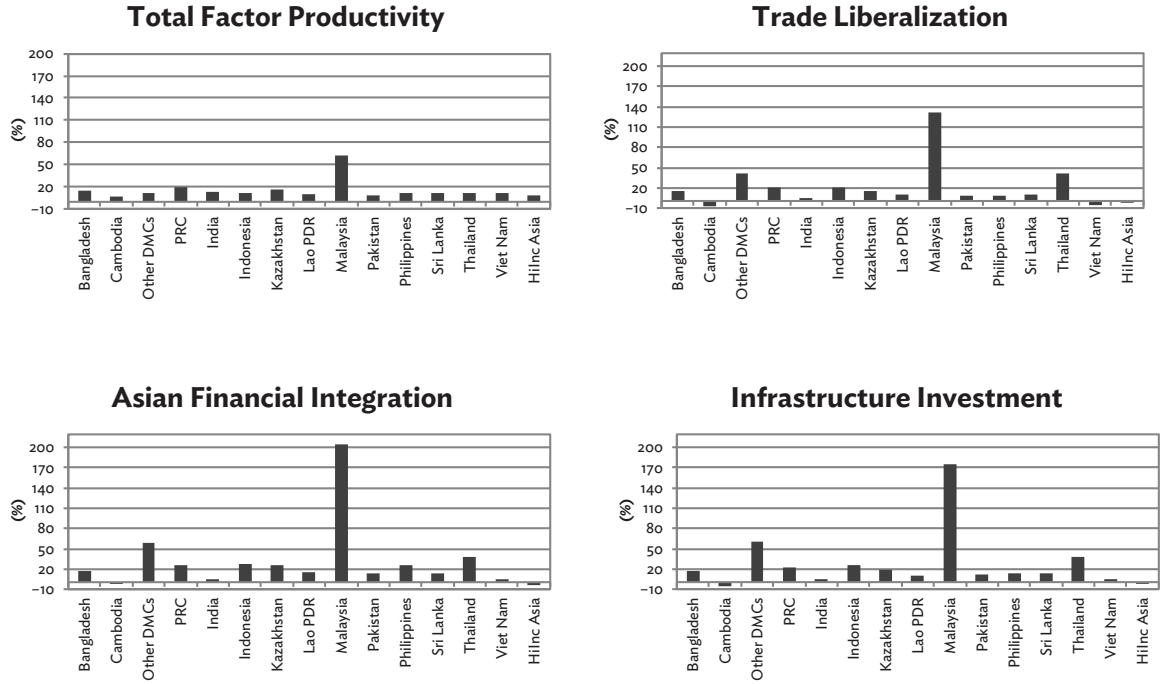
A. Agriculture and Food Sectors

The real output growth rates for each country, under each of the six productivity and policy scenarios, are depicted in Figure 5. Here we see that every economy except the highest-income group produces more food in every scenario, but the rates of agrifood sector growth vary. In particular, most member countries respond to total factor productivity growth by shifting employment of their domestic labor forces and economic activity toward industry and tertiary sectors. This has been a well-trodden pathway for development historically, as rural populations move to cities in search of higher wages and enterprises expand activities away from agrifood products with historically low average income elasticities. It should be emphasized that this process, intrinsic to modernization, is perfectly natural, supports higher long-term living standards, and need not endanger food security.

One striking result here is the dramatic expansion of Malaysian agriculture. This is not surprising upon closer examination of the data, because the now-mature energy extraction economy has for decades absorbed the lion's share of primary sector investment, and Malaysian rural areas appear to have very low baseline agricultural utilization rates. On a regional basis, this relatively abundant land could deliver dramatically higher returns if complementary factor productivity and trade facilitating policies improved.

For the high-income Asia economic aggregate, the results are also quite intuitive. These economies are experiencing rapidly aging populations and shrinking active labor forces. In these cases, labor scarcity needs to be offset by high-productivity, high-wage employment to achieve superior long-term growth. This would best be achieved by sourcing lower-value agrifood products elsewhere, a process that has already been well established (e.g., Japanese investments in Thai agrifood production), and should continue if Asia is to take full advantage of the gains from regional specialization. These results support a fundamental policy insight: the potential for trade to improve Asian regional food security. There is a trilemma between domestic food self-sufficiency, economic diversification, and growth. Countries that insist on domestic sourcing of food will find these objectives in conflict with policies that promote regional integration, higher incomes, and more sustained growth. These internal inconsistencies need to be recognized for the sake of both regional dialog and nationally coherent growth strategy.

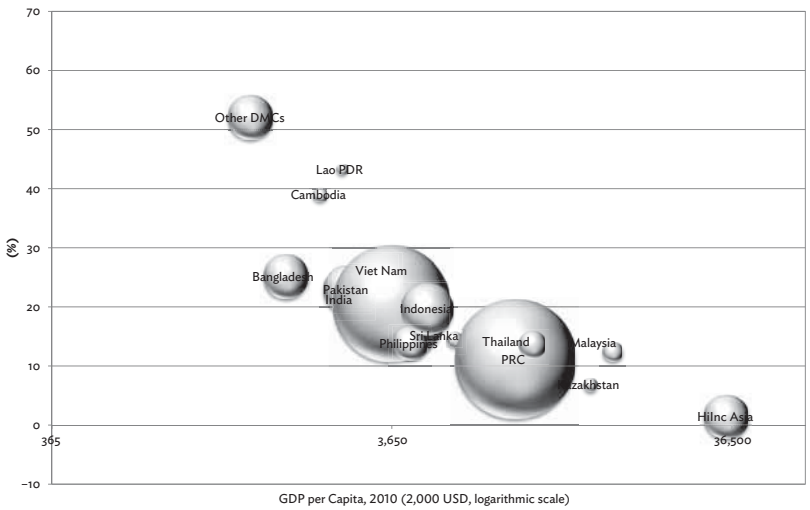
Figure 5: Agrifood Output Changes
(% change from baseline in 2030)



DMC = developing member country, HiInc Asia = high-income ADB members, PDR = Lao People's Democratic Republic, PRC = People's Republic of China.

Source: Authors' estimates.

Figure 6: Share of Gross Domestic Product in Agriculture, 2010



DMC = developing member country, GDP = gross domestic product, HiInc Asia = high-income ADB members, Lao PDR = Lao People's Democratic Republic, PRC = People's Republic of China.

Notes: Countries/regions are listed in order of increasing per capita income. Horizontal axis depicts annual per capita real GDP. Bubble size is proportional to population.

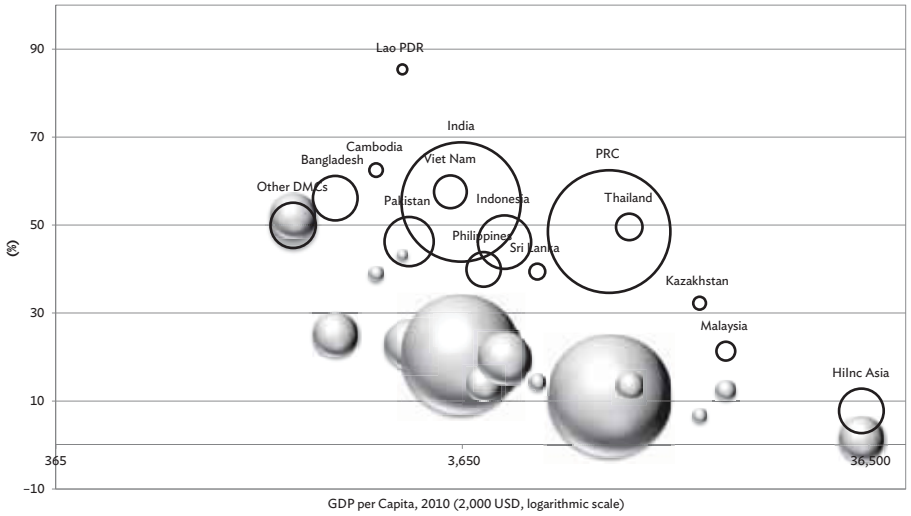
Source: Authors' estimates from Global Trade Analysis Project based at Purdue University.

The perspective of Figure 5, showing rates of national agricultural growth, understates the pace of structural transformation in Asia. As Figure 6 makes clear, size matters a great deal in this process. Thus, the low rates of agricultural growth in the PRC are of much greater significance than sharp agricultural output increases in other DMCs or Malaysia. Indeed, we can see here that the momentum of Asian agrarian transition is being driven by the PRC, with India leading a cluster of economies in more gradual transition.

Figure 7 clearly illustrates why transition from agriculture is necessary to improve average living standards. The solid circles in this figure depict agricultural GDP shares in each country, while the hollow circles indicate employment shares. Generally, the lower the country's income, the lower the average wages in agriculture, historically the economy's lowest productivity sector. Food is obviously essential for national survival, but in Asia most economies are realizing low average per capita GDP from this activity, and net labor migration elsewhere could unlock significant livelihood potential.

Output growth results for manufacturing are more robust and diverse across the region (Figure 8). As explained earlier, manufacturing is generally a beneficiary of structural transformation over the period 2010–2030, and in most cases we see resource diversion from and relatively faster growth than agriculture. These results reveal the core of the structural growth dynamic in all six scenarios. Enhancing the growth potential for Asia will accelerate the structural transition of member economies from agrarian to industrial, and the countries that go farthest in this structural transformation will be those that grow fastest. As it did for earlier generations of dynamic Asian economies, industrialization will be the main engine of employment and income growth. Our results suggest that all the economies of the region can enhance this source of growth, but that some need more determined and perhaps targeted industrial policies than others.

Figure 7: Gross Domestic Product and Employment Shares in Agriculture, 2010

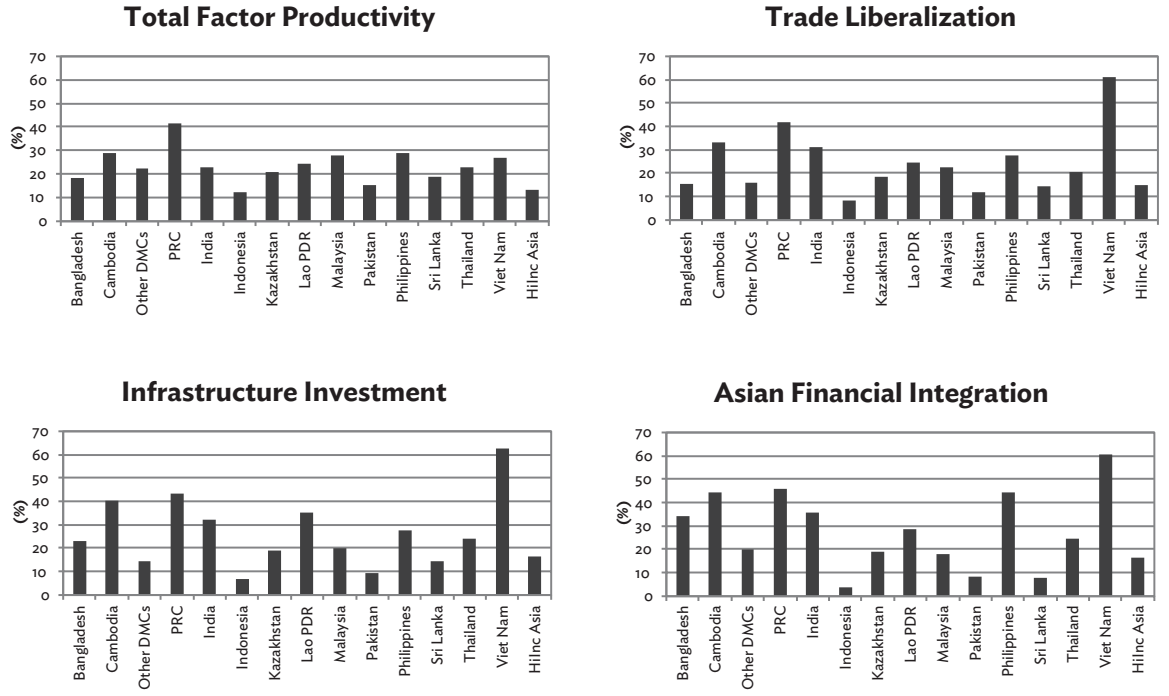


DMC = developing member country, GDP = gross domestic product, HiInc Asia = high-income ADB members, Lao PDR = Lao People's Democratic Republic, PRC = People's Republic of China.

Notes: Countries/regions are listed in order of increasing per capita income. Solid circles depict agricultural GDP shares in each country, while the hollow circles indicate employment shares. Horizontal axis depicts annual per capita real GDP. Bubble size is proportional to population.

Source: Authors' estimates from Global Trade Analysis Project based at Purdue University.

Figure 8: Manufacturing Output Changes
(% change from baseline in 2030)



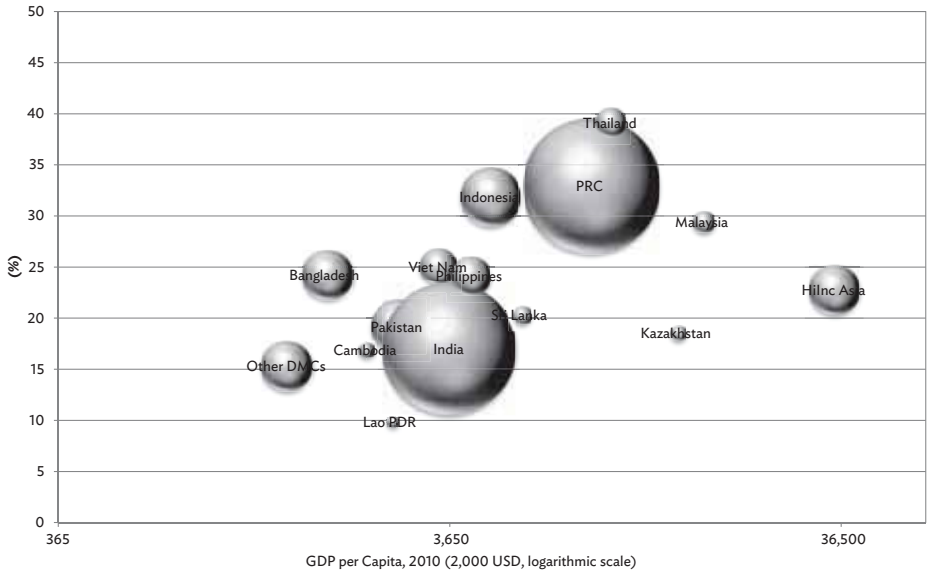
DMC = developing member country, HiInc Asia = high-income ADB members, Lao PDR = People' Democratic Republic, PRC = People's Republic of China.

Source: Authors' estimates.

A scale-adjusted perspective on regional economic structure is presented in Figure 9, which more explicitly reveals the transformational nature of manufacturing. Using heuristic dividing lines to represent the three stages of structural transformation, we see how the PRC has emerged as the most industry-intensive economy (in GDP terms) in the region. The impacts of this on domestic living standards are well known, as industrial employment was fueled by migration of subsistence wage rural populations, the resulting income growth has been very dramatic. Figure 6 reminds us that the same labor reserves exist in India (in both rural and urban areas), but the challenge remains to stimulate large-scale industrial employment and recruit these populations into the process of structural transformation.

Comparing GDP and employment shares (Figure 10) shows that manufacturing has mixed potential to contribute to average living standards. In the PRC, GDP shares for industry are significantly higher than employment shares, indicating that secondary economic structure is an important driver of rising living standards. In India, by contrast, industry contributes less to total GDP than to employment, suggesting that manufacturing wages lag service compensation in contributing to average per capita incomes. This is also true of high-income Asian economies as a group, where professional service sector employment offers premium compensation by comparison with manufacturing jobs. These two cases suggest that the structural transformation process should focus on the quality of service sector employment, including skill content, productivity, and the commitments to education and training needed for this.

Figure 9: Share of Gross Domestic Product in Manufacturing, 2010

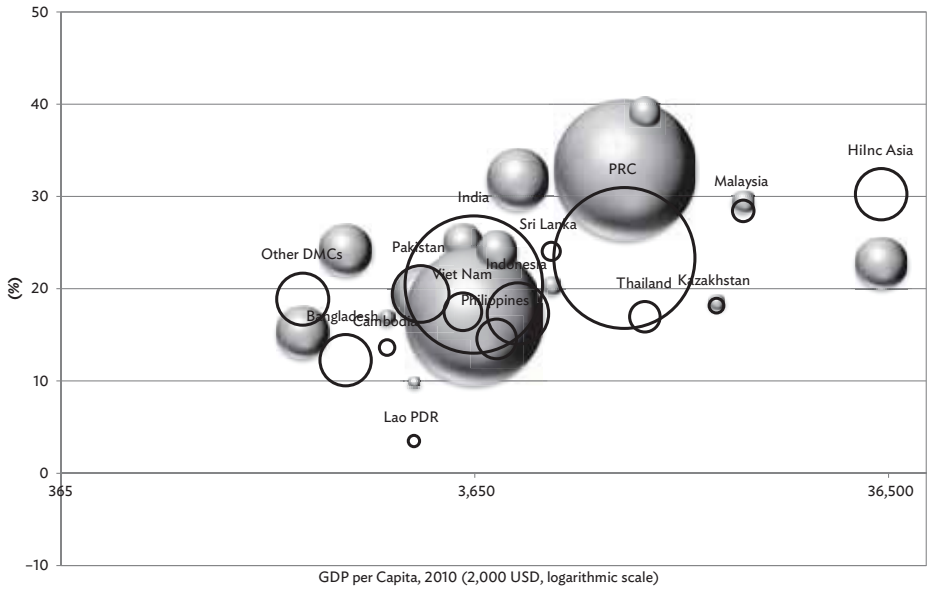


DMC = developing member country, GDP = gross domestic product, HiInc Asia = high-income ADB members, Lao PDR = Lao People's Democratic Republic, PRC = People's Republic of China.

Notes: Countries/regions are listed in order of increasing per capita income. Horizontal axis depicts annual per capita real GDP. Bubble size is proportional to population.

Source: Authors' estimates from Global Trade Analysis Project based at Purdue University.

Figure 10: Gross Domestic Product and Employment Shares in Manufacturing, 2010



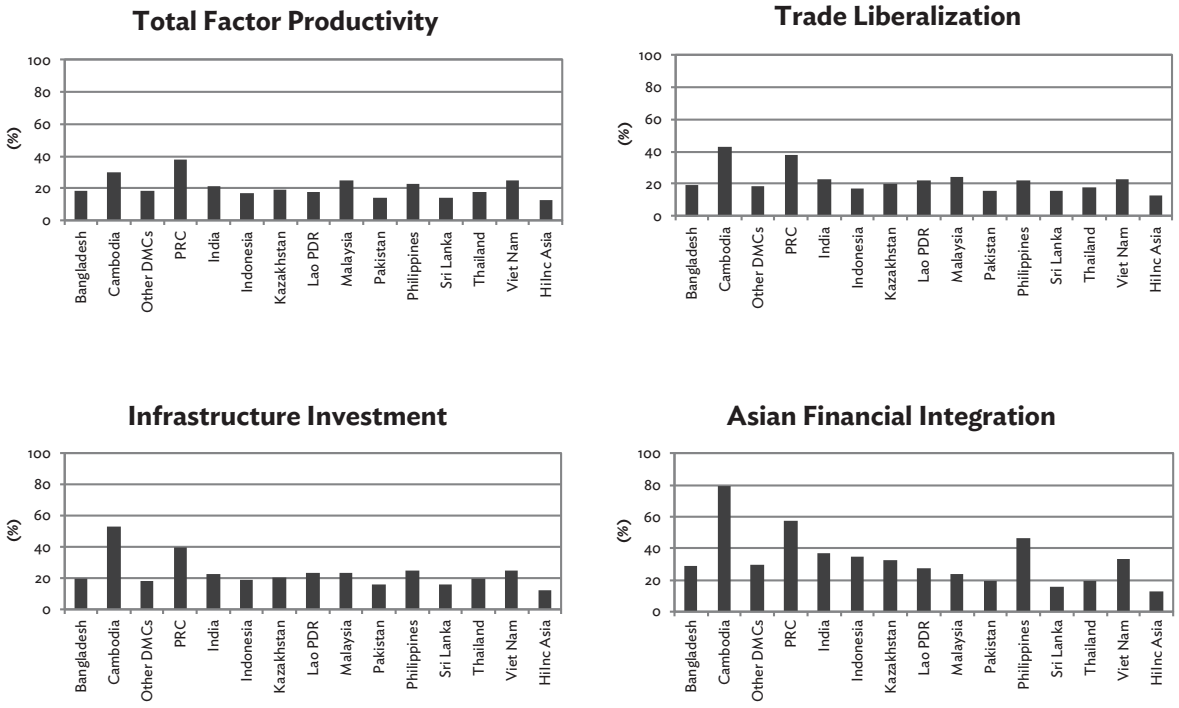
DMC = developing member country, GDP = gross domestic product, HiInc Asia = high-income ADB members, Lao PDR = Lao People's Democratic Republic, PRC = People's Republic of China.

Notes: Solid circles depict GDP shares in each country, while the hollow circles indicate employment shares. Countries/regions are listed in order of increasing per capita income. Horizontal axis depicts annual per capita real GDP. Bubble size is proportional to population.

Source: Authors' estimates from the Global Trade Analysis Project based at Purdue University.

We cannot omit services from consideration in any long-term development and growth study. In light of the fact that OECD economies get about two-thirds of their employment and income from these activities, a service-intensive economy is often seen as the destination for an Asian structural transformation since it began in earnest about 60 years ago and continues today. Our results suggest that productivity growth and policy facilitation can be quite congenial to accelerated service sector employment and output, but financial liberalization is particularly so. Not only is finance an important service sector in its own right, it can be argued that service sector investment is among the easiest to expand from national to regional markets. We see in Figure 11 that regional financial integration is a potent catalyst for service-intensive growth and structural transformation.

Figure 11: Output Growth in Services
(% change from baseline in 2030)

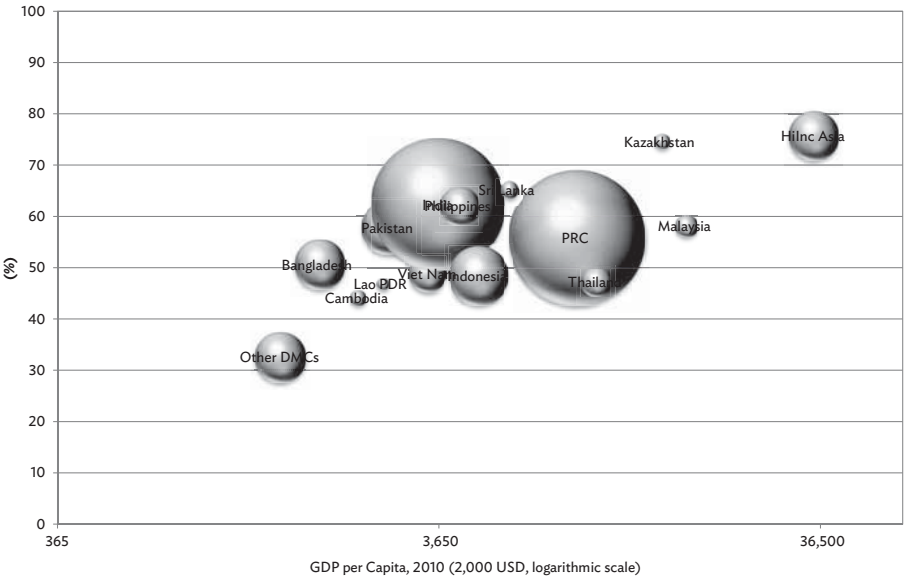


DMC = developing member country, HiInc Asia = high-income ADB members, Lao PDR = People' Democratic Republic, PRC = People's Republic of China.

Source: Authors' estimates.

Figure 12 summarizes the initial conditions for service sector GDP across the Asian region. Here we clearly see that, in value-added terms, the share of economic activity accorded to services can be quite large even for low-income countries. This does not contradict the basic paradigm of structural transformation, but we need to qualify our understanding of service sector employment in terms of real wages. It is not the real size of the service sector in aggregate GDP that determines structural progress, but the per capita returns to employment in each sector. Thus, low-income countries may have high GDP shares, but these wages remain below levels needed for middle class emergence and self-sustaining, consumption-driven domestic growth.

Figure 12: Share of Gross Domestic Product in Services, 2010

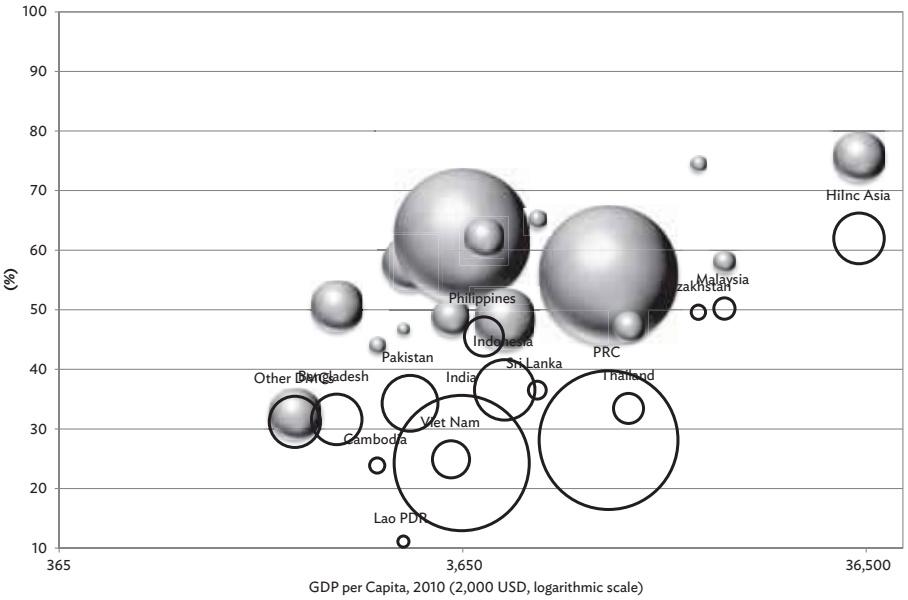


DMC = developing member country, GDP = gross domestic product, HiInc Asia = high-income ADB members, Lao PDR = Lao People's Democratic Republic, PRC = People's Republic of China.

Notes: Countries/regions are listed in order of increasing per capita income. Horizontal axis depicts annual per capita real GDP. Bubble size is proportional to population.

Source: Authors' estimates from Global Trade Analysis Project based at Purdue University.

Figure 13: Service Sector Gross Domestic Product and Employment Shares, 2010



DMC = developing member country, GDP = gross domestic product, HiInc Asia = high-income ADB members, Lao PDR = Lao People's Democratic Republic, PRC = People's Republic of China.

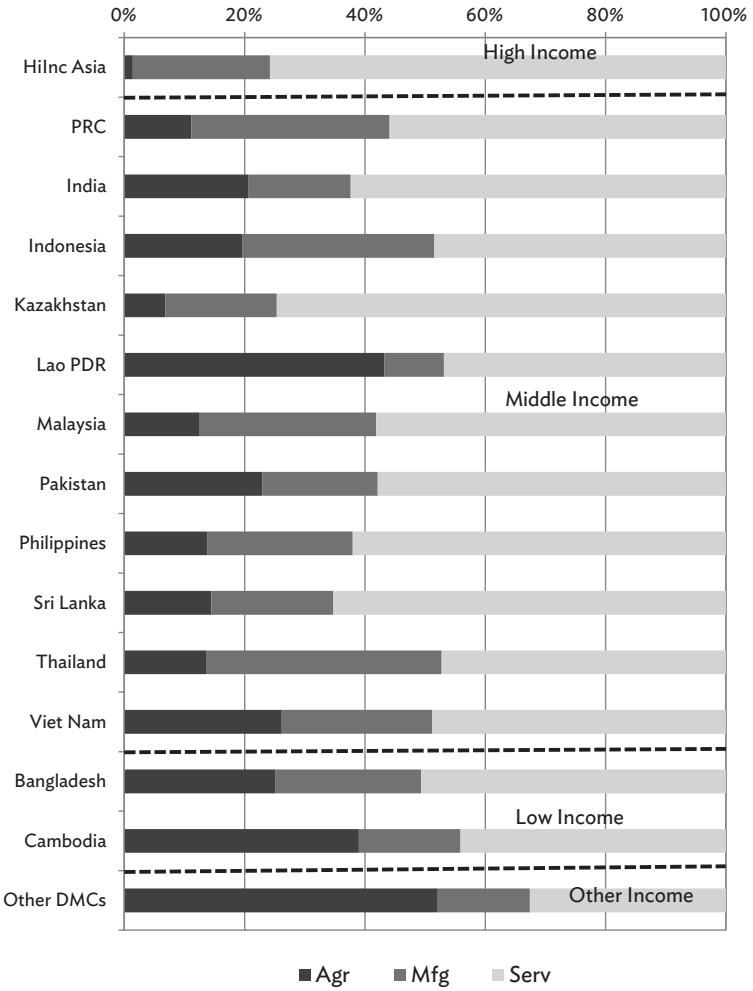
Notes: Countries/regions are listed in order of increasing per capita income. axis depicts annual per capita real GDP. Bubble size is proportional to population.

Source: Authors' estimates from Global Trade Analysis Project based at Purdue University.

Figure 13 puts services in a per capita GDP perspective, revealing again the importance of this sector to livelihoods at all stages of development. Just as agriculture is an underachiever in determining average living standards, services generally contribute much more than the average to GDP on a per capita worker basis. As mentioned in reference to manufacturing above, this means services must remain a very high priority for skill-intensive labor market policies. As we can see across this diverse spectrum of Asian economies, this fact remains true before, during, and after industrialization.

To summarize regional structural conditions, Figure 14 depicts GDP shares for the initial scenario year 2010. Countries in this figure, arranged vertically, by increasing per capita GDP. Here we see basic features of structural transformation across the diverse region. Thus, the lowest-income countries generally have the highest share of GDP in agriculture, middle-income countries are more industry dependent, and higher-income countries have large service sector GDP shares.

Figure 14: Initial Conditions—Share of Real Gross Domestic Product, 2010

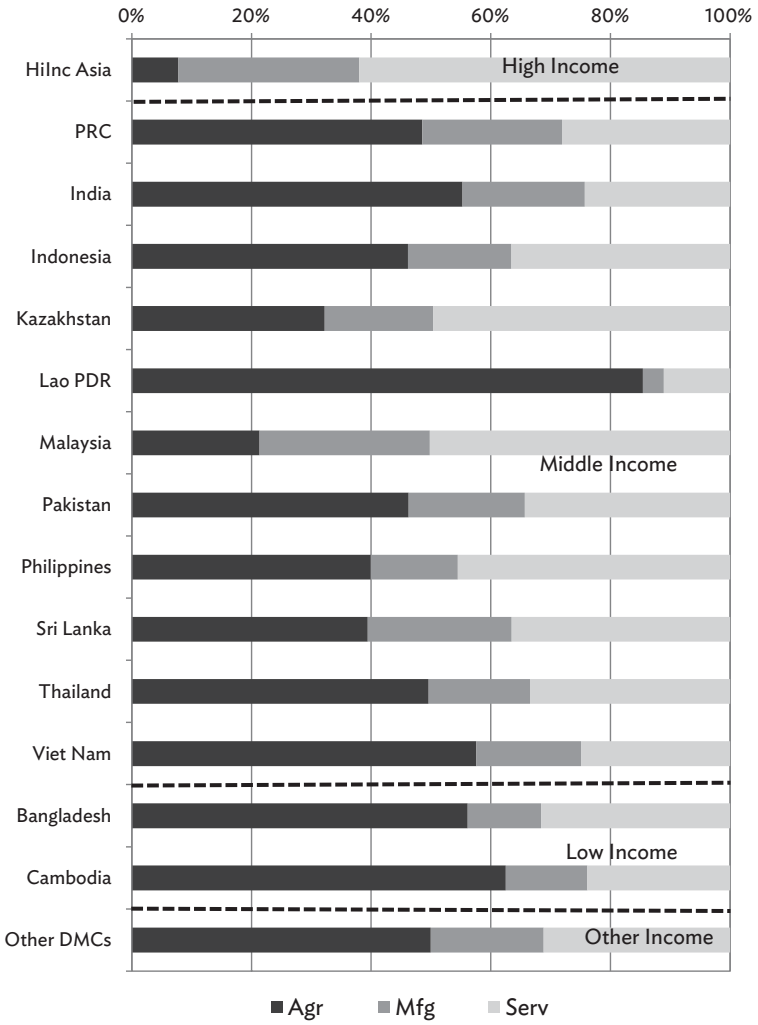


DMC = developing member country, HiInc Asia = high-income ADB members, Lao PDR = Lao People's Democratic Republic, PRC = People's Republic of China, Mfg = manufacturing, Serv = services.

Source: Global Trade Analysis Project 8 based at Purdue University, www.gtap.org.

As was already observed, however, GDP shares are not sufficient indicators of stage of development, especially for services. To better understand the latter, we need to take account of employment, as it explains the per capita wage component of value added. A relatively large service sector can reflect a massive service sector labor force working for subsistence wages in one country, or a smaller, highly skilled "professional" labor force in an OECD economy. Figure 15 contains several important insights regarding structural transformation. First, we see the dominance of agricultural employment directly associated with lower-income status.

Figure 15: Initial Conditions: Employment Shares, 2010



Agr = agriculture, DMC = developing member country, HiInc Asia = high-income ADB members, Lao PDR = Lao People's Democratic Republic, PRC = People's Republic of China, Mfg = manufacturing, Serv = services.

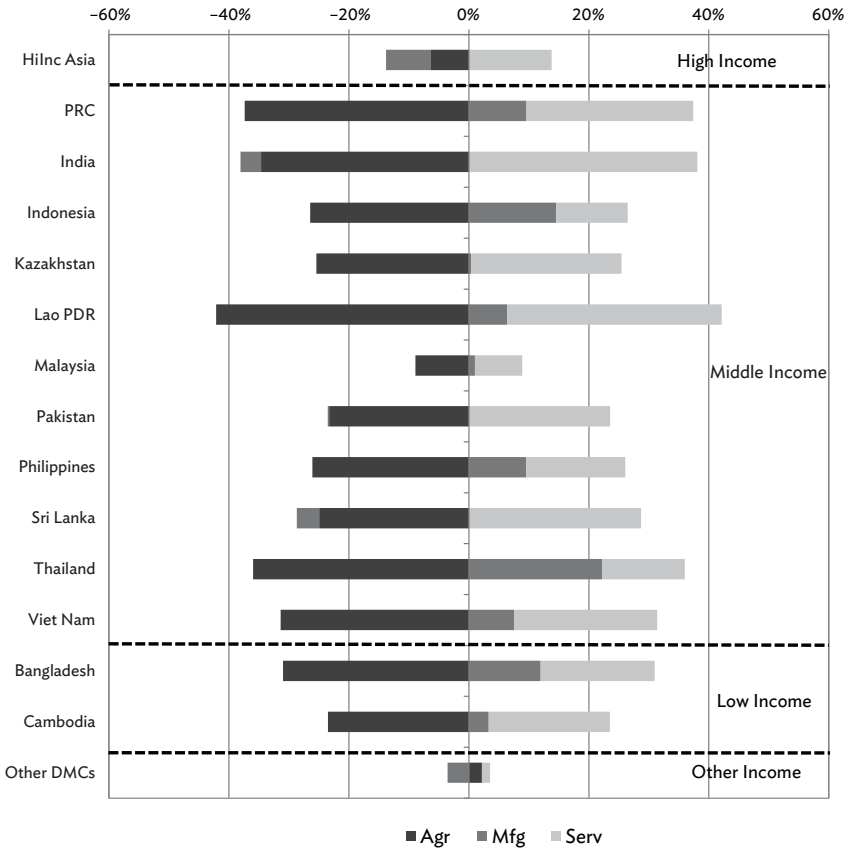
Source: Global Trade Analysis Project 8 based at Purdue University.

Second, manufacturing as a percent of total employment is not a useful indicator of this sector's contribution to living standards. These results show that industrial employment is about the same percentage in Pakistan and Sri Lanka as in the PRC, but we know that structural transition is more advanced in the PRC because jobs in this sector are more skill and education-intensive, with higher

productivity and wages that reflect this fact. This means the "quality" of structural transformation will ultimately be just as important as labor resource shifts, absolute job creation, and migration.

Figure 16 offers a more revealing picture of sector contributions to living standards, and what can be expected from continued structural transformation in the Asian region. The quantities measured here, GDP share minus employment shares, are a general macro indicator of how much labor in each of the three structural sectors (agriculture, manufacturing, services) contributes to national income. Thus, we see in all but Other DMC that agriculture contributes less to GDP than to employment, meaning that average wages (and attendant productivity) in agriculture are chronically below economywide averages. In this way, large pools of labor in agriculture can be seen as a drag on growth.

Figure 16: Initial Conditions: Gross Domestic Product and Employment Shares, 2010



Agr = agriculture, DMC = developing member country, HiInc Asia = high-income ADB members, Lao PDR = Lao People's Democratic Republic, PRC = People's Republic of China, Mfg = manufacturing, Serv = services.

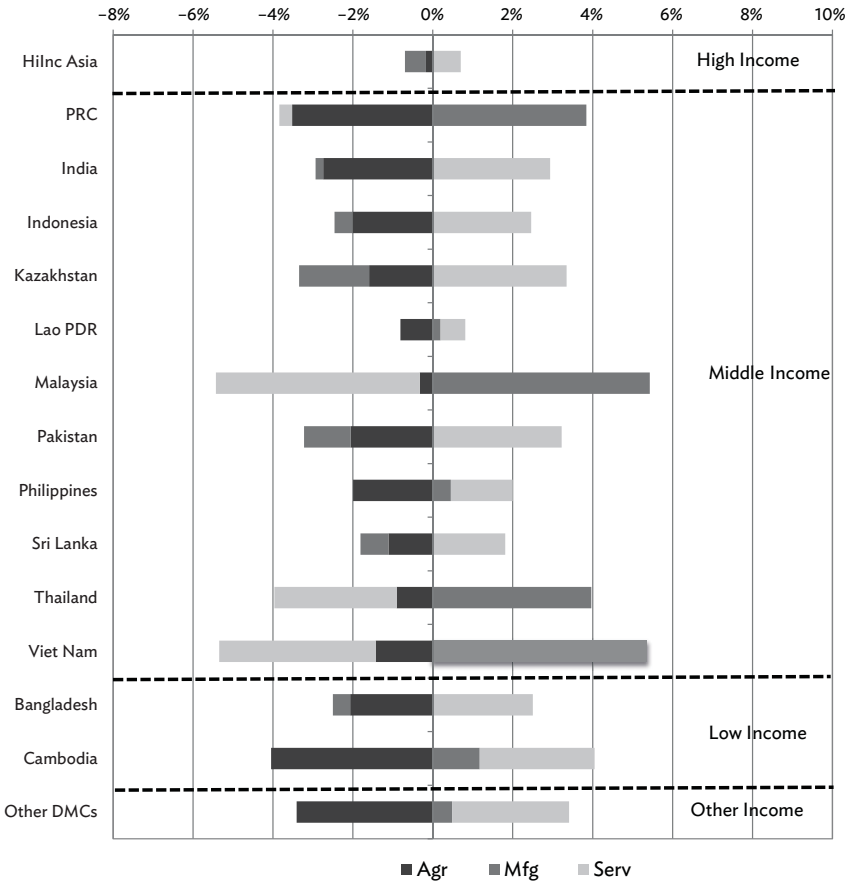
Source: Global Trade Analysis Project 8 based at Purdue University.

Conversely, we see that in most economies, manufacturing employment is an above-average (per capita worker) contributor to GDP. There are a few important exceptions in both low-income (India and Sri Lanka) and high-income countries where industrial wages are inferior to average service sector compensation. These two categories define the bookends of structural transformation—from low-wage, unskilled services to higher, education-intensive professional labor. To a significant extent

then, we see that structural transformation is as much about the qualitative characteristics of service sector labor as it is about the intermediate stage of industrialization.

Finally, we examine the dynamic scenarios from a structural perspective, asking how much change can be expected and why. Figure 17 shows the changes that can be expected in real GDP shares for the Asian economies considered under the most dynamic scenario of regional financial liberalization (i.e., FDI). In all countries, agriculture will see its share decline even though absolute agrifood output will continue to rise over the entire period 2010–2030. We know this is a fundamental characteristic of structural transformation, and it will continue at different paces and in different degrees across the region.

Figure 17: Change in Real Gross Domestic Product Shares, 2010–2030



Agr = agriculture, DMC = developing member country, HiInc Asia = high-income ADB members, Lao PDR = Lao People's Democratic Republic, PRC = People's Republic of China, Mfg = manufacturing, Serv = services.

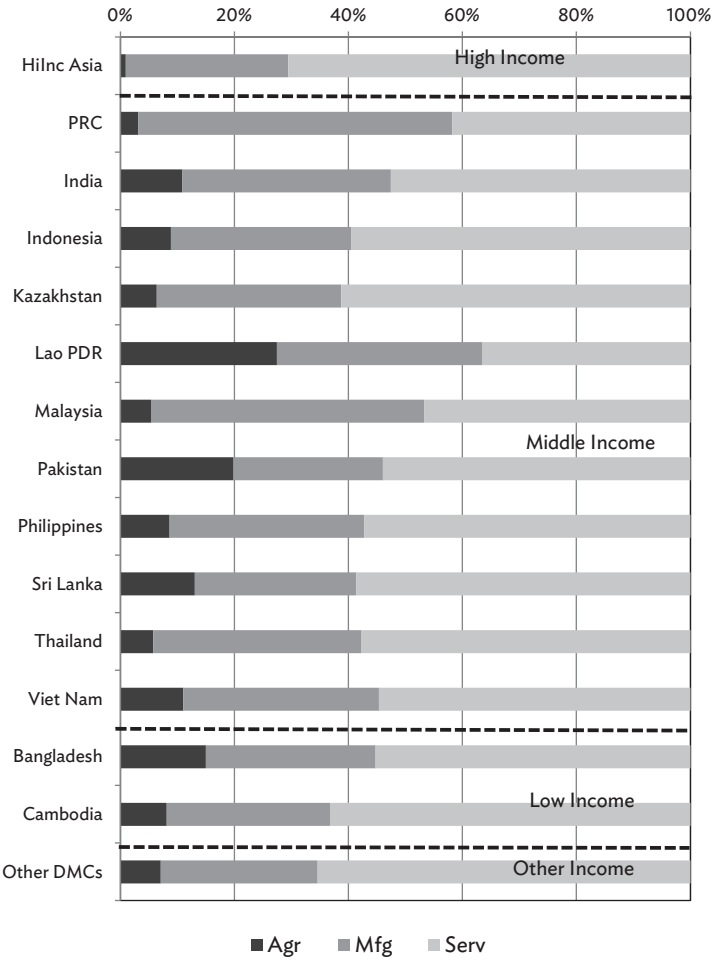
Source: Global Trade Analysis Project 8 based at Purdue University.

We see from the relatively mixed share changes for manufacturing and services that there is nothing inevitable about the OECD model of service-intensive transition, at least over the next 2 decades. Service sector GDP will be salient in 11 of 15 Asian economies, but manufacturing GDP will be fastest growing in Malaysia, Viet Nam, Thailand, and the PRC, respectively. These results reveal two essential insights regarding structural transformation in the region during the period considered. First,

the speed of transformation will vary considerably, and up to 20 years from now, some economies will still be in the primary or secondary stages of development. This is a result not only of initial conditions, which we already know are very diverse in Asia, but of the two main drivers of growth, domestic and external demand.

It is essential to recognize that demand patterns are the primary determinant of structural transformation. Policy and supply-side factors (resources and enterprises) play a supporting role, but demand is the only force that can ultimately sustain patterns of resource allocation and investment. For Asia, these patterns will be quite specific to economies and their initial conditions, and both policy and enterprise agency must take account of this. Figures 18 and 19 summarize these patterns for both domestic and external (export) demand for all 15 Asian economies we consider, and the differences elucidate what potential exists in the medium term to facilitate structural change nationally and regionally.

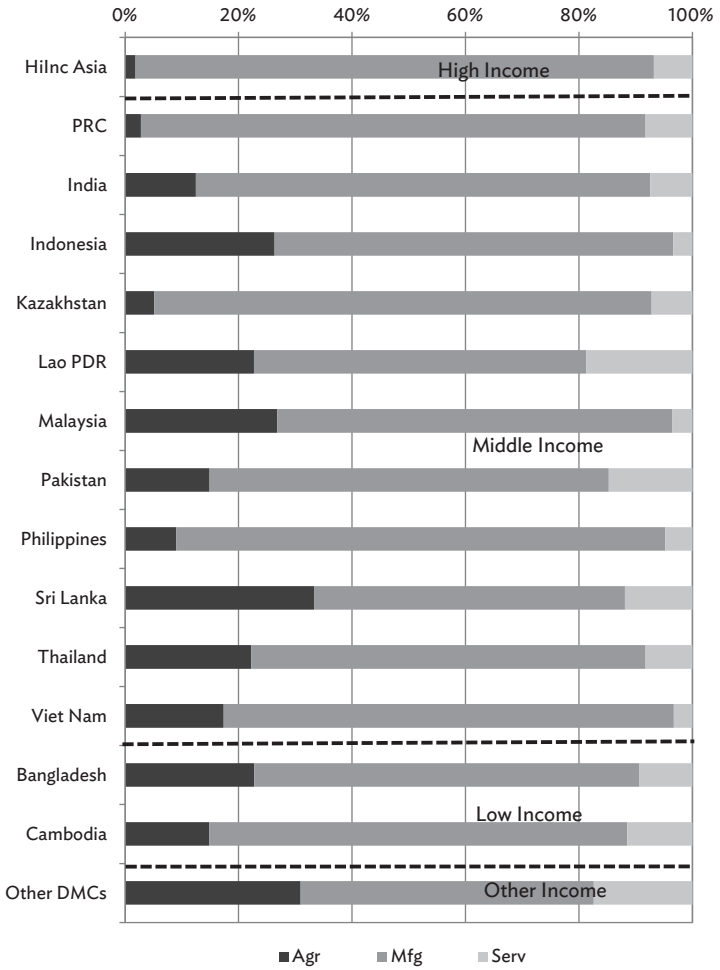
Figure 18: Shares of Domestic Demand for Domestic Output, 2010



Agr = agriculture, DMC = developing member country, HiInc Asia = high-income ADB members, Lao PDR = Lao People's Democratic Republic, PRC = People's Republic of China, Mfg = manufacturing, Serv = services.

Source: Global Trade Analysis Project 8 based at Purdue University.

Figure 19: Shares of Real Export Demand, 2010



Agr = agriculture, DMC = developing member country, HiInc Asia = high-income ADB member countries, Lao PDR = Lao People's Democratic Republic, PRC = People's Republic of China, Mfg = manufacturing, Serv = services.

Source: Global Trade Analysis Project 8 based at Purdue University.

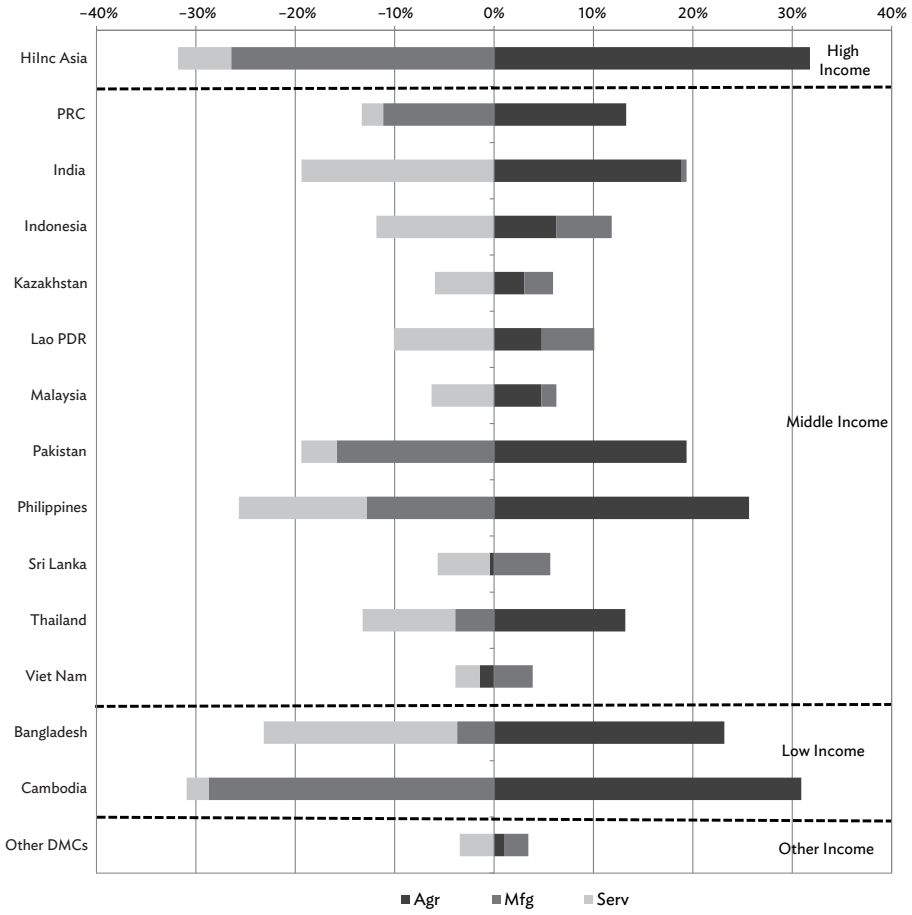
For all the countries considered, in real value terms, domestic demand is already dominated by services (except in the PRC), while exports are dominated by manufacturing. The PRC's manufacturing emphasis is primarily the result of intermediate demand for export production, itself very manufacturing dominant (Figure 19). What these demand patterns mean as a practical matter is that a given economy's potential for structural change will depend on the pace and magnitude of growth in domestic and external demand. Countries with large and growing internal markets will transit more rapidly toward a service-intensive economic structure. Those that are highly dependent on exports for growth will be pushed in the direction of industrialization.

Obviously, the relative importance of domestic and external demand will depend on both domestic purchasing power and trade orientation. Lower-income countries, which have lower domestic demand capacity and want to leverage external demand for growth, will be drawn toward industrial structure. High-income countries can sustain large-scale demand for services, reinforcing structural transformation toward a postindustrial economic order. Middle-income and transition

economies, such as the PRC and Thailand, will draw economic orientation from both sources of demand, and here policy could have a decisive influence on structural transformation.

Ultimately, the lesson from these results is that structural transformation is driven by demand and differentiated by source. Domestic demand, after meeting basic agrifood needs, is service intensive. Export demand for most of the Asian region is manufacturing intensive. The relative influence of these two forces in a given economy depends on their scale and pace of growth. For example, a small low-income economy might be driven toward industrialization by dynamic export opportunities. A high-income Asian economy may also export (even with very high manufacturing intensity like high-incomeAsian economies), but the depth of its domestic demand prevails overall, reinforcing its status as a postindustrial, service-oriented economy.

Figure 20: Change in Export Shares, 2010–2030



Agr = agriculture, DMC = developing member country, HiInc Asia = high-income ADB members, Lao PDR = Lao People's Democratic Republic, PRC = People's Republic of China, Mfg = manufacturing, Serv = services.

Source: Global Trade Analysis Project 8 based at Purdue University.

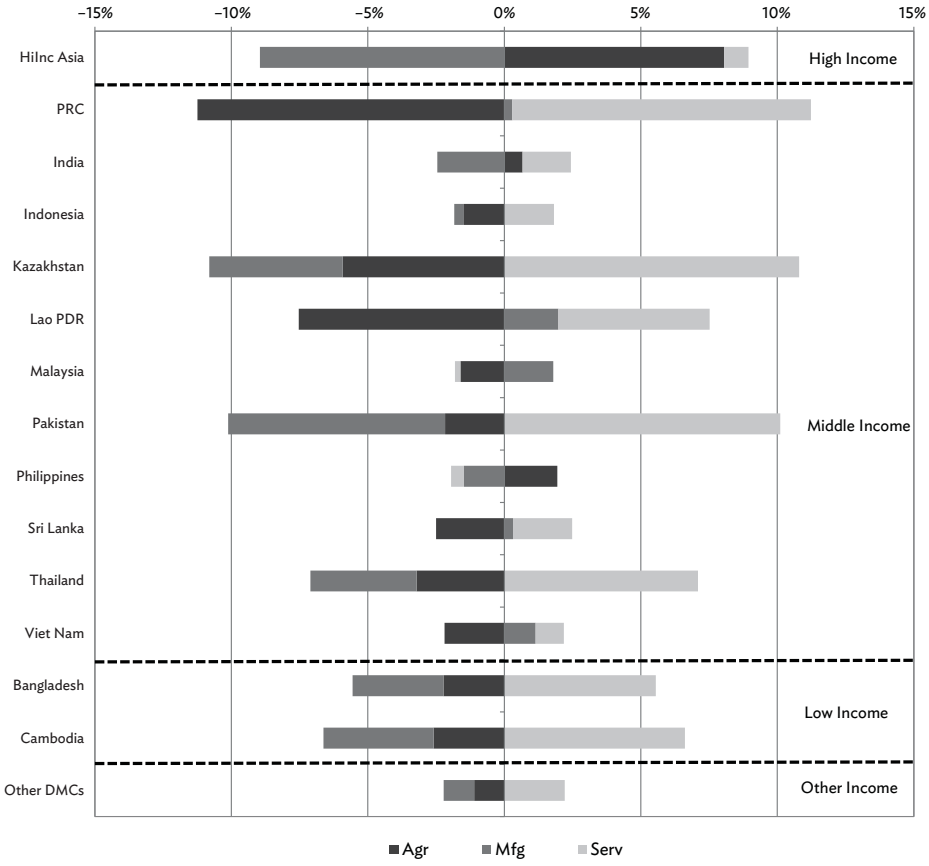
Although initial conditions suggest that manufacturing for export will be a primary driver of Asian regional growth, the long-term forecasts reveal structural changes that will shift the composition of output, employment, and value-added growth across the region. In particular, Figure 20 shows how rising Asian incomes will strongly stimulate agrifood trade growth, a process already well documented

by ADB and other research institutions.[7] For example, Jha et al. (2011) estimate that agrifood trade in the region will nearly double by 2020, and here we see that trend continuing through the next decade to 2030.

The implications of agrifood-intensive export growth are particularly important to lower-income Asia. Many of these economies lack the population densities and domestic savings needed to pass through a diversified industrialization phase. Expanded agrifood trade thus offers them growth leverage, but it is essential to meet this demand with higher domestic productivity and expanded value-added creation. Without policies to achieve this, agrifood growth will not realize its potential for domestic livelihood improvement, as farming remains a low-wage activity for rural poor populations.

Agrifood trade is bound to expand as emerging Asia increases its urban populations and incomes rise in large economies. Without domestic agricultural progress in low-income countries, however, this trade growth will merely increase regional inequality. Higher-income countries will import basic agricultural commodities, capturing most of the value added in the food supply chain.

Figure 21: Change in Domestic Demand Shares, 2010–2030



Agr = agriculture, DMC = developing member country, HiInc Asia = high-income ADB member, Lao PDR = Lao People's Democratic Republic, PRC = People's Republic of China, Mfg = manufacturing, Serv = services.

Source: Global Trade Analysis Project 8 based at Purdue University.

[7] It should be noted that, although agriculture's share of exports increases for most countries, absolute exports of all three types (agriculture, manufacturing, and services) increase for all economies over the period considered.

During the same period, the second main driver of growth, domestic demand, will become more service intensive (Figure 21). This process, in response to rising incomes, is the classical structural change seen around the world and the dominant characteristic of OECD (so-called "postindustrial") economies. The superior growth of services holds promise for all the region's economies, as historically we have seen that tertiary activities contribute more to GDP than to total employment (i.e., offer superior wages) at all stages of development. Each regional government can enhance the economic benefits of service sector expansion by promoting higher productivity (education, training, etc.) as well as facilitating private investments to the same end (regional integration, financial liberalization, and foreign direct investment promotion).

As we have seen so many times in the Asian region, there is no one size, pathway, or even destination that applies to all. Policy must be adapted to take best advantage of individual circumstances. However, despite the diversity of Asian economies, two aspects of future growth offer significant gains to any Asian economies that can implement the policies needed to capture them: (i) export growth, particularly in agrifood, can significantly improve the prospects of lower-income Asian economies and lower-income people across the entire region, as long as productivity and value added can be increased; and (ii) service sector growth, in response to domestic demand, can enhance aggregate and per capita GDP growth with more determined public and private investments in education and training. Among the most important enabling policies will be more open multilateralism and more efficient regional financial integration.

VI. LABOR MARKET IMPACTS

Employment development, both in terms of absolute job creation and job quality, is a primary determinant of livelihoods in emerging markets and therefore a primary consideration for policymakers. Because this region is so diverse in terms of initial labor market conditions, it would be tempting to conclude that no single policy could be generalized for national implementation across Asia. In fact, our results suggest that a small number of human resource issues and economic policies are of very general applicability, if one measures economic progress by the standards of high wages and job creation. We review the results of our scenario analysis from both perspectives in this section.

A. Wages

Job creation is necessary for social stability and progress, but it is not sufficient in low-income countries. As rural populations inexorably transit to nonrural areas, labor services become the main source of wealth for populations in Asia. For this reason, policies that enhance average wages become ever more important to improving overall livelihoods. As economic theory tells us, and the results of Table 10 clearly indicate, factor productivity is a primary determinant of real wages.

Thus, the successful Asian economies have been technology-driven and continually striving to upgrade the skills of their populations. The benefits of this human resources approach to growth and development become even more pronounced with the application of regional policies that facilitate trade and capital flows. Thus, we see that national investments in human resources can contribute to growth, but their full potential can only be realized with complementary financial investment. This is true regardless of the source of the investment, a fact that should not be ignored by countries that have not committed fully to a favorable investment climate. In these circumstances, every public dollar spent on human capital is underperforming without the complementary private dollar to enhance productivity, directly via on-the-job training and indirectly via technology infusion.

Table 10: Average Wage Growth
(% change from baseline in 2030)

Country/Region		KProd	LProd	TProd	TLib	Infr	FLib
High Income	HiInc Asia	16	12	27	29	32	35
Middle Income	China, People's Rep. of	50	18	77	80	89	131
	India	19	8	27	25	31	69
	Indonesia	26	10	34	38	50	83
	Kazakhstan	18	14	33	30	45	97
	Lao PDR	31	6	33	40	56	101
	Malaysia	23	21	48	55	70	81
	Pakistan	11	1	11	7	12	51
	Philippines	49	15	54	49	65	127
	Sri Lanka	20	3	22	19	30	52
	Thailand	55	1	59	82	119	126
	Viet Nam	31	18	48	89	130	159
Low Income	Bangladesh	19	12	28	23	31	63
	Cambodia	43	16	57	133	181	228
Other income	Other DMCs	30	13	38	47	57	91
	All Asia	30	11	41	51	68	101

DMC = developing member country, FLib = financial liberalization, HiInc Asia = high-income ADB Members, Infr = infrastructure investment, KProd = improvements in production technology, Lao PDR = Lao People's Democratic Republic, LProd = improvements in labor productivity, TLib = trade liberalization, TProd = total factor productivity growth.

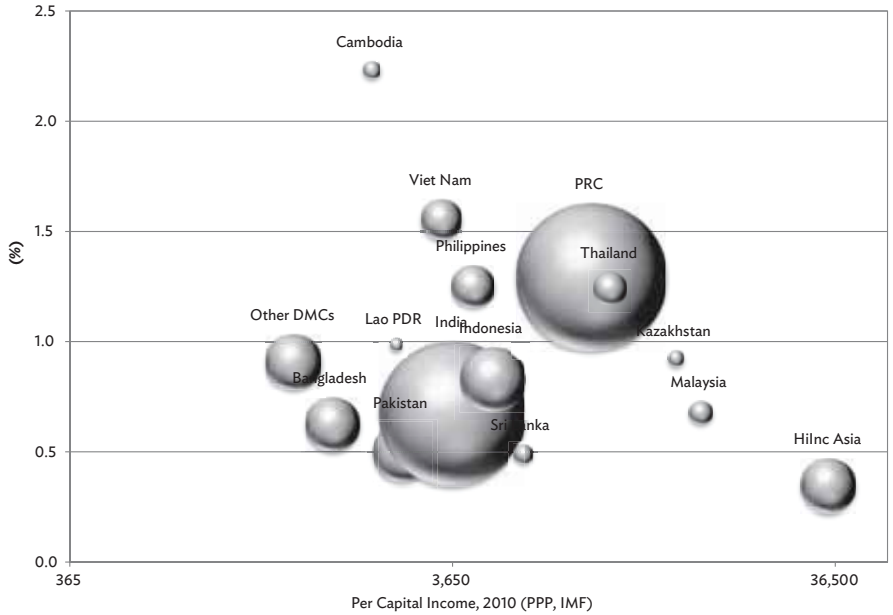
Note: Countries/regions are listed in order of increasing per capita income.

Source: Authors' estimates.

Conversely, countries that merely invite capital investment without making their own financial commitments to human capital development will be trapped in long-term structural bias toward resource extractive, low value-added, low-wage production. This low productivity trap is a primary distinction between dynamic Asia and earlier development experiences in Africa and Latin America. The latter economies are still struggling to find and/or sustain skill-intensive, high-wage development pathways, while Asian economies have more widely accepted this basic notion: In a world of capital mobility, the only long-term justification for higher wages will be higher labor productivity.

Finally, the combined policies embodied in financial liberalization are pro-poor. In other words, leveraging foreign direct investment is most beneficial to lower-income countries, in some cases doubling the real wage gains from domestic productivity growth alone (Table 10). This can be seen graphically in Figure 22 which shows average real wage gains by country, per capita income, and population for this scenario. Not only can we ascertain a distinct downward relationship (lower income countries experience higher wage growth), the population figures reflected in bubble sizes suggest that these changes to individual purchasing power would have tectonic effects on regional and global demand.

Figure 22: Average Wage Changes by Country and Gross Domestic Product per Capita
(% change from baseline in 2030)



DMC = developing member country, GDP = gross domestic product, HiInc Asia = high-income ADB member countries, IMF = International Monetary Fund, Lao PDR = Lao People's Democratic Republic, PPP = purchasing power parity, PRC = People's Republic of China.

Notes: Countries/regions are listed in order of increasing per capita income. Horizontal axis depicts annual per capita real GDP. Bubble size is proportional to population.

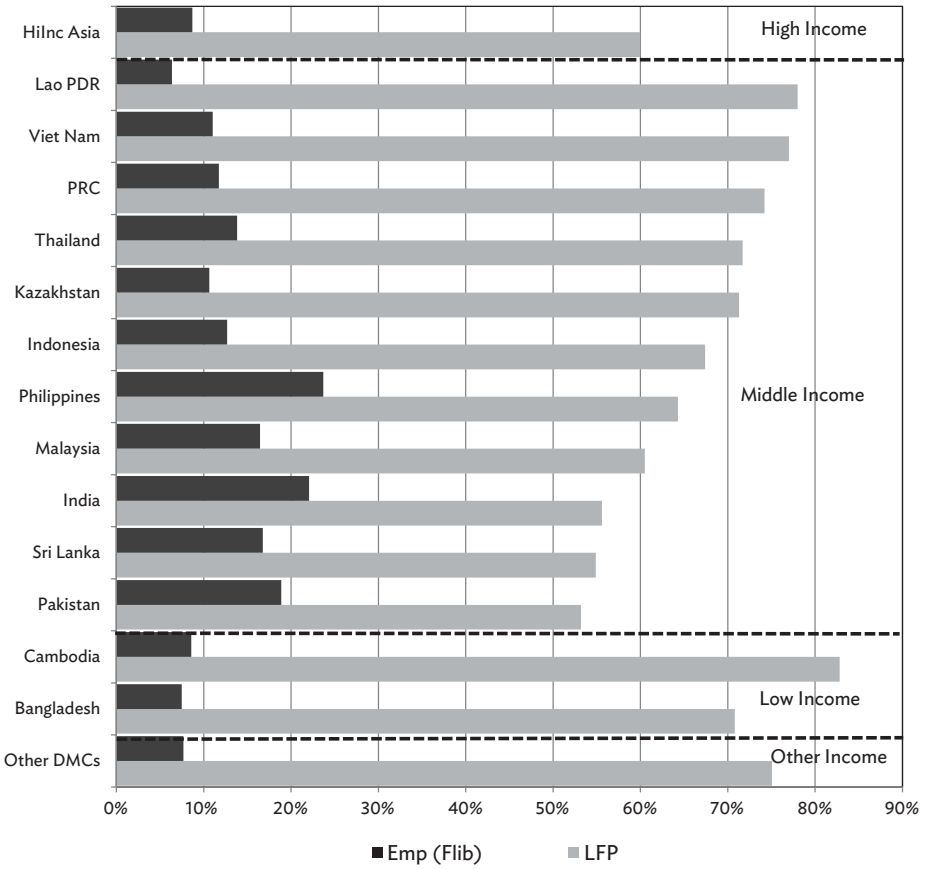
Source: Authors' estimates from Global Trade Analysis Project based at Purdue University.

B. Employment

Our labor market analysis would not be complete without identifying some of the impacts of our productivity and policy scenarios on net job creation. Many calibrated general equilibrium (CGE) and other forecasting models rely on an assumption of full employment. This means that their simulation experiments do not consider unemployment or underemployment and only look at product markets under an aggregate human resource constraint. Because employment is such a high priority, this approach would be insufficient for the present analysis, so the trade integrated general equilibrium (TIGER) model incorporates a variety of more elaborate adjustment mechanisms, including unemployment, migration, equilibrium labor force participation, and mobility constraints.

Without too much technical detail, the primary considerations for aggregate employment are, on the incentive side, the economywide average real wage and, on the constraining side, the initial labor force participation rate. We already discussed the first variable above, and participation rates by country are presented in Figure 23. For the last scenario, comprising total factor productivity growth and the three policy interventions (financial liberalization), we also present average employment growth in Figure 23. These results suggest that, in addition to dramatic wage increases, job creation could be a major dividend from productivity-oriented Asian regional growth policies. Some countries would enjoy 20% higher employment, while others (e.g., Viet Nam) might be constrained by high baseline participation rates.

Figure 23: Employment Growth (Financial Liberalization) and Average Labor Force Participation (Baseline) by Country (percentages)



DMC = developing member country, Emp = employment, FLib = financial liberalization, HiInc Asia = high-income ADB members, LFP = labor force participation, Lao PDR = Lao People's Democratic Republic, PRC = People's Republic of China.

Source: Authors' estimates.

Some observers of global growth have challenged the notion that skill-intensive industrial-to-service sector transition can sustain long-term increases in incomes. The so-called Baumol "postindustrial trilemma" is based on the notion that technological progress limits the rate of labor absorption in manufacturing over time, requiring ever smaller unit requirements of higher-productivity labor and imposing an implicit constraint on wage growth in other sectors.[8] In some OECD countries (e.g., the United States), we have indeed observed a bifurcation of labor markets between skilled and unskilled employment. Skilled workers appear to be complementary factors for technology, while unskilled workers appear to be substitutes. Meanwhile, unskilled workers already crowded out of agriculture, are driven into ever more intense service sector competition. This dichotomy drives the basic enhancement of skilled wages in parallel with classical labor–capital substitution, driving down relative wages of unskilled workers and increasing domestic inequality.

[8] For background, compare Baumol, Blackman, and Wolff (1985) and Aghion and Durlauf (2005).

The fate of displaced unskilled workers will largely determine the long-term per capita income effects of growth, both in the OECD economies and elsewhere. As other researchers (e.g., Felipe 2013) have demonstrated, services are highly diverse in productivity terms, particularly in higher-income countries. In other words, there is no necessary link between service sector expansion as a share of total employment and lower average wages. The basic challenge is to promote skill-intensive service sector development and the education and training policies to support it. Our results for regional financial liberalization are a classic example of skill-intensive service sector promotion, and show superior average wage growth accompanying structural transformation. If countries react more passively, simply allowing manufacturing technology to displace unskilled workers into an undifferentiated service sector, falling average real wages will be inevitable.

VII. CONCLUSION AND POLICY IMPLICATIONS

To strengthen the basis of evidence for Asian regional policy making, this study presents a set of long-term forecasts for regional growth, highlighting the roles of structural transformation, factor productivity, and policies that can facilitate private sector support for more sustained and inclusive regional growth. Asia is comprised of very diverse economies, and this diversity presents both challenges and opportunities. Challenges include institutional differences that can undermine regional policy coherence and escalate both costs and risks for regional investors. Also impeding growth are limited domestic savings resources in lower-income DMCs, a situation that hinders investment and technological progress. Another constraint from the same source is limited fiscal capacity, which leads to very different levels of per capita public goods and services across the region.

The next phase of structural transformation for Asia will have several salient features. First, our results suggest that no single policy orientation, pathway, or even destination will apply to all economies. Indeed, it is essential to recognize that transformation across the region will proceed in different ways, at different paces, and with different medium-term consequences. The main driver for structural transformation within national economies will be demand patterns, both domestic and external. Each of these two demand sources has a very different sector emphasis, however, and will drive domestic resource allocation in different directions. Asian economies with high export shares will be drawn to more intensive primary resource allocation, while those with larger domestic demand shares will become more service oriented.

Rising incomes across Asia have already begun to accelerate agrifood trade, and this process will continue, sharply increasing the growth leverage that agriculture offers to low-income Asian economies. To realize the full potential of this process, regional economies must increase agrifood productivity and expand added value in processing and marketing. Otherwise, this traditionally low-wage sector will likely fuel increased regional inequality, delivering basic agricultural commodities to higher-income countries with little value-added capture by exporters.

We see that services are essential contributors to average living standards in high-, medium-, and even low-income Asian economies. Indeed, domestic demand for services will be a primary contributor to GDP growth across the region. For this reason, policies that improve the efficiency of service sector labor allocation, as well as higher skill and productivity via determined education and training programs, will be essential to sustaining higher living standards. In this way, we can overcome the postindustrial trilemma of adverse real wage trends for unskilled workers, and transition to long-term growth sustained by demand from an ever-expanding middle class.

These results also remind us that economic diversity presents many opportunities for more efficient Asian regional specialization. Faster-growing economies can confer growth externalities upon their neighbors, and countries with relatively abundant low-cost resources (including labor) can offer higher and more diversified investment returns to countries with relatively abundant capital resources and more advanced commercial institutional development. Conversely, countries with high net savings can facilitate growth by investing in savings-constrained DMCs and supporting higher employment, technology transfer, and export market access for their partners.

Long-term forecasts for the Asian economies suggest that factor productivity growth continues to be essential to improving livelihoods generally and promoting regional convergence in particular. Our findings support the notion that productivity improvements are not only more cost-effective in lower-income countries, they have a bigger relative income dividend for recipient countries than for investing countries. Looking at a variety of policies that facilitate productivity growth by promoting private sector development, our results offer three main insights. First, the potential benefits of further regional tariff reductions are limited, and Asian economies should expand the trade policy dialog to address more structural barriers to trade. Second, trade-facilitating investments in hard infrastructure can significantly enhance growth in the region, particularly for lower-income economies.

The biggest growth dividend we have identified comes from deeper Asian financial integration. In the past, successful Asian economies have been technology driven and continually striving to upgrade the skills of their population. The benefits of this human resources approach to growth and development become even more pronounced with the application of regional policies that facilitate trade and capital flows. With more effective Asian regional integration, including much more efficient regional capital allocation, Asia's prosperity can accelerate significantly and reach out to the majority of its population, over half of humanity. This second and perhaps greatest stage of modern Asian economic emergence, growth through regionalism, could make the greatest contribution to livelihood improvement in modern times.

APPENDIX: TECHNICAL OVERVIEW OF THE TRADE INTEGRATED GENERAL EQUILIBRIUM (TIGER) MODEL

The role of markets is to mediate exchange, usually with a flexible system of prices, the most important endogenous variables in a typical calibrated general equilibrium (CGE) model. As in a real market economy, commodity and factor price changes induce changes in the level and composition of supply and demand, production and income, and the remaining endogenous variables in the system. In CGE models, an equation system is solved for prices that correspond to equilibrium in markets and satisfy the accounting identities governing economic behavior. If such a system is precisely specified, equilibrium always exists and such a consistent model can be calibrated to a base period data set. The resulting calibrated general equilibrium model is used to simulate the economywide (and regional) effects of alternative policies or external events.

The distinguishing feature of a general equilibrium model, applied or theoretical, is its closed form specification of all activities in the economic system under study. This can be contrasted with more traditional partial equilibrium analysis, where linkages to other domestic markets and agents are deliberately excluded from consideration. A large and growing body of evidence suggests that indirect effects (e.g., upstream and downstream production linkages) arising from policy changes are not only substantial, but may in some cases even outweigh direct effects. Only a model that consistently specifies economywide interactions can fully assess the implications of economic policies or business strategies. In a multicountry model like the one used in this study, indirect effects include the trade linkages between countries and regions, which themselves can have policy implications.

The model we use for this work is a version of the LINKAGE 7 model developed at the World Bank by Dominique van der Mensbrugghe, implemented in the GAMS programming language, and calibrated to the Global Trade Analysis Project (GTAP) global database. Apart from its traditional neoclassical roots, an important feature of this model is product differentiation, where we specify that imports are differentiated by country of origin and exports are differentiated by country of destination (e.g., Armington 1969). This feature allows the model to capture the pervasive phenomenon of intra-industry trade, where a country is both an importer and exporter of similar commodities, and avoids tendencies toward extreme specialization.

This paper uses a dynamic general equilibrium forecasting tool, the Trade Integrated Global Energy and Resource (TIGER), a global, multiregion, multisector, dynamic applied general equilibrium model.[1] The base data set—GTAP[2] Version 8.0—is defined across 134 country and regional groupings and 57 economic sectors. For this paper, the model has been defined for an aggregation of 20 countries and regions and 10 sectors. Full technical documentation of the TIGER model is published elsewhere, and the remainder of this appendix briefly outlines the main characteristics of supply, demand, and the policy instruments of the model.

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[1] TIGER is based on the LINKAGE model, developed and maintained by the World Bank, which assumes no responsibility for this analysis or its results.

[2] GTAP refers to the Global Trade Analysis Project based at Purdue University. For more information see www.gtap.org

A. Production

All sectors are assumed to operate under constant returns-to-scale and perfect competition. Production in each sector is modeled by a series of nested constant elasticity of substitution (CES) production functions that are intended to represent the different substitution and complementarity relations across the various inputs in each sector. There are material inputs that generate the input/output table, as well as factor inputs representing value added.

Three different production archetypes are defined in the model—crops, livestock, and all other goods and services. The CES nests of the three archetypes are graphically depicted in Figures A.1 through A.3. Within each production archetype, sectors will be differentiated by different input combinations (share parameters) and different substitution elasticities. The former are largely determined by base year data, and the latter are given values by the modeler.

The key feature of the crop production structure is the substitution between intensive cropping versus extensive cropping, i.e., between fertilizer and land (Figure A.1).[3] Livestock production captures the important role played by feed versus land, i.e., between ranch- versus range-fed production (Figure A.2).[4] Production in the other sectors more closely matches the traditional role of capital and/or labor substitution, with energy introduced as an additional factor of production (Figure A.3).

In each period, the supply of primary factors—capital, labor, and land—is usually predetermined. However, the supply of land is assumed to be sensitive to the contemporaneous price of land. Land is assumed to be partially mobile across agricultural sectors. Given the comparative static nature of the simulations, which assumes a longer-term horizon, both labor and capital are assumed to be perfectly mobile across sectors (though not internationally).

The current model specification has an innovation in the treatment of labor resources.[5] The GTAP data set identifies two categories of labor: skilled and unskilled. Under the standard specification, both types of labor are combined in a CES bundle to form aggregate sectoral labor demand (i.e., the two types of labor skills are interchangeable). In the new specification, a new factor of production has been inserted, which we call human capital. It is combined with capital to form a physical cum human capital bundle, with an assumption that they are complements. On input, the user can specify what percentage of the skilled labor factor to allocate to the human capital factor.

Once the optimal combination of inputs is determined, sectoral output prices are calculated assuming competitive supply (zero-profit) conditions in all markets.

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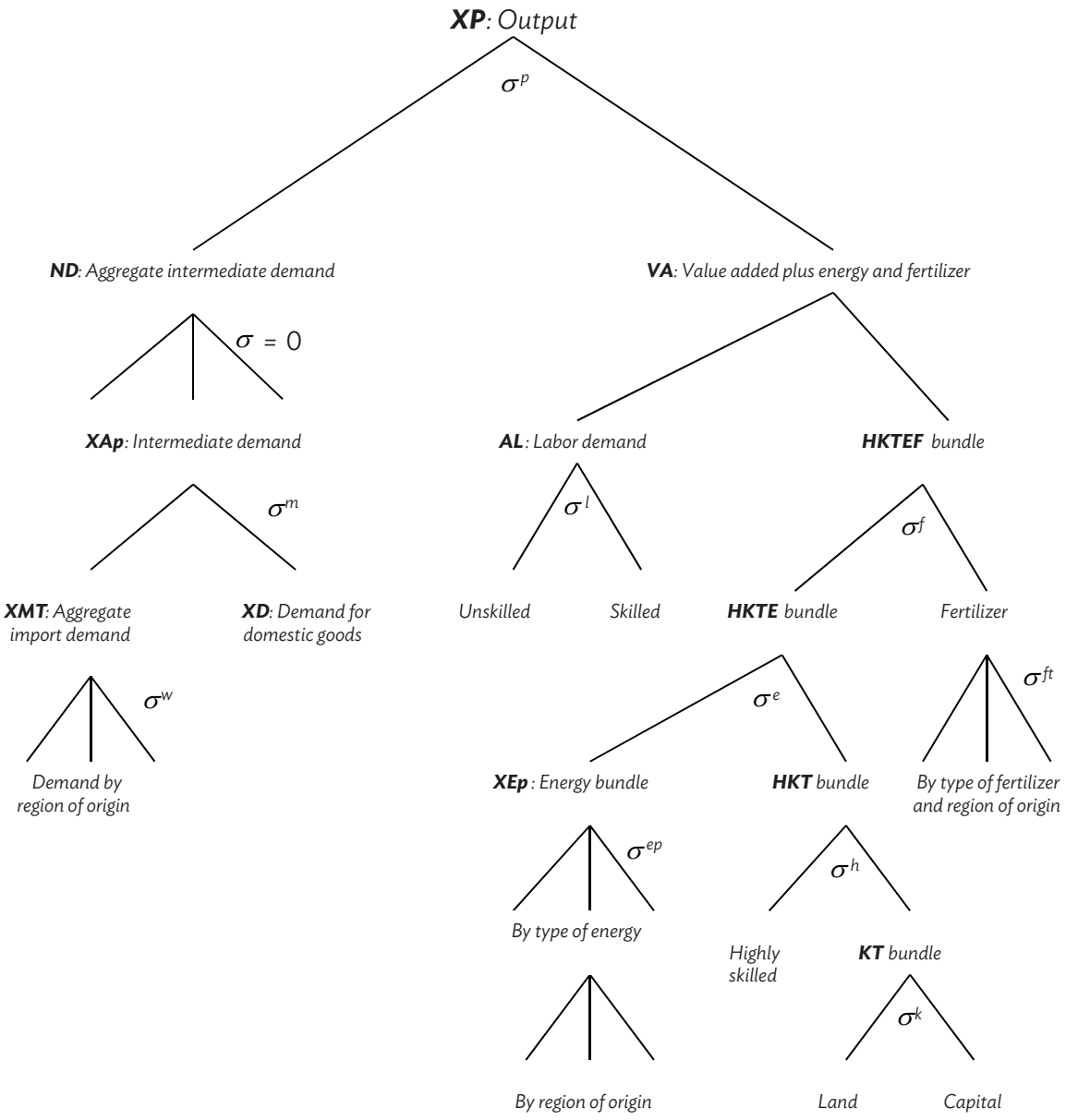
[3] In the original GTAP data set, the fertilizer sector is identified with the crop sector (i.e., chemicals, rubber, and plastics).

[4] Feed is represented by three agricultural commodities in the base data set: wheat, other grains, and oil seeds.

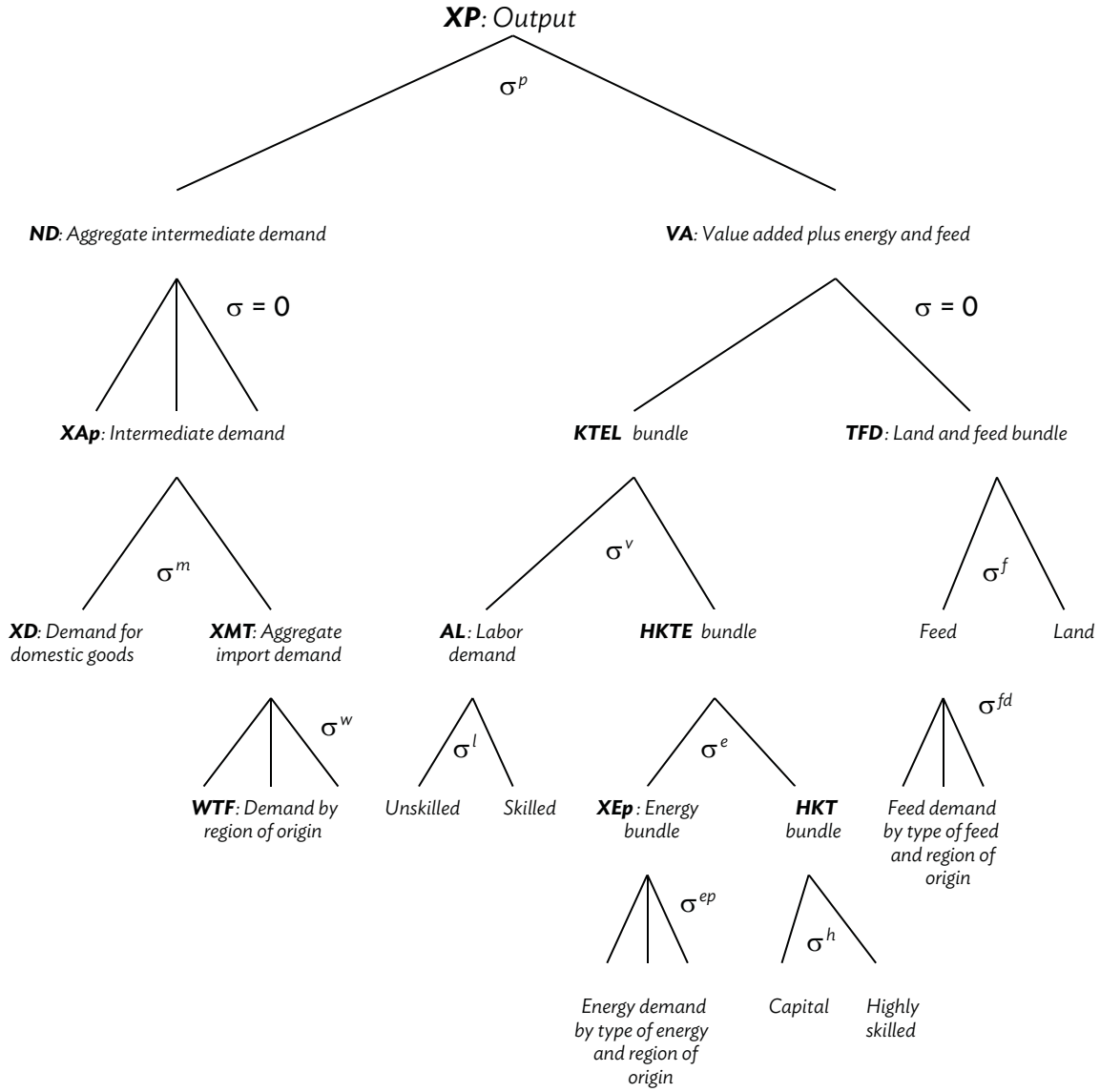
[5] This feature is not invoked in results reported here. Because of increased interest in labor markets and human capital in the Latin American context (e.g., see Roland-Holst and van der Mensbrugghe 2005), we have developed this modeling capacity and are using it experimentally.

Figure A.1: Production Function for Crops



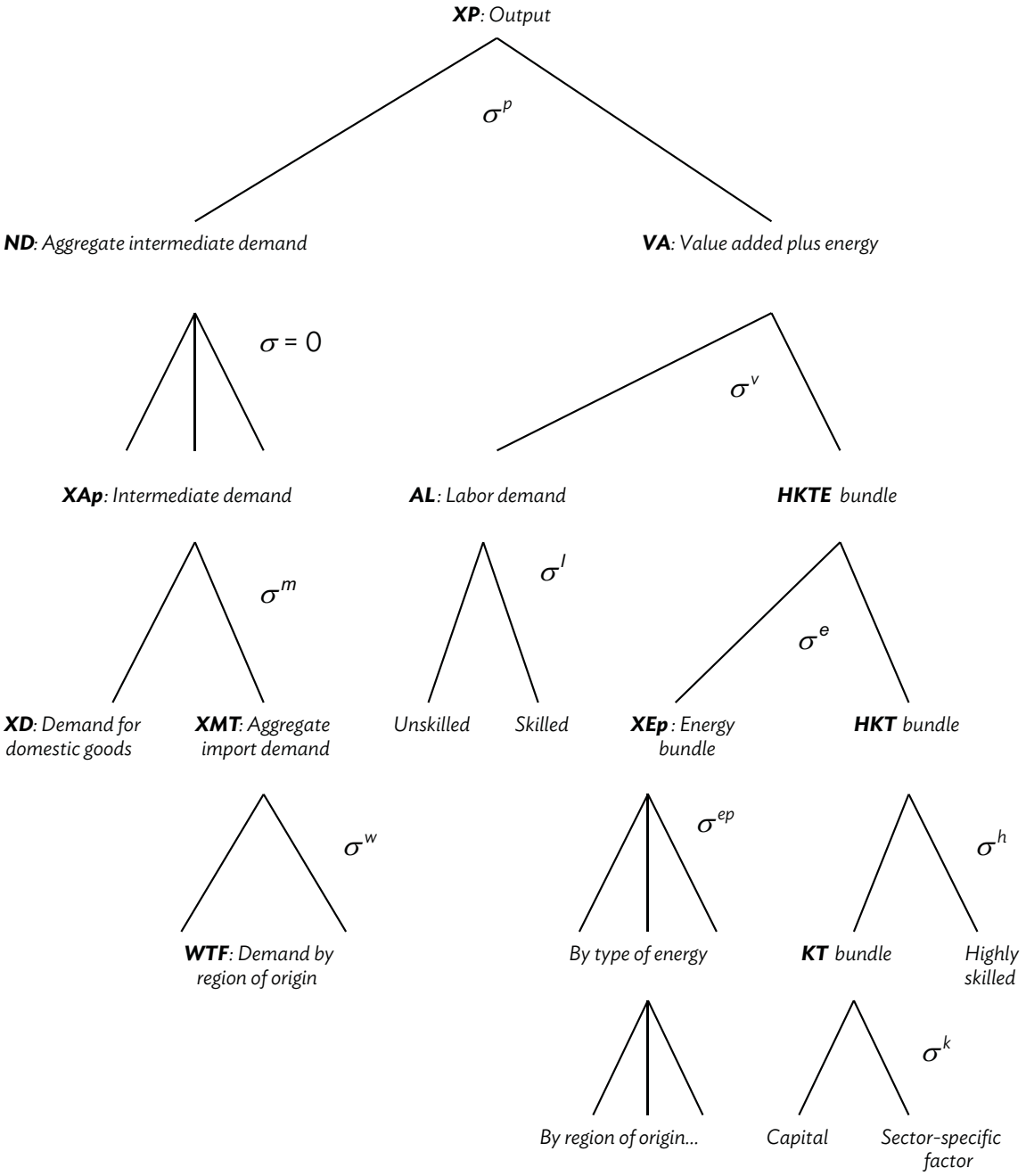
Source: Authors' framework.

Figure A.2: Production Function for Livestock



Source: Authors' framework.

Figure A.3: Production Function for Non-Agriculture



Source: Authors' framework.

B. Consumption and Closure Rules

All income generated by economic activity is assumed to be distributed to a single representative household. The single consumer allocates optimally his/her disposable income among consumer goods and savings. The consumption/saving decision is completely static: saving is treated as a "good" and its amount is determined simultaneously with the demands for the other goods, the amount of savings being set arbitrarily equal to the average price of consumer goods.[6]

Government collects income taxes, indirect taxes on intermediate and final consumption, taxes on production, tariffs, and export taxes and pays sectoral subsidies. Aggregate government expenditures are linked to changes in real GDP. The real government deficit is exogenous. Closure therefore implies that some fiscal instrument is endogenous in order to achieve a given government deficit. The standard fiscal closure rule is that the marginal income tax rate adjusts to maintain a given government fiscal stance. For example, a reduction or elimination of tariff rates is compensated by an increase in household direct taxation, ceteris paribus.

Each region runs a current account surplus (deficit) that is fixed (in terms of the model numéraire). The counterpart of these imbalances is a net outflow (inflow) of capital, subtracted from (added to) the domestic flow of savings. In each period, the model equates gross investment to net savings (equal to the sum of savings by households, the net budget position of the government, and foreign capital inflows). This particular closure rule implies that investment is driven by savings. The fixed trade balance implies an endogenous real exchange rate. For example, removal of tariffs induces increased demand for imports, is compensated by increasing exports through a real exchange rate depreciation.

C. Foreign Trade

The world trade block is based on a set of regional bilateral flows. The basic assumption in TIGER is that imports originating in different regions are imperfect substitutes (Figure A.4). Therefore, in each region, total import demand for each good is allocated across trading partners according to the relationship between their export prices. This specification of imports—commonly referred to as the Armington[7] specification—implies that each region faces a downward-sloping demand curve for its exports. The Armington specification is implemented using two CES nests. At the top nest, domestic agents choose the optimal combination of the domestic good and an aggregate import good consistent with the agent's preference function. At the second nest, agents optimally allocate demand for the aggregate import good across the range of trading partners.[8]

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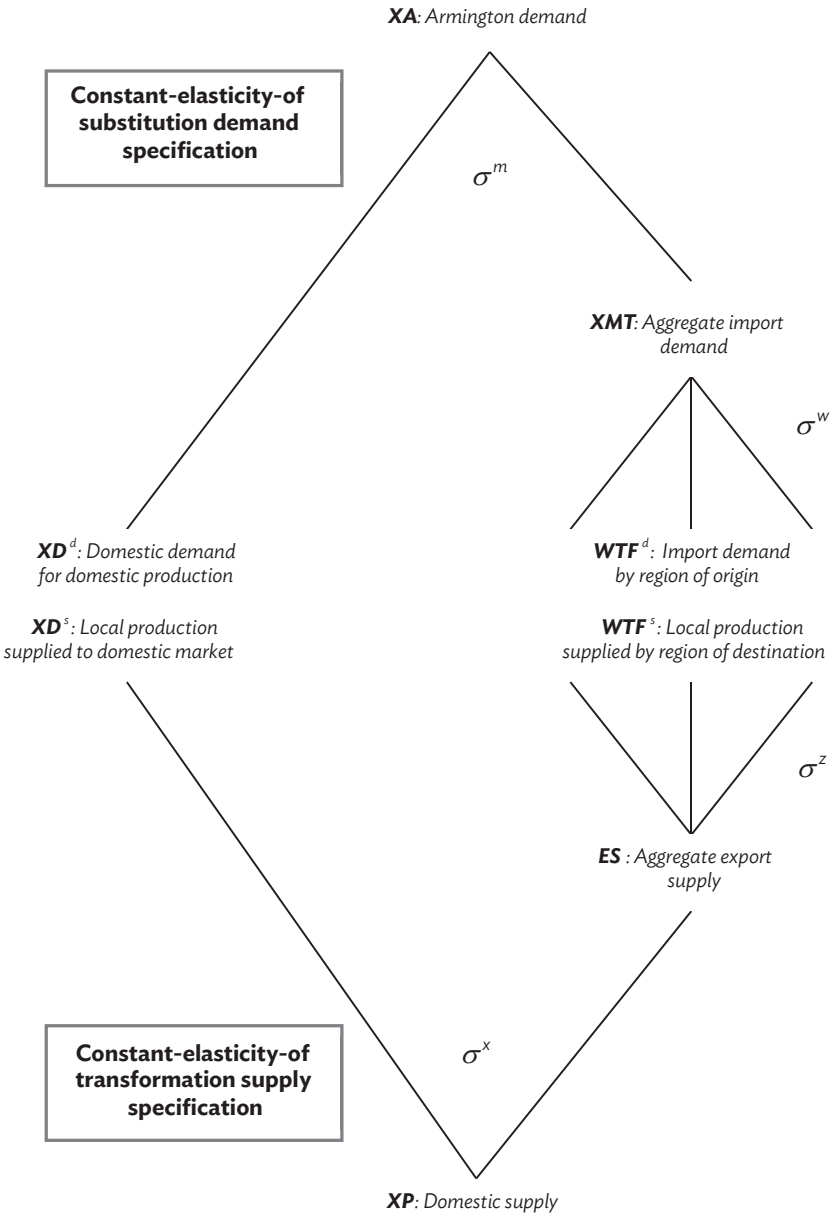
[6] The demand system used in TIGER is a version of the extended linear expenditure system (ELES), based on a temporal maximization. In this formulation, the marginal propensity to save out of supernumerary income is constant and independent of the rate of reproduction of capital.

[7] See Armington (1969).

[8] The GTAP data set allows each agent of the economy to be an Armington agent; i.e., each column of demand in the input/output matrix is disaggregated by domestic and import demand. (The allocation of imports across regions can only be done at the national level). For the sake of space and computing time, the standard model specification adds up Armington demand across domestic agents, and the Armington decomposition between domestic and aggregate import demand is done at the national level, not at the individual agent level.

Figure A.4: Trade Aggregation



Source: Authors' framework.

The bilateral supply of exports is specified in parallel fashion using a nesting of constant-elasticity-of-transformation functions. At the top level, domestic suppliers optimally allocate aggregate supply across the domestic market and the aggregate export market. At the second level, aggregate export supply is optimally allocated across each trading region as a function of relative prices.[9]

[9] A theoretical analysis of this trade specification can be found in Dervis, de Melo, and Robinson (1982).

Trade variables are fully bilateral and include both export and import taxes and subsidies. Trade and transport margins are also included; therefore, world prices reflect the difference between FOB and CIF pricing.

D. Prices

The TIGER model is fully homogeneous in prices (i.e., only relative prices are identified in the equilibrium solution). The price of a single good, or of a basket of goods, is arbitrarily chosen as the anchor to the price system. The price (index) of OECD manufacturing exports has been chosen as the numéraire, and is set to 1.

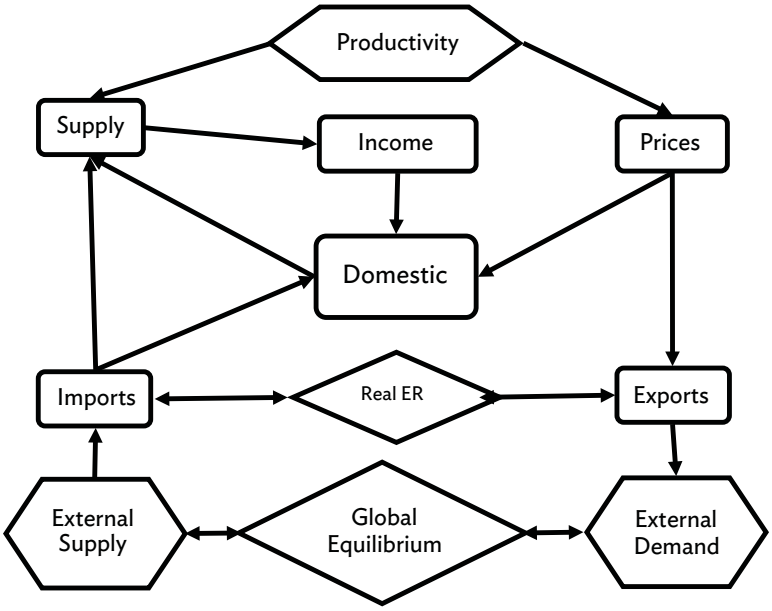
E. Elasticities

Production elasticities are relatively standard and are available from the authors. Aggregate labor and capital supplies are fixed, and within each economy they are perfectly mobile across sectors.

F. Model Calibration

The model is calibrated to country and regional real GDP growth rates, obtained as consensus estimates from independent sources (International Monetary Fund: 2012, World Bank: 2012). Using exogenous rates of implied total factor productivity growth, the model computes supply, demand, and trade patterns compatible with domestic and global equilibrium conditions. Equilibrium is achieved by adjustments in the relative prices of domestic resources and commodities, while international equilibrium is achieved by adjusting trade patterns and real exchange rates to satisfy fixed real balance of payment constraints. The general process is schematically represented in Figure A.5.

Figure A.5: General Equilibrium Calibration Mechanism



Source: Authors' framework.

G. Notes on the Adjustment Process

The calibration procedure highlights the two salient adjustment mechanisms in the model (as well as the real economies), domestic and international prices. General equilibrium price adjustments are generally well understood by professional economists but, in the multilateral context, the role of exchange rates can be a source of confusion. Generally, in a neoclassical model like this one, there are no nominal or financial variables and the function of the exchange rate is only to equalized real purchasing power between different economies.

Because models like this do not capture the aggregate price level or other nominal quantities, there is no nominal exchange rate in the sense of traditional macroeconomics or finance. Since there is no money metric in the model, all prices are relative prices, and the exchange rate (the composite relative price of foreign goods) is no exception. If there were financial assets in the model, one could define a nominal exchange rate as the relative price of two international financial assets (money, bonds, etc.). Without them, the exchange rate is defined in terms of real international purchasing power (i.e., the relative price of tradable to nontradable goods). In a multisector setting, the real exchange rate is defined as the ratio of an index of the value of all tradables on world markets to an index of the value of all nontradables.

Since any tax, or other price-elevating distortion, on an import is an implicit tax on all tradable goods, trade liberalization causes prices of tradable goods to fall and the real exchange rate to depreciate. Real exchange rate depreciation also makes exports more competitive, one of the principal motives for unilateral liberalization. The general implication of this is that trade will expand rapidly for a country removing significant import protection, and more rapidly for countries removing more protection. The pattern of trade expansion, and the domestic demand and supply shifts that accompany it, depend upon initial conditions and adjustments among trading partners.

It should also be noted that, even in an economy that departs from perfect competition, removing price distortions confers efficiency gains, increasing output potential and real incomes.

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Growth Horizons for a Changing
Asian Regional Economy

This paper presents a set of long-term forecasts for Asian regional growth, highlighting the roles of factor productivity and policies that can facilitate private sector support for more sustained and inclusive regional growth. The results suggest that no single policy orientation, pathway, or even destination will apply to all economies. The main driver for each economy's structural change will be demand—both domestic and external. Asian economies with high export shares will be drawn to more intensive primary and industrial resource allocation, while those with larger domestic demand shares will become more service-oriented. The long-term forecasts for the Asian economies suggest that factor productivity growth continues to be essential to improving livelihoods and promoting regional convergence.

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