4. Trade Integration in Latin America and the Caribbean: Hype, Hope, and Reality

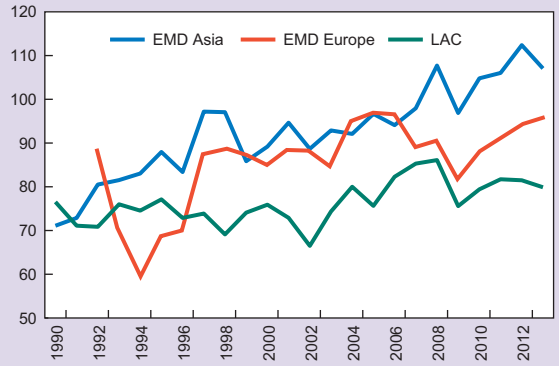
Latin America and the Caribbean (LAC) is less open to trade than most other emerging market regions. This chapter finds that most of the countries in the region have been "undertrading" given fundamentals, despite efforts by a number of them to open up to trade. Strong performers have been able to penetrate large markets, including advanced economies, which requires higher levels of productivity and competitiveness. LAC stands to benefit from deeper integration into global value chains, although we find that the direct short-term trade impact is likely to be small. Finally, trade agreements should focus on raising global competitiveness, and avoid the creation of regionally protected trade blocks.

Growth in Latin America and the Caribbean (LAC) has been slowing for several years, amid generally worsening terms of trade and pressing policy challenges (Chapter 2). In this context, deeper trade integration—both within the region and with the rest of the world—has been put forward as a strategy for reinvigorating the region's economic dynamism (Figure 4.1) (World Bank 2014, De la Torre and others 2015).

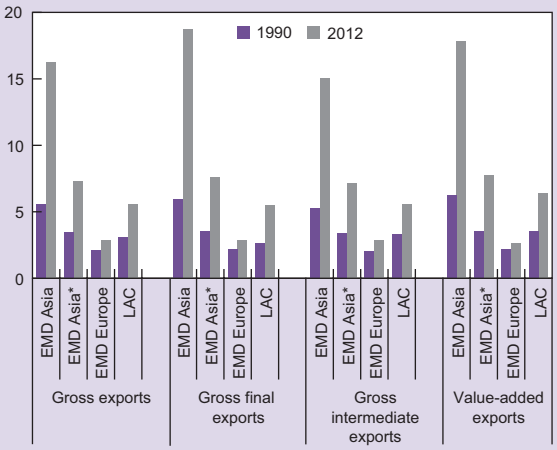
Like their peers in emerging Asia and Europe, LAC economies have significantly increased their share in total world exports over the past 25 years, whether measured in terms of gross flows (total, final, or intermediate goods exports) or in value-added terms (Figure 4.1).[1] However, the strong growth in export values in LAC partly reflected rising prices during the commodity boom, which fueled an underlying trend of greater export concentration. Against this backdrop, it is timely to take stock of key trade patterns in LAC, including comparison with other emerging market regions, and analyze the potential for deeper trade integration and its benefits.

Figure 4.1
Trade: LAC and Other Regions

1. Trade Openness
(In percent of GDP, regional median)



2. Participation in World Exports
(Percent)



Sources: Eora MRIO, Comtrade; CEPPI; IMF, World Economic Outlook database; and IMF staff calculations.
Note: EMD = emerging and developing; LAC = Latin America and the Caribbean. EMD Asia* excludes China. Openness (gross) is the sum of gross exports and imports divided by nominal GDP from the IMF, World Economic Development database.

Setting the Stage

This chapter highlights three background facts that are relevant when discussing policies to promote trade in LAC: heterogeneity in policy orientation, patterns of intra-regional trade, and the role of potential trade hubs in the region (Brazil and Mexico).

Note: Prepared by Natalija Novta and Fabiano Rodrigues Bastos with outstanding research assistance provided by Steve Brito.

[1] Gross exports can be decomposed into domestic and foreign content (or value added; for details see Koopman, Wang and Wei 2014). Note that China has had a particularly strong performance, improving its share in global exports by about 10 percentage points over this period.

1. The region is marked by heterogeneity in openness and trade policy orientation.

In terms of openness to trade, LAC exhibits vast cross-country differences, with gross imports and exports ranging from 25 percent to 125 percent of GDP. Variation in trade openness measured in value-added terms is still prominent, but smaller (Figure 4.2).

Regarding trade policies (Figure 4.2), the region is also diverse, with tariff levels ranging from 1.5 percent to almost 14.5 percent. Still, all countries in the region have made progress in reducing trade restrictiveness since 1990 (Figure 4.2).

While conducive to stronger trade, lower average tariffs alone may not be sufficient to secure more homogenous and improved trade openness across LAC. This is likely to be particularly challenging in the current slowing environment for global trade (IMF 2015b).

2. Intraregional trade in LAC—as a share of its exports—is comparable with other regions of emerging and developing economies. However, its composition is different, skewed toward final goods.

While intraregional trade as a share of LAC exports is lower than in other regions (such as Europe or Asia), if we restrict the comparators to emerging markets and developing countries only, LAC appears to have similar levels of regional trade integration (Figure 4.3). A clear difference, though, relates to the composition of trade flows within the region, more heavily oriented toward final goods than in other regions (Figures 4.3 and 4.6).

These trade patterns are consistent with the region's comparative advantages and natural resource endowments—apparent from the contribution of agriculture and mining sectors to the total domestic content of exports (Figure 4.3).

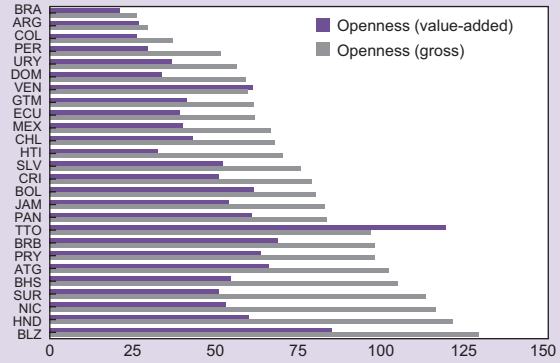
Similar structures of production in LAC, concentrated in the commodity sector, limit the immediate scope to increase regional trade in intermediate goods. The region's structural

Figure 4.2

Openness and Trade Policies

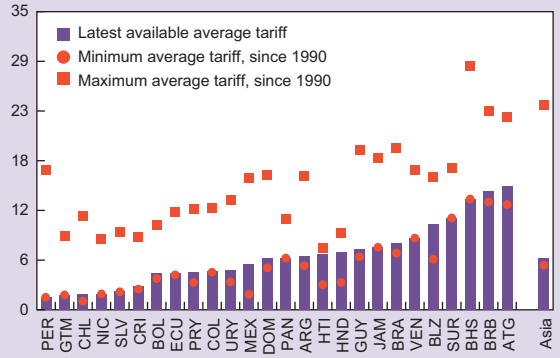
1. Openness

(Percent of GDP)



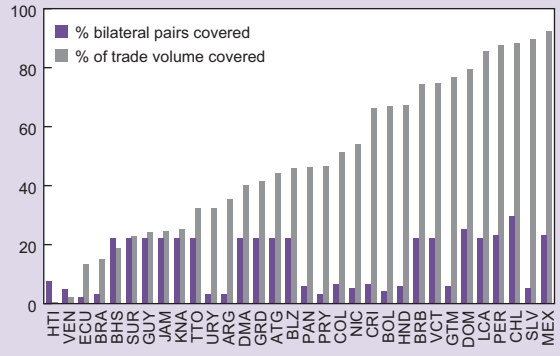
2. Trade Restrictiveness in LAC

(Percent)



3. Trade Agreement Coverage in LAC

(Percent)

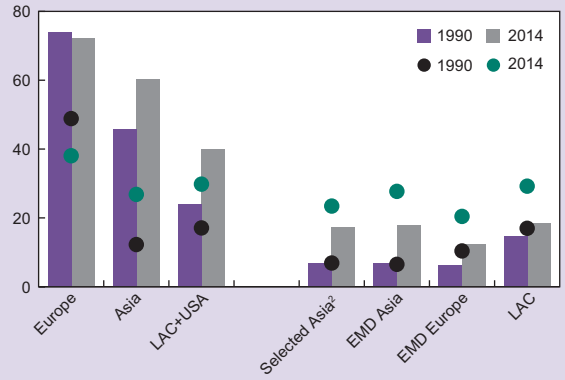


Sources: Eora MRIO; UN Comtrade database; CEPPI; IMF, World Economic Outlook database; World Bank, World Development Indicators tariff database; and IMF staff calculations.

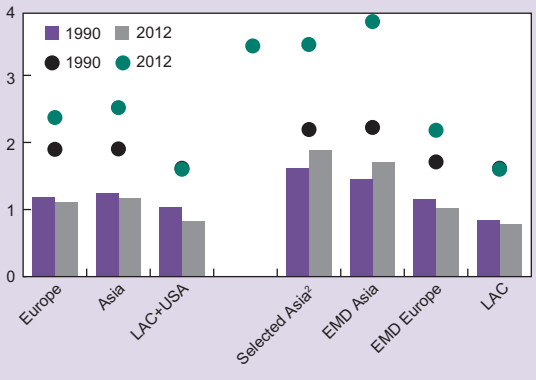
Note: EMD = emerging and developing; LAC = Latin America and the Caribbean. Openness (value added) uses value-added exports as defined by Koopman, Wang, and Wei (2014) divided by nominal GDP. Tariffs are calculated as a weighted average across all industries. For Asia, we show the simple average for all emerging market and developing economies. See page 89 for country acronyms.

Figure 4.3
Intraregional Trade

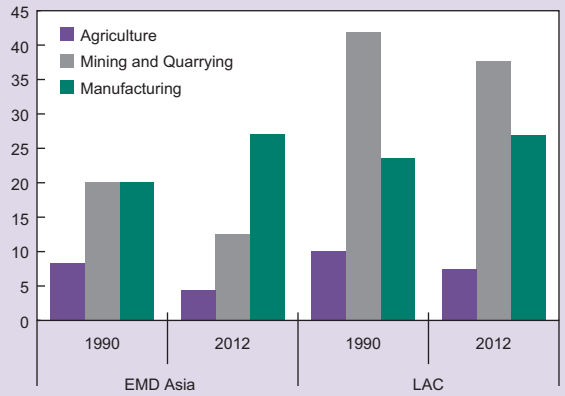
1. Share of Intraregional Gross Exports[1]
(Percent of regional gross exports)



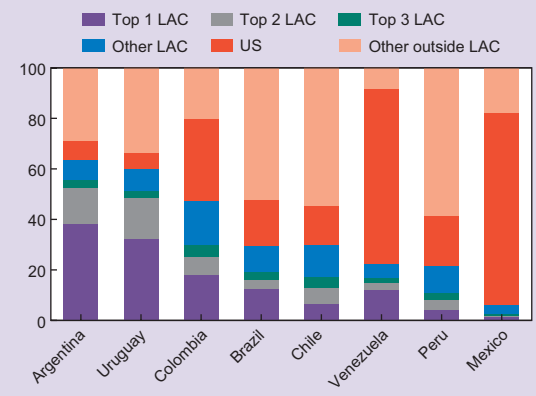
2. Intraregional Intermediate vs. Final Gross Exports[1]
(Ratio)



3. Domestic Value Added by Sector[3]
(Percent of total exports)



4. Exports, by Destination, Selected Economies
(Percent of total exports)



Sources: Eora MRIO; IMF, Direction of Trade database; and IMF staff calculations.
Note: EMD = emerging and developing; LAC = Latin America and the Caribbean.
[1]Bars indicate exports with destinations within the region, divided by total exports of the region. The circles correspond to the median ratio of intraregional exports over total exports, for each region.
[2]Selected Asia includes Cambodia, China, Indonesia, Malaysia, Philippines, Taiwan Province of China, Thailand, and Vietnam.
[3]Weighted average using sector exports. Asia includes only emerging market and developing economies.

drawbacks (Figure 4.4) also hold back the materialization of productive complementarities and economic diversification. Still, there is important heterogeneity across LAC countries in the extent of intra-regional trade.

3. Brazil and Mexico are not playing the role of dynamic emerging market trade hubs in LAC, as China is in emerging Asia.

No economy in LAC has played the dual role of a competitive exporter to large markets and systemic importer from within the region (particularly of intermediate goods)—that is, a trade hub. Specifically:

- Both Brazil and Mexico are top-five trading partners for no more than 12 regional partners (Figure 4.5). Mexico's linkages with the United States are very strong, but integration with LAC has remained limited. Brazil has grown in importance as a regional trade destination (see Figure 4.5), but its important linkages with Argentina and other neighboring economies have not been accompanied by growing market penetration beyond its immediate neighborhood.

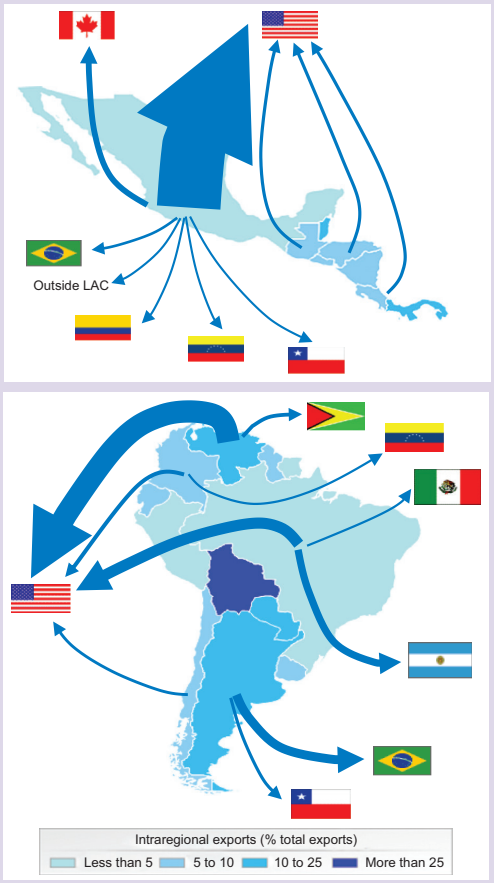
Figure 4.4

Regional Links and Business Environment

LAC Intraregional Exports, 2012

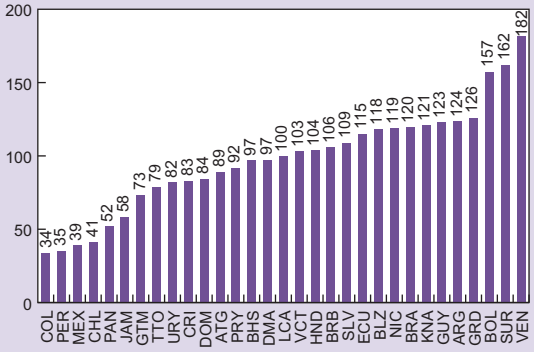
(Arrows: current U.S. dollars, shade: percent of country exports)

1.



2. Doing Business, 2015

(Rank position)



Sources: Eora MRIO; IMF staff calculations; and World Bank, Doing Business 2015.

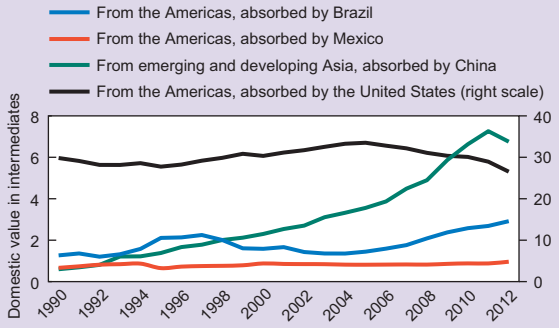
Note: The shading of countries in the map indicates each country's level of intraregional exports, that is, the share of total gross exports with a destination in LAC. The arrows indicate top 10 bilateral export flows for each subregion, with destination in the Americas. The thickness of each arrow corresponds to the value of the bilateral export flow in 2012, in current U.S. dollars. For country acronyms see page 89.

Figure 4.5

Systemic Countries in LAC Trade

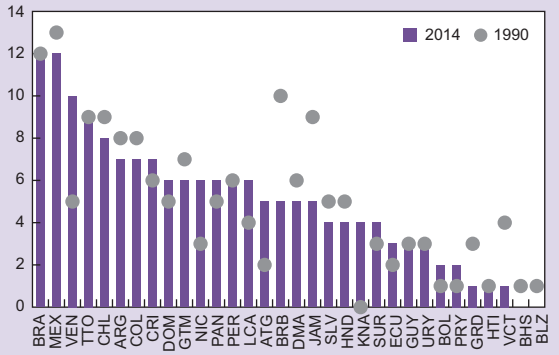
1. Domestic Value in Intermediate Goods Exports, from the Americas and Asia, Absorbed by Local Hubs

(Percentage of exports, weighted average)



2. Number of Times the Country Appears as Top Five Export Destinations in LAC[1]

(Units)



Sources: Eora MRIO; IMF, Direction of Trade database; and IMF staff calculations.

Note: Circles reflect the number of top five export destinations within LAC, for each country shown, in 2014 and 1990. For country acronyms see page 89.

[1]Only LAC destinations considered.

- In marked contrast, China has emerged as a catalyst for wider intra-regional productive complementarities in Asia as it went through significant structural transformation. China has become a trading/processing hub for intermediate goods with growing access to large markets in advanced economies and an indispensable source of regional dynamism of a type that LAC currently does not possess (Blyde 2014; Baumann 2008).

The United States remains an essential trade partner for LAC countries. However, the development of

a strong emerging market trade hub could further boost the region's trade outlook.

Is LAC Undertrading? A More Formal Analysis

We estimate gravity equations for bilateral trade flows to formally assess comparative trade performance across economies—see Anderson (2011), Shepherd (2013), and Noguera (2012).[2] The gravity model provides a useful benchmark to control for standard trade determinants, which we use to characterize trade intensity "gaps" across regions and countries based on the estimated residuals. We consider different specifications based on the following equation:

$$e_{ijt} = \beta' X_{ijt} + \gamma' U_{ijt} + \theta' W_{ijt} + \varepsilon_{ijt} \qquad (4.1)$$

The variable e_{ijt} corresponds to the logarithm of bilateral exports between countries i and j in period t. Model I includes a limited set of standard explanatory variables in vector X (namely GDP of countries i and j, distance, contiguity, whether a common language is spoken, whether a previous colonial relationship existed, whether the exporting country is landlocked, and time fixed effects) (see Table 4.1).

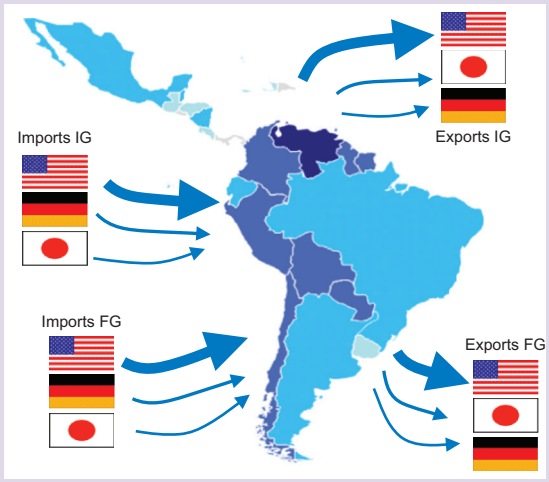
Later in the chapter, we introduce Model II, which includes bilateral pair fixed effects (vector U), and a set of additional variables, including supply chain and trade policy related measures, captured in vector W.[3]

Figure 4.6

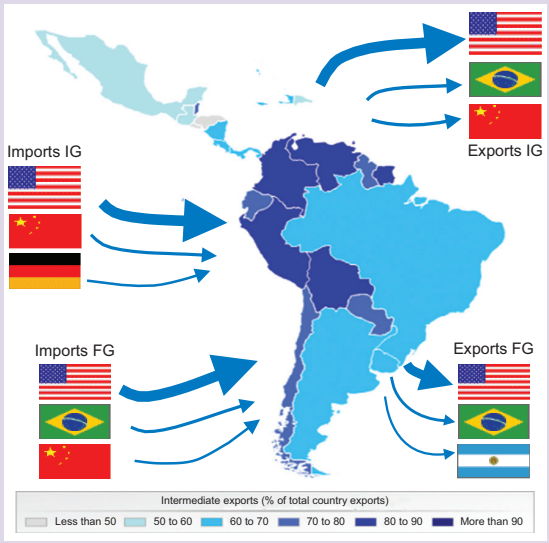
Intermediate and Final Goods: Top Partners

(Arrow: current U.S. dollars; shade: percent of country's exports)

1. LAC: Imports and Exports, 1990



2. LAC: Imports and Exports, 2012



Sources: Eora MRIO; and IMF staff calculations.
Note: IG = intermediate goods, FG = final goods. The shading of countries in the map indicates each country's intermediate goods exports as a share of total country exports. The arrows indicate the top three export destinations and import sources, for LAC as a whole in 1990 and 2012, for final and intermediate goods. The thickness of each arrow corresponds to the value of the aggregate export (import) flow in 1990 and 2012, in current U.S. dollars.

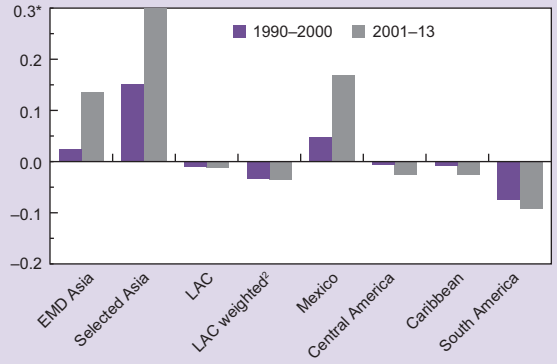
The estimated residuals obtained from Model I capture bilateral trade intensity after controlling for the basic set of determinants. The model is estimated for both gross exports and value-added

[2] Over the last decade, research has been focusing on the theoretical foundations of the gravity equation—see Anderson and van Wincoop (2003).

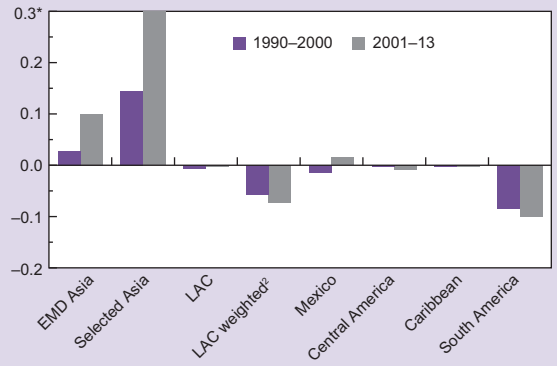
[3] The sample includes bilateral exports from 1990 to 2012 or 2013 (depending on the variable). The datasets used are the UN Comtrade database, EORA, WEO, and CEPPI. The model is estimated using ordinary least squares with clustered robust standard errors and also through Poisson pseudo-maximum likelihood (PPML). Santo Silva and Tenreyro (2006) argue that PPML performs better because it can account for cases of zero trade flows.

Figure 4.7
Estimated Trade Intensity Gaps
(Based on residuals from gravity regressions)

1. Trade Performance, Gross Exports[1]
(Mean of gravity regression residuals: + overtrading /– undertrading)



2. Trade Performance, Value Added[1]
(Mean of gravity regression residuals: + overtrading /– undertrading)



Sources: CEPPI; IMF, World Economic Outlook database; UN Comtrade; and IMF staff calculations.
[1]Bars correspond to the mean of estimated residuals in the gravity model, which includes the following regressors: distance, contiguity, language, colonizer, landlocked, and time fixed effects.
[2]GDP-weighted average.
Note: Bar for selected Asia (2001–13) capped—value reaches 0.6 (gross exports, panel 1) and 0.4 (value-added exports, panel 2). Bars for Central America, Caribbean and South America are also GDP-weighted means.
Note: EMD = emerging and developing. Selected Asia includes Cambodia, China, Indonesia, Malaysia, Philippines, Thailand, and Vietnam.

exports.[4] The resulting residuals can be interpreted as deviations of observed export intensities from what would be predicted based on standard geographic and cultural determinants along with common calendar year effects. Figure 4.7 shows a summary of these residuals, or trade intensity gaps.

[4] The data on value-added exports include goods and services, while the data on gross exports include only goods. This is an important feature to keep in mind as a growing literature on services exports documents important specificities (see Saez and others 2015).

On average, all else being equal, LAC countries stand out for bilateral trade intensity gaps in both periods of the sample (1990–2000 and 2001–13), and their comparative standing has worsened more recently—this result applies to both gross and value-added exports (Figure 4.7), and South America is the main driver of this result.

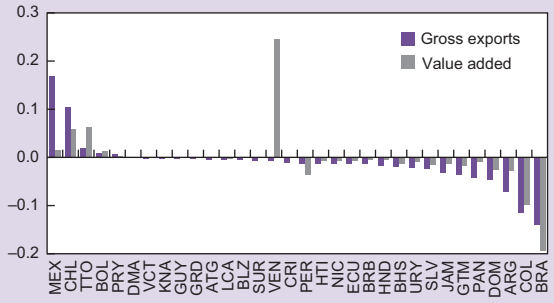
Heterogeneity in LAC

Estimates of residuals from the basic gravity equation can also be used to further highlight regional heterogeneities with respect to trade intensity (Figure 4.8). Argentina and Brazil, for example, appear with relatively large negative residuals, suggesting "undertrading," and this seems consistent with their relatively restrictive trade policies. However, several economies with more trade-friendly policies also fall short of what could be expected—for instance, Colombia, Costa Rica, or Peru.

One factor that appears to affect average trade performance relative to the model benchmark is how well (or badly) economies perform in large markets. This can be illustrated by examining the partner-specific residuals of countries at opposite ends of Figure 4.8.

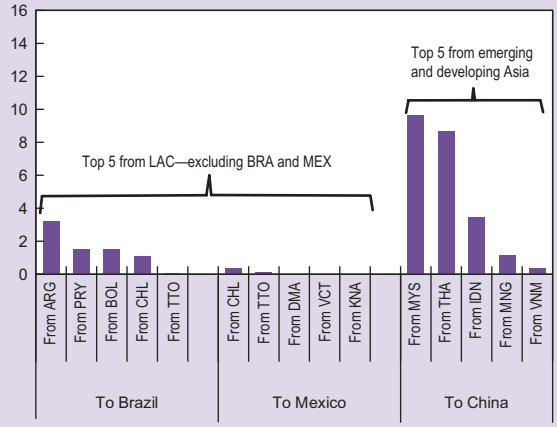
- For instance, on the one hand, Mexico's strong average trade performance is overwhelmingly driven by bilateral trade flows with the United States. For Brazil, on the other hand,

Figure 4.8
Heterogeneity in LAC, 2000–13[1]
(Units, average residuals)



Sources: CEPPI; IMF, World Economic Outlook database; UN Comtrade; and IMF staff calculations.
[1]Based on PPML estimation of the gravity equation. Bars correspond to the mean of estimated residuals in Model I. Venezuela has high value-added residual due to exports of oil. See page 89 for country acronyms.

Figure 4.9
Regional Hubs: Brazil, China, and Mexico
(Average residuals from gravity equations, 2001–13)



Sources: CEPPI; IMF, World Economic Outlook database; UN Comtrade; and IMF staff calculations, based on Poisson pseudo-maximum likelihood estimation of the gravity equation.
Note: See page 89 for country acronyms.

a particularly strong negative residual in trade flows with the United States is behind the large average trade intensity gap.

- The sources of residuals for Chile are a bit more varied, including not only trade with China as expected, but also Japan and Korea. In the case of Colombia, weak bilateral exports to the two largest countries in the region (Brazil and Mexico) are pulling down average residuals.

The analysis also corroborates the limited role that Brazil and Mexico play as regional trade hubs. The residuals for exports of LAC countries to Brazil and Mexico are low, especially compared with residuals for exports of Asian countries to China (Figure 4.9).

The importance of performance in large economies is not trivially due to size, since the GDPs of reporting and partner countries are controlled for in this framework. However, by construction, the residuals will reflect a number of factors affecting competitiveness not directly included in the regression. Hence, we turn to a set-up with bilateral pair fixed effects, to control for unobserved heterogeneity.[5]

[5] We also run specifications with exporter and importer fixed effects—see Novta and Rodrigues Bastos (forthcoming).

The Role of Value Chains and Regional Trade Agreements

The emergence of value chains across countries has contributed to rising trade volumes and caused positive growth spillovers across several Asian economies.[6] We examine the role of global supply chains by augmenting Model I with two variables (included in vector W of equation 4.1): (1) foreign value added in gross exports, and (2) domestic value added of intermediate goods exports that are reexported to third countries.[7] The specification uses bilateral pair fixed effects (vector U in equation 4.1). Both GVC variables are used at the country level (not bilateral pair level), measured in percent of gross exports, and are lagged in the estimation. They are meant to capture the impact of predetermined economy-wide features related to global value chains on bilateral trade performance.

Higher foreign value added in gross exports is typically used to capture rising integration in global value chains. For example, imports of intermediate goods to assemble and export a final product would embed higher foreign value added in production. Countries that are more downstream in the global production chain tend to have higher foreign value added in their exports, whereas commodity-rich economies are placed upstream and would naturally have a lower proportion of foreign value added in their exports.

The other global supply chain variable used is less well known: domestic value added embedded in intermediate goods exports that are reexported to third countries. This measure captures the extent to which economies supply intermediate inputs to third countries, thereby engaging in longer productive chains.

[6] For discussion of how the development of global value chains has changed the elasticity of exports with respect to the exchange rate, see the October 2015 *World Economic Outlook*, Chapter 3.
[7] This measure is based on a decomposition of domestic value added that traces in which countries final and intermediate goods are ultimately absorbed. It was first proposed by Koopman, Wang, and Wei (2014).

The econometric results suggest that countries with a higher foreign content of exports (more integration into global value chains) tend to have stronger performance in bilateral gross export flows. However, the direct quantitative impact is small and stronger for emerging and developing Asia than for LAC. Moving from the 5th to the 95th percentile of foreign value added in the sample is associated with an increase in gross exports of about 3 percent in Asia versus 2 percent in LAC.

The results also suggest that economies that engage in longer supply chains have stronger bilateral export performance. The direct quantitative impact is again relatively small, but stronger in LAC than in Asia. Moving from the 5th to the 95th percentile in the sample is associated with an increase in gross exports of about 2 percent in LAC versus 1 percent for emerging and developing Asia.[8]

The economically small, though statistically significant, direct short-term impact of aggregate global value chain variables suggests that more than trade integration is needed. To reap long-term gains, LAC should leverage trade to promote knowledge spillovers and innovation, a long-standing challenge for the region (De La Torre, Lederman, and Pienknagura 2015).

Finally, after controlling for country-specific global value chain dynamics over time and unobserved heterogeneity at the bilateral pair level, we investigate how trade agreements affect bilateral export performance.[9] The results (Table 4.1) obtained from Model II suggest that trade agreements have not been effective in boosting LAC export performance. However this finding is overturned if we use country fixed effects rather than bilateral pair fixed effects.[10] Such contrasting results on the impact of trade agreements are commonly found in the literature.[11] Overall, the takeaway from our results and related literature is that increasing the number of trade agreements might not necessarily boost trade. The specifics of each agreement, and accompanying reforms, will determine its actual benefits.

Policy Takeaways

Improving export performance in LAC is both critical and challenging. Many economies in the region are facing significant slowdowns with deteriorating medium-term perspectives. Exchange rate adjustments will continue to play a role, but tapping trade as a medium-term growth engine is more difficult.

Over the past 25 years, LAC has remained more closed than other emerging market regions, and most economies in the region are undertrading given fundamentals. This has been true despite policy efforts in the region to lower trade barriers. While remaining realistic about the potential for significant improvements, this chapter points to policy avenues that can help:

- Efforts to penetrate large markets are crucial, both through advanced economies and regional emerging market trade hubs. In order to gain

[8] Results for both global value chain variables included are robust to Poisson Pseudo-Maximum Likelihood Estimation (Table 4.1). The results are also robust to using exporter and importer fixed effects instead of bilateral pair fixed effects.

[9] We introduce a dummy variable for trade agreement in vector W in equation 4.1. The dataset on trade agreements is from de Sousa (2012).

[10] The results for this alternative specification are discussed by Novta and Rodrigues Bastos (forthcoming). Basically, the country-level fixed effects specification controls for unobserved heterogeneity through exporter and importer fixed effects, rather than through bilateral pairs fixed effects. Thus, it exploits not only the variation over time in the model (within variation) but also the variation between bilateral pairs for each country. The downside of this approach is that unobserved heterogeneity at the bilateral pair level could introduce omitted variable bias in the estimates. Some studies have also found a low impact of trade agreements on export flows—Frankel, Stein and Wei (1995); Frankel (1997)—while other authors have argued that a greater impact can be found by treating potential endogeneity of trade policy (Baier and Bergstrand 2007).

[11] Cipollina and Salvatici (2012) survey more than 80 different papers on the issue, highlighting their variability in estimated impact, but siding with the view that trade agreements do contribute to trade.

market shares in a competitive environment, bolder progress in structural reforms is needed within LAC.[12]

- LAC should seek to increase participation in multicountry production chains, and lift barriers to trade in intermediate goods. The direct short-term impact on trade from such strategy, however, will remain small unless integration ultimately leads to sustained productivity growth. To achieve that, the best route is to create fertile ground for resource reallocation, learning spillovers and innovation, particularly through the unlocking of intra-industry trade (De La Torre, Lederman, and Pienknagura 2015). In that respect, research has shown that institutions (contract enforceability and judicial quality, in particular) are important conduits for improving trade, especially in intermediate inputs (Nunn 2007).
- Trade agreements are not a magic wand for boosting trade. Lowering tariff barriers is necessary but not sufficient—it requires accompanying structural reforms, and attention to nontariff barriers. Trade agreements should be a tool for raising global competitiveness, and LAC should guard against the risk of creating protected regional blocs or reinstating inward-looking policies (Taylor 1998). In mega-regional trade negotiations, countries in LAC face a challenge to advance their interests—the involvement of Chile, Mexico, and Peru in the Trans-Pacific Partnership (TPP) is a leading example.[13] Last, but not least, the proliferation of trade agreements requires stepped up coordination among the multiple existing and planned initiatives—particularly true for the MERCOSUR and Pacific Alliance.

[12] This point has been emphasized in previous *Regional Economic Outlooks: Western Hemisphere* editions of April 2015 and April 2013, where policy strategies for raising long-term growth prospects were also discussed.

[13] The TPP includes 12 countries in Asia and the Americas, including the United States.

Table 4.1. Gravity Equation

Variables	(1) OLS Gross Exports	(2) OLS Value Added	(3) OLS Gross Exports	(4) OLS Value Added	(5) POISSON Gross Exports	(6) POISSON Value Added
Lag Ln GDP Reporting	1.202***	0.967***	0.430***	0.247***	0.516***	0.435***
	(0.006)	(0.005)	(0.024)	(0.007)	(0.037)	(0.022)
Lag Ln GDP Partner	0.904***	0.836***	0.578***	0.439***	0.635***	0.739***
	(0.006)	(0.004)	(0.017)	(0.006)	(0.035)	(0.029)
Ln Weighted Distance	–1.316***	–0.648***				
	(0.020)	(0.017)				
Contiguity	0.972***	0.876***				
	(0.104)	(0.110)				
Common Official Language	0.615***	0.453***				
	(0.047)	(0.040)				
Colonial Relationship	1.082***	0.580***				
	(0.103)	(0.096)				
Common Colonizer post 1945	0.988***	0.245***				
	(0.067)	(0.057)				
Landlocked	–0.326***	0.001				
	(0.037)	(0.025)				
Ln Commodity Export Price			0.158	0.467***	0.869***	0.327***
			(0.104)	(0.022)	(0.133)	(0.076)
Trade Agreement			0.045	0.018**	0.067*	0.020
			(0.034)	(0.009)	(0.040)	(0.019)
EMD Asia			0.174*	0.109***	0.057	0.058
			(0.096)	(0.037)	(0.060)	(0.045)
EMD Europe			0.238***	0.028**	–0.028	–0.004
			(0.061)	(0.014)	(0.064)	(0.032)
LAC			–0.211***	–0.135***	0.030	–0.008
			(0.078)	(0.017)	(0.072)	(0.032)
Lag FVA_exports			–0.005	–0.011***	0.017**	–0.012***
			(0.003)	(0.001)	(0.007)	(0.003)
EMD Asia			0.058***	0.014***	0.050***	0.041***
			(0.005)	(0.002)	(0.008)	(0.005)
EMD Europe			0.034***	0.009***	0.032***	0.004
			(0.005)	(0.001)	(0.006)	(0.003)
LAC			0.032***	–0.008***	0.019*	0.032***
			(0.005)	(0.002)	(0.010)	(0.004)
Lag VA_exports (reexported intermediaries)			–0.039**	–0.039***	0.011	–0.066***
			(0.019)	(0.006)	(0.040)	(0.016)
EMD Asia			0.139***	0.071***	0.084**	0.160***
			(0.021)	(0.007)	(0.041)	(0.020)
EMD Europe			–0.011	0.085***	0.124***	0.018
			(0.027)	(0.007)	(0.037)	(0.016)
LAC			0.171***	0.084***	0.169***	0.130***
			(0.025)	(0.007)	(0.040)	(0.025)
Constant	–1.595***	–5.776***	–10.779***	–9.804***		
	(0.182)	(0.151)	(0.488)	(0.102)		
Observations	397,826	316,047	371,609	337,368	510,843	563,731
R Squared	0.635	0.790				
R Squared Fixed Effects			0.232	0.417		
Log pseudolikelihood					–75117	–59389
Time FE/Bilateral Pair Fixed Effects	YES/NO	YES/NO	YES/YES	YES/YES	YES/YES	YES/YES
Number			23,419	22,191	23,419	27,222

Note: Sample: 1990–2013 for gross exports and 1990–2012 for value-added exports. Ordinary least square (OLS) estimation with clustered robust standard errors—*** p < 0.01, ** p < 0.05, * p < 0.1. Time fixed effects are included in all models but not shown. Complete set of interaction dummies for trade agreement, FVA and VA are estimated for all regions (models 3–6), but shown only for emerging and developing Asia, Europe, and LAC. Bilateral pair fixed effects are included in models 3–6. Commodity price index is from Gruss (2014).