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China, and India Growth and the
Rest of the World: The Role of
Trade**

Robert Z. Lawrence

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Robert Z. Lawrence is Albert L. Williams Professor of International Trade and Investment at the Harvard Kennedy School, senior fellow at the Peterson Institute of International Economics, and research associate at the National Bureau of Economic Research.

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Please contact the author for information about this paper.

Email: robert_lawrence@Harvard.Edu

Asian Development Bank Institute
Kasumigaseki Building 8F
3-2-5 Kasumigaseki, Chiyoda-ku
Tokyo 100-6008, Japan

Tel: +81-3-3593-5500
Fax: +81-3-3593-5571
URL: www.adbi.org
E-mail: info@adbi.org

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Abstract

This paper explores the impact of past and future growth in the Association of Southeast Asian Nations (ASEAN)¹, the People's Republic of China (PRC), and India—here referred to as the ACI countries—on aggregate welfare, relative wages, and global emissions in the rest of the world. It outlines several analytical frameworks, considers effects over the past decade and, based on consensus forecasts, the implications of that growth for the rest of the world in the decades to come.

Since the mid-1990s, ACI growth has improved the non-oil terms of trade of the developed countries. There have also been strong complementarities between ACI suppliers of intermediate inputs and PRC exports. More developed Asian countries have benefited from PRC capital goods demand. ACI growth has, however, put competitive pressures on other less-developed manufacturing exporters, worsening their terms of trade and constraining their pricing ability. ACI growth has been especially beneficial for oil and minerals commodity producers. On the other hand, net food importers and oil importing countries have been adversely affected by high import costs.

Future ACI growth provides opportunities and challenges for the rest of the world. For developed countries the opportunities are for selling high-end services and capital and consumer goods in the ACI markets and enjoying the benefits from intra-industry trade; the challenges will come from increased head-to-head competition in manufactured goods and services that should become more intense in future decades. For medium-income producers currently at between 30% and 60% of US levels, there will be a tougher tradeoff between more intensive competition with the PRC and serving the growing middle classes in ACI countries. For poorer countries, there will be greater opportunities for becoming part of global supply chains in manufactured exports.

Standard frameworks that assume internal factor mobility suggest continuing pressures for wage inequality in developed countries. But these hinge on the assumption that the ACI and developed countries will continue to produce similar products and that the ACI will specialize in unskilled labor-intensive products. In fact, as their exports become more technology-intensive and developed countries more specialized these pressures could be alleviated. On the one hand, as the “flying geese” process continues, exports from countries with lower incomes than the PRC are likely to displace PRC labor-intensive exports rather than domestic production in developed countries. On the other hand, while it may cause job loss and erode the returns to specific factors, PRC export growth is less likely to be a source of wage inequality in advanced economies.

JEL Classification: F01, F10

¹ In this paper we proxy ASEAN using data for Indonesia, Malaysia, Philippines, Singapore, Thailand, and Viet Nam.

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1. INTRODUCTION

Using the work of Dani Quah, a study by Citibank (Buiters 2011) notes that in 1980 the global economy's center of gravity was in the mid-Atlantic. By 2008, the continuing rise of the People's Republic of China (PRC) and the rest of East Asia implied that it had moved to a location east of Helsinki and Bucharest. Citibank projects that by 2050 it will be located midway between India and the PRC.

The shift reflects the growth in the Association of Southeast Asian Nations (ASEAN), the PRC, and India—here referred to as the ACI countries. This development has been greeted with mixed feelings in the rest of the world. Some see great benefits: larger export markets, cheaper imports, higher export prices, increased inward investment; but others have concerns about competing with the ACI in their domestic and export markets as well as their impact on the prices of primary commodities and standardized manufactured goods. In many countries ACI growth is also blamed for adverse shifts in the distribution of income and there is alarm about the impact of that growth on the global environment.

Are these hopes and concerns warranted? This paper explores the impact of ACI on aggregate welfare, relative wages, and global emissions. In section 2, I describe the growth rates achieved by the ACI over the past decade and those that are expected through 2030. In section 3, I outline frameworks that help us explore the implications of this growth for welfare in the rest of the world. In section 4, I apply these frameworks to analyze the impact of ACI growth on the rest of the world over the past decade. In section 5, I consider the future implications. In section 6, I discuss the links between trade and wages. In section 7, I consider emissions of Greenhouse Gases, and finally I discuss policy responses.

2. GROWTH PERFORMANCE AND OUTLOOK

Growth 2000–2010: Since 2000, the location of global growth has shifted dramatically towards developing countries in general and the ACI in particular. During the 1980s and 1990s, developing and industrialized countries on average grew at close to the same pace, but from 2000 developing economy growth accelerated. Not only were the ACI countries able to sustain rapid growth, but growth in Africa, the Middle East, Latin America, and the rest of Asia was strong. By contrast, performance of the developed countries was quite tepid through 2008, and after the deep recession associated with the Global Financial Crisis, their recovery has been halting.

The share of emerging economies in international trade grew even faster, reflecting the trade-intensive growth path of the dominant emerging economies. In 2000, the BRICS (Brazil, India, the PRC, and Russia) accounted for 7.2% of world exports. By the third quarter of 2010, this share had risen to 18%. The PRC became the world's largest exporter and second largest importer by value in mid-2009 (from rank of 7 for exports and 8 for imports in 2000).

Rapid growth was also pervasive across the ACI economies. In 2000, for example, as shown in Table 2, ACI per capita incomes included a lower-income developed country, Singapore, at 70.5% of United States (US) levels, two upper middle-income developing countries, Malaysia (at 27.4%) and Thailand (22.5%), three lower middle-income countries, Indonesia (at 11.3%), the PRC (9.2%), and the Philippines (8.2%), and two low-income developing countries, India (at 6.6%), and Viet Nam (6.3%).

However, over the next decade, each ACI country moved into a higher per capita income echelon (Table 2). The PRC's rise was the most rapid, reaching 23.9% of US purchasing power parity (PPP) per-capita levels by 2010; Singapore almost caught up with the US, reaching 90.4% of its per-capita; Malaysia reached 32.6% of US per capita, Thailand 29.2%, Indonesia 15.4%, India 10.8%, and Viet Nam 10.4%. Thus all made marked improvements.

Only the Philippines (9.73%) had moved up by less than 20%. Consequently, the share of the ACI economies in world gross domestic product (GDP) measured in PPP terms rose dramatically—increasing by more than 50% over the period 2000–2010—from 19.5% in 2000 to 31.2% in 2010 (Table 1). In contrast, the share of advanced economies in world GDP declined by 15 percentage points. ACI shares in nominal global output and per capita incomes, measured using current (World Bank Atlas) exchange rates lag behind those in PPP terms because of their lower prices of non-tradable goods and weak exchange rates (Tables 4 and 5). Nonetheless, ACI shares still more than doubled, from 7.1% in 2000 to 15.8% in 2010 (Table 4).

Table 1: World GDP Share of the PRC, India, and 6 Major APEC Nations (PPP)

% of World GDP	2000	2010	2030
PRC	9.437%	18.64%	28.57%
India	5.336%	7.43%	13.05%
Indonesia	1.924%	2.142%	2.84%
Malaysia	0.504%	0.526%	0.50%
Philippines	0.537%	0.566%	0.60%
Singapore	0.231%	0.248%	0.23%
Thailand	1.116%	1.141%	1.10%
Viet Nam	0.404%	0.543%	0.75%
APEC Total (excluding PRC and India)	4.72%	5.17%	6.02%
ACI Total	19.49%	31.24%	47.64%

APEC = Asia-Pacific Economic Cooperation. The 21 member economies of APEC are: Australia; Brunei Darussalam; Canada; Chile; People's Republic of China; Hong Kong, China; Indonesia; Japan; Republic of Korea; Malaysia; Mexico; New Zealand; Papua New Guinea; Peru; Philippines; Russian Federation; Singapore; Taipei, China; and Thailand.

Source: Conference Board Total Economic Database was used to compile GDP and GDP per capita data six years—1950, 1960, 1965, 1973, 2000, and 2030. Forecast data from the IMF, Citi Bank, EIU, USDA, the Conference Board and the United States Census Bureau were used to generate the information for 2030.

Table 2: GDP Per Capita (PPP) Compared with US GDP Per Capita of the PRC, India, and Six Major APEC Nations

GDP per capita	2000	2010	2030
PRC	9.221%	23.906%	59.71%
India	6.556%	10.804%	25.99%
Indonesia	11.271%	15.353%	29.25%
Malaysia	27.421%	32.623%	41.24%
Philippines	8.157%	9.730%	12.67%
Singapore	70.515%	90.384%	101.23%
Thailand	22.159%	29.184%	44.48%
Viet Nam	6.288%	10.402%	20.83%
APEC Total (excluding PRC and India)	12.56%	16.66%	27.19%
ACI Total	8.40%	17.66%	39.82%

Source: Conference Board Total Economic Database was used to compile GDP and GDP per capita data six years—1950, 1960, 1965, 1973, 2000, and 2030. Forecast data from the IMF, Citi Bank, EIU, USDA, the Conference Board and the United States Census Bureau were used to generate the information for 2030.

Table 3: GDP and GDP Per Capita Growth Rates of the PRC, India, and Six Major APEC Nations 2010–2030

Country/Region	GDP growth rate	GDP per capita growth rate
PRC	6.72%	6.48%
India	7.44%	6.28%
Indonesia	5.95%	5.05%
Malaysia	4.24%	2.91%
Philippines	4.75%	3.07%
Singapore	4.03%	2.29%
Thailand	4.25%	3.88%
Viet Nam	6.17%	5.31%
APEC Total (excluding PRC and India)	5.27%	4.24%
ACI Total	6.69%	5.94%
United States	2.58%	1.72%
World	4.47%	3.47%

Source: Conference Board Total Economy Data Base and author's calculations. Conference Board Total Economic Database was used to compile GDP and GDP per capita data six years—1950, 1960, 1965, 1973, 2000, and 2030. Forecast data from the IMF, Citi Bank, EIU, USDA, the Conference Board and the United States Census Bureau were used to generate the information for 2030.

Table 4: World Nominal GDP Share (Exchange Rate Adjusted) of the PRC, India, and Six Major APEC Nations

Nominal GDP Weight of the World (exchange rate adjusted)	2000	2010	2030
PRC	3.80%	9.86%	20.99%
India	1.46%	2.90%	5.63%
Indonesia	0.52%	1.19%	1.73%
Malaysia	0.30%	0.40%	0.41%
Philippines	0.26%	0.33%	0.34%
Singapore	0.29%	0.37%	0.69%
Thailand	0.39%	0.53%	0.59%
Viet Nam	0.10%	0.17%	0.25%
APEC Total (excluding PRC and India)	1.86%	3.00%	4.01%
ACI Total	7.12%	15.77%	30.63%

Source: World Bank Atlas and author's calculations using projections. Conference Board Total Economic Database was used to compile GDP and GDP per capita data six years—1950, 1960, 1965, 1973, 2000, and 2030. Forecast data from the IMF, Citi Bank, EIU, USDA, the Conference Board and the United States Census Bureau were used to generate the information for 2030.

Table 5: Nominal GDP Per Capita (Exchange Rate Adjusted) Compared with US GDP Per Capita

Nominal GDP per capita (exchange rate adjusted)	2000	2010	2030
PRC	2.70%	9.34%	34.32%
India	1.30%	3.12%	8.77%
Indonesia	2.20%	6.15%	13.63%
Malaysia	11.55%	17.78%	25.35%
Philippines	2.84%	4.22%	5.50%
Singapore	65.04%	91.59%	
Thailand	5.65%	10.16%	18.83%
Viet Nam	1.12%	2.44%	5.47%
APEC Total (excluding PRC and India)	3.61%	7.107%	14.10%
ACI Total	2.34%	6.544%	19.91%

Source: World Bank, Conference Board Total Economy Data Base and author's calculations. Conference Board Total Economic Database was used to compile GDP and GDP per capita data six years—1950, 1960, 1965, 1973, 2000, and 2030. Forecast data from the IMF, Citi Bank, EIU, USDA, the Conference Board and the United States Census Bureau were used to generate the information for 2030.

Table 6: World Nominal GDP Share of the PRC, India, and Six Major APEC Nations

% of World GDP	2000	2010	2030
PRC	7.07%	13.71%	22.41%
India	3.77%	5.62%	10.52%
Indonesia	1.16%	1.38%	1.96%
Malaysia	0.50%	0.56%	0.57%
Philippines	0.44%	0.49%	0.56%
Singapore	0.25%	0.31%	0.30%
Thailand	0.74%	0.79%	0.81%
Viet Nam	0.26%	0.37%	0.55%
APEC Total (excluding PRC and India)	3.35%	3.91%	4.74%
ACI Total	14.19%	23.24%	37.68%

Source: World Bank, Conference Board Total Economy Data Base and author's calculations. Conference Board Total Economic Database was used to compile GDP and GDP per capita data six years—1950, 1960, 1965, 1973, 2000, and 2030. Forecast data from the IMF, Citi Bank, EIU, USDA, the Conference Board and the United States Census Bureau were used to generate the information for 2030.

Table 7: Nominal GDP Per Capita compared to US GDP Per Capita of the PRC, India, and Six Major APEC Nations

GDP per capita	2000	2010	2030
PRC	6.08%	16.13%	40.29%
India	4.48%	7.50%	18.02%
Indonesia	6.50%	8.91%	16.97%
Malaysia	25.95%	30.89%	38.97%
Philippines	6.43%	7.74%	10.06%
Singapore	74.46%	93.56%	104.77%
Thailand	14.23%	18.60%	28.35%
Viet Nam	3.95%	6.49%	13.00%
APEC Total (excluding PRC and India)	8.65%	11.48%	18.32%
CIA Total	5.93%	11.98%	26.93%

Source: World Bank, Conference Board Total Economy Data Base and author's calculations. Conference Board Total Economic Database was used to compile GDP and GDP per capita data six years—1950, 1960, 1965, 1973, 2000, and 2030. Forecast data from the IMF, Citi Bank, EIU, USDA, the Conference Board and the United States Census Bureau were used to generate the information for 2030.

Table 8: Share of World GDP (in Nominal, Exchange Rate Adjusted Terms) According to Real GDP Per Capita

Real per capita GDP as % of US per capita GDP	2000	2010	2030
0–19.99%	13.34%	8.93%	2.89%
20–39.99%	6.49%	23.49%	18.64%
40–59.99%	5.20%	4.24%	29.54%
60–79.99%	43.00%	32.40%	14.18%
80–100%	31.98%	30.33%	34.03%

Source: World Bank, Conference Board Total Economy Data Base and author's calculations. Conference Board Total Economic Database was used to compile GDP and GDP per capita data six years—1950, 1960, 1965, 1973, 2000, and 2030. Forecast data from the IMF, Citi Bank, EIU, USDA, the Conference Board and the United States Census Bureau were used to generate the information for 2030.

Table 9: Share of World in PPP Terms

Per Capita GDP as % of US per Capita GDP	1950	1960	1965	1973	2000	2010	2030
0–19.99%	21.30%	17.13%	17.61%	14.20%	30.91%	18.88%	5.60%
20–39.99%	21.50%	26.53%	20.73%	21.60%	10.07%	33.07%	27.84%
40–59.99%	8.75%	7.11%	12.85%	5.50%	6.33%	3.47%	37.26%
60–79.99%	15.05%	22.08%	21.30%	31.61%	29.51%	21.61%	9.93%
80–100%	33.40%	27.16%	27.51%	27.10%	23.19%	22.59%	19.22%

Notes: Percentage of world GDP held by each group based on per capita GDP compared with US per capita GDP (0–19.99%, 20–39.99%, 40–59.99%, 60–79.99%, 80–100%) in each year was found and tabulated.

Source: Conference Board Total Economic Database was used to compile GDP and GDP per capita data six years—1950, 1960, 1965, 1973, 2000, and 2030. Forecast data from the IMF, Citi Bank, EIU, USDA, the Conference Board and the United States Census Bureau were used to generate the information for 2030.

Global Imbalances: Global economic growth between 1990 and 2010 was associated with the emergence of large trade and current account imbalances (Table 10). A particularly powerful growth driver was the surge in developed country spending that outran the rise in GDP. Boosted by buoyant equity and property markets, low interest rates, and “creative” financing practices—that turned out to be disastrous—developed country consumers borrowed and spent more than their incomes. This led the US to generate large current account deficits financed heavily by foreign central banks that accumulated large holdings of dollar reserves. Developing countries in Asia and elsewhere represented the other side of the coin. East Asians generally kept their exchange rates weak and accumulated reserves. In the PRC, extremely high domestic saving rates by both households and corporations supported an investment and export-led dynamic that featured high profit shares and declining shares of wages and consumption in GDP. The outcome was rapid growth in exports of goods and services as a share of GDP (16% to 35% from 1990–2008), combined with slower growth in imports (13% to 27% of GDP from 1990–2008), and a rising trade surplus that reached 7.7% of its GDP in 2008 (from 3% in 1990).

Table 10: External Balance on Goods and Services (% of GDP)

	1980	1990	2000	2008
External balance goods & services				
High income: OECD	(1.3)	(0.6)	(0.8)	(1.3)
United States	(0.5)	(1.3)	(3.9)	(4.9)
European Union	(2.3)	(0.5)	0.3	0.7
Japan	(0.9)	0.9	1.5	0.1
Low & middle income	(2.2)	(0.3)	1.5	1.1
Brazil	(2.3)	1.2	(1.8)	0.2
PRC	(0.4)	3.0	2.4	7.7
India	(3.1)	(1.4)	(0.9)	(5.4)
Russian Federation		0.2	20.0	9.2
South Africa	8.0	5.5	3.0	(3.0)
Sub-Saharan Africa (developing only)	1.2	0.9	1.6	(2.8)

() = negative.

OECD = Organisation for Economic Co-operation and Development.

Source: World Development Indicators.

Prospects: To provide a consensus estimate of GDP growth from 2010 to 2030 for 122 countries, I have drawn on five reports.² Where specific forecasts were available I gave each equal weight. Since the reports do not all provide forecasts for the full period, however, I have had to extrapolate some of the projections on the basis of the more extended forecasts.³ These extrapolations were based on the assumption that the growth profiles would match those of the two complete sets (Citi bank and the Economist Intelligence Unit) I do have for the full period.⁴ GDP per capita levels in 2030 were then estimated using these projected GDP growth levels and population growth projection estimates provided by the Census Bureau. 2010 nominal GDP levels were provided by the Economist Intelligence Unit, which were then used to predict the 2030 nominal GDP levels, using the GDP growth rates.

² These are the Conference Board Global Economic Outlook, Citi Bank Global Economics View (Butler 2011), the USDA Long Term Projections, IMF World Economic Outlook Database, and Economist Intelligence Unit (EIU) Country Data.

³ EIU and Citi provided forecasts up to 2030, but the Conference Board and USDA had project income through 2020 and the IMF had merely a five year projection, from 2010 to 2015.

⁴ If for example Citi projected a country's growth would decelerate from 7% between 2010 and 2020 to 5% between 2020 and 2030, and the IMF projected a growth of 10 for that country, we assumed that between 2020 and 2030 the IMF number would be 5/7 of 10, i.e., 7%.

I also estimated nominal GDP growth under the assumption that real exchange rates would appreciate smoothly along with convergence to US GDP levels.⁵

I report the per capita and aggregate real growth rates of the twenty largest countries over the twenty year period in Table 11 (See also Table 3). Developed countries are expected to grow slowly. The US averages 2.6% annual growth and just 1.7% per capita growth. The major European economies and Japan are expected to grow even more slowly: UK (2.2 GDP/1.8 per capita), France (1.9/1.6), Germany (1.4/1.5), Italy (1.2/1.1), and Japan (1.2/1.5). Thus the locus of global growth remains the developing countries in general and the ACI in particular. Reflecting their growing weight, global growth is a robust 4.5%, with per capita incomes rising at 3.5% annually. The ACI easily exceeds this pace, averaging 6.7% per annum, led by India (7.44%), followed by the PRC (6.7%), and APEC (5.3%). India's overall growth reflects its faster population growth, and its per capita rate of 6.3% is actually slightly lower than the PRC (6.5%). While the PRC's growth is projected to be rapid, it still represents a considerable deceleration from the pace it maintained for three decades. Within APEC the fastest growth occurs in Viet Nam (6.17%) and Indonesia (5.95%).

As Reported in Table 11, outside the ACI, the GDP growth projections for the largest developing countries include Brazil (4.4% per annum), Russia (3.9%), the Republic of Korea (henceforth, Korea) (3.5%), Mexico (3.7%), Pakistan (5.6%), Turkey (3.6%), Egypt (5.8%), Nigeria (6.6%), and Iran (4.2%).

The ACI are a major factor in the rise in global GDP. As noted in Table 1, between 2010 and 2030 the ACI share rises from 31.2% to 47.6%, accounting for almost 60% of the additional rise in global GDP. The PRC share rises by a full ten percentage points, from 18.6% to 28.6% and it alone accounts for 35.7% of overall global growth and 62% of all ACI growth. India's share increases from 7.4% to 13.05%, contributing 17.3% of the global growth and 29% of the ACI growth. APEC's global share also rises, but only from 5.2% to 6%, and it accounts for 7% of global growth.

Thus by far the most important global impact will be the result of what happens in the PRC, with India being about half as important. Outside of the PRC and India, the largest contributions to world growth come from the US—8.6% (Table 11). No other countries are significant. The largest impacts come from Indonesia (3.33%), Brazil (2.5%), Russia (1.9%), Korea (1.4%), Mexico (1.23%), Pakistan (1.2%), Nigeria (1.07%), and the United Kingdom (UK) (1.06%). The developed countries (defined as those with two thirds of US per capita income) accounted for 44% of world output in PPP terms in 2010. But they account for only 18% of the growth in world GDP over the twenty year period. Of the twelve countries that contribute three quarters of world growth, only two are developed countries.

In terms of nominal incomes, ACI is relatively less important. In 2010, ACI accounted for 15.8% of world income measured at current exchange rates (Table 6). That share would rise to 30.6%, however, on an exchange rate adjusted basis. Thus, despite its nominal share of just 15.8%, ACI contributes about 40% of the marginal global growth in adjusted nominal income and the PRC alone would account for 28% of the increase. Clearly, even though their nominal per capita incomes remain substantially lower than the US in 2030 (Table 7) for those with goods and services to sell to ACI, the expected rise in buying power is considerable.

⁵ We assume that countries will have the same nominal per capita incomes as the US when they reach the same PPP per capita incomes as the US. Accordingly, we assume that their exchange rates appreciate smoothly as they converge.

Table 11: Countries Ranked by Share in World PPP Growth 2010–2030

Period Country	PPP GDP growth rate 2010–2030	Share in World PPP Growth 2010–2030	Per Capita Income Relative to USA		Share in World GDP		GDP per capita % of US	% of World GDP
			2010	2030	2010	2030		
PRC	6.7	35.59	23.9	59.71	18.64	28.60	0.24	0.19
India	7.4	17.02	10.8	25.99	7.43	13.00	0.11	0.07
United States	2.6	8.62	100.0	100.00	18.12	12.60	1.00	0.18
Indonesia	6.0	3.33	15.4	29.25	2.14	2.80	0.15	0.02
Brazil	4.4	2.51	22.0	31.01	2.58	2.50	0.22	0.03
Russian Federation	3.9	1.94	28.7	49.66	2.33	2.10	0.29	0.02
Rep. of Korea	3.5	1.38	70.2	97.84	1.99	1.60	0.70	0.02
Mexico	3.7	1.23	24.9	30.30	1.63	1.40	0.25	0.02
Pakistan	5.6	1.21	8.2	13.27	0.85	1.10	0.08	0.01
Nigeria	6.6	1.07	6.4	10.21	0.57	0.90	0.06	0.01
Thailand	4.3	1.06	29.2	44.48	1.14	1.10	0.29	0.01
United Kingdom	2.2	1.06	72.7	73.48	2.65	1.70	0.73	0.03
Japan	1.2	1.04	72.1	68.98	5.33	2.80	0.72	0.05
Egypt	5.8	1.01	13.9	22.29	0.67	0.90	0.14	0.01
Canada	3.0	0.91	80.8	90.74	1.59	1.20	0.81	0.02
Viet Nam	6.2	0.90	10.4	20.83	0.54	0.80	0.10	0.01
France	1.9	0.89	70.5	68.83	2.66	1.60	0.70	0.03
Turkey	3.6	0.88	26.5	31.76	1.20	1.00	0.26	0.01
TOTAL		81.64			72.06	77.70		

Source: Author's projections.

Source: Conference Board Total Economic Database. Forecast data from the IMF, Citi Bank, EIU, USDA, the Conference Board and the United States Census Bureau were used to generate the information for 2030.

Global Imbalances: Moreover, the growth divergence between developed and developing countries is expected to be accompanied by additional global production and expenditure shifts required to rebalance global trade flows. In the medium-term, the need for fiscal consolidation in numerous developed countries will constrain both public and private expenditures implying market growth that is even slower than GDP growth. The advanced economies will not therefore provide markets for developing countries that are expanding as rapidly as they did in the past. This will represent a major change from the experience of the past decade in which developing country growth, especially in Asia, was based on servicing developed country markets.

By contrast, income growth in emerging markets will generate a growing number of middle class consumers with substantial aggregate buying power. On the production side, the focus of global competition in manufacturing will shift in Asian markets from production to serve consumers in advanced economies to production for supplying this growing domestic middle class. The adjustment process will be eased by a gradual real appreciation of the PRC yuan that will stimulate PRC imports from developed (and other developing) countries and facilitate the re-orientation of PRC exporters towards supplying the domestic market. The re-shift of the PRC economy towards increased domestic consumption is expected to impact on commodity prices and the geographic location of manufacturing production. I will consider these aspects in greater depth later.

3. THEORY—IS FOREIGN GROWTH GOOD FOR THE HOME COUNTRY?

In a widely cited article, “Where Ricardo and Mill Rebut and Confirm Arguments of Mainstream Economists Supporting Globalization,” Paul Samuelson castigated many in the economics profession for arguing that trade inevitably boosts national income in leading economies such as the US and ignoring the long recognized possibility that these gains could shrink (Samuelson 2004: 142).

“Economic history is replete with such examples,” wrote Samuelson, “Even where the leaders continued to progress in absolute growth, their rate of growth tended often to be attenuated by an adverse headwind generated from low-wage competitors and technical imitators .”

Samuelson’s argument rests on the impact that foreign growth could have on America’s welfare when comparative advantage changes. He analyzes the question with a classical Ricardian model in which patterns of comparative advantage reflect differences in industry labor productivity.⁶ His model implies that changes which orient the developing economy towards more trade (because of increased export supplies and/or import demand at given prices) are good for the developed country because it expands trade and improves the developed country’s terms of trade. Basically, the role of the developing country as an export market and supplier of cheap imports dominates its role as an export competitor. On the other hand, if foreign growth leads to less trade it could hurt the developed country by reducing the terms of trade at given trade volumes. In this case, the developing country emerges as an export competitor and channels resources away from supplying developed country imports.

In addition to theories based on the determinants of comparative advantage, however, as the model pioneered by Krugman (1979) has demonstrated, there are additional potential gains from trade (and foreign growth) when, in the presence of scale economies, trade increases the variety of available products. Indeed, Broda and Weinstein (2006) have found the welfare effects for the US of increased imports of varieties to be substantial—2.6% of US

⁶ Demand is assumed away by having similar spending patterns at home and abroad.

GDP from 1972 to 2001. Thus even in cases where import-biased growth abroad might depress the home country's terms of trade, this growth could also increase the product choices available to the home country to a degree that more than offsets this effect on welfare.⁷ An additional channel for trade gains could come through improving resource allocation at home by concentrating production in more productive firms. This source of gains is captured in the class of models with heterogeneous firms developed by Melitz (2003).

In more complex models (and in reality), therefore, changes in short-run domestic welfare from foreign growth will not be fully revealed only by the changes in the terms of trade. While some the gains from trade *will* operate through the terms of trade, the size of the gains will also depend on consumer preferences. Given any level of the terms of trade, the larger is the share of imports in consumption, the greater will be the impact of cheaper import prices on domestic income.

Nonetheless, looking at the behavior of the terms of trade is a useful place to start. Samuelson wrote his article to castigate economists for naively assuming that growth in the PRC would necessarily be good for the US. In a similar vein in 1953, John Hicks (1953) asked whether growth in the US was good for the UK. Hicks conjectured that in the first stages of foreign growth, countries would tend to experience the fastest productivity gains in their export industries and thus provide benefits to the rest of the world.

“I should ... expect to find that the improvements which *start* a process of development will be export-biased. This is little more than a deduction from the general principle of the division of labour. Countries, like people, are most likely to make their improvements in those sorts of production which they already do relatively well than in those they do relatively badly; ... Since it is the things which they make relatively well which they will be exporting, or on the point of exporting, improvements in these industries will be export-biased.” (Hicks 1953: 129)

However, in later stages Hicks also argued the effects on their trading partners could be adverse as countries enhanced their capabilities to produce the goods they were importing.⁸

While Hicks gives an intuitive explanation for his conjecture, it is supported by many of the theories that explain international patterns of specialization. Since incomes are determined by combining factor supplies and technology, countries with higher per capita incomes are likely to be (a) more intensively endowed with human and physical and institutional capital; and (b) have superior technologies, and if tastes are associated with incomes, also have distinctive demand patterns. Thus there is likely to be a strong association between (a) per capita incomes and relative factor endowments such as human and physical capital—the Heckscher-Ohlin theory; (b) per capita incomes and technological capabilities—the Ricardian theory; and (c) per capita incomes and demand patterns—the Linder theory.⁹ It would not therefore be surprising if per capita incomes serve as a powerful predictor of patterns of specialization.

⁷ Actually, if products are differentiated there and have distinctive national characteristics—the so-called Armington assumption—foreign growth worsens their terms of trade as the varieties in which they specialize increase in supply. Indeed, this is an argument made by Acemoglu and Ventura (2002) to explain why national income levels tend to stick together. This implies that the home country benefits from foreign growth both through more choice and improved terms of trade.

⁸ For example, Hicks argued initially in the nineteenth century growth in the US had been good for industrial Britain because the US had specialized in agricultural exports. But he claimed that as the US developed manufacturing capacity the effects were harmful because it competed head to head with British manufactured exports.

⁹ A more recent framework which emphasizes the role of demand patterns is Fajgelbaum, Grossman, and Helpman (2011).

Indeed, the strength of the correlation between specialization patterns and income levels is confirmed by the work of Hausmann et al. (2007) who find a very strong association between the goods a country exports, and the goods exported by other countries with similar per capita incomes. It has also been revealed in the sequential patterns of specialization that the Asian economies as have followed as they have developed—the phenomenon known as “the flying geese”.¹⁰ Initially, for example, Japan dominated exports of clothing and simple manufacturers, but as it developed it shifted towards more complex manufactured goods, such as consumer electronics, ships, and steel. At same time, Hong Kong, China; Singapore; Taipei,China; and Korea—the so-called Newly Industrializing Economies (NIEs)—took over the export markets being vacated in products such as clothing and toys. Later Japan moved even further up the technological ladder into exporting autos and sophisticated capital goods, the NIEs increasingly into replacing Japan in consumer electronics ships and steel and other Asian countries such as Malaysia, Philippines, and Indonesia, and ultimately the PRC took over the labor-intensive products such as clothing and consumer electronics (Lin 2011). Support for this view can also be found in Edwards and Lawrence (2010).

In 1950, per capita incomes in Europe and Japan were half and a fifth of US levels, respectively (Conference Board TED data). Over the subsequent two decades, today’s developed countries were able to converge rapidly towards US levels, and by the 1970s were at levels close to about 70% of US levels. The PRC and India and other AIC countries have indeed grown rapidly over the past decade. But even in 2010, per-capita incomes in the PRC are roughly where Japan was in the early 1950s, and India is at a level of about half that. In 2010 Korea (at 52.2% of US per capita levels) and Taipei,China (57.9% of the US) are roughly where the European countries were in the 1950s while major developing country exporters of manufactured goods such as Mexico (25%), Brazil (18.9%), and most other developing countries remain far below those of the US.

While conventional theory may suggest a positive relationship between ACI growth and the developed countries, it has the opposite implications for other developing countries that compete with the ACI in export markets. In particular, the increase in the global supply of unskilled-labor intensive products could adversely affect these countries’ terms of trade. There are two more additional channels that need to be explored. The first relates to the impact of prices of primary commodities for which the ACI are net importers. Whereas the frameworks of traditional trade theory tend to emphasize supply factors as drivers of trade patterns, the demand side can also play a role. In this respect, the ACI countries have an important impact on the world through their demand for primary commodities, and their growth would be expected to raise incomes abroad for other net exporters and reduce those of other net importers. The second is the possibility through global supply chains, of boosting the demand for providers of inputs that are complementary to ACI exports. In what follows I consider the evidence for these four types of effects.

4. EVIDENCE

Developed Countries: In fact, Hicks seems to have captured the process of convergence quite well. Consider America’s terms of trade since 1950 shown in Figure 1. Convergence by today’s developed countries towards US productivity levels was associated with two phases in America’s terms of trade: first, improvements until the late 1960s; and second, even greater declines in the 70s. As would be expected if foreign growth was export-biased, the US terms of trade had improved steadily until the late 1960s. By the early 1970s, however, the major European economies and Japan had closed much of their productivity gap with the US. Their per-capita incomes were between 67% and 78% of US levels. In response, their exports increasingly competed with those made by the US. As a result, by 1971 the US

¹⁰ “The phrase “flying geese pattern of development” was coined originally by Kaname Akamatsu.

dollar had become overvalued, and the US was forced to adjust to the decline in its competitiveness through real exchange rate depreciation and the associated declines in its terms of trade. This marked the second phase that has concerned both Hicks and Samuelson

The 70s data also capture the effects of two oil shocks. After the second oil shock in the late 1970s, however, the aggregate terms of trade of the US have remained in a fairly narrow range. Moreover, contrary to Samuelson's concerns, since the early 1990s, America's non-oil US terms of trade have steadily improved, in the main because of declining relative prices of manufactured imports from developing countries (see Figures 2 and 3). Again, therefore, there is support for Hicks: it appears that the developing countries who are in the initial phases of their convergence have improved America's terms of trade by providing larger export markets and cheaper manufactured imports. The same trend is apparent for the manufacturing terms of trade of Germany and Japan. Indeed, the fact that the non-oil terms of trade continued to improve despite the weakening of the US dollar after 2001 was especially striking (Figure 4).

Per capita (PPP) incomes in the PRC and India in 2010 were 23.9% and 10.8%, respectively, of US levels—more or less where Japan was relative to the US in the early 1950s. As I explore below, if the past is prologue, this suggests their convergence to the technological frontier could take several decades for the PRC and perhaps twice that long for India.

Substitutes: The fact that relative prices of the manufactured goods exported by developing countries have declined may be good news for consumers in developed countries, but it is not necessarily good news for other countries that have been forced to compete with ACI exports. There is what has become known as the adding up problem first highlighted by Cline (1982). As long as they can displace domestic producers in developed countries, developing country exports can all expand together. But at some point, once domestic producers are driven out, the emergence of the PRC and other Asian exporters could crowd out opportunities for other developing countries. These effects are especially likely in the standardized manufactured goods in which many developing countries specialize.

In his tribute to Sanjay Lall, Raphael Kaplinsky, for example, argues that the contemporary global economy is in a phase of structural excess capacity, particularly for manufactured products exported by low-income countries. He mentions, on the one hand, the combination of the elimination of productive capacity in high-income countries, and on the other hand, the competitiveness of East Asia in general and the PRC in particular. Using disaggregated EU import data, Kaplinsky and Santos-Paulino (2006) found that the less technologically advanced exports from lower-income countries are falling in relative price.

There is also evidence that PRC prices, set in US dollars, have limited the pass through of exchange rate changes in other countries into US prices. Marazzi et al. (2005) find that the pass-through has declined most steeply in those product categories in which the PRC expanded its import market share most rapidly. The effect is closely related to the PRC's peg to the dollar over much of this post-2000 period. Bergin and Feenstra (2007), for example, show theoretically that the rising import shares by countries with fixed exchange rates can lead to a disproportionate reduction in the pass-through of exchange rates to US import prices. They estimate that the rising share of trade from the PRC, or from all countries with fixed exchange rates, explains a decline in pass-through by about one-fifth of its size over the period 1993–2006.

Blecker and Razmi (2009) also provide support for the view that export markets for developing countries manufactured goods have become congested. They present econometric evidence of (a) significant quantitative displacement of manufactured exports from some developing countries by similar types of exports from other developing countries; that exports from different developing countries are close substitutes and most strikingly, that developing countries obtain significant growth benefits by maintaining low real exchange

rates relative to competing developing countries, despite real depreciations relative to the industrialized countries. Similarly, Eichengreen et al. (2007) found that PRC exports displaced exports from less-developed Asian economies in consumer goods.

Hansen and Robertson (2008) identify 10 developing economies for which manufacturing represents more than 75% of merchandise exports (Hungary, Malaysia, Mexico, Pakistan, the Philippines, Poland, Romania, Sri Lanka, Thailand, and Turkey), and which are therefore the economies most exposed to the adverse consequences of the PRC's export growth. They develop a model using a gravity specification and argue that "had [the PRC's] export supply capacity been constant over the 1995–2005 period demand for exports would have been 0.8% to 1.6% higher in the 10 countries studied." (Abstract). Thus, although they do not dispute the negative impact of PRC competition on their competitors, they conclude that even for the developing countries most specialized in export manufacturing, the PRC's expansion has represented a modest negative shock.

Indeed, whatever the marginal effects of the ACI on their exports, it is nonetheless hard to make the case that ACI competition has had an overwhelming negative impact on growth in most of the developing countries most dependent on manufactured exports. As reported in Table 12, I have taken the 13 developing countries identified by either Blecker and Razmi or Hansen and Roberston as reliant on manufactured exports and do not find that typically their growth rates were slower between 2000 and 2010 than in the earlier decade. Indeed, in eight of the cases growth was actually faster after 2000.¹¹

There remains a pervasive concern in Africa and Latin America among low-income countries that have not yet become manufacturing exporters that growth in the ACI could leave them trapped as commodity producers to the detriment of their long term growth (IMF 2011). This fear is especially pronounced in Africa, where there is widespread desire for increased value-addition.

Table 12: Average Annual GDP Growth of Countries Most Dependent on Manufactured Exports

Country	1990–2000	2000–2010	Difference
Malaysia	7.1	4.5	(2.6)
Mexico	3.5	1.7	(1.8)
Dominican Republic	6.1	5.0	(1.1)
Sri Lanka	5.2	5.1	(0.2)
Thailand	4.5	4.3	(0.1)
Poland	3.8	3.9	0.1
Jamaica	0.7	0.9	0.1
Turkey	3.7	3.8	0.1
Pakistan	4.4	4.8	0.4
Bangladesh	4.8	5.8	1.0
Hungary	0.6	1.9	1.3
Philippines	2.9	4.7	1.8
Romania	(1.7)	4.0	5.7
Average	3.5	3.9	0.4

() = negative.

Source: Combines list of Blecker and Razmi (2009) and Hansen and Robertson (2008).

¹¹ Exceptions are Malaysia, Mexico, and Dominican Republic.

Complements: There is evidence that PRC exports have also displaced manufactured exports from the newly industrializing economies (NIEs)¹² and some ASEAN countries. However, the association between growth in these economies and growth in the PRC has been positive. While the Asian NIE economies may have lost some market share for finished goods in the US, for example, their exports to developed country markets, they appear to have been more than compensated by the growth in their exports to the PRC. Some of these exports are capital goods while others take the form of intermediate goods that are assembled in the PRC and ultimately exported. The most dynamic part of PRC exports consists of the processing and assembly of imported components by foreign owned firms—these firms account for almost 60% of PRC exports. These exports are highly import-intensive and the import content typically ranges from 40%–50%, but exceeds 80% for high-technology electronic products.¹³

The iconic example of this development is the iPod. While the full value is counted as an import from the PRC, only 4 dollars of the landed US price of 180 dollars is attributed to the PRC where the assembly takes place (by a Taipei, China-owned firm). The hard drive, display assembly, and battery pack are sourced from Japan; the SDRAM from Korea; and the video processor, flash memory, and controller chip from the US (Linden et al. 2009).¹⁴ The emergence of production networks therefore enables firms to specialize in a limited part of the production chain.

Ahearn et al. (2006), for example, find Asian economies tend to experience export growth together as long as global growth is strong. They do find changes in the US market that are consistent with a flying geese pattern in which the PRC moves into the product space vacated by the Asian NIEs or with greater integration of trade across Asia in the production of final goods. Nevertheless, the PRC's dramatic gains in recent years increase the pressure on Asian economies, particularly in ASEAN and South Asia, to seek other areas of comparative advantage (Eichengreen et al. 2007).

The terms of trade are clearly an endogenous variable that is influenced by supply and demand changes at home and abroad. While the ex post behavior of the terms of trade are interesting therefore, a more convincing test of the Samuelson concern about the ACI requires a counterfactual exercise in which the effects of developing country growth are estimated, holding developments in the advanced countries constant. Hsieh and Ossa (2010) have undertaken such an exercise. They have developed a multi-country, multi-industry general-equilibrium model of international trade featuring inter-industry trade which combines the Ricardian framework with intra-industry trade as in Krugman (1980), and firm heterogeneity as in Melitz (2003). They explore the effects of total factor productivity growth in the PRC at the two-digit industry level on average real income in the rest of world over the period 1992–2007.

They find the impact was positive—while most of the gains accrued to the PRC itself, operating through the terms of trade spill-over, PRC productivity growth added a 0.48% increase to the average real income of the rest of the world. The gains were especially large for Asian economies (0.87% for Japan and 1.42% for other Asian economies), positive for the US (0.33%) and Africa (0.30%), and small but positive in Latin American countries besides Mexico in which there were larger gains (0.61%). Although Mexico was indeed negatively affected by its direct export competition with the PRC, the authors argue this was more than offset by the positive effects of lower PRC prices on Mexican imports, relative

¹² Hong Kong, China; Korea; Singapore; and Taipei, China.

¹³ The domestic content of selected PRC electronic exports is 4.6% for Computers and accessories, 14.9% for Telecommunications equipment, 19.7% for Other computer peripheral equipment, and 22% for Electronic element and devices (Koopman et al. 2008).

¹⁴ Another contribution that is hard to estimate is the use of hard drives, made by the Japanese firm Toshiba in the PRC.

wage responses in Mexico to higher wages in the US, and the entry and exit of firms in all countries and industries in the world

Commodities: Led by ACI, global growth has fed a commodity price boom that in turn has generated further growth. Oil, metals, minerals, and agricultural markets all had very strong upward price trends. The IMF's aggregated commodity price index rose almost threefold between 2000 and the peak of the commodity boom prior to the crisis. Metal prices rose slightly more than threefold over the period, while food and beverage prices doubled. Coal prices and iron-ore prices rose by multiples of five to seven. Commodity prices plummeted during the Global Financial Crisis, but have recovered and now in many cases exceed pre-crisis levels.

A fundamental determinant of the commodity price boom is the commodity intensity of developing country growth (i.e., demand factors).¹⁵ The effect of high investment rates and industry-intensive production, both of which are commodity and energy-intensive, in developing countries can be seen in their voracious demand for metals and other primary commodities. The PRC, for example, contributed a third of global growth over the past few years, but accounted for almost 60% of the increased demand for metals and other primary commodities and 20–40% of the increase in oil.¹⁶

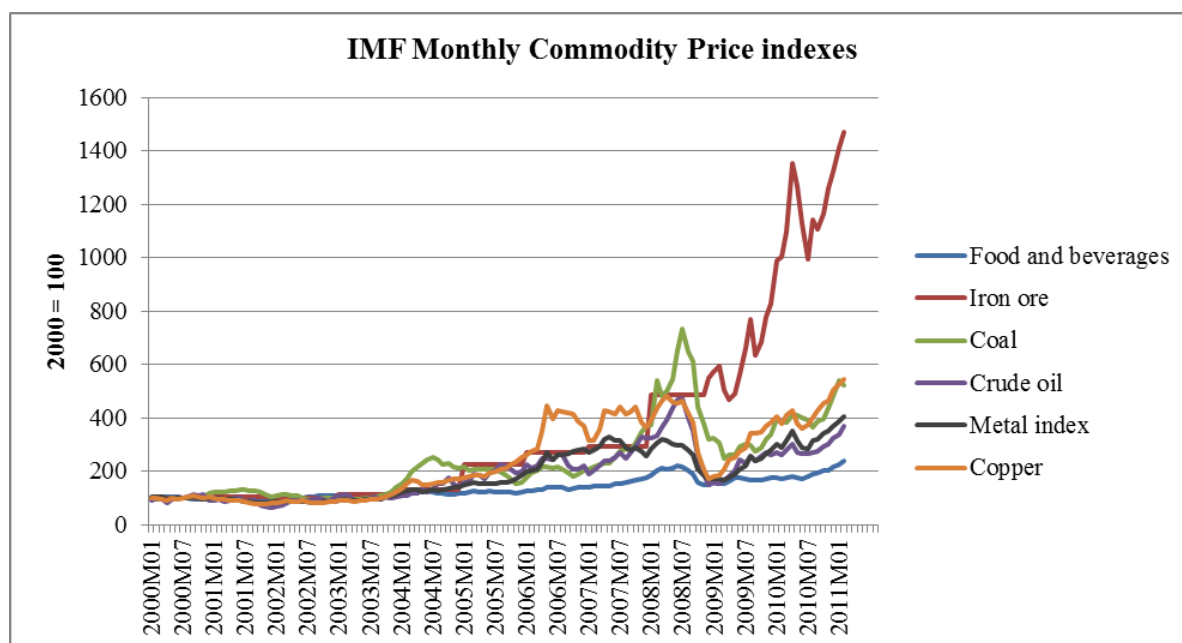
The upward price trends in oil, metals, minerals, and agricultural markets (see Figure 1) have in turn been important positive drivers of growth in the many developing countries that are dependent on commodity exports. It has also allowed these countries to attract foreign investment.¹⁷ For net commodity importers, on the other hand, this development has negative consequences. In particular, higher oil prices have offset the improvement in US manufactured goods terms of trade.

While responsible for strong growth in many commodity producers, their trade has also been viewed with some concern. In particular, as mentioned above, the issue relates to the lack of value-addition and that the demand from the PRC and India has mainly been for unprocessed goods. In both South Africa and Brazil, for example, policymakers have emphasized the desire for increased value-addition prior to the exporting of commodities.

¹⁵ Economies that grow at 7%, will generally invest around 30% of their output. In the PRC, the investment share of GDP reached close to 50% in 2009. Investment expenditure is concentrated on infrastructure, construction, and equipment, all of which are metals and minerals intensive. Industrial production is also commodity and energy (and pollution) intensive. On average, industrial production makes up 37% of GDP in emerging economies compared to 25% in high-income Organisation for Economic Co-operation and Development (OECD) countries. In the PRC, the share of industrial production in GDP is exceptionally large—47% of GDP in 2008. The industry share is lower in India (28% of GDP) and Brazil (27% of GDP), but still higher than in the US (21% of GDP). (Data obtained from World Development Indicators).

¹⁶ The metals intensity of the PRC's GDP is far higher than comparable developing countries. For example, the PRC's copper and aluminum intensity was 1.8 and 4.1 kgs per \$1,000 of real GDP for 2007–09, compared with world averages of 0.4 and 0.7, respectively (Global Economic Prospects January 2011: 58). In 2008, the PRC overtook the OECD in metal consumption. Shares in growth obtained from <http://commentaryandanalysis.mining.com/2010/12/06/oil-demand%E2%80%99s-triumphant-return/>

¹⁷ For evidence of the strong positive growth links between the BRICs and Low Income Countries see IMF (2011).

Figure 1: Commodity Price Indexes, 2005 = 100

Notes: Iron ore: the PRC import Iron Ore Fines 62% FE spot (CFR Tianjin port) USD/metric ton. Coal: Australian thermal coal, 12,000- btu/pound, less than 1% sulfur, 14% ash, FOB Newcastle/Port Kembla, US\$ per metric tonne. Copper: grade A cathode, LME spot price, CIF European ports, US\$ per metric tonne.

Source: IMF Commodity Price Series.

Services: As a result of improvements in communications technology, there has been a rapid expansion in services trade that has attracted considerable attention and given rise to alarm in the US about the potential impact on both employment and wages. Trade with India in particular has been the focus of attention because it takes the form both of relatively low-skilled service activities such as business process outsourcing including data processing and call centers and high-skilled activities such as software development. There is evidence, however, that over the past decade the effects of services off-shoring have been relatively modest.¹⁸

The most comprehensive analysis of this issue is Liu and Trefler (2008). They consider both the effects of outsourcing of traded services between unaffiliated buyers to India and the PRC and the services exports to these countries from the US. Their results are summarized by the provocative title of their paper “Much Ado About Nothing.” They conclude: “Since the small effects are precisely estimated we can say with confidence that even if service trade with [the PRC] and India grows at its current clip, the labor- market implications will be small.” (Liu and Trefler 2008: 3)

Conclusions: The proof of the pudding is in the eating, and all told given the strength of developing country growth over the past decade, and the fact that the difficulties in advanced countries stemmed from their own regulatory failures, it does not appear to be the case that growth in the ACI has been detrimental to growth in the rest of world as whole. Indeed, on the contrary, there is compelling evidence this growth has improved the non-oil terms of trade of the developed countries. There are, however, two potential negative channels

¹⁸ US imports of private services from India have indeed grown rapidly between 1999 and 2009 and the US trade balance in private services turned from a surplus of \$1.2 billion in 2004 to a deficit of \$ 4.7 billion in 2008. While import growth has been rapid and the US services deficit with India has increased, compared with overall US imports of goods and services of \$2.5 trillion in 2008, and a trade deficit of about \$700 billion, these numbers suggest that the attention paid to services trade with India is way out of proportion to the attention that has been focused on them.

through which this growth may have reduced the welfare of countries. The first is through the effects on global prices for more standardized manufactured goods. There is some evidence this has occurred but it has not been large enough to stunt growth, even for most of the developing countries most adversely affected. A second problem has been created for both developed and developing oil and food importing economies. However, growth in the developing world outside ACI has been pervasive and strong. This suggests that, on average, developing countries have benefitted more from the ability to participate in Asian supply chains, enjoy high commodity prices, enjoy lower priced in manufactured goods, attract foreign investment, than they have suffered from increased competitive pressures in manufactured goods and increased import costs from higher oil prices.

5. PROSPECTS

Over the next twenty years, ACI will offer the rest of the world rapidly growing markets. If the consensus projections are correct, the large share of incremental global demand represented by ACI growth—almost 60% in PPP terms and almost 40% in nominal income terms—will serve as the focal point of global growth. Income growth in ACI will be driven by a growing number of middle class consumers with substantial aggregate buying power and by the infrastructure needs required for growth. By contrast, developing country markets will be growing even more slowly than their GDPs. The focus of global competition will therefore shift from production to serve consumers in advanced economies towards supplying the growing ACI middle class. For developed country exporters there will be immense opportunities to supply capital goods, advanced services, and sophisticated consumer goods to these markets. There should also be opportunities for both developed and developing economy primary commodity producers. The key questions, though, relate to competitive impacts of ACI as producers of manufactured goods and services.

Table 8 divides the world nominal output into the shares provided by countries at different levels of per capita income. It shows how over the next twenty years a dramatic decline is expected to occur in the lowest quintile. In nominal shares, the poorest countries' contributions will decline from 8.9% to 2.89% between 2010 and 2030, in PPP terms from 18.8% to just 5.6% (Table 9). This is good news for those poorest countries that seek to compete on the basis of low wages. By contrast, the middle of the rankings will become much more congested. With the nominal share rising from 4.24% to 29.54%, and the PPP share from 3.47% to 37.26%. This highlights the challenges that will face countries seeking to move through what is sometimes known as the middle-income trap.

Given its large weight, the PRC's growth is the most important for global demand and competitive patterns. Over the period, according to the projections I presented in Section 2, the PRC's per capita income will rise from 23.9% of US levels to 59.7% of US levels in 2030. Since US per capita income is also rising, albeit much more slowly (it reaches \$43,300 in 1990 dollars in 2030), this implies that the PRC will have a per capita income level in 2030 of \$25,000 in 1990 dollars—a level that is similar to the 2010 levels of developed countries such as Sweden (\$24,800 in 1990), Canada (\$24,900), and the Netherlands (\$24,000). Thus, remarkably, by current standards, the PRC would have the per capita income of a rich developed economy. In relative terms, however, its peers in per capita terms in 2030 are expected to be somewhat poorer countries like Armenia, Uruguay, Chile, and Italy.

Over the two decades, assuming these projections are correct, the PRC's global role as a competitor will change. Given its technology levels, initially, the PRC will compete head-to-head with manufactured exporters that in 2010 are in the range of 20%–30% of US per capita incomes. These include countries such as Brazil (22% of US per capita income in 2010), Mexico (19.5%), Turkey (26.6%), Russia (28.7%), and ASEAN economies such as Thailand (29%) and Malaysia (32.6%). Towards the end of the period, however, the PRC will converge more closely to the levels of European countries such as Greece, Portugal, Spain,

Italy, Poland, and Czech Republic and is within striking distance—80%—of the levels of the UK, Germany, France, and Japan.

The PRC will be moving out of the labor-intensive manufacturing activities that have served as the driving force behind its export performance over the past decade. Indeed, this shift will be promoted by a reorientation of the PRC market from investment and export led growth towards consumption led growth, higher wages, and a real appreciation of the PRC yuan.

The rebalancing of demand will affect the composition of PRC GDP, leading to new opportunities and challenges for other emerging economies. As PRC consumption increases and its saving rate falls, investment expenditure will decline relative to consumption expenditure. PRC consumption patterns are far more oriented towards agricultural and food products (21% of consumption) and services (63%, including government services) whereas investment expenditure is made up predominantly of construction (53%) and machinery and equipment, including electrical machinery (27%). This shift will therefore reduce the capital and minerals intensity of its production.

An important component of the PRC's shift towards increasing domestic consumption involves an emphasis on wage growth. PRC wages have already been rising quite rapidly—the average hourly wage in manufacturing in US dollars more than doubled in the four years from 2006 (from 0.9 dollars/hour to 1.9 dollars/hour) and in the 2011–2015 five-year plan issued in 2011, for example, it was announced that minimum wages would increase by 13% annually. In addition to higher wages in terms of domestic currency, additional changes in global competitiveness will occur as a result of currency appreciation.

Those foreign-owned exporting firms that seek to remain in the PRC will have to respond by increasing production for the domestic market and/or by upgrading and moving into higher unit value products. These developments will lead to the PRC moving up the technology ladder towards the production of more sophisticated manufactured products, especially medium technology products such as automobiles and machinery. This will increase competitive pressures on producers in these sectors from middle-income developing countries and other Asian economies (Korea; Taipei, China; and Japan) as well. Over time, it is likely that the PRC will enter into the higher unit value realms of high-technology products, coming into greater competition with exports from more developed countries.

It is possible, therefore, that the favorable terms-of-trade trends for developed countries could change in the future. On the one hand, there will be downward pressures on their export prices. As it converges more closely to developed country per capita levels, the mix of goods and services exported by the PRC could shift to more closely resemble the exports of today's industrialized countries in both composition and sophistication. While some changes of this nature are already apparent, if the experience is similar to the earlier convergence of Europe and Japan to US per capita income levels, the challenges are only likely to begin to occur on a sizable scale in a decade or more.

However, this convergence in income levels will give rise to two countervailing forces. On the one hand, it could as Samuelson argued reduce the gains from trade by the US and other more developed countries by providing more competition for their exporters. On the other hand, convergence could also lead to more intra-industry trade of the kind that is typical between economies at similar income levels. This would, by contrast, generate more gains from trade for the developed economies by increasing product variety through increased opportunities to exploit economies of scale. The net impact of these two effects could in principle go in either direction.

On the other hand, the costs of labor-intensive imports could rise. To be sure, the PRC's movement up the technology ladder will create new opportunities for other economies to enter into the assembly stage of global supply chains. Some of these will be other ACI economies—India, Indonesia, Viet Nam, and the Philippines— but others could be low wage countries in Africa and Latin America (Broadman 2006). Indeed, India is projected to achieve

the global relative per capita position that is today occupied by the PRC. Within ACI, India's peers in per capita incomes are currently the Philippines (9.7% of US levels), Viet Nam (10.4%), and Indonesia (15.5%). By 2030 its per-capita income is projected to be the equivalent in 2010 of countries such as Malaysia, Poland, Uruguay, and the Czech Republic, and its peers in 2030 are expected to be countries like Indonesia, South Africa, Peru, and Jordan.

It is also possible that the very strong complementarities between PRC growth and that of the relatively more advanced Asian countries could be attenuated as the PRC improves its indigenous capacity to produce capital goods, autos, and consumer durables.

Over the next two decades, therefore, the flying geese pattern should be sustained, although some of the geese could be overtaken by others. If all goes well, Asian NIEs such as Singapore; Korea; Taipei, China; and Hong Kong, China will occupy the ranks of the most developed economies, overtaking the former leading Asian goose, Japan.¹⁹ The PRC, in turn, could overtake two ASEAN economies, Thailand and Malaysia, and rapidly converge towards developed economy status. Meanwhile, the space it vacates will be occupied by Viet Nam, Indonesia, and India, with the Philippines bringing up the rear.

I should emphasize that these growth projections implicitly assume that countries will be able to make the necessary transitions to ascend to higher rungs of economic development. In particular, the challenge for the PRC as an exporter will be to replace its highly labor-intensive assembly exports with the more sophisticated manufacturing activities. In addition, for the high-end Asian countries the challenge will be to shift from growth through producing exports for the industrial economy markets, towards growth oriented towards meeting ACI demand.

Commodities: The net impact of PRC growth on commodity demand will depend on two offsetting developments. On the one hand, rapid income growth should boost demand but, on the other, the change in the composition of the growth could reduce its commodity intensity. These tensions will be felt most strongly with respect to the demand for minerals, whereas the growth effects will dominate in the case of food and fuels. But future trends in commodity prices will not only be influenced by the PRC. On the demand side, continued high economic growth together with increased in population size, urbanization, and industrialization in emerging economies is expected to sustain growth in the demand for commodities. In India, the demand for infrastructure will continue to be strong for the foreseeable future, given the relatively low current density of automobile ownership, and the likely increase in the demands for automobiles and roads. Supply constraints will contribute towards sustained price pressure in both agriculture and minerals. For most commodities, the primary reserves are not located in the same places that generate most of the demand. Additionally, many known reserves slated for future exploration are located in developing regions where the political climate may be unstable and a lack of infrastructure may pose challenges for extraction, processing, and transportation.

All told, however, strong commodity demands will encourage foreign investment in mining and minerals and the necessary complementary infrastructure. Thus, African and Latin American countries have opportunities to use their leverage to increasingly participate in more value-addition to resources. Increased demand for food products provides opportunities for enhanced agricultural production and exports from African agricultural producers. This in turn could bring improvements to rural areas and raises rural purchasing power.

¹⁹ Among other ASEAN economies, by 2030, Singapore just overtakes the US per capita income. Whereas Japan is expected to remain at 70% of the US level, other NIEs such as Korea (97.8% of US levels in 2030) and Taipei, China (99.8%) are also expected to approach the US, while Hong Kong, China is expected to be far richer than the US (138%).

What is noteworthy, therefore, is that while ACI growth will bring competitive challenges to the richer developing and developed countries, it should create an especially favorable environment for the poorer countries that produce primary commodities and have the potential to become exporters of manufactured products. The contrasting implications for middle-income and low-income countries are captured by the changes in the shares of global GDP represented by different levels of GDP per-capita. As shown in Table 9, the next twenty years are expected to see a remarkable shift and by the end of the period very little of the world economy will occupy the lowest rung. This creates opportunities and relieves the competitive pressures for those that remain. By contrast, the largest share of the world will be occupying the middle rung—something that has not occurred since the Second World War. Two thirds of that middle is represented by the PRC, but in addition other countries include Italy, Poland, Czech Republic, Spain, Portugal, Greece, Thailand, Argentina, and Malaysia. These are the countries in which head-to-head competition with the PRC is likely to be most intense.

Services trade: I have noted that, while they have grown rapidly, international services trade due to off-shoring remains a relatively modest share of US GDP. Alan Blinder (2006) (see also Bhagwati and Blinder 2009) has argued, however, that the impacts of services off-shoring on the US (and by implication other developed economies) could be very large. He estimates that 21.6% of jobs—between 30 and 40 million—could potentially be off-shored. Blinder acknowledges that there is no presumption that all these jobs will be lost, but he believes that many will be. Generally this development will benefit the US as a major net exporter of high-end services. Even if all the jobs estimated by Blinder (2009) as “potentially” off-shorable were in fact to be off-shored, the adjustment is likely to take place over several decades, and represent something in the order of 1% of employment per year. To be sure, job loss could be particularly painful and costly if off-shoring requires people to change occupations rather than just change jobs. But even an upper estimate of the required adjustment seems within the scope of the US economy, provided that it occurs relatively slowly.

A major question though is, as in the case of manufactured goods, whether towards the end of the period India could emerge as competitor for the US and other developed economies in services. Judged by its per-capita incomes, the answer would be no, but the average could be especially misleading given the presence of a number of highly-skilled and trained engineers that is too small to impact the average, but large enough to develop a substantial exporting base. Rather than the full range of US services, these competitive challenges are most likely to occur in information technology, especially software, medical services, and motion pictures.

Conclusions: For each income group in the rest of the world, therefore, ACI growth provides opportunities and challenges. For developed countries the opportunities are for selling high-end services and capital and consumer goods in the ACI markets and enjoying the benefits from intra-industry trade; the challenges will come from increased competition in manufactured goods and services that should become more intense toward the end of the period. For medium-income producers currently at between 20% and 60% of US levels, there will be a tougher tradeoff between more intensive head-to-head competition with the PRC and serving the growing middle classes in ACI economies. For poorer economies, there will be greater opportunities to become part of global supply chains in manufactured exports and to supply primary commodities. Finally, strong commodity markets could have adverse effects on net importers.

Risks: I should end this section with a very strong note of caution. I have discussed these projections as if they are certain but they are undoubtedly wrong in many respects. I have only to recall how mistaken expectations were in 2000, for example, when it was conventional wisdom to assume that (a) the global system was inherently inhospitable to non-Asian developing countries; (b) unlike Asia the US had a strong financial system; and (c) the world had moved into a new economy driven by information technology and services

and therefore the prospects for primary commodities were bleak. Likewise in the late 1980s, it was widely assumed that Japan would inevitably overtake the US in per capita income.

Large uncertainties about the future remain. I can mention a few just to underscore how fragile these projections might be. The most serious challenges to these forecasts could occur if the PRC's growth path is disrupted. Shifting from export- to domestic-led growth could prove to be difficult. The PRC's growth has rested on massive investments in industrial capacity that have been partially subsidized through low interest rates. A shift in its orientation could lead to overcapacity and debt services problems for the sectors that benefited from the earlier pattern. Under these circumstances, its growth could slow with powerful implications for global commodity markets. A second issue relates to the stability of the PRC's political arrangements. A third relates to the challenges of making the transition from assembling components originating elsewhere and specializing in low-end products, towards providing increasing share of value added domestically and exporting more sophisticated products. While India also seems poised for growth, its problems in meeting its infrastructure needs, and in governance among others, could also prove more serious than is implicitly assumed.

A second danger stems from difficulties in sustaining even the slow developed country growth I have projected. This too could have negative implications for primary commodity producers. For Japan, the challenge of recovering from a two decade slump is formidable. In the US, reigniting and sustaining growth in the face of growing budgetary pressures could also prove difficult. Recent policies and responses to the financial crisis have focused on dealing the demand-orientated repercussions of the crisis. In the longer-term, structural changes will be required. For example, current fiscal expenditure cannot be sustained without running into serious debt sustainability issues.

A third danger is the stability of the global financial system. The global financial system has stabilized but remains fragile, particularly in Europe where the Southern (Greece, Spain) and Eastern European economies face high sovereign debt levels. Reform of the financial sector is not yet complete and there is a risk that the risky behavior could again prove disruptive. (World Bank Global Economic Prospects 2011).

There are omnipresent dangers in oil markets. High oil prices, which give rise to violent swings in expenditure patterns, preceded the global recessions of 1974 and 1980, the US recession in 1991, and the global financial crisis in 2008–09. Political disturbances in major Arab suppliers could be highly disruptive.

Finally, over the past decade, "the adding up problem" clearly did not prevent developing economies from growing rapidly together with ACI. But there could be difficulties for the many economies that must simultaneously occupy the middle rungs of the global economy with the PRC, and for those just ahead of it that must make way and shift to producing more advanced goods and services.

6. TRADE AND WAGES

While improvements in the Developed Country terms of trade from trade with developing economies are good for national welfare, they may nevertheless be associated with rising wage inequality within the developed economies. Orthodox trade theory, which links the Heckscher-Ohlin theory and the Stolper-Samuelson theorem (a combination I label HOSS), highlights a key role for changes in the relative prices of skilled- and unskilled-labor intensive traded goods in relative wage determination within industries. Cheaper exports produced by developing countries could, according to this theory, cause inequality along the lines of skills in the US and other developed economies.

The theory also has implications for wage inequality in other parts of the developing world. If there were only two economies, and two factors, skilled and unskilled labor, wages in the developing economy would become more equal as a result of liberalization. Reducing tariff barriers in developing economies is assumed to reduce the relative domestic price of skill-intensive products and the result should be a decline in the skill premium and more equal wages. On the other hand, if there are many developing economies, and liberalization takes place in only one large developing economy, just ACI for example, wages there would become more equal, but since the world price of unskilled labor intensive products would also fall as the liberalizing economy supplies more of its exports to pay for its additional imports, wage inequality could also rise in other developing economies.

I should note that to link changes in all relative traded goods prices directly with changes in relative wages requires that close substitutes for imports are produced domestically. If imported and domestic products are imperfect substitutes, and/or economies are fully specialized, the transmission process could be attenuated. In fact, if they do not compete directly in making products similar to imports, lower priced imports from developing economies could actually raise the real wages of both more and less skilled US workers by increasing their purchasing power.

It is not surprising, given the explanatory power of the conventional theory, that it has served as the basis of many studies of the effects of trade and relative wages. In the 1980s, for example, wage inequality was a major contributor to increased income inequality in the US. The earnings of workers with skills by all measures (education, occupation, experience) outpaced those with less skill by all of these criteria. Since this inequality occurred at the same time as the US economy was becoming more open, especially with respect to trade with developing economies, especially the ACI economies, it was quite natural that researchers considered whether trade could provide the explanation. However, the results of these studies were fairly mixed. William Cline (1997: 144) in his comprehensive survey argued that “a reasonable estimate based on the literature would be that international influences contributed about 20% [*italics added*] of the rising wage inequality in the 1980s.”

Nobel laureate Paul Krugman (1995) was one of those who had argued that trade flows were too small to have much of an impact on wage inequality in developed economies. But he had also been vocal (Krugman 2000) in making the point that the volume of trade was an important clue to the size of its potential effects on relative wages. In 2007 Krugman noted that that after a decade of very rapid growth, the value of US manufactured imports from developing economies as a whole exceeded that of similar imports from developed economies. He also pointed out that very low wage countries such as the PRC made up a greater share of these imports. Accordingly, Krugman suggested that trade had reached the scale at which the adverse consequences for the wages of relatively less-skilled US workers could be substantial.²⁰ In several newspaper columns he conjectured that if the earlier studies were updated, much larger effects would be found. However, despite raising these concerns, Krugman himself wrote a paper (Krugman 2008) in which he was unable to

²⁰ For an extensive analysis of these arguments see Lawrence (2008) and Cline (1997).

demonstrate that the effects had been large. He did not exactly abandon his position, but argued that as a result of global supply chains, it had become difficult to detect effects that were taking place within, rather than between, industries.

Indeed, studies that measure the net factor content of US trade, actually suggest that displacement due to trade has not fallen disproportionately on unskilled US workers (Mishel et al. 2008). Simulation models that use assumed skill-intensities and are not subject to Krugman's complaint provide an upper-bound estimate suggesting that trade increased the skill premium between 1995 and 2006 by just 2% (Bivens 2007). All told, therefore, there is not much evidence using conventional methods for applying the HOSS framework of a substantial role for trade in causing greater US wage inequality over the past decade. Indeed, there is not much evidence of increased wage inequality, for any reason. Instead, in recent years both high-school and college educated workers have fared poorly and the rise in US income inequality is attributable to an increase in the share of income earned by the very rich—the top 1%—and an increased in the share of profits (Lawrence 2008).

The conventional framework in which the HOSS is applied assumes that industries are homogeneous entities that produce distinctive undifferentiated products with production processes that can be characterized by their factor intensities. This leads to the presumption that US imports from developing countries occur mostly in relatively unskilled-labor intensive industries—an assumption that is important in building simulation models. It turns out, however, that the relationships between industry skill-intensities and the origins of US manufactured imports are extremely weak (Edwards and Lawrence 2010b). Indeed, using US input coefficients, the US industries accounting for most of the imports from developing countries do not use unskilled-labor relatively intensively. Weighting the six digit NAICS manufacturing industry ratios of production to non-production by US imports from developing countries in 2007 produces the same ratio as weighting industry ratios by imports from developed countries. In fact, 75% of US imports of computers and electronics come from developing economies, yet in the US this is by far the most skill intensive industry. This suggests that even at the most disaggregated levels at which skills can be measured, developed and developing economies are exporting and producing very different kinds of products.

The HOSS theory explores the relationship between trade and the returns to factors that are mobile. The theory is very useful in explaining long run developments in factor returns and its empirical application in the returns to attributes that can be readily discerned—such as education and broad occupational categories, e.g., blue- and white-collar workers. But applying the theory requires making very strong assumptions about factor mobility and incomplete specialization. Indeed, the assumptions are so extreme that the title of a recent paper by Davis and Mishra includes the phrase “Stolper-Samuelson is Dead”.

However, trade could also affect other dimensions of wages (and other factor returns) that reflect worker and industry attributes that are less mobile, more dispersed, and less easily observed, and a number of traditional and new theories explore these channels. One traditional approach emphasizes the impact of trade on the returns to industry-specific or immobile factors. A second channel through which trade could operate is by affecting industry-specific factor rents when competition is imperfect in factor markets. A third channel is through the impact on heterogeneous firms rather than homogeneous industries as assumed in the HOSS theory.²¹ While more relevant, these theories do not have the implications that the impacts of trade are likely to be felt throughout the economy, however.

²¹ In his original model of this process, Melitz (2003) assumes that workers earn similar wages, but by linking firm wages to firm profitability through a variety of mechanisms theorists have explored new channels by which trade affects wages. These include “notions of fairness” (Egger and Kriekemeier 2009), rent-sharing between owners and workers (Amiti and Davis 2008), incentives to search for good workers (Helpman, Isthokoi, and Redding 2010) and to reduce worker shirking (Davis and Harrigan 2007), and incentives to upgrade skills (Verhoogen 2008).

Instead, they are more likely to be confined to particular industries, locations, and occupations.

Indeed, there is support for studies that have applied the specific wage theories in the US and elsewhere.²² One noteworthy recent study is provided by Autor, Dorn, and Hansen (2011) who report economically and statistically significant evidence of job loss in manufacturing employment in the regions which compete with PRC imports. They also find that job loss due to PRC manufactured imports does not reduce wages within manufacturing, but that it does appear to depress local wages more generally—they estimate it led local wages in regions subject to PRC competition by about 2% over the 17 year period.²³ A second important study is that of Ebenstein et al. (2009) who find that workers experience losses in their occupational earnings if they lose their jobs as a result of trade and are forced to change industries.

At the same time as income inequality had increased in the US, it had also increased in the 1980s and 1990s in many developing economies. This has given rise to an extensive literature that has been well surveyed by Goldberg and Pavcnik (2007: 77).²⁴ They emphasize that the experience “provides little support for conventional wisdom that trade openness in developing countries would favor the less fortunate (at least in relative terms).” Among plausible explanations they discuss are skill-biased technical change, the effects of increased openness in raising the demand for higher quality products that require more skilled workers, the fact that the tariff and other barriers that were reduced most protected least skilled workers, and the possibility that relatively more advanced developing economies were actually becoming more specialized in skill-intensive products. But they also emphasize that the mechanisms causing inequality in particular countries are likely to be “country, time and case specific.” (78). All told therefore, while there is evidence that ACI and other developing economies have affected the wages of some workers, there is less support for the sweeping generalizations that are sometimes made with respect to their impact using the Stolper-Samuelson framework.

Future: What does the future portend for income inequality in the rest of the world as a result of ACI growth? The view of Fehr, Jokisch, and Kotlikoff (2008) is captured by the title of their paper, “Dynamic Globalization and the Potentially Alarming Prospects for Low Skilled Workers”. The authors build a dynamic, general equilibrium, life cycle simulation model with six goods and five regions (US, Europe, Northeast Asia [Japan; Korea; Taipei,China; Hong Kong, China], the PRC, and India). In their simulations, it takes Europe and Northeast Asia 10 years and the PRC 15 years to reach US productivity levels, whereas India takes much longer—75 years. They find that increases in productivity improvements in the PRC and India will raise the relative effective supply of unskilled labor and drive down its relative price. Indeed, the relative wage of high-skilled workers is 5.8 times higher than that of low-skilled workers at the start of the period, and it rises to 10.1 times higher at the end. However, refusing to engage in such trade does not seem to be the answer either. They run another interesting simulation in which they exclude the PRC and India from the model and find by the end of the century the effect is to reduce US and Developed Country GDP by 14% and 17%, respectively. In other words, despite contributing to wage inequality, trade with these developing countries is very beneficial to the US in the aggregate. The key to changing this outcome, they argue, lies in improving the education systems in the PRC and India in order

²² Harrison, McLaren, and McMillan (2010) is a thorough survey of recent research on trade and inequality. These authors point out that much of this work is motivated by recent firm-level developments—both theoretical modeling and data access: “These theoretical developments have been in important respects fed by empirical work, and are now in turn giving rise to a rich new empirical literature, partly due to the increasing access to firm-level data across an increasing range of countries.”(Harrison, McLaren, and McMillan 2010: 43)

²³ In addition, they have other costs in the form of increased federal transfer programs. They argue the efficiency costs incurred essentially offset the consumer gains over the medium-term.

²⁴ See also Harrison 2007

to limit the new supplies of unskilled workers. They write (Fehr et al.: 35), “if Chinese and Indian education policies begin to produce new high-, middle-, and low-skilled workers in the same proportions as now occurs in the developed regions, the exacerbation of wage inequality can be fully reversed. Consequently, one of the best ways the developed world can assist its unskilled workers is to help improve education in China and India.”

However, this model rests heavily on the assumption that specialization is incomplete so that in effect there is global factor price equalization. If on the other hand, specialization occurs, so that factor price equalization does not take place, the effects could be attenuated. Indeed, specialization appears to have taken place over the past decade. Schott (2003) for example, has emphasized the empirical problems of applying the “single-cone” version of HOSS theory which requires that all countries produce all types of goods. He demonstrates how that framework fails to explain actual trade patterns. On the other hand, he does find empirical support for a multi-cone equilibrium in which countries specialize in the subset of goods that are most suited to their endowments. Debaere and Demiroglu (2003) similarly find that while Organisation for Economic Co-operation and Development (OECD) countries have sufficiently similar factor endowments to produce the same set of goods, this is not the case for countries generally.

In the analysis in the previous section, I described the next stage of the flying geese process. If that description is accurate, the ACI and other countries that will be replacing the PRC are unlikely to be making additional new inroads into US industries such as clothing, textiles, and consumer electronics which have already become fully specialized. Accordingly, they are unlikely to make a substantial additional impact on wage inequality. At the same time, as the PRC moves up into more skill-intensive activities, even if it does cause additional displacement of domestic production, the displacement is unlikely to be as unskill-intensive as it was previously. At the same time, at the global level, the PRC’s adjustment process is likely to be associated with an increase in the relative price of the most unskilled-labor intensive products—a development that should also assist unskilled workers in other countries. Accordingly in future, while ACI growth could increase competitive pressures and cause displacement, it is unlikely to be strongly biased against least skilled workers.

A different concern about the future has been raised with respect to services outsourcing. Trade with India in particular has been the focus of attention because it takes the form both of relatively low skilled service activities such as business process outsourcing including data processing and call centers and high-skilled activities such as software development. In this case, it is the high skill activities which are seen as potentially more threatening in developed economies, since many of the workers potentially affected have not previously been exposed to international competition in general and competition with developing economies in particular. When high-wage workers are affected, again, the issue is not wage inequality but the downward pressure on wages that is the source of concern. Several studies have focused on the number of workers potentially exposed to such trade and the potential benefits or losses.

But it is actually unclear whether the impact should be expected to fall more heavily on skilled or unskilled workers. Mishel, Bernstein, and Shierholz (2009) show that sorted by education levels, the shares of jobs Alan Blinder estimates to be either highly offshorable or offshorable are not all that different from the shares of workers with these education levels in the economy as a whole. For example, 38.2% of jobs that are either highly offshorable or offshorable are currently held by workers with high school or less. These workers currently constitute 43.5% of the labor force. Similarly, those with college degrees or higher hold 27.8% of all jobs and account for 31.6% of the jobs considered to be offshorable. If these developments turn out to be as important as Blinder believes they will be, they would certainly cause dislocation but they would not lead to increased inequality along skill lines.

In sum, both with respect to manufactured goods and services, while undoubtedly the returns to specific skills are likely to be affected, the pervasive effects foreseen by Fehr et al. are unlikely to occur.

7. ENVIRONMENT: EMISSION IMPOSSIBLE?

The PRC's economic structure is extra-ordinarily energy intensive. And growth in the PRC is increasingly important as a source of carbon emissions. Even if the industrialized nations achieved their 80% reduction target, the global goals for emissions would not be met. The International Energy Agency concluded, the major nations in the Organization for Economic Cooperation and Development "alone cannot put the world onto the path to 450-ppm trajectory, even if they were to reduce their emissions to zero".

In 2007, the PRC was 10% of the world economy measured by PPP (and 6.4% measured in current dollars). While it accounted for 9.2% of world oil consumption—roughly in line with its PPP size—the PRC emissions are disproportionately large and it accounts for a startling 20.7% of global CO₂ emissions—about the same as that of the US with an economy twice as large. This is because the PRC consumed 40% of the world's coal. Remarkably, in 2006, the PRC's share of world CO₂ emissions was about the same as its share in world population. According to the OECD, between 2000 and 2008 the share of global CO₂ emissions emanating from the PRC increased from 13.5% to 22.3% and the PRC actually accounted for 59% of the global growth in CO₂ emissions from fuel.

The PRC's production structure is extraordinarily concentrated in energy-intensive heavy industry powered by coal. In 2005, for example, industrial production accounted for 47.5% of PRC GDP versus 20.7% in the US, 27.3% in Europe, 28.8% in India, 29.3% in Brazil, and 39.5% in Russia. In 2005, the PRC's iron and steel industry accounted for 34.6% of world production and alone accounted for 18% of its energy consumption—compared with 12.8% of energy consumption accounted for by the PRC's entire transportation sector.

In the IEA 2009 reference case which forecasts the rise in emissions between 2006 and 2030, global CO₂ emissions increase by 39% between 2006 and 2030, at a rate of 1.4% per year. Emissions from OECD countries increase by a total of 7.3%, and are still 26.8% above their 1990 levels, far above their pledges under the Kyoto Protocols, but emissions from developing countries are up a huge 67%. PRC emissions rise by 95%. The PRC therefore contributes fully 50% of overall world emissions growth and other developing countries combined another 41%.

By 2030, the PRC accounts for almost 30% of emissions compared with 17.5% of the world's population. This is not primarily because of its use of liquid fuels—in 2030 it accounts for 14.5% of global CO₂ emissions from liquid fuels—but rather because its share in global coal consumption is expected to be 51.2%. In the base case simulated by the Energy Information Agency, oil prices are \$130 in 2030. In scenarios with oil prices of \$50 and \$200 global oil consumption is 12 log points higher and 17 log points lower respectively, implying a range of 29 log points. But global CO₂ emissions are just 4.3 log points higher and 4.1 points lower, in the case of low and high prices—a range of 8.1 log points. Thus reducing oil consumption in 2030 by 25%—through an oil price that is 300% higher—reduces overall CO₂ emissions by just 8%. The central message is that oil is only part of problem and even dramatic oil price increases play a relatively small part of the solution to global climate change.

This is especially true for the PRC. In the reference scenario by 2030, liquid fuels account for 35% of global CO₂ emissions, but only 17% of PRC emissions. Thus measures which change PRC liquid fuels consumption make extremely modest contributions to aggregate PRC emissions. The key to cleaner PRC growth lies in reducing its coal consumption. This in turn requires a transition to a far less energy intensive growth path.

Although India is often lumped together with the PRC, its role in the growth of global oil consumption and emissions is projected to be much less important. In 2006, for example, India's share in world output was 4% on a PPP basis (and 1.9% at current exchange rates). This share is projected to grow to 7.2% (3.6% at current exchange rates). Its share in global liquid fuels rises from 3.2% to 4.4%—an annual rate of 2.4% versus the PRC at 3.2%; and

emissions from 4.5% to 5%—28% of India's emissions are expected to come from liquid fuels in 2030, about the same as in 2006. All told therefore, unless it dramatically alters the structure of growth, the most damaging impact of ACI growth on the rest of the world could well occur through increased emissions.

8. CONCLUDING COMMENTS

It is an extreme understatement to suggest that developments in ACI are important for the rest of the world. Increasingly, what happens in the ACI will be the most important determinant of global economic performance and the evolution of global patterns of specialization. This would be true even if the advanced countries were growing at their long run potential rates, and not experiencing difficulties in returning to these long run growth paths. As I have described, likely patterns of evolution it has become clear that geese will continue to fly with those lagging replacing and in some cases overtaking those that lead them. However, it has also become clear that they will have to change their patterns of migration and find alternatives to the routes they have traditionally taken. Indeed, they will have to increasingly build their nests in the PRC and India.

Policies that facilitate the changed patterns of growth will be required. In particular, for the PRC the challenge is how to change the patterns of growth from reliance on exports and investment towards consumption and then to move up the technology ladder in response to rising wages and appreciating exchange rates. For those that now lead the PRC, competitive challenges lie ahead as it advances and the global economy becomes more concentrated with more middle-income and advanced economies. This will require increased investment in human capital and policies that promote innovation. For the economies that follow the PRC, the challenges are to take advantage of the opportunities to become part of global supply chains that supply both advanced and ACI markets with manufactured goods, services, and primary commodities. Indeed, if the problems of absorbing the PRC when it was specializing in labor intensive exports created what Cline termed “the adding-up problem,” the PRC's prospective patterns now create what I can call “the subtraction opportunity”.

ACI economies can play a role, both individually and acting together, to enhance the benefits from their growth. In particular they can generate opportunities for each other and for other developing economies by reducing the trade barriers that still fragment their markets. The free trade agreements within the region should be deepened, and the barriers that constrain imports should be reduced. In addition, just as foreign investors have played a key role in the emergence of the PRC as the world's leading exporter, so the PRC and other foreign investors can assist low-income economies in ACI and elsewhere to do the same. Their role in developing manufacturing supply chains in Africa and other poor regions could be especially helpful. Finally, effective policies on greenhouse gas are crucial for the world to avoid the detrimental impacts of climate change. These should emphasize the development of new sources of power that economize on CO₂.

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