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Please cite this paper as:

Cadestin, C., J. Gourdon and P. Kowalski (2016-10-11), "Participation in Global Value Chains in Latin America: Implications for Trade and Trade-Related Policy", *OECD Trade Policy Papers*, No. 192, OECD Publishing, Paris.
http://dx.doi.org/10.1787/5jlpq80ts8f2-en

OECD Trade Policy Papers No. 192

Participation in Global Value Chains in Latin America

IMPLICATIONS FOR TRADE AND TRADE-RELATED POLICY

Charles Cadestin,

Julien Gourdon,

Przemyslaw Kowalski

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This document has been declassified on the responsibility of the Working Party of the Trade Committee under the OECD reference number TAD/TC/WP(2015)28/FINAL.

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Abstract

Participation in Global Value Chains in Latin America: Implications for Trade and Trade-Related Policy

Charles Cadestin, Julien Gourdon
and Przemyslaw Kowalski, OECD

This paper characterises the extent of GVC participation in selected countries of Latin America. It looks deeper into certain key trade policy-related aspects of Latin American trade integration with the potential to improve GVC participation. Latin America has a dense web of intra and extra-regional preferential trade agreements (PTAs). Nevertheless, the overlap, duplication and conflicts among the different rules and standards governing trade under these PTAs are likely reducing the benefits of these agreements. This is prompting renewed interest in the idea of linking or harmonising the various Latin American PTAs. To help inform this debate, this study analyses the impact of rules of origin (RoO) and non-tariff measures (NTMs) on GVC integration in the region, and examines relevant harmonisation initiatives.

The empirical work presented in this paper estimates that RoO in PTAs of Latin American countries undo more than 15% of the positive trade effect of these agreements, particularly for intermediate products (30%). The estimated tariff equivalents of RoO suggest that MFN liberalisation of tariffs on intermediate products could be a cost-efficient way of alleviating the problems related to RoO and stimulating both intra- and extra-PTA value chains. Other viable initiatives could include renegotiation or harmonisation of existing product-specific RoO, or improvements to overall RoO architecture such as amendments to certification, *de minimis* or cumulation rules.

While countries may legitimately apply different standards, technical regulations and conformity assessment procedures, such differences may nonetheless impose particular costs on GVCs which involve operations across multiple countries. The empirical work on NTMs shows that on average, NTMs used by Latin American countries impose additional costs equivalent to a tariff of roughly 15% for intermediate products. These costs suggest that there is benefit in exploring scope for mutual recognition, or harmonisation of technical regulations or conformity-assessment procedures. The empirical assessment shows that, on average, such provisions can reduce the cost of NTMs by approximately one fifth.

Overall, the results of this study show that convergence on rules of origin and regulatory standards could significantly reduce the burden of complying with competing or overlapping rules and regulations. While convergence is not necessarily straightforward and can involve some upfront costs (e.g. in terms of negotiation), these costs need to be set against the costs of inaction in terms of the ability of Latin American countries to increase their integration into regional and global value chains, with gains to trade, productivity and growth.

Key words: Global value chains; GVCs; intermediate inputs; trade policy; trade agreements; rules of origin; cumulation; non-tariff measures; NTMs; mutual recognition; Latin America.

JEL Classification: F1, F2, F6

Acknowledgements

This paper has been prepared by Charles Cadestin, Julien Gourdon and Przemyslaw Kowalski of the OECD. It has benefitted from statistical assistance by Clarisse Legendre and useful comments by Jose Antonio Ardavin, Jared Greenville, Javier Lopez-Gonzalez, Julia Nielson, James Messent, and Monika Sztajerowska

Table of contents

Tables

Figures

Boxes

Executive Summary

There are large differences in economic and geographic circumstances across Latin America but low productivity is a shared challenge across the region (OECD, 2016a). Recent OECD analysis suggests that efficient integration into global value chains (GVCs) can be an important element in raising productivity levels (e.g. OECD, 2013; OECD, 2015a and 2015b). Existing assessments of the extent of GVC participation in Latin America suggest that it is lower than in other developing regions (e.g. Blyde, 2014). Intra-regional links seem particularly weak, in contrast to the strong role of regional value chains in Southeast Asia, Europe or North America (OECD, 2015a). It is thus useful to explore the role policies could play in making GVC participation more beneficial for the region.

This report builds on earlier OECD work on GVC integration in Asia and Africa (OECD, 2015a) and uses the OECD Trade in Value Added (TiVA) and gross trade data to characterise the extent of GVC participation in selected[1] countries of Latin America. It identifies some of the key determinants that underpin GVC participation and looks deeper into certain key trade policy-related aspects of Latin American trade integration with the potential to improve GVC participation.

Facilitating GVC participation requires reducing the fragmentation-related costs of production. Some of these costs accrue at the border (e.g. tariffs, costs related to customs inefficiencies) but many accumulate long before the border is reached (e.g. costs related to quality of infrastructure and logistics services, as well as regulatory burdens). A number of Latin American countries have considerable potential for improvement and catch-up with the best performing countries in many of these areas. The empirical analysis presented in this report provides information to help countries in prioritising reforms.

While regional trade is relatively diversified and well-established, the varying degrees of GVC integration suggest that further regional integration may hold promise. Outside the region, trade in intermediates with North America, the European Union and South East Asia is somewhat less well diversified but is much larger in scale and has been growing more dynamically in the recent past. This suggests that there is also potential for further improving GVC integration with other regions.

Latin America has a dense web of intra and extra-regional preferential trade agreements (PTAs). In principle, this means that much of trade faces low border barriers. Nevertheless, the overlap, duplication and conflicts among the different rules and standards governing trade under these PTAs are likely reducing the benefits of these agreements. This is prompting renewed interest in the idea of linking or harmonising the various Latin American PTAs. To help inform this debate, this study analyses the impact of rules of origin (RoO) and non-tariff measures (NTMs) on GVC integration in the region, and examines relevant harmonisation initiatives.

RoO establish the conditions that a product must satisfy to be deemed eligible for preferential access to member countries' markets and thus are integral elements of PTAs. In the world of GVCs, where products from countries outside of the PTA can serve as inputs into products of participating countries, RoO can have negative consequences not only for extra- but also intra-PTA value chain formation. The empirical work presented in this paper estimates that RoO in PTAs of Latin American countries undo more than 15% of the positive trade effect of these agreements, particularly for intermediate products (30%). On average, RoO are estimated to have tariff equivalents of around 8.6% and 9% for, respectively, intra- and extra-PTA imports of intermediate products. Average MFN tariffs on intermediate products are below the 8.6% threshold in more

1. Country coverage aims to be as inclusive as possible although it varies throughout the report depending on the empirical investigation undertaken and data availability.

than 60% of Latin American countries, which suggests that in many cases the average protection that these tariffs afford to intra-PTA input providers may be less than the cost of administering preferential market access through RoO. MFN liberalisation of tariffs on intermediate products could be a cost-efficient way of alleviating the problems related to RoO and stimulating both intra- and extra-PTA value chains.

Other viable – although also arguably more costly – initiatives could include renegotiation or harmonisation of existing product-specific RoO, or improvements to overall RoO architecture such as amendments to certification, *de minimis* or cumulation rules. Indeed, the Latin American countries such as Chile, Costa Rica and Mexico which adopted some of the more flexible approaches to RoO also tend to be those that are better integrated into GVCs. There is still, however, scope to do more. Negotiation of more inclusive cumulation schemes, such as those that allow full cumulation across PTA partners, cross-cumulation of RoO between overlapping PTAs or flexible sourcing from extra-PTA partners, is particularly promising and is already being pursued in many newer agreements involving countries in the region, including the Pacific Alliance and the Trans-Pacific Partnership.

A further area for attention in the context of efforts to promote greater participation in GVCs is NTMs. NTMs such as standards, technical regulations and conformity assessment procedures, are not normally aimed at discriminating against imports; given their consumer protection or other public policy objectives, usually the same standards and requirements apply to domestically produced and imported products. Nevertheless, these measures can have unintended effects on trade, which can be more restrictive than necessary to achieve their policy objective, in effect acting as hidden protection. In addition, while countries may legitimately apply different standards and approaches, use of diverging national standards may nonetheless impose particular costs on GVCs which involve operations across multiple countries. *A priori* it is not clear whether costs of compliance would be higher for intermediate or final products; NTMs traditionally aim to protect consumers, but because of the importance of timeliness and quality and the sensitivity of value chain operations to trade costs, NTMs can prove particularly problematic for GVC trade. The empirical work presented in this report shows that on average, NTMs used by Latin American countries impose additional costs equivalent to a tariff of 20% for primary intermediate products and 12% for processed intermediates. Their incidence is found to be correlated negatively with GVC participation; Latin American countries where NTM restrictiveness with respect to intermediate trade is high and where these issues are not addressed under their PTA are generally less integrated into GVCs.

Given the importance of ensuring quality standards and appropriate consumer protection,[2] these costs suggest that there is benefit in exploring scope for mutual recognition, or harmonisation of technical regulations or conformity-assessment procedures. An empirical assessment of the extent to which NTM-compliance costs can be reduced by these measures shows that, on average, such provisions can reduce the cost of NTMs by approximately one fifth. Mutual recognition of conformity assessment is the most effective facilitation mechanism, responsible for much of the reduction in cost. While not without administrative costs and challenges, mutual recognition – especially for conformity assessment – appears relatively more feasible than harmonisation to promote the convergence of standards over the medium term (as countries can keep their own standards and process of certification).

Overall the results of this study show that convergence on rules of origin and regulatory standards could significantly reduce the burden of complying with competing or overlapping rules and regulations. While convergence is not necessarily straightforward and can involve some upfront costs (e.g. in terms of negotiation), these costs need to be set against the costs of inaction in terms of the ability of Latin American countries to increase their integration into regional and global value chains, with gains to trade, productivity and growth.

2. It could be argued that efficient and well applied standards and certification processes can facilitate GVCs by providing a means to ensure the quality of inputs.

Introduction

Although global value chains (GVCs) are often considered a defining feature of the current wave of globalisation, there is still more to learn about what determines engagement in GVCs, the effects of such engagement, and the implications for policy making. These questions are particularly pertinent for emerging and developing countries as the unbundling and spatial fragmentation of tasks and business functions has opened opportunities for their firms to engage in global markets without having to develop complete products or domestic value chains. At the same time, for many developing countries, less competitive business environments, and competing priorities for limited public resources place a premium on identifying the most efficient ways to foster integration with the global economy and improve social and economic outcomes.

The OECD has recently begun work to assess the determinants and economic effects of GVC participation across developing countries, focusing first on Africa, the Middle East and Asia (OECD, 2015a). This report extends the analysis to Latin America (LA). It aims to characterise the extent of participation of Latin American countries in global and regional value chains and to identify some of the key determinants with a view to identifying trade and trade-related policy reforms that could boost value chain participation and improve the related economic outcomes.

The first section follows closely the approach and methodology developed in OECD (2015a). It first elaborates what is new in the current wave of globalisation and the emergence of GVCs and the implications for appropriate economic policy responses. The section then draws on the OECD Trade in Value Added (TiVA) database as well as detailed trade data from the BACI database to characterise GVC participation in LA and compare it with other regions. Based on analysis of overall levels of participation and their regional, global and sectoral dimensions, the study identifies policy reforms with the highest potential to improve participation, focusing on reducing the border and behind-the-border costs to GVC activity and enhancing intra-regional links.

The second section looks deeper into the potential of regional integration initiatives to improve GVC participation and the impact of rules of origin (RoO) in Latin American preferential trade agreements (PTAs). RoO define the origin of products for the purposes of their preferential treatment under PTAs. In a global economy characterised by GVCs, RoO have become key factors shaping trade, foreign direct investment (FDI) and value chain location decisions. This part of the study examines how different approaches to RoO and their harmonisation have shaped value chain participation in Latin America.

The third section investigates the impact of different non-tariff measures (NTMs) used by Latin American countries and efforts to ensure that they are not more trade restrictive than necessary in different Latin American PTAs. With falling tariff protection, NTMs – and in particular standards, technical regulations and conformity assessment procedures – have come to the forefront of market access considerations globally. While not normally aimed at discriminating against imports, they can have unintended effects and can unnecessarily impact trade, or act as hidden protection. This chapter provides an empirical assessment of whether NTMs are particularly burdensome for value chain activity and how costs associated with them can best be lessened.

Together with insights from the OECD (2015a) and other recently completed or on-going work on value chains undertaken in 2015-16 (e.g. the project on *Global Value Chains and Small and Medium-sized Enterprises in Southeast Asia*, *Diagnostic of Chile's Engagement in Global value Chains*[3], and sectoral GVC analyses undertaken in 2016), the results of this work can serve as an input to a larger OECD synthesis volume on participation of developing countries in value chains.

3. The OECD Directorates for Trade and Agriculture, Financial and Enterprise Affairs and Science, Technology and Innovation have recently completed a *Diagnostic of Chile's Engagement in Global value Chains*, commissioned by the Government of (available at: https://www.oecd.org/chile/diagnostic-chile-gvc-2015.pdf). The diagnostic provides analysis on three complementary dimensions of Chile's GVC participation: trade and production; foreign direct investment (FDI); and innovation and knowledge-based capital.

PART I

Participation of Latin American Countries in Regional and Global Value Chains

1. Mapping and benchmarking Latin America's participation in regional and global value chains

1.1 What is new about global value chains?

Emerging OECD research suggests that GVC participation can bring about economic benefits in terms of productivity, diversification and sophistication of production. This underscores the importance of understanding what determines participation in GVCs and the scope for governments to facilitate and shape participation (e.g. OECD, 2013; OECD, 2015a and 2015b).

The emergence of GVCs has profoundly changed the nature and determinants of the location of economic activity with implications for both domestic and international economic policy. Although importing inputs for processing and further export is not new, it was not until the information and communication technology revolution of the early 1990s – most notably the development and internationalisation of the Internet – that stages of production could be separated spatially on a large scale (Baldwin, 2012). This initially allowed firms to achieve efficiency gains from finer specialisation and economies of scale, and with time has become necessary to stay competitive.

Pre-GVC era products, while already complex (e.g. cars, machinery, electronic equipment traded internationally on a large scale in the 1990s) and requiring a wide range of co-ordinated tasks and material and immaterial inputs, tended to be produced by single firms whose activities were concentrated in specific geographical locations, often individual regions within countries (e.g. auto industry in Michigan in the United States). By contrast, today's products are bundles of tasks and inputs originating from multiple regions and countries, often involving multi-directional flows of material inputs, services and personnel, ownership of assets (in a cross-border context FDI), enforcement of contracts and standards, encompassing transfer of technology and protection of intellectual property (IPR).

In the GVC world competitiveness is inextricably linked to access to competitively-priced intermediate inputs. Competitiveness is today much more sensitive to costs incurred all along the geographically-fragmented production processes, including: moving inputs and semi-finished products across locations, personnel travel, services necessary for smooth operation of production chains (e.g. transport and logistics, telecommunication, postal and courier services), and administrative procedures.

Against this background, directing countries' GVC integration strategies towards reducing the fragmentation-related costs of production may be a useful approach. Some of these costs accrue at the border (e.g. tariffs, customs inefficiencies) but many accumulate long before the border is reached (e.g. quality of infrastructure, costs and quality of logistics services, regulatory burden). Given that, even in economies thought to have thrived on GVCs, large portions of international supply chains still tend to be domestic (De Backer and Miroudot, 2013), the "pre-border" domestic cost component is very important.

Moreover, GVCs demand much greater interdependency of different areas of economic policy. The goal of enhancing GVC participation is unlikely to be achieved solely through lowering of tariffs and NTMs if FDI policies are restrictive, if intellectual property is not sufficiently protected or if contracts cannot be enforced. Similarly, attracting FDI can be as much about statutory FDI restrictions, such as foreign equity limits or screening, as about the costs of trading across borders and inefficient business environments. With GVCs, the division between the different domains of domestic and international economic policies has become increasingly blurred.

1.2 The nature of Latin America's GVC participation and some incipient policy questions

Recent work on determinants and economic effects of GVC participation across developing countries in Africa, the Middle East and Asia (OECD, 2015a) showed that many developing countries are increasingly involved in GVCs, and that this participation tends to bring about economic benefits in terms of enhanced productivity, sophistication and diversification of economic activity. South East Asian economies and those in Europe and Central Asia show the highest degrees of participation, while Middle East and North African countries also have relatively high participation ratios. South Asia, along with regions in Sub-Saharan Africa, trail behind. South East Asia – the region with some of the most comprehensive and deepest regional integration agreements among developing countries – has the highest average share of intra-regional GVC participation. In the rest of the developing world, the share of intra-regional GVC participation is lower than the share of extra-regional links.

Recent attempts at characterising GVC participation in Latin America (Blyde, 2014; UNECLAC, 2014 and OECD/CAF/ECLAC, 2015) suggested that the region's participation is lower than other developing regions and that intra-regional links are particularly weak. These studies also suggested that in several Latin American countries, GVC participation primarily consists of supplying relatively unprocessed natural resource-based inputs and consequently a generally high degree of concentration of trade and value chain links and dependence on a small number of products and markets.

High degrees of specialisation are not a concern in themselves; they can be testament to the gains from trade. However, strong reliance on natural resources has exposed some Latin American economies to external shocks and has arguably worked against development of innovation- and employment-intensive activities and the environment.[4] Diversification of economic activity is thus seen in Latin America as an important policy objective (e.g. Blyde, 2014).

The nature and extent of participation in GVCs are far from uniform across the region. For example, Mexico and Costa Rica specialise in processing and exporting inputs and are well integrated with North American supply chains, while Chile and Peru specialise in upstream mining and agricultural inputs destined increasingly for Asian markets.

Since the extent and nature of GVC integration reflects many country- and region-specific characteristics, simply using indicators of GVC participation and comparing the level of participation cannot lead to the conclusion that a country with a higher participation index is doing better or worse in GVCs. Larger countries, for example, tend to source fewer intermediate inputs from abroad, because they have larger domestic markets from which to draw their intermediate goods and services (OECD, 2015a). Latin America, although rich in natural resource endowments, is relatively remote from the main manufacturing hubs in Europe, North America and Asia, with disparities in the size of its markets, separated by natural barriers and geographical distances. Latin America is also unique globally in the sense that, apart from Brazil, all regional partners share a common language.

While some existing studies posit that value chain integration in Latin America is below its potential (e.g. Blyde, 2014), it is not clear whether this is driven by geographical and structural factors or by weak performance in the key policies identified above as influencing GVC participation. One approach to assessing how countries engage in GVCs is to use statistical techniques to establish the most important determinants of GVC integration across countries and then, on this basis, identify which countries can improve their participation through appropriate policy reforms. Following this methodology, OECD (2015a) estimated that structural factors, such as geography, size of the market and level of development are important determinants of participation. Trade and foreign direct investment (FDI) policy reforms, along with improvements in domestic logistics, customs, intellectual property protection, infrastructure and institutions, can nevertheless also play an important role in promoting GVC engagement. Section 1.3.4 of this chapter benchmarks Latin American countries on some of these determinants.

4. The OECD's *Diagnostic of Chile's Engagement in Global value Chains* discussed the case of Chile and its copper sector (OECD, 2015b).

A key question is the extent to which intra- and extra-regional PTAs have played or can play a role in enhancing participation in regional and global value chains, globally and specifically in Latin America. On the one hand, the positive relationship between imports of intermediates and export competitiveness is significantly stronger in the case of global rather than regional sourcing (OECD, 2015a). This would imply that regional initiatives aimed at facilitating access to intermediate inputs, while welcome, can only do so much to boost competitiveness.

On the other hand, in Southeast Asia – the region with some of the most comprehensive and deepest regional PTAs among developing countries – regional value chains play a more important role than in other developing regions (OECD, 2015a). Survival and diversification rates of intermediate trade are linked to higher levels of intra-regional trade, which in turn suggests that regional integration may be a way of learning by doing, preparing for competition in global markets and of diversification. PTAs with regional partners are found to boost trade in intermediates more than similar agreements with partners in other regions, and PTAs in general are found to boost trade in intermediates more than trade in final consumption products (OECD, 2015a). Finally, many types of trade costs – for example those related to physical infrastructure and customs and border procedures – can be predominantly regional in nature and thus more easily addressed within regional initiatives (OECD, 2015d).

The remainder of this section aims to shed light on some of these policy issues by examining the available empirical evidence on the extent and nature of GVC participation in LA and by taking stock of performance in relevant policy areas.

1.3 Mapping GVC participation in Latin America

1.3.1 Evidence from the OECD Trade in Value Added Data

The OECD TiVA database (Box 1) enables measurement of the share of foreign value added embodied in a country's gross exports ("backward GVC integration ratio", Figure 1) and the extent to which a country's value added is used by its foreign partners for their own export production ("forward participation ratio", Figure 2) (OECD, 2013 and 2015a).[5] The two ratios are sometimes added together to produce an overall "GVC participation ratio". By this measure, Chile, with more than 52% of its gross exports accounted for by either foreign value added processed in Chile or Chilean value added exported further by its trading partners, is the country with strongest GVC links in the region and the only one where this ratio is higher than the average for the rest of the OECD TiVA sample. In the region, Chile is followed by Mexico (47%), Costa Rica (45%), Colombia (38%), Brazil (35%) and Argentina (30%).

However, when the two types of GVC participation are considered separately, there is a marked heterogeneity across the region. Mexico and Costa Rica have relatively high backward GVC participation ratios, on a par with many developed OECD countries (Figure 1). In 2011 in Mexico, for example, 32% of gross exports on average were accounted for by foreign value added, while in Costa Rica the figure was 28%. At the same time these two countries had some of the lowest forward GVC participation ratios at, respectively, 15% and 17% (Figure 2). Chile, Brazil and Colombia, on the other hand, were located towards the lower end of the distribution in terms of backward GVC participation and towards the higher end for forward GVC participation. Chile and Colombia had some of the highest forward participation ratios in the OECD TiVA sample at, respectively, 32 and 30%, while Brazil was a moderate 24%.

5. These indicators of participation have been among the key metrics used in summarising the empirical insights from the recent initiatives aimed at measuring GVC activity using harmonised systems of inter-country input-output tables (ICIOs) as in Timmer et al. (2012), OECD (2013), de Backer and Miroudot (2013), UNCTAD (2013b) or OECD (2015a). A number of other measures have been proposed in the literature to measure "upstreamness", or the length of chains (see De Backer and Miroudot, 2013, for a summary of different measures proposed in the literature).

Box 1. Data Sources and methodology

Evidence presented in this section combines two sources of data. While the gross trade data which has been used traditionally to analyse countries' trading relationships gives an idea of the volume, geographical and product concentration of a country's cross-border transactions, it does not distinguish between the domestic and foreign value added embodied in traded products and therefore does not provide a full picture of the country's trading relationships. The OECD TiVA database released in 2013 and updated in 2015 and the underlying OECD inter-country input-output tables (OECD ICIOs) have been developed to decompose gross trade flows into various types of foreign and domestic value added according to their country and sector origin, country and sector of destination, and use (e.g. final consumption or intermediate use). The OECD TiVA database covers 62 countries, including six Latin American countries: Argentina, Brazil, Chile, Colombia, Costa Rica and Mexico.[1] This data is first used to map the participation of the covered LA countries in global value added linkages for the first time.

Subsequently, the latest version of the BACI dataset (see Gaulier and Zignago, 2010) is employed to supplement this analysis with evidence on a larger number of LA countries and more product detail.[2] This data allows us to cover export and import relationships to and from approximately 240 economies over the period 1998-2011 at the Harmonised System (HS) 6-digit level of aggregation, capturing over 5 000 products. To focus the subsequent analysis on the most relevant components of trade related to GVCs – intermediate inputs – products at the HS 6-digit level have been classified into 11 types of goods, including three categories of intermediate products: primary intermediates, processed intermediates and fuels.[3] This data is used to analyse the level of concentration and stability of LA's value chain links.

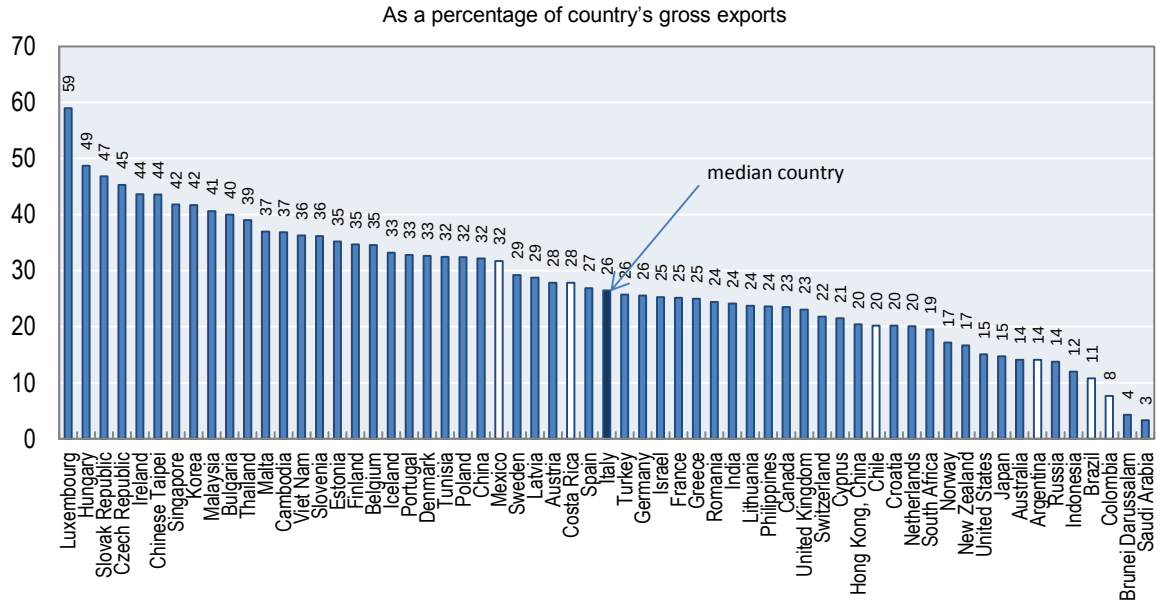
1. Peru is in the process of integration into the OECD TiVA database

2. BACI is based on the official data compiled by United Nations Statistics Division and benefits from several consistency and reconciliation checks

3. This aggregation is based on both the United Nations' classification of Broad Economic Categories (BEC) and the OECD's STAN Bilateral Trade Database by industry and end-use (BTDIxE). It is however more disaggregated than each of these classifications (OECD, 2015a).

Figure 1. Backward GVC participation ratios, cross-country comparison for 2011

As a percentage of country's gross exports



1. Note by Turkey:

The information in this document with reference to "Cyprus" relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Turkey recognises the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of the United Nations, Turkey shall preserve its position concerning the "Cyprus issue."

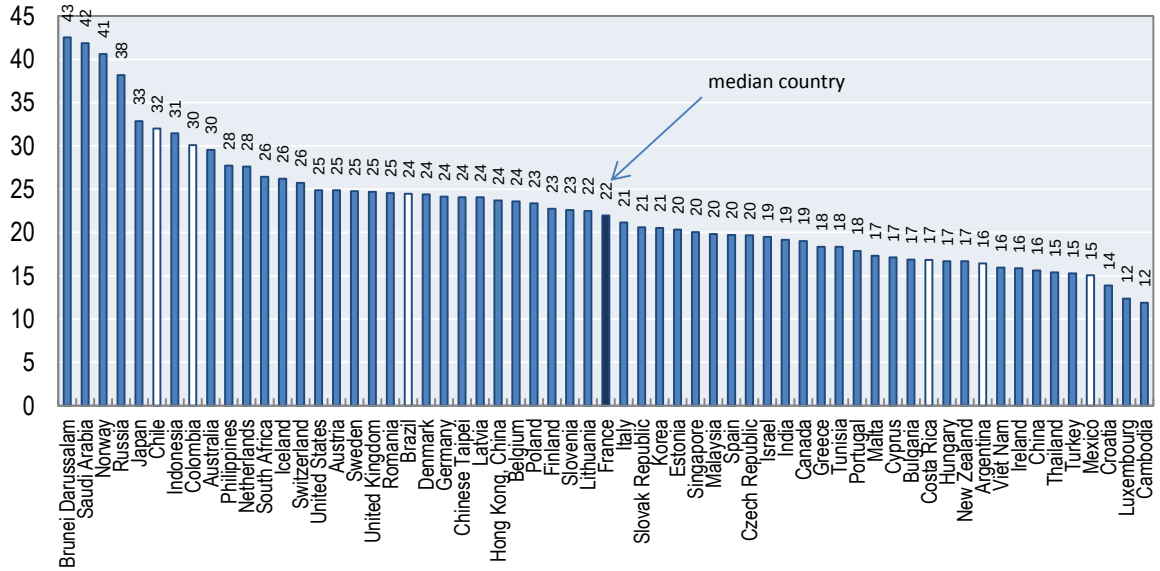
2. Note by all the European Union Member States of the OECD and the European Union:

The Republic of Cyprus is recognised by all members of the United Nations with the exception of Turkey. The information in this document relates to the area under the effective control of the Government of the Republic of Cyprus.

Source: OECD Trade in Value Added Database.

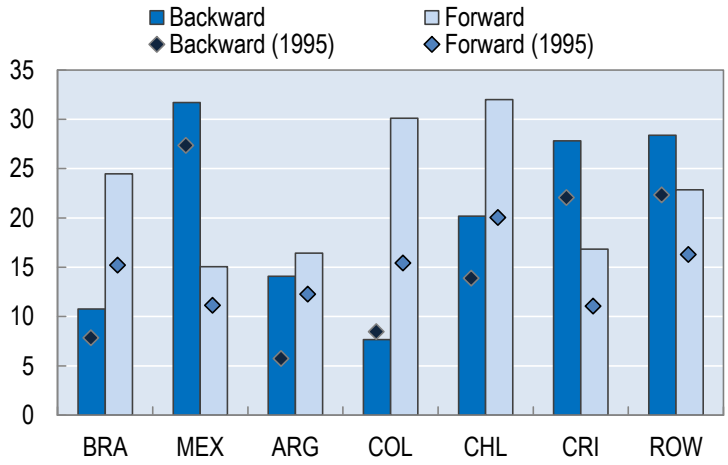
Figure 2. Forward GVC participation ratios, cross-country comparison for 2011

As a percentage of country's gross exports



Source: OECD Trade in Value Added Database.

Figure 3. Backward and forward GVC participation ratios in Latin American countries (1995-2011)

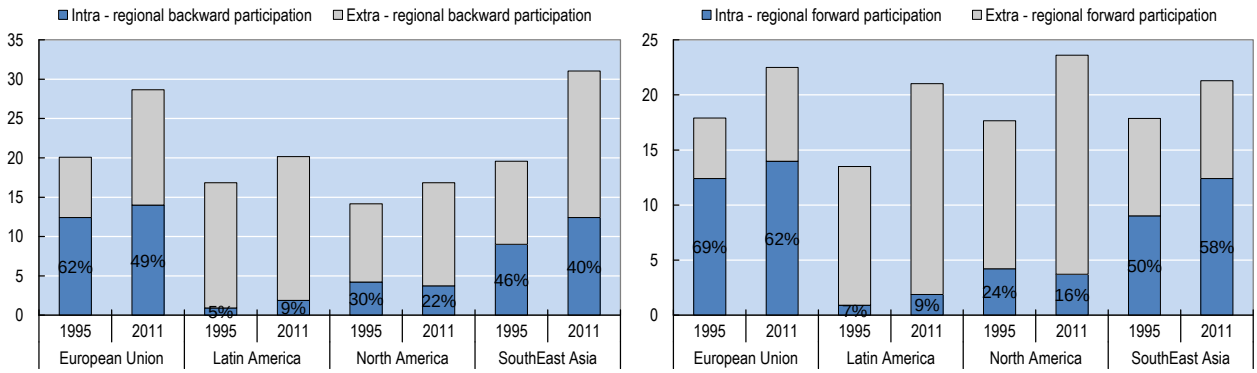


Note: The rest of the world (ROW) category here denotes all the remaining countries in the OECD TiVA sample.
Source: OECD Trade in Value Added Database.

The fact that Latin American countries with high backward engagement tend to have lower forward engagement, and vice versa, reveals specialisation in either downstream or upstream segments of GVCs, consistent with the general trend observed across countries in the OECD TiVA database (OECD, 2015a). For example, a country that is specialised in assembling and processing intermediate products and subsequently exporting these – such as Mexico for auto, electrical and optical equipment and textiles or Costa Rica for computer, electronic and optical equipment (Figure 6) – will have a strong backward participation index but a weak forward participation one. Conversely, a country which predominantly supplies intermediates to an assembler – such as Chile for exports of copper and copper-based materials –will tend to have a highly developed forward participation indicator but relatively undeveloped backward participation.

The regional dimension of value chain activity is apparent when examining backward and forward GVC participation by origin and destination of traded value added, (Figure 4). In Latin America, only 9% of foreign value added used for exports on average was sourced from within the region (Figure 4, Panel A) or exported as intermediates for further processing in the region (Figure 4, Panel B). In the European Union and South East Asia – the two regions with some of the highest overall GVC participation rates globally – regional links were much stronger. For example, in the European Union on average 49% of foreign value added used for exports came from other EU countries and in South East Asia this ratio was 40% in 2011.

Figure 4. Intra and extra-regional participation in GVCs



Note: Shading identifies the share of linkage which is from the region.

Source: Authors' calculation based on OECD Trade in Value Added Database.

Further decomposition by source and destination countries sheds additional light on the regional and global dimensions of backward and forward GVC links (Figure 5). Latin America is quite diverse. South American countries have generally weaker backward links which are, however, more concentrated within the region (more than 25% in the case of Chile, mainly from Brazil, Colombia and Argentina; 30% in the case of Argentina, mainly from Brazil; Figure 5, Panel A). Central American countries display higher levels of backward integration but tend to source more from North America, the European Union and Asia. In Mexico and Costa Rica, only 3% and 11% respectively of foreign inputs come from other Latin American countries, while 40% comes from the United States and Canada. In this sense, Central American countries belong more to North American GVCs.

Forward linkages with regional partners (Figure 5, Panel B) are most developed in Argentina and Colombia, with Latin America accounting for 17% and 14% respectively of intermediate exports, compared to 8% and 3% for Mexico and Chile. However, Chile and Mexico and, to a lesser extent Brazil, have developed important forward links with other regions (Mexico with the United States, Canada and, to a lesser extent, with the European Union and Asia; Chile and Brazil with Asia and, to a lesser extent, with NAFTA and the European Union). This makes these countries potentially important hubs of forward participation for the region as a whole.[6]

6. The trans-regional GVC links are important globally. Germany, for example, is a strong supplier of value added to many countries outside of the European Union (for example in Asia) as is the United States which supplies a significant share of the value added to the exports of many countries and regions. These key countries, which transcend regional boundaries or coordinate regional production can be thought of as "headquarter" economies, whereas those that use rather than sell their value added can be likened to "factory" economies (Baldwin and Lopez Gonzalez, 2013). Japan, China and Korea are also increasingly playing the role of headquarters and their role in shaping the GVC engagement of Latin American countries has become more pronounced (Figure 5 and Figure A2.1).

The United States is one of the most important providers of inputs for export processing across the region and in particular for Mexico and Costa Rica. The European Union, the People's Republic of China (hereafter "China"), Japan and South East Asia are also important and, again, more so for Mexico and Costa Rica. Over 1995 and 2011 (Annex Figure A1.1), the rise of China as an input provider is the most important development globally and for Latin America. Mexico and Costa Rica and to a lesser Chile have experienced the most significant increases in sourcing from China. At the same time, sourcing from the European Union and NAFTA countries decreased. In Mexico and Colombia, for example, the share of foreign value added used for exports from the United States and Canada decreased by respectively five and one percentage points. By contrast, Chile and Argentina have increased sourcing from the United States and Canada (albeit modestly) and from regional neighbours (Annex Figure A2., Panel A).

An even starker re-orientation can be seen for forward linkages. In general, the share of direct exports – where exported products are being consumed or processed for consumption in the first country to which exports are directed – have diminished globally and exports for further processing and export have increased, illustrating the continuing expansion of GVC trade (Annex Figure A2., Panel B). China, again, has accounted for a large proportion of this shift. In Latin America, the most pronounced re-orientation towards China can be seen in Chile and is related to shipments of intermediate copper, copper-related, agriculture and food products (OECD, 2015e). The extent of the re-orientation of Chile's forward linkages towards China is comparable to that of the rest of "Factory Asia" (East and South East Asia) (Annex Figure A2., Panel B). Similar, albeit somewhat more modest trends, can also be seen in Costa Rica and Brazil. This reorientation coincided with the declining importance of processing destinations in the European Union and regional partners – although for some Latin American countries, Mexico, Chile and Argentina have become more important in terms of forward linkages. Interestingly, the United States and Canada have become more important for all Latin American countries aside from Costa Rica.

The *sectoral backward and forward GVC participation* rates also show significant heterogeneity within the region. Mexico and Costa Rica – the two countries specialised more in the downstream (backward linkage) segments of GVCs – and in some sectors, also Colombia and Chile, show levels of sourcing of foreign inputs higher than the average across the rest of the OECD TiVA sample (Figure 6, Panel A). Foreign content is particularly high in Mexico's exports of computer, electronic, electrical and optical equipment, vehicles and transport machinery and other manufacturing sectors; foreign content accounts for more than 50% of gross exports and exceeds the rest-of-the world averages. Colombia also has relatively high foreign content in its exports of vehicles and transport machinery and vehicles and transport equipment, as does Costa Rica in computer, electronic, electrical and optical equipment, metals and mining, agricultural, construction and transport, post and telecommunications sectors. Chile has above average backward GVC links in agriculture, mining, textiles and transport, post and telecommunications sectors.

Generally, Argentina, Brazil and Colombia record lower than average backward GVC participation across the majority of the sectors examined. While the relatively large size of their domestic markets is a factor, these low participation rates also suggest that policies may be less conducive to GVC participation. Decomposing participation rates into their different determinants and assessing the performance of these same countries in some of the GVC-related policy areas indicates that this is indeed the case (see Section 1.3.3).

Sectoral forward participation rates in the region are less even (Figure 6, Panel B). Chile stands out as having relatively strong forward links in many natural resources-based sectors such as mining, wood and paper, basic and fabricated metals, but also in some manufacturing products and wholesale and retail trade services. Costa Rica has relatively strong forward GVC links in computer, electronic, electrical and optical equipment, basic and fabricated metals and business services. Mexico has slightly above average participation rates in the machinery and vehicles and transport machinery and vehicles and transport equipment sectors, while Colombia has a relatively strong forward linkages in mining. In Argentina and Brazil, again, in the majority of sectors, forward GVC participation rates are lower than in other countries in the region and the rest of the world.

Figure 5. Latin American countries in global matrices of value added trade flows

Panel A. the Origin of value added in exports - backward participation (2011)

		To																	
		ARG	BRA	CHL	COL	CRI	MEX	USA_CAN	AUS_NZL	DEU	FRA	GBR	Rest_EU	CHN	JPN	ASEAN	Rest_SEA	IND	ROW
From	ARG			1.2%															
	BRA	3.4%		2.4%															
	CHL																		
	COL			1.8%															
	CRI																		
	MEX					1.4%		1.2%											
	USA_CAN	2.1%	2.1%	4.0%	2.1%	11.6%	12.9%		1.7%	2.4%	2.5%	3.2%	3.0%	3.5%	1.8%	3.5%	4.1%	2.4%	1.5%
	AUS_NZL													1.3%	1.0%	1.3%	2.0%	1.0%	
	DEU						1.6%				3.7%	2.6%	4.4%	1.8%		1.1%	1.3%		1.3%
	FRA									1.8%		1.3%	1.7%						
	GBR									1.7%	1.5%		2.1%						
	Rest_EU	1.3%	1.2%	1.4%		1.8%	2.2%	1.3%	1.0%	8.8%	6.8%	5.5%		2.4%		2.2%	1.9%	1.5%	2.7%
	CHN			1.3%		1.8%	4.2%	1.6%	1.1%	1.3%	1.5%	1.3%	1.3%		2.2%	3.5%	4.9%	2.0%	1.0%
	JPN					1.1%	2.4%	1.1%						4.7%		3.6%	5.3%		
	ASEAN						1.2%		2.6%					3.1%	1.7%		3.6%	1.8%	
	Rest_SEA						1.9%							5.1%	1.0%	2.7%			
	IND															1.1%			
	ROW	3.5%	3.2%	4.6%	1.4%	5.8%	2.8%	3.7%	4.2%	6.4%	6.5%	5.9%	8.4%	6.7%	4.3%	7.6%	12.0%	11.1%	
	Domestic	86%	89%	80%	92%	72%	68%	87%	86%	74%	75%	77%	76%	68%	85%	71%	62%	76%	90%
	Foreign	14%	11%	20%	8%	28%	32%	13%	14%	26%	25%	23%	24%	32%	15%	29%	38%	24%	10%

Note: This figure provides a visual representation of backward GVC participation across different countries or regions. Each entry identifies the origin of value added embodied in column nation's gross exports. For example, where row nation Mexico meets column nation Costa Rica the 1.4% gives us the average share of value added that Costa Rica uses from Mexico in order to produce a unit of gross exports and 72% if Costa Rica's gross exports are accounted for by domestic value added.

Panel B. Destination of value added used by trading partners for exports – forward participation (2011)

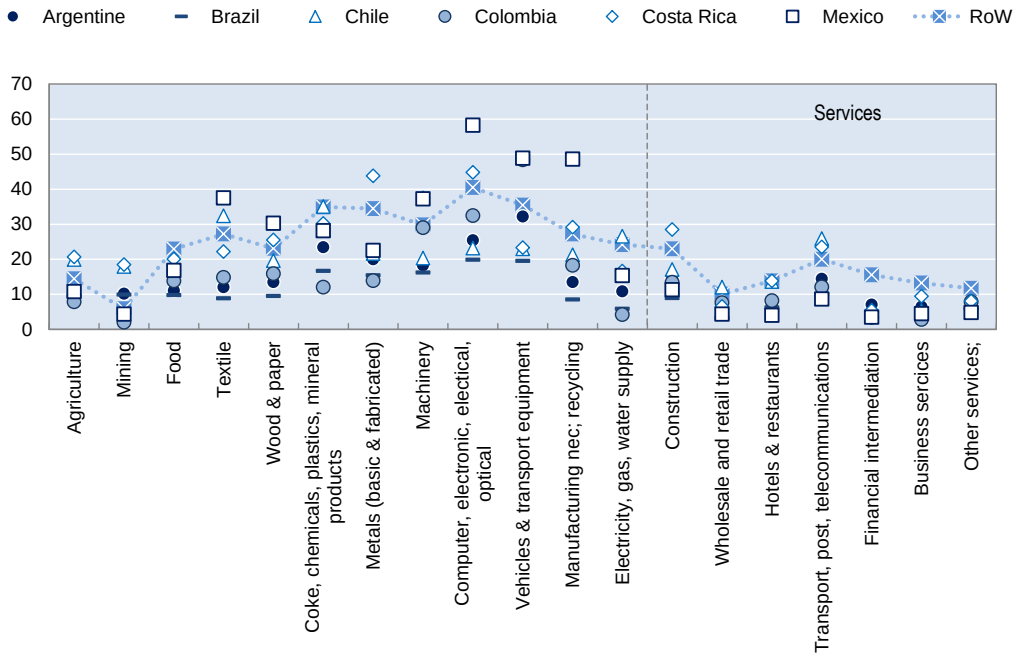
		To																		
		ARG	BRA	CHL	COL	CRI	MEX	USA_CAN	AUS_NZL	DEU	FRA	GBR	Rest_EU	CHN	JPN	ASEAN	Rest_SEA	IND	ROW	Total forward linkage	Direct exports
From	ARG		1.1%	1.1%				2.5%					2.4%	1.9%		1.7%			2.2%	16%	84%
	BRA							2.3%		1.5%			3.2%	4.2%		1.6%	1.7%		2.5%	22%	78%
	CHL							2.9%		1.3%			3.6%	8.4%	1.4%	1.5%	3.9%		1.6%	29%	71%
	COL			2.2%				7.3%		1.3%			3.9%	2.2%					2.4%	25%	75%
	CRI						1.6%	3.0%					2.4%	4.4%		2.5%	1.0%		1.5%	19%	81%
	MEX							10.4%					1.8%	1.4%					1.0%	18%	82%
	USA_CAN						1.7%			1.3%			4.0%	2.7%		1.6%	1.7%		2.1%	19%	81%
	AUS_NZL							1.0%					1.4%	6.3%	2.1%	3.7%	5.3%	1.1%	1.2%	24%	76%
	DEU							1.4%			1.9%	1.3%	10.7%	2.6%			1.0%		3.3%	24%	76%
	FRA							1.2%		3.7%		1.4%	8.7%	1.8%					3.0%	23%	77%
	GBR							1.9%		3.2%	1.4%		9.6%	1.6%		1.3%			2.8%	24%	76%
	Rest_EU							1.0%		4.1%	1.6%	1.3%		1.5%					3.1%	15%	85%
	CHN							2.4%		1.2%			2.8%		1.2%	2.6%	3.2%		2.2%	19%	81%
	JPN							2.4%		1.1%			1.7%	8.9%		4.1%	5.5%		1.7%	28%	72%
	ASEAN							1.2%					1.8%	5.8%	1.5%		3.7%		1.3%	19%	81%
	Rest_SEA							1.9%					2.1%	11.3%	1.0%	3.6%			1.7%	25%	75%
	IND							1.5%		1.3%		1.0%	3.7%	3.0%		3.1%	1.8%		3.0%	20%	80%
	ROW							2.1%		2.2%	1.1%	1.0%	6.9%	3.1%		2.2%	3.1%	1.2%		25%	75%

Note: This figure provides a visual representation of forward GVC participation across different countries or regions. Each entry identifies the destination of value added embodied in row nation's gross exports. Where row nation Chile meets column nation China the 8.4% gives us the share of Chilean value added embodied in Chiles's gross exports which is used by China for China's own exports. The far right entry of 29% for row nation Chile denotes the share of Chilean value added that is used by all its trading partners for their exports – the overall forward linkage – while the 71% denotes the Chile's value added which is directly exported.

Source: Authors' calculations based on OECD TiVA database.

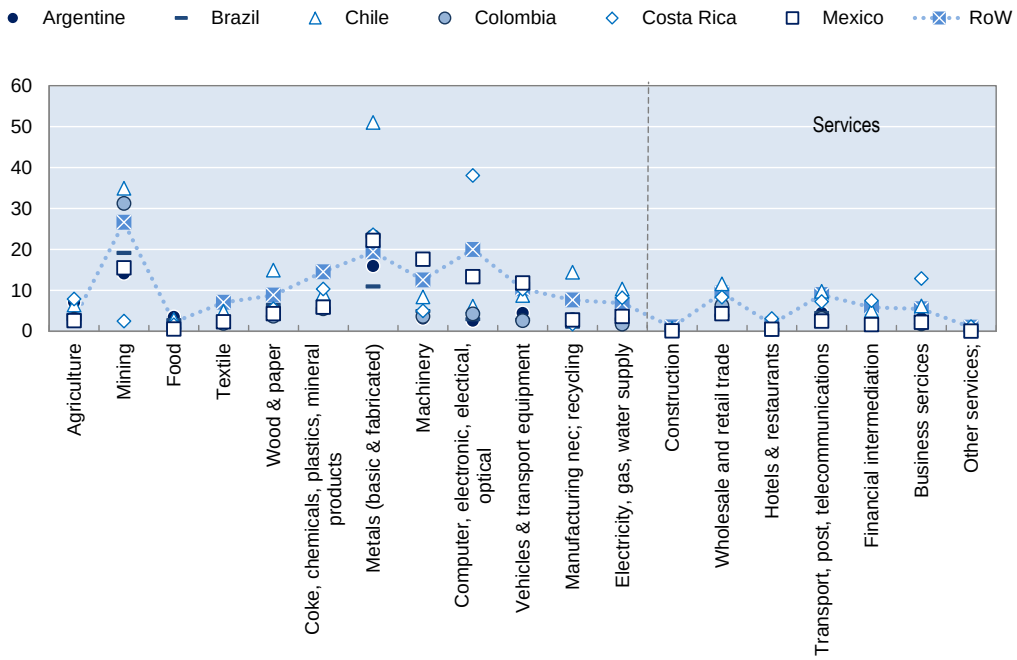
Figure 6. Structure of Latin America's GVC integration by sector

Panel A. Backward GVC integration



Note: This panel presents sectoral backward integration ratios, i.e. foreign value added content in gross sectoral exports as share of gross exports.

Panel B. Forward GVC integration



Note: The forward linkage is calculated here as the domestic value added that is used by other countries to produce their exports divided by the total value added generated by the sector as suggested by Wang et al. (2014). Rest of the World (ROW) denotes the average in all the remaining countries in the OECD TiVA.

Source: OECD Trade in Value Added Database.

1.3.2 Evidence from intermediates trade data

Using BACI trade data at the HS 6-digit level, classifying trade flows into different use categories and focusing on trade in merchandise intermediates and primary intermediates – the "bloodstream" of GVC trade – enables greater country coverage (Annex Table A1.1). Importantly, it also enables examination of the high product and market concentration that are of concern in the Latin American context. As was the case some twenty years ago, top-10 regional exports at HS 6-digit remain heavily concentrated in raw and semi-processed raw materials (e.g. fuels, iron and copper ores and concentrates, and gold), and agricultural raw materials such as soya beans and related semi-processed soya products, raw cane sugar and maize. Moreover, while in the late 1990s these top products accounted for less than 30% of the region's exports, in 2012/2013 they had risen to 44% (Table 1). This illustrates not only a high and growing concentration of exports but also the entrenched position of the region as supplier of primary intermediate inputs.

Table 1. Top 10 regional exports

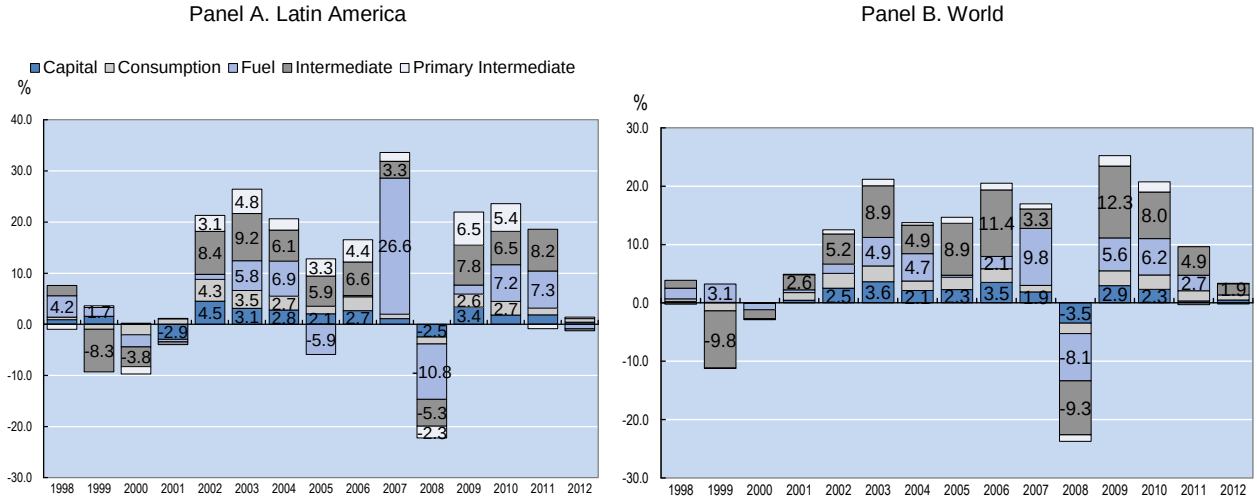
Year	HS6	Description	Share of region's exports
1998/1999	270900	Petroleum oils and oils obtained from bituminous minerals, crude	8.1
	271000	Petroleum oils & oils obtained from bituminous minerals, o/than crude	4.7
	090111	Coffee, not roasted, not decaffeinated	3.5
	740311	Copper cathodes and sections of cathodes unwrought	2.3
	080300	Bananas including plantains, fresh or dried	2.2
	230400	Soya-bean oil-cake & oth solid residues, whether or not ground or pel	2.1
	120100	Soya beans	1.7
	170111	Raw sugar, cane	1.6
	710812	Gold in unwrought forms non-monetary	1.4
	260111	Iron ores & concentrates, oth than roasted iron pyrites, non-agglomer	1.3
2005/2006	270900	Petroleum oils and oils obtained from bituminous minerals, crude	13.5
	271000	Petroleum oils & oils obtained from bituminous minerals, o/than crude	6.3
	740311	Copper cathodes and sections of cathodes unwrought	3.9
	260300	Copper ores and concentrates	3.3
	120100	Soya beans	2.0
	230400	Soya-bean oil-cake & oth solid residues, whether or not ground or pel	1.8
	260111	Iron ores & concentrates, oth than roasted iron pyrites, non-agglomer	1.8
	090111	Coffee, not roasted, not decaffeinated	1.5
	710812	Gold in unwrought forms non-monetary	1.4
	170111	Raw sugar, cane	1.2
2012/2013	270900	Petroleum oils and oils obtained from bituminous minerals, crude	18.3
	271000	Petroleum oils & oils obtained from bituminous minerals, o/than crude	4.8
	260111	Iron ores & concentrates, oth than roasted iron pyrites, non-agglomer	3.6
	260300	Copper ores and concentrates	3.5
	120100	Soya beans	3.5
	740311	Copper cathodes and sections of cathodes unwrought	2.9
	710812	Gold in unwrought forms non-monetary	2.4
	230400	Soya-bean oil-cake & oth solid residues, whether or not ground or pel	2.4
	170111	Raw sugar, cane	1.6
	100590	Maize (corn) nes	1.5

Source: Authors' calculations based on the BACI dataset.

A decomposition of world and Latin American merchandise export growth shows that the strong concentration in fuels and primary intermediates has exposed the region to commodity and macroeconomic cycles (Figure 7). In boom periods, Latin America's export growth rates tended to be higher than other parts of the world, but relied more heavily on fuels and primary intermediates. During downturns – which are typically characterised by falling fuel and commodity prices – these product categories contributed to trade collapses to a greater extent than in other regions. In parallel to increasing reliance on fuels and primary intermediates, is a

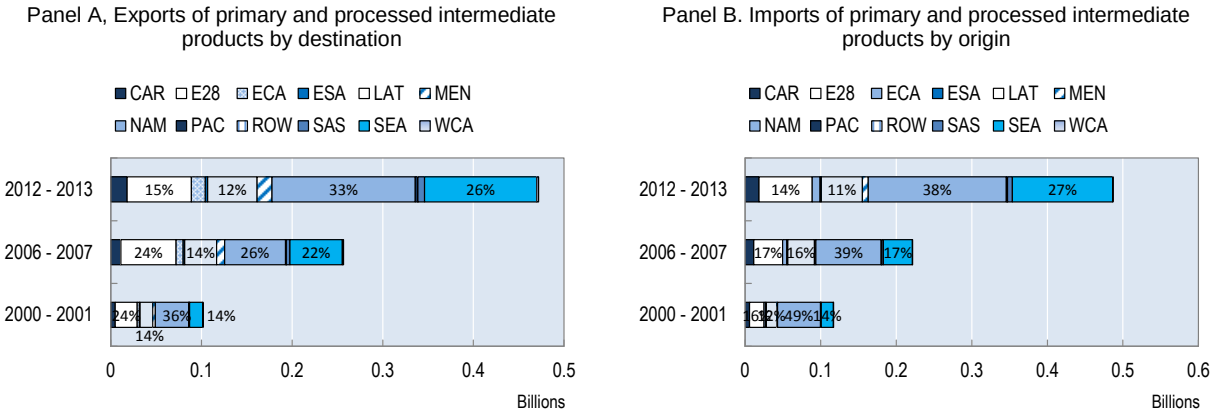
significant re-orientation of both exports and imports of intermediates away from the European Union and North America and towards South and East Asia (Figure 8).

Figure 7. Decomposition of world and Latin American export growth rates (1998-2012)



Source: Authors' calculations based on the BACI dataset.

Figure 8. Direction of trade of intermediate inputs in Latin American countries (2000-2013)



Source: Authors' calculations based on the BACI dataset.

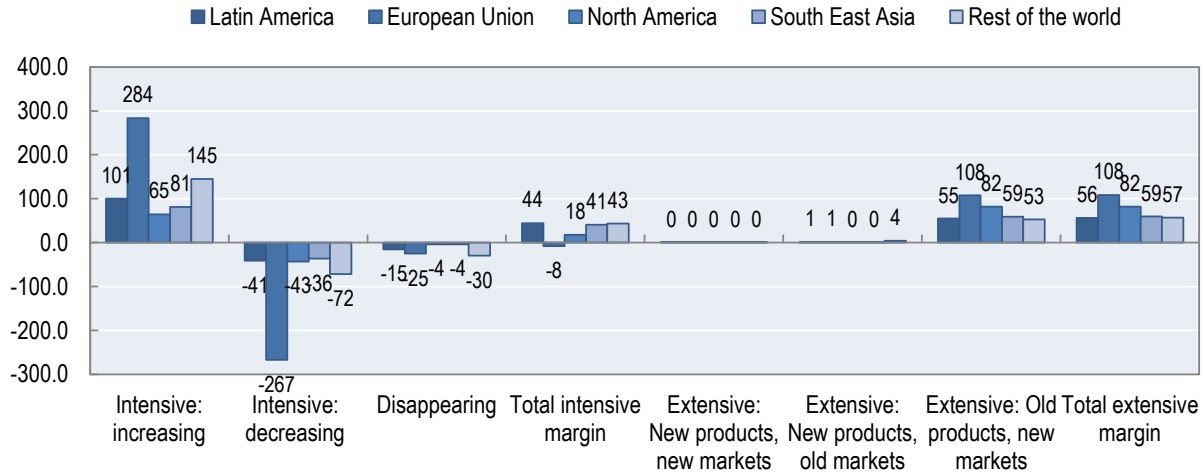
Intensive and extensive margin of intermediate trade

The emergence of new flows in terms of products exported and destination markets has been shown to be particularly important in explaining the growth of exports in intermediate goods (Beltramello et al., 2012). Diversification via a significant increase in the number of markets served may result in no, or only marginal, changes in export growth. Or export growth might occur through increases in the volume of exported goods across countries without necessarily exporting more products or serving more destinations. In order to discern whether diversification, and if so what kind of diversification, is bringing more export growth, we decompose export growth of intermediate products between 2007 and 2012 into two principal margins: (i) the intensive margin which corresponds to export growth for (bilateral) export flows at the HS 6-digit level that were already

active in 2007; and (ii) the extensive margin which corresponds to new export relationships that were not observed in 2007. This decomposition gives us a snapshot of the sources of export growth.[7]

The five regions compared, including Latin America, are similar in the sense that the extensive margin – and in particular starting to ship old products to new markets – accounts for the bulk of intermediate export growth (Figure 9). In Latin America this margin accounts for 56% of export growth in the investigated period, which is slightly lower than in South East Asia (59%) and much lower than in North America (82%) and the European Union (108%). In Latin America new products have not generated much export growth, consistent with the earlier observation that, over 2000-2012, the range of intermediate products exported by LA countries and the markets to which these are shipped did not change significantly.

Figure 9. Intensive and extensive margins for intermediate export growth to the world (2007-2012)



Source: Authors' calculations based on the BACI dataset.

Survival analysis

Following the approach in OECD (2015a), a "survival analysis" was performed for export flows in processed intermediates with the aim of comparing the sustainability of exporting activities in Latin America to other regions. Exporting is generally a risky activity, with only around one-third of exports launched remaining active after three consecutive years. The survival profile of Latin America is less favourable than that for the European Union (the region where intermediate exports survive the longest), North America and South East Asia, although the differences are not very large (Figure 10). In Latin America, approximately 12% of intermediate flows survive the first five years, compared to 17% for the European Union which, considering the level of integration and geographical proximity within the European Union (figures include intra-EU trade), as well as differences in the levels of development between these regions, is not a large difference. Moreover, Latin America's exports of intermediates survive consistently longer than in two regions that specialise in natural resources – the Middle East and North Africa and the Asia Pacific.[8] As for other developing regions

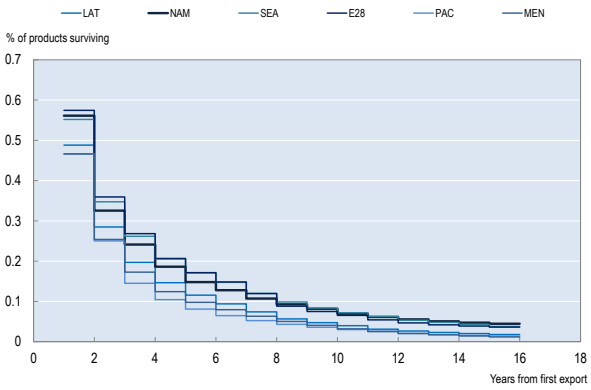
7. In order to better describe the phenomenon occurring under both margins, each margin is decomposed into three components. For the intensive margin, export growth for increasing export volumes, decreasing export volumes and ceased activities are split. For the extensive margin, export growth generated by exports of already exported goods but shifted to new markets, exports of new products to already served markets and exports of new products to completely new markets are separately considered.

8. These differing survival rates can depend on the composition of exported products and direction of trade; auxiliary econometric tests performed in this project which control for product-specificity and direction of exports show that Latin America has a higher probability of failure than Middle East North African region when controlling for products (Table A4.1).

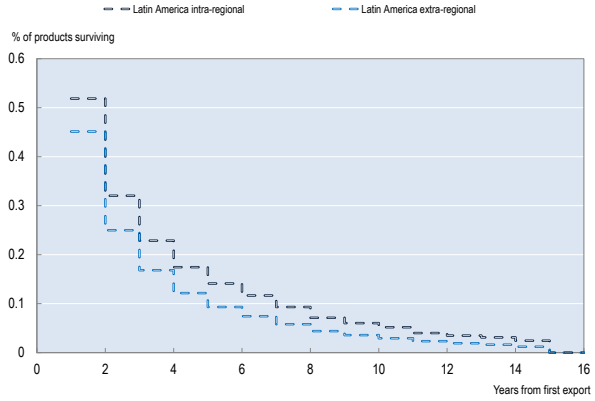
(OECD, 2015a), survival profiles are also higher in Latin America for intra-regional exports, which again suggests that regional markets may be a good place to learn how and what to export (the difference between the dashed lines in Figure 10).

Figure 10. Survival rates of intermediate exports to the world

Panel A. Across regions



Panel B. Distinguishing between intra and extra-regional exports



Source: Authors' calculations based on the BACI dataset.

Diversification and scale

Intra-regional exports of intermediates also tend to be more diversified than exports to other regions. On average, in 2012, a typical Latin American country was exporting more than 800 HS 6-digit intermediate products to a regional partner with which it shared a common language and common border and more than 600 products to a regional partner with which it only shared a common border. In contrast, a typical LA exporting country was exporting an average of just above 500 products to a typical country in North America, 200 products to the European Union, and below 200 products to South East Asia. While intra-regional exports of intermediates are more diversified, they still account for much smaller trade shares – typically around 5% of export values – than extra-regional destinations (Figure 11).

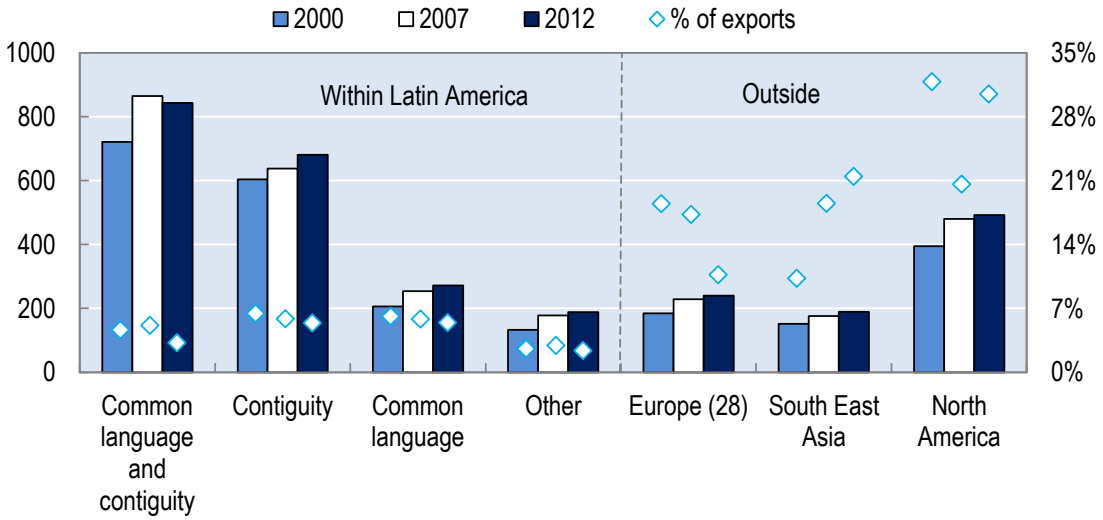
The potential trade-off between diversification and increasing the value of exported intermediates and the question of the role that further regional integration can play can be illustrated further using the modified extensive and intensive margins of trade indices developed by Hummels and Klenow (2005) where more weight is given to more intensely traded products.[9] We find that exports to other countries in the region were the most diversified, followed by exports to North America, the EU28 and South East Asia. Intermediate exports to other regions were much less diversified and in some destination regions the number of products has been declining (Figure 12, Panel A). The intensive margin gives us Latin America's similarly-weighted market shares in regional markets across the range of intermediate products in exports to different regions. We see that across the intermediates exported, with an intensive margin of 20% in North America, Latin America is enjoying strong demand for its products, which is much less the case in other regions. We also see that the

9. For example, the Hummels-Klenow extensive margin of Latin America with respect to South East Asia calculated in this way can be thought of as a weighted percentage of Latin American intermediates exported to North America where products that the world trades relatively intensely get a higher weight. The higher weight of the more intensely imported categories is justified because these products categories are more important in world trade and hold a greater potential for export scale expansion for Latin American exporters. A petroleum product will typically have a much higher weight than woollen garments. A country exporting a wide range of products that are not traded much is therefore going to have a lower extensive margin than a country exporting the same number of intensely-traded products.

intensive margin in Latin American markets has been falling since the 2008-2009 crisis, while it has been gradually increasing in North America, as well as – albeit from a much lower base – in South East Asia and the European Union (Figure 12, Panel B).

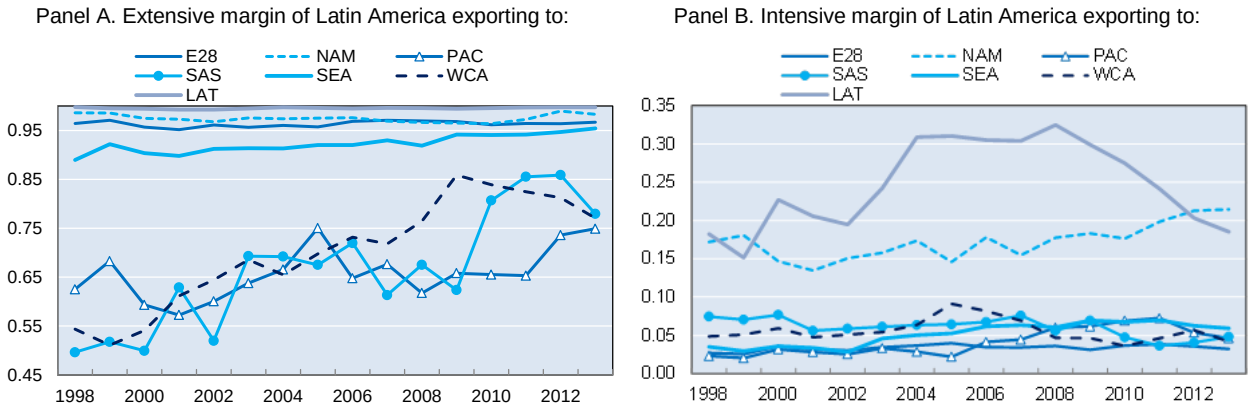
This analysis shows that Latin America's intra-regional intermediate trade is already well diversified but the scale is low and falling; Latin American countries have been losing market share for intermediates in markets of their regional partners. Intermediate trade with North America, the EU and South East Asia is also quite well diversified and has become more intensive. The potential for further export growth lies both in intra Latin American integration efforts, as well as in further improving trade with North American, EU and South East Asian partners.

Figure 11. Average number of intermediate products exported and exports shares by type of partner



Note: "Other" denotes pairs of Latin American countries without a common border or language.
Source: Authors' calculations based on the BACI dataset.

Figure 12. Hummels-Klenow extensive and intensive margins of Latin American exports to different regions



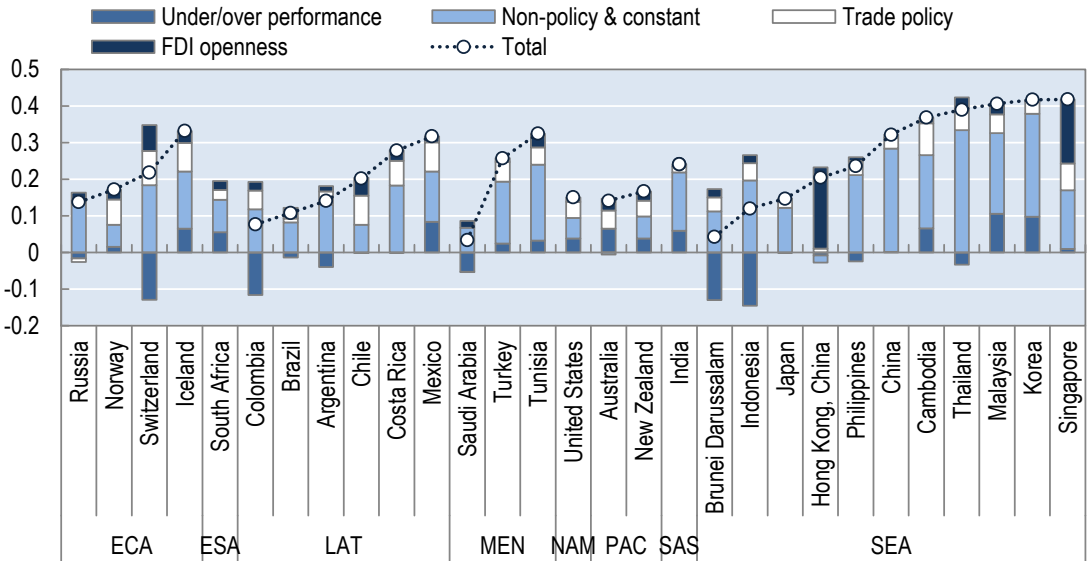
Source: Authors' calculations based on the BACI dataset and Hummels and Klenow (2005).

1.3.3 Some of the determinants of GVC participation in Latin America

The extent and nature of GVC integration in Latin America will reflect many country and region-specific characteristics, as well as the policy environment influencing all the different costs of production implicit in geographically-fragmented production processes. This section uses the methodology proposed in OECD (2015a) to benchmark the most important characteristics in explaining differences in the extent of countries' GVC integration and to identify those countries which can improve their participation through appropriate policy reforms.[10]

While some of the important determinants of GVC participation are market size, level of development, industrial structure and geographical location, policy determinants such as low import tariffs, both at home and faced in export markets, engagement in PTAs and openness to inward FDI also matter –sometimes more than structural factors (Annex 5). A decomposition of these most significant determinants for the six Latin American countries covered in the OECD TiVA database (Figure 13) shows that structural factors contribute significantly to participation but so do trade policy and FDI openness. A comparison of Argentina and Chile, for example, shows that, based solely on structural factors, Argentina's backward GVC participation would be expected to be more extensive than that of Chile. Yet, the higher actual participation of Chile is explained by its more liberal trade and FDI regime (Figure 13).

Figure 13. Backward GVC participation ratio–relative contribution of non-policy and policy factors



Source: Estimations based on OECD TiVA database.

These six Latin American countries also show some differences in their policy stance relative to the average in the OECD TiVA sample (Annex Figure A5.1). Import tariffs imposed and import tariffs faced in export markets are relatively low and the coverage of PTAs on imports and exports of intermediates is relatively developed in Mexico, Chile and Costa Rica, but not in Argentina and Brazil. In general, however, Latin American countries have higher number of bilateral and regional trade agreements compared to countries in other regions. Further progress will thus naturally depend on improvements in the functioning of these agreements. Moreover, as analysis of the hurdles associated with multiple trade agreements, such as overlapping and complicated RoO or NTMs suggests (see Sections 2 and 3), progress may also be made through their consolidation.

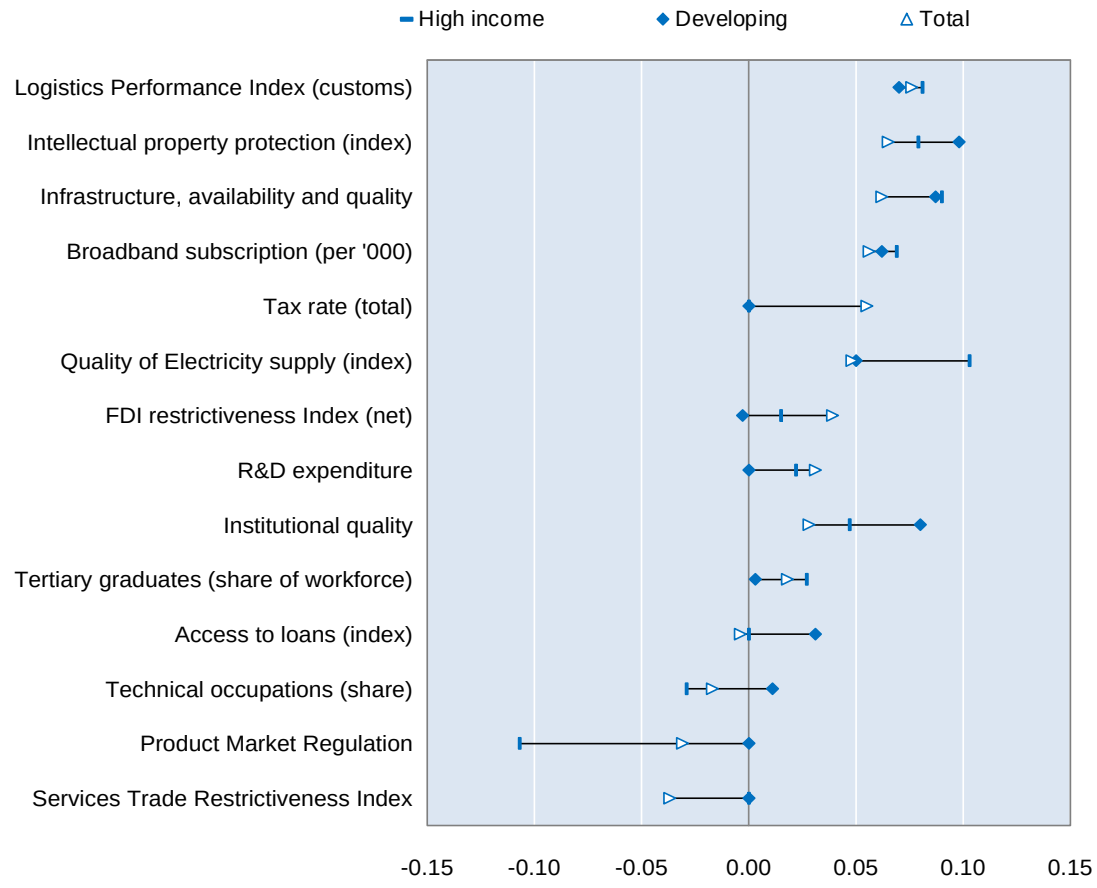
10. The current analysis uses the new 2015 release of the OECD TiVA database and thereby covers more countries and an additional year.

Latin American countries tend to be relatively open to FDI (Annex Figure A5.2), although pockets of restrictiveness remain in certain countries and sectors. In Mexico, for example, certain elements related to screening, and approval of, FDI remain more restrictive than in other countries (OECD FDI Restrictiveness Index). In Chile, barriers to the trade in maritime transport services are higher than in any other OECD country and around 75% of these are due to restriction on foreign entry (OECD, 2015b).[11]

The econometric model used for the decomposition of GVC participation rates in Figure 13 accounts only for some 60% of variation in the GVC participation rates (Annex 5). In Mexico and to a smaller extent Costa Rica and Chile, the unexplained portions tend to be positive, which suggests that there are factors that are not included in our model that appear to boost these countries' backward participation. In Colombia, Argentina and Brazil however, there are factors that hamper participation. These unexplained positive or negative residuals give an indication of respectively over or under-performance in terms of backward GVC participation and capture all the other factors and policies relevant for GVC participation but which are not covered in the modelling exercise.

Other OECD work (2015a) to quantify the importance of some other GVC participation determinants across a larger number of developed and developing economies found that trade facilitation and logistics performance, quality of infrastructure and of institutions, intellectual property protection and quality of electricity supply are particularly important (Figure 14).

Figure 14. The impact on GVC integration of other policies



Source: OECD (2015a). Estimations based on OECD TiVA database.

11. See Services Trade Restrictiveness Index: www.oecd.org/tad/services-trade/services-trade-restrictiveness-index.htm

Highly geographically fragmented production processes have become much more sensitive to trade costs. Trade facilitation has thus become central to the well-functioning of GVCs. Today, only 0-10% of trade costs are estimated to be tariffs, with 10-30% represented by natural trade costs (i.e. geographical and cultural factors) and the remaining 60-80% relating to indirect costs of trade procedures, maritime connectivity and services, business (regulatory) environment, currency fluctuations and availability and use of ICT services (UNESCAP, 2014).

The heterogeneity of trade costs across and within selected developing regions is highlighted in Table 2. Although some of these costs will be due to non-policy related factors such as economies of scale in shipping (Haddad, 2007) or natural geographical barriers, some can be addressed by policy. Latin America has some of the highest trade costs across all the regions. In terms of intra-regional trade (the diagonal in Table 2), Latin America's costs are second only to those of East and Southern Africa (ESA) and West and Central Africa (WCA). Latin America is also the only region in which costs of trade *vis-à-vis* another region – in this case North America – are on average lower than for trade with other countries in the region.[12] The region also faces relatively high trade costs *vis-à-vis* South East Asia and Europe. For example, importers in SEA face approximately half the trade costs when importing from within the region, the Middle East and North Africa (MENA) or North America. Similarly, importers in the EU face approximately half the trade costs when importing from Europe and Central Asia (ECA), MENA or NAM. These comparisons illustrate significant impediments Latin American producers are facing connecting to the GVC hubs in SEA and the European Union.

Table 2. Region by region trade weighted trade costs

	E28	ECA	ESA	LAT	MEN	NAM	PAC	SAS	SEA	WCA
E28	35									
ECA	67	62								
ESA	112	146	104							
LAT	110	159	189	94						
MEN	76	108	93	135	50					
NAM	66	102	125	92	72	15				
PAC	90	141	148	149	70	73	8			
SAS	95	139	162	184	61	89	107	92		
SEA	88	118	155	129	69	72	80	104	69	
WCA	108	165	94	128	115	105	143	100	162	104

Note: Figures show *ad valorem* equivalents of trade costs calculated from Arvis et al. (2013) using the trade cost measure proposed in Novy (2010). Since the data is bilateral, here we show trade weighted average costs of trade by region for the year 2010.

Source: Authors' calculations based on ESCAP-World Bank Trade Cost Database.

Some of these trade costs can be tackled with appropriate national trade facilitation reforms. To help governments improve their border procedures, reduce trade costs, boost trade flows and reap greater benefits from international trade, OECD has developed a set of trade facilitation indicators (TFIs) that identify areas for action and enable the potential impact of reforms to be assessed.[13] The TFIs also help monitor progress on

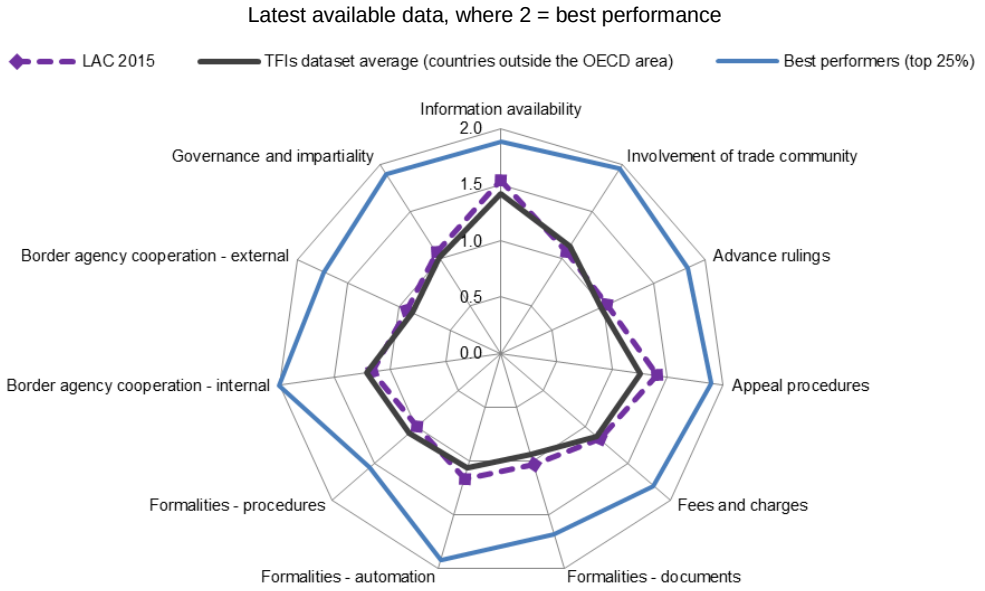
12. Since these estimates are based on a comparison of how much countries trade within their own borders with how much they trade with other countries (and these are then used to calculate average trade-weighted costs of trade within and across regions), these low LA-NAM costs likely reflect extensive trade relationships between countries in Central America and the United States and Canada, but this does not necessarily extend to countries in South America.

13. These can be accessed at: http://www.oecd.org/trade/facilitation/indicators.htm. Countries covered in Latin America and Caribbean (LAC) include: Antigua and Barbuda, Argentina, Bahamas, Barbados, Belize, Bolivia, Brazil, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, El

implementation of the WTO Trade Facilitation Agreement. The potential impact of border performance on trade costs and indicators of GVC participation can be assessed using the OECD Trade Facilitation Indicators (TFIs), which follow closely the policy areas covered by the WTO Trade Facilitation Agreement (TFA). Estimates based on the indicators provide a basis for governments to prioritise trade facilitation actions. The TFA offers an opportunity to reduce trade costs by up to 16.3% in Latin America and the Caribbean, should countries in this region fully implement the TFA (Moïsé and Sorescu, 2013; OECD, 2015e). TFIs show that, on average, the trade facilitation performance of Latin America and the Caribbean matches or exceeds the average performance of the group of surveyed countries, which comprises 130 countries outside the OECD area, in all TFI areas.[14] Performance improved between 2012 and 2015 on advance rulings, appeal procedures, automation and external border agency co-operation. However, the TFIs also show that the region is far behind the best performers and that performance in specific aspects of trade facilitation varies significantly across countries (Figure 15).

Many Latin American countries also have considerable potential for catch-up with the best performing countries in other areas that matter for GVC integration. For example, while Colombia, Peru, Mexico and Chile have relatively light regulatory burdens on firms, they are still relatively heavier than those in the best performing SEA countries, and countries such as Venezuela and Bolivia have very restrictive regimes. Similar heterogeneity can be observed with respect to the quality of institutions and IPR protection (Figure 16). Moreover, with the exception of well performing countries such as Chile or Panama, efficiency of customs procedures and quality of trade and transported-related infrastructure seems to be problematic across the region.

Figure 15. Latin America and the Caribbean's trade facilitation performance: OECD indicators (2015)



Note: The analysis is based on the latest available data as of May 2015 and the set of indicators as constructed for countries outside the OECD area in "Trade Facilitation Indicators: The Potential Impact of Trade Facilitation on Developing Countries' Trade" (*OECD Trade Policy Paper No. 144*, 2013). "Best performance" denotes the average of the top quartile for each of the trade facilitation areas covered, across all countries within the database. Latin America and Caribbean region in this database covers 25 countries in 2015.

Source: OECD Trade Facilitation Indicators.

Salvador, Guatemala, Honduras, Jamaica, Nicaragua, Panama, Paraguay, Peru, Suriname, Trinidad and Tobago, Uruguay, Venezuela.

14. This suggests that the high trade costs documented in Table 2 are associated principally with high transport costs due to geography and possibly also the complications associated with overlapping PTAs.

Inexpensive and good quality service inputs can enhance GVC competitiveness. For example, as much as 30% of value added of the manufacturing sector's exports is accounted for by services inputs (OECD, 2013). While this sort of "servicification" is a more general phenomenon and not necessarily strictly related to participating in GVCs, GVCs depend crucially on well-functioning transport, logistics, finance, communication and other business and professional services to move goods and coordinate production along the value chain (OECD, 2014). Reforms to foster the development of a competitive domestic services sector and efficient trading of services across borders are thus a priority.

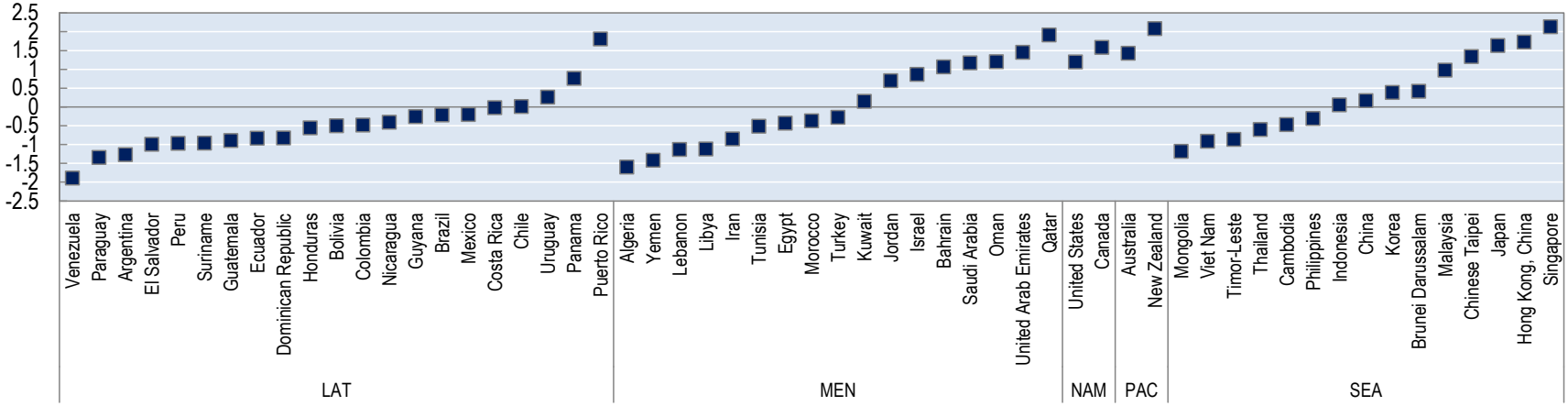
According to the OECD STRI,[15] Chile is one of the least restrictive countries in a number of backbone services such as accounting, engineering, air transport, road freight transport, distribution and insurance, but it is relatively restrictive in telecom, maritime transport and courier services. Brazil is more restrictive than the OECD and all country averages in all the services sectors and more restrictive than Chile in all sectors except maritime transport. Mexico is somewhat less restrictive than Brazil and more restrictive than Chile across the board, although it is more open than Chile in maritime transport, courier and distribution services.

In sum, there are important differences in the degree of restrictiveness of different GVC-related policies across countries and across sectors. The composite indices capturing policy performance often reflect different types of restrictions. Designing appropriate reforms to promote GVC participation requires a dedicated analysis of the underlying regulations in specific countries and specific sectors and consideration of the costs and political economy of reforms. The empirical analysis presented in this section provides a starting point for policy makers in the region to assess their countries' GVC engagement and to consider policy options.

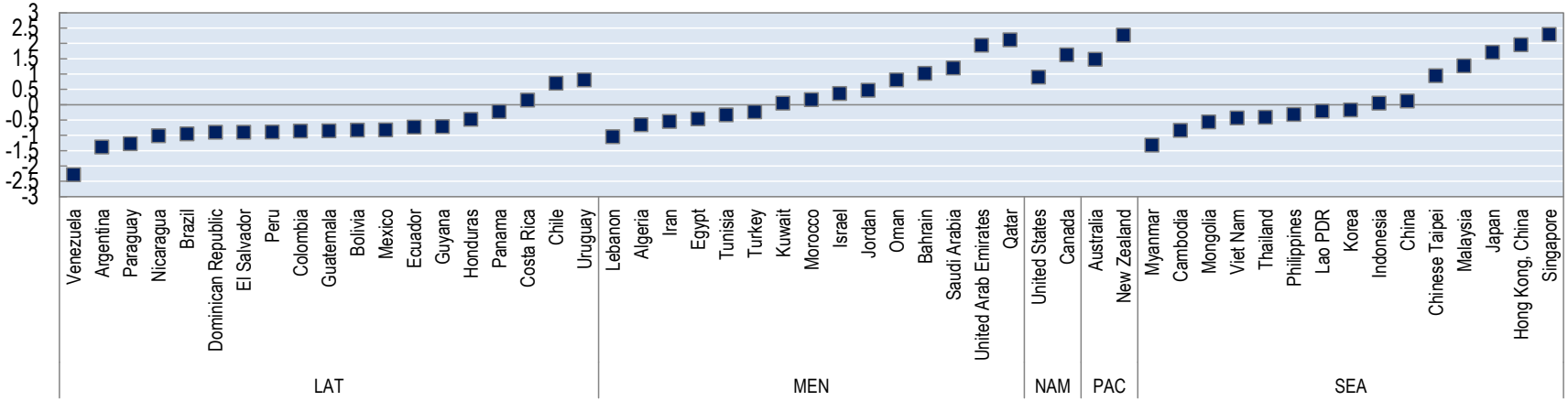
15. The STRI covers three economies (Brazil, Mexico and Chile) and is being currently extended to Colombia and Costa Rica.

Figure 16. Indicators of other sources of trade costs

Panel A. Intellectual property protection, 2012



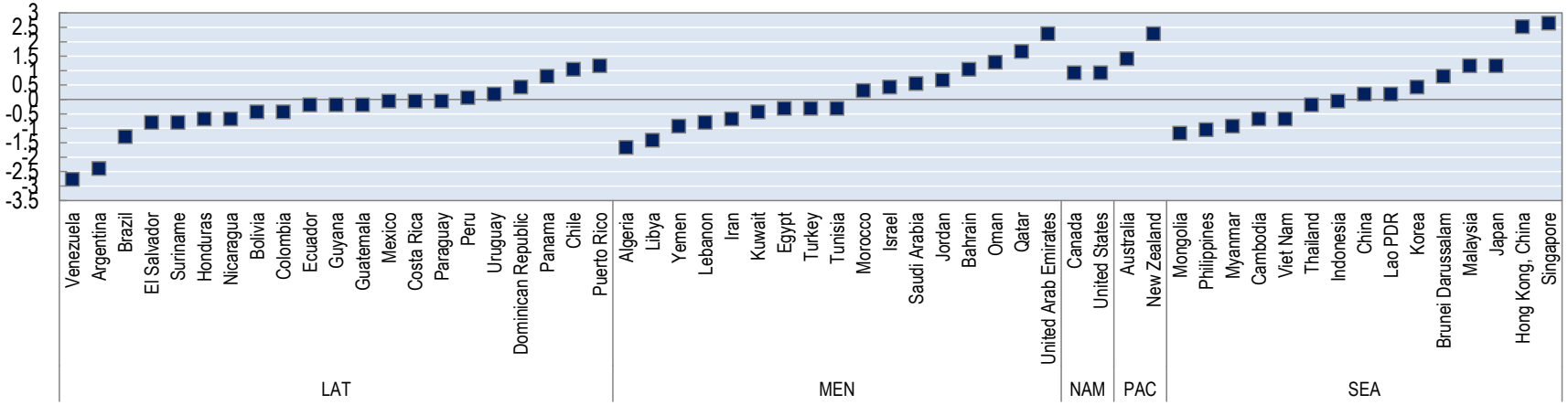
Panel B. Quality of institutions, 2015



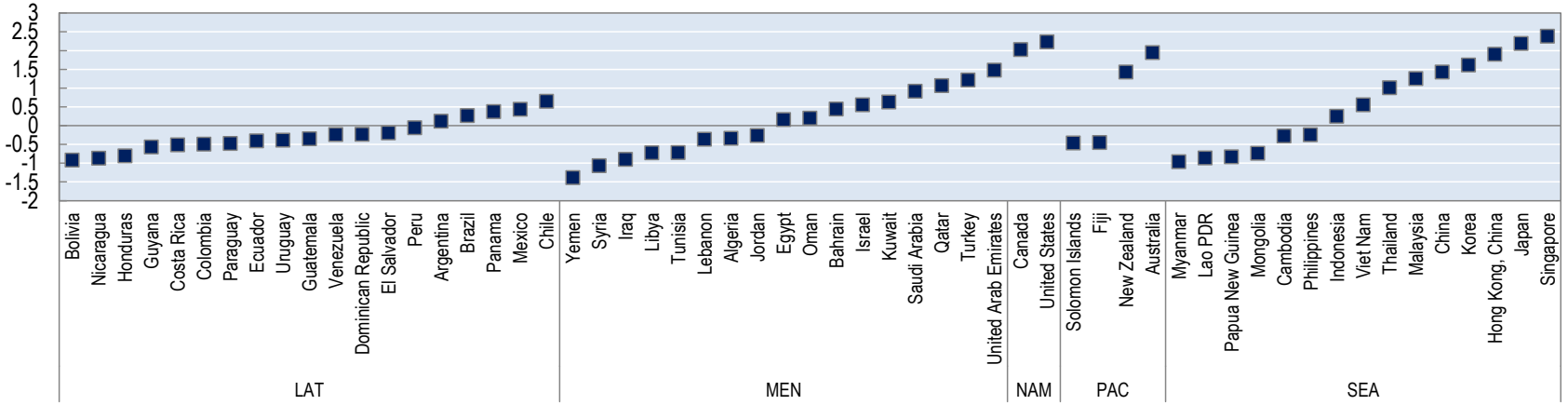
Note: These are standardised scores: 1 denotes one standard deviation in the sample of countries considered in OECD (2015a).

Figure 16. Indicators of other sources of trade costs (*cont.*)

Panel C. Efficiency of customs procedures



Panel D. Quality of trade and transport-related infrastructure



Note: These are standardised scores: 1 denotes one standard deviation in the sample of countries considered in OECD (2015a).

Source: WEF and World Bank.

Part II.

Preferential Trade Agreements and GVC Participation in Latin America

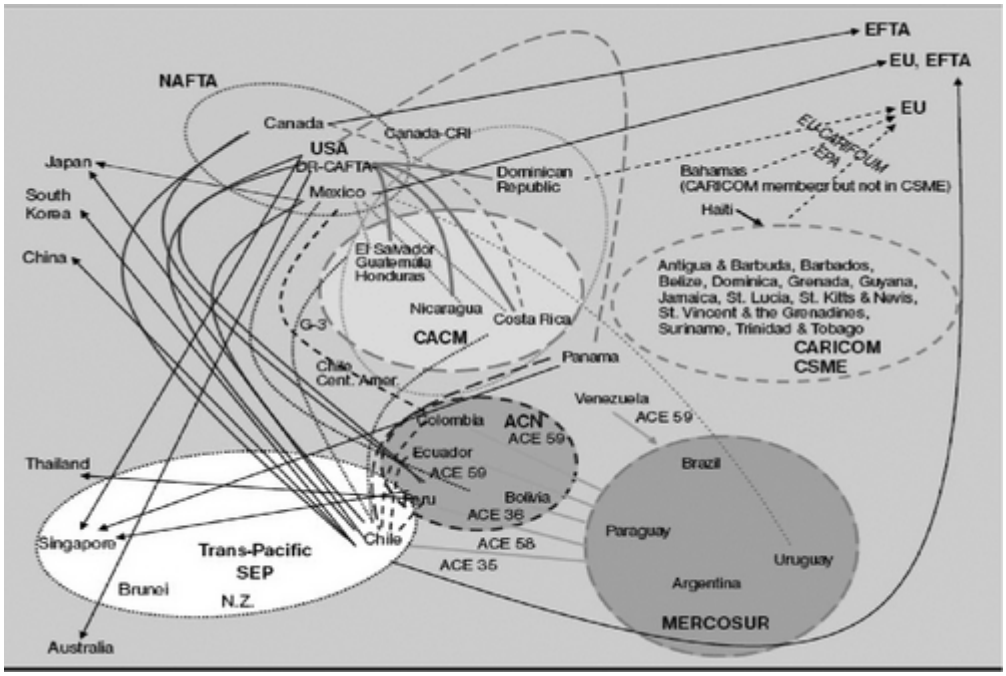
Proliferation of PTAs has been one of the most prominent developments in the global trading system in the last thirty years. Some 280 PTAs were signed between 1980 and 2015 among 180 countries, mostly in the 1990s and the first half of 2000s. Fewer agreements have been signed in recent years, but those that have been signed recently tend to be deeper[16] (Hofman, Osnago and Ruta, 2016). PTAs have accounted for much of the improved market access and new rule making since the establishment of the WTO and tend to cover a wider set of issues than WTO Agreements. Despite their preferential nature, some PTAs have been gradually extended to larger groups of countries, giving rise larger trading and rule-making blocs. At the same time, there has been much debate about PTAs. First, because they can redirect trade from more efficient trading partners outside the agreement towards less efficient ones within them (trade diversion effect) which can undermine, and in some cases even overturn, economic gains associated with easier trade between the parties (trade creation effect). Second, the sheer number of PTAs and the differences in their provisions have added to the complexity of rules, potentially imposing a disproportionately higher toll on smaller firms.

The proliferation of PTAs has coincided with the spread of GVCs, although it is not clear whether new agreements facilitated the formation of new and more efficient value chains, or whether these agreements followed and cemented already-existing relationships – or, indeed, if they hampered the formation of possibly more efficient relationships that would have emerged with MFN liberalisation. For example, while some studies linked integration through trade and investment agreements in South East Asia, North America and Eastern Europe to the emergence of large international production networks in these regions (see Kaminski and Ng, 2005 for Europe; Krapohl and Fink, 2013 for ASEAN; or Orefice and Rocha, 2013), others have argued that in East Asia the GVC phenomenon may have actually predated regional integration (e.g. Ramasamy, 2011 and Menon, 2013). OECD (2015a) found that a higher share of imports and exports covered by PTAs were correlated with higher degree of sourcing of foreign inputs for export production. The study also found that the trade-creating effect of belonging to a PTA was larger for trade in intermediates than for other types of trade. However, the preferential treatment afforded to intra-PTA production relationships, as well as the accompanying rules of origin and standards, have in some cases been found to be detrimental to actors outside the PTA, as well as to their intra-PTA business partners (Estevadeordal, Blyde, Harris and Volpe, 2013).

Latin American countries are among the most active signatories of PTAs. The spread of PTAs in the region began in the early 1990's after the signing of MERCOSUR in 1991 and the North American Free Trade Agreement (NAFTA) in 1994. Currently 68 PTAs involving at least one Latin American country have been notified to the WTO (see Annex 6 and Figure 17 for an overview). These comprise nine agreements of different Latin American countries with the United States or Canada, seven agreements with either the European Union or EFTA, 15 with partners in East and South East Asia and 32 intra-regional agreements. Each of the countries in the region has at least ten agreements and some have as many as 26. These agreements vary with respect to scope and depth. They include more traditional treaties such as the Andean Community or Mercosur which cover mainly conventional areas such as market access, and other "second-generation" agreements, such as the Central American Free Trade Agreement, which include more GVC-compatible provisions related to, for example, competition policy or services.

16. Depth is defined in Ruta et al. (2016) as having a wider of legally enforceable provisions (e.g. on competition policy, IPR, labour market regulations, etc.).

Figure 17. PTAs in Latin America



Source: IDB.

The most recent trade integration initiatives include the Pacific Alliance Agreement between Mexico, Colombia, Peru and Chile (entry into force in July 2015) and the conclusion of negotiations by Chile, Mexico and Peru and nine other countries in Asia Pacific of the Trans-Pacific Partnership (TPP) in October 2015. The Pacific Alliance countries eliminated tariffs on 92% of bilateral trade upon entry into force of the Agreement and adopted measures to gradually eliminate those remaining. The agreement included also several measures aimed at reducing non-tariff barriers related to rules of origin, certification, technical barriers and customs and administrative procedures. The TPP, which in addition to Chile, Mexico and Peru includes Australia, Brunei, Canada, Japan, Malaysia, New Zealand, Singapore, the United States, and Viet Nam, includes improvements to market access and reduction of non-tariff barriers and envisages extensive provisions in the area of investment, services trade, competition and IPR protection.

The future trading conditions faced by Latin American firms and their opportunities to engage with international supply chains will depend on the evolution of the network of PTAs involving countries in the region but also those involving their trading partners. Since value chains have both important regional and global dimensions (e.g. OECD, 2015a) developments in both intra- and extra-regional agreements and interactions between them matter. While Latin America's extra-regional GVC links seem to be roughly on par with those of other regions (Figure 4), intra-regional links are visibly weak. An important question is whether Latin American firms are missing out on opportunities offered by regional partners and whether this is related to the relatively dense and complicated web of intra and extra-regional PTAs. Overlap, duplication, conflicting rules of origin and differing technical standards are some of the potential problems.

Consolidation of existing agreements or negotiation of new more flexible ones[17] could hold promise for a more economically integrated continent, with increasing integration of various domestic and regional supply chains, and the establishment of regional investment poles. As countries continue to pursue preferential integration and geographical fragmentation of production processes continues, there will be, in principle, greater incentives to consolidate rules of origin and product standards. However, this has not happened yet in any significant way; in more than half of the PTAs concluded by Mexico, Chile and Peru, for example, the

17. Some of the flexibility mechanisms with respect to RoO and standards, which can be included in PTAs, are discussed below.

same rules apply to only slightly more than 40% of traded products (Perales, 2012). Also, even though there is an increasing tendency to include clauses dealing with regulatory standards in the new generation of PTAs, among the 62 FTAs involving Latin American countries only less than 20 include such provisions.

Recently, as testified notably by initiatives of the Pacific Alliance countries, the idea of linking or harmonising the various Latin American PTAs is gathering strength. Harmonisation of regulatory standards on products is also attracting interest. To support and inform this approach, this study analyses the impact of RoO and NTMs on GVC integration in the region, takes stock of progress in and the impact of the relevant harmonisation initiatives, and discusses some options for future policy initiatives.

2. The impact of Rules of Origin

2.1 Rules of origin in the context of GVCs

RoO establish the conditions that a product must satisfy to be deemed eligible for preferential access to member countries' markets and thus are integral elements of PTAs. The primary policy goal of RoO is to ensure that the parties to the PTA receive the benefits of the agreement; rules that overly strict may indeed prevent certain producers from taking the advantage of the agreement, but rules that are too liberal may not sufficiently benefit producers who make investments in the PTA region. They are primarily used to prevent trade deflection – that is, to prevent products from non-participating countries reaching a high-tariff PTA member via the transhipment of the product through a low-tariff member.

In the world of GVCs, where products originating from countries outside the PTA serve as inputs into products of participating countries, the preventive role becomes less straightforward and may even be counterproductive in the context of maximising value addition within the PTA. While it is clear that RoO constrain extra-PTA sourcing of inputs and processing and encourage these activities within the PTA, it is also clear they can actually have negative impact on value chain formation within the PTA. For example, some value chain participants who tend to source little from outside or engage in significant processing internally may be able to meet the RoO and therefore qualify for preferential access. Other firms may simply be unable to meet RoO because of technological or managerial constraints and will therefore face a competitive disadvantage and may ultimately exit the market. RoO may narrow the choices for locating segments of production abroad, discouraging the use of cheaper parts and materials from third countries. In some cases, RoO can increase production costs to the point where the cost of compliance exceeds the benefit of the preferences conferred by the agreement (Estevadeordal and Suominen, 2006, 2008). Depending on the nature of extra- and intra-regional value chain links, this can have ripple effects on intra-PTA value chain partners, with potentially important consequences for market structure and productivity.

Thus, in contrast to pre-GVC production structures when products used to originate predominantly from within the confines of one country, the effects of RoO can actually be negative for some intra-PTA firms and value chain segments and these effects will not be a consequence of competitive pressure related to market opening but of a particular kind of regulation.[18] This indicates that RoO are not compatible with the idea of competitive global sourcing in GVCs – a concern aggravated by the apparent arbitrariness of some RoO and the fact that their negotiation can be captured by interest groups. For example, different types of RoO can be applied in the context of similar preferential tariff margins on like products. In some cases, RoO can be specified so as to effectively undo trade liberalisation that would be implied by tariff concessions in order to protect some producers (e.g. Estevadeordal and Suominen, 2008).

The WTO Rules of Origin Agreement and the WCO Kyoto Convention[19] recognise two basic criteria for determining origin: wholly obtained and substantial transformation. The wholly obtained criterion specifies that the country of origin of a product is the country where the commodity has been wholly produced (or grown, harvested or extracted for non-manufactured products). In this case, the origin requirement is met if a product or commodity does not use any foreign components or materials. The substantial transformation

18. In extreme cases, they can even have negative effects at the country level, for example when the negotiated rules of origin can only be met by GVC participants from one party to the agreement.

19. The International Convention on the Simplification and Harmonization of Customs Procedures.

criterion specifies that the country of origin is the country where the last substantial transformation took place, and this transformation must be sufficient to give its essential character to a commodity. There exist three distinct sets of criteria to express "substantial transformation" that can be used stand-alone or in combination (Box 2).

Box 2. Types of substantial transformation criterion in RoO

RoO are combinations of different types of criteria that must be met for products to quality for preferential treatment. The first type of criteria is a change in the tariff classification (CTC) of the manufactured good against the classification of the inputs from extra-PTA parties used for producing the good. CTC may involve transforming the products so as to alter the classification at the level of: chapter (HS 2-digit), heading (4-digit), subheading (6-digit) or even a tariff item level (8 or 10-digit). A change in heading (CH) is a particularly common requirement (see Annex Table A7), either as a stand-alone or in tandem with other RoO criteria.

Exceptions can be attached to particular CTC requirement generally prohibiting the use of non-originating materials from a particular HS subheading, heading, or chapter for goods supposed to qualify via CTC and thereby making the requirement more restrictive.

The second type of criteria is value content (VC), which requires the product to acquire a minimum local value (usually between 30% and 60%) in the exporting country in order to meet RoO requirements. The value content requirement can be expressed as a minimum percentage of the product's total value, a minimum difference between the value of the final good and the costs of the imported inputs; or a minimum value of parts out of the total.

The third type of criteria, called the technical requirement (TR), prescribes or prohibits specific manufacturing operations or inputs in the originating country to meet RoO requirements. For example, TRs feature prominently in RoO governing trade of textile products. According to Estevadeordal et al. (2009) VC or TR rules attached to a given CTC rule add restrictiveness to RoO.

There are two main concerns related to RoO (Estevadeordal and Suominen, 2008): their restrictiveness (see below) and divergence. Many trade partners are also linked through several trade agreements (bilateral, regional, etc.) which can mean exporters have access to different RoO regimes providing alternative routes to fulfilling RoO for a given product. The ability to choose between the different co-existing RoO is a facilitating factor, especially if it is clearly specified in the agreements and communicated to the business community. However, if a country has several different RoO regimes in its agreements with different countries, this can have negative effects as producers may either have to split production to use different input mixes to export to different markets (or keep track of and work around the multiple RoO) or concentrate on specific markets with less restrictive RoO. A third concern relates to how RoO in overlapping PTAs interact and can be cumulated (Section 2.3).

In earlier attempts to derive cost estimates for various product-specific rules of origin, Estevadeordal and Suominen (2008), used an index of the restrictiveness of rules of origin developed by Estevadeordal (2000) and linked it to the rates of utilisation of preferences while controlling for the size of the preferential margin. In brief, the index posits that restrictiveness depends on the combination of requirement of change of tariff classification at the different levels of aggregation of the HS classification with value content and technical requirements. The proposed rule is that a requirement of a change at the level of chapter is more restrictive than change at the level of heading and change at the level of heading more restrictive than change at the level of subheading, and so on. In addition, value change and technical requirements attached to a given tariff change classification add to the restrictiveness (Estevadeordal, 2000). Using this index, Cadot et al. (2006) found utilisation rates of preferences to be positively related to preferential margins and negatively related to the restrictiveness of the rules of origin. The trade-weighted averages of RoO compliance costs calculated in this study were found to be 6.8% ad valorem equivalent for NAFTA and 8% for EU.

Some existing studies differentiate between the costs of compliance of RoO according to the level of processing of products. Cadot et al. (2005), for example, found that RoO have a much greater impact on trade of intermediates than on trade in final goods in EU and US agreements with developing countries. Estevadeordal and Suominen (2008) found that restrictive RoO in final goods encourage trade in intra-PTA inputs and diversion from extra-PTA sources of intermediates. More recently, Cadot and Ing (2016) found that *ad valorem* equivalents of ASEAN RoO are significant and that some rules appear particularly restrictive in the

textile and apparel, footwear, prepared food and automobile sectors.[20] They argued that this hampers the development of GVCs and that those sectors could benefit from simplification of RoO.

The constraints generally presented by RoO can be reduced through the use of various mechanisms, such as adoption of *de minimis*, cumulation and business-friendly RoO certification schemes. The utility of such schemes has been confirmed by existing empirical literature: Augier, Gasiorek, and Tong (2005), Estevadeordal and Suominen (2008) and Park and Park (2009) find cumulation schemes particularly effective. There are signs that countries around the world are becoming more aware of the importance of flexible sourcing schemes. One notable Latin American experience involves cumulation in Central American countries and Mexico (see Box 3). The last part of this section explores in more detail how Latin American countries have made use of those mechanisms.

Box 3. The facilitating role of cumulation schemes: The case of Mexico and Central America

At the end of the nineties Mexico signed three agreements with Costa Rica (1995), Nicaragua (1998), and the "Northern Triangle" of El Salvador, Guatemala, and Honduras (2001). These agreements did not allow cumulation among the six countries with the negative effect of segmenting the value chains.

For example, exports of chocolates from Costa Rica would not face tariffs when imported into Mexico as long as they were produced entirely in Costa Rica, but the same chocolates would face a tariff if they used cocoa paste from Honduras. In 2011, the six countries signed a new agreement that enabled full cumulation under a single set of agreed RoO. This gave firms more flexibility in sourcing their inputs.

This example shows that a more systemic approach to RoO may be needed and that promoting more cumulation of origin across the many bilateral and regional trade agreements in Latin American could be promising. This is the approach followed by the Pacific Alliance, where having bilateral agreements with all Alliance members is a pre-requisite for membership and their harmonisation one of its objectives. Firms can take advantage of the differences in input prices across locations, resulting in more cross-border production sharing within the region and higher competitiveness of their products.

Source: Blyde (2014).

RoO stipulated in both intra- and extra-regional PTAs of Latin American countries can have important implications for their firms seeking to participate in international supply chains. While it is clear that preferential trade liberalisation requires some RoO, it is also evident that some RoO can have less desirable effects than others. Some of the key questions are: (i) how RoO might have hampered the development of GVCs in Latin America and (ii) what are the options to better align them with the realities of GVCs. These questions are addressed in the remainder of this section.

2.2 The impact of product-specific rules of origin on GVC integration in Latin America

2.2.1 Structure of RoO in Latin American PTAs

Although there is a significant variation in the types of RoO across PTAs in Latin America (Annex Table A7), certain distinct groupings can be identified (Estevadeordal and Suominen, 2008). On the one end of the spectrum, there are the traditional trade agreements, such as the Latin American Integration Association (LAIA), which uses a general rule applicable across the board for all tariff items, i.e. a change in tariff classification at the heading level or, alternatively, a regional value added of at least 50% of the free on board (FOB) export value of the final good, for 76% of the HS 6-digit products. The LAIA is the model for RoO in the Andean Community and MERCOSUR, as well as in the agreements between countries in the two groupings (Abreu, 2016).

In agreements such as NAFTA on the other hand, depending on the product, RoO require a change in chapter, heading, or subheading (43, 42 and 15% of tariff lines respectively for NAFTA). The value content requirements apply to a relatively small proportion of tariff lines. This was used as a model for subsequent US and Canadian agreements with other Latin American countries (e.g. USA-Chile, USA-Colombia, USA-Peru, USA-Central America-Dominican Republic Free Trade Agreement, Chile-Canada, Canada-Costa Rica FTAs), as well as for many of Mexico's agreements, including the Mexico-Costa Rica, Mexico-Chile, Mexico-Bolivia,

20. This finding is in contrast to some of the assessments of RoO in the ASEAN agreement, which find them to be relatively flexible (e.g. Box 8.7 in Productivity Commission (2010).

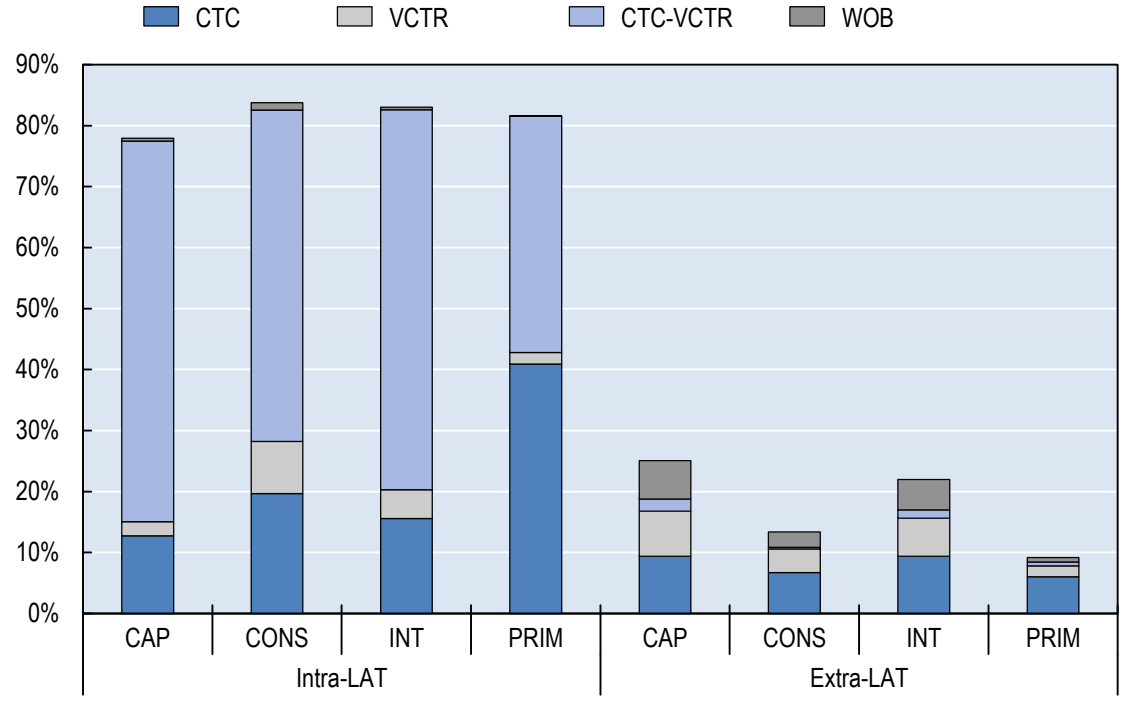
Mexico-Nicaragua, Mexico-Northern Triangle (El Salvador, Guatemala, and Honduras) and Mexico-Colombia-Venezuela (G3). It was also the model for the Trans-Pacific Partnership Agreement concluded between the United States, Chile, Mexico, Peru and a number of other countries in Asia Pacific.

The RoO regime of the Central American Common Market (CACM) is positioned between those of LAIA/MERCOSUR and NAFTA: it employs primarily CTC requirements alone (sometimes with exceptions), but in more precise and diverse ways than MERCOSUR, in that it requires the change to take place at the chapter, heading, or subheading level. It also leaves a relatively large proportion (12%) of tariff lines without a RoO requirement. CAFTA-DR coexists with the CACM's market access mechanisms under the so-called multilateralism principle, which allows Central American producers to choose between the CACM and CAFTA-DR market access regimes when exporting to the other Central American markets.

In the two agreements involving the European Union – the EU-Chile and EU-Mexico – around 30% of tariff lines are free of RoO, while those subject to a change in tariff classification refer to change at the heading level, although compared to other agreements in the region they also have relatively high shares of products subject to value content or technical requirements. In addition, more than 4% of originating products are subject to the wholly obtained rule.

Overall, between 70% to 80% of intra-regional trade in Latin America is covered by RoO, which is significantly higher than for extra-regional trade (less than 20%, Figure 18). While this primarily reflects the higher shares of intra-regional trade covered by PTAs, it also suggests that these regional preferences co-exist with a potentially heavy RoO burden. In contrast to intra-regional trade, extra-regional trade in intermediates and capital goods faces a heavier RoO burden than trade in consumption goods. At the same time, primary intermediates face a relatively low RoO burden.

Figure 18. Share of trade covered by rules of origin in intra and extra-regional PTAs



Source: Authors using INTrade, the IDB Trade and Integration Information System.

2.2.2 Estimating the impact of RoO on intra-PTA GVC participation

In order to assess the impact of RoO on participation in intra-PTA value chains, first, a gravity model of bilateral trade of Latin American countries with all intra- and extra-regional trading partners in the period 1995-2014 is estimated at the HS 6-digit level and distinguishing between intermediate and final products. As discussed above, PTAs generally aim to support intra-PTA trade, both for trade in final products and intermediates. RoO can however prevent certain GVC participants located within the PTA from benefiting from its provisions and this can have additional knock-on effects on their downstream intra-PTA partners. The direction and the relative size of the effects of RoO on intra-PTA trade in intermediate and final cannot be known *a priori*. Among other factors, they depend on whether final or intermediate products have higher extra-PTA content which in turn depends on the nature of GVC integration. For example, it is possible that intra-PTA shipments of components, which are only partially processed, may have more difficulty meeting the RoO criteria compared to the final products. The direction and size of the effects of RoO on intermediate and final products is thus ultimately an empirical question.

Columns (1) to (6) in Annex Table A8 show parameter estimates for the trade effect of engaging in a PTA for, respectively, all goods, and intermediate goods and final goods separately. With the adopted specification, the effect of a PTA is composed of three elements: a pure effect of having a PTA, an effect of a preferential margin afforded by the PTA and effects of a RoO associated with the PTA. Columns (1) through (3) show average parameter estimates for specifications considering an average effect of any kind of RoO for, respectively, all products, intermediate products and final products. Columns (4) through (6) show parameter estimates for PTAs and RoOs with different components consolidated into the four main categories of rules defined above.

For all products, the combined effect of a PTA is to increase bilateral trade between PTA members by on average 30.6% in the absence of RoO[21]; however, this trade creating effect is reduced by some 4.5 percentage points (i.e. to 25.1%) in the presence of a RoO. In other words, across all products, RoO undo one-sixth of the trade expansion from a PTA. For intermediates, the combined effect of a PTA is to increase bilateral trade between the PTA members by on average 38% in the absence of RoO[22]; this, however, is reduced by some 15 percentage points (i.e. to 23.7%) with RoO, or by more than 30%. In sum, PTAs can have particularly strong trade creating effects on intra-PTA trade, which are nevertheless hampered by RoO, and these effects are stronger for intermediate products. This suggests that RoO can have strong and negative effects on formation of intra-PTA value chain relationships.

There are a number of potential explanations for the differential impact of RoO on trade of final and intermediate products. RoO specified for products classified as intermediates could tend to be more restrictive.[23] Or, perhaps more plausibly, intermediates could tend to have a lower intra-PTA content and face more difficulty meeting RoO.

Figure 19 presents *ad valorem* equivalents (AVEs) of the estimated effects of the different types of RoO across all, intermediate and final products.[24] The results are mixed with respect to their statistical significance although there are some intuitive patterns consistent with rankings of restrictiveness derived by Carrere and de

21. If we consider that the average tariff on all products in our dataset is 6.6%, the average trade impact of an PTA can be calculated from the estimated coefficients presented in Annex Table A8 as exp[-0.07+0.166*ln(6.6+1)]-1 = 30.6% for products without RoO, and exp[-0.07+0.166*ln(6.6+1)-0.043]-1 = 25.1% for products with RoO.

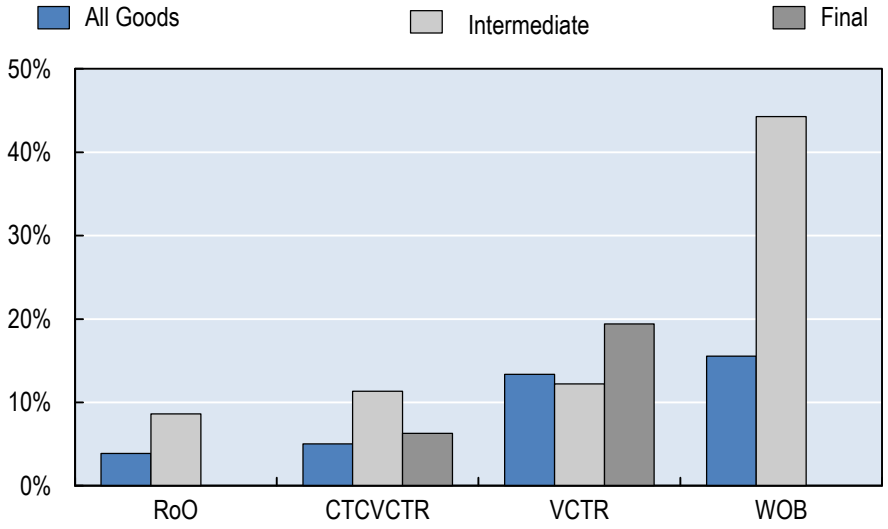
22. The average tariff for is 5.2% for intermediate. A similar calculation for intermediate products would give 37.8% increase in trade in the absence of RoO which however is reduced by nearly 15 percentage points (i.e. to 23.7%) with RoO.

23. This could be the case if RoO are specified as to encourage regional value chain formation or if intermediates are perceived lower value or more likely to compete with domestic products.

24. Coefficient estimates have been converted into *ad valorem* equivalents (AVEs) using a standard formula for semi-logarithmic equations: AVE = exp(coefficient estimate) -1 and subsequently dividing it by a corresponding import demand elasticity (Annex 8).

Melo (2006) and Estevadeordal and Suominen (2008). As would be expected, the most trade-inhibiting type of RoO is the wholly obtained rule (WOB) and this type of RoO is particularly restrictive for intermediate products with an estimated AVE of 45%.[25] RoO specified as change of tariff classification (CTC) are estimated to have no statistically significant impact. When RoO combine a change in tariff classification (CTC) with a value content or technical requirement (CTC-VCTR)[26] the estimated AVE is at around 11.4% for intermediate products and 6.3% for final products. The value content or technical requirement (VCTR), often pointed out as more challenging to comply with for than a CTC rule, has an estimated AVE of 12.4% and 19.6% for, respectively, intermediate and final products.

Figure 19. Estimated *ad valorem* equivalent (AVEs) of RoOs in Latin American countries



Source: Authors' calculations using BACI.

Another approach to measure the impact of RoO on intra-PTA trade is to consider utilisation of tariff preferences associated with PTAs (Abreu, 2013). Even when two countries have a PTA, some parties will not apply for, or will not be able to meet the RoO for, the preferential treatment under the PTA. Among other factors, utilisation of preferences will depend on: the attractiveness of preferences, proxied by the difference between MFN and preferential tariffs (i.e. the preferential margin); and on the restrictiveness of the relevant RoO. This approach is applied to estimate the restrictiveness of RoO using a unique preference utilisation data[27] obtained from the LAIA and covering all pairs of countries belonging to the association over 2002-2012.

25. This is expected as this kind of RoO is typically seen for primary agricultural and natural resources-based products.

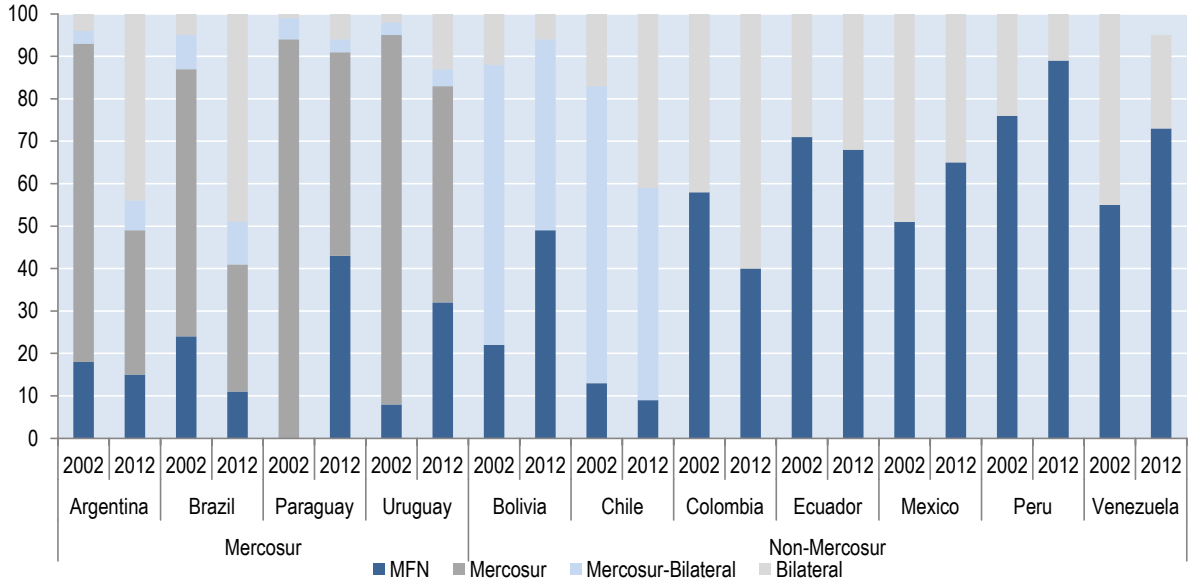
26. Due to the way RoO in existing agreements were categorised for our assessment, our grouping CTC-VCTR cannot distinguish between a cumulation of CTC rules with VC thresholds or TR requirements, or different types of RoO as alternative ways of demonstrating origin. However, even if this category is capturing alternatives, Cadot and Ing (2016 forthcoming) argues that this still may be more complicated to interpret and implement and therefore may not provide the expected flexibility. The restrictive effect will depend on the type of CTC (if change at the chapter, heading or sub-heading level) and the VC calculation method (value added or value of materials), which are also not distinguished in the current econometric exercise.

27. Data on the actual use of preferences are generally not disclosed. LAIA is a notable exception. In the absence of such data, previous studies based their identification on the variation in trade flows across country pairs as per above, controlling for product and country heterogeneity with fixed effects. The current study therefore obtains more precise estimations of RoO effect but on a smaller sample of countries. As noted above, LAIA was the model for Mercosur ROO.

Figure 20 below shows that the use of preferences differs widely across LAIA countries. In Mercosur, most of countries' imports enter under PTAs (often the Mercosur regime itself but also other relevant bilateral PTAs), though we observe a decline in the use of Mercosur regime across all covered countries and an increase in the use of the MFN regime in imports into Paraguay and Uruguay over 2002-2012. Among Non-Mercosur countries the MFN regime is more prevalent but the use of preferential regimes is highly significant, especially for countries like Bolivia and Chile which signed agreements with Mercosur. Colombia and Mexico made also significant use of their bilateral trade agreements with other LAIA countries.

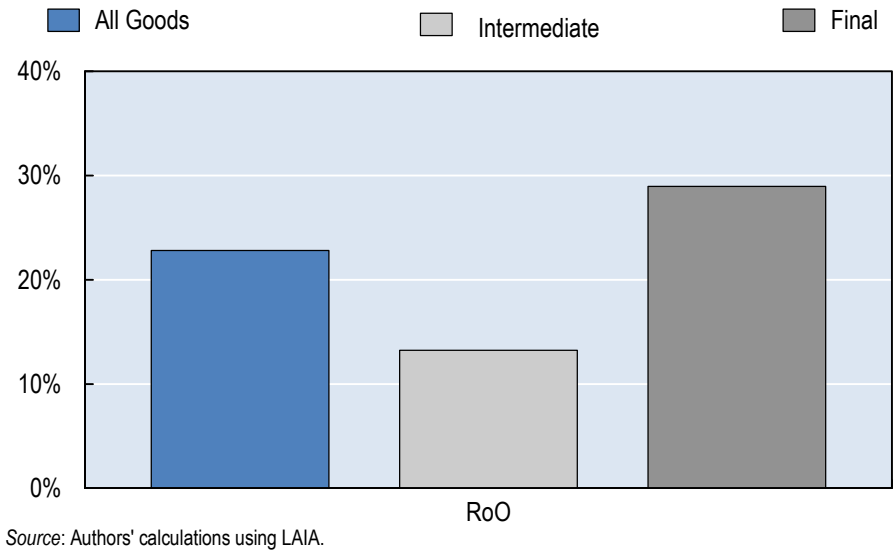
When we control for preference margins and a host of other determinants (Annex 9), we find a negative effect of RoO, with an average drop in the utilisation rate of 22% when a RoO applies (Figure 21) although we also find that RoO matter more for final goods in this group of countries.

Figure 20. Use of preferences in Latin American Agreements



Note: The figures denote shares of imports by country.
Source: LAIA.

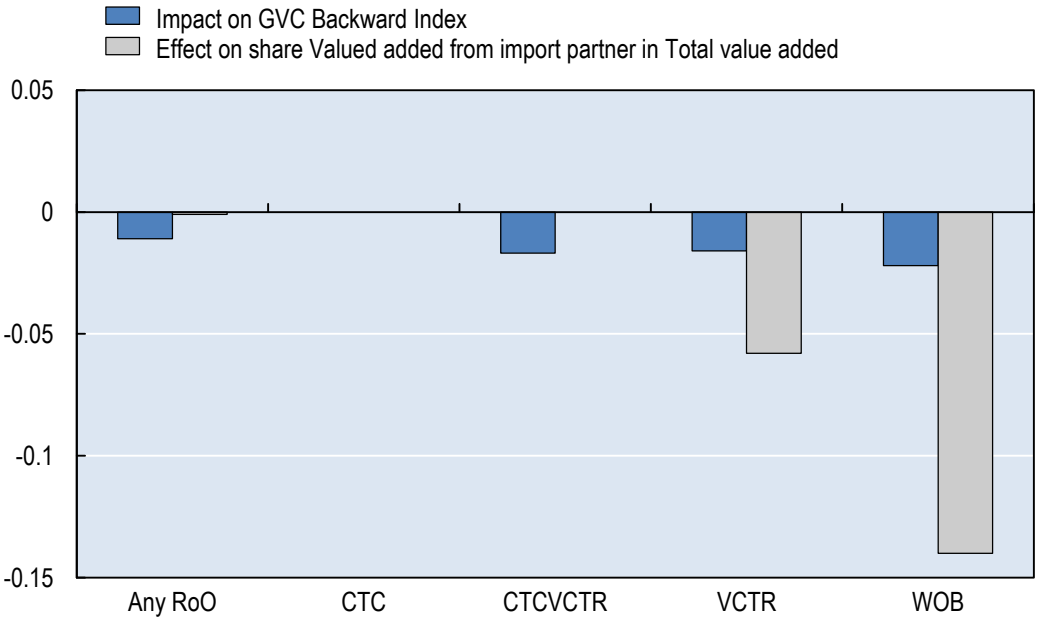
Figure 21. Estimated negative effect of RoOs on utilisation rate of preferences



Source: Authors' calculations using LAIA.

The impact of RoO on the level of backward GVC integration (i.e. the overall share of foreign value added in gross exports of a country) is also estimated.[28] RoO are found to constrain integration into GVCs most notably in the case of wholly obtained rules (WOB) and value content or technical requirement rules (VCTR), also when associated with CTC (CTC-VCTR). CTC seems to be less restrictive than value content or technical requirements, which is in line with results for trade of intermediates.

Figure 22. Estimated impact of RoO on GVC integration



Source: Authors' calculations using TIVA and EORA datasets.

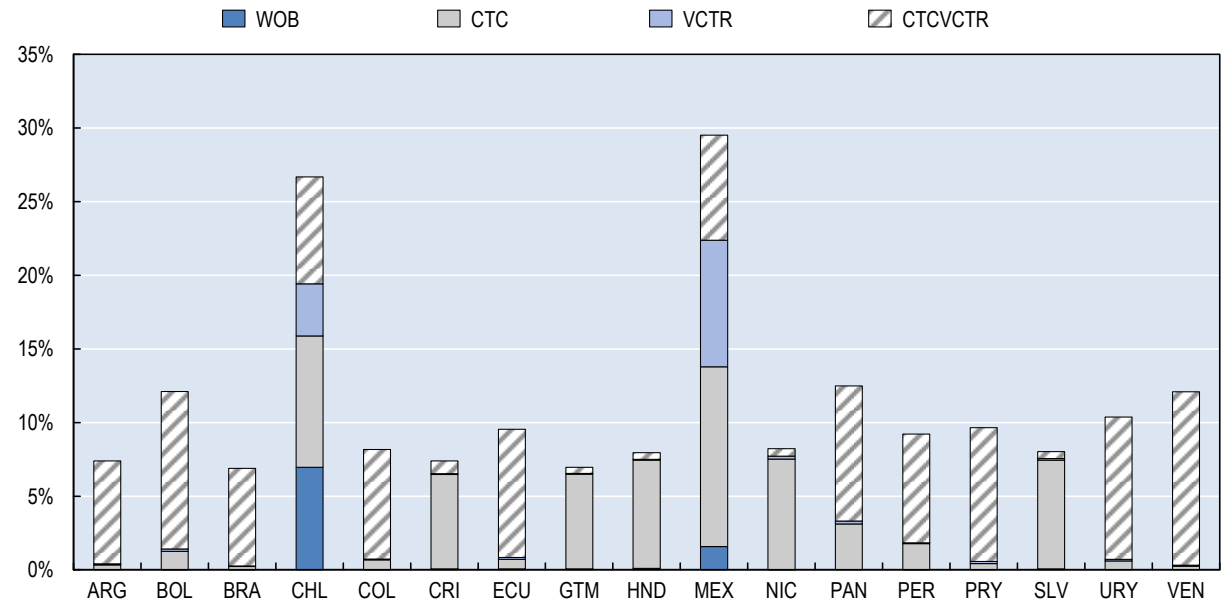
Costs associated with RoO in specific Latin American countries can be further inferred from their current structure (Figure 23) and the estimated ranking of restrictiveness of the different types of RoO. For example in Chile and Mexico, which have the largest numbers of PTAs and are therefore relatively more exposed to RoO, there are considerable differences in prevalence of different types of RoO faced. Chile is significantly more exposed to WOB rules which are highly constraining for trade in intermediates. Most countries are subject to a combined CTC and VC or TR (CTC-VCTR) which is a highly restrictive RoO. Producers in Central America do not face many RoO and those applicable are not among the most restrictive for GVCs.[29]

Countries like Argentina, Brazil and Colombia, which were below their potential backward GVC participation in Figure 13, face RoO that are the most restrictive for trade in intermediates (CTC-VCTR) (Figure 23). In contrast, Costa Rica, which does not employ constraining RoO such as WOB or CTC-VCTR in its PTAs, is integrated into GVCs relatively well. A somewhat puzzling result is that PTAs of Chile and Mexico, which are also relatively well integrated into GVCs, employ constraining RoO. As we will see later in this section however, these are also the countries that have implemented some facilitating mechanisms.

28. A bilateral version of this approach has also been employed where the impact of RoO on the share of foreign value added sourced from a specific partner has been estimated. Both approaches are detailed in Annex 10 and yield the same result. Structural and trade policy determinants such as tariffs and the coverage of imports and exports by trade agreements have the expected signs, although they are not always significant in the pair-sector-year version of the model. Parameters on RoO variables are displayed in Figure 22.

29. An important caveat here is that the empirical analysis stops in 2011. Since 2011 Central American countries and Mexico have been negotiating provisions to allow more flexibility in RoO of CAFTA.

Figure 23. Types of RoO in Latin American countries (share in imports)



Source: Authors' calculations using INTrade, the IDB Trade and Integration Information System.

2.2.3 The impact of RoO on extra-PTA GVC participation

Another quantitative exercise was undertaken to assess the impact of Latin American PTAs and the associated RoO on extra-PTA trade. Restrictive RoO would be generally expected to deter imports of intermediates from outside the PTA but they may also prevent downstream participants within the PTA from choosing efficient input suppliers with potentially important consequences for productivity. Several theoretical studies have emphasised that RoO can give rise to trade diversion in intermediates but there is only one empirical study, by Conconi et al. (2016) on Mexico. To the best of our knowledge, the present study is the first empirical exercise of this type conducted for a larger number of Latin American countries.[30]

The exercise considers the impact of RoO in Latin American PTAs on trade between each Latin American country and third countries which do not have any PTAs with that country.[31] A key difficulty with this approach is that a RoO applied to an imported product at, say, 6-digit level does not necessarily affect extra-PTA imports of products in the same product category but rather imports of upstream products. Thus, this approach investigates the vertical linkages of RoO, or how RoO specified with respect to downstream products affect upstream sourcing of products from outside the PTA. The methodology employed, following Conconi et al. (2016), is to analyse the texts of RoO chapters in existing PTAs and, for each downstream product, determine which upstream products must originate from within the PTA to meet the RoO. A categorical variable is then defined at the upstream product level as equal to one if a RoO on a downstream product imposes sourcing restrictions on this particular product. This information is then used to create a matrix of vertical RoO restrictions. Next, a summary index is constructed for each upstream product and each importing Latin American country. This captures restrictiveness of RoO contained in this country's PTAs for upstream products imported from third countries. The index is then employed in a gravity model of trade to establish the magnitude of the impact on imports of intermediates from non-PTA members.

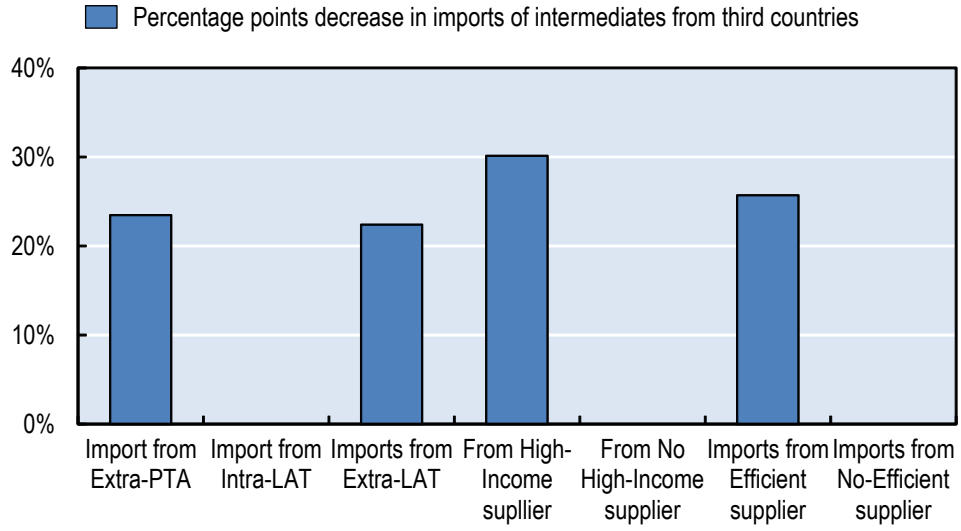
The estimation includes other explanatory variables such as the size of the preferential tariff margin associated with the PTA (Annex 11). The results pertaining to the RoO index are presented in Figure 24 and

30. We are grateful to Paola Conconi for helpful guidance on this exercise.

31. Hence, the composition of this group of third countries differs for each Latin American country.

show an average drop of imports of intermediates from non-PTA members of 23.5%.[32] When we distinguish between different categories of extra-PTA partners we see that this effect reflects mostly the negative impact on imports from high income countries outside Latin America which also tend to be globally efficient suppliers of intermediates.[33] An *ad valorem* equivalent of this estimate is at 9%.[34]

Figure 24. Impact of RoOs on imports of Latin American countries from third countries



Source: Authors' calculations using INTrade, the IDB Trade and Integration Information System.

2.3 How adopting flexibility mechanisms for RoOs can support GVC integration

2.3.1 Facilitation mechanisms

In addition to the differences in origin determination methods at the product level, RoO regimes vary by the types of general provisions sometimes referred to as "facilitation mechanisms" (Estevadeordal and Suominen, 2008). These include: flexible methods for certifying origin of products, *de minimis* rules which allow for the use of a specified percentage of non-originating products in the production process without affecting the origin status of the final product; and different RoO cumulation rules so as to allow the use of imported inputs without undermining the product's origin. Many Latin American countries have implemented such facilitation mechanisms in their trade agreements (Annex Table A12) but there is also scope for further action.

The certification process is one of the most important aspects of administration of RoO and can be adjusted to make the RoO regime less restrictive (WCO, 2014). The *issuing body* for certificates of origin is key in determining the administrative burden of the process and who bears the burden of proving and securing information about the origin of the goods in case of a doubt or verification. Self-certification by exporters is

32. This figure takes into account the estimated coefficients as well as the structure of imports. It is calculated by multiplying the coefficients (here -0.113 in column 1) by the average of log(IndRoO) for intermediate goods under each category (for instance 2.07 for intermediates from any third countries) which gives 23.5 percentage point reduction.

33. For the purposes of exposition here, efficient suppliers are identified as countries with an index of revealed comparative advantage in exports which is greater than 1. This index is calculated at the HS 6-digit product level.

34. This is calculated on the basis of coefficient estimates in Annex Table A.11 using the following formula AVE=(exp(-0.113)-1)/1.189=-0.095. See also Annex 8.

deemed to have low administrative burdens (but also requires trust), while governmental certification is considered more burdensome. The *validity period* of the certification determines the time limit between the date of issuance of a certificate and finalisation of the importation of goods under this certificate. The *record keeping time period* determines the period during which documents or background information relating to the origin of the goods should be maintained. The *waiver threshold* specifies the maximum value of shipments for which a certificate of origin is not required. Some PTAs allow for *amendments of minor errors* without the need to issue a new certificate while others require a new certificate. The authority deemed responsible for *verification of certificates* also matters in terms of the burden associated with RoO administration. Direct verification by importer is deemed more restrictive since it requires a firm in the importing country to check the veracity of exporters in the territory of exporting country.

Figure 25 displays key features of approaches to certification of RoO adopted in 18 PTAs signed by Latin American countries on the basis of the WCO's Origin database.[35] For each certification feature, the number of PTAs which have more (grey colour) and less (blue colour) restrictive provisions are reported. The results suggest that while some Latin American PTAs already have facilitating certification provisions, there is also room for improvement. *Self-certification* is present in 8 out of the 18 agreements. The *validity period* is less than a year for half of the agreements. In the majority of cases, *the record time keeping* is 5 years or more. The *threshold* under which a certificate is not required is below 1 000 USD in more than half of the agreements.[36] Twelve agreements do not allow for *amendments of minor errors* and 11 rely on the more restrictive *direct certification verification*.

Adopting higher *de minimis* levels is another mechanism that can alleviate the heavy RoO burden. *De minimis* rules allow for the use of a specified percentage of non-originating products in the production process without affecting the origin status of the final product. In half of the surveyed PTAs, the applied *de minimis* percentage is 10%, although in the other half they are lower and in three agreements they are not specified (Figure 26). Also, different *de minimis* levels have been adopted in agreements signed by individual countries.

Adopting flexible *cumulation* rules generally implies that inputs from trading partners can be used in the production of a final good without undermining origin. Cumulation schemes can differ with respect to with which countries PTA members can cumulate (i.e. the "quantitative" aspect in Figure 26). "Bilateral" cumulation – present in practically all PTAs – operates between two PTA partners and permits each of them to treat products that originate in the other partner as if they were their own. "Expanded" or "regional" cumulation between three or more countries is similar, and works so that inputs can be sourced anywhere within the PTA network. The third type, called sometimes "extended" cumulation, allows some use of inputs from non-signatory countries.

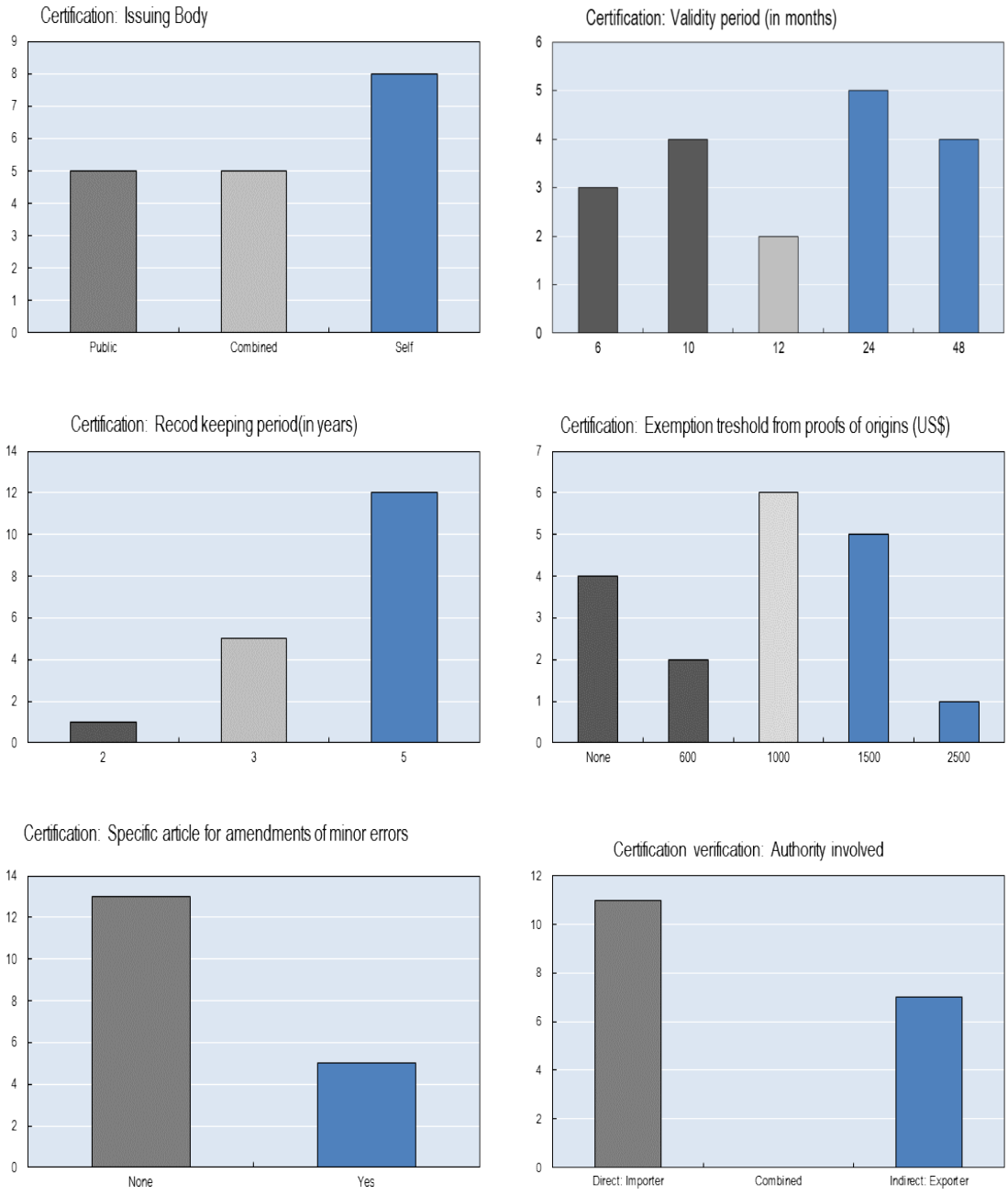
Cumulation schemes can also differ with respect to the process of cumulation. "Diagonal" cumulation requires that both countries comply with the same RoO. "Full" cumulation, deemed less restrictive, implies that all stages of processing or transformation of a product within a free trade zone can be considered as qualifying operations in the manufacture of an originating good, regardless of whether the processing is sufficient to confer originating status to the materials themselves. Finally "cross" cumulation works so as to merge individual overlapping bilateral treaties so that inputs can be sourced anywhere within the network (see e.g. Estevadeordal et al., 2013; SECO, 2013).

The WCO data distinguishes between the instances of bilateral, expanded (regional), extended (worldwide), diagonal and full cumulation. On the basis of this limited spectrum we see that only 4 out of the 18 Latin American agreements allow for "full" cumulation and none allow cumulation beyond "bilateral". This suggests that more flexible approaches to cumulation could be an area for consideration in future trade initiatives in the region.

35. These PTAs include: Australia-Chile, Canada-Chile, Chile-China, Chile-Japan, Chile-India, Chile-Mexico, Dominican Rep-Central America-USA, EFTA-Chile, EFTA-Mexico, EU-Mexico, EU-Chile, Japan-Mexico, Korea-Chile, MERCOSUR-Chile, MERCOSUR-Mexico, MERCOSUR-India, NAFTA, USA-Chile.

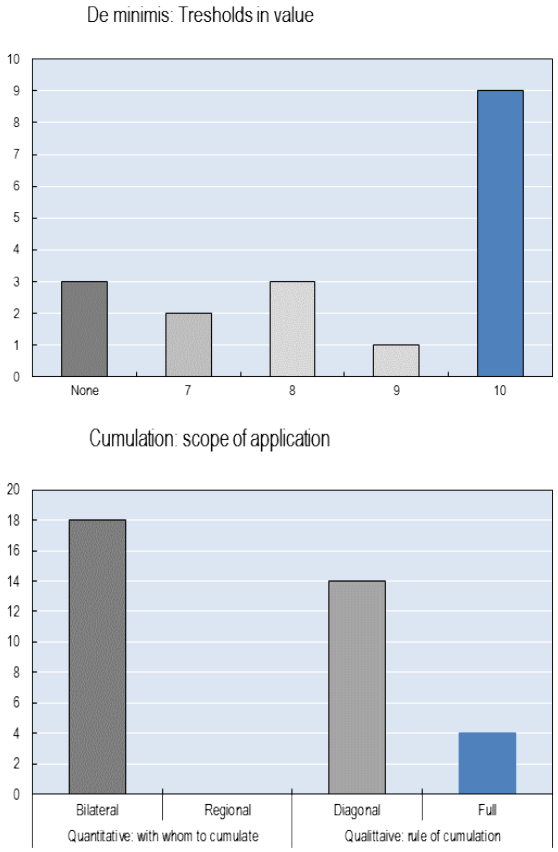
36. This threshold has recently been raised in the recent agreements of Chile and Mexico with European Union, EFTA and the United States.

Figure 25. Main features of certification provisions in selected Latin American PTAs



Source: WCO Origin Database.

Figure 26. RoO *de minimis* and cumulation schemes in selected Latin American PTAs

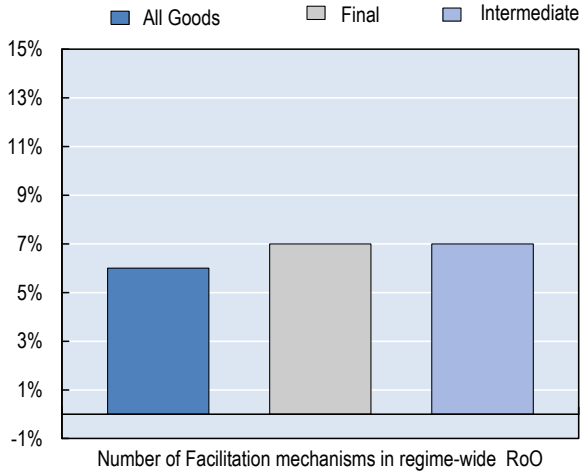


Source: WCO Origin Database.

The cost-alleviating effects of such facilitation mechanisms are assessed empirically in Annexes 13 and 14; Figures 27 and 28 below present some of the results.[37] Adopting at least one of the facilitation mechanisms proves effective in alleviating the burden of RoO. Results in Annexes show that combining different mechanisms provide stronger effect, in particular for intermediates. Adoption of such mechanisms is not homogeneous across PTAs in Latin America. Self-certification is already being pursued in agreements in Central America and Chile but it is almost absent in all other Latin American countries, especially Argentina and Brazil (Figure 29). Countries with higher shares of self-certification are also those that are the most integrated into GVCs (Chile, Costa Rica and Mexico, Figure 13). While cumulation is present in most PTAs, their types differ from one agreement to another. Indeed, current schemes rarely go beyond "bilateral" or "diagonal" cumulation. A few can be referred to as "full" cumulation but none are "cross" or "extended". They are, therefore, far from an approach that would allow for products to be composed of inputs originating from multiple intra and extra-PTA partners. It is becoming increasingly evident that only more progressive cumulation schemes can effectively alleviate some of the RoO burden in a world dominated by GVCs (e.g. UNCTAD, 2011). Better data is needed to derive more rigorous estimates of their benefits and this may be a promising area for further research.

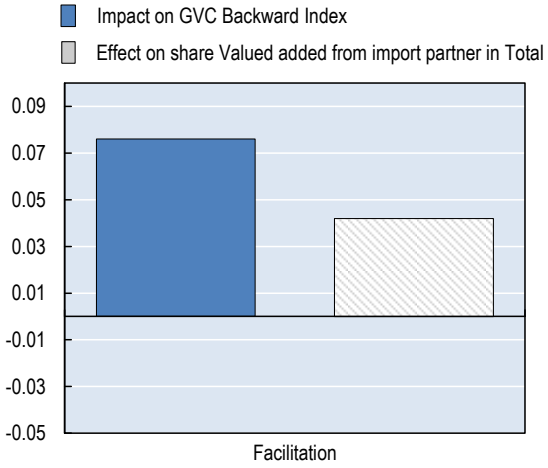
37. To cover a larger number of countries and agreements, in these estimations we use the IDB information on facilitation schemes. This data is discussed in Annex 12.

Figure 27. Cost-alleviating impact of facilitation mechanisms for RoOs in Latin American countries



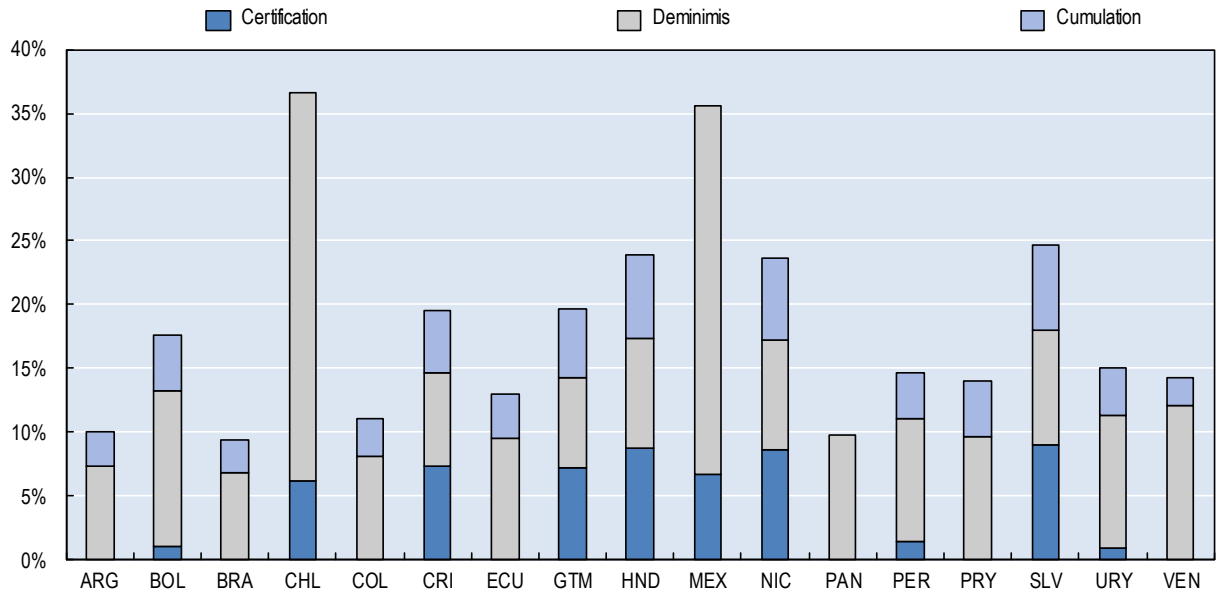
Source: Authors' calculations using BACI dataset.

Figure 28. Impact of facilitation mechanisms in RoOs on GVC index in Latin America



Source: Authors' calculations using TiVA and EORA datasets

Figure 29. Types of facilitation mechanisms in Latin American countries



Source: Authors' calculations using INTrade, the IDB Trade and Integration Information System.

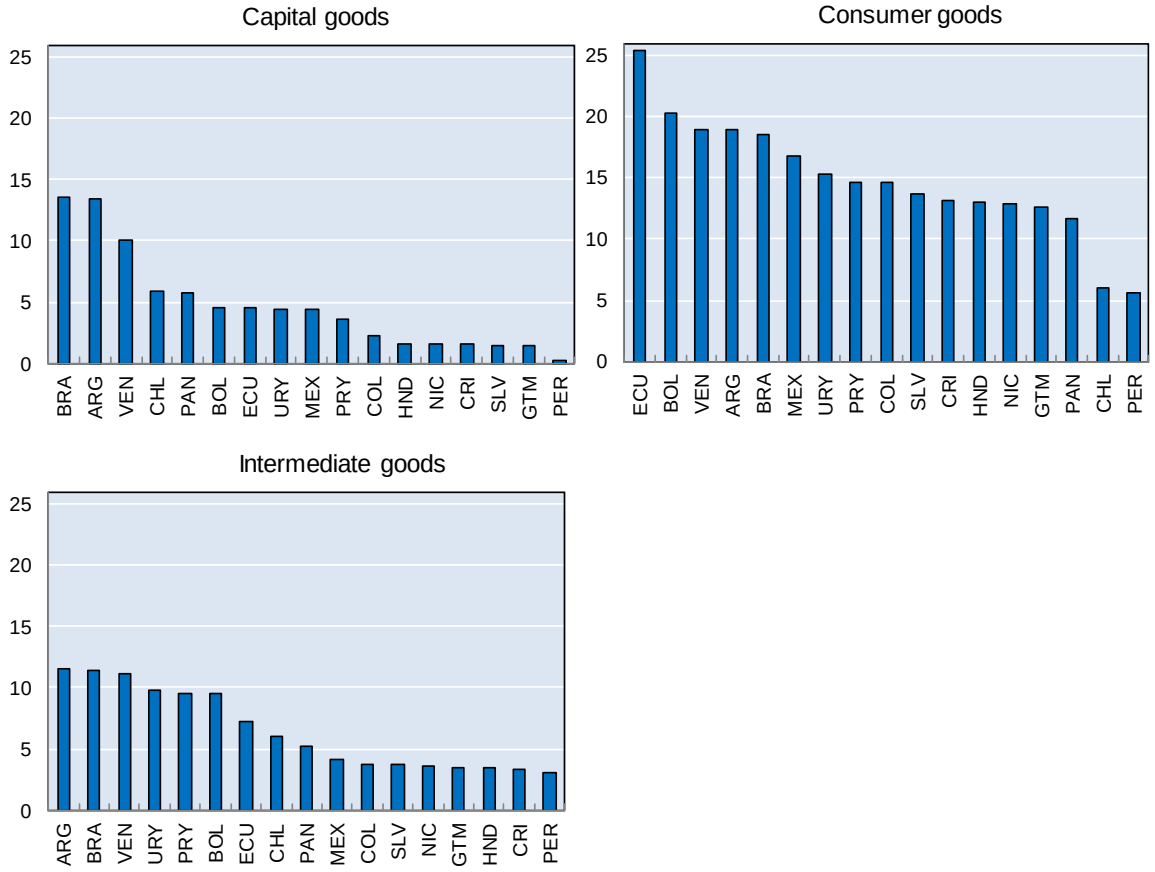
2.4 Policy implications with respect to rules of origin

The analysis of trade effects of RoO regimes presented in this section shows clearly that while PTAs can support formation of intra-PTA value chains they also come with a heavy RoO burden. Indeed, while having a PTA is estimated to have a large positive impact on intra-PTA trade in intermediates in cases where there are no RoO, the presence of RoO can undo a large part of this effect. RoO in Latin American PTAs are also estimated to have a large negative impact on sourcing from extra-PTA partners, particularly those located outside Latin America. This is all the more concerning since these disadvantaged suppliers are among the world's most efficient; impeding the ability to source from them can have detrimental effects on the productivity of Latin American firms. We also find that some types of RoO, such as value content or technical requirements, are more restrictive than others and that the type of RoO used in Latin American PTAs can vary considerably across a country's PTAs as well as across countries.

The simplest and most effective way of dealing with complications associated with RoO is MFN liberalisation of remaining tariffs, which can be undertaken unilaterally or as a concerted effort. The case for such MFN liberalisation is particularly strong when preference margins afforded by existing PTAs are small. The empirical work presented in this paper shows that the current RoO in the region indeed undo some of the positive trade effects and that this is particularly the case for trade in intermediate products. RoO are estimated to have a tariff equivalent of around 8.6 and 9% for, respectively, intra and extra-PTA imports of intermediate products. Average MFN tariffs on intermediate products are below the 9% threshold in more than 60% of Latin American countries (Figure 30). This suggests that in the majority of cases the average protection that these tariffs afford to intra-PTA input providers may be less than the cost of administering preferential market access through RoO. MFN liberalisation of tariffs on intermediate products could thus be a viable policy option and one which would not require costly negotiation. It would be a cost-efficient way of stimulating both intra- and extra-PTA value chain formation through trade policy. Depending on political economy and other considerations, such liberalisation could possibly be undertaken unilaterally or in a concerted fashion at the sector or regional level.

Figure 30. Average MFN tariffs in Latin American countries by product category

Simple averages



Source: UN TRAINS.

Alternatively, renegotiation or harmonisation of existing RoO could focus on product-specific RoO or on broader architectural issues such as amendments to certification, *de minimis* and cumulation rules (Estevadeordal et al., 2013). A prominent example of product-specific RoO renegotiations are the four rounds of changes to NAFTA RoO to make them more permissive of materials from outside North America (Estevadeordal et al., 2013). The estimated restrictiveness of the different RoO types and their prevalence across the different Latin American PTAs suggests that the scope for such changes may be larger in LAIA, Andean Community and Mercosur, where larger proportions of tariff lines face a combination of change in tariff classification, value content and technical rules. Another example of product-specific rule renegotiations is the current EU initiative to revise RoO across its PTAs in order to reach a common protocol. This approach has been used in European Union's new PTAs with Central America, Colombia and Peru (Inama, 2011a).

Beyond changes to product-specific rules, there is also scope for amendments to the administration of various agreements. In particular, more widespread adoption of self-certification and expansion and harmonisation of *de minimis* could alleviate some of the RoO burden and such modifications might be easier to negotiate – notwithstanding the significant levels of trust required – than adjustments of product-specific rules.

Negotiation of more inclusive cumulation schemes, such as those that allow full cumulation across PTA partners, cross-cumulation of RoO between overlapping PTAs or flexible sourcing from extra-PTA partners, have been suggested as the most promising approach to the reform of architecture of RoO (Estevadeordal, 2013). Some approaches to cumulation put emphasis on similarity of rules which suggests that future cumulation initiatives may be more feasible within the families of agreements with similar RoO, but there are

also more flexible approaches that allow cumulation across overlapping PTAs with different RoO or indeed from key suppliers from outside the PTA network. The high and constantly increasing fragmentation of production in GVCs suggest that, ultimately, only the latter type of cumulation schemes which are extended widely to a large number of key suppliers, which may be largely outside of the PTA network (e.g. China), can yield real efficiency gains (e.g. Inama (2011b)).[38]

An early example of RoO cumulation in the region is Mercosur and the Andean Community, where the provisions of 19 different sets of rules that govern trade between the nine concerned countries state that materials originating in any one of them can be considered as originating in any of the others when used in subsequent production. In the case of Mexico and the Central American Common Market (CACM), the six countries signed a new agreement that enables full cumulation under a single set of RoO (Box 3). Similarly, the Pacific Alliance established provisions for cumulation among the four member countries, thus essentially merging the six existing bilateral relationships under a single framework (Estevadeordal et al., 2013). In the recently-concluded Trans Pacific Partnership (TPP) Agreements involving three Latin American countries (Chile, Mexico and Peru), countries agreed to a common set of rules of origin and full cumulation, under which all of the regional content at every step of the production process can be cumulated in the calculation of local content.

Arguably one of the most flexible approaches, which enables full cross-cumulation under different sets of rules of origin, has been adopted in Canada's agreements with Peru and Bolivia. These agreements allow cumulation with third parties with which both signatories have PTAs in force and subject to reciprocal agreement by these third parties (Estevadeordal et al., 2013). This approach demands that the origin requirements are fulfilled within the preferential trade zone encompassing the overlapping PTAs with the applicable RoO being the one between the last two parties of a transaction (SECO, 2013). This kind of approach could be seen as particularly promising in order to allow cumulation across the different RoO families in the region.

3. Non-Tariff Measures in the context of GVCs

As discussed in Section 1, low import tariffs on intermediate inputs, low tariffs faced in export markets and engagement in PTAs can all facilitate GVC engagement. While non-tariff measures (NTMs) are much more difficult to measure, they have been identified as relatively more important than tariffs (e.g. UNCTAD, 2013) and, with falling tariff protection, have come to the forefront of discussions on market access globally. This section takes stock of different NTMs used by Latin American countries and investigates their effects. It also assesses efforts to alleviate their unnecessary trade restrictiveness on GVC integration in different Latin American PTAs.

NTMs such as standards, technical regulations and conformity assessment procedures are not normally aimed at discriminating against imports; given their consumer protection or other public policy objectives, usually the same standards and requirements apply to domestically produced and imported products. Nevertheless, these measures can have unintended effects on trade, which can be more restrictive than necessary to achieve their policy objective, in effect acting as hidden protection. In addition, while countries may legitimately apply different standards and approaches, use of diverging national standards may nonetheless impose particular costs on GVCs which involve operations across multiple countries. Having to translate and interpret regulations and bring products into conformity with different standards can be an additional fixed cost on trade (which may be particularly burdensome for smaller firms) but standards and regulations can also raise marginal costs if they result in a decreased scale of operation (e.g. as a result of having to separate production destined for different export markets). Often exporters are requested to test and certify their products in each of the countries where they export. These tests and certifications are costly and duplication of tests increases costs.

As pointed out by OECD (2014), in a GVC-dominated world "firms and consumers are more concerned by information and traceability of products which therefore leads to an expansion of the number of quality and

38. This is also the reason given for the lack of results of cumulation schemes introduced so far (UNCTAD, 2011).

safety standards". While the need for standards is clear, their complexity and, above all, heterogeneity have been identified as one of the main challenges to insertion into GVCs. Ferrantino (2012), for example, argues that "*NTMs may accumulate in long supply chains implying that their trade-distorting effects are greater for goods produced in a fragmented manner than for goods with simple production processes*." For the purposes of this study, the aim is not to assess whether standards are more trade restrictive than necessary, but to highlight the particular costs that multiplication of diverging standards poses in a world of GVCs.

With the multiplication of standards, upstream industries may have to put in place parallel production processes for supplying components to several destinations and go through certification procedures multiple times. They may also be forced to specialise in exports to one market only. In food value chains, for example, process standards adapted to one country's requirements may render exporting to another country infeasible. Costs of conformity assessment also include the risk that goods are rejected by the importing country after shipment. Time required for complying with administrative requirements and inspections by the importing country's authorities is also a trade cost and can be particularly problematic in the context of GVCs where timeliness is an important factor.

The presence of non-tariff measures is thus one of the challenges faced by firms seeking to join global supply chains. Regulatory NTMs impact at least two stages of the supply chain – the original production stage, because costs of production can be increased by efforts to comply with product standards (Maskus et al., 2005) and the import procedure stage, because inspection and testing may cause delays. Whether NTMs are particularly problematic for value chain activity and how costs associated with them can best be lessened is an empirical question which is addressed in this section. To shed light on these questions the analysis that follows compares their impact on trade in final and intermediate products. *A priori*, it is not clear whether costs of compliance can be expected to be higher for intermediate or final products. On the one hand, given that NTMs traditionally aim to protect consumer interests, they could be expected to be a greater issue for trade in final products. On the other hand, because of the importance of timeliness and the sensitivity of value chain operations to trade costs, trade in intermediate products could prove more sensitive to NTMs. In addition, standards may matter for buyers of inputs and components as much as they matter for consumers.[39]

In the second step, to assess the extent to which these NTM costs can be cut by various TBT and SPS provisions included in PTAs, we estimate the impact on NTM-related AVEs of implementation of deep-integration clauses such as mutual recognition and harmonisation of technical regulations or conformity-assessment procedures.

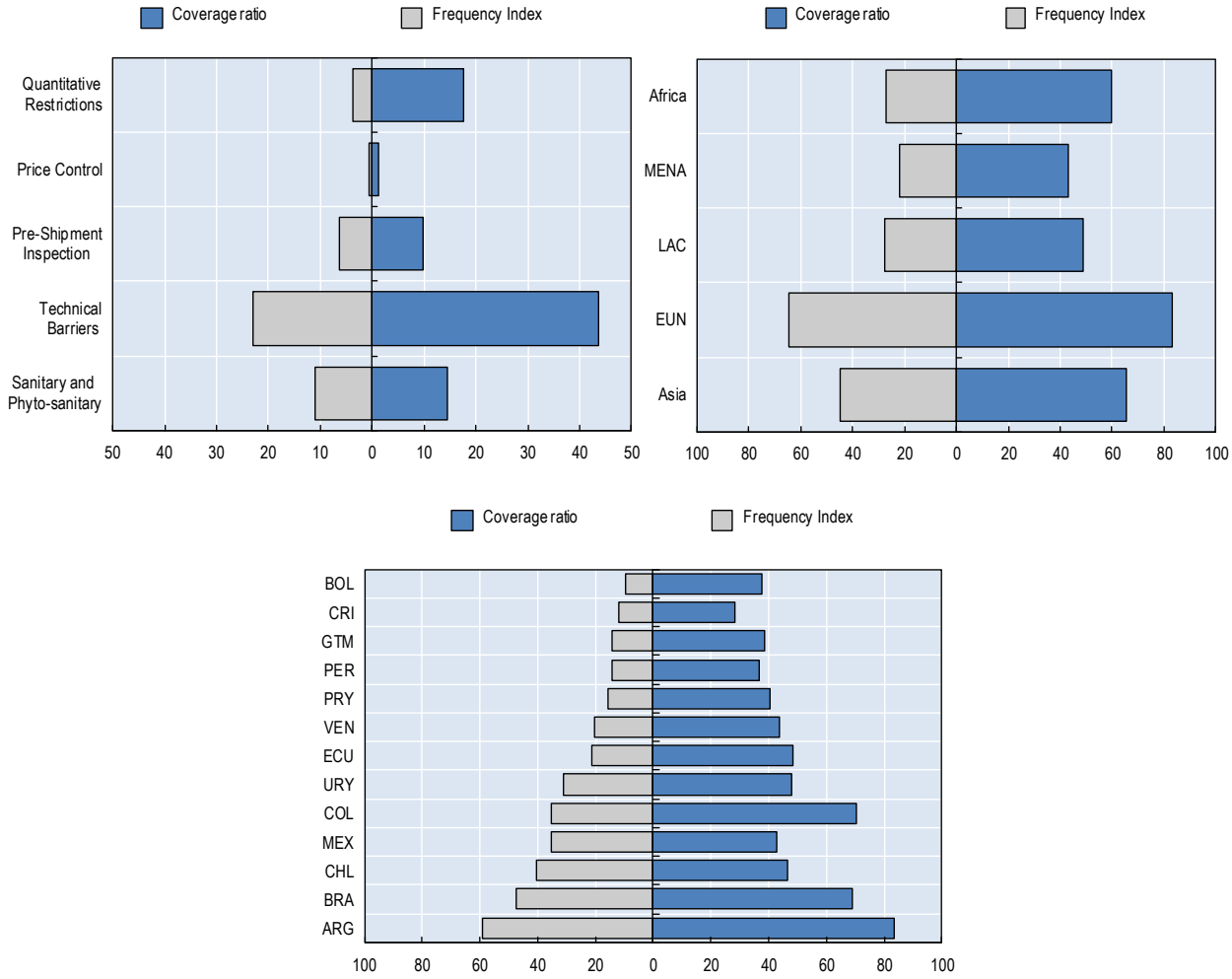
3.1 Prevalence of Non-Tariff Measures in Latin America

While a broad definition of NTMs includes all policy-related non-tariff trade costs incurred from production to final consumption stage, for practical purposes, NTMs are typically categorised according to their scope and design and are divided into technical measures such as Sanitary and Phytosanitary (SPS) measures and Technical Barriers to Trade (TBTs) and non-technical measures (for more details see Annex 15).

Figure 31 shows the frequency and coverage across the different types of NTMs in Latin American countries and in other regions. Measures arising from national regulation, such as SPS measures and technical barriers to trade (TBT), have grown in importance globally in recent years while the usage of more traditional NTMs such as, for example, quantitative restrictions and non-automatic licensing has declined. The incidence of NTMs in Latin American countries is no higher than, for example, in Europe or Asia but there is important heterogeneity across Latin American countries, ranging from more than 40% coverage ratios in Argentina, Brazil, and Chile to less 20% in some countries in Central America. This means that traders in different countries in the region face very different challenges in dealing with NTMs.

39. It could be argued that efficient and well applied standards and certification processes can facilitate GVCs by providing a means to ensure the quality of inputs.

Figure 31. Non-tariff measures in Latin America

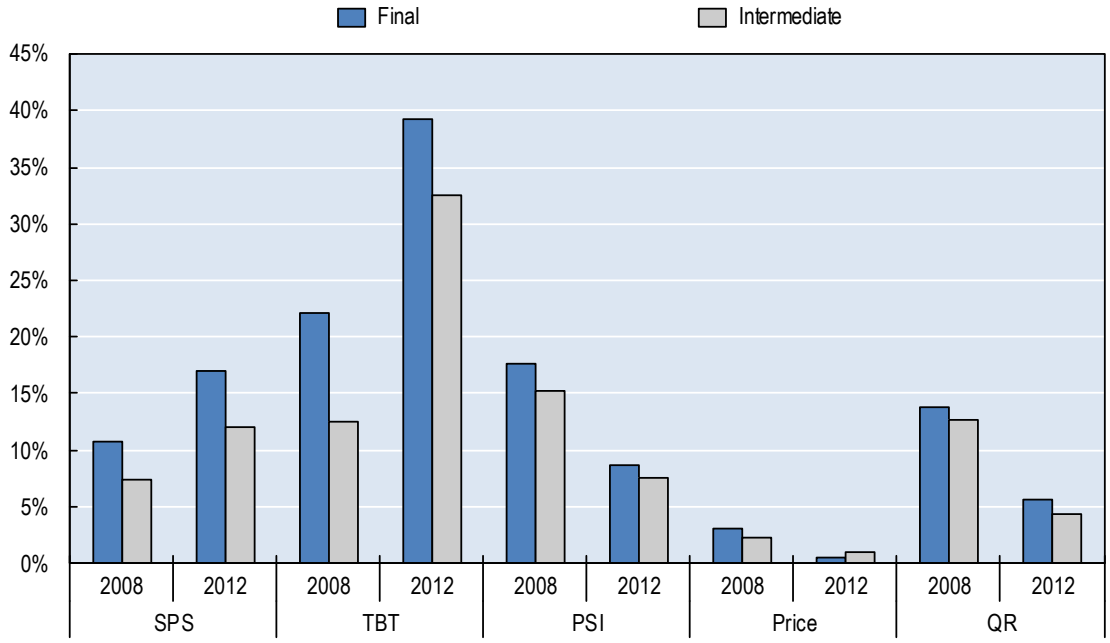


Note: The frequency index yields the percentage of products to which one or more NTMs are applied. The coverage ratio measures the percentage of imports subject to NTMs.

Source: Own calculations based on CEPII NTM-MAP.

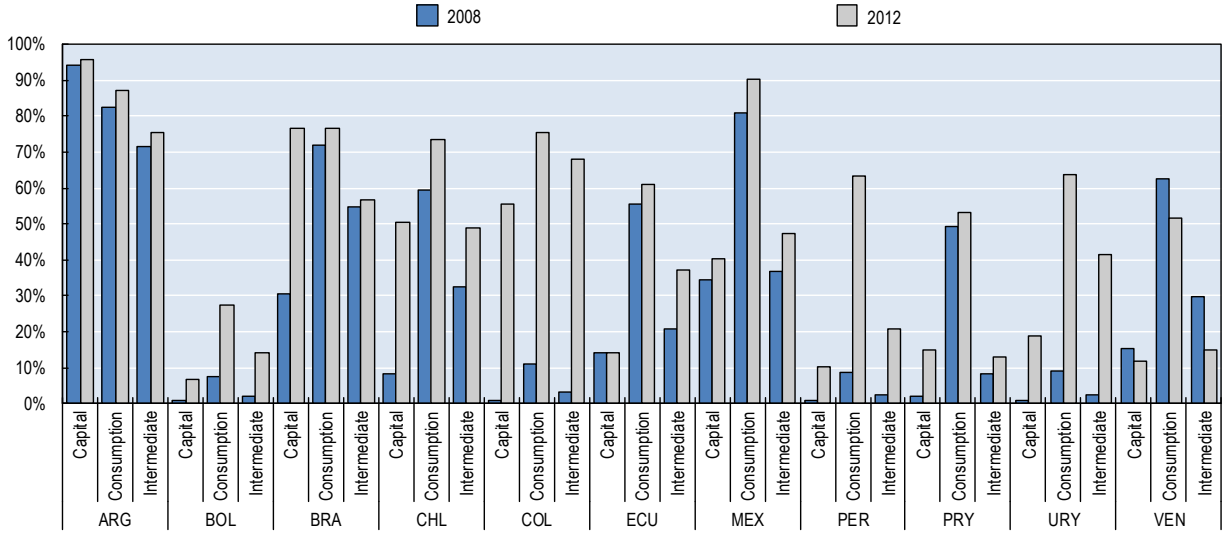
Countries are increasingly using NTMs to regulate imports. Figure 32 illustrates the changes in the use of NTMs between 2008 and 2012 in Latin America across five broad groups of NTMs. While the number of products affected by other measures, such as Quantitative Restrictions (QR) and Pre-shipment Inspection (PSI), declined, the number of products covered by SPS and TBT has sharply increased (by approximately 100% for TBT and 50% for SPS). As of 2012, about one-third of products in our sample of Latin American countries have one or more types of SPS and/or TBT. Price controls remain rarely used, while the use of quantity control measures has declined, possibly because of the continuing tariffication of quotas. Finally, use of pre-shipment inspection and contingency measures appears to have substantially decreased in Latin America.

Figure 32. Types of NTM prevalence by products in Latin America



Source: Own calculations based on UNCTAD TRAINS and CEPII NTM-MAP.

Figure 33. Proliferation of NTMs for capital, intermediate and consumption goods



Source: Own calculations based on CEPII-NTM Data.

Dispersion of NTM incidence across the different types of products (Figure 33) indicates that all Latin American countries, apart from Venezuela, follow the path of increasing NTM coverage.[40] This is the case in particular in some countries which had relatively few NTMs in 2008, such as Bolivia, Colombia, Peru and Uruguay. Products destined for final consumption are more exposed to NTMs, which is plausible if we recall that these traditionally aim to protect consumer interests.[41] This phenomenon again seems to be more present in the countries which have intensified their NTM use recently, such as Peru, Paraguay, Uruguay and Bolivia. Nevertheless, intermediate products were generally also more affected by NTMs in 2012 than in 2008. This is especially evident in Chile, Colombia, Ecuador but also Uruguay and Peru.

3.2 How restrictive are NTMs for GVC participation in Latin America?

To gauge the restrictiveness of NTMs, this paper uses a price-based method developed by Cadot and Gourdon (2016) that directly estimates *ad valorem* equivalents (AVEs) on the basis of NTM and trade unit value data. The approach focuses on investigating the differences between domestic and international prices (i.e. the price gaps) in the presence or absence of NTMs.[42] Results are presented in Figure 34. In the top two figures AVEs for country pairs with no NTM are not taken into account in calculating the average while in the bottom two figures such cases are set to zero. Therefore the first approach captures the restrictiveness of an NTM, while the second one captures the average effect of NTMs when accounting for their incidence.

In 2012 the presence of NTMs significantly increased the price of imported and exported products –with AVEs ranging from 10 to 20% – though this was much less than in 2008 when the estimated AVEs ranged from 20 to 35%. Since NTMs are not always present, the average impact is lower, from 3 to 9% on average in 2012 and 6 to 13% in 2008. In 2008, consumer products were affected more by the NTMs (AVE of 13%) than they were in 2012 (8%). One explanation for this drop is a more efficient implementation (less costly procedures) and harmonisation of standards.

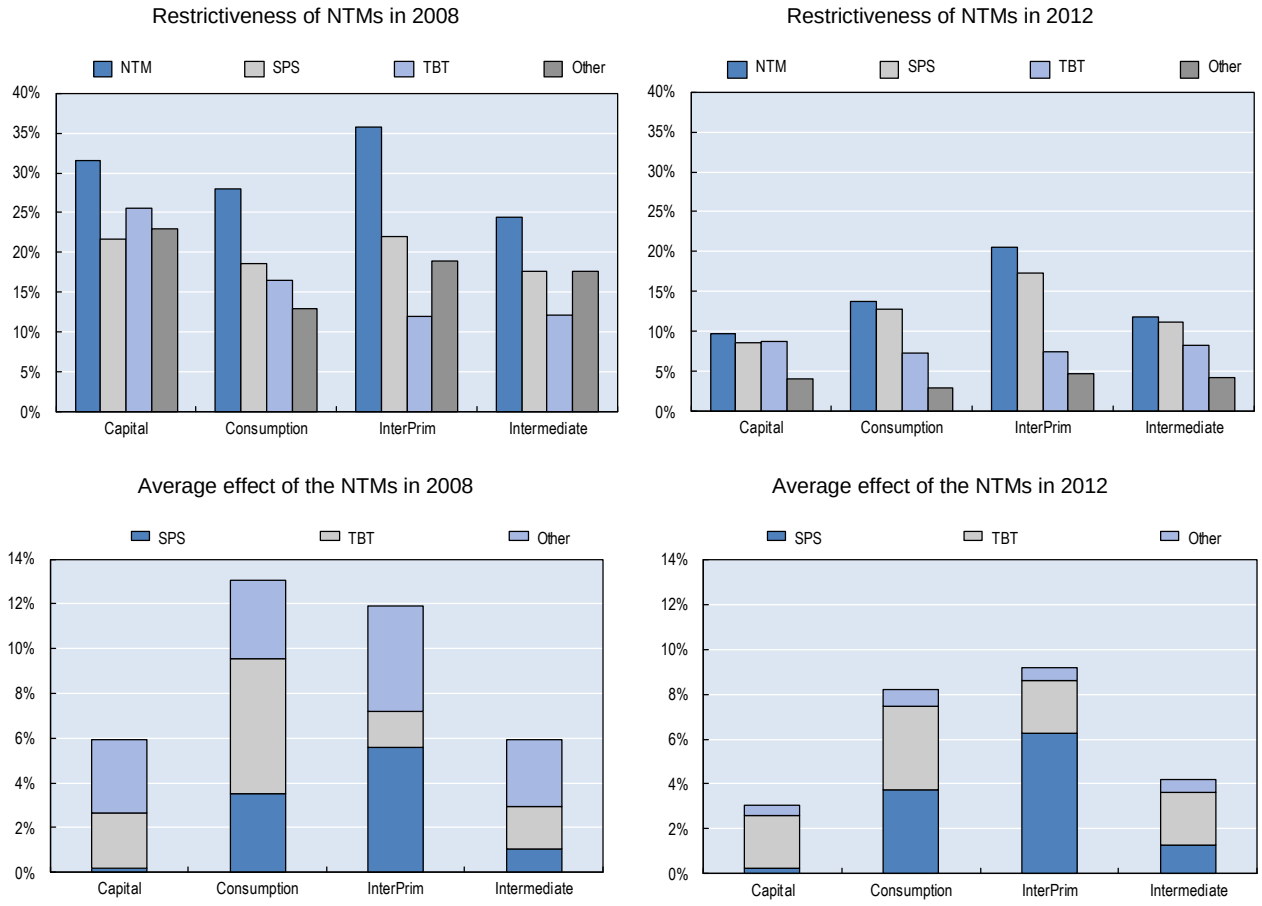
By contrast, the trade-restricting impact of NTMs with respect to intermediate products, particularly primary products, did not decrease significantly. In fact, more recently, NTMs have become more restrictive for imports of primary intermediate products than for imports of consumer products. Looking deeper into the evolution of different types of NTMs underlying these changes, the decrease in restrictiveness linked to NTMs is most likely due to phasing out of quantitative restrictions such as non-automatic import licencing and quotas. Other types of measures, such as SPS and TBT measures which are arguably more relevant for primary intermediates, have become more prevalent (Figure 34). At the same time, the estimated rise in AVEs is more moderate compared to the increase in coverage of measures which indicates that these measures may have been less costly or more efficiently implemented. It is thus the rising number of NTM measures – not necessarily their higher restrictiveness – that has propped up their impact on prices.

40. In Figure 33, some of the shares can reflect a narrow range of imports to which NTMs apply.

41. It might also however, sometimes reflect a desire of countries to preserve certain production activities for the domestic market.

42. Conceptually, there are two ways to assess the restrictiveness of NTMs: through price or through quantity. When a country imposes a cost-raising NTM on a product, the price of that product will be expected to rise in the domestic market. If the regulatory measures are non-discriminatory, as mandated by WTO rules, the price rise reflects a cost increase that is the same for imported and domestically-produced brands of the good. The price rise, in turn, reduces demand for both imported and domestically-produced brands. Thus, there are conceptually two ways of measuring the demand-reducing effect of the measures: (i) by measuring the price increase, or (ii) by measuring the reduction in the quantity demanded. The price-gap method can be applied by simple comparison of averages on a case-by-case basis after correction for transport costs and other observables (see Ferrantino, 2006 for examples), or econometrically, as in this study. Details of the methodology employed in this report are provided in Annex 16.

Figure 34. *Ad valorem* equivalents of NTMs in Latin America for intermediates and final goods



Source: Authors' calculations using CEPII Trade Unit Value and UNCTAD TRAINS.

However, the estimated country-specific impacts of NTMs differ considerably across the region (Table 3). Except for Colombia, and to a lesser extent Argentina, NTMs other than SPS and TBT are no longer playing a major role (they are still highly restrictive but less prevalent). We also see a more restrictive impact for consumer products of TBT measures. SPS measures which apply often to food and pharmaceutical products seem highly restrictive for primary intermediate products imported by Argentina, Brazil, Chile, Colombia, Mexico and Peru.

Latin American countries which record a below-potential backward GVC integration (Figure 13) also tend to have the highest restrictiveness of NTMs. For example, AVEs on intermediates and primary intermediates in Argentina (respectively 12.8 and 9.1%), Brazil (11.8 and 7.3%) and Colombia (13.9 and 7.8%), are well above AVEs for Mexico (10.3 and 5.2%) and Costa Rica (7 and 1.6%). This is confirmed by a negative correlation between the estimated restrictiveness of NTMs and the sectoral measure of backward GVC participation in Latin American countries (Figure 35); most of the sectors presenting an average AVE above 10% are among the lowest quintile (under 20%) in terms of GVC integration.[43]

43. This exercise compares the average of NTMs' AVE for each of the OECD TiVA database sectors to the level of GVC integration measured by the backward GVC participation index. We have ten Latin American countries (information on countries outside of the OECD TiVA comes from the EORA dataset, see OECD, 2015a) and 30 sectors giving us 300 observations. A centile distribution of the backward GVC index is used.

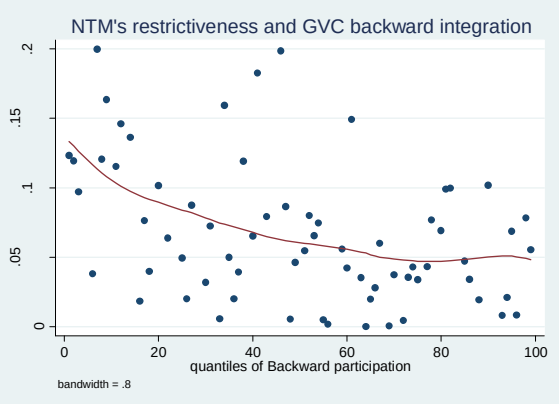
Table 3. *Ad Valorem* equivalents of NTMs for Latin American countries by product category (2012)

	SPS	TBT	Other	SPS	TBT	Other
	Argentina			*Guatemala*		
Capital	0.1%	10.0%	2.0%	0.0%	0.0%	0.0%
Consumption	3.8%	5.9%	2.1%	4.1%	1.8%	0.0%
InterPrim	7.6%	5.0%	0.2%	4.4%	1.6%	0.0%
Intermediate	2.1%	5.5%	1.5%	0.8%	1.1%	0.0%
	Bolivia			*Mexico*		
Capital	0.2%	0.0%	0.1%	0.2%	3.5%	0.1%
Consumption	2.9%	1.3%	0.0%	4.8%	7.1%	0.5%
InterPrim	5.6%	1.8%	0.4%	8.0%	2.1%	0.2%
Intermediate	1.0%	0.8%	0.0%	0.8%	4.0%	0.4%
	Brazil			*Peru*		
Capital	1.4%	5.8%	0.4%	0.2%	0.5%	0.0%
Consumption	5.5%	5.6%	0.1%	3.3%	2.3%	1.1%
InterPrim	8.7%	3.1%	0.0%	7.2%	2.1%	0.0%
Intermediate	2.9%	3.9%	0.5%	0.8%	1.1%	0.3%
	Chile			*Paraguay*		
Capital	0.4%	3.4%	0.0%	0.2%	1.3%	0.0%
Consumption	5.1%	5.2%	1.1%	4.3%	6.2%	0.5%
InterPrim	8.7%	1.7%	2.1%	3.8%	2.5%	0.6%
Intermediate	1.2%	4.5%	0.2%	0.8%	1.0%	0.1%
	Colombia			*Uruguay*		
Capital	0.0%	0.7%	2.8%	0.1%	0.8%	0.3%
Consumption	3.2%	2.8%	3.3%	3.4%	3.3%	0.1%
InterPrim	8.3%	2.6%	3.0%	6.4%	3.0%	0.0%
Intermediate	2.6%	1.5%	3.6%	0.9%	3.5%	0.2%
	Costa Rica			*Venezuela*		
Capital	0.1%	1.4%	0.0%	0.1%	1.4%	0.1%
Consumption	3.1%	0.6%	0.1%	2.5%	2.1%	0.5%
InterPrim	5.1%	1.5%	0.2%	3.8%	1.1%	0.0%
Intermediate	1.0%	0.6%	0.0%	0.4%	0.8%	0.2%
	Ecuador			*Latin America*		
Capital	0.0%	1.5%	0.1%	0.2%	2.3%	0.5%
Consumption	2.6%	4.2%	0.4%	3.7%	3.7%	0.8%
InterPrim	3.5%	2.5%	0.7%	6.2%	2.4%	0.6%
Intermediate	1.1%	2.4%	0.1%	1.3%	2.4%	0.6%

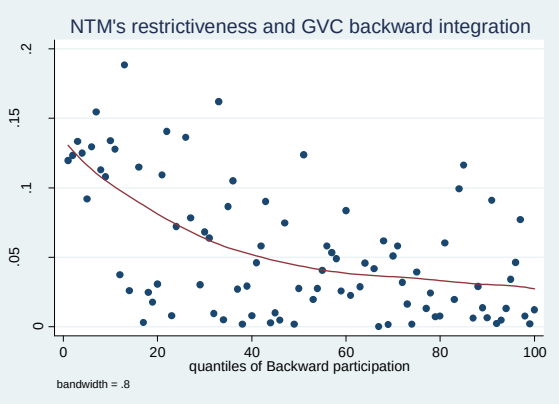
Source: Authors' calculations using CEPII Trade Unit Value and UNCTAD TRAINS.

Figure 35. NTMs restrictiveness and GVC integration

With TiVA Data for 2011 in Latin America



With EORA Data for 2011 in Latin America



Note: TiVA data covers Argentina, Brazil, Chile, Costa Rica, Colombia and Mexico; EORA data covers Argentina, Bolivia, Brazil, Chile, Costa Rica, Colombia, Ecuador, Guatemala, Peru, Paraguay, Uruguay and Venezuela.

Source: authors' calculations based on OECD TiVA and EORA.

The significance of these results is confirmed in an econometric investigation of the relationship between the backward and forward GVC integration ratios and presence of NTMs (Annex 17). In this exercise, following Orefice et al. (2015), the number of SPS and TBT concerns notified to the WTO[44] is used as an alternative measure of NTMs in order to expand the time dimension of the study. Table 4 summarises the estimated impact of TBT and SPS measures and their relationship with measures of GVC participation. SPS measures used by importing countries are found to have a negative impact on backward GVC participation (constraining imports of intermediates) while SPS measures applied by markets of exporting countries impact negatively forward GVC participation (constraining exports of intermediates). Hence, SPS measures seem to be an important determinant of GVC participation in the region. At the same time, TBT measures do not seem to have a significant impact.[45]

Table 4. NTMs as Determinants of GVC Participation

	Backward integration into GVC	Forward integration into GVC
Number of concerns on domestic SPS measures from partners	**Negative impact**	*Not significant*
Number of concerns on domestic TBT measures from partners	*Not significant*	*Not significant*
Number of concerns on partner SPS measures from countries	*Not significant*	**Negative impact**
Number of concerns on partner SPS measures from countries	*Not significant*	*Not significant*

Source: Authors' calculations using EORA dataset.

44. Specific Trade Concerns database https://i-tip.wto.org/goods/.

45. A recent OECD study (2016) has replicated this exercise for the agricultural sector and found similar results with respect to SPS measures.

Average AVE by sector (Table 5) show that agriculture and food processing sectors in Latin America are affected by NTMs the most and this could explain the relatively low levels of GVC integration in the sector (e.g. OECD, 2016b). Imports of final and intermediate products in key manufacturing sectors traditionally more integrated into GVCs, such as motor vehicles, chemical products or textiles, are also affected by NTMs to an important extent. The results are also consistent with those in Table 3 in the sense that TBT turn out to be more restrictive for trade in final products and SPS are more restrictive for trade in primary intermediate products.

Table 5. *Ad Valorem* Equivalent of NTMs by Sectors

ICIO codes	ICIO Sectors	AVE of NTMs	Final	Inter-mediate	Inter-primary
C01T05	Agriculture, hunting, forestry and fishing	**14.5%**	**15.1%**	**10.7%**	**13.7%**
C10T14	Mining and quarrying	2.6%		1.7%	2.8%
C15T16	Food products, beverages and tobacco	**13.3%**	**12.7%**	**13.9%**	**16.3%**
C17T19	Textiles, textile products, leather and footwear	**6.2%**	**6.5%**	**5.9%**	**8.0%**
C20	Wood and products of wood and cork	**9.4%**	4.6%	**9.7%**	**14.9%**
C21T22	Pulp, paper, paper products, printing and publishing	1.0%	1.7%	0.6%	**5.9%**
C24	Chemicals and chemical products	**5.6%**	**9.3%**	**5.4%**	**5.4%**
C25	Rubber and plastics products	2.2%	3.4%	2.0%	**7.2%**
C26	Other non-metallic mineral products	1.4%	1.6%	1.3%	**5.0%**
C27	Basic metals	1.4%	0.0%	1.2%	4.1%
C28	Fabricated metal products	1.9%	2.4%	1.7%	
C29	Machinery and equipment, nec	2.7%	2.7%	2.7%	
C303233	Computer, Electronic and optical equipment	3.2%	3.7%	2.4%	
C31	Electrical machinery and apparatus, nec	2.7%	3.4%	2.1%	
C34	Motor vehicles, trailers and semi-trailers	**8.3%**	**11.0%**	**6.6%**	
C35	Other transport equipment	3.8%	**5.0%**	2.2%	
C36T37	Manufacturing nec; recycling	2.1%	2.0%	1.8%	4.9%

Source: Authors' calculations using CEPII Trade Unit Value and UNCTAD TRAINS Figures above 5% are in bold.

3.3 How can adoption of facilitating provisions in PTAs support GVC integration?

Promoting the convergence of standards and certification requirements and encouraging mutual recognition can go a long way to alleviating the burden of compliance and enhancing the competitiveness particularly of small-scale exporters. Many PTAs have provisions that encourage their members to coordinate technical and SPS regulations through a variety of approaches that include, *inter alia*, harmonisation or mutual recognition. Such agreements may also involve technical consultations between members prior to the issuance of new regulations. Harmonisation and mutual recognition can also apply to conformity-assessment procedures, in which case measures can differ in member countries but compliance verification can be performed in the exporting country, reducing thereby compliance costs (Box 4).

Under *mutual recognition* a firm can produce to its standards and seek to have these recognised as equivalent to local standards in all of its trading partners. Such an approach can be however problematic when differences in standards are too large. *Harmonisation* of product standards is seen by some as being an alternative[46], although in practice this has proved very hard to achieve. In cases where neither recognition nor

46. Piermartini and Budetta (2009) note that harmonisation presents also some advantages relative to mutual recognition in terms of its effects on trade; with harmonisation; products produced in different

harmonisation is feasible (e.g. when countries' optimal standards are very different) the countries can still minimise the trade-reducing effect of different standards by introducing more *transparency* with respect to their national standards and technical regulations. Differences in national standards might be less detrimental to trade if they are communicated clearly at early stages of their adoption and with input of the private sector, including foreign market participants. Finally, restrictiveness of technical barriers to trade can be reduced through the *recognition* or *harmonisation of conformity assessment*. This requires a certain degree of trust between countries and confidence in the quality of the methodologies employed in their conformity tests but is less demanding than recognition or harmonisation of standards themselves.

Box 4. Facilitation mechanisms related to standards

Mutual Recognition (MR) of technical regulations

Mutual recognition requires that countries mutually recognise each other's standards as equivalent so that products that meet any of the two countries' standards will be granted unrestricted market access.

Harmonisation (HM) of technical regulations

Full harmonisation implies that countries agree to a common standard, which includes the design of detailed characteristics of the product.

Transparency (TR)

Transparency implies that countries notify their standards and technical regulations (for instance by implementing enquiry points for standards), this may reduce the searching costs for exporters which want to acquire information about the standards in another country.

Mutual recognition and harmonisation of conformity assessment

This implies that the importing country recognises the competence of the exporting country's certification bodies to test and certify that a product complies with the regulations of the importing country (country to which it is exported).

Source: Piermartini and Budetta (2009).

Table 6 summarises the fourteen agreements that include provisions on TBTs involving Latin American countries surveyed by Piermartini and Budetta (2009). Unsurprisingly, there appears to be a tendency for regional agreements to favour harmonisation of technical regulations over their mutual recognition, while the opposite is true for conformity assessment procedures.

An empirical assessment of the extent to which NTM-compliance costs can be reduced by the various TBT and SPS provisions such as mutual recognition, or harmonisation of technical regulations or conformity-assessment procedures suggests[47] that on average, in Latin America, adopting TBT disciplines in trade agreements reduces the cost of NTMs implementation by 19.7% (Table 7). The mutual recognition of conformity assessment in itself is estimated to reduce the costs of NTMs by 18.4%. This is an interesting finding since this type of approach is the easiest and the least costly step that can be taken to promote the convergence of standards (i.e. countries can keep their own standards and process of certification).

It should be mentioned that the information in the Piermartini and Budetta database indicates whether the TBT provisions refer to the WTO TBT agreement, transparency requirements and whether regional liberalisation of TBTs through harmonisation or mutual recognition is pursued. However, it does not measure the extent to which these provisions are effectively applied and this may explain why the mutual recognition of standards does not have a larger effect on reducing NTM restrictiveness.

countries are likely to be more similar and better substitutes from the point of view of producers and consumers.

47. The details of this empirical exercise are given in the Appendix 19.

Table 6. TBT Provisions in Trade Agreements

	I. Reference to WTO-TBT Agreement	B. Technical Regulations		C. Conformity Assessment		III. Transparency Requirements
		(i) Mutual Recognition	(ii) Harmonization	(i) Mutual Recognition	(ii) Harmonization	(i) Notification
Canada-Chile (telecom)	NO	NO	YES	NO	YES	NO
Canada-Costa Rica	YES	NO	NO	NO	NO	NO
Korea-Chile	YES	NO	NO	YES	NO	NO
Mexico-Chile	YES	YES	YES	YES	NO	YES
Mexico-Japan	YES	NO	NO	NO	NO	NO
Mexico-Nicaragua	NO	YES	NO	YES	NO	YES
Mexico-Uruguay	YES	YES	YES	YES	YES	NO
US-Chile	YES	YES	NO	YES	NO	NO
EC-Chile	NO	NO	YES	YES	YES	NO
EC-Mexico	YES	NO	YES	NO	YES	NO
Mexico-EFTA	YES	NO	NO	NO	NO	NO
Mexico-Northern Triangle	YES	YES	NO	YES	NO	YES
Aladi	YES	NO	YES	YES	YES	YES
Andean Community	NO	NO	YES	NO	YES	YES
CACM	NO	YES	YES	YES	YES	YES
Group of 3	YES	YES	YES	YES	YES	YES
MERCOSUR	YES	NO	YES	YES	YES	YES
NAFTA	YES	YES	YES	YES	YES	YES
CAFTA	YES	NO	NO	YES	NO	NO

Source: Piermartini and Budetta (2009).

The figures from Table 7 must be analysed in parallel with information on the agreements containing such provisions (Figure 36). Chile, Uruguay and Mexico, the countries with the highest number of trade agreements including standards provisions, also show the most important drops in the price-increasing impact of NTMs. Chile, for example, benefited from mutual recognition of conformity assessment with Mexico, Korea and United States. The CAFTA agreement which includes Costa Rica, Guatemala and Colombia includes solely language encouraging mutual recognition for conformity assessment and these countries are estimated to have benefited much less from deep integration NTM clauses. Argentina, Brazil and Colombia, which display higher AVEs on intermediates than other Latin American countries have hardly addressed NTM restrictiveness through TBT provisions in their trade agreements.

Cost savings related to deep integration clauses vary by sector (Table 8). Natural resources-based industries such as pulp and paper as well as rubber and plastics have benefitted the most, but significant benefits are also estimated for manufacturing of electrical machinery and apparatus, computer, electronic and optical instruments, and chemical products. The effects are less pronounced for food products, wood product and chemicals, mostly covered by SPS measures, as harmonisation or mutual recognition in this area is more difficult to achieve. Important industrial sectors such as motor vehicles and processed food products are estimated to be in the middle but they still can benefit from significant cost reductions.

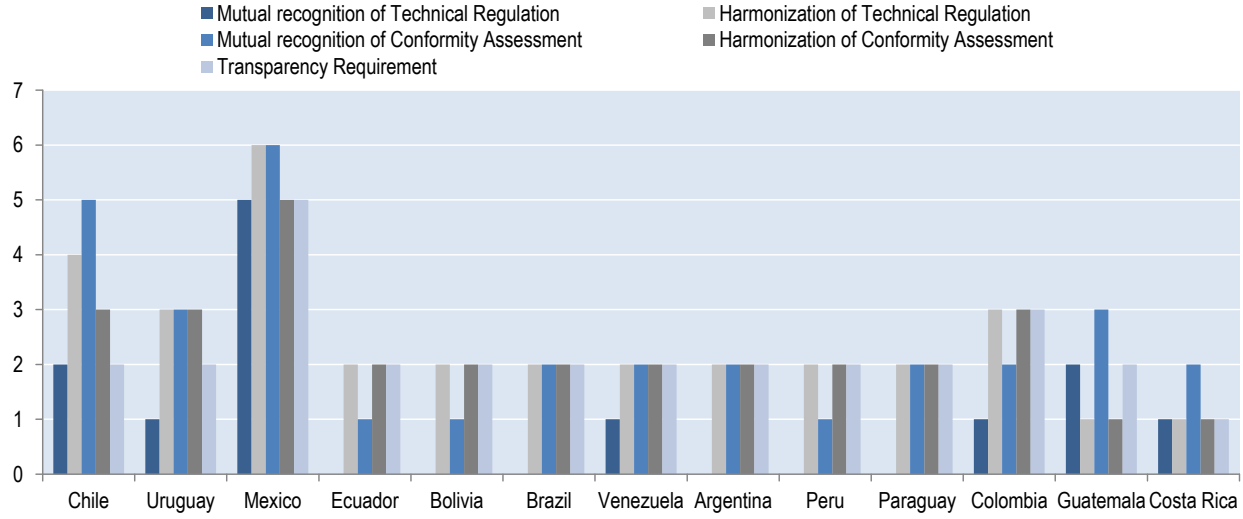
Two concrete examples of how adoption of facilitating provisions can alleviate the NTM burden are the Pacific Alliance Agreement and the Trans-Pacific Partnership. The Pacific Alliance improves on agreements previously signed among its members in that it mentions the general terms of harmonisation of non-tariff measures, such as SPS and TBT. Nevertheless, it includes few details on how to take this forward in practice. The TPP countries reached an even more significant agreement which includes mutual recognition of conformity assessment of other parties in TPP for TBT. This is likely to reduce costs and burdens for the businesses, especially for small firms.

Table 7. AVE-reducing effect of deep-integration clauses RTA, by country

	Any types of Provisions	Mutual recognition of Conformity Assessment	Harmonization of Conformity Assessment	Mutual recognition of Technical Regulation	Harmonization of Technical Regulation	Transparency Requirement
Chile	-31.0%	-31.5%	-29.5%	-9.3%	-28.2%	-24.5%
Uruguay	-25.7%	-23.6%	-18.3%	-8.8%	-18.7%	-21.6%
Mexico	-25.4%	-22.2%	-21.6%	-14.6%	-21.0%	-24.1%
Ecuador	-24.0%	-22.3%	-21.4%	-8.2%	-20.9%	-21.6%
Bolivia	-21.4%	-21.2%	-21.1%	-7.6%	-21.6%	-21.0%
Latin America	**-19.7%**	**-18.4%**	**-16.6%**	**-8.3%**	**-16.6%**	**-17.2%**
Brazil	-19.4%	-17.6%	-14.7%	-8.4%	-14.4%	-15.9%
Venezuela	-18.6%	-16.7%	-16.6%	-12.3%	-16.7%	-17.1%
Argentina	-18.2%	-16.6%	-14.3%	-7.8%	-13.7%	-16.2%
Peru	-17.8%	-17.0%	-18.4%	-4.5%	-18.4%	-15.5%
Paraguay	-16.6%	-18.7%	-13.9%	-5.0%	-14.1%	-16.0%
Colombia	-13.4%	-10.7%	-12.4%	-6.0%	-11.3%	-11.1%
Guatemala	-13.2%	-13.7%	-8.8%	-9.6%	-10.9%	-12.8%
Costa Rica	-11.4%	-7.8%	-5.1%	-6.1%	-5.5%	-6.0%

Source: Authors' calculations using CEPII Trade Unit Value and UNCTAD TRAINS.

Figure 36. Number of agreements with TBT provisions by Latin American countries



Source: Authors' calculations based on data from LAIA.

Table 8. AVE-reducing effect of deep-integration clauses in RTA, by ICIO section

HS Sections	Any Goods	Final	Intermediate	Inter-primary
Rubber and plastics products	-48.80%	-80.90%	-43.80%	-16.30%
Pulp, paper, paper products, printing, publishing	-38.60%	-43.20%	-28.30%	-41.60%
Electrical machinery and apparatus, nec	-36.90%	-41.60%	-31.10%	
Computer, Electronic and optical equipment	-28.30%	-29.60%	-25.50%	
Textiles, textile products, leather and footwear	-24.00%	-23.60%	-24.90%	-2.40%
Chemicals and chemical products	-22.00%	-43.40%	-19.70%	42.20%
Fabricated metal products	-20.30%	-21.90%	-18.90%	
Machinery and equipment, nec	-18.00%	-16.00%	-22.60%	
Other non-metallic mineral products	-18.00%	-43.40%	-13.80%	-20.60%
Motor vehicles, trailers and semi-trailers	-17.80%	-19.00%	-16.20%	
Food products, beverages and tobacco	-17.70%	-19.40%	-13.00%	-19.50%
Mining and quarrying	-17.40%		-23.30%	-16.50%
Basic metals	-16.00%		-16.70%	-12.60%
Wood and products of wood and cork	-15.70%	9.20%	-19.70%	-5.70%
Manufacturing nec; recycling	-13.60%	-11.80%	-14.50%	-20.00%
Agriculture, hunting, forestry and fishing	-13.40%	-11.30%	-4.20%	-16.50%
Other transport equipment	-11.40%	-5.20%	-30.80%	
TOTAL	-19.80%	-20%	-20.40%	-16.50%

Source: Authors' calculations using CEPII Trade Unit Value and UNCTAD TRAINS.

4. Conclusions

There are large differences in economic and geographic circumstances across Latin America but low productivity is a shared challenge across the region (OECD, 2016a). Recent OECD analysis suggests that efficient integration into global value chains (GVCs) can be an important element in raising productivity (e.g. OECD, 2013; OECD, 2015a and 2015b). The ICT-enabled geographical separation of tasks and business functions has allowed firms to decrease costs and benefit from economies of scale and has become a key determinant of competitiveness. As a result, today's goods and services are bundles of inputs originating from multiple locations and sourced in line with trade costs and comparative advantage determined at the task and function, rather than product, level.

Existing assessments of the extent of GVC participation in Latin America suggest that it is lower than for other developing regions. Intra-regional links seem particularly weak, in contrast to the strong role of regional value chains in Southeast Asia, Europe or North America (OECD, 2015a). It is thus useful to explore the role policies can play in making GVC participation more beneficial for the region. This report builds on earlier OECD work on GVC integration in Asia and Africa (OECD, 2015a) and uses the OECD Trade in Value Added (TiVA) and gross trade data to characterise the extent of GVC participation in Latin America. It identifies some of the key determinants that underpin GVC participation and looks deeper into certain key trade policy-related aspects of Latin American trade integration with the potential to improve GVC participation.

Mapping of GVC participation reveals a considerable heterogeneity across the region. For example, countries such as Mexico and Costa Rica, which are located closer to North American manufacturing hubs rely extensively on foreign inputs (coming predominantly from North America and, increasingly, from Asia) and specialise in processing them for further export, mostly to North America. They are part of North American GVCs. Importing for processing and re-export is less prevalent in Chile and much less prevalent in Argentina, Brazil and Colombia, which tend to specialise in exporting natural resource-based intermediate products which are further processed or consumed abroad, increasingly in Asia. The importance of regional sourcing also varies across countries. Chile, Argentina, Brazil and Costa Rica, and to a lesser extent Mexico, rely considerably on regional partners for inputs to produce their exports. In this respect, Mexico, Chile and to a

lesser extent Brazil, which have strong forward links with manufacturing hubs in North America (for Mexico) and Asia (for Chile and Brazil) serve as regional platforms for global value chain linkages.

Facilitating GVC participation requires reducing the fragmentation-related costs of production. Some of these costs accrue at the border (e.g. tariffs, costs related to customs inefficiencies) but many accumulate long before the border is reached (e.g. costs related to the quality of infrastructure and logistics services, as well as regulatory burdens). Considering that even in economies thought to have thrived in GVCs large portions of international supply chains still tend to be domestic, the domestic cost component is likely to be very important, underscoring the importance of domestic reforms. A number of Latin American countries have considerable potential for catch-up with the best performing countries in many of these areas. The empirical analysis presented in this report provides information to help countries in prioritising reforms.

While regional trade is relatively diversified and well-established, the varying degrees of GVC integration suggest that further regional integration may hold promise. Outside the region, trade in intermediates with North America, the EU and South East Asia is somewhat less well diversified but is much larger in scale and has been growing more dynamically in the recent past. This suggests that there is also potential for further improving GVC integration with other regions.

Latin America already has a dense web of intra- and extra-regional PTAs. In principle, this means that much of trade faces low border barriers. Nevertheless, the overlap, duplication and conflicts among the different rules and standards governing trade under these PTAs are likely reducing the benefits of these agreements. Complicated regulation may be particularly burdensome for smaller firms and firms whose competitiveness relies on efficient and flexible global sourcing. This is prompting renewed interest in the idea of linking or harmonising the various Latin American PTAs. To help inform this debate, this study analyses the impact of rules of origin (RoO) and non-tariff measures (NTMs) on GVC integration in the region, and highlights relevant harmonisation initiatives.

RoO establish the conditions that a product must satisfy to be deemed eligible for preferential access to member countries' markets; they are thus integral elements of PTAs. In the world of GVCs, where products from countries outside of the PTA can serve as inputs into products of participating countries, RoO can have negative consequences not only for extra- but also intra-PTA value chain formation. The empirical work presented in this paper estimates that RoO in PTAs of Latin American countries undo much of the positive trade effect of these agreements, and this effect is particularly strong for trade in intermediate products. On average, RoO are estimated to have tariff equivalents of around 8.6% and 9% for, respectively, intra- and extra-PTA imports of intermediate products. Average MFN tariffs on intermediate products are below the 9% threshold in more than 60% of Latin American countries, which suggests that in many cases the average protection that these tariffs afford to intra-PTA input providers may be less than the cost of administering preferential market access through RoO. MFN liberalisation of tariffs on intermediate products could be a cost-efficient way of alleviating the problems related to RoO and stimulating both intra- and extra-PTA value chains.

Other viable – although also arguably more costly – initiatives could include renegotiation or harmonisation of existing product-specific RoO, or improvements to overall RoO architecture such as amendments to certification, *de minimis* or cumulation rules. Indeed, the Latin American countries such as Chile, Costa Rica and Mexico which adopted some of the more flexible approaches to RoO also tend to be those that are better integrated into GVCs. There is still, however, scope to do more. Negotiation of more inclusive cumulation schemes, such as those that allow full cumulation across PTA partners, cross-cumulation of RoO between overlapping PTAs or flexible sourcing from extra-PTA partners, is particularly promising and is already being pursued in many newer agreements involving countries in the region, including the Pacific Alliance and the Trans-Pacific Partnership.

A further area for attention in the context of efforts to promote greater participation in GVCs is NTMs. NTMs such as standards, technical regulations and conformity assessment procedures, are not normally aimed at discriminating against imports; given their consumer protection or other public policy objectives, usually the same standards and requirements apply to domestically produced and imported products. Nevertheless, these measures can have unintended effects on trade, which can be more restrictive than necessary to achieve their policy objective, in effect acting as hidden protection. In addition, while countries may legitimately apply different standards and approaches, use of diverging national standards may nonetheless impose particular

costs on GVCs which involve operations across multiple countries. *A priori* it is not clear whether costs of compliance would be higher for intermediate or final products; NTMs traditionally aim to protect consumers, but because of the importance of timeliness and quality and the sensitivity of value chain operations to trade costs, NTMs can prove particularly problematic for GVC trade. The empirical work presented in this report shows that on average, NTMs used by Latin American countries impose additional costs equivalent to a tariff of 20% for primary intermediate products and 12% for processed intermediates. Their incidence is found to be correlated negatively with GVC participation; Latin American countries where NTM restrictiveness with respect to intermediate trade is high and where these issues are not addressed under their PTA are generally less integrated into GVCs.

Given the importance of ensuring quality standards and appropriate consumer protection,[48] these costs suggest that there is benefit in exploring scope for mutual recognition, or harmonisation of technical regulations or conformity-assessment procedures. An empirical assessment of the extent to which NTM-compliance costs can be reduced by these measures shows that, on average, such provisions can reduce the cost of NTMs by approximately one-fifth. Mutual recognition of conformity assessment is the most effective facilitation mechanism, responsible for much of the reduction in cost. While not without administrative costs and challenges, mutual recognition – in particular of conformity assessment procedures – appears relatively more feasible than harmonisation to promote the convergence of standards over the medium term (as countries can keep their own standards and process of certification).

Overall the results of this study show that moves towards convergence on rules of origin and regulatory standards could significantly reduce the burden of complying with competing or overlapping rules and regulations. While convergence is not necessarily straightforward and can involve some upfront costs (e.g. in terms of negotiation), these costs need to be set against the costs of inaction in terms of the ability of Latin American countries to increase their integration into regional and global value chains, with gains to trade, productivity and growth.

48. It could be argued that efficient and well applied standards and certification processes can facilitate GVCs by providing a means to ensure the quality of inputs.

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Annex 1.

Coverage and sources

Annex Table A1.1. General country coverage

Latin America coverage
Argentina*
Bolivia
Brazil*
Chile*
Colombia*
Costa Rica*
Ecuador
El Salvador
Guatemala
Guyana
Honduras
Mexico*
Nicaragua
Panama
Paraguay
Peru
Suriname
Uruguay
Venezuela

Note: This table shows indicative intended country coverage of this study. The actual coverage differs across the different parts of this report, depending on the kind of data being used. Countries with stars are those that are present in OECD's Trade in Value Added database.

Annex Table A1.2. Data sources

Variable	Source
backward and forward linkages	OECD Trade in Value Added database (2015 version)
/	CEPII BACI Base Analytique du Commerce International (Gaulier and Zignagno, 2010)
/	CEPII GeoDist for geographical variables
Share of imports covered by RTAs	DESTA dyadic database and OECD TiVA (2015) database
Share of exports covered by RTAs	DESTA dyadic database and OECD TiVA (2015) database
Average tariffs faced	TRAINS database
Average tariffs charged	TRAINS database
Trade weighted trade costs	Arvis et al., 2013)
Trade Facilitation Index	OECD Trade Policy Paper No. 144, 2013)
Intellectual property protection	Global Competitiveness Index 2015 - 2016
Quality of instituations	Global Competitiveness Index 2015 - 2016
Efficiency of customs procedure	World Economic Forum and World Development Indicators
Quality of trade and transport-related infrastructure	World Economic Forum and World Development Indicators
/	Services Trade Restrictiveness Index, OECD

Annex 2.

Destination and origin of value added

Annex Figure A2. Latin American countries in global matrices of value added trade flows

Panel A. Changes in value added in exports (backward participation) (1995-2011)

		ARG	BRA	CHL	COL	CRI	MEX	USA_CAN	AUS_NZL	DEU	FRA	GBR	Rest_EU	CHN	JPN	ASEAN	Rest_SEA	IND	ROW
From …	ARG			0%															
	BRA	3%		2%			0%							0%					
	CHL					0%													
	COL			2%		0%													
	CRI																		
	MEX					0%		1%											
	USA_CAN	1%	0%	1%	-1%	3%	-5%		-1%	1%	1%	0%	1%	-1%	0%	-1%	-1%	1%	0%
	AUS_NZL													0%	1%	0%	1%	1%	
	DEU						0%		0%		0%	0%	0%	0%		0%	0%		-1%
	FRA									0%		0%	-1%						0%
	GBR								0%	0%	0%		0%			0%		0%	0%
	Rest_EU	0%	0%	0%	0%	0%	1%	0%	0%	3%	1%	1%		0%		0%	0%	1%	-1%
	CHN		1%	1%		2%	4%	1%	1%	1%	1%	1%	1%		2%	3%	4%	2%	1%
	JPN					0%	0%	-2%	-1%			-1%	0%	-3%		-3%	-2%		0%
	ASEAN						1%		1%					1%	1%		2%	1%	
	Rest_SEA			0%			1%							-3%	0%	0%			0%
	IND															1%			
	ROW	3%	1%	2%	0%	1%	2%	2%	3%	4%	4%	3%	5%	3%	3%	4%	9%	7%	
	Domestic	-8%	-3%	-6%	1%	-6%	-4%	-3%	-2%	-11%	-8%	-5%	-7%	1%	-9%	-4%	-14%	-15%	2%
	Foreign	8%	3%	6%	-1%	6%	4%	3%	2%	11%	8%	5%	7%	-1%	9%	4%	14%	15%	-2%

Note: This figure corresponds to Panel A in Figure 5 and provides a visual representation of percentage point changes backward GVC participation across different countries or regions based on the OECD TiVA database.

Source: Authors' calculations based on OECD TiVA database.

Annex Figure A2. Latin American countries in global matrix of value added trade flows (*cont.*)

Panel B. Destination of value added used by trading partners for exports – forward participation (2011)

		ARG	BRA	CHL	COL	CRI	MEX	USA_CAN	AUS_NZL	DEU	FRA	GBR	Rest_EU	CHN	JPN	ASEAN	Rest_SEA	IND	ROW	Direct Exports	Forward
From	ARG							1.5%						1.5%						-5%	5%
	BRA													3.7%						-7%	7%
	CHL													7.3%						-10%	10%
	COL			2.1%				3.3%					1.1%	2.0%					-2.1%	-10%	10%
	CRI						1.5%	-1.3%						4.2%		2.0%	-0.8%			-6%	6%
	MEX							1.9%						1.2%						-5%	5%
	USA_CAN												1.1%	2.0%						-6%	6%
	AUS_NZL							-0.4%						5.0%			2.0%			-9%	9%
	DEU												1.0%	2.1%						-5%	5%
	FRA									1.1%				1.5%						-5%	5%
	GBR									1.1%			1.3%	1.3%						-5%	5%
	Rest_EU									1.3%				1.2%						-4%	4%
	CHN												1.3%			1.1%			1.1%	-6%	6%
	JPN							-2.0%						6.9%			1.4%			-8%	8%
	ASEAN							-1.3%						4.7%			1.3%			-7%	7%
	Rest_SEA							-1.3%						7.6%						-8%	8%
	IND												1.1%	2.5%						-7%	7%
	ROW													2.4%			1.6%	1.0%		-8%	8%

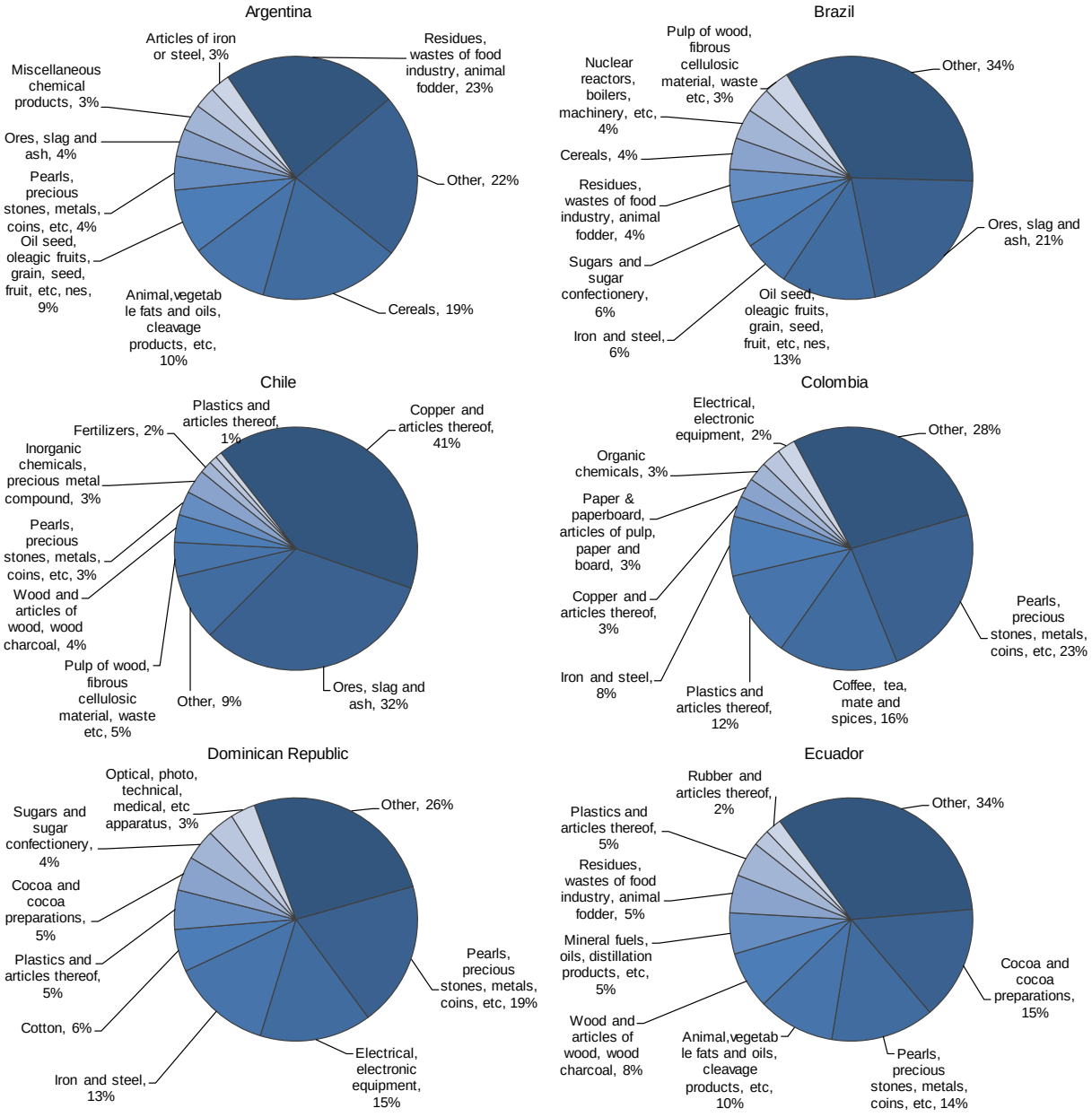
Note: This figure corresponds to Panel B in Figure 5 and provides a visual representation of percentage point changes in the forward GVC participation across different countries or regions based on the OECD TiVA database.

Source: Authors' calculations based on OECD TiVA database.

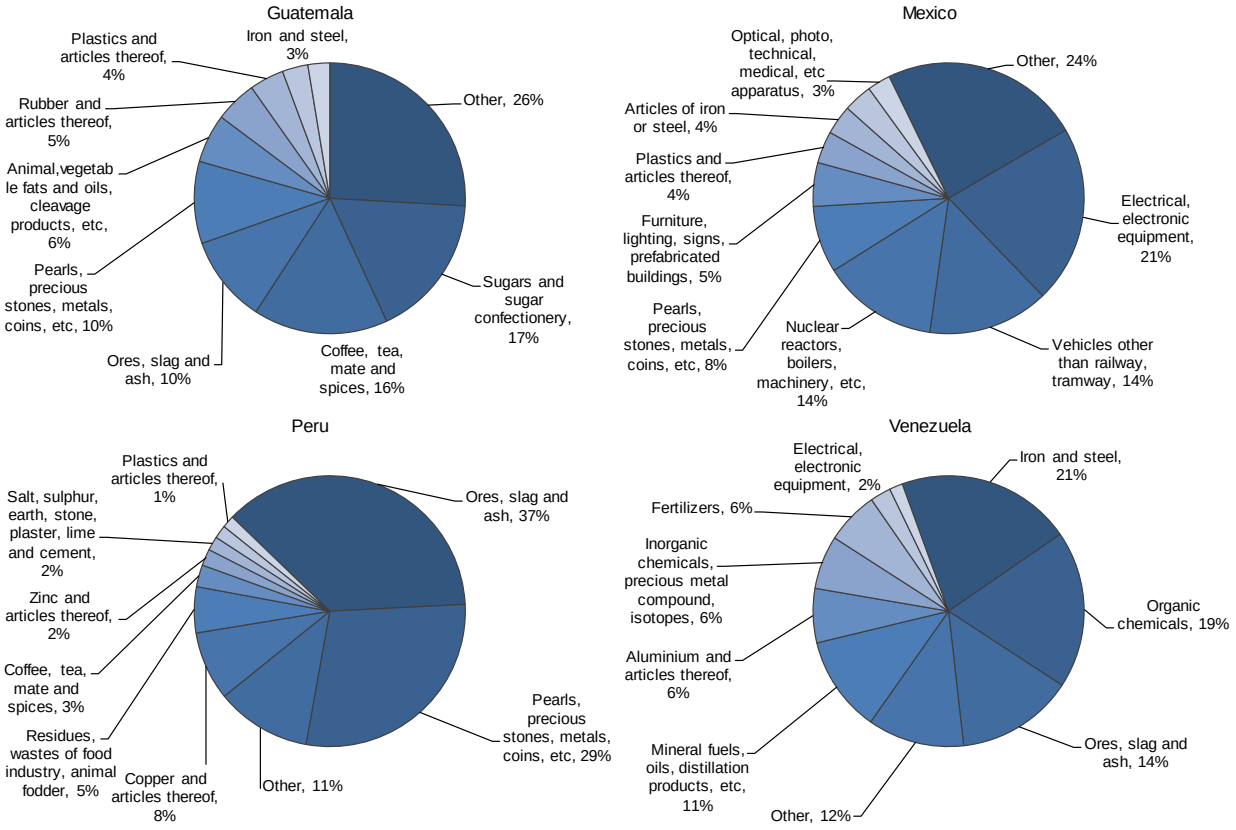
Annex 3.

Top products and destination markets

Annex Figure A3.1. Top-10 export products in selected Latin American countries (2012)

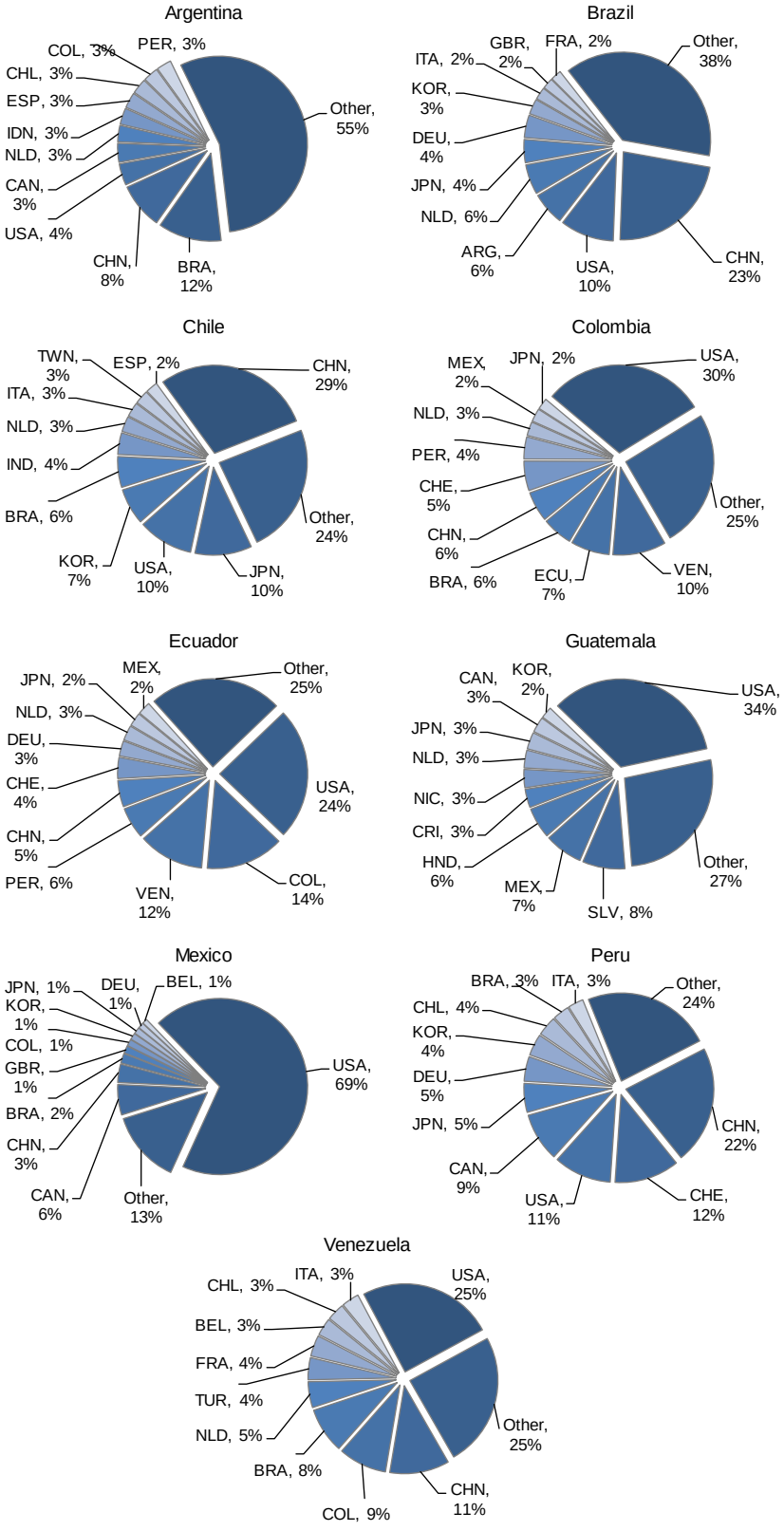


Annex Figure A3.1. Top-10 export products in selected Latin American countries (2012) (*cont.*)



Source: Authors' calculations based on the BACI dataset.

Annex Figure A3.2 Top-10 export markets (2012)



Source: Authors' calculations based on the BACI dataset.

Annex 4.

Survival analysis

Annex Table A4. Cox regression of survival spells

		Survival spell				
	Primary intermediates	1.031***	(0.00111)			
Products	06-15 Vegetable	0.963***	(0.00267)			
	16-24 Foodstuffs	0.938***	(0.00305)			
	25-27 Minerals	0.989***	(0.00278)			
	28-38 Chemicals	0.984***	(0.00255)			
	39-40 Plastic / Rubber	0.917***	(0.00258)			
	41-43 Hides, Skins	1.167***	(0.00357)			
	44-49 Wood	1.012***	(0.00262)			
	50-63 Textiles, Clothing	1.078***	(0.00256)			
	64-67 Footwear	1.003	(0.00491)			
	68-71 Stone / Glass	0.978***	(0.00265)			
	72-83 Metals	0.961***	(0.00254)			
	84-85 Mach/Elec	0.914***	(0.00255)			
	86-89 Transportation	0.901***	(0.00282)			
	90-97 Miscellaneous	0.939***	(0.00267)			
Region	CAR (i)	1.158***	(0.00451)	CAR (j)	1.271***	(0.00267)
	E28 (i)	0.897***	(0.00360)	E28 (j)	0.994**	(0.00235)
	ECA (i)	0.981***	(0.00367)	ECA (j)	0.991***	(0.00240)
	ESA (i)	1.019***	(0.00382)	ESA (j)	1.088***	(0.00246)
	MEN (i)	0.953***	(0.00366)	MEN (j)	1.056***	(0.00238)
	NAM (i)	0.886***	(0.00371)	NAM (j)	0.987***	(0.00266)
	PAC (i)	0.997	(0.00384)	PAC (j)	1.016***	(0.00259)
	ROW (i)	1.228***	(0.00726)	ROW (j)	1.214***	(0.00408)
	SAS (i)	0.922***	(0.00373)	SAS (j)	1.056***	(0.00255)
	SEA (i)	0.881***	(0.00362)	SEA (j)	0.999	(0.00239)
	WCA (i)	1.027***	(0.00404)	WCA (j)	1.102***	-0.00247
Intra - Extra trade	LATLAT	0.986***	(0.00446)			
	LATCAR	0.911***	(0.00490)	CARLAT	1.094***	(0.00704)
	LATE28	1.062***	(0.00412)	E28LAT	1.073***	(0.00260)
	LATECA	0.923***	(0.00537)	ECALAT	1.012***	(0.00399)
	LATESA	0.915***	(0.00614)	ESALAT	1.095***	(0.00687)
	LATMEN	0.955***	(0.00498)	MENLAT	0.925***	(0.00430)
	LATPAC	0.942***	(0.00743)	PACLAT	1.027***	(0.00591)
	LATROW	1.036*	(0.0211)	ROWLAT	0.958**	(0.0193)
	LATSAS	0.908***	(0.00677)	SASLAT	0.973***	(0.00419)
	LATSEA	0.983***	(0.00459)	SEALAT	1.028***	(0.00278)
	LATWCA	0.913***	(0.00664)	WCALAT	1.073***	(0.0135)
	Observations	44,307,137				

Note: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. The reference modality for classification is Intermediates, the one for Products is "01 – 05 Animal", the one for region (i and j) is Latin America), the reference for Intra – Extra trade are LATNAM and NAMLAT. Regarding the region variable, region (i) parameters are those for exporter, region (j) parameters are those for importer. Regarding Intra – extra trade, the first region is the exporter to the second region (for instance, the parameter LATCAR is the exporting spell of a product from a Latin American country to a Caribbean country). The values that are shown are $\exp(\beta)$: an exporting region with a parameter that is higher than 1 has a higher probability that the spell breaks than Latin America.

The regressed equation is the following:

$$\lambda(y|X) = \lambda_0(t) \,.\, \exp\big(\beta_{Primary} 1_{Primary} + \lambda_{exporting\ region} \cdot 1_{exporting\ region} + \lambda_{importing\ region} \cdot 1_{importing\ region} + \lambda_{export-import\ dyad} \cdot 1_{export-import\ dyad}\big)$$

Source: Authors' own calculations based on the BACI dataset.

Annex 5.

Decomposition of GVC integration and the role of trade policy and FDI openness

Annex Table A5.1. Backward decomposition

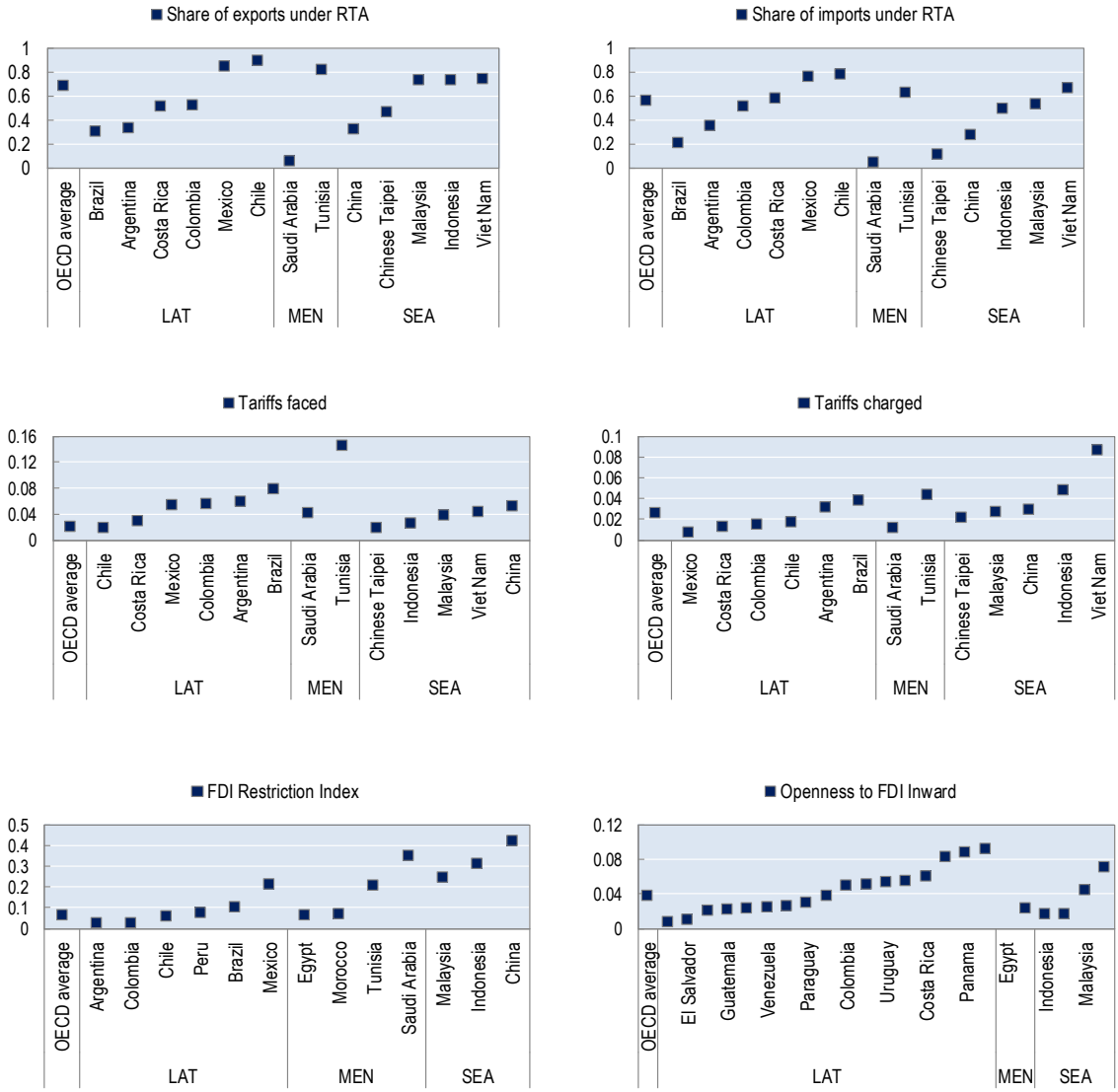
	Backward
Average tariffs charged	0.00229
	(0.00286)
Average tariffs faced	-0.00200
	(0.00177)
Share of imports covered by RTAs	0.170**
	(0.0689)
Share of exports covered by RTAs	-0.0528
	(0.0602)
Inward FDI (as % of GDP)	0.0476***
	(0.00586)
Manufacturing VA (as % of GDP)	0.0104***
	(0.00103)
Distance to hub (log)	-0.00622
	(0.0149)
Distance to activity log)	-0.0606
	(0.0447)
Population (log)	0.00960
	(0.00712)
GDP (constant, 2005 USD, log)	-0.0222***
	(0.00651)
year==1995	-0.0593**
	(0.0261)
year==2000	0.00650
	(0.0211)
year==2005	0.00557
	(0.0177)
year==2008	0.0177
	(0.0186)
year==2009	-0.00977
	(0.0182)
year==2010	-0.00403
	(0.0178)
Constant	0.989***
	(0.316)
Observations	205
R-squared	0.573

Note: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

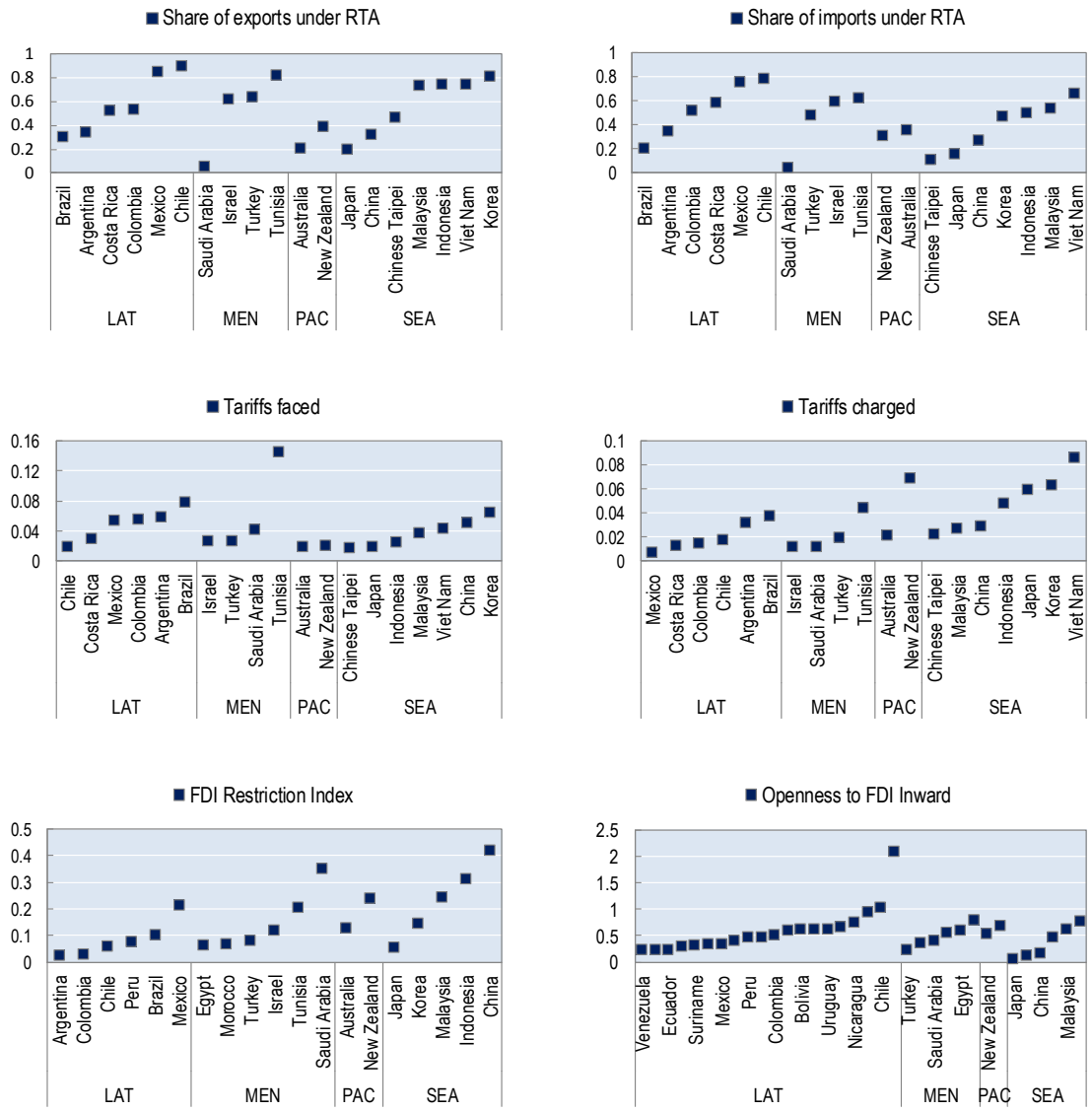
$$B = \alpha + X\beta + Z\gamma + S\delta + T\sigma + \epsilon$$

Where B stands for backward, X are trade policy variables (tariffs charged and faced, share of imports and exports covered by a PTA), Z represent the investment openness (inward FDI (as % of GDP)), S are the structural variables (distance to hub, to activity, GDP) and T are time fixed effects. The regression is run on all countries except European Union due to missing values on tariffs faced.

Annex Figure A5.2. Trade policy and FDI openness (2011)



Annex Figure A5.2. Trade policy and FDI openness (2011) (*cont.*)



Note: OECD average corresponds to OECD countries except Mexico and Chile.

Sources: Authors' calculation based on DESTA RTAs dyadic database (March 2015), OECD TiVA database (2015), TRAINS database, OECD FDI Restrictiveness Index, UNCTAD Statistics on Foreign Direct Investment and OECD (2015a).

Annex 6.

List of Latin American PTAs

Annex Table A6. List of PTAs in force as of year 2013 and Information on RoO and TBT provisions (Y=Yes)

Intra Region FTA	Year entry in force	Information on RoOs	Information on TBT provisions
LAIA	1981	Y	Y
Andean Community	1988	Y	Y
CACM	1960	Y	Y
MERCOSUR	1991	Y	Y
CAFTA-Dominican Republic	2006	Y	Y
CACM- Panama	2009	Y	
CACM-Chile	2002	Y	
G3	1995	Y	Y
MERCOSUR-Bolivia	1997	Y	
MERCOSUR-Chile	1996	Y	
MERCOSUR-Colombia	2004	Y	
MERCOSUR-Ecuador	2004	Y	
MERCOSUR-Venezuela	2004	Y	
MERCOSUR-Peru	2006	Y	
Northern Triangle- Colombia	2009	Y	
Northern Triangle- Mexico	2009	Y	Y
Chile-Ecuador	2010	Y	
Chile-Mexico	1999	Y	Y
Chile Panama	2006		
Chile-Peru	2009	Y	
Chile-Colombia	2009	Y	
Colombia-Costa Rica	2013		
Costa-Rica-Peru	2011		
Mexico-Bolivia	2010	Y	
Mexico-Costa Rica	2006	Y	Y
Mexico-Nicaragua	1985	Y	Y
Mexico-Uruguay	2004	Y	Y
Mexico-Peru	1987		
Panama-Chile	2008	Y	
Panama- Costa Rica	2008	Y	
Panama-Salvador-Honduras	2009	Y	
Panama Peru	2011		

Extra Region FTA	Year entry in force	Information on RoOs	Information on TBT provisions
NAFTA	1994	Y	Y
EU-CACM	2012		
EU-Chile	2003	Y	Y
EU-Mexico	2000	Y	Y
EU- Colombia	2012		
EU-Peru	2012		
India-MERCOSUR	2004		
EFTA- Colombia	2008		
EFTA-Chile	2003		
EFTA- Mexico	2000		Y
Australia-Chile	2008		
Canada-Chile	1997	Y	Y
Canada-Colombia	2008		
Canada-Panama	2010		
Canada-Peru	2008		
Canada-Costa Rica	2002	Y	Y
China-Chile	2005		
China-Costa Rica	2010		
China-Peru	2009		
India-Chile	2006		
Israel-Mexico	2000		
Japan-Chile	2007	Y	Y
Japan-Mexico	2005	Y	Y
Japan-Peru	2011	Y	Y
Korea-Chile	2004	Y	Y
Korea-Peru	2011		
Malaysia-Chile	2010		
Singapore-Costa Rica	2010		
Singapore-Panama	2006		
Singapore-Peru	2008		
Thailand-Peru	2011	Y	
Turkey-Chile	2009		
US-Chile	2003	Y	Y
US-Colombia	2012	Y	
US-Panama	2012	Y	
US-Peru	2009	Y	

Source: Authors using DESTA and WTO for list of PTAs and IADB for information on RoOs and Piermartini and Budetta (2009) for information on TBT provisions.

Annex 7.

Rules of Origin in Latin American PTAs

Annex Table A7. List of PTAs in force as of year 2013 and the percentage of HS products under each RoO category

	Year entry in force	No RoOs	CTC	CTC or VC or TECH	VC or TECH	Wholly Obtained	Chapter Change	Heading Change	Sub-heading Change
LAIA	1981	18.0		76.9	5.1			100.0	
Andean Community	1988	4.2		92.0	2.6	1.2		100.0	
CACM	1960	87.2	12.8				23.8	40.6	35.6
CAFTA-DR	2006	43.2	46.2	9.9	0.7		37.1	36.1	26.8
MERCOSUR	1991	1.1		84.2	14.6			99.8	
NAFTA	1994	23.9	57.1	18.2	0.8		42.9	41.6	15.5
CACM- Panama	2009	64.6	26.4	5.6	3.4		32.0	37.2	30.8
CACM-Chile	2002	78.2	1.1	20.6			23.6	43.8	32.6
CACM-Dominican Republic	2006	77.6	22.4				16.0	67.4	16.7
EU-Chile	2003	27.2	40.1	1.5	26.6	4.6		100.0	
EU-Mexico	2000	28.0	39.3	1.4	26.9	4.5		100.0	
G3	1995	49.2	49.8	1.0			43.1	26.0	30.9
MERCOSUR-Bolivia	1997	22.3		41.3	36.4			100.0	
MERCOSUR-Chile	1996	22.2		49.8	27.9			100.0	
MERCOSUR-Colombia	2004	9.6	1.9	75.5	10.6	2.3	2.5	94.8	2.7
MERCOSUR-Ecuador	2004	10.1	2.5	77.1	7.7	2.6	2.7	86.1	11.1
MERCOSUR-Venezuela	2004	7.7	1.9	80.8	7.3	2.3	2.2	93.8	3.9
MERCOSUR-Peru	2006	33.3	0.7	55.3	9.7	0.9	1.6	98.1	0.0
Northern Triangle- Colombia	2009	61.7	8.5	28.2	1.6		28.0	34.8	37.3
Northern Triangle- Mexico	2009	35.9	62.5	0.9	0.7		44.3	26.2	29.5
Canada-Costa Rica	2002	48.2	35.3	16.6			27.6	50.8	21.6
Chile-Canada	1997	28.8	54.5	15.5	1.2		43.3	40.6	16.1
Chile-Ecuador	2010	19.2		75.8	5.0			100.0	
Chile-Japan	2007	51.4	22.0	25.3		1.3	34.9	50.0	15.2
Chile-Korea	2004	38.5	31.5	29.4	0.5		35.4	60.6	4.1
Chile-Mexico	1999	50.6	15.5	32.9	1.0		29.9	43.1	27.0
Chile-Peru	2009	-2.0	25.7	76.2			10.4	89.4	
Chile-Colombia	2009	20.2	4.5	75.3			13.5	82.5	4.0
Mexico-Bolivia	2010	47.9	39.2	12.9	0.1		50.7	28.4	20.9
Mexico-Costa Rica	2006	28.2	51.4	19.5	1.0		42.8	28.1	29.1
Mexico-Japan	2005	35.5	45.7	18.8			45.9	43.0	11.1
Mexico-Nicaragua	1985	29.7	50.6	19.7			43.2	26.4	30.4
Mexico-Uruguay	2004	33.2	28.7	36.8	1.2		30.9	39.2	29.9
Panama-Chile	2008	88.7	6.0	5.3			0.0	72.5	27.5
Panama- Costa Rica	2008	92.6	6.5	0.9			15.8	65.8	18.4
Panama-Salvador-Honduras	2009	98.9	0.3	0.8			23.7	51.2	25.2
Peru-Thailand	2011	80.5	15.0	4.5			22.3	45.2	32.5
U.S.-Chile	2003	37.5	52.8	9.7			38.0	39.0	23.0
U.S.-Colombia	2012	50.3	38.8	10.1	0.9		35.7	36.4	27.9
U.S.-Panama	2012	51.1	38.8	9.3	0.8		37.1	35.4	27.4
U.S.-Peru	2009	50.3	38.8	10.1	0.9		35.7	36.4	27.9
		35.2	19.2	39.2	5.6	0.8	18.1	67.5	14.3

Source: Authors using INTrade, the IDB Trade and Integration Information System.

Annex 8.

Estimation of AVEs of costs of origin with a gravity model

RoO data in the form of precise requirements at the HS6 level of product classification were downloaded from IADB platform. Import data in thousand US dollars are from the CEPII's BACI database, which is based on COMTRADE but reconciles direct export and mirrored import data. Gravity variables are from the CEPII's free-access online database. Our estimation strategy is based on the ubiquitous gravity equation, but we estimate it at a disaggregated (product) level. We derive our estimation equation from the standard Anderson-van Wincoop (2004) framework after relaxing key symmetry assumptions about production costs and trade costs. That is, we allow for variation in those costs across products and estimate the gravity at the product-country pair level. The dimension of our gravity model is thus origin-destination-product-year.

RoO data is available only for agreement covering Latin American countries and not for other preferential agreements in the world. Therefore it is possible to disentangle the effect of tariffs from those of RoOs for country pairs with at least one Latin American country in the pair but not for others. Accordingly, all country pairs eligible for preferential rules are marked with a single dummy variable. Because the value of preferences depends on MFN tariffs (for instance, when MFN tariffs are zero, preferences are nonexistent), MFN tariffs are included in the estimation. We obtain the preferential margin (PRF) simply by multiplying the MFN tariff with the RTA dummy, assuming therefore that RTA give access to a zero percent duty. The applicable RoO in the form of a vector of dummies, one for each type of RoO are also included.

Formally, let *o*, *d* and *p* index respectively the origin country, the destination country and a product identified at the six-digit level of the Harmonised system (HS6, at which there are over 5 000 products) for year *t*. Let δ_o and δ_d designate vectors of fixed effects identifying respectively each origin country and each destination country. Let v_{odk} be the import of product *p* imported from *o* to *d* and $\mathbf{x}_{od}$ a vector of bilateral determinants of trade including distance, common border, and GDP in both countries. Let MFN designate MFN tariff "PRF" the Preferential margin for partners under any PTA and RoO equal 1 if at least one of the PTA among the pair apples a RoO. The estimation equation is

$$(1)\ \ln v_{odpt} = \delta_o + \delta_d + \delta_p + \delta_t + \gamma x_{od} + \beta_1 \ln(1 + MFN_{odpt}) + \beta_2 \ln(1 + PRF_{odpt}) + \beta_3 RoO_{odpt} + \mu_{odpt}$$

Parameter estimates on standard gravity controls (distance and border) are as expected. The elasticity of trade to distance is roughly -0.250, implying that a doubling in bilateral distance reduces trade by 15%. A common land border raises trade by 30% [exp(0.27)-1]. Note that the trading countries' GDPs are not included because they are absorbed by exporter and importer fixed effects. This formulation is superior to one with GDPs as fixed effects control adequately for "multilateral resistance terms". As we could expect tariffs are reducing trade flows and in the country pair is in a trade agreement this would increase trade flows and preferential margin granted by the RTA is increasing trade flows.

The coefficient *b* in front of the RoO dummy gives the quantity impact of RoO on imports. To estimate AVE from the coefficient *b* the simplest approach is to use AVE= exp(*b)*-1 as in Cadot and Ing (2016), in column 1 it will then be [exp(-0.056)-1]= 5.5%. We have decided to choose a more refine measure, following the Kee et al. (2009) formulae for NTMs' AVE, First we still use estimate of the quantity-impact of RoOs on imports and then we turn to the transformation of quantity-impacts into price effects, using the import demand elasticities (we got from the WB Trade data portal). Those import demand elasticities are defined for each product importer are on average of 1.081 for all goods, 1.189 on intermediate goods and 0.926 on final goods. Therefore our AVE is [exp(-0.043)-1]/1.081=4%.

Annex Table A8. Results from the Gravity model

VARIABLES	1 Import	2 Import	3 Import	4 Import	5 Import	6 Import
Products	ALL	INT	FIN	ALL	INT	FIN
GDP_ reporter	0.193***	0.140***	0.286***	0.199***	0.145***	0.294***
	(0.006)	(0.009)	(0.009)	(0.006)	(0.009)	(0.009)
GDP_partner	0.382***	0.363***	0.423***	0.388***	0.367***	0.431***
	(0.007)	(0.010)	(0.010)	(0.007)	(0.010)	(0.010)
Distance	-0.191***	-0.213***	-0.234***	-0.187***	-0.207***	-0.227***
	(0.008)	(0.011)	(0.011)	(0.008)	(0.011)	(0.012)
Common border	0.444***	0.471***	0.376***	0.443***	0.475***	0.376***
	(0.015)	(0.020)	(0.022)	(0.015)	(0.020)	(0.023)
Tariff	-0.071***	-0.060***	-0.106***	-0.072***	-0.062***	-0.108***
	(0.004)	(0.005)	(0.006)	(0.004)	(0.005)	(0.006)
RTA*Tariff	0.166***	0.154***	0.174***	0.172***	0.164***	0.185***
	(0.005)	(0.007)	(0.009)	(0.006)	(0.008)	(0.009)
RTA	-0.070***	0.040	-0.144***	-0.078***	0.023	-0.155***
	(0.025)	(0.038)	(0.036)	(0.025)	(0.038)	(0.036)
RoO	-0.043*	-0.108***	-0.023			
	(0.023)	(0.036)	(0.030)			
cat==CTC				0.012	-0.050	0.043
				(0.024)	(0.037)	(0.031)
cat==CTCVCTR				-0.056**	-0.145***	-0.060*
				(0.025)	(0.039)	(0.034)
cat==VCTR				-0.156***	-0.157***	-0.198***
				(0.026)	(0.040)	(0.036)
cat==WOB				-0.184***	-0.747***	-0.037
				(0.046)	(0.083)	(0.055)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Exporter Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Importer Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
HS3 Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,362,709	2,435,350	1,927,359	4,362,709	2,435,350	1,927,359
R-squared	0.27	0.28	0.28	0.27	0.28	0.28

Corresponding *ad valorem* equivalents

	All goods	Intermediate goods	Final goods
RoO	4.0%	8.6%	0.0%
CTC	0.0%	0.0%	0.0%
CTCVCTR	5%	11.4%	6.3%
VCTR	13.4%	12.2%	19.4%
WOB	15.5%	44.3%	0.0%

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Source: Authors using BACI

Annex 9.

Estimation of Impact of RoO on Preference Utilisation

In the Table A9 we replicate our gravity model from Annex 8 but we restrain our sample to LAIA countries. The difference in this exercise is that the variable of interest is not anymore the import value between partners but the utilisation rate of preferences of each agreement *r*, calculated as the share of imports coming from the partner through a specific agreement in the total import flow coming from this partner. This will then change the dimension of our gravity model which is now origin-destination-product-year-agreement. This allows to precisely measuring how specific RoO attached to an agreement *r* impact the utilisation rate of this agreement. The estimation equation is

$$(2) \qquad \ln Share^{r}_{odpt} = \delta_o + \delta_d + \delta_p + \delta_t + \gamma x_{od} + \beta_1 \ln(1 + MFN_{odpt}) + \beta_2 \ln(1 + PRF^{r}_{odpt}) + \beta_3 RoO^{r}_{odpt} + \mu_{odpt}$$

Coefficients must be interpreted differently than in the previous table and coefficients for RoO are not *ad valorem* equivalent. For instance presence of a RoO will decrease by 24% the utilisation of the preferential margin for an exporter (exp (-0.247)-1= 24%).

Annex Table A9. Results from Gravity model on LAIA country on the utilisation rate

VARIABLES	1 Utilization rate	2 Utilization rate	3 Utilization rate
Products	ALL	INT	FIN
GDP_ reporter	1.799***	1.702***	1.886***
	(0.026)	(0.035)	(0.037)
GDP_partner	-0.363***	-0.398***	-0.307***
	(0.022)	(0.028)	(0.035)
Distance	-0.508***	-0.475***	-0.574***
	(0.014)	(0.019)	(0.021)
Common border	0.203***	0.191***	0.214***
	(0.020)	(0.027)	(0.030)
Tariff	-0.149***	-0.128***	-0.155***
	(0.010)	(0.014)	(0.014)
RTA*Tariff	0.117***	0.166***	0.085***
	(0.012)	(0.018)	(0.016)
RTA	1.337***	1.163***	1.375***
	(0.036)	(0.051)	(0.048)
RoO	-0.247***	-0.119***	-0.293***
	(0.027)	(0.036)	(0.039)
Year Fixed Effects	Yes	Yes	Yes
Exporter Fixed Effects	Yes	Yes	Yes
Importer Fixed Effects	Yes	Yes	Yes
Secto HS3 Fixed Effects	Yes	Yes	Yes
Observations	1,099,014	648,561	450,453
R-squared	0.19	0.17	0.24

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Source: Authors using LAIA.

Annex 10.

Estimation of impact of RoO on GVC integration

The sample includes only Latin American countries, for which we have information on rules of origins comprised in their trade agreements. Hence for the country-year dimension we need to use EORA data source for which we have at least 18 Latin American countries otherwise we will not have sufficient observations with TiVA. In a second exercise for which we will use gravity approach at pair-year level and then at pair-product-year level, we can use TiVA data over the six Latin American countries covered (Argentina, Brazil, Chile, Colombia, Costa Riva and Chile) since we will have sufficient observations in a gravity dimension

Annex Table 10.1 shows results for Latin American countries over 1996-2011 using a country-year dimension and the backward index from EORA as outcome variable, standards gravity variables are included in a country dimension and trade policy variables consist of the tariff, the share of imports covered by an RTA and the share of imports covered by at least on rules of origins. We only include fixed effect for years.

Annex Table 10.2 shows results for six Latin American countries over 1995-2011 using a pair-year-sector dimension. The outcome variable is, in a country (importer), the share of value added from the partner (exporter) in the total value added coming from abroad and data are from TiVA. Explanatory variables are same as for the previous gravity estimates and we also control with fixed effects on years, importer, exporter and sectors. For rules of origin, since there is now a sector dimension covering several HS6 products, we calculate the share of import by sector-pair covered by different sort of RoOs.

Annex Table A10.1. With EORA data

VARIABLES	(1) backward	(2) backward
Distance to closest hub	-0.047***	-0.003
	(0.006)	(0.009)
Population	-0.004	0.003
	(0.005)	(0.005)
GDP	-0.004	-0.011*
	(0.006)	(0.006)
Revealed FDI Openess	0.033***	0.021***
	(0.003)	(0.004)
Share of manufacturing	0.003***	-0.001
	(0.001)	(0.001)
Average tariff charged	-0.633***	-0.312**
	(0.123)	(0.135)
Share of imports covered by an RTA	0.102***	0.056***
	(0.017)	(0.020)
Share of imports covered by a RoO	-0.011*	
	(0.006)	
Share of imports covered by CTC rule		0.006
		(0.004)
Share of imports covered by CTCVCTR rule		-0.017***
		(0.006)
Share of imports covered by VCTR rule		-0.017**
		(0.007)
Share of imports covered by WO rule		-0.022**
		(0.009)
Year Fixed Effects	Yes	Yes
Observations	188	188
R-squared	0.71	0.78

Annex Table A10.2. With TIVA data

VARIABLES	(1) lnVAFD	(2) lnVAFD
Distance	-0.931***	-0.923***
	(0.084)	(0.084)
Common border	0.333**	0.257*
	(0.136)	(0.139)
Common Language	0.047	0.146
	(0.321)	(0.326)
Common Ethnicity	0.193	0.088
	(0.309)	(0.315)
Tariff	0.006	0.003
	(0.023)	(0.023)
Prefrence Margin	-0.062	-0.044
	(0.039)	(0.039)
RTA	0.277*	0.407***
	(0.147)	(0.088)
Share of imports covered by a RoO	-0.000	
	(0.030)	
Share of imports covered by CTC rule		0.018
		(0.025)
Share of imports covered by CTCVCTR rule		0.018
		(0.022)
Share of imports covered by VCTR rule		-0.057***
		(0.014)
Share of imports covered by WO rule		-0.140***
		(0.025)
Year Fixed Effects	Yes	Yes
Exporter Fixed Effects	Yes	Yes
Importer Fixed Effects	Yes	Yes
Sector Fixed Effects	Yes	Yes
Observations	33,783	33,783
R-squared	0.79	0.79

Annex 11.

Estimation of impact of RoO on Sourcing of intermediates

Following Conconi et al. (2016) we set up gravity estimation to investigate the impact of LAT PTA RoO on imports of intermediate goods from non-member countries. Our output is the change in imports of intermediate products *p* (we exclude imports of final goods) *VarImport* from third countries (origin *o*) between 1995 and 2014 for Latin American countries (destination *d)*. Third country will then differ for each Latin American country.

The index IndRoO captures the number of sourcing restrictions on final good *x* that apply to the intermediate good *p* (previously we had defined a variable equal to one if a RoO on a final good *x* impose sourcing restrictions on an intermediate good *p*).The estimation includes other explaining variables such as change in preferential tariff with RoO relative to change in MFN tariff for the intermediate good *p* (to isolate effects of preferential RoO from those of preferential tariff (*PRF*) liberalisation) and the preference margin (*Margin)* for the Latin American country on his partner *j* market on the final good since the larger the difference between the MFN and preferential tariffs on partner's market j for the final goods *x* the stronger the incentives to sources the restricted inputs within the members (i.e. *j*) and not from non-member origin *o*. And we include fixed effect for importers (LAT countries) exporter (third countries) and sector at HS 3 digit level.

(3) $$\ln VarImport_{odp} = \delta_o + \delta_d + \delta_p + \beta_1 \ln(VarMFN_{odp} - VarPRF_{odp}) + \beta_2 \ln(1 + Margin_{ojx}) + \beta_3 lnIndRoO_{odxp} + \mu_{odpt}$$

The magnitude effects are obtained by multiplying the coefficients (here -0.113 in column 1) by the average of lnIndRoO for intermediate goods under each category (for instance 2.07 for intermediates from any third countries) which gives 23.5 percentage point reduction.

Table A11. Results on change in LAT imports of intermediates from non-member countries

VARIABLES	1 Change in Intermediates Import	2 Change in Intermediates Import	3 Change in Intermediates Import	4 Change in Intermediates Import	5 Change in Intermediates Import	5 Change in Intermediates Import	5 Change in Intermediates Import
Country of origin	From Any third countries	From High Income	From Non-High Income	From LAT countries	From Non-LAT countries	From Efficient suppliers (RCA>1)	From Non-Efficient suppliers (RCA<1)
Index of RoO	-0.113***	-0.145***	-0.067	-0.159	-0.108**	-0.124**	-0.099
	(0.043)	(0.054)	(0.071)	(0.160)	(0.045)	(0.048)	(0.094)
Preference Margin	0.133	0.160	-0.032	0.204	0.128	0.285*	-0.442
	(0.136)	(0.176)	(0.219)	(0.499)	(0.142)	(0.157)	(0.275)
Change on Preferential Tariff	-0.072	0.003	-0.208**	0.231	-0.082	-0.085	-0.037
	(0.057)	(0.072)	(0.092)	(0.222)	(0.059)	(0.065)	(0.118)
Exporter Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Importer Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector HS3 Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	16,907	10,253	6,654	908	15,999	12,625	4,282
R-squared	0.13	0.12	0.18	0.21	0.14	0.13	0.21

Source: Authors using INTrade, the IDB Trade and Integration Information System.

Annex 12.

List of PTAs with facilitation mechanisms for RoO

Annex Table A12. Types of facilitation mechanisms in FTA

FTA	Year entry in force	Self Certifcation (=1)/ Public Certification =(0)	De Minimis (=1) / No de minimis (=0)	Cumulation (=1) / No cumulation (=0)
LAIA	1981			
Andean Community	1988	0	0	0
CACM	1960	1	1	0
MERCOSUR	1991	0	0	0
CAFTA-Dominican Republic	2006	1	1	1
CACM-Chile	2002	1	1	0
MERCOSUR-Bolivia	1997	0	0	1
MERCOSUR-Chile	1996	0	0	0
MERCOSUR-Colombia	2004	0	0	1
MERCOSUR-Ecuador	2004	0	0	1
MERCOSUR-Venezuela	2004	0	0	1
MERCOSUR-Peru	2006	0	0	1
G3		0	1	0
Northern Triangle- Mexico	2009	1	1	0
Chile-Ecuador	2010	0	0	0
Chile-Mexico	1999	1	1	0
Chile-Peru	2009	0	0	0
Chile-Colombia	2009	0	1	0
Mexico-Bolivia	2010	1	1	0
Mexico-Costa Rica	2006	1	1	0
Mexico-Nicaragua	1985	1	1	0
Mexico-Uruguay	2004	1	1	0
NAFTA	1994	1	1	0
EU-Chile	2003	0	1	0
EU-Mexico	2000	0	1	0
Canada-Chile	1997	1	1	0
Canada-Costa Rica	2002	1	1	0
China-Chile	2005	0	1	0
Thailand-Peru	2011	1	1	0
U.S.-Chile	2003	1	1	0
U.S.-Colombia	2012	1	1	1
U.S.-Panama	2012	1	1	1
U.S.-Peru	2009	1	1	1

Source: Authors using INTrade, the IDB Trade and Integration Information System.

Annex 13.

Estimation of Benefits of RoO Facilitation Mechanisms with a Gravity Model

We simply replicate the estimation of Annex 8 and we add either the average number of bilateral trade agreement between two countries with number of facilitation mechanisms (columns 1,3and 5,) or a dummy equal to one if there is at least one trade agreements between the two country with a facilitation mechanisms (remaining columns).

Annex Table A13. Results from Gravity model

	All Goods		Intermediate		Final Goods	
	1	2	3	4	5	6
VARIABLES	Import	Import	Import	Import	Import	Import
GDP_ reporter	0.202***	0.191***	0.149***	0.139***	0.297***	0.284***
	(0.006)	(0.006)	(0.009)	(0.009)	(0.009)	(0.009)
GDP_partner	0.392***	0.381***	0.376***	0.362***	0.433***	0.420***
	(0.007)	(0.007)	(0.010)	(0.010)	(0.010)	(0.010)
Bilateral distance (in logs)	-0.175***	-0.192***	-0.196***	-0.213***	-0.217***	-0.236***
	(0.008)	(0.008)	(0.011)	(0.011)	(0.012)	(0.011)
Common border	0.457***	0.444***	0.484***	0.471***	0.390***	0.375***
	(0.015)	(0.015)	(0.020)	(0.020)	(0.022)	(0.022)
lnTariff	-0.072***	-0.070***	-0.063***	-0.059***	-0.106***	-0.105***
	(0.004)	(0.004)	(0.005)	(0.005)	(0.006)	(0.006)
RTA*Tariff	0.170***	0.164***	0.162***	0.153***	0.177***	0.172***
	(0.006)	(0.005)	(0.007)	(0.007)	(0.009)	(0.009)
RTA	-0.152***	-0.142***	-0.061	-0.000	-0.227***	-0.252***
	(0.026)	(0.030)	(0.038)	(0.043)	(0.036)	(0.044)
RoO	-0.073***	-0.055**	-0.152***	-0.118***	-0.049	-0.034
	(0.023)	(0.023)	(0.036)	(0.037)	(0.030)	(0.030)
NumFacilitation	0.063***		0.080***		0.063***	
	(0.005)		(0.006)		(0.007)	
Facilitation		0.089***		0.053		0.129***
		(0.024)		(0.033)		(0.034)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Exporter Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Importer Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Sector HS3 Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,362,709	4,362,709	2,435,350	2,435,350	1,927,359	1,927,359
R-squared	0.26	0.26	0.27	0.27	0.26	0.26

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Source: Authors using BACI.

Annex 14.

Estimation of impact of RoO Facilitation mechanisms on GVC integration

We reproduce estimations from Annex 10 on EORA and TiVA data and share of products covered by facilitation mechanisms.

Annex Table A14.1. With EORA Data

VARIABLES	(1) backward
Distance to closest hub	-0.046***
	(0.007)
Population	-0.005
	(0.006)
GDP	-0.003
	(0.005)
Revealed FDI Openess	0.032***
	(0.003)
Share of manufacturing	0.003***
	(0.001)
Average tariff charged	-0.635***
	(0.126)
Share of imports covered by an RTA	0.083***
	(0.017)
Share of products covered by a product specific RoO	-0.082*
	(0.048)
Share of products covered by Faciltation regime	0.076*
	(0.045)
Year Fixed Effects	Yes
Observations	188
R-squared	0.71

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Clustered standards errors at country-year level.

Source: Authors using EORA.

Annex Table A14.2. With TIVA Data

VARIABLES	1 lnVAFD
Distance	-1.008***
	(0.081)
Common border	0.181
	(0.128)
Tariff	-0.019
	(0.021)
RTA	0.018
	(0.176)
Share of products covered by a product specific RoO	-0.007
	(0.032)
Share of products covered by Faciltation regime	0.042
	(0.035)
Year Fixed Effects	Yes
Exporter Fixed Effects	Yes
Importer Fixed Effects	Yes
Sector Fixed Effects	Yes
Observations	33,783
R-squared	0.79

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Clustered standards errors at pair sector level.

Source: Authors using TiVA.

Annex 15.

Definition, classification and data collection on Non-Tariff Measures

To better identify NTMs, and distinguish among the various forms of NTMs, a detailed classification is therefore of critical importance. The UNCTAD classification is the output of a six year process to create an official classification of NTMs, which began in 2006. The project was led by a seven person Group of Eminent Persons (GEP) on Non-Tariff Barriers, and was supported by a Multi-Agency Support Team (MAST), of which the OECD is a member.[1] The classification developed a tree/branch structure that included 16 classes of NTMs, of which the initial classification effort focused on ten classes of NTMs.[2] Multitude of NTMs are aggregated in various groups: hard measures (e.g. price and quantity control measures), threat measures (e.g. antidumping and safeguards), sanitary and phytosanitary standard (SPS), technical barriers to trade (TBT).

These policies are not necessarily restrictive because these types of instruments can also enhance consumer demand for goods by increasing quality attributes (technical requirements) or by reducing informational asymmetries (standards). However, many of these policies involve considerations of institutional capacity and likely have distortionary impacts on trade. Sometime they are imposed to address the possible capacity failures of trade partners; and often they require an extensive domestic institutional capacity to implement these policies. Although different types of requirements affect different inputs and stages of production, most of these policies also affect overall trade costs (e.g. certification, inspections, etc.). In addition, compliance costs often vary depending on infrastructure and institutional capacity of the exporting country, and thus ultimately these costs do affect trade flows.

Chapter A, on sanitary and phytosanitary measures, refers to measures affecting areas such as restriction for substances, restrictions for non-eligible countries' hygienic requirements, or other measures for preventing dissemination of diseases, and others. Chapter A also includes all conformity assessment measures related to food safety, such as certification, testing and inspection, and quarantine.

Chapter B, on technical measures, refers to measures as labelling, marking, packaging, restrictions to avoid contamination or other measures protecting the environment, standards on technical specifications, and quality requirements.

Chapter C, classifies the measures related to customs formalities.

Chapter D, price control measures, includes measures that have the intention to change the prices of imports, such as minimum prices, reference prices, antidumping or countervailing duties.

Chapter E, licensing, quotas and other quantity control measures, groups the measures that have the intention to limit the quantity traded, such as quotas. Chapter E also covers licenses and import prohibitions that are not SPS or TBT related.

In response to the increased interest of both researchers and policymakers, UNCTAD and the World Bank in collaboration with the International Trade Center and the African Development Bank, have initiated a new

1. Other member agencies include the FAO, IMF, ITC, UNCTAD, UNIDO, World Bank, and WTO. The EC, USITC, and USDA are observers.

2. For more information on the UNCTAD NTM classification and MAST process please see: http://unctad.org/en/Pages/DITC/Trade-Analysis/Non-Tariff-Measures/MAST-Group-on-NTMs.aspx and http://unctad.org/en/PublicationsLibrary/ditctab20122_en.pdf.

effort on NTMs data with the objectives of improving the coverage and classification of NTMs and to update, consolidate and freely disseminate NTM data on UNCTAD TRAINS database

The CEPII NTM-MAP (Non-Tariff Measures MAP) database contains indicators measuring the incidence of Non-Tariff Measures by using different methodologies and the UNCTAD TRAINS Database as source data. For the simple inventory approach the CEPII NTM-MAP provide three based indices: the frequency index, the coverage ratio and the prevalence score. The frequency index simply captures the percentage of products that are subject to one or more NTMs. The coverage ratio captures the percentage of imports that is subject to one or more NTMs.

The frequency index accounts only for the presence or absence of an NTM, and summarises the percentage of products *i* to which one or more NTMs are applied. In more formal terms, the frequency index of NTMs imposed by country *j* is calculated as:

$$F_j = \left[\frac{\sum D_i M_i}{\sum M_i} \right] \cdot 100$$

where *D* is a dummy variable reflecting the presence of one or more NTMs and *M* indicates whether there are imports of good *i* (also a dummy variable). Note that frequency indices do not reflect the relative value of the affected products and thus cannot give any indication of the importance of the NTMs on overall imports.

A measure of the importance of NTMs on overall imports is given by the coverage ratio which measures the percentage of trade subject to NTMs for the importing country *j*. In formal terms the coverage ratio is given by:

$$C_j = \left[\frac{\sum D_i V_i}{\sum V_i} \right] \cdot 100$$

where, the *D* is defined as before, and *V* is the value of imports in product *i*. One drawback of the coverage ratio, or any other weighed average, arises from the likely endogeneity of the weights (the fact that imports are dependent on NTMs). This problem is best corrected by using weights fixed at trade levels that would arise in a NTM (and tariff) free world. Otherwise, the coverage ratio would be systematically underestimated. While one cannot get to that benchmark, it is possible to soften the endogeneity problem (and testing for the robustness of the results) by using trade values of past periods.

Annex 16.

Estimation of costs of Non-Tariff Measures

The estimation strategy we propose can be thought of as a simple treatment-effect approach where the prices of some goods in some countries are "treated" by NTMs. Formally, let *o*,*d* and *k* index respectively the origin country, the destination country and a product identified at the six-digit level of the Harmonised system (HS6, at which there are over 5 000 products). Let δ_o and δ_d designate vectors of fixed effects identifying respectively each origin country and each destination country. Let v_{odk} be the unit value of product *p* imported from *o* to *d* (the empirical counterpart of P_{odk}^{CIF}) and $\mathbf{x}_{od}$ a vector of bilateral determinants of trade including distance, common language, common border, and so on. Let superscript "A" designate type-A measures (SPS) in the MAST classification, "B" type-B measures (TBT), and "other" all the rest (essentially quantitative restrictions).

To estimate, we turn to an estimation approach where AVEs are retrieved from product-by-product regressions (as in Kee et al., 2009) instead of a panel regression with product fixed effects. Each product-level regression has a gravity-like origin-destination structure.

Omitting product subscripts, the "representative-product" regression is

$$\ln v_{od} = \delta_o + \delta_d + \beta_1^A n_d^A + \beta_2^B n_d^B + \beta_3^{other} n_d^{other} + \beta_4 \ln\left(1 + t_{od}\right) + \mathbf{x}_{od}\boldsymbol{\gamma} + u_{od} \quad (4)$$

A variant of this equation makes it possible to differentiate the effect of NTMs depending on characteristics of the importing country by interacting NTMs with country importer dummies δ_d. The idea is to account for systematic variations between countries in the application of *all* NTMs on *all* products, depending on levels of income, governance, and, when using dummies, on any unobservable characteristics of a given country. For a "representative product", we have

$$\ln v_{od} = \delta_o + \delta_d + \sum_{k=A,B,\text{other}} \beta_1^k n_d^k + \sum_{k=A,B,\text{other}} \beta_2^k \left(n_d^k \times \delta_d\right) + \beta_3 \ln\left(1 + t_{od}\right) + \mathbf{x}_{od}\boldsymbol{\gamma} + u_{od} \quad (5)$$

In estimating (5), we introduce interacted destination dummies one by one and re-estimate each time, as introducing all interactions simultaneously would generate too much collinearity, making estimation infeasible.

Given that there are over 4 575 products at the HS6 level on which at least one country in our sample has an NTM (in all, there are over 5 000 products at HS6); three different types of NTMs (A, B and "other") and three coefficients by type of NTM (the importer-specific dummy interacted with the three type of NTMs), the estimation in (5) would involve estimating a maximum of 3× 3 × 4 575 = 41 625 coefficients. This is likely to be intractable if we try to estimate these coefficients in a single regression.

Note that the degree of pass-through of compliance costs is not mechanical and depends on market structure. In a standard monopolistic-competition model, "mill pricing", where producers charge the same free-on-board (fob) price to all destinations, is optimal. There is then full pass-through. However, new theoretical and empirical developments show that the degree of pass-through depends on market structure, firm size and other determinants.

Annex 17.

Estimation of impact of NTMs on GVC integration

The MAST data are available solely for one or two years (2008 and 2012 in the case of LAC) hence we cannot perform a similar exercise to Annex 9 over 1995-2011 with such data. This is why we will use here the Specific Trade Concerns database from WTO which collect all concerns raised by WTO members regarding SPS or TBT measures implemented by WTO partners over 1995-2012.

As for tariff we compile the number of concerns, on SPS and on TBT separately, that a country receive on its own measures ("charged") and the number of concerns that a country raised on SPS and TBT measures of its partners ('faced"). The total number of observations in our estimations is well below what was in previous table without NTM variables (from 834 to 214 observations) this is why we stick to EORA sources for the backward and forward index which cover more country than TIVA. We do not focus on variables other than NTM since they have been commented in previous part and are conformed to the expectations.

Annex Table A17. With EORA Data

VARIABLES	(1) backward	(2) backward	(3) forward	(4) forward
Average tariff charged	-0.550***	-0.453***	-0.367***	-0.495***
	(0.124)	(0.141)	(0.112)	(0.146)
Average tariff faced	-0.739***	-0.804***	-0.861***	-0.776***
	(0.149)	(0.154)	(0.269)	(0.282)
Share of imports covered by an RTA	0.048	0.028	0.246***	0.273***
	(0.051)	(0.054)	(0.078)	(0.075)
Share of exports covered by an RTA	0.019	0.034	-0.161**	-0.180***
	(0.042)	(0.043)	(0.069)	(0.067)
Revealed FDI Openness	0.024	0.014	0.119**	0.133***
	(0.028)	(0.027)	(0.049)	(0.050)
Manufacturing Value Added (% of GDP)	0.003***	0.004***	0.003**	0.002
	(0.001)	(0.001)	(0.001)	(0.001)
Distance to closest manufacturing hub	0.066*	0.069**	0.013	0.010
	(0.035)	(0.034)	(0.044)	(0.045)
Distance to economic activity	-0.026**	-0.026**	0.021	0.020
	(0.012)	(0.012)	(0.021)	(0.021)
Population	-0.018***	-0.013**	-0.000	-0.006
	(0.004)	(0.006)	(0.007)	(0.009)
GDP		-0.007		0.010
		(0.006)		(0.007)
SPS charged	-0.010***	-0.009***	0.005	0.005
	(0.003)	(0.003)	(0.004)	(0.004)
TBT charged	-0.001	-0.001	-0.001	-0.001
	(0.002)	(0.002)	(0.003)	(0.003)
SPS faced	0.004	0.005	-0.031***	-0.032***
	(0.003)	(0.003)	(0.005)	(0.005)
TBT faced	-0.001	-0.001	-0.001	-0.000
	(0.002)	(0.003)	(0.004)	(0.004)
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	214	214	214	214
R-squared	0.68	0.68	0.55	0.56

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Source: Authors using EORA data.

Annex 18.

NTM AVEs by ICIO sectors and countries

Annex Table A18. AVEs of NTMs by countries and sectors

	ARG	BOL	BRA	CHL	COL	CRI	ECU	GTM	MEX	PER	PRY	URY	VEN
Agriculture, hunting, forestry and fishing	18%	11%	21%	21%	19%	8%	14%	14%	17%	14%	10%	13%	8%
Mining and quarrying	*3%*	*1%*	*6%*	*1%*	10%	9%	*0%*	*0%*	*0%*	*1%*	*2%*	*1%*	*1%*
Food products, beverages and tobacco	15%	11%	16%	19%	13%	9%	9%	13%	16%	13%	18%	13%	9%
Textiles, textile products, leather and footwear	14%	*0%*	11%	10%	6%	*0%*	8%	*0%*	10%	*4%*	7%	7%	*3%*
Wood and products of wood and cork	12%	16%	15%	14%	14%	*0%*	*1%*	*3%*	11%	10%	*5%*	16%	*5%*
Pulp, paper, paper products, printing and publishing	*5%*	*0%*	*2%*	*1%*	*2%*	*0%*	*0%*	*0%*	*2%*	*0%*	*1%*	*0%*	*1%*
Coke, refined petroleum products and nuclear fuel	7%	*4%*	11%	6%	9%	*5%*	7%	7%	6%	*3%*	*5%*	7%	*4%*
Chemicals and chemical products	9%	*3%*	9%	8%	15%	*4%*	*4%*	*4%*	6%	*3%*	*2%*	6%	*2%*
Rubber and plastics products	6%	*1%*	*5%*	*1%*	10%	*0%*	*1%*	*1%*	*1%*	*1%*	*1%*	*1%*	*1%*
Other non-metallic mineral products	*5%*	*0%*	*2%*	*0%*	*4%*	*0%*	*1%*	*0%*	*3%*	*1%*	*1%*	*1%*	*0%*
Basic metals	*5%*	*0%*	*2%*	*0%*	*3%*	*0%*	*2%*	*0%*	*1%*	*0%*	*2%*	*1%*	*1%*
Fabricated metal products	*5%*	*0%*	*5%*	*2%*	*3%*	*0%*	*1%*	*0%*	7%	*0%*	*1%*	*1%*	*0%*
Machinery and equipment, nec	12%	*0%*	7%	*3%*	*3%*	*2%*	*2%*	*0%*	*4%*	*0%*	*1%*	*1%*	*0%*
Computer, Electronic and optical equipment	14%	*0%*	*4%*	6%	*4%*	*1%*	*2%*	*1%*	6%	*1%*	*3%*	*1%*	*1%*
Electrical machinery and apparatus, nec	10%	*0%*	*4%*	10%	*2%*	*0%*	*0%*	*0%*	*2%*	*0%*	*1%*	*0%*	*3%*
Motor vehicles, trailers and semi-trailers	12%	*3%*	14%	*5%*	10%	8%	13%	*0%*	*5%*	9%	*1%*	17%	9%
Other transport equipment	17%	*1%*	9%	*3%*	6%	*1%*	*3%*	*0%*	*4%*	*2%*	*0%*	*3%*	*1%*
Manufacturing nec; recycling	*4%*	*1%*	*3%*	*2%*	*3%*	*0%*	*0%*	*0%*	10%	*0%*	*1%*	*2%*	*0%*

Source: Authors' calculations using CEPII Trade Unit Value and UNCTAD TRAINS.

Annex 19.

Estimation of AVE gains from TBT provisions in Trade agreements

Our approach is simply to re-estimate equation (5) of Annex 16 with interaction terms between NTM dummies and dummies marking deep-integration clauses. We focus on SPS (type-A) and TBT (type-B) measures as deep-integration clauses concern essentially those. Let *h* stand for standards harmonisation, m for mutual recognition, and c for mutual recognition of conformity-assessment procedures. We define a set of dummy variables marking type of RTAs based on their deep-integration clauses $\ell = \{h, m, c\}$ as coded by Piermartini and Budetta (2009):

$$a_{od}^{\ell} = \begin{cases} 1 & \text{if } o \text{ and } d \text{ have an RTA with deep-integration clause } \ell \\ 0 & \text{otherwise} \end{cases}$$

and rewrite our product-level estimation equation as

$$\ln v_{od} = \delta_o + \delta_d + \sum\nolimits_{j=A,B,\text{other}} \alpha_1^j n_d^j + \sum\nolimits_{j=A,B,\text{other}} \beta_1^j \left(n_d^j \times a_{od} \right) + \beta_2 \ln\left(1 + t_{od}\right) + \mathbf{x}_{od}\boldsymbol{\gamma}_1 + \mathbf{z}_d\boldsymbol{\gamma}_2 + u_{od}$$

Annex 20.

Glossary

Annex Table A20. Glossary

		Definition
General	AVE	Ad-Valorem Equivalent
	BACI	Base Analytique du Commerce International
	FCIRI	Foreign Direct Investment Restrictiveness Index
	FDI	Foreign Direct Investment
	HS6	Harmonized System (6 digits)
	ICIO	Input-Ouput Inter-Country
	IPR	Intellectual Property Rights
	NTM	Non-Tariffs Measures
	PTA	Preferential Trade Agreement
	RVC	Region Value Chain
	STRI	Services Trade Restrictiveness Index
	TFI	Trade Facilitation Index
	TiVA	Trade in Value Added
Geography	ECA	Europe & Central Asia
	ESA	Eastern and Southern Africa
	LA, LAT	Latin America
	LAC	Latin America and the Caribbeans
	MEN / MENA	Middle East & North Africa
	NAM	North America
	PAC	Pacific
	SAS	South Asia
	SEA	South East Asia
	WCA	West and Central Africa
Trade Agreements	ASEAN	Association of SouthEast Asian Nations
	CACM	Central American Common Market
	CAFTA-DR	Dominican Republic - Central America FTA
	LAIA	Latin American Integration Association
	MERCOSUR	Mercado Comun del Sur
	NAFTA	North American Free Trade Agreement
Rules of Origins	CTC	Change in Tariff Classification
	CTC Exc	Exception attached to a particular Change in Tariff Classification
	VC	Value Content
	TR	Technical Requirement
	VCTR	Value Content or Technical Requirement
	WOB	Wholly Obtained
Non-Tariffs Measures	PSI	Preshipment Inspection
	QR	Quantitative Restriction
	SPS	Sanitary and Phytosanitary
	TBT	Technical Barriers to Trade