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The New Silk Road

Emerging Patterns in Asia-Latin American Trade for Energy & Minerals

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I. Introduction

Momentous changes have taken place since the turn of the century for international trade in Latin America and the Caribbean (LAC). The rise of fast-growing, populous economies in Asia has increased demand for Latin American primary commodities to unprecedented levels, quickly raising Asia's importance as an economic partner for LAC.[1] Between 2000 and 2013, inter-regional trade in energy and minerals grew by an average of 10.9% per year, reaching $33 billion in real terms in 2013. By comparison, the region's trade in energy and minerals with the rest of the world grew by an average of 1.5% in real terms during the same period.[2]

The recent surge in inter-regional trade has been led primarily by China and – to a lesser extent – India. With respect to trade in energy and minerals, powerful economic complementarities between China's growing need for these resources and LAC's abundance of them have underpinned the boom in their inter-regional ties. Over the last decade, China's demand for raw materials has shifted the center of gravity for world trade in primary commodities towards Asia.

As the Chinese economy matures and economic growth slows however, questions arise as to how the country's future demand for energy and mineral commodities will evolve and how this might impact producing and exporting countries. Another question is how demand for energy and minerals will evolve in other populous yet relatively resource-poor Asian countries such as India, as their economies develop and converge to a level similar to China's today.

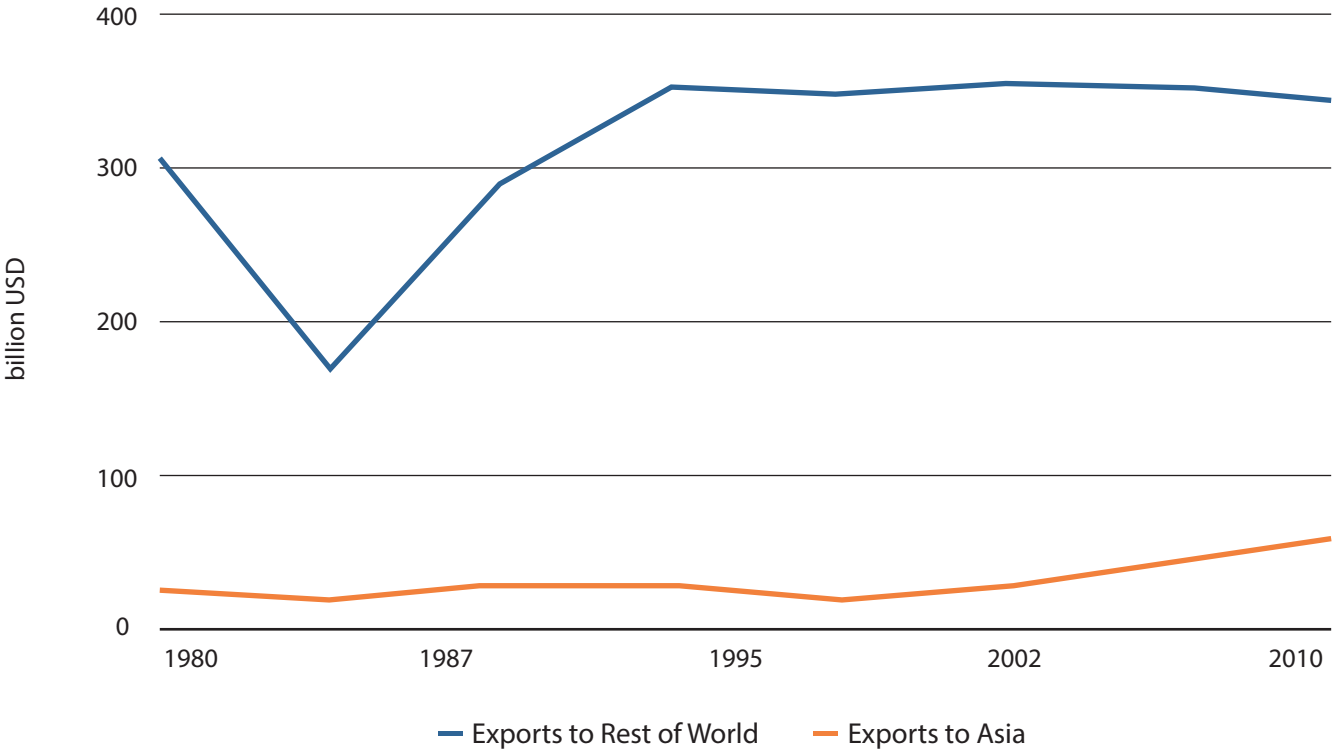
For countries in Latin America and the Caribbean the shift in trading patterns towards Asia has come at a time when demand for the region's energy and mineral resources from traditional partners in North America and Europe has slowed. Given the dependence of many Latin American countries on energy and mining for export revenue and the implications that another wave of surging Asian demand could have for the region's sustainable development prospects, it is important for LAC governments to understand how the region's trade relationship with Asia will evolve over time. This analysis traces the trade relationship in energy and minerals between Asia and Latin America and the Caribbean, focusing specifically on China and India, over the past three decades. It then offers an outlook for future trade in these sectors between the regions.

II. Past and Present Trends in Asia-LAC Trade

With the rise of China to become one of the world's largest economies, much attention has been placed on Latin America and the Caribbean's deepening trade relations with Asia. In little more than a decade, China went from being a relatively unknown economic partner to Latin America's second-largest trading partner, behind the United States. China is now the most important export partner for many of LAC's largest economies, including Brazil and Chile. More broadly, the region's economic performance has become increasingly linked to the Asian giant.[3]

1 In this study Asia refers to: People's Republic of China (CHN), India (IND), Japan (JPN), South Korea (KOR); ASEAN: Thailand (THA), Malaysia (MYS), Singapore (SGP), Indonesia (IDN); OASIAN: Bangladesh (BGD), Cambodia (KHM), Hong Kong (HKG), Taiwan (TWN), Lao People's Democratic Republic (LAO), Pakistan (PAK), Philippines (PHL), and Vietnam (VNM)
2 Unless otherwise stated, trade statistics throughout this study come from the author's estimates using UN Comtrade data
3 See, for instance, Cesa-Bianchi, Pesaran, Rebucci, Xu (2011)

Figure 1.1 **LAC's Exports to Asia vs Rest of World**



Source: Authors' calculations from UN Comtrade data

Yet, as Figure 1.1 reveals, the rise in inter-regional trade is relatively new, with most of the increase having taken place after 2005 following China's accelerated integration into the world economy after its entry to the World Trade Organization (WTO) in 2001. Nevertheless, the Asia-LAC relationship dates back further. Japan and – to a lesser extent – South Korea and other so-called Asian tigers, also spurred an increase in inter-regional trade during their own industrialization period between World War II and the 1980s, albeit at much lower levels than today. The Asia-LAC trade relationship followed a similar pattern then as it does now: resource-scarce Asian countries looked to LAC for primary inputs including energy and minerals, which are then used to manufacture goods that are exported back to LAC and other world markets.

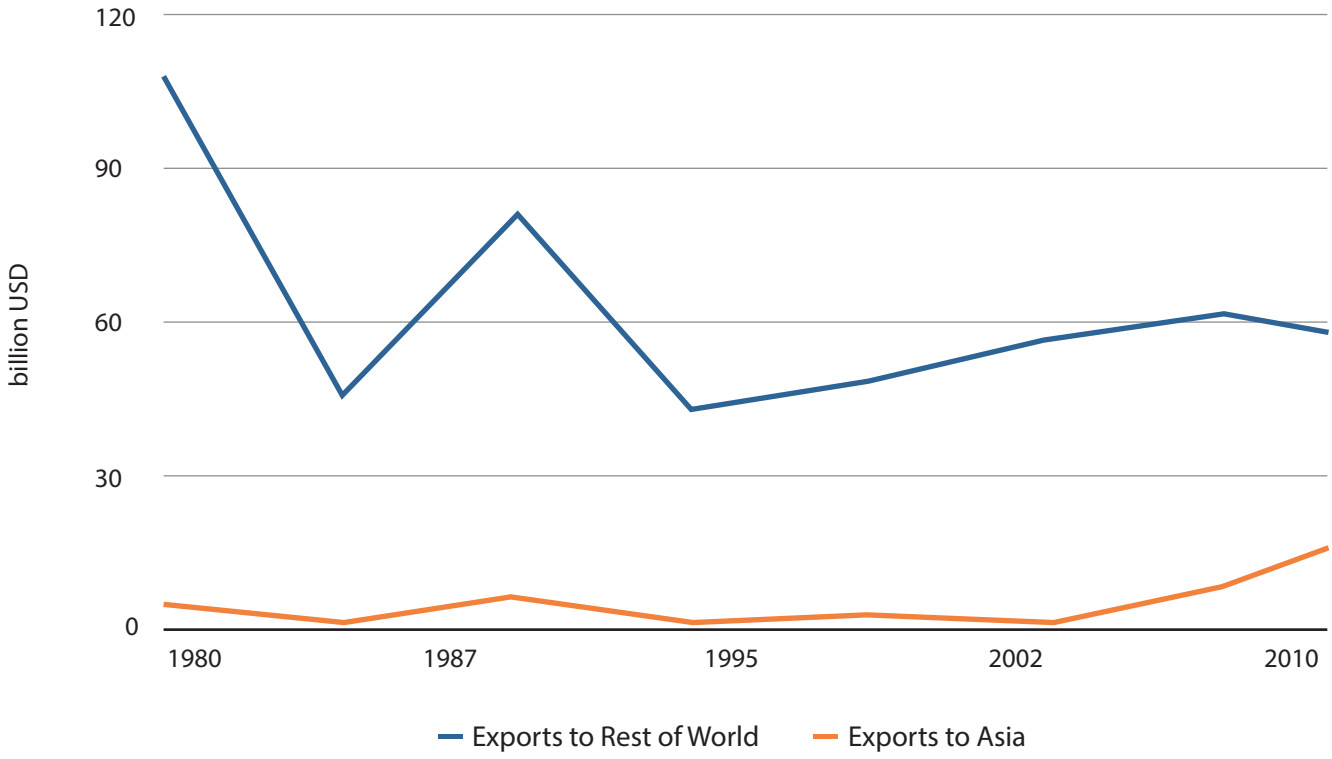
II.A. Energy

With respect to inter-regional trade in energy, Japan dominated Asia's demand for LAC products over several decades and was Latin America's primary trading partner in the sector until 2000, when the region's exports to Asia reached US$2 billion in real terms (see Figure 1.2). Japan comprised 91% of LAC's energy exports to Asia in 1980 but fell to 43% in 2000 when South Korea took over as LAC's top export destination, with 46% of the region's energy exports to Asia, as seen in Figure 1.4.[4]

4 South Korea moved ahead of Japan as LAC's top export destination for energy in 2000, however this was short-lived. Japan's energy imports from LAC overtook South Korea's soon after. Nevertheless, this was around the same time that China and India's demand for LAC's energy exports began to increase to higher levels than that of Japan or South Korea.

Crude petroleum made up the bulk of exports during this time, rising from 90% in 1980 to 98% in 2000. Unsurprisingly, LAC's large oil producing countries were the top exporters of energy to Asia. As Figure 1.5 reveals, Venezuela supplied 48% of LAC's energy exports to Asia in 1980 but fell to 4% in 2000. By 2000, Mexico had taken over as the top exporter, with 43% of exports, down from 26% in 1980.

Figure 1.2 **LAC's Energy Exports to Asia vs Rest of World**

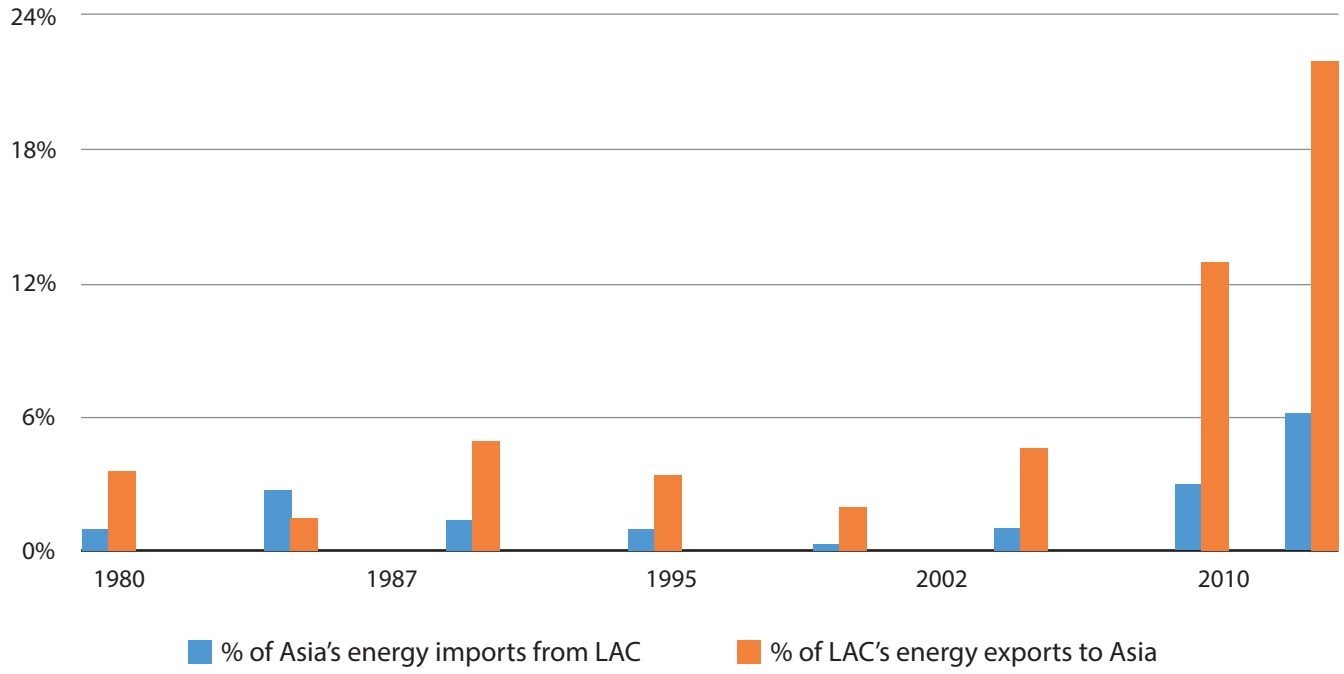


Source: Authors' calculations from UN Comtrade data

Nevertheless, Asia remained a relatively minor destination for Latin America's energy exports through the turn of the century and the same was true for the region's share of Asia's energy imports from the world. In 1980, less than 4% of LAC's energy exports were destined for Asia, and LAC represented only 1% of Asia's energy imports (see Figure 1.3).

The majority of LAC's inter-regional exports of energy – specifically of crude oil – went instead to the United States while Asia sourced its crude oil imports from regions closer in proximity, such as the Middle East. In the wake of the Asian financial crisis of the late 1990s, Asia's energy demand slumped and inter-regional trade fell further. In 2000, Asia made up 2% of LAC's energy exports, while LAC made up less than 1% of Asia's energy imports.

Figure 1.3 **Asia's Share of LAC's Energy Exports vs LAC's Share of Asian Imports of Energy**

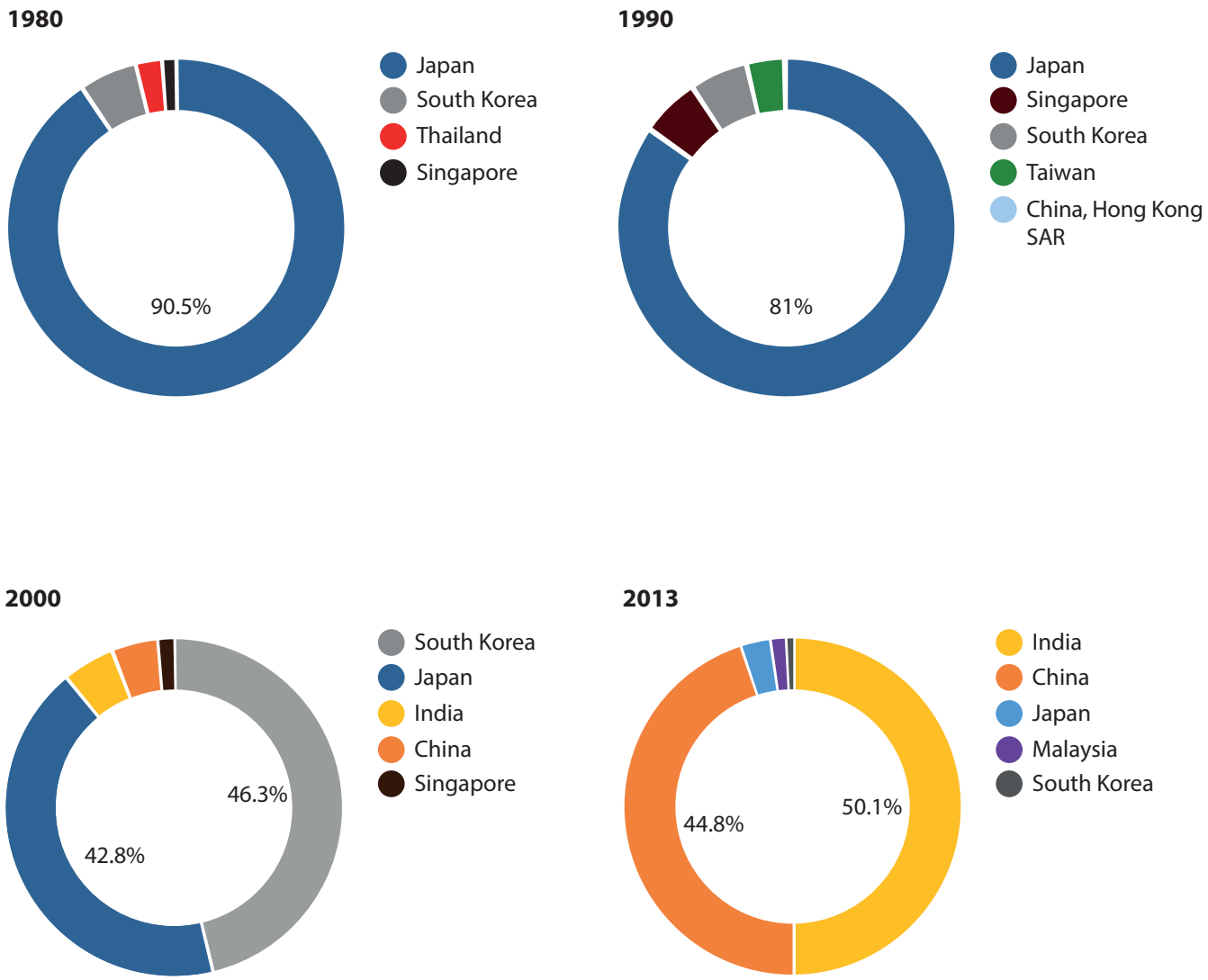


Source: Authors' calculations from UN Comtrade data

However, by the 1990s China and India had begun to enact the economic reforms that would later unleash their development and jumpstart their demand for energy and raw materials. While growth in primary energy demand in the more developed Asian economies including Japan and South Korea had begun to taper, Chinese and Indian demand was beginning to pick up speed.

In China in particular, rapid economic growth beginning in the 1990s combined with high rates of fixed capital formation and urbanization led to a surge in demand for energy and minerals. Over the next two decades, China's rapid industrialization and integration into the world economy reshaped the global commodity landscape and propelled the Asia-LAC relationship to new heights. Starting in the mid-2000s, the Asia-LAC relationship entered into a new phase.

Figure 1.4 **LAC's Main Energy Export Partners in Asia, 1980 to 2013**



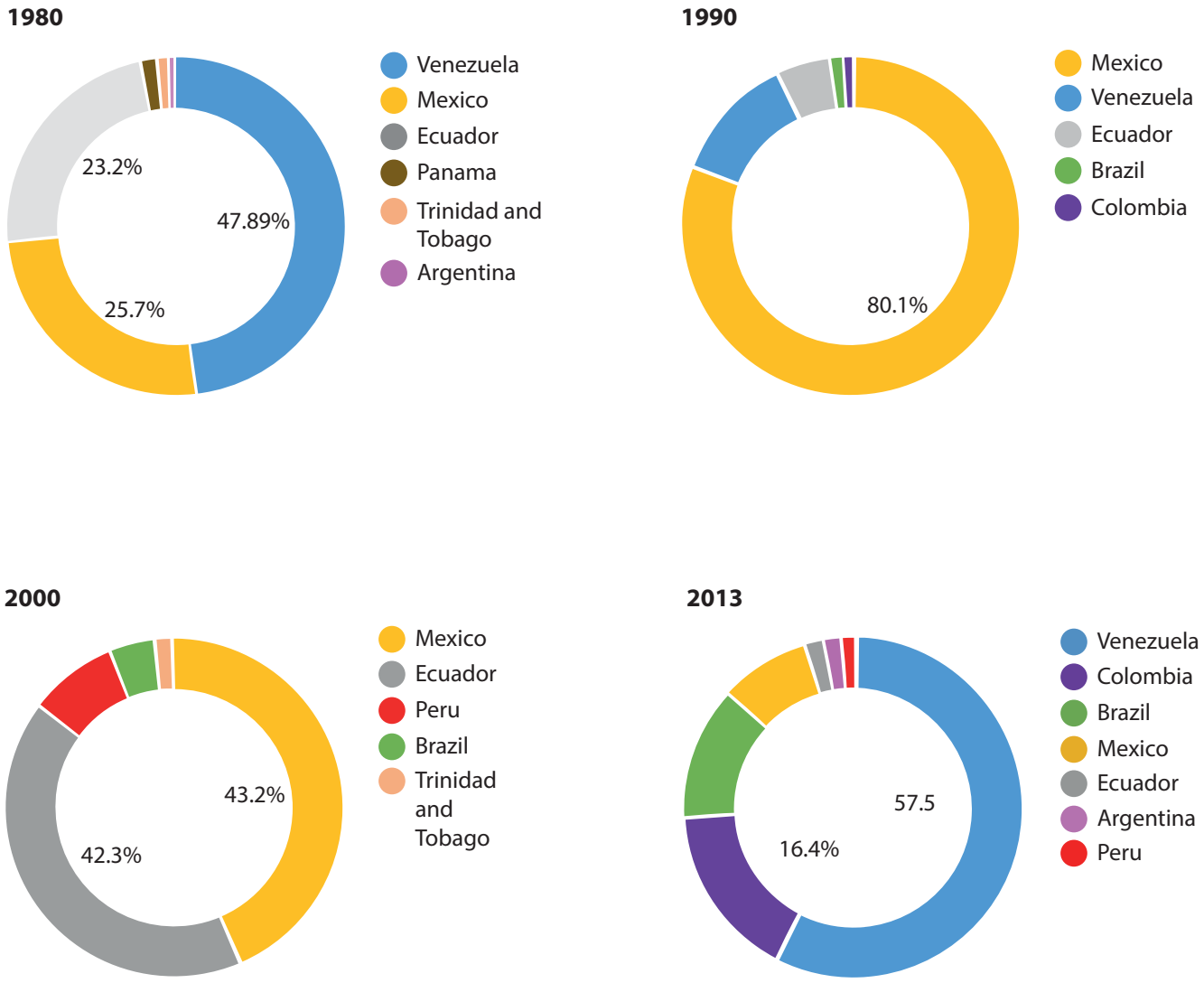
Source: Authors' calculations from UN Comtrade data

Higher energy demand typically follows economic growth.[5] As growth in China and India picked up, developing Asia quickly became the world's new growth center for energy demand. From 1990 to 2012, China's economy grew at an average rate of 9.9%, becoming the world's second-largest economy and a critical engine of global growth.[6] The country quickly transformed itself from a primarily agrarian society to an urban, industrialized economy, raising per capita income for more than a billion people to US$11,500 in 2013, up from US$1,500 in 1990.[7]

In the meantime India grew at an average rate of 6.5% from 1990-2012. By 2013, India had become the world's third-largest economy when measured on a purchasing power parity basis, though its GDP per capita remained much lower than China's, growing from US$1,800 in 1990 to US$5,250 in 2013. In contrast, Japan's economy stagnated at a growth rate of 0.09% during the same period.

5 International Energy Agency (2014).
6 GDP is expressed in year-2013 dollars in purchasing power parity terms. Growth rate calculations based on IEA (2014) estimates using IMF, World Bank, and other databases.
7 Measured in year-2011 dollars in purchasing power parity terms using World Bank World Development Indicators data

Figure 1.5 **LAC's Main Energy Export Partners in Asia, 1980 to 2013**



Source: Authors' calculations from UN Comtrade data

Besides being some of the fastest growing economies over the last twenty-five years, China and India are also the world's most populous countries, raising the scale of demand for energy and other natural resources. China's primary energy demand grew from 879 million tons of oil equivalent (Mtoe) in 1990 to 2,909 Mtoe in 2012 – a 231% increase. Its demand for oil grew by 284%, from 122 to 468 Mtoe.[8] Today, China is the world's second-largest consumer and the largest importer of oil. The country consumed an estimated 10.7 million b/d of oil in 2013, with just over half of consumption being made up by imports.[9]

8 International Energy Agency (2014). Per the IEA definition, "oil" includes crude oil and petroleum products.
9 Energy Information Administration, China (2014). "Oil" includes crude oil and petroleum products.

Reflecting its smaller economy and population, India's primary energy demand grew more modestly, from 317 Mtoe in 1990 to 788 Mtoe in 2012 – a 149% increase. Its demand for oil increased by 190% during the same time from 61 to 177 Mtoe.[10] By 2013, India was the fourth-largest consumer of oil in the world after the United States, China, and Japan, consuming nearly 3.7 million b/d.[11] The country is relatively poorly endowed in terms of oil reserves and has become increasingly reliant on imports to keep pace with demand. In 2012, the latest year for which the country's import dependency data is available, 71% of oil consumption was met by imports.[12] As a point of comparison, between 1990 and 2012, the rest of the world's primary energy and oil demand increased by 27% and 16% respectively. Primary energy demand in Japan actually declined, and its demand for oil fell by 16% from 250 Mtoe in 1990 to 210 Mtoe in 2012.[13]

These changes in the destination of Latin America's energy exports to Asia from Japan and South Korea to China and India reflected the large shifts in Asian energy demand taking place throughout the 2000s. As Japan's share of LAC's energy exports to Asia fell to 3% by 2013, China and India had become Latin America's main export partners, although neither country registered as a significant export destination for LAC before 2000.

India's share of LAC's energy exports to Asia jumped from 5% in 2000 to 50% in 2013, making it the region's top export partner just ahead of China, which made up 45% of LAC's energy exports to Asia, up from 4% in 1990. As in previous decades, crude oil made up 98% of the region's energy exports to Asia in 2013, as shown in Table 1.

Table 1 **LAC's Top Energy Exports to Asia**

1980	share(%)	1990	share(%)
Crude petroleum and oils obtained from bituminous materials	89.7%	Crude petroleum and oils obtained from bituminous materials	93.3%
Coke and semi-coke of coal, of lignite or peat	7.5%	Kerosene (including kerosene type jet fuel)	2.6%
Mineral waxes	1.5%	Gas oils	1.7%
Motor spirit (including aviation spirit)	0.8%	Motor spirit (including aviation spirit)	1.0%
		Other coal	1.0%
Share of energy exports to Asia	***99.5%***	***Share of energy exports to Asia***	***100%***
2000	**share(%)**	**2013**	**share(%)**
Crude petroleum and oils obtained from bituminous materials	98.2%	Crude petroleum and oils obtained from bituminous materials	97.9%
Other fuel oils	1.4%	Other liquefied gaseous hydrocarbons	1.3%
Share of energy exports to Asia	***99.6%***	***Share of energy exports to Asia***	***99.2%***

Source: Authors' calculations from UN Comtrade data

10 International Energy Agency (2014)
11 Energy Information Administration, India (2014)
12 Ibíd.
13 International Energy Agency (2014)

Given the important differences in demand for both total primary energy and oil between China and India discussed above, it may be surprising that by 2013 India was importing more energy from Latin America than China. China's energy diplomacy towards LAC has been more prominent than India's, often driven by the highest levels of government.[14]

Yet there are a couple of reasons why India's energy imports from LAC are higher. This is primarily due to the country's goal of diversifying its sources of crude oil following recent supply disruptions in the Middle East. The Middle East, including Iran, has historically been an important supplier of crude oil to India. After 2011, India lost access to Iranian crude oil due to economic sanctions imposed by the United States and Europe on Iran's oil exports. In 2011, Iran supplied 7.8% of India's crude oil and by 2013 that share had fallen to 5.4%.

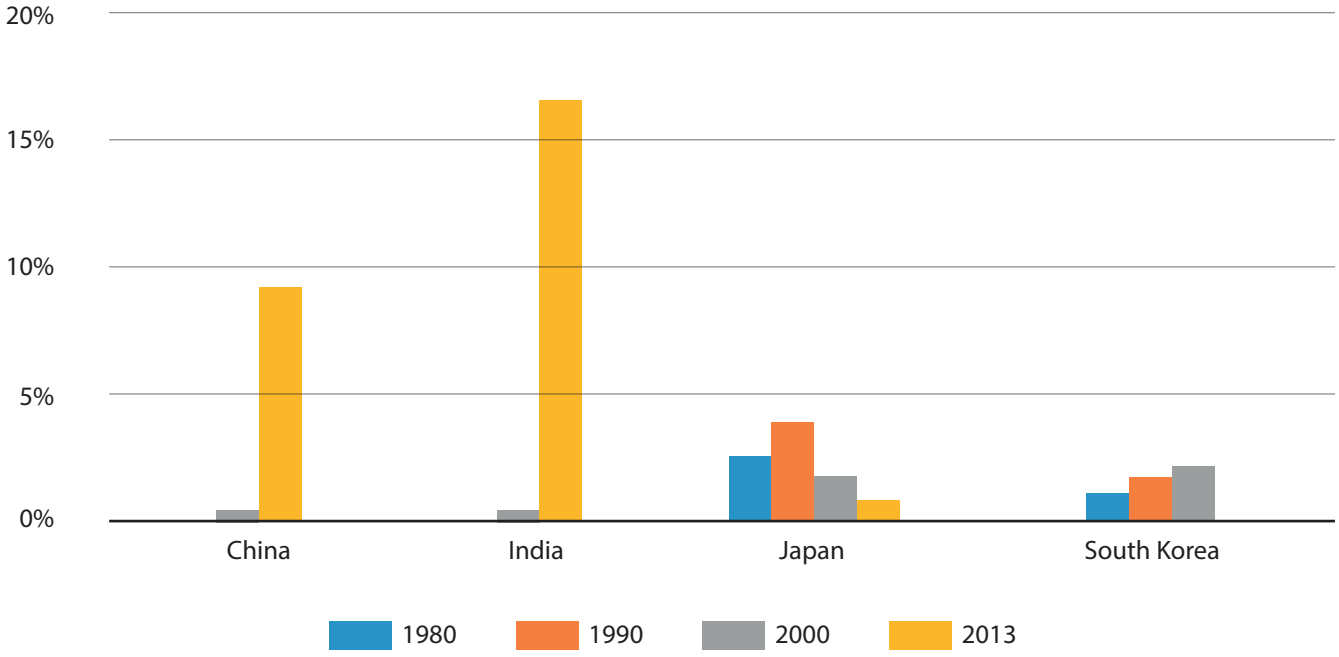
In light of this, India looked to the world crude oil market and replaced much of this supply with crude oil from the Americas, particularly from Venezuela.[15] Yet Indian officials went further to express their view of Latin America as holding strategic importance to the country's long-term effort to lessen its reliance on Middle Eastern imports and strengthen its energy security in the future.[16] As a result, LAC's share of Indian crude oil imports grew by more than the share that was lost from Iran, from 8.5% in 2011 to 16.7% in 2013. Moreover, although the Indian government identified Latin America as an important new source of oil imports, it was private Indian oil producers and refiners that incorporated larger volumes of LAC crude into their sourcing strategies in order to take advantage of relatively lower prices for heavier crude versus lighter crude types.[17] Compared to public sector refineries, private Indian companies have greater capacity to refine heavier crude types, including those produced in Latin America.

Since 2012, the majority of the increase in India's imports from Venezuela was a result of a sourcing strategy developed by Reliance Limited – a leading private oil and gas company in India. In 2012, Reliance reached a 15-year agreement with Petróleos de Venezuela S.A. to purchase 400,000 b/d from Venezuela.[18]

Given the country's long-term interest in diversifying its sources of crude oil, imports from LAC in the future are not likely to wane drastically when Iranian oil exports pick up again. The United Nations International Trade Statistics Database's 2014 data reveals that while India's crude oil imports from Iran have grown to make up 7% of the country's crude oil imports following an easing of sanctions by the United States and Europe, crude oil imports from Latin America also grew to 17.5%.

14 For a review of the literature on Chinese energy engagement with Latin America see, for instance, Koch-Weser (2015)
15 Energy Information Administration, India (2014)
16 Chakraborty and Katakey (2014); Economic Times (2014)
17 Saint-Mézard (2014); Energy Information Administration, India (2014)
18 Saint-Mézard (2014).

Figure 1.6 **LAC's Share of Oil Imports for Selected Asian Economies**



Source: Authors' calculations from UN Comtrade data

A second reason why India's energy imports from LAC are higher than China's may have to do with China's resource-seeking strategy in the region. Greater China-LAC trade has often come with pledges of higher Chinese investment in energy and infrastructure and often with loan disbursements by Chinese development banks to Latin American governments or their national oil companies in exchange for oil. Since 2005, China has lent over US$119 billion to LAC, with more than half going to energy-backed loans.[19] The country has lent more than US$108 billion in exchange for oil worldwide.[20]

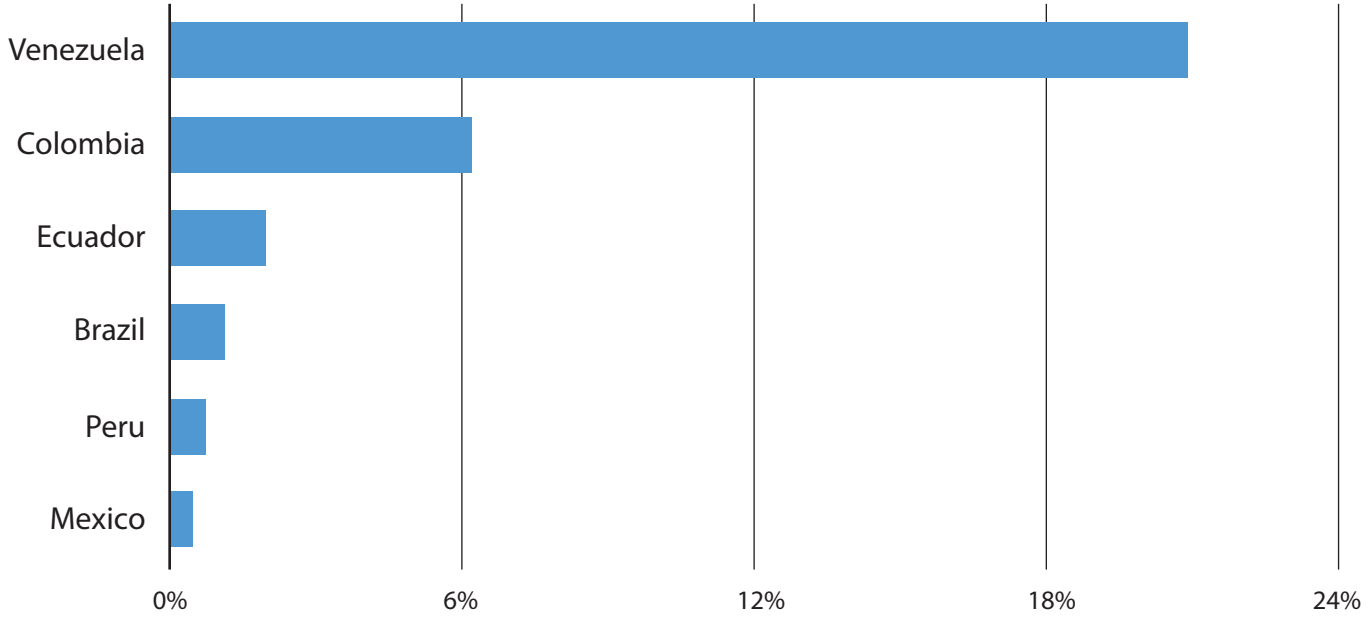
However, unknown amounts of LAC oil destined for payment to China are re-sold in the market and exported globally and are therefore not included in official China-LAC trade statistics.[21] Thus, the extent of China's reach in LAC's energy trade may be underestimated. On the other hand, India's energy trade with Latin America is reflected only in official trade statistics.

19 Inter-American Dialogue's China-Latin America Finance Database; Camus, LePham, Shankar, and White (2013)
20 Energy Information Administration, China (2014)
21 Alvez (2013); Downs (2011)

India does not have comparable energy-backed contracts with oil producers around the world, giving it less direct access to a diverse set of crude oil suppliers than China. Furthermore, India's overseas oil and gas investments are marginal when compared to China's. Combined with India's higher import dependency on crude oil than China – 71%[22] versus 60%[23] – this difference in access to crude oil supplies may help explain India's higher share of Latin American crude oil imports. Figure 1.6 shows confirmation that LAC is a more significant supplier of crude oil for India than other Asian economies and that this is a recent phenomenon. In 2013, over 16.7% of India's oil imports were sourced from Latin America and the region supplied 9% of China's crude oil.

Still, it is very clear that Asia as a whole has gained paramount importance as a destination for Latin America's energy exports since 2000 and that this process has resulted from an increased demand for the region's crude oil from India and China By 2013, the share of Latin America's energy exports going to Asia had grown to 22% (up from 2% in 2000), representing US$15.3 billion in real terms that year. Venezuela made up the majority (58%) of the region's energy exports to Asia, followed by Colombia (16%), Brazil (12%), and Mexico (9%). Latin America's relative importance as a supplier of energy to Asia also increased as the region's share of Asia's energy imports grew to 6% by 2013, up from marginal levels in 2000.

Figure 1.7 **LAC's Energy Exports as Share of Total Exports. 2013**



Source: Authors' calculations from UN Comtrade data

Among bilateral LAC-Asian energy trade relations, the Venezuela-India relationship was the largest in terms of monetary value in 2013, amounting to US$5.78 billion in real terms.[24] Venezuela's trade with China followed at US$3.93 billion. Mexico's trade with India (US$1.43 billion), Colombia's trade with China (US$972 million) and Brazil's trade with China (US$944 million) came in third, fourth, and fifth place respectively. Figure 1.7 reveals just how important energy exports to Asia have become for some Latin American countries.

22 Data only available for 2012 from the Energy Information Administration, India (2014)
23 BP Country Insights, China (2014)
24 Although inter-regional trade in energy consists mainly of LAC exporting crude oil to Asia, Asian countries also export energy products to LAC, albeit at much smaller volumes.

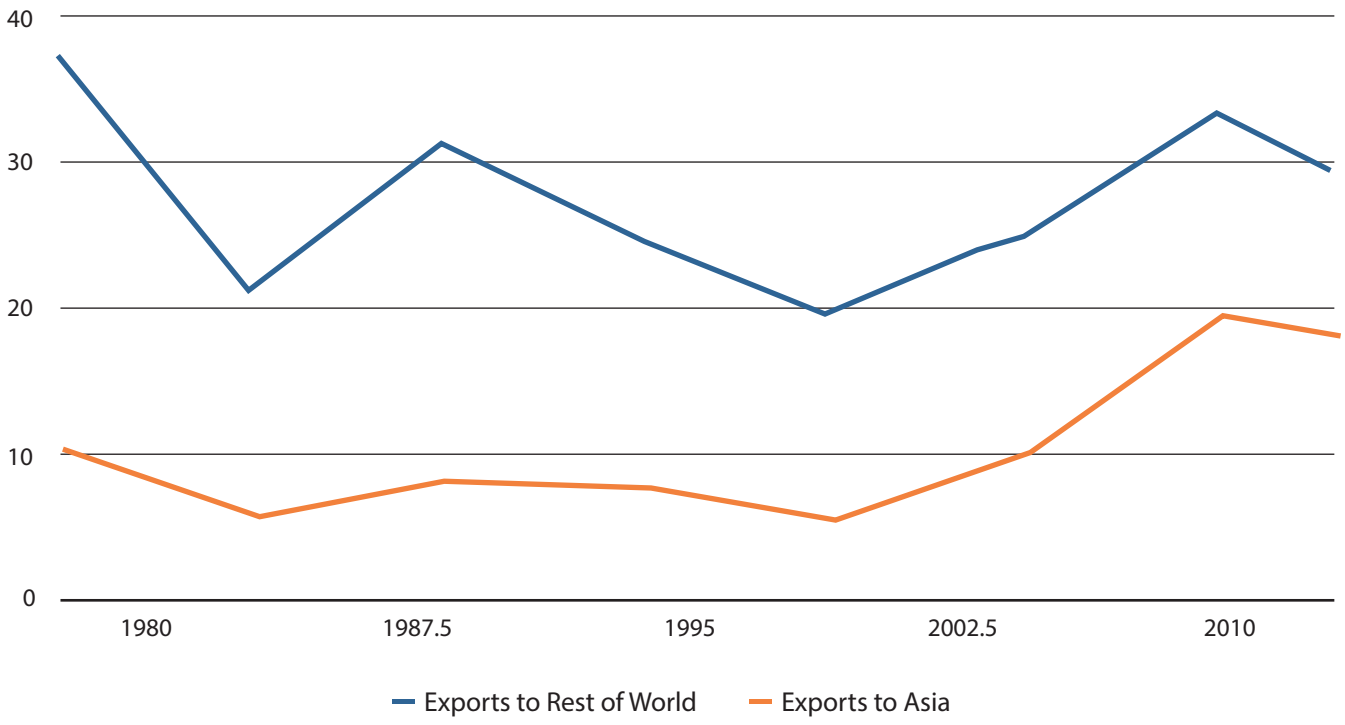
In 2013, 21% of all Venezuelan exports consisted of energy exports to Asia. Six percent of Colombia's total export income came from its energy exports to Asia. Ecuador, Brazil, Peru, Mexico, and the rest of LAC's overall exports were not as dependent on energy exports to the region, at around 5% or less of total export revenue coming from energy exports to Asia.

II.B. Minerals

Like energy trade, the evolution of Asia-LAC trade in minerals responded primarily to changes taking place in Asia's economies over time. Demand for minerals grows when an economy is industrializing, its per capita income is increasing, and its society is urbanizing. It tapers at higher levels when an economy matures.[25] Thus, LAC's mineral exports to Asia have expanded dramatically mainly as a result of rapid growth in China, with India playing a much more secondary role than it performs in energy trade with LAC.

Starting in 2000, around the time that China was admitted into the World Trade Organization, LAC's mineral trade with Asia began to surge, peaking in 2010 and growing at a slower pace thereafter (see Figure 2.1). From 2000 to 2010, LAC's minerals exports to Asia grew at an average of 11% per year, reaching US$34.2 billion in real terms. In contrast, Latin America's mineral exports to the rest of the world grew by 4% per year during the same period.

Figure 2.1 **LAC's Minerals Exports to Asia vs Rest of World**



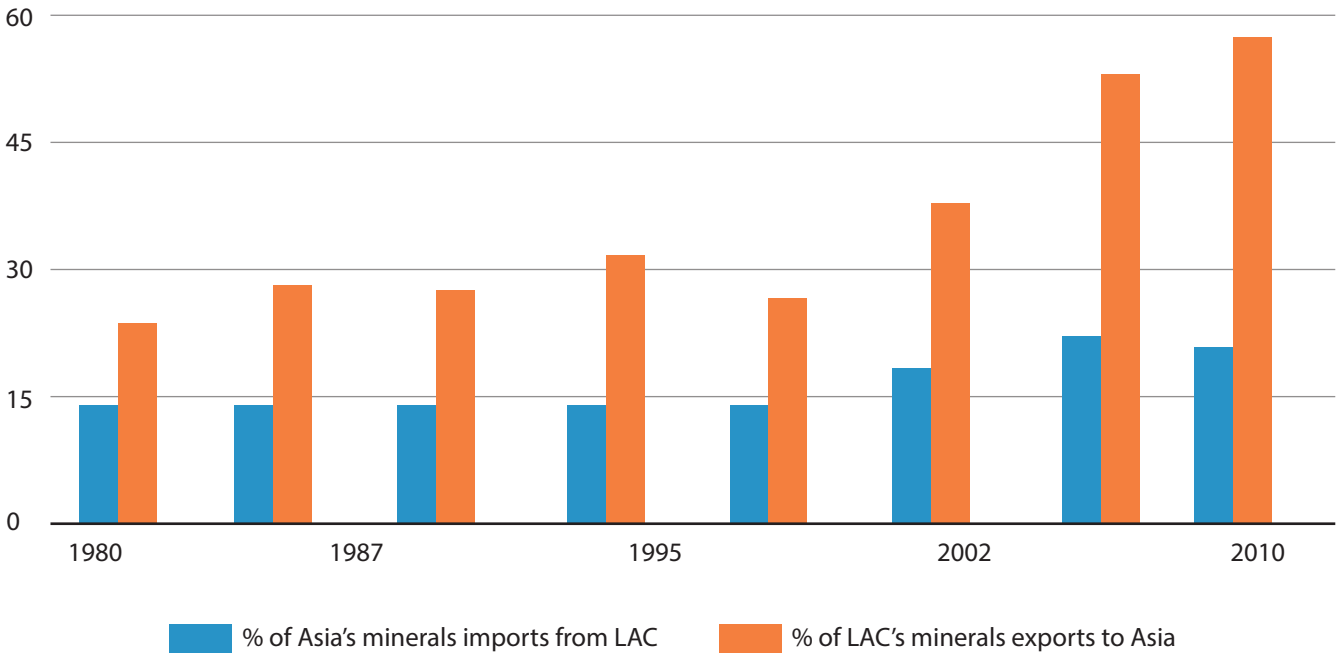
Source: Authors' calculations from UN Comtrade data

Unlike the trends observed in energy trade, Latin America was already a significant supplier of minerals to Asia before China's demand picked up in the 2000s. In 1980, 26% of LAC's mineral exports were destined for Asia, and 16% of Asia's mineral imports came from LAC (see Figure 2.2). Japan was LAC's top export destination for minerals until around the year 2000. In 1980, Japan purchased 91% of LAC's mineral exports, but by 2000 it represented 49%, when total mineral exports from LAC to Asia amounted to US$6 billion in real terms (see Figure 2.3).

25 Kesler (2007); Inter-American Development Bank (2012); Menzie, and Singer, and DeYoung (2005)

In 1980, iron ore concentrates and agglomerates were LAC's top mineral exports to Asia, making up 44% of total mineral exports to the region. Copper, at different levels of refinement, made up 18% of mineral exports (see Table 2). Brazil (33%), Chile (19%), Peru (18%), and Mexico (16%) were LAC's top mineral exporters to Asia (see Figure 2.4) that year. By 2000, copper had replaced iron ore as LAC's top mineral export to Asia, making up 54% of exports. The share of iron ore exported to the region fell to 20%. Chile was LAC's primary exporter, supplying 55% of mineral exports to Asia and Brazil (25%) and Peru (8%) followed.

Figure 2.2 **Asia's Share of LAC's Mineral Exports vs LAC's Share of Asian Mineral Imports**



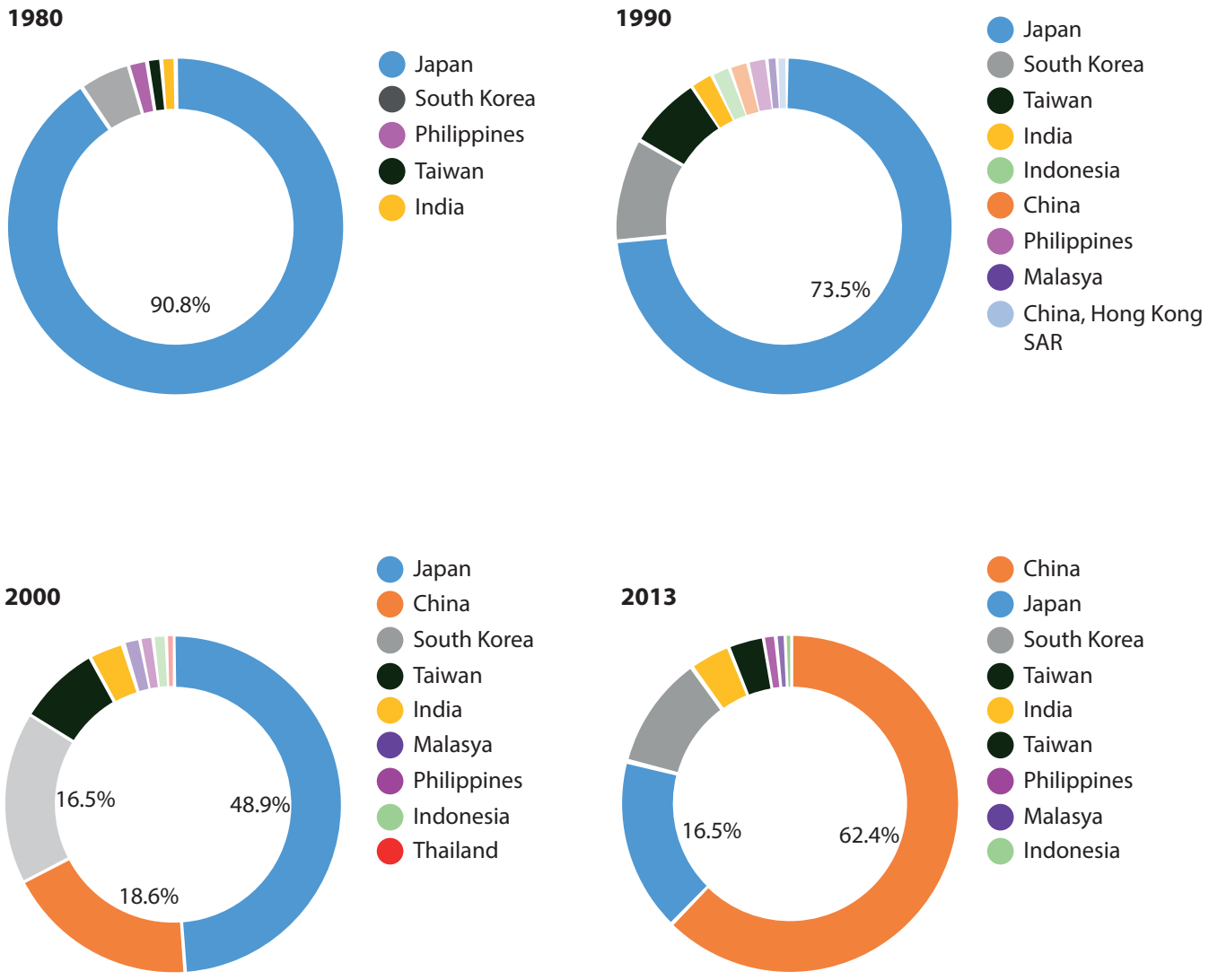
Source: Authors' calculations from UN Comtrade data

As discussed previously, starting around 2000, China's mineral demand increased dramatically, driving Asia-LAC mineral trade to unprecedented levels. China's rising demand for minerals has been closely tied to a development model that has emphasized the expansion of industry across several sectors and net exports since the opening of its economy in the 1990s. Between 2002 and 2012, China's industrial production grew at an average annual rate of 14.7%.[26]

The high levels of investment and fixed capital formation necessary for such an expansion drove the country's mineral demand and transformed China into the world's largest consumer, producer, and importer of many widely traded minerals. With respect to metals alone, for instance, China consumed 47% of the 91 million tons of metals produced globally in 2012, up from 4% in 1990. Mineral imports were estimated to account for more than 40% of China's total mineral consumption in 2012.[27] The sheer size of China's demand for many mineral commodities has been a major driver of global commodity prices.[28]

26 World Bank (2014)
27 Ibid.
28 See, for example, Erten and Ocampo (2012) and Heap (2005)

Figure 2.3 **LAC's Main Mineral Export Partners in Asia**



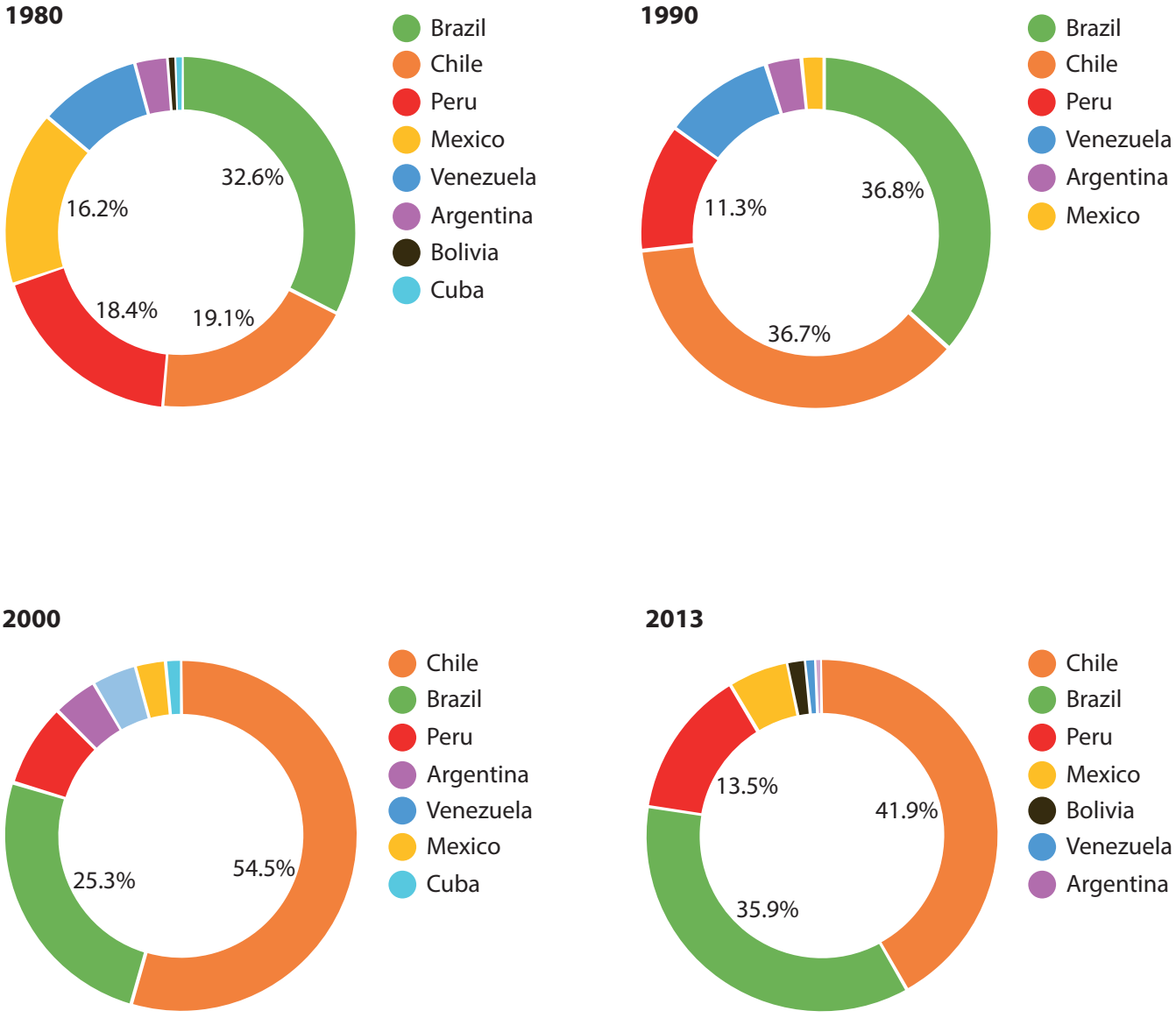
Source: Authors' calculations from UN Comtrade data

Further, China is also a major consumer and importer of copper and iron ore, which are Latin America's primary mineral exports to Asia. From 2000 to 2013, China's consumption of refined copper rose from 1.9 million tons to 9.8 million tons, making up 47% of the world's demand in 2013. Today, China is the world's largest consumer of refined copper and importer of copper concentrates, comprising 37% of global imports in 2013.[29] The country's major sources of copper concentrates in 2013 were Chile (24%), Peru (19%), Australia (7.7%), Mexico (7.5%), and Mongolia (6.8%).[30]

Similarly, China is now the world's largest iron and steel producer and consumer, as well as the world's largest iron ore importer. Starting in 2000, China's demand for iron ore rose rapidly as the country used it to produce ever-increasing amounts of steel,[31] which by 2005, was estimated to be more than the combined production of the United States and Japan. By 2013, China's iron ore imports represented 67% of global imports,[32] being sourced from Australia (47%) and Brazil (22%).[33]

29 Authors' calculations from World Bureau of Metals Statistics
30 USGS, China (2014)
31 World Bank (2014)
32 Authors´calculations from UN Comtrade data. Share is calculated by US$ value.
33 USGS, China (2014)

Figure 2.4 **Asia's Main Mineral Export Partners in LAC, 1980-2013**



Source: Authors' calculations from UN Comtrade data

In contrast to China, India's demand for minerals has remained much lower. India has followed a services-oriented, consumption-based path to economic development that has resulted in only marginal growth with respect to GDP of the country's industrial sector over the past 50 years. Net exports too have added little to overall GDP growth and at times have impacted it negatively.[34] An illustration of their different development paths is the fact that India represented 1.5% of global manufacturing exports in 2012, compared to China's 18%.[35]

Consequently, consumption of minerals in India remains lower than in China and has not added significantly to the surge in Asia-LAC mineral trade. Between 2000 and 2013, India's consumption of refined copper grew from 240 thousand tons to 423 thousand tons, which amounted to just 2% of global consumption in 2013.

34 Francis and Winters (2008)
35 Authors' calculations from UN Comtrade data.

The country imported 756 thousand tons of copper concentrates in 2013, making up 11% of world imports compared to China's 37% as mentioned above.[36] On the other hand, India has large reserves of iron ore, of which it is a net-exporter.[37]

Table 2 **LAC's Top 10 Mineral Exports to Asia**

1980	share (%)	1990	share (%)
Iron ore and concentrates	30%	Refined copper, unwrought	28%
Iron ore agglomerates	14%	Aluminium and aluminium alloys, unwrought	24%
Silver, unwrought	12%	Iron ore and concentrates	20%
Aluminium and aluminium alloys, unwrought	12%	Copper ores and concentrates	7%
Copper ores and concentrates	9%	Iron ore agglomerates	6%
Refined copper, unwrought	5%	Zinc ores and concentrates	3%
Unrefined copper	4%	Unrefined copper	2%
Common salt; pure sodium chloride; salt liquors; sea water	3%	Ores and concentrates of precious metals	2%
Zinc ores and concentrates	2%	Zinc and zinc alloys, unwrought	1%
Lead ores and concentrates	2%	Common salt; pure sodium chloride; salt liquors; sea water	1%
Share of minerals exports to Asia	**93%**	***Share of minerals exports to Asia***	**94%**

2000	share (%)	2013	share (%)
Copper ores and concentrates	29%	Iron ore and concentrates	32%
Refined copper, unwrought	25%	Copper ores and concentrates	31%
Iron ore and concentrates	12%	Refined copper, unwrought	17%
Aluminium and aluminium alloys, unwrought	11%	Iron ore agglomerates	4%
Iron ore agglomerates	8%	Unrefined copper	3%
Silver, unwrought	2%	Lead ores and concentrates	2%
Zinc ores and concentrates	2%	Zinc ores and concentrates	2%
Nickel matte, sinters, etc	1%	Copper waste and scrap	2%
Ores and concentrates of molybdenum, niobium, titanium, etc	1%	Ores and concentrates of precious metals	2%
Ores and concentrates of precious metals	1%	Ores and concentrates of molybdenum, niobium, titanium, etc	1%
Share of minerals exports to Asia	**94%**	***Share of minerals exports to Asia***	**96%**

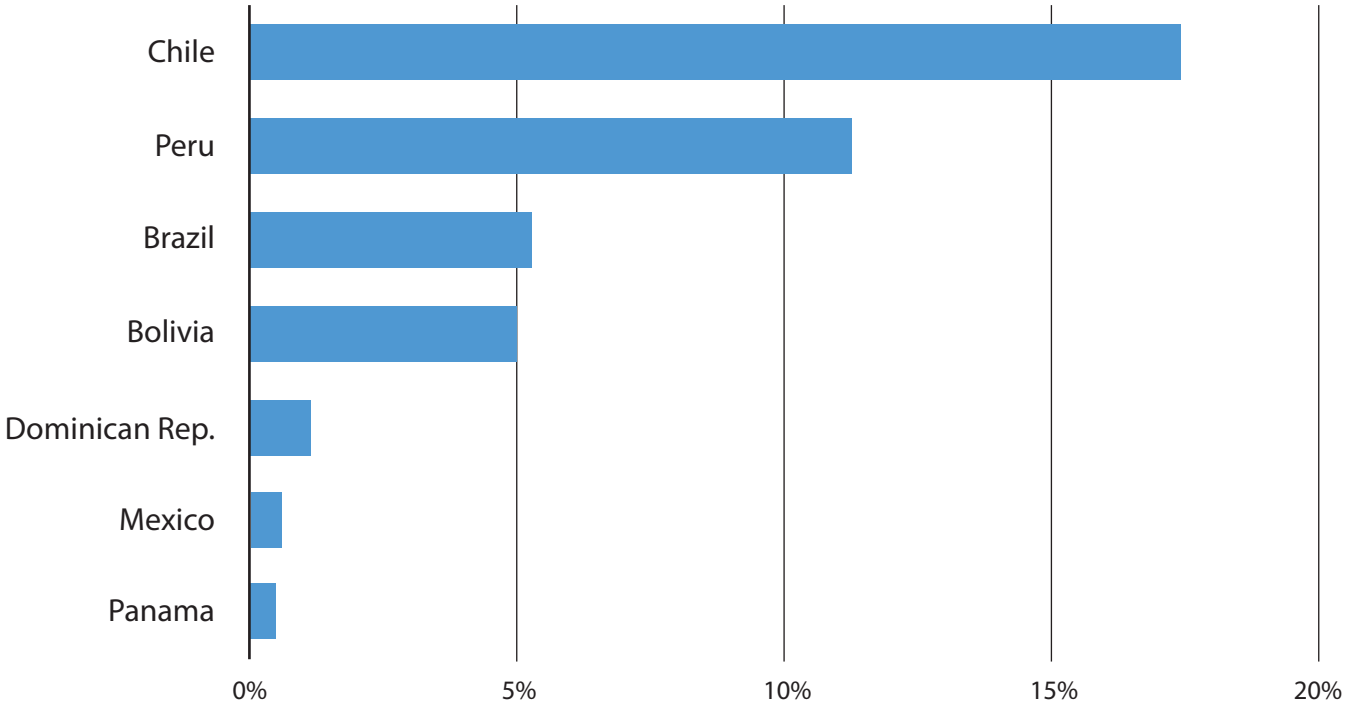
Source: Authors' calculations from UN Comtrade data

36 Authors' calculations from World Bureau of Metals Statistics
37 USGS, India (2014)

Asia-LAC mineral trade after 2000 primarily reflected China's growing demand for copper and iron ore. The share of LAC's mineral exports that were destined for Asia jumped to 58% in 2013 from 27% in 2000, with a value of US$16.8 billion in real terms. Likewise, Latin America's share in Asia's mineral imports grew, with 21% of minerals sent to Asia being supplied by the region, up from 13% in 2000. China's share of LAC's global mineral exports increased to 62% in 2013 from 19% in 2000.

Japan's share of LAC's exports to Asia fell to 17% by 2013 from 49% in 2000, while India made up only 4% of Latin America's exports to Asia that same year, up from 3% in 2000. Copper (in various forms) was LAC's top mineral export to Asia, making up 53% of total mineral exports, and iron ore made up 36% (see Table 2). Chile (42%), Brazil (36%), and Peru (13%) were LAC's primary mineral exporters to Asia in 2013. Chile – the world's leading producer of copper – accounted for 42% of LAC's exports to Asia that year, while Brazil and Peru – also among the world's largest producers of iron ore and copper respectively – supplied 36% and 13% of Latin America's mineral exports to Asia.

Figure 2.5 **LAC's Mineral Exports to Asia as Share of Total Exports, 2013**



Source: Authors' calculations from UN Comtrade data

Among bilateral mineral trade relationships, the Chile-China exchange was the largest in the sector in 2013, amounting to US$4.06 billion in real terms. Brazil's trade with China followed at US$3.99 billion. Chile's trade with Japan came in third place at US$1.34 billion. Mexico and Peru's trade with China came in fourth and fifth place at US$1.27 and US$1.02 billion respectively.

Figure 2.5 reveals Asia's importance as a source of overall export income for the LAC countries that rely heavily on mineral exports. In 2013, 19% of all Chilean exports consisted of mineral exports to Asia. Eleven percent of all of Peru's export income came from its mineral exports to Asia, and the share amounted to 5% for Brazil and for Bolivia. The Dominican Republic, Mexico, Panama, and other LAC countries' export income were not as dependent on mineral exports to the region.

III. The road ahead for Asia-LAC trade

It is clear from our analysis above that the Asia-LAC relationship has taken on greater importance to both regions over time mainly due to China and India's growing demand for crude oil and minerals. As these economies further develop in the coming years, the weight of their demand for energy and minerals will continue to shape the patterns of global trade in these commodities. Asia's growing import needs have been projected to absorb an increasing share of the global fossil fuels and mineral trade in the coming decades.[38]

At the same time, Latin America will continue to be a net provider of energy to the world and South America will remain an important supplier of key mineral commodities. Given Asia's projected economic and demographic trajectory,[39] the relevant question regarding the future of Asia-LAC trade is not whether trade in energy and minerals between the regions will continue, but rather which countries will drive it, what trade levels can be reached in terms of both volume and value, and what effects this relationship could have on both regions.

The previous sections have set the current and historical context and highlighted the nature and intensity of some of the factors influencing inter-regional trade in energy and minerals. The following section will examine how these factors could evolve in the coming decades and how this could impact Asia-LAC trade.

III.A. Future Demand from China and India

Over the past few years, the sustainability of China's investment-led and export-driven growth path has begun to face serious challenges. Many of the potential productivity increases available from channeling resources into industry have largely been achieved, and, on the demographic front, China faces a rapidly aging and declining population due to the one child policy.[40] In 2014, the country's growth rate of 7.4% was the slowest in 24 years.

Keenly aware of the need for economic rebalancing, the Chinese government is already introducing a gradual structural transformation of the economy to a model based more on domestic consumption and services. In 2013, the Chinese government outlined broad principles for such reform.[41] Nevertheless, while the Chinese economy is on its way to becoming the largest economy in the world, this period of transformation may also involve episodes of economic volatility.

According to economic forecasts by the International Monetary Fund and International Energy Agency for the period 2012 to 2040, China's annual rate of GDP growth is set to slow to an average of 5.0%, compared to an average 10% growth rate between 2000 and 2012 (see Table 3).[42] China's population is projected to peak around 2030 and decline thereafter. At the same time, according to a study by the Chinese Academy of Social Science, urbanization in China is projected to reach 67.8% by 2030, translating into 14 million people moving to urban centers each year for the next 15 years.[44]

38 International Energy Agency (2014)
39 See section below for economic and demographic projections
40 Lardy and Borst (2013); Schellekens (2013)
41 The document, the "Decision on Major Issues Concerning Comprehensively Deepening Reforms", was announced during the Third Plenum of the Chinese Communist Party's 18th Congress in November 2013. However, China's 11th and 12th Five Year Plans had already begun to focus on changing the country's growth strategy. See, for example, World Bank the Development Research Center of the State Council, P. R. China (2013)
42 International Energy Agency (2014)
43 Ibid.
44 CASS (2010); Yu (2011).

Table 3 **Economic Growth Projections for Selected Asian Economies**

	Real GDP Growth Projections (compound avg. growth rate %)				
	1990-2012	2012-2020	2020-2030	2030-2040	2012-2040
China	9.9	6.9	5.3	3.2	5.0
India	6.5	6.2	6.6	5.3	6.0
Southeast Asia	5.1	5.3	4.6	3.9	4.5
Japan	0.09	1.1	1.1	0.8	1.0

Note: GDP expressed in 2013 US$ in purchasing power parity terms
Source: IEA (2014) estimates using IMF, OECD, World Bank, and other data

Table 4 **Demographic Projections for Selected Asian Economies**

	Population growth (compound avg. growth rate %)			Population (million)		Urbanization (%)	
	1990-2012	2012-2025	2012-2040	2012	2040	2012	2040
China	0.8	0.4	0.1	1.358	1.416	52	74
India	1.6	1.1	0.8	1.237	1.566	32	46
Southeast Asia	1.5	1	0.8	608	760	45	61
Japan	0.1	-0.2	-0.4	128	115	92	97

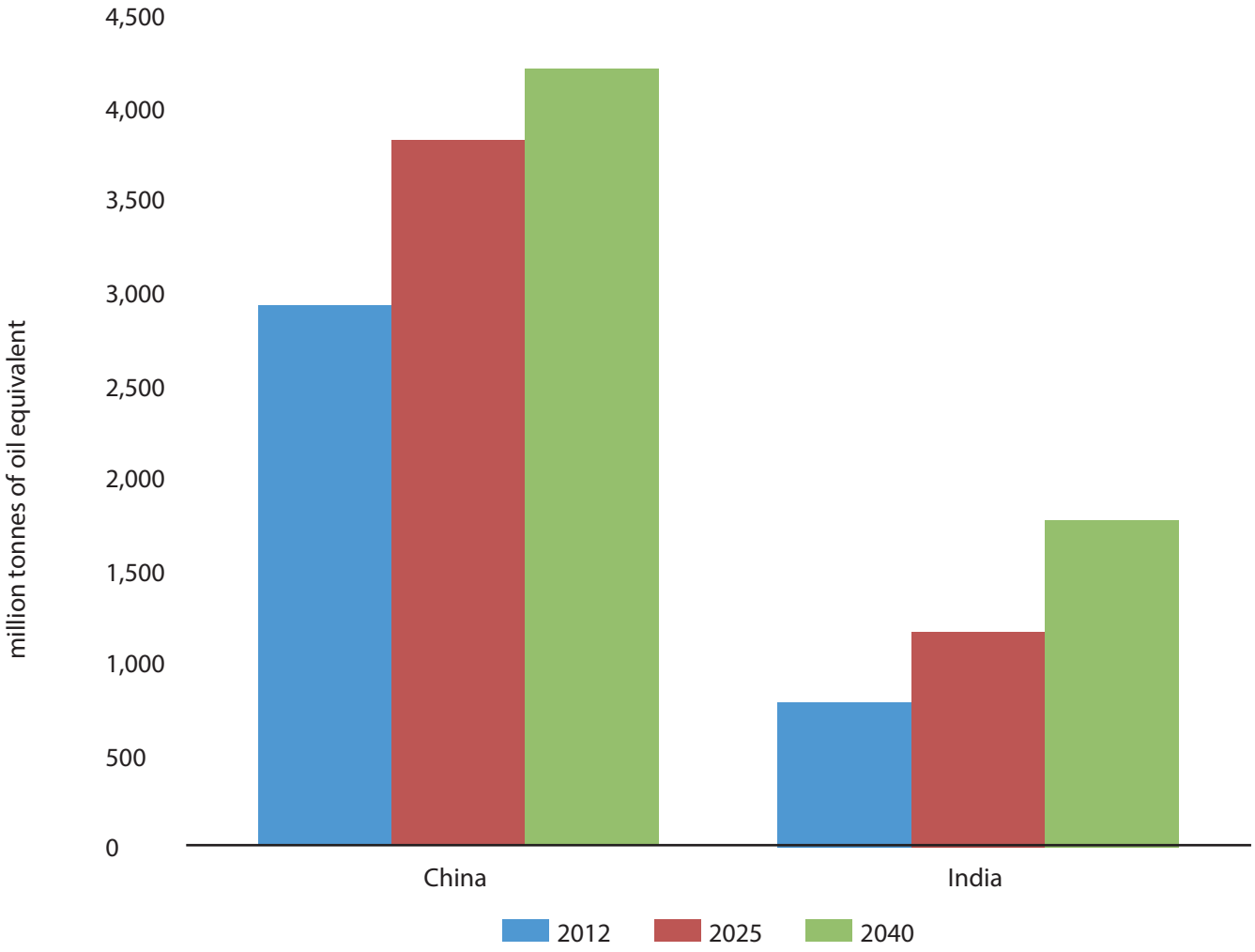
Source: IEA (2014) estimates using UN Population Division data

Despite a slowdown in China's economic growth rate, the country's role in the global economy will continue to be critical. According to a study by the World Bank, even if China were to gradually halve its growth rate to 5% as predicted, it would still be expected to overtake the United States as the world's largest economy.[45] At the same time, China's projected rise in income throughout this period would be equivalent to adding the equivalent of 15 of today's South Korea to the world economy.[46]

These trends will translate into continued robust growth in Chinese energy demand over the next two decades, albeit with a tapering off sometime in the 2030s (see Figure 3.1). The International Energy Agency projects that in the period leading up to 2025, China will remain the dominant driving force behind the rise in global energy demand, accounting for more than one-third of the global increase in demand over that period. By 2025, China's share of global energy demand is projected to rise to 31%, reaching 3,802 Mtoe. China's demand for oil is projected to increase by 41% to 658 Mtoe in 2025.[47]

45 Schellekens (2013).
46 Ibid.
47 International Energy Agency (2014)

Figure 3.1 **China and India's Primary Energy Demand Projections**

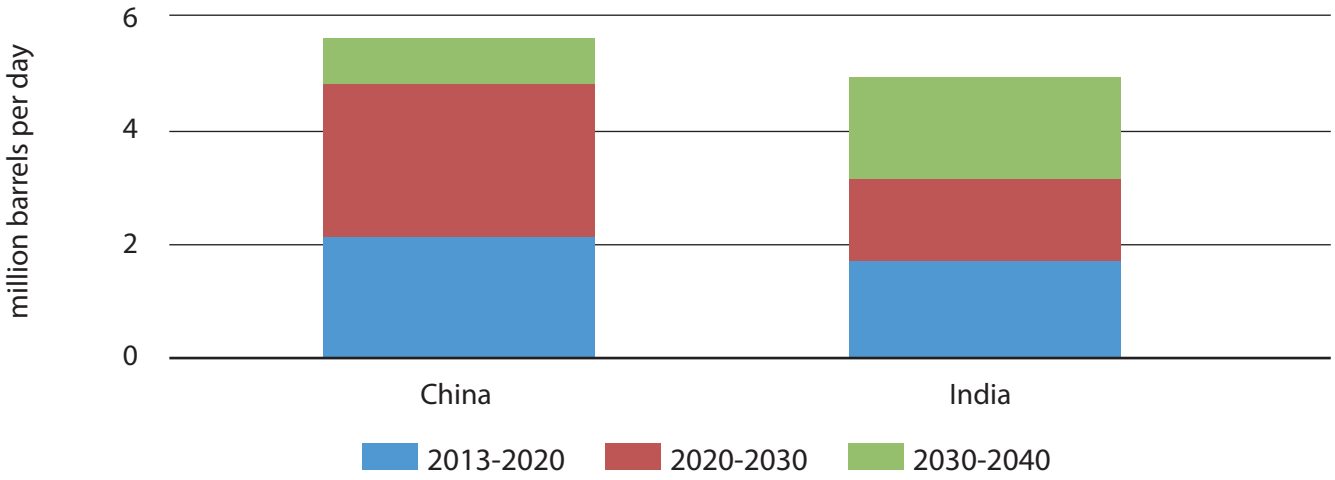


Source: IEA (2014)

The landscape changes after 2025, however following structural changes in the Chinese economy, a leveling off and eventual decline in the country's population growth, as well as policy-driven efficiency improvements.[48] The country is still projected to become the world's largest oil consumer in the early 2030s, with consumption reaching an estimated 15.7 million b/d of oil in 2040.[49] Yet, the IEA projects that 90% of China's total increase in oil consumption from 2012-2040 occurs prior to 2030; thereafter, growth is minimal (see Figure 3.2). The Energy Information Administration expects China to import over 66% of its total oil by 2020 and 72% by 2040, as demand will continue to outstrip domestic supply.[50]

48 Ibid.
49 Ibid.
50 Energy Information Administration, China (2014)

Figure 3.2 **China and India's Incremental Oil Demand Projections (2013-2040)**



Source: IEA (2014)

The picture for mineral demand is similar, though specific commodities within that group may see more of a slowdown, as China's economy shifts away from resource-intensive industry and into service provision. China is still at a developmental stage where per capita mineral consumption will rise alongside increases in per capita GDP. According to a study by the United States Geological Survey, countries with real GDP per capita above USD$10,000 tend to exhibit higher rates of mineral consumption per capita,[51] though consumption generally plateaus as a country's economy matures.[52]

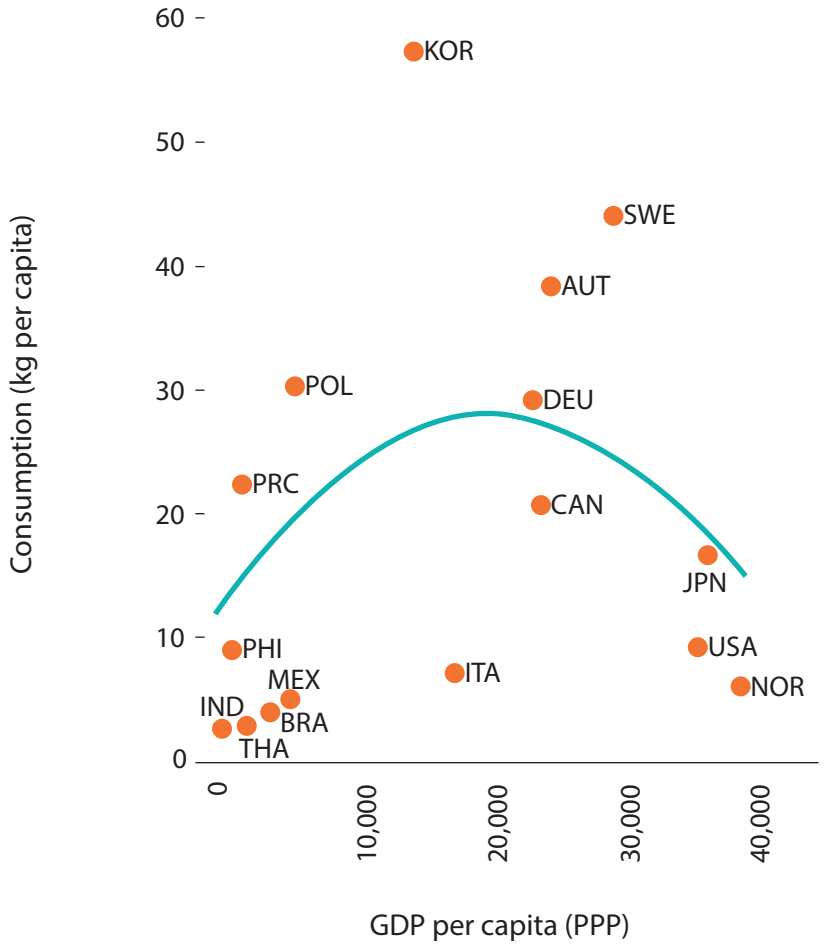
Using copper as an example, a 2012 study by the Inter-American Development Bank reveals that China and India may still be decades away from reaching the turning point at which per capita consumption of minerals begins to decline. Assuming a 7% annual growth rate of refined copper consumption (below the average of 9% between 1992 and 2012), the study concluded that it would take China and India 35 and 51 years respectively to reach this turning point.[53]

Still, even once this turning point is reached, China's level of demand for minerals will continue to be significant given its economic weight.[54] Chinese demand should thus continue to create opportunities for trade with Latin America. Figure 3.3 shows the relationship between per capita consumption of copper and per capita income across selected economies as an example.

Furthermore, although China's current economic rebalancing might affect the demand for some mineral commodities such as iron ore - which is more closely associated with investment - demand for other minerals that are associated with sectors like consumer and durable goods, including copper or rare-earth minerals, may see rising consumption.[55] Purchases of consumer goods by Chinese citizens with increasing disposable income, like televisions or automobiles, will have an increasingly important impact in China's mineral demand in the future. Given China's relatively constrained mineral endowment, its mineral imports will continue to be strongly linked to growth in the country.

51 Menzie, DeYoung, and Steblez (2000)
52 Menzie, Singer, and DeYoung (2005)
53 Inter-American Development Bank (2012)
54 Ibid.
55 Canuto (2014); Menzie and Tse (2006)

Figure 3.3 **Turning Point for Copper Consumption**



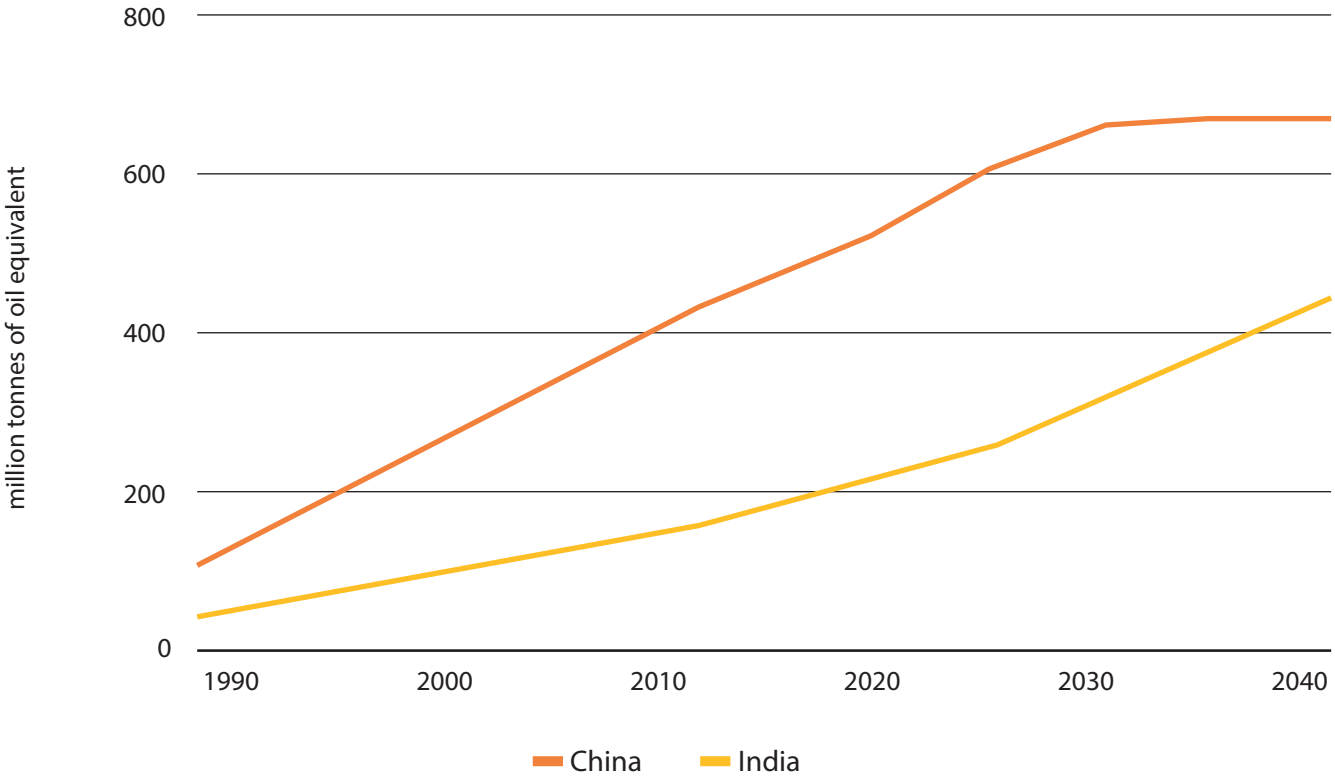
Source: IDB (2012)

Although India's demand for energy and mineral commodities has remained at a lower level than China's, its continued growth in income per capita and likely future structural reforms are bound to increase the country's demand for these commodities over the next decades. Despite its recent economic slowdown, India's economy is regaining momentum. Although the country faces serious economic constraints, including high levels of debt, infrastructure deficiencies, and continued political gridlock, there is potential for increased industrial production and higher rates of economic growth in the future. From 2012 to 2040, India's economy is projected to grow by 6% per year. By the late 2020s, India's GDP per capita is projected to reach China's current level and to continue growing rapidly thereafter. Around 2030, India is also expected to become the world's most populous country.[56]

These developments will fuel India's future growth in energy demand, increasing its importance in global markets just as China's is beginning to wane slightly. According to the International Energy Agency, India is set to take over China as the main source of global energy demand growth by the late 2020s. From 2012 to 2025, India's primary energy demand is projected to grow from 788 Mtoe to 1,170 Mtoe and to continue growing thereafter by 2.8% per year until 2040 to reach 1,757 Mtoe.[57] With respect to oil, India's demand is projected to grow more significantly after 2030 (see Figure 3.4). India's oil demand is estimated to grow by 3% per year from 2025 until 2040, reaching 9.2 million b/d and transforming the country into the world's third-largest oil consumer after China and the United States. Meanwhile, domestic production is set to remain relatively flat at around 1 million b/d.[58] Thus India's crude oil imports and therefore its participation in the international oil market are expected to grow dramatically during this time.

56 International Energy Agency (2014)
57 Ibid.
58 Ibid.

Figure 3.4 **China and India's Oil Demand Projections, 1990-2040**



Source: Authors' calculations from UN Comtrade data

Similarly, India's demand for mineral commodities should see large increases with projected economic expansion and improvements to living standards. India's current per capita consumption of minerals is among the lowest in the world.[59] As the Indian economy modernizes, it will require massive investments in infrastructure and industry. According to a 2012 study of India by the United States Geological Survey (USGS), the country's demand for metals and minerals is projected to increase four to five times over the next 15 years.[60] As previously mentioned, taking copper as an example, it should take around 51 years for the country to reach the turning point where demand for that mineral begins to decline. Until then, India's level of mineral demand will grow.

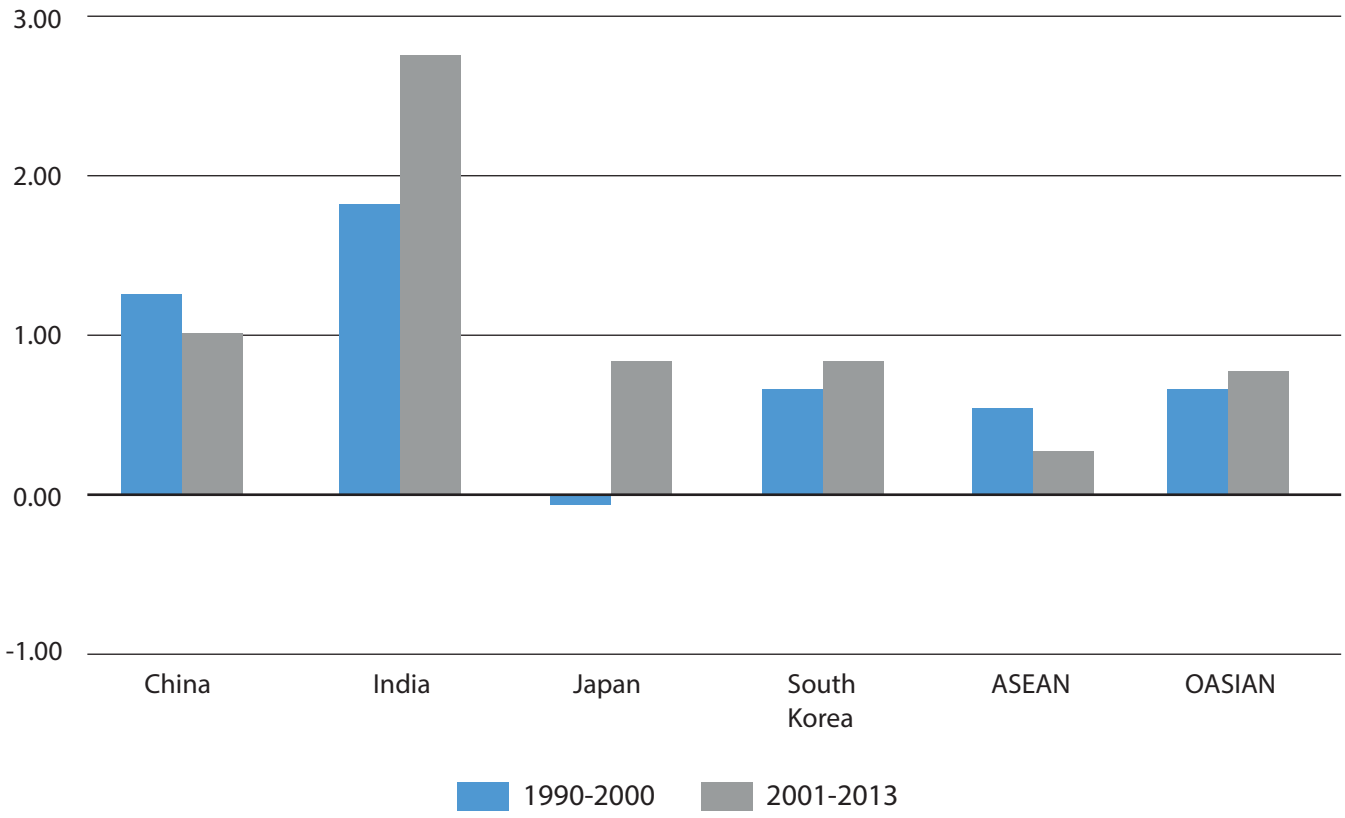
III.B. Future Trade

As a result of the developments set to take place in the Chinese and Indian economies over the next few decades, future energy trade between Asia-LAC will continue to be driven primarily by demand from the two Asian giants. Many Asian economies – particularly India – are consuming ever-growing amounts of LAC's energy, beyond what would be expected from their GDP growth alone. Figure 3.5 shows estimates of Asia's income elasticity of demand for LAC's energy exports from 1990-2000 and from 2001-2013 (see Technical Appendix for estimation details). Immediately evident is that India's income elasticity of demand for LAC exports grew dramatically between the two time periods.

59 USGS, India (2014)
60 Ibid.

From 2001-2013, the average income elasticity of demand for LAC energy exports for the world was near 0.34. That is, for every 1% in GDP growth, energy imports from LAC could be expected to grow by 0.34% on average. For every 1% increase in Indian GDP, however, LAC's energy exports to India grew by 2.48% during the same time period. China's income elasticity of demand with respect to LAC's energy exports was also higher than the average: for every 1% increase in Chinese GDP from 2001 to 2013, the country's energy imports from LAC grew by 0.91%.

Figure 3.5 **Asia's Income Elasticity of Demand for LAC's Energy Exports**



Note: See Technical Appendix for estimation details
Source: Authors' estimates from UN Comtrade data

Following the projections presented above for oil demand in China and India, it is reasonable to expect robust inter-regional trade in energy in the future. India's income elasticity of demand for LAC energy exports will likely increase more than China's given the structural changes taking place in the Chinese economy and India's higher import dependency compared to China's.

Over the coming three decades, crude oil will likely remain LAC's primary energy export to Asia. By 2040, Asian countries are expected to import two out of every three barrels of crude traded internationally.[61] According to the International Energy Agency, Asia's import requirements of crude oil will rise to around 33.5 million b/d, up from 19.7 million b/d in 2013. While the Middle East will almost certainly remain the largest supplier of crude oil to Asia, the region can only partially satisfy Asia's growing import needs.

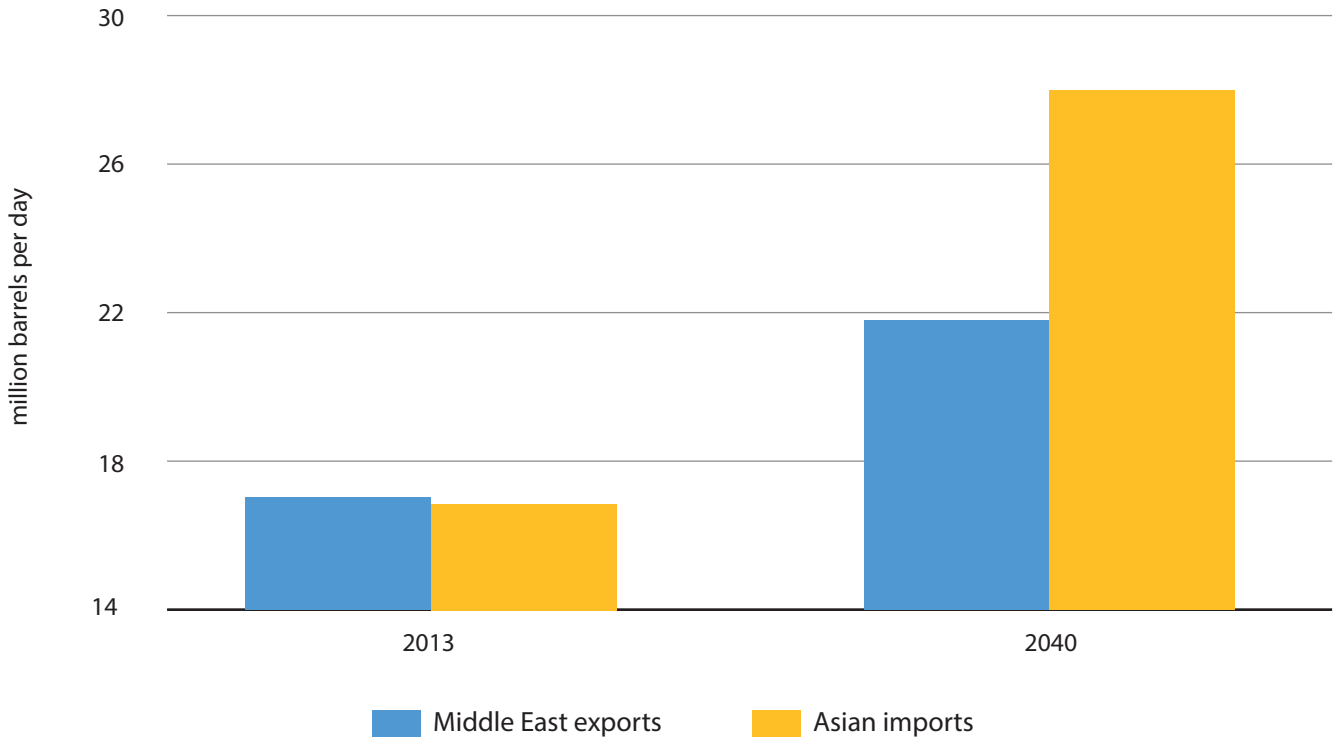
Figure 3.6 compares the Middle East's current and projected exports of oil to Asia's import demand. Asia's import requirements have already caught up with the volume of crude oil exports available from the Middle East, making import diversification critical for Asia's continued growth moving forward.[62]

61 International Energy Agency (2014)
62 Ibid.

Dependence on supply from the Middle East increases Asia's vulnerability to potential disruptions or to the implications of possible shortfalls in investment in the region due to current or future conflict. At the same time, exports of oil from Africa – another important supplier of oil for Asia – are expected to decline in the coming decades as output falls and local demand increases.[63] In contrast, Latin America's current oil production is expected to rise to 12 million b/d by 2030, from 9.4 million b/d in 2013. Production growth is projected to be led mainly by Brazil, Mexico, Colombia, and Venezuela.[64]

Thus LAC is expected and forecast to become an increasingly important source of crude oil for Asia. Nevertheless, increased production will rely on investment, which in turn hinges on a rebound in the price of oil as well as political and economic stability in the region, particularly in the larger oil producing countries.

Figure 3.6 **Asian Imports vs Middle East Exports of Crude Oil**



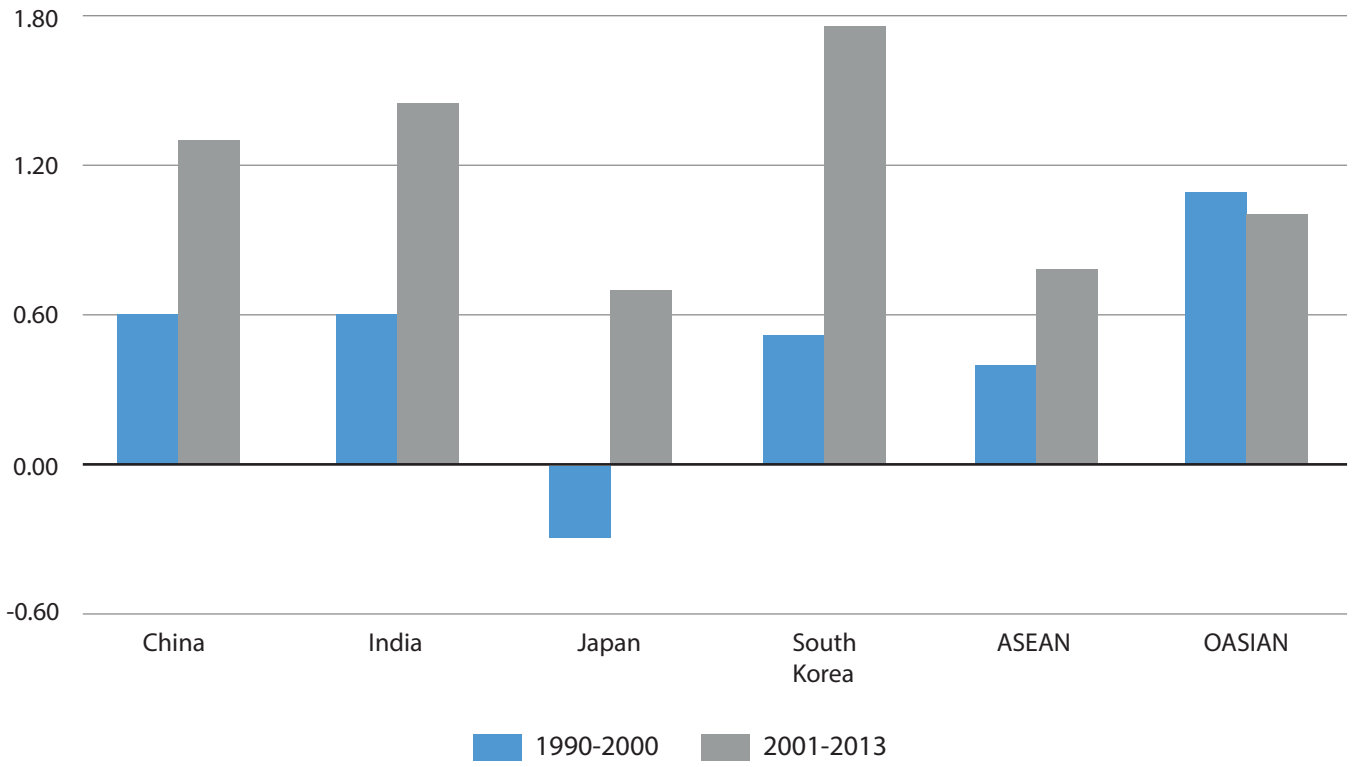
Source: IEA (2014)

Although Asia's energy mix is projected to shift increasingly towards the use of natural gas, it is unlikely that LAC will become a major supplier of gas to the region given the high transportation costs associated with its trade as well as a lack of the necessary infrastructure to supply the requisite amounts. Asia is also relatively rich in coal reserves, making a higher share of coal in inter-regional trade unlikely. On the other hand, it is possible that Asia's exports of petroleum products to LAC could increase. LAC is projected to become more import-dependent on petroleum products in the future, while Asia's downstream sector will grow more competitive.[65] The International Energy Agency projects that LAC will have to import at least 2 million b/d of petroleum products by 2030, representing 20% of consumption.[66]

63 Ibid.
64 Ibid.
65 Ibid.
66 Ibid.

As is the case with inter-regional trade in energy, future mineral trade between Asia and LAC can be expected to expand by more than would be predicted by mere GDP growth. From 2001-2013, the average income elasticity of demand for LAC's mineral exports was 0.44. As shown in Figure 3.7, South Korea's income elasticity of demand for LAC's mineral exports was the highest among Asian countries: for every 1% increase in South Korea's GDP, LAC's exports increased by 1.77%. China and India's income elasticity of demand with respect to LAC's mineral exports was similar, at 1.3% and 1.39% respectively.

Figure 3.7 **Asia's Income Elasticity of Demand for LAC's Minerals Exports**



Note: See Technical Appendix for estimation details
Source: Authors' estimates from UN Comtrade data

Given LAC's comparative advantage in copper and iron ore, these commodities will likely continue to make up the bulk of inter-regional trade in minerals. This is also evident by the LAC sectors in which Asian companies tend to invest. Nevertheless, the share of these minerals in inter-regional trade might shift given the structural changes taking place in their economies.

Demand for minerals will be affected by the future uses for these mineral commodities, population growth, and the level of income that will determine how much of a commodity is consumed. In the long-run, however, per capita consumption will remain at much higher levels. Changes in per capita copper consumption in most developed countries including the United States have been small, for example.[67]

67 Ibíd.

IV. Conclusions

Our analysis of the past and future trends in energy and mineral trade between Latin America and Asia beginning in 1980 through 2040 reveals an ever-growing inter-dependence between the regions. Propelled by unprecedented demand for crude oil and minerals in China and India, Asia has come to hold a vital position as a destination for Latin American exports. The surge in Asia-LAC trade in energy and minerals following China and India's economic rise can be characterized as unprecedented in terms of scale and speed, having grown dramatically in just the last decade.

Inter-regional trade has brought economic benefits to Latin America and the Caribbean, but it has also raised concerns about its impact on the region's long-term growth prospects, its political economy, and the environment. Inter-regional trade follows a similar pattern today as it did in the past, with LAC exporting raw materials to Asia in exchange for manufactured goods. Given China and India's projected future demand for energy and minerals outlined in this study, LAC governments can expect to see a similar relationship develop and grow into the future.

To a great extent, such patterns are a reflection of both regions' comparative advantages and are driven by market forces. Asia has turned to Latin America in an effort to overcome its natural resource constraints and LAC has been able to diversify and expand its export markets for energy and minerals at a time when demand for these commodities has slowed from markets once considered critical, such as the United States.

Yet, Latin America's exports to Asia have become increasingly concentrated on a few economies and commodities. This puts increasing pressure on LAC countries, which are becoming ever more reliant on exports of raw materials to boost economic growth. In the future, a more proactive response from LAC governments to attract Asian investment in diverse sectors of the economy could lead to a more diversified and fruitful inter-regional relationship.

Bibliography

Alves, A.C. 2013. "Chinese Economic Statecraft: A Comparative Study of China's Oil-backed Loans in Angola and Brazil." Journal of Current Chinese Affairs 42(1): 99–130.

British Petroleum. 2014. Country Insights for China in BP Energy Outlook 2035.

Canuto. 2014. "The Commodity Super Cycle: Is This Time Different?" Washington, DC: World Bank Economic Premise 150.

Camus, J.A., J. LePham, R. Shankar, and K. White. 2013. "Strictly Business? An Examination of China's Natural-Resource Acquisition Strategy in Latin America." Stanford, CA: Stanford Institute for Economic Policy Research.

CASS. 2010. The China Economy Yearbook. Vol. 4. Brill Academic Publishers. Amsterdam, Netherlands.

Chakraborty, Debjit, and Rakteem Katakey. 2014, October 25. "India plans to diversify oil imports." Live Mint, Retrieved from http://www.livemint.com

Cesa-Bianchi, A., M.H. Pesaran, A. Rebucci, and T. Xu. 2011. "China's Emergence in the World Economy and Business Cycles in Latin America." Washington, DC: Inter-American Development Bank Working Paper 266.

Downs, E. 2011. "Inside China, Inc: China Development Bank's Cross-Border Energy Deals." Washington, DC: John L. Thornton China Center Monograph Series 3.

EIA. 2014. Country Analysis for China. Washington, DC.

EIA. 2014. Country Analysis for India. Washington, DC.

"India diversifying its sources of crude oil imports: Oil Minister Dharmendra Pradhan." 2014, July 23. Economic Times, Retrieved from http://articles.economictimes.indiatimes.com/

Erten, B., and Ocampo J.A. 2012. "Super-cycles of commodity prices since the mid-nineteenth century." DESA Working Paper 110.

Francis, M., and C. Winters. 2008. "India and the Global Demand for Commodities: Is There an Elephant in the Room?" Ottawa, ON: Bank of Canada Discussion Paper 18.

Heap, A. 2005. "China—The Engine of a Commodities Super Cycle." New York, NY: Citigroup Smith Barney.

International Energy Agency. 2014. World Energy Outlook 2014. Paris, France: International Energy Agency and Organisation for Economic Co-operation and Development.

Inter-American Development Bank. 2012. Shaping the Future of the Asia and the Pacific—Latin America and the Caribbean Relationship. Manilla, Philippines: Inter-American Development Bank, Asian Development Bank, and Asian Development Bank Institute.

Inter-American Dialogue's China-Latin America Finance Database. 2014. Washington, DC: Inter-American Dialogue.

Kesler, S. 2007. "Mineral Supply and Demand into the 21st Century." Reston, VA: United States Geological Survey.

Koch-Weser, I. 2015. "Chinese Energy Engagement with Latin America: A Review of Recent Findings." Washington, DC: Inter-American Dialogue.

Lardy, N., and N. Borst. 2013. "A Blueprint for Rebalancing the Chinese Economy." Washington, DC: Peterson Institute for International Economics PB13-02.

Menzie, W.D., J. DeYoung, Jr., and W. Steblez. 2000. "Some Implications of Changing Patterns of Mineral Consumption." Reston, VA: United States Geological Survey.

Menzie, W.D., D. Singer, and J. DeYoung. 2005. “Mineral resources and consumption in the twenty-first century.” In Simpson, R.D., Toman, M.A., and Ayres, R.U., Eds. Scarcity and growth revisited—Natural resources and the environment in the new millennium (pp. 33-53). Washington, DC: Resources For the Future.

Saint-Mézard, I. 2014. “The International Dimensions of India’s Energy Security.” Paris, France: Asia Centre.

Schellekens, P. 2013. “A Changing China: Implications for Developing Countries.” Washington, DC: World Bank Economic Premise 118.

USGS. 2014. Country Analysis for China. Reston, VA.

USGS. 2014. Country Analysis for India. Reston, VA

World Bank. 2014. World Bank Commodity Outlook 2014. Washington, DC.

World Bank and the Development Research Center of the State Council, P.R. China.2013. China 2030: Building a Modern, Harmonious, and Creative Society. 2013. Washington, DC.

Yu, Y. 2011. “Identifying the Linkages between Major Mining Commodity Prices and China’s Economic Growth—Implications for Latin America.” Washington, DC: IMF Working Paper WP/11/86.

Technical Appendix

To estimate the income elasticity of Asia's energy and mining imports from Latin America and the Caribbean, two unbalanced panel data sets were used, covering the value of energy and mining imports traded by X countries for the period 1990–2013, available in UN COMTRADE. Bilateral imports are aggregated into the mining and energy categories following the World Trade Organization's classification and using data at the six-digit level of the Harmonized System code.

The income elasticity of imports is estimated with the following extended gravity equation adapted from IDB (2012) and reported for the periods of 1990–2000 and 2000–2013, which were chosen on the basis of what looks like a clear "structural break" in the Asia–LAC relationship:

$$\ln M_{ijt} = \alpha + \beta_1 \ln dist_{ij} + \beta_2 \ln Y_{it} + \beta_3 \ln Y_{jt} + \beta_4 \ln L_{it} + \beta_5 \ln L_{jt} + \beta_6 \ln N_{it} + \beta_7 \ln N_{jt} + \beta_8 COL + \beta_9 COMCOL + \beta_{10} COL45 + \beta_{11} BORD + \beta_{12} LANG + \beta_{13} RTA + \beta_{14} FORMER + \beta_{15} CHN + \beta_{16} IND + \beta_{17} JPN + \beta_{18} SKOR + \beta_{19} ASEAN + \beta_{20} OASIAN + \beta_{21} LAC + \beta_{22} CHN*\ln Y_{it} + \beta_{23} IND*\ln Y_{it} + \beta_{24} JPN*\ln Y_{it} + \beta_{25} SKOR*\ln Y_{it} + \beta_{26} ASEAN*\ln Y_{it} + \beta_{27} OASIAN*\ln Y_{it} + \beta_{28} LAC*\ln Y_{it} + \beta_{29} CHI*\ln Y_{it}*LAC + \beta_{30} IND*\ln Y_{it}*LAC + \beta_{31} JPN*\ln Y_{it}*LAC + \beta_{32} SKOR*\ln Y_{it}*LAC + \beta_{33} ASEAN*\ln Y_{it}*LAC + \beta_{34} OASIAN*\ln Y_{it}*LAC + \lambda_i + \lambda_j + \lambda_t + \varepsilon_{ijt}$$

where,

- i - importing country
- j - exporting country
- t - year
- M_{ijt} - value of i's imports from j
- $Dist_{ij}$ - denotes bilateral distance between importer and exporter
- Y_{it} and Y_{jt} - GDP of importer and exporter at time t
- L_{it} and L_{jt} - land area of the importing and the exporting countries
- N_{it} and N_{jt} - market size (population) in the importing and the exporting countries
- COL - dummy variable taking the value of 1 when the countries involved share a colonial relationship, 0 otherwise
- COMCOL - dummy variable taking the value of 1 if the countries involved were colonized by the same country, 0 otherwise
- COL45 - dummy variable taking the value of 1 if the country pairs were in a colonial relationship post 1945, 0 otherwise
- BORD - dummy variable taking the value of 1 if the countries involved share the same border, 0 otherwise
- LANG - dummy variable taking the value of 1 if the countries involved speak the same language, 0 otherwise
- RTA - dummy variable taking the value of 1 if both countries are members in the same trade agreement, 0 otherwise
- FORMER - dummy variable taking the value of 1 if the countries were previously part of the same country, 0 otherwise
- CHN - dummy variable taking the value of 1 if the importing country is the PRC, 0 otherwise
- IND - dummy variable taking the value of 1 if the importing country is India, 0 otherwise
- JPN - dummy variable taking the value of 1 if the importing country is Japan, 0 otherwise
- SKOR - dummy variable taking the value of 1 if the importing country is Republic of Korea, 0 otherwise
- ASEAN - dummy variable talking the value of 1 if the importing country is Thailand, Malaysia, Singapore, or Indonesia, 0 otherwise
- OASIAN - dummy variable taking the value of 1 if the importing country is an Asian country not classified as CHN, IND, JPN, SKOR, or ASEAN, 0 otherwise
- LAC - dummy variable taking the value of 1 if the reporting country j is located in Latin America and the Caribbean, 0 otherwise
- λ_i, λ_j and λ_t - importer, exporter, and year fixed effects
- ε_{ijt} - i.i.d. error term which is assumed to be normally distributed