Master's Thesis of International Studies

# ECONOMIC IMPACT OF EXPORT SOPHISTICATION IN LATINAMERICAN COUNTRIES

## 중남미 국가들에서 수출 고도화의 경제적 효과

February 2020

Graduate School of International Studies

Seoul National University

International Commerce Major

Aylin Anahi Poma Veramendi

# ECONOMIC IMPACT OF EXPORT SOPHISTICATION IN LATINAMERICAN COUNTRIES

## 중남미 국가들에서 수출 고도화의 경제적 효과

Kim, Chong-Sup

Submitting a master's thesis of International Studies

February 2020

Graduate School of International Studies

Seoul National University

International Commerce Major

Aylin Anahi Poma Veramendi

Confirming the master's thesis written by
Aylin Anahi Poma Veramendi
February 2020

| | | |
|---|---|---|
| Chair | Rhee, Yeongseop | (Seal) |
| Vice Chair | Ahn, Jae Bin | (Seal) |
| Advisor | Kim, Chong-Sup | (Seal) |

# ABSTRACT

Considering the economic conditions of Latin America and the Caribbean region, a study in the region could give clues about the current situation and opportunities for export development, the current dependency on natural resource export basket point outs that there is low competitiveness in the current export basket, and an improvement in export performance could lead the region reduce the gap that has with other regions.

This study can help understand better whether increasing the export performance in LAC region can have a significant impact that can be reflected in its economic growth.

Current periods statistics in the region shows that the export development corresponds more to a previous decade rather than the last years. The descriptive analysis of EXPY and PRODY indexes shows that currently LAC is not exploiting its market opportunities, and these statistics together with empirical results show that the impact of export performance in economic growth is positive and changing the export basket to more sophisticated products would boost the economic growth in the region.

***Keywords:*** *LAC, export performance, region, EXPY, economic growth*

**Student Number:** 2018-22480

# TABLE OF CONTENTS

# INDEX

## FIGURES



## TABLES

# 1. INTRODUCTION

In the 1970s and the 1980s, economists observed that many developing countries' exports to developed countries were largely accounted for by primary commodities and resource- and labor intensive manufactures, while their exports to other developing countries contained higher share of technology and skill intensive manufactures (Amsden, 1986).

Exports thus have a developmental effect, especially in terms of industrialization and structural transformation. In *What you export matters* the authors developed PRODY and EXPY indicators. When local cost discovery generates knowledge spillovers, specialization patterns become partly indeterminate and the mix of goods that a country produces may have important implications for economic growth. The authors demonstrate this proposition formally and adduce some empirical support for it. (Hausmann et al., 2007)

The validity of this measure has been accepted by some authors and others have criticized the paper, however assuming the validity of these indicators, there is still room for more research to further analyze industry performance across regions.

The hypothesis of this work is that the validity of this indicators for developing countries as LAC can allow the region to make significant progress given the characteristics of the region. These indicators can help explain differences in the level of income of countries, and can help predict the future of economic growth, and guide industry to achieve economic development.

In previous studies, reviewing the validity of the measure, Huber's paper *Measurement matters* deals with this measurement and its limitations and how to reap the best possible benefit from its usage. Additionally, different arrangements in the original specification were made in *Export Sophistication and Economic Performance: evidence from Chinese provinces*, to include more observations. They estimate the upgrading of China's domestic exports sophistication and foreign sophistication relying on provincial trade data differentiating between domestic and non-domestic trading units.

The main finding of this article is that globally the expected gains from exporting more sophisticated goods are conditional. Additionally, they include more variables and use regional variations.

Hausmann also includes a different regression for income groups where the result indicate that developed economies do not have a significant impact of improving EXPY but middle- and low-income countries do get higher benefits from sophisticating export basket.

Using the same specification as Hausmann to compare and making a regional study this research will address the impact of export sophistication on LAC compared with other regions and if this progress is significant enough to speed up the economic growth in the region.

## 2. RELATED LITERATURE

Many previous studies suggest that diversification and sophistication (adding value to goods or services) are the path for economic development. In this study, economic performance is understood as a combination of both and shows how competitive is the export basket of a country considering the level of sophistication and diversification of its exports.

In the Road to Sustainable Development, they try to validate the links between economic diversification and sustainable growth. And the results indicate that high economic concentration exposes economies to exogenous events such as changes in oil prices and this exposure creates economic volatility. However, this volatility and its ensuing spillover effects can be mitigated with the effective development and diversification of high-value added exports (Abouchakra, 2008)

In Export sophistication, growth and the middle-income trap, they claim that structural transformation is at the heart of economic development. Successful developing countries progressively change their production structure, replacing low value-added activities and unsophisticated goods with higher value-added activities and more sophisticated products. Changing the economic structure of the economy requires the acquisition and refinement of productive knowledge.

Thus, these two factors are mutually exclusive both diversification and sophistication are important for economic development, but it is difficult to find an appropriate measure for a general economic performance index.

One of the first indicators developed to measure the competitiveness of export basket was previously calculated by RCA called the Balassa index,

introduced by Béla Balassa and Mark Noland (Balassa) is one of the first attempt that successfully show a measure to calculate the level of competitiveness of trade basket. As calculated by RCA we can see the reveal competitive advantage of different products or countries, it is a simple matrix that written in other ways can have important implication for economic development.

Another approach made by Michaely is the share of exports in industrial activities, this index calculated first for a three-digit level data shows a general perspective in the world of the share of goods compared with GDP. And together with other measures calculated for different countries show a general view of imports and export and the competitiveness of those countries. (Michaely, 1984)

Finally, a different approach made by Hausmann as already mention is a different arrangement of RCA that shows the level of competitiveness of different products with PRODY index, and EXPY index to measure the competitiveness of a country based on the PRODY. This theoretical development is developed in Hausman together with some of the possible economic implications.

In the reviews of this methodology, one of the main concerns lays on the calculation of PRODY and EXPY measures, calculating this measure has serious differences due to the aggregation of industry for PROXY values, and although similar results were obtained as Hausmann for 2003 not all the results are the same, this is due to the inclusion of some countries or the exclusion of others and the reporting method. (Huber, 2017)

The difference among using different levels of aggregation was tested for this study but is outside of the results as was already made in other papers, and the results indicate a big difference. A more specific disaggregated EXPY

index has more consistent results, which raises the question whether if using a six-digit level data would increase the impact of EXPY previously calculated by Hausmann in growth regressions or would make it at least more significant.

Another finding by Hausman is that among Latin-American countries only Mexico has level of EXPY that is comparable to those in East Asia. Which according to the paper might confirm the hypothesis that all natural-resource exporting countries have low EXPY due to the low technology level.

Using this indicator in growth regressions is significant however one of the main concerns using EXPY in a growth regression is the endogeneity with GDP, to avoid this problem first Hausman calculated the impact of this index using four-digit level data and using OLS estimation and 2SLS estimation including country size and population as instrumental variables, and Fixed effects for country characteristics. This specification uses GDP per capita growth, initial GDP per capita, initial EXPY measure and other proxy variables. Since EXPY is used only for the initial year this reduces the endogeneity, and this equation has significant results since shows how the initial level of sophistication in the industry affected countries in the upcoming years, however due to data limitation for this specification there is only 42 to 82 observations, a different arrangement to have more observations and considering that the industry sophistication can have impact in five to ten years includes panels of five and ten years from 1962 to 2000. This increases the number of observations to 300 to 600 observations, and shows a similar result showing the importance of export performance in the long run. Since these estimations were calculated up to 2000 and almost 20 years have passed since then, it is important first to update these estimations.

As an alternative to Hausmann a paper used for China's provinces uses OLS model with fixed effects, however this specification might have bigger problems because the impact is measured on GDP per capita directly and this might be correlated with EXPY. Also, the substitution of province level income in the index was not tested, which makes the results very inconsistent with previous literature.

*Export sophistication, growth and the middle-income trap* uses the same indicator to create a matrix of probabilities using Markov process, the transition probabilities approach suggest that most countries get stuck in the intermediate levels of export sophistication and only very few middle-income countries manage to climb to the top of the sophistication ladder. (Fortunato & Razo, 2014)

Hausmann found that EXPY is most strongly in low- and middle-income countries based on income levels subgroups, this suggest that for a region as LAC which is mainly composed by middle income countries EXPY indicator would have a higher impact in economic growth. However, the finding of Fortunato suggest that this assumption is incorrect since middle income countries struggle to climb sophistication levels.

## 3. MOTIVATION

Considering the economic conditions of LAC countries and the current dependency on natural resource export basket this research reviews different indicators and statistics to find the impact of sophistication in LAC.

According to the Economic Trade Outlook 2018 LAC is projecting a 9.7% rise in the value of regional merchandise exports in 2018, reflecting an increase of 7.6% in prices and 2.1% in volume. By volume, however, the region's exports are projected to grow by less than half the rate of increase in exports by developing economies overall, which is 4.6% by WTO projections.

Imports at the regional level also picked up in 2018 for the second year running, with a projected expansion of 9.5% in value terms. Unlike exports, imports have gained more by volume than by price. Thus, the export performance in general is not good now and is projected to worsen, it is important to propose alternatives that can help reduce the gap and reduce the external vulnerability, commodity-exporting countries need to change their production and export structures to improve their net export performance. Previous literature suggests that improving EXPY indicator can help the region reduce the gap between the region and the rest of the world.

Some researchers believe that diversification is the key to economic growth, diversification has an inverted U-shaped relationship with income, increases with income until income reaches a level comparable to the low-end of high-income countries, after which diversification declines (Cadot, Carrère, & Strauss-Kahn, 2011).

This is a constant preoccupation of policymakers in developing countries. Especially in LAC where one of the common believes is that due to the abundance in natural resources, and the tendency to produce a highly concentrated export basket, a specialization pattern would avoid economic volatility and increase growth. (Huber, 2017)

The main motivation of this study is to provide evidence to help understand better whether increasing the export performance in the region can have a significant improvement that can be reflected in the economic growth.

# 4. RESEARCH METHODOLOGY

This research sets one main goals - whether increasing the export performance in LAC region can have a significant impact that can be reflected in economic growth. To this purpose the study is divided in three parts:

LATINAMERICA'S EXPORT PERFORMANCE

In the first part of his study I will explore the current situation of LAC region, descriptive statistics of the region's export basket, and an analysis of the current situation gives a general view of the development across years compared to other regions.

This part will answer two main questions:

- *What is the current export performance of LAC countries compared to the rest of the world?*
- *Is there a gap between LAC and other regions export performance?*

Different figures and tables taking different indicators proposed by different authors based all on export statistics are analyzed to this end. Starting from Export volume and value indexes derived from UNCTAD's data base that give an idea of the performance of the region, trade structure by the economic commission also divides the products between natural based and technology manufactures, including trading partners to the region.

And finally export market penetration measures the extent to which a country is exploiting the market opportunities.

EXPORT SOPHISTICATION

In the second part, the focus is on descriptive statistics coming from the indicators developed by Hausmann (PRODY and EXPY), these indicators hide important information for countries and regions, I will analyze first the world export basket with PRODY index and later the situation of the all countries grouped by seven regions with EXPY index. This part answers to these questions:

- *How is composed world export basket and who's better off*?
- *What are the opportunities to improve export performance?*

EMPIRICAL STUDY

Finally, in the third part an empirical study, updating Hausmann estimation up to 2017 and finding the impact of EXPY in economic growth. And more importantly I will use different estimation methods to find the regional impact of EXPY in economic growth. This part will answer to:

- *Could improving the export performance in LAC have a significant impact on economic growth?*
- *Is the impact important enough to speed up the growth of the region respect to the others?*

# 5. LATINAMERICA'S EXPORT PERFORMANCE

In this section I will analyze the results from a range of international trade indicators as a first approximation in looking the evolution and changes in LAC region during 1994 to 2017, I will also divide this time lapse in two periods from 1994 to 2005 and 2006 to 2017 to show the last decade development.

First, I present export performance in terms of volume and value index comparing two regions LAC countries, and the rest of the world (WLD). Second a summary of the projections calculated by the Economic Trade Outlook 2018 in LAC regarding export structure and finally statistics of export market penetration using IEMP index that measures the extent to which a country is exploiting the market opportunities from their existing set of export products.

Each of these indicators has potential weaknesses, but together give a good perspective of the current state of LAC export performance.

## 5.1. EXPORT VALUE AND VOLUME INDEX

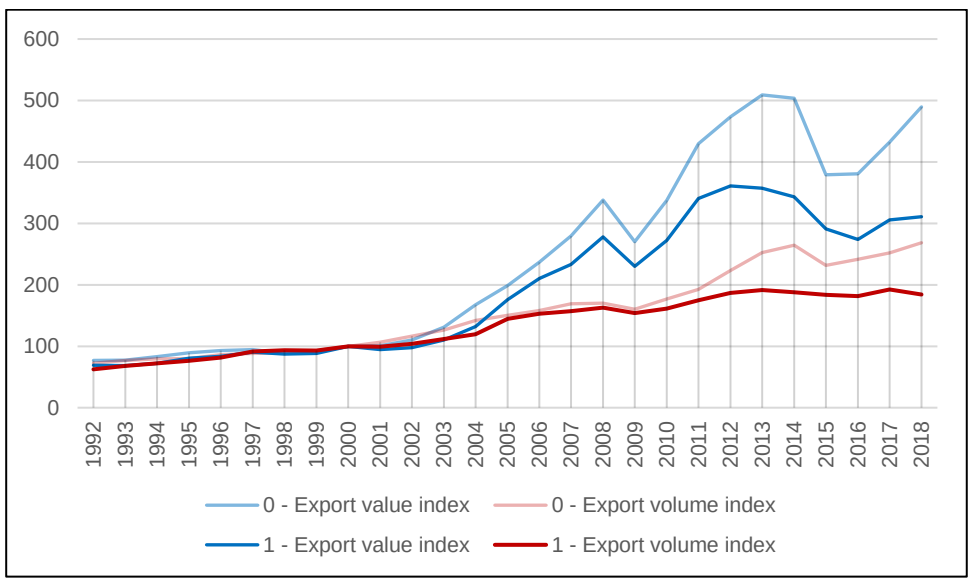
In the figure 1 two indicators of export volume and export value are shown, one is a proxy for LAC countries and cero is the rest of the world. As shown by the average of the index in LAC countries compared with the rest of the world, in both volume and value LAC is behind, being worse the case of value of exports.

As shown by the dark and light lines there is gap between LAC and the rest of the world. But the gap was not as big always as shown by the index this tendency starts to diverge in between 2000 to 2004 and is clearer in recent years. Of course, this tendency is diverging not only in the region but also in

the world but there is a clear gap that shows that export value index is worsening in the region compared to others, which means there is not enough value in the export basket.

Additionally, the decreasing reduction trend in value starts in 2002 and a simple country filter shows that this mainly due to China, after China became a member of the World Trade Organization (WTO), one of the main concerns for the region is that Latin American imports from China have risen with an imbalance in terms of value added and technology content, which is also reflected in this figures in value content.

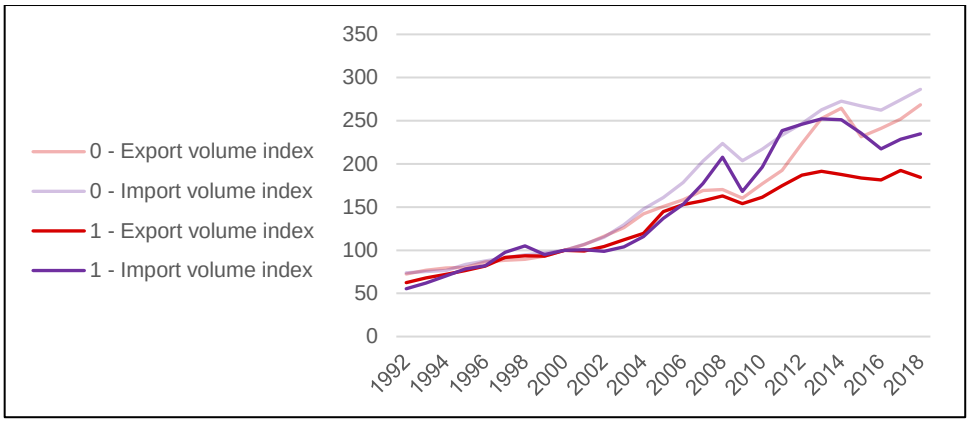
**Figure 1. Export value and volume index (2000 = 100)**




*Source: Elaborated based on WDI Databank*

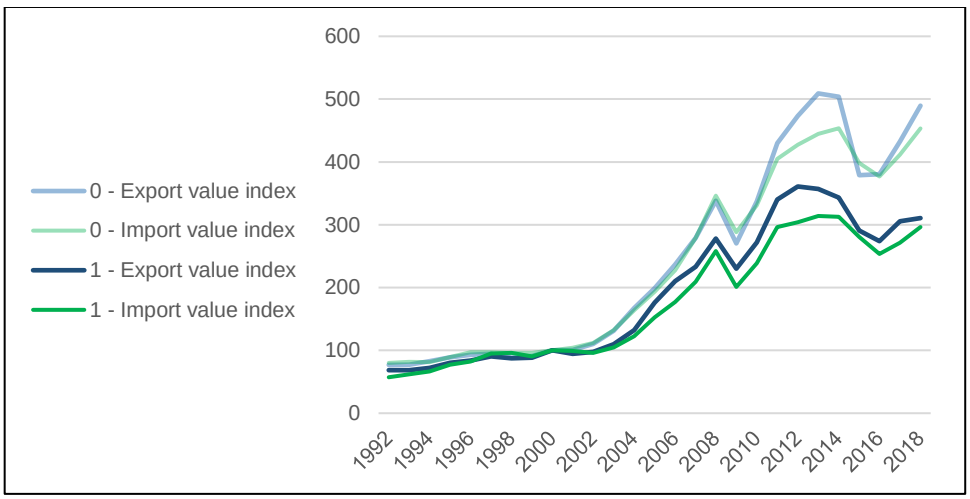
If we only compare export and import volumes (figure 2), the average of countries are in general lower than the rest of the world, this result might be biased because if we exclude LAC countries we exclude a big portion of developing economies however, considering import volume index this shows than in general there is higher gap in export than in imports where the average of the index is similar from the rest of the world.

**Figure 2. Export and Import volume index (2000 = 100)**




*Source: Elaborated based on WDI Databank*[1]

**Figure 3. Export and Import value index (2000 = 100)**




*Source: Elaborated based on WDI Databank*[2]

[1] Export volume indexes are derived from UNCTAD's volume index series and are the ratio of the export value indexes to the corresponding unit value indexes.
Import volume indexes are derived from UNCTAD's volume index series and are the ratio of the import value indexes to the corresponding unit value indexes.

[2] Export values are the current value of exports (f.o.b.) converted to U.S. dollars and expressed as a percentage of the average for the base period (2000).
Import value indexes are the current value of imports (c.i.f.) converted to U.S. dollars and expressed as a percentage of the average for the base period (2000).

The same comparison in terms of export and import value (figure 3) shows LAC trade goods with less monetary value compared to others, that together with volume index show that LAC trades as much as other regions in volume but less in value.

***Stylized facts***

- The general perspective shows that LAC is behind in export performance compared with the rest of the world.
- The gap between LAC countries export performance and the rest of the world is more related to export value than volume.
- Import volumes are too high considering the export performance of the region.

### 5.2.TRADE STRUCTURE

Dividing the trade structure by the share of trade in primary products and natural resource-based manufactures and high medium and low technology manufactures we can see in a simplified way the current trade structure of the region. LAC region's main trading partners are US, China and EU where the stronger export growth in 2018 reflected by the projected variation shows trade with China, which consist almost entirely of raw materials and natural-resource-based manufactures (see table 1).

This development further entrenches the primary export specialization of the region, especially of South America. By contrast, exports within the region and to the United States, have a higher manufacturing content, and they will grow at much lower rates. On the import side, those from China are also the fastest-growing. But Chinese imports consist almost entirely of manufactures that compete with regional products in several industries. China is now the second largest origin of imports into the region, after the United States (UN, 2018).

**Table 1. LAC trade structure, by main trading partner 2017**

| Partner | | Projected variation, 2018 % | Share in total goods trade, 2017 | Share of primary products and natural-resource-based manufactures, 2017 | Share of high-, medium- and low-technology manufactures, 2017 |
|---|---|---|---|---|---|
| Exports | China | 28 | 10.3 | 93.5 | 6.5 |
| | Latin America and the Caribbean | 12 | 16.9 | 45.8 | 54.2 |
| | United States | 7.1 | 44.2 | 27.3 | 72.7 |
| | European Union | 8.7 | 10.4 | 69.7 | 30.3 |
| Imports | China | 13 | 17.6 | 8.9 | 91.1 |
| | Latin America and the Caribbean | 8.5 | 15.5 | 46.7 | 53.3 |
| | United States | 8.7 | 32.6 | 41 | 59 |
| | European Union | 3.6 | 13.8 | 21.8 | 78.2 |

***Source**: Economic Commission for Latin America and the Caribbean (UN), COMTRADE.*

The higher export value is mainly a result of prices gains for commodities, added to stronger demand in the United States in the case of Mexico and Central America.

The heavy weight of raw materials in the region's export basket leaves the region vulnerable to fluctuations in the prices of these products and, thus, to external restraints, especially at times like the present, when international financing is expensive.

***Stylized fact***

The export performance of the region in 2018 shows clear continuity with its historical patterns. The region's export specialization, based on static comparative advantages (abundance of raw materials and low wages), has led to poor export growth.

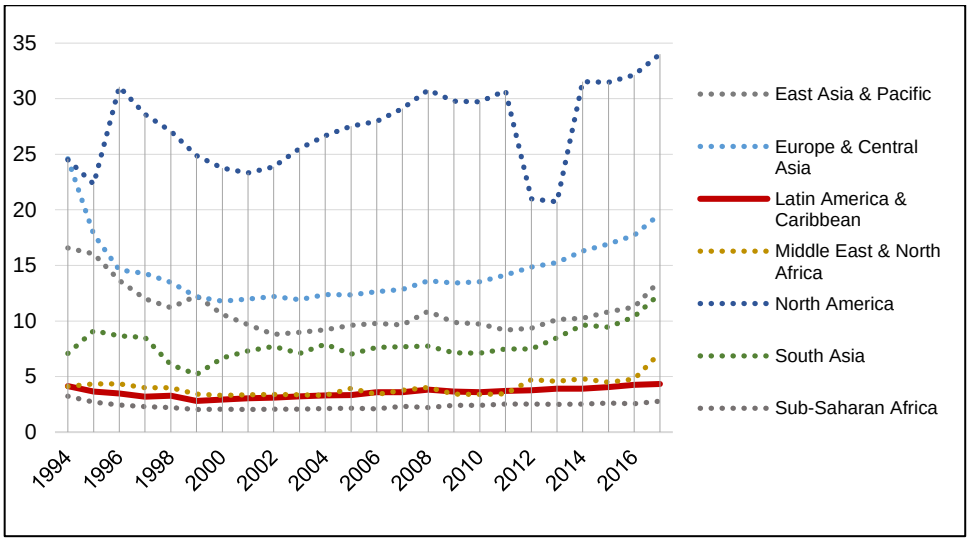
### 5.3. EXPORT MARKET PENETRATION

Typically, a given developing countries will reach only a small fraction of importing countries the index of export market penetration (IEMP) measures

the extent to which a country is exploiting the market opportunities from the existing set of export products.

Is calculated with the export and products of each product in a country's export basket and includes the number of importers of that product. Thus. for the given range of products that a country exports, IEMP will be higher for countries that reach a large proportion of the number of international markets that import that product (Brenton & Newfarmer, 2007).

**Figure 4. Export Market penetration by regions 1992 to 2017**




*Source: Elaborated based on World Bank database*

The figure shows that the countries with higher market penetration levels are North America, Europe & Central Asia and East Asia & Pacific, where LAC is behind the middle east and only above Sub-Saharan Africa.

***Stylized fact***

LAC is not exploiting the market opportunities; the region is not reaching to most of the international markets that import their export basket.

# 6. EXPORT SOPHISTICATION

The previous indicators give a basic idea of the current situation of LAC export compared with other regions, however to answers the research questions regarding the implication and the impacts of the export performance in economic growth. This research uses the measure of export sophistication created by Hausmann, Hwang and Rodrik (Brenton & Newfarmer).

This metric has the advantage that includes the other characteristics showed individually above from countries' export basket and let us see in a global indicator the level of sophistication in exports. Also, this includes the level of sophistication of each product in a very highly disaggregate level (HS 6-digits), which allows a fine-tuned evaluation.

Therefore, this quantitative index ranks traded goods in terms of their implied productivity. This measure is constructed by taking a weighted average of the per-capita GDPs of the countries exporting a product, where the weights reflect the revealed comparative advantage of each country in that product. So, for each good, they generate an associated income/productivity level (PRODY). After an income/productivity level that corresponds to a country's export basket (EXPY) is made by calculating the export-weighted average of the PRODY for that country (Hausmann, 2007).

PRODY index is a weighted average of the per capita GDPs of countries exporting a given product, represents the income level associated with that product. Thus, PRODY is the sum of share for product k in country j (calculated as exports of product k in country j over total exports of country j) multiplied by income of country j, divided by the sum of share for all countries.

$$PRODY_k = \sum_j \frac{(x_{kj}/X_j)*Y_j}{\sum_j (x_{kj}/X_j)}$$

The productivity level associated with country j's export basket EXPYj, is in turn defined by the share of k products in country j multiplied by PRODY for those products.

$$EXPY_j = \sum_k \frac{x_{kj}}{Xj} * PRODY_k$$

Using the EXPY measures calculated for 6 digit-level products, we can compare the export performance with EXPY measure on LAC region, analyzing also the export basket of Latin-American countries.

### 6.1. DESCRIPTIVE STATISTICS

#### A) PRODY

PRODY values are calculated for every year and using the math logic we can assume that these values should not change that much over time, we do not expect that for example watches - a highly sophisticated product - will be less sophisticated across years however there is some variations, because this is calculated based on the export volumes of every country and in some years. Constructing PRODY for different countries during different years could introduce a serious bias into EXPY index, so a balanced sample is used for countries with complete data across years.

For EXPY index just the average value of PRODY is used, however the value of PRODY across years hides some information about the development of the industry sectors. Thus, to see the development of industry in general this research shows some statistics for PRODY index at HS 2-digit level across years. The results are can better expressed in Figure 5, where the PRODY value for the latest years is shown in blue shades from 2004 to 2018 and the

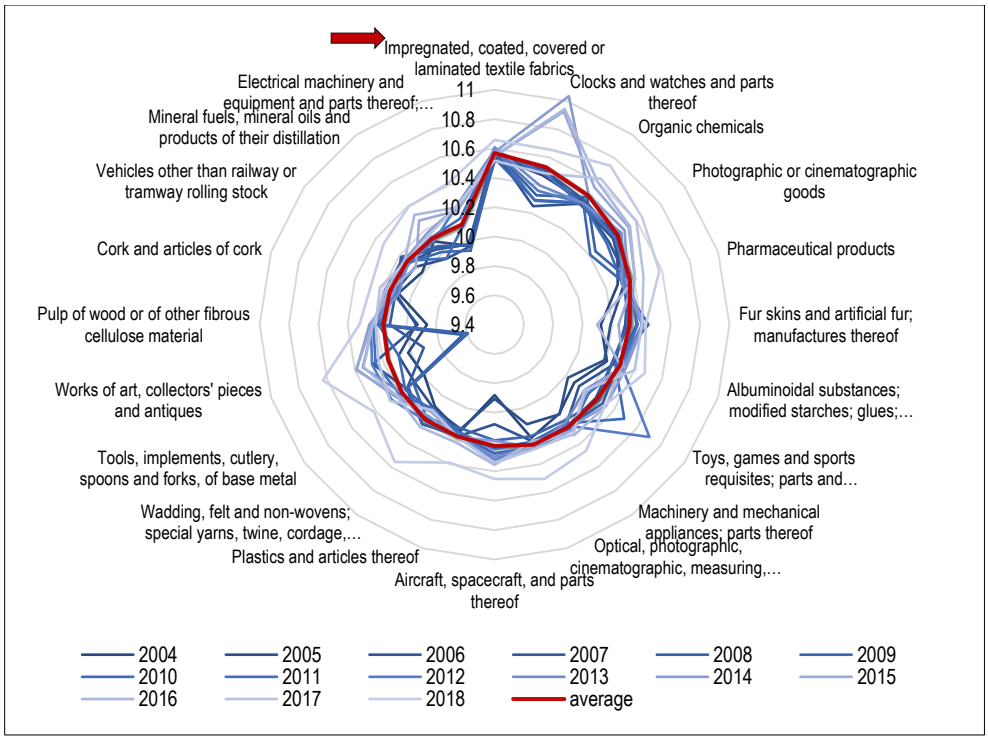
red and thick line is the average value, just the highest 20 industry sectors according to the classification are in the graph.

The results indicate that; HS59 that includes Impregnated, coated, covered or laminated textile fabrics is the most sophisticated; HS29 Organic chemicals, and HS91 Clocks and watches and parts follow. These graphs show not that these industries are the highest sophisticated industries based on the inherent technological level but shows that these industries are more sophisticated given the fact that not many countries produce these products and given the economic level needed to produce them. Which might have important implications to direct industry, since represents a potential for developing economies. Once got higher economic levels developing countries could direct industry to these industry sectors.

One limitation is the that this data excludes service and financial sector which are highly sophisticated sectors, however these can be interpreted as the sophistication of the manufacturing sectors.

When it comes to developing policies to increase export volumes and increase value added, PRODY index can give a good perspective on the world export basket and which industries (including the products in the classification) are more competitive.

**Figure 5. PRODY highest industry sophistication sectors, 2004 to 2018**

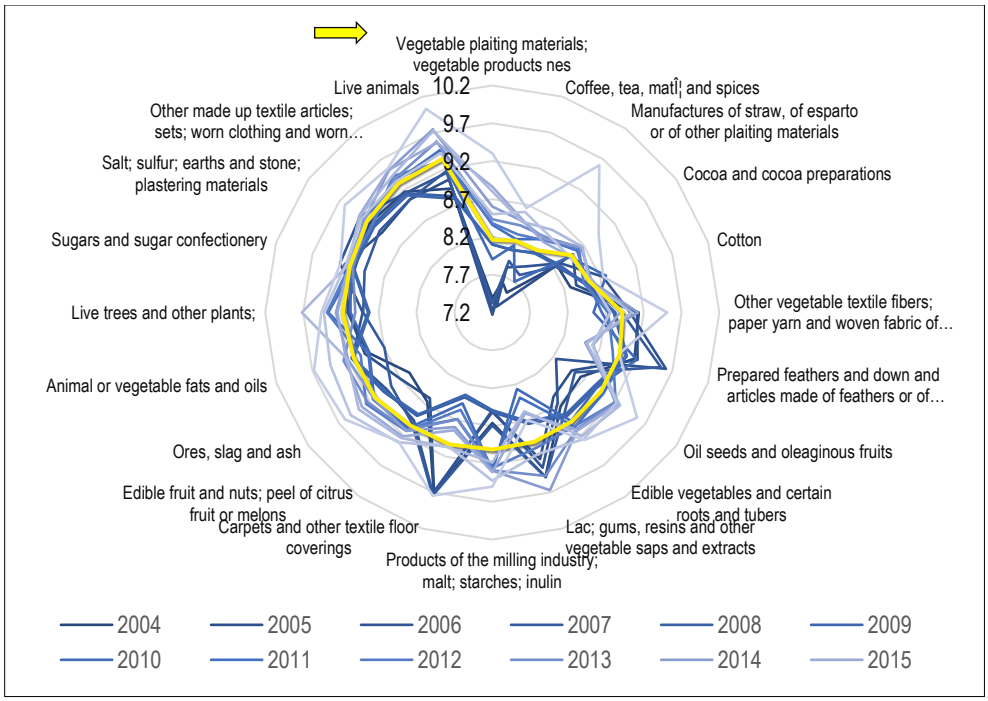



*Source: Calculated based on data from UN Comtrade*

At the same time the graph shows big discrepancies across some years which shows how the variation in PRODY could affect EXPY index, however tested for 6-digit level the discrepancies are less, the variation increases in HS2 digit level due to differences in reporting.

Analogously figure 6 shows that the lowest PRODY values are for HS14 Vegetable, plaiting materials, vegetable products nes; and the second and third lowest are HS09 Coffee, tea, mate and spices; and HS46 Manufactures of straw, of esparto or of other plaiting materials. Which confirms that agriculture, and related industries are the less sophisticated and show one of the main reasons why many countries that export these products have a low competitive basket and fail to reach their potential economic growth.

**Figure 6. PRODY lowest industry sophistication sectors, 2004 to 2018**




*Source: Calculated based on data from UN Comtrade*

A simple comparison of any country basket in these graphs can give an idea about the competitiveness of the export basket, and show that strategically these sectors would not increase economic growth.

### B) EXPY

Using the average of PRODY products for 6-digit level products EXPY index is calculated with income levels of every country, the results in figure 7 show how sophisticated is the export basket in LAC compared to the export basket of the rest of the world.

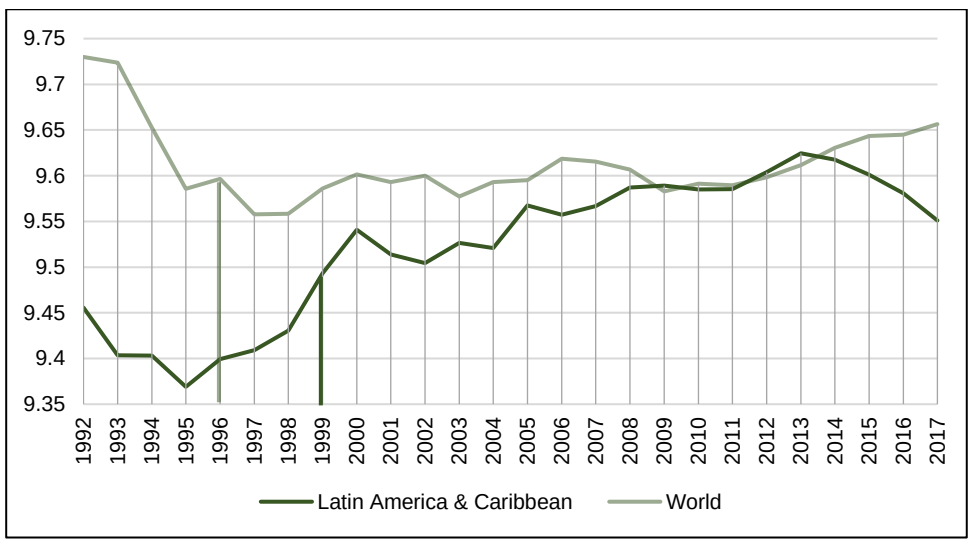
LAC compared with other regions has lower EXPY values, this can be caused by changes in income or the inclusion of big competitors, but in general shows a lower level of sophistication in the export basket. During 2008 to 2012 the

export basket was like the rest of the world however there is a decreasing tendency afterwards.

Testing for structural brakes in EXPY indicator across years, indicates that for LAC and WLD two states are identified, first for LAC the structural brake is more likely to be in 1999, however after this year the index remains in the same state and there is low probability to change the state again. Thus, the probability that the index remains in state two (state after 1999) is 90%. Whereas for other regions (WLD) excluding LAC the change of state happened before in 1996.

A simple implication of this result is that a structural change in the development of export basket happened before in other regions and LAC was left behind reaching the change of state after three years, which might prove that LAC was behind compared to the world in export sophistication since 90's.

**Figure 7. EXPY by region from 1992 to 2017, 6-digit level**

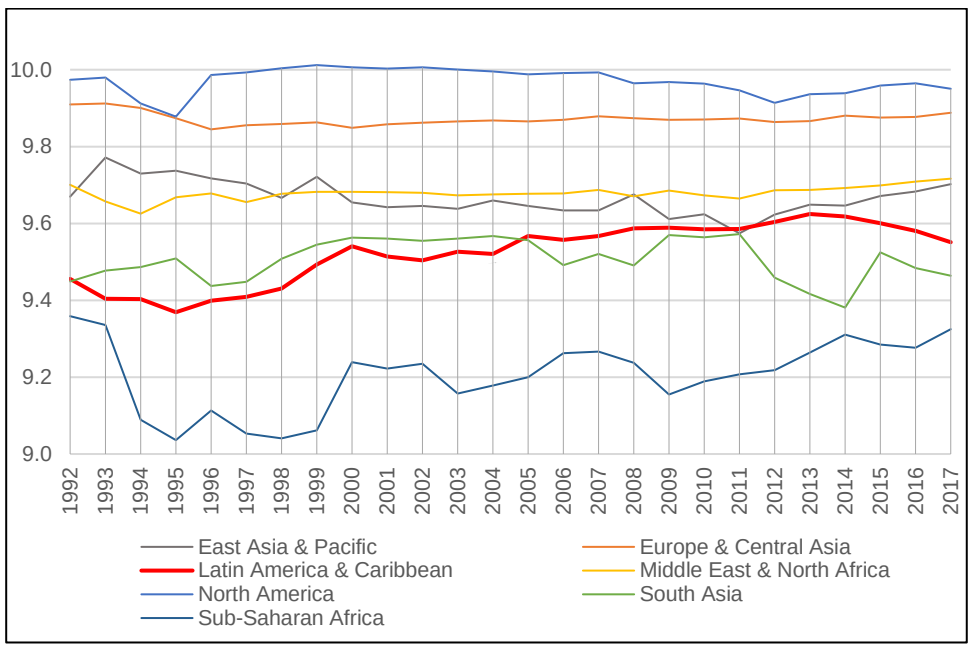



*Source: Elaborated with data from WITS*

In figure 7 EXPY values are in natural logarithm and are a mean for around thirty LAC countries and a mean for the rest of the countries that include all other regions including North America, Asia, Europe and Africa.

Figure 8 is a comparison between LAC and other regions, the EXPY values are from 1992 to 2017 and show how LAC is only above Sub-Saharan Africa and South Asia. Specific country comparison might show different results, but the general view shows that there is a significative difference among the region and others.

**Figure 8. EXPY development by region from 1992 to 2017**




*Source: Elaborated with data from WITS*

Table 2 has the general statistics of EXPY value by region, according to these statistics the general mean for EXPY (in natural logarithm) is 9.6 and as figure 5, North America, Europe and East Asia are the regions with higher EXPY values.

**Table 2. EXPY statistics by region from 1992-2017**

| Region | Mean | Std. Dev | Min | Max |
|---|---|---|---|---|
| East Asia & Pacific | 9.66 | 0.35 | 8.20 | 10.14 |
| Europe & Central Asia | 9.87 | 0.18 | 9.34 | 10.41 |
| Latin America & Caribbean | 9.53 | 0.23 | 8.71 | 10.14 |
| Middle East & North Africa | 9.68 | 0.12 | 9.38 | 10.02 |
| North America | 9.97 | 0.06 | 9.66 | 10.03 |
| South Asia | 9.51 | 0.19 | 8.89 | 9.93 |
| Sub-Saharan Africa | 9.20 | 0.44 | 7.39 | 10.20 |

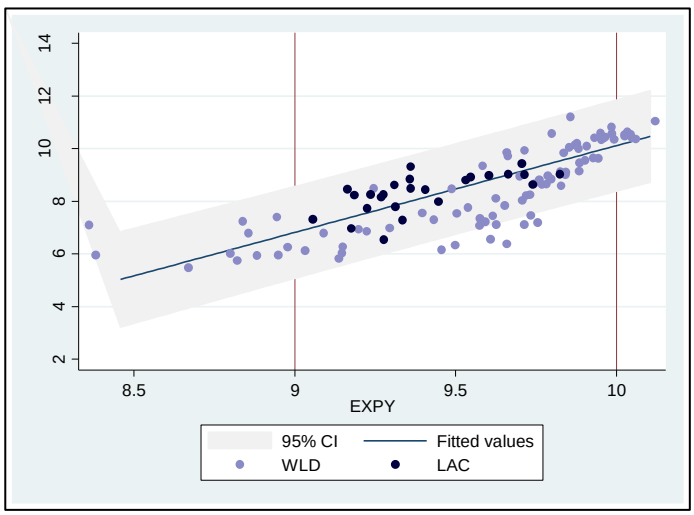
*Source: Calculated with data from WITS*

Additionally, statistics for every year are in Table A1 in the appendix, and Table 3 includes data for the five countries with highest EXPY values over the mean 9.6 and it is a summary that includes 1992, 2004 and 2017. This table only includes countries with an EXPY values higher than 9.6 and among them the top five countries with the highest EXPY, here we can see that the countries that always remain with higher values of EXPY are Japan, Switzerland, Germany and for LAC countries most of them do not have stable position, only Mexico keeps a high value in EXPY that remains high across years.

Other way to see this is with the frequency's graphs figure 11 is a set of histograms by region of EXPY index and includes all years and countries. The graphs show that LAC EXPY values are mostly around 9.5 like South Asian countries, however north America, Europe and Middle East and East Asia have frequently higher values of EXPY which makes these regions' export basket more competitive. These values are in accordance to current reports for trade in Value Added (TiVA) where the statistics are similar regions as Europe, North America and East Asia are leading value added in trade.

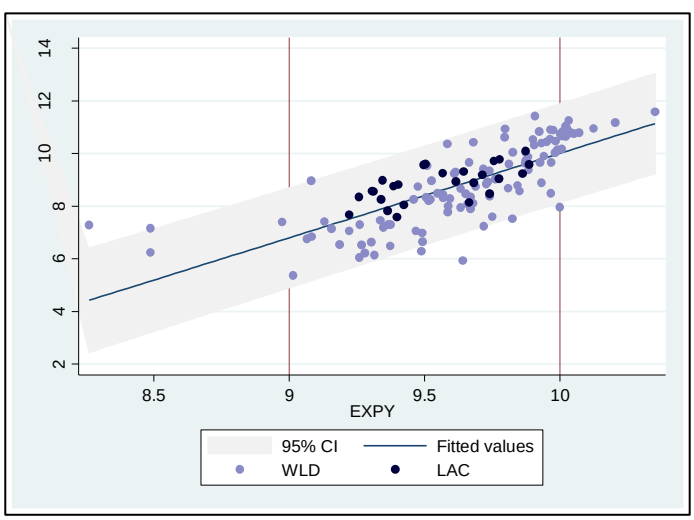
A similar scatter graph comparing EXPY index to GDP per capita in natural logarithm shows the place of the region during 1994 in figure 9, and in 2017 in figure 10. The points of reference marked in a EXPY values 10 and 9 show that other regions have successfully moved in export performance indicating that a development that can impact economic growth is possible.

**Figure 9. EXPY Vs. GDP scatter, 1994**




*Source: Calculated with data from WITS*

**Figure 10. EXPY Vs. GDP scatter, 2017**



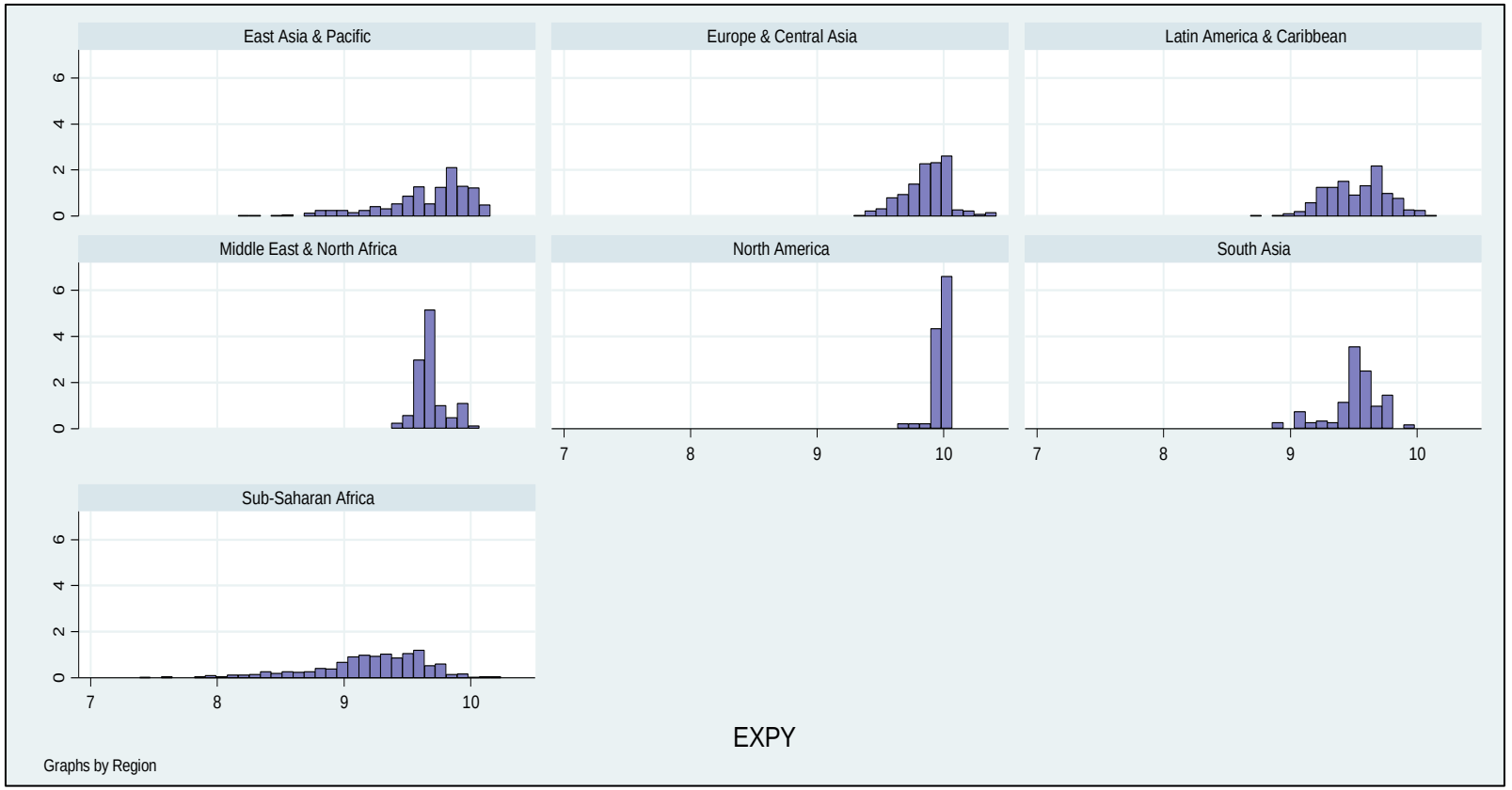

*Source: Calculated with data from WITS*

**Table 3. EXPY for top countries by region 1992, 2004, 2017**

| REGION | 1992 | | 2004 | | 2017 | |
|---|---|---|---|---|---|---|
| | Country | EXPY | Country | EXPY | Country | EXPY |
| East Asia & Pacific | Japan | 10.00 | Japan | 10.06 | Singapore | 10.12 |
| | Singapore | 9.90 | Singapore | 10.05 | Japan | 10.07 |
| | Korea, Rep. | 9.88 | Micronesia, Fed. Sts. | 10.03 | Korea, Rep. | 10.01 |
| | New Zealand | 9.85 | Korea, Rep. | 9.97 | Philippines | 10.00 |
| | Australia | 9.79 | Hong Kong SAR, China | 9.95 | Hong Kong SAR, China | 9.96 |
| Europe & Central Asia | Switzerland | 10.10 | Luxembourg | 10.34 | Luxembourg | 10.35 |
| | Finland | 10.06 | Switzerland | 10.15 | Ireland | 10.20 |
| | Sweden | 10.04 | Ireland | 10.14 | Germany | 10.05 |
| | Ireland | 10.02 | Finland | 10.05 | Austria | 10.04 |
| | Germany | 10.02 | Germany | 10.05 | Finland | 10.04 |
| **Latin America & Caribbean** | **Mexico** | **9.81** | **Bahamas** | **9.96** | **Antigua and Barbuda** | **9.89** |
| | **Brazil** | **9.70** | **Mexico** | **9.87** | **Aruba** | **9.87** |
| | **Jamaica** | **9.68** | **St. Kitts and Nevis** | **9.73** | **Mexico** | **9.86** |
| | | | **Costa Rica** | **9.72** | **St. Kitts and Nevis** | **9.78** |
| | | | **Jamaica** | **9.72** | **St. Lucia** | **9.78** |
| Middle East & North Africa | United Arab Emirates | 9.95 | Malta | 9.91 | Israel | 9.95 |
| | Saudi Arabia | 9.66 | Israel | 9.87 | United Arab Emirates | 9.80 |
| | Oman | 9.66 | Bahrain | 9.76 | Tunisia | 9.74 |
| | Tunisia | 9.64 | Tunisia | 9.69 | Iran, Islamic Rep. | 9.73 |
| | | | Kuwait | 9.68 | Lebanon | 9.69 |
| North America | United States | 9.99 | United States | 10.01 | United States | 9.98 |
| | Canada | 9.96 | Canada | 9.98 | Canada | 9.92 |
| South Asia | India | 9.61 | India | 9.71 | India | 9.75 |
| Sub-Saharan Africa | South Africa | 9.76 | Eswatini | 9.95 | Eswatini | 9.97 |
| | | | Lesotho | 9.79 | South Africa | 9.73 |
| | | | South Africa | 9.77 | Lesotho | 9.72 |
| | | | Mauritania | 9.71 | Congo, Rep. | 9.67 |
| | | | Mozambique | 9.68 | Central African Republic | 9.64 |

*Source: Calculated with data from WITS*

**Figure 11. Histograms by region**




*Source: Calculated with data from WITS*

LAC has remained in the same position in figure 9 and 10 which shows the low development in export performance. These graphs include fitted values and error intervals that are part of the results that will be better explained after in the empirical methodology.

The histogram in figure 11 shows how the frequency of expy values across regions, and proves that few countries achieve expy values higher than 10, and expy values are similar across LAC countries where most of countries have values between 9 and 10 but much less countries have higher values than 10 compared to east Asia  or Europe, this is also supported by each countries statistics in table 3 and figure A1 in the annex for every country in LAC.

***Time comparison***

Considering the breaking point found in the index a comparison between two periods can be made to see answer the questions regarding if the development of export basket corresponds to the latest years or the 90's were LAC was already behind other regions.

Figure 12 shows the development of EXPY indicator between 1994 to 2017 to compare the situation of LAC and the world. Here LAC follows a similar tendency compared to the world in export sophistication. Most of the countries have move to the right indicating a development of export basket and few countries have move backward.

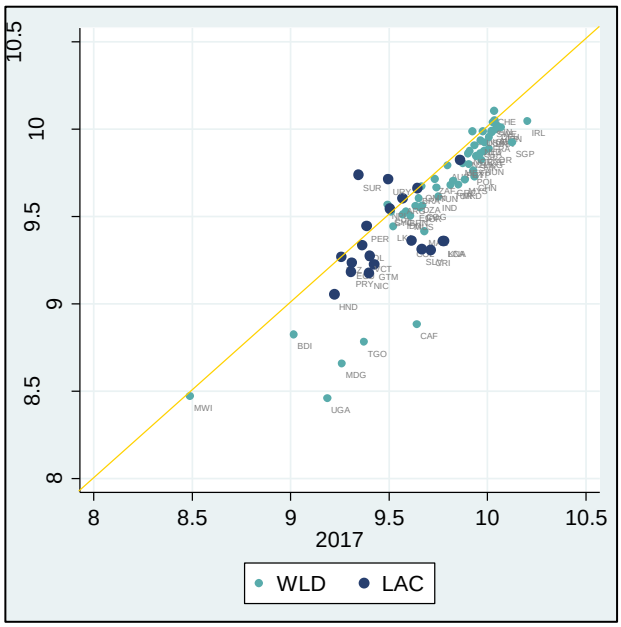
LAC has made a significant development in these 23 years regarding export performance, most countries moved to the right and only few countries remain in the same state or move backwards.

Figure 13 shows the development by periods from 1994 to 2005 and 2006 to 2017, considering the literature review countries should upscale technology and move to the right indicating a development in the export basket, as

expected in general there is a movement of most of the countries to the right indicating a development of the export basket in the last years and we can see also that more countries have gone backwards in the last decade than in the previous one.

LAC export performance has improved more in the previous decade than in the last one. Only Guatemala, St. Lucia and Nicaragua have made a positive development in both periods (table A1, Annex). Countries as Uruguay and Suriname have worsened the sophistication level in both periods and the difference is clear in figure 13.[3]

**Figure 12. EXPY 1994 Vs 2017, LAC/WLD**




*Source: calculated with data from WITS*

[3] The graphs only include countries with export data for the years in the figures, thus Venezuela and other countries without information are excluded.

**Figure 13. EXPY WLD, 1994 Vs 2005**

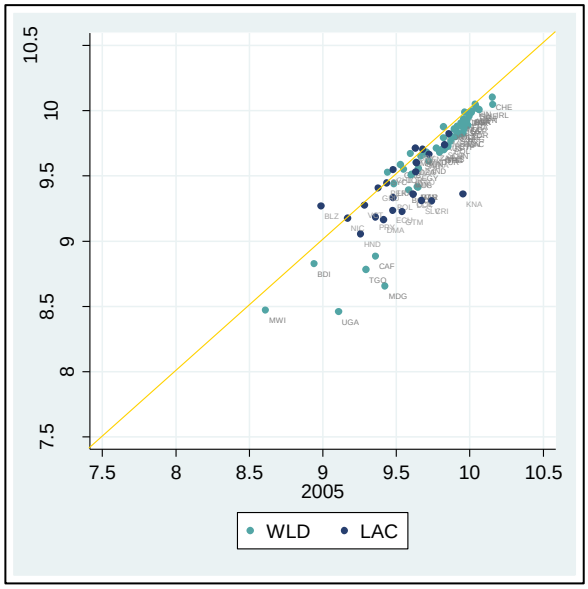
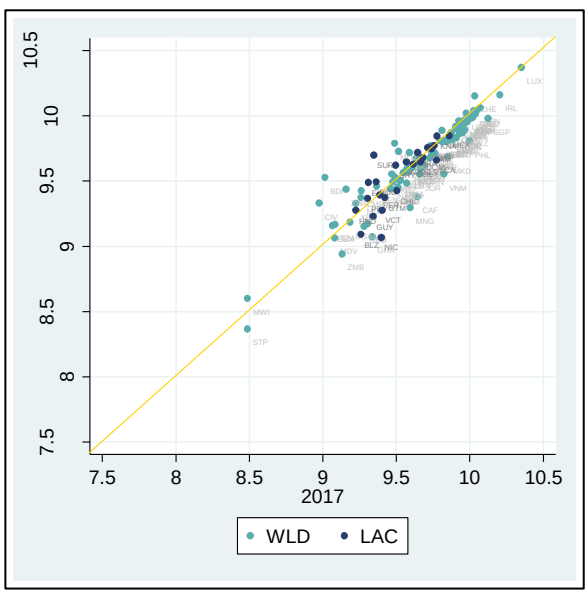



**Figure 14. EXPY WLD, 2006 Vs 2017**




*Source: calculated with data from WITS*

For 23 years LAC countries have move to the right as much as the rest of the world meaning that have increased their level of sophistication more from their initial point in 1994.

Different from the rest of the world LAC countries development in EXPY corresponds more to the previous decade than the last eleven years.

# 7. EMPIRICAL STUDY

In this section, I will present the baselines for the regressions and discuss the conditions and limitations of the information used. In section I the specification used by Hausmann and in section II a different specification with time variations.

## 7.1.DATA

Data for GDP per capita data comes from World Bank database and EXPY data was obtained from WITS and COMTRADE for HS 6-digit level products from 1992 to 2017 for 177 countries. However, some regressions contain different time periods and due to balancing some countries are also excluded in some regressions, thus the number of countries and periods used can be better illustrated in Table A1 of the appendix.

The values used for land, population or other proxies come from World Bank database for each country, as well as regional and income level classifications.

All the variables come from World Bank database, WITS and UNCTAD STAT

- Land: is a country's total area, excluding area under inland water bodies, national claims to continental shelf, and exclusive economic zones. In most cases the definition of inland water bodies includes major rivers and lakes.
- Population: total population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship. The values are midyear estimates.

## 7.2.SECTION I

### A) BASELINE SPECIFICATION

I will start doing a general analysis with Hausman specification to show the relation of EXPY and economic growth. This is analysis is made in both cross-national and grouping settings. First for the cross-national analysis economic growth is measured by the average of GDP per capita growth and it is the dependent variable. The regressors are initial GDP per capita and initial EXPY value for each country. The time horizon is 23 years from 1994 to 2017, data from 1992 and 1993 had to be excluded because there is not complete data for enough countries.

This equation can be better expressed as:

$$\overline{GDPg/cap_{\iota}} = a_1 GDP/cap_{i,1994} + a_2 EXPY_{i,1994} + \varepsilon \ (1)$$

Specification (1) was calculated with two estimation techniques, OLS robust and 2SLS. For 2SLS two IV variables are included, land and population these two variables are exogenous variables and can be used as instrumental variables to calculate EXPY, in a similar baseline instead of using the arithmetic average of GDP per capita growth as dependent variable, the growth between the initial and final period was calculated and used for each country as dependent variable. Also, the final EXPY was used as dependent variable to see the impact of the same regressors in the final level of sophistication of these countries.

$$EXPY_{2017} = a_1 GDPg/cap_{i,1994} + a_2 EXPY_{i,1994} + \varepsilon(2)$$

These specifications do not have many observations due to data limitation and considering also that since there is not time variation depend only of country level data.

For the second case were time variation is included creating cross periods panels, following previous literature an average annual data over five-year periods are created, this reduces annual fluctuations and measurement errors. Thus, for this data we can observe the time variation impact.

These specifications are made for two cases, first a panel data dividing the time horizon in five panels of five years each, to make the results comparable with the conceptual framework developed by previous studies. This includes all countries to have more observations and was done also with the interaction between LAC dummy and EXPY value. Additionally, Fixed effects for country variations were included to avoid omitted variables.

### B) RESULTS

In Table 3 we can see using the first specification of Hausmann that we have very similar results, GDP of year 1994 is significative but compared with the previous results of Hausmann has a lower value, this might be the result of increasing time horizon and using 6 digit level EXPY measure, also it makes sense that initial GDP per capita 1994 has a lower impact on GDP growth of more recent years.

Thus, according to this regression 1 unit on EXPY 1994 would increase 3% GDP per capita every year. In the second regression using the specification for instrumented variables (population and land) EXPY has a higher value. 1unit increase on EXPY 1994 would increase 4.5% GDP per capita every year.

In the third regression instead of using the arithmetic mean of GDP growth the dependent variables are the calculated GDP per capita growth between 1994 and 2017, as shown in the regression the value shows that EXPY is still significative positive, but it has a lower value if we use the total growth

between the period. Thus, 1 unit increase in initial EXPY has a 0.1% impact on GDP per capita growth between 1994 to 2017.

In both the first and second regressions compared with previous findings adding more years to the specification reduces the EXPY value in almost half.[4] Showing that the impact of EXPY in GDP per capita growth is lower in recent years.

**Table 4. Growth regressions first specification**

| Estimation | OLSr | IV | OLSr | OLSr |
|---|---|---|---|---|
| Dependent var. | GDPm94-17 | GDPm94-17 | GDPd94-17 | EXPY94-17 |
| GDP94 | -0.00835** | -0.0110** | -0.000314*** | 0.0155 |
| | (-2.95) | (-3.01) | (-3.80) | (0.78) |
| EXPY | 0.0331** | 0.0456** | 0.000998** | 0.654*** |
| | (3.05) | (2.78) | (2.99) | (5.79) |
| Constant | -0.225** | -0.321* | -0.00628* | 3.293** |
| | (-2.73) | (-2.53) | (-2.41) | (3.41) |
| Observations | 73 | 73 | 73 | 73 |
| Adjusted R-squared | 0.212 | 0.18 | 0.306 | 0.757 |

t statistics in parentheses

* p<0.05, ** p<0.01, *** p<0.001

Finally, in the last specification the resulting EXPY from 2017 was used as dependent variable and the initial EXPY and GDP per capita in 1994 as independent variables, here the results show that only EXPY of 1994 is significant, actually both variable have the risk to be correlated but the results show that there is not much correlation between GDP and EXPY which might support the results in the first regressions.

[4] In *What you export matters* the regression was made from 1994 to 2003 and the values for EXPY in equivalent regressions to 1 and 3, are 0.060 and 0.072 respectively.

## PANEL REGRESSIONS

One benefit of the panel regression is the inclusion of more observations that makes possible to add LAC as dummy variable one important finding of this regressions is that even though the EXPY has a significative and positive value as expected, this is not significative different for LAC according to this specification.

Most economies in LAC are middle-income economies so this result is comparable to the panels income sub-group analyzed by Hausmann, increasing the time horizon compared with the previous results by Hausmann show a very similar result for 5 years panel regressions, and the same positive impact of EXPY in growth for 10 years panels.

Table 5 shows robust results for EXPY most estimations find an increase of 3% on GDP per capita growth with one unit increase of initial EXPY. Including an interaction term to see the impact in of the indicator in LAC the difference is almost zero and shows that although EXPY has appositive impact in GDP growth the indicator does not have a higher impact for LAC compared with the rest of the world. This does not rule out the fact that the indicator has a positive impact on growth, just shows that the difference that would make in LAC as a region is not different from any other region.

In table 5 the first regression is OLS robust with clusters for time with one interaction, second one is 2SLS with interaction, third one is OLS robust with clusters, fourth one is GMM estimation, fifth one is 2SLS using size and population as instruments and finally sixth regression is OLS with fixed effects for countries.

**Table 5. Five panels growth regression, 1992 -2017**

| 5 panels of 5 years each | Latin-America | | World | | | |
|---|---|---|---|---|---|---|
| | OLSr | IV | OLSr | GMM | IV | FE |
| GDPi | -0.00818*** | -0.00783*** | -0.00814*** | -0.00814*** | -0.0107*** | -0.0387*** |
| | (-16.19) | (-7.14) | (-16.72) | (-7.55) | (-4.48) | (-8.39) |
| EXPYp | 0.0284* | 0.0264*** | 0.0269* | 0.0269*** | 0.0406*** | 0.0354*** |
| | (4.43) | (5.86) | (4.18) | (6.82) | (3.35) | (4.59) |
| LAT=1 | 0.194* | -0.00381 | | | | |
| | (4.14) | (-1.42) | | | | |
| LAT=1 # EXPYp | -0.0206* | -0.0184 | | | | |
| | (-4.23) | (-1.63) | | | | |
| Constant | -0.178* | 0.0912*** | -0.165 | -0.165*** | -0.274** | 0.017 |
| | (-2.87) | (9.63) | (-2.65) | (-5.32) | (-2.83) | (0.23) |
| Observations | 638 | 635 | 638 | 638 | 635 | 626 |
| Adj. R-squared | 0.09 | 0.076 | 0.086 | | 0.068 | 0.34 |

t statistics in parentheses

* p<0.05, ** p<0.01, *** p<0.001

### C) LIMITATIONS

- The number of observations is limited with this specification, and it is very difficult to see the impact of the indicator across regions.
- EXPY index is used for only one base period so it assumes that there is not change across time in this variable.

## 7.3. SECTION II

### A) BASELINE SPECIFICATION

Considering different specifications proposed in other researches an alternative specification can be used to have a better understanding of country and regional differences. As mentioned before since EXPY measure can be constructed for every year, including a yearly time variation is possible to create a country-year cross panel data.

Different from the previous part were EXPY is calculated as an average with this specification a problem of endogeneity might arise, EXPY might be correlated to GDP, thus to avoid this problem, constructing lagged variables allow us to use past, present and future values for strictly exogenous variables. In this way one lagged can be included in the specification to correct for any endogeneity issues. (Arellano & Bond, 1991)

As a result, in the next specification GDP per capita growth is still the dependent variable, and EXPY the regressor but EXPY is calculated for each year and lagged one year. Initial GDP is also included. Since this specification uses cross sectional time series a different methodology should be used. For this purpose, two estimation techniques were used Pooled OLS and Fixed effects for time and country variations, and for region and time variations.

$$GDPg/cap_{i,t} = a_1 GDP_t + a_2 EXPY_{i,t-1} + FE_i + FE_t + \varepsilon \quad (3)$$

**B) RESULTS**

The results are similar to section I, show a positive value of EXPY in GDP per capita, controlling for the initial value of GDP. Initial GDP per capita has a negative sign which means that countries with larger initial GDP tend to have lower growth, which can be explain by the idea of convergence in economics where developing countries have the potential to grow at a faster rate than developed countries because diminishing returns are not as strong as in capital-rich countries.

EXPY value is significative and positive in most equations, table 5 is a summary of different estimation methods. First regression is OLS robust, second pooled OLS for years cluster, third is OLS with fixed effects for country and years, fourth regression is pooled OLS for region cluster and finally, fifth regression is OLS with fixed effects for region and years.

The overall coefficient of EXPY is lower from the previous specification and indicates that once controlling for initial GDP, a unit increase in EXPY (in natural logarithm) will increase 1.2% GDP per capita growth every year.

Additionally, the coefficients obtained from regression four and five were included besides the overall estimation result, this includes the results of the regional dummies.

In regression fourth and five the results with two estimation methods are similar, the regression coefficient for region 3, LAC provides a measure of the difference between the group identified by the dummy variable (in this case Latin America & Caribbean) and the group that serves as a reference (East Asia & Pacific). Here, the regression coefficient for LAC is approximately -0.01 significant. This suggests that, after effects of initial GDP are considered, LAC will have a lower growth in GDP per capita by every unit increase of EXPY compared to East Asia & Pacific (the reference group).

This is similar for region four and seven, Middle East and Africa, whereas for other regions there is no significative difference between with the reference group (East Asia & Pacific), which might sound discouraging but does not mean that the index will not have any impact in LAC or Africa, overall the indicator has a positive impact in GDP per capita growth, just will take more development in the export basket of these regions to achieve the same economic growth than other already developed regions.

**Table 6. Cross panel data regressions, 1992 -2017**

| Dependent variable: GDPpcgrowth | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Estimation type | OLSr | OLSpC | FEY&C | OLSpRE | FEY&RE |
| GDPinitial | -0.00591*** | -0.00298 | 0.0185*** | -0.00698*** | -0.00682*** |
| | (-8.41) | (-0.36) | (3.77) | (-6.99) | (-9.25) |
| EXPYlagged | 0.0206*** | 0.00619 | 0.0103* | 0.0124*** | 0.0128*** |
| | (6.99) | (0.79) | (2.07) | (4.66) | (4.63) |
| Constant | -0.123*** | -0.0312 | -0.235*** | -0.0282 | -0.0329 |
| | (-5.07) | (-0.35) | (-3.67) | (-1.14) | (-1.39) |
| *1=East Asia & Pacific* | | | | 0 | 0 |
| | | | | (.) | (.) |
| *2=Europe & Central Asia* | | | | 0.00207 | 0.00164 |
| | | | | (0.48) | (0.76) |
| *3=Latin America & Caribbean* | | | | -0.00964** | -0.00996*** |
| | | | | (-3.12) | (-4.43) |
| *4=Middle East & North Africa* | | | | -0.0158*** | -0.0155*** |
| | | | | (-4.37) | (-5.79) |
| *5=South Asia* | | | | 0.00165 | 0.00243 |
| | | | | (0.37) | (0.64) |
| *6=North America* | | | | -0.00568 | -0.00598 |
| | | | | (-1.65) | (-1.09) |
| *7=Sub-Saharan Africa* | | | | -0.0173*** | -0.0170*** |
| | | | | (-5.50) | (-6.67) |
| Observations | 3270 | 3270 | 3269 | 3270 | 3270 |
| *Adjusted R-squared* | 0.022 | 0.157 | 0.259 | 0.049 | 0.046 |
| Fixed effect year | no | no | yes | no | yes |
| Fixed effect country | no | yes | yes | no | no |
| Fixed effect region | no | no | no | yes | yes |

t statistics in parentheses
* p<0.05, ** p<0.01, *** p<0.001

## C) LIMITATIONS

- It is no possible to see the regional impact without a reference region
- Only initial GDP is used as control variable, the impact of other control variables overcasts the results and shows less robust impact.

# 8. OPPORTUNITIES AND IMPLICATIONS

One of the main problems identify from LAC export basket is the low performance in terms of volume and value, however there is a rising tendency and as a region LAC has the potential to increase trade with other regions, as identified by market penetration index LAC is not reaching to all markets.

Successful countries should progressively change their production structure, replacing low value-added goods with more sophisticated activities and diversifying export basket. However, it is a common mistake of developing countries, as countries in LAC to focus in natural resource-based products because most of the countries are abundant in these.

Considering the Prody index we can identify the more competitive products according to export statistics, and it will be important to take this in consideration to developed future strategies to direct industry and export basket, considering the most competitive products and the reality and conditions of each country.

There are large differences in economic and geographic circumstances across Latin American countries however low export performance is a shared challenge across the region.

Agricultural and resource base products are not competitive as shown by the index and do not support economic development as much as other products, as shown with the empirical evidence. It is important to developed to sector to provide food safety within each country however this sector is the motor for development, as shown by the indicator there is more competitive sectors which are not only competitive for technology development but also

important determinant of this index as how many countries export the product can make the product more competitive compare to others.

In this way, the results suggest that industries as optical, photography, games would be more benefit for investment in economic development rather than agricultural sector.

It is important for LAC countries to support the development of these sectors instead of sectors with abundance of raw materials, historically historical this low sophisticated basket pattern in LAC has led to poor export growth, and consequently it is another wasted opportunity for the economic development of the region.

Increasing the value added of export products considering the competitiveness of the world export basket, effectively directing industry and export basket has appositive impact on economic growth that according to empirical results can increase between 2 to 3% GDP per capita growth.

Using EXPY index gives an idea of the export performance level of each country, and this indicator might help develop strategies based on a constant evaluation of export performance. As shown in this study it is possible to identify possible break points in the development pattern, a case study by country considering trading partners and each country's condition can also give clues about effective trade negotiations.

# 9. CONCLUDING REMARKS

LATINAMERICA'S EXPORT PERFORMANCE

LAC is behind in export performance compared with the rest of the world. The gap between LAC countries export performance and the rest of the world is due to low export value and more volume. Import volumes are too high considering the export performance of the region.

The region's trade structure, based abundance of raw materials and low wages, has led to poor export growth. Additionally, LAC is not exploiting the market opportunities.

EXPORT SOPHISTICATION

Even when many authors claim that PRODY and EXPY indicators have statistical problems the results are mostly consistent and are a good start to develop more effective strategies to boost export performance.

The descriptive statistics of these indicators can show that industries as coated laminate fabric, organic chemicals, pharmaceutical products, or games parts are as competitive as machinery production and these are sectors that require less investment in technology and especially pharmaceutical products is a great opportunity for developing countries where more research, industry support and investment could have a much bigger impact in economic growth rather than other sectors. Additionally, it is important to upscale industries that are not very competitive as cotton or agricultural products to industries with more value added as chemicals production, organic production, etc.

The competitive level of other regions and trading partners can also play an important role, according to the descriptive statistics LAC is only above sub-Saharan Africa and South Asia, thus a careful analysis of this index could support better strategies to negotiate trade agreements.

Comparing two-time periods in the regions the current export development corresponds more to a previous decade between 1994 to 2005 rather than the eleven last years.

EMPIRICAL STUDY

The empirical study shows robust results indicating a positive impact of increasing sophistication to help economic growth, and this is consistent across specifications.

Different from Hausmann conclusion that middle income and low-income countries benefit more of export sophistication than high income countries, the results show the opposite, LAC region benefits as much as other regions from export sophistication, but since other regions as East Asia or Europe have already a well-developed export infrastructure they would benefit more.

However, this should not discourage developing countries of upscaling export sophistication but the contrary proven that export sophistication has economic growth significance developing countries should aim to support policies that help improve export sophistication.

## 10. REFERENCES


Adkins, L. C. (2011). *Using Stata for principles of econometrics*: Wiley Global Education.

Amsden, A. H. (1986). The direction of trade—past and present—and the 'learning effects' of exports to different directions. *Journal of Development Economics, 23*(2), 249-274.

Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *The review of economic studies, 58*(2), 277-297.

Balassa, B. (1965). Trade liberalisation and "revealed" comparative advantage 1. *The manchester school, 33*(2), 99-123.

Brenton, P., & Newfarmer, R. (2007). *Watching more than the discovery channel: export cycles and diversification in development*: The World Bank.

Cadot, O., Carrère, C., & Strauss-Kahn, V. (2011). Export diversification: what's behind the hump? *Review of Economics and Statistics, 93*(2), 590-605.

Fortunato, P., & Razo, C. (2014). Export sophistication, growth and the middle-income trap. *Transforming Economies–Making Industrial Policy Work for Growth, Jobs & Development, ILO*, 267-287.

Hausmann, R., Hwang, J., & Rodrik, D. (2007). What you export matters. *Journal of economic growth, 12*(1), 1-25.

Huber, S. (2017). Indicators of product sophistication and factor intensities: Measurement matters. *Journal of Economic and Social Measurement, 42*(1), 27-65.

Macario, C., Bonelli, R., Ten Kate, A., & Niels, G. (2000). *Export growth in Latin America: policies and performance*: Lynne Rienner Publishers.

Michaely, M. (1984). *Trade, income levels, and dependence* (Vol. 8):

Amsterdam ; New York : North-Holland ; New York : Sole distributors for the U.S.A. and Canada, Elsevier Science Pub. Co.

UN, E. (2018). International trade outlook for Latin America and the Caribbean 2017: recovery in an uncertain context. *International trade outlook for Latin America and the Caribbean 2017: recovery in an uncertain context.*

# 11. APPENDIX

## Table A1. EXPY statistics by year

| Year | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| 1992 | 51 | 9.66 | 0.29 | 8.80 | 10.10 |
| 1993 | 66 | 9.63 | 0.29 | 8.92 | 10.09 |
| 1994 | 87 | 9.58 | 0.36 | 8.46 | 10.11 |
| 1995 | 103 | 9.53 | 0.41 | 8.24 | 10.11 |
| 1996 | 115 | 9.55 | 0.38 | 8.36 | 10.12 |
| 1997 | 123 | 9.52 | 0.41 | 8.12 | 10.13 |
| 1998 | 124 | 9.53 | 0.42 | 8.13 | 10.13 |
| 1999 | 130 | 9.56 | 0.41 | 7.99 | 10.26 |
| 2000 | 145 | 9.59 | 0.37 | 7.96 | 10.31 |
| 2001 | 147 | 9.58 | 0.39 | 7.85 | 10.28 |
| 2002 | 150 | 9.58 | 0.41 | 7.89 | 10.28 |
| 2003 | 153 | 9.57 | 0.41 | 7.92 | 10.30 |
| 2004 | 152 | 9.58 | 0.40 | 7.62 | 10.34 |
| 2005 | 154 | 9.59 | 0.40 | 7.56 | 10.35 |
| 2006 | 149 | 9.61 | 0.36 | 7.98 | 10.37 |
| 2007 | 156 | 9.61 | 0.36 | 7.82 | 10.39 |
| 2008 | 152 | 9.60 | 0.37 | 8.15 | 10.41 |
| 2009 | 156 | 9.58 | 0.41 | 7.39 | 10.40 |
| 2010 | 160 | 9.59 | 0.38 | 8.02 | 10.40 |
| 2011 | 159 | 9.59 | 0.38 | 7.97 | 10.38 |
| 2012 | 158 | 9.60 | 0.37 | 8.01 | 10.36 |
| 2013 | 158 | 9.61 | 0.35 | 8.23 | 10.36 |
| 2014 | 154 | 9.63 | 0.34 | 8.18 | 10.35 |
| 2015 | 150 | 9.64 | 0.34 | 8.20 | 10.34 |
| 2016 | 148 | 9.63 | 0.33 | 8.47 | 10.32 |
| 2017 | 135 | 9.64 | 0.34 | 8.26 | 10.35 |

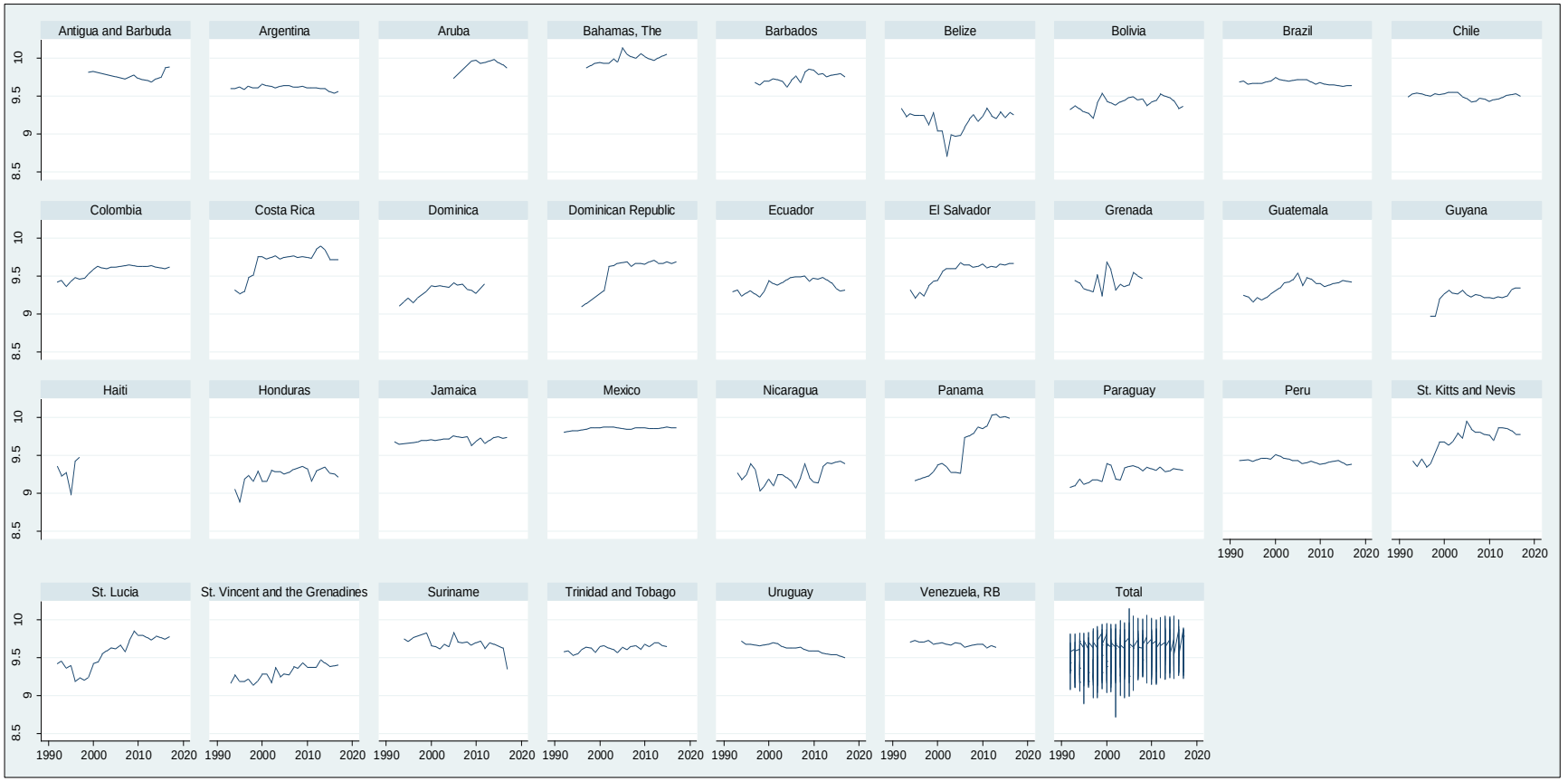
*Source: calculated with data from WITS*

## Table A2. EXPY development in LAC

| N | COD | Country | 1994 | 2017 | Growth 94-17 | Growth 94-05 | Growth 06-17 |
|---|---|---|---|---|---|---|---|
| 1 | KNA | St. Kitts and Nevis | 9.36 | 9.78 | 4.46% | 6.33% | -0.69% |
| 2 | CRI | Costa Rica | 9.31 | 9.71 | 4.34% | 4.65% | -0.45% |
| 3 | SLV | El Salvador | 9.31 | 9.67 | 3.79% | 3.88% | 0.21% |
| 4 | GTM | Guatemala | 9.23 | 9.42 | 2.15% | 3.41% | 0.55% |
| 5 | LCA | St. Lucia | 9.36 | 9.78 | 4.46% | 2.76% | 1.19% |
| 6 | NIC | Nicaragua | 9.18 | 9.40 | 2.42% | -0.08% | 3.63% |
| 7 | COL | Colombia | 9.36 | 9.62 | 2.72% | 2.69% | -0.14% |
| 8 | HND | Honduras | 9.06 | 9.22 | 1.85% | 2.22% | -0.56% |
| 9 | VCT | St. Vincent and the Grenadines | 9.28 | 9.40 | 1.37% | 0.07% | 1.37% |
| 10 | PRY | Paraguay | 9.19 | 9.31 | 1.32% | 1.90% | -0.64% |
| 11 | ECU | Ecuador | 9.24 | 9.31 | 0.83% | 2.60% | -1.87% |
| 12 | MEX | Mexico | 9.82 | 9.86 | 0.39% | 0.34% | 0.12% |
| 13 | BOL | Bolivia | 9.34 | 9.36 | 0.30% | 1.55% | -1.37% |
| 14 | CHL | Chile | 9.55 | 9.50 | -0.44% | -0.71% | 0.83% |
| 15 | BRA | Brazil | 9.66 | 9.64 | -0.21% | 0.62% | -0.77% |
| 16 | PER | Peru | 9.45 | 9.39 | -0.63% | -0.10% | -0.06% |
| 17 | ARG | Argentina | 9.60 | 9.57 | -0.36% | 0.36% | -0.81% |
| 18 | BLZ | Belize | 9.27 | 9.26 | -0.11% | -3.05% | 1.85% |
| 19 | URY | Uruguay | 9.71 | 9.50 | -2.23% | -0.87% | -1.29% |
| 20 | SUR | Suriname | 9.74 | 9.35 | -4.05% | 0.90% | -3.65% |

*Source: calculated with data from WITS*

## Figure A1. EXPY development in LAC




*Source: Elaborated with data from WITS*

# ACKNOWLEDGEMENT

I would like to express sincere thanks to people who supported me to complete this thesis and finish my master program.

My parents Corcino and Natividad that have always given me their support and advice, my advisor professor Kim, Chong-Sup, other professors, and my colleagues and friends in GSIS.

I have learned a lot from my experience in South Korea, and I would like to give special thanks to the Ministry of Education in Bolivia who granted me the opportunity to complete my Master Studies here.

I am very grateful for all I have learned, and I will continue learning in the future as well. I strongly believe that a better understanding of International Economics and Trade policies and strategies can help developing economies, thus I would like to contribute in this area in the future.