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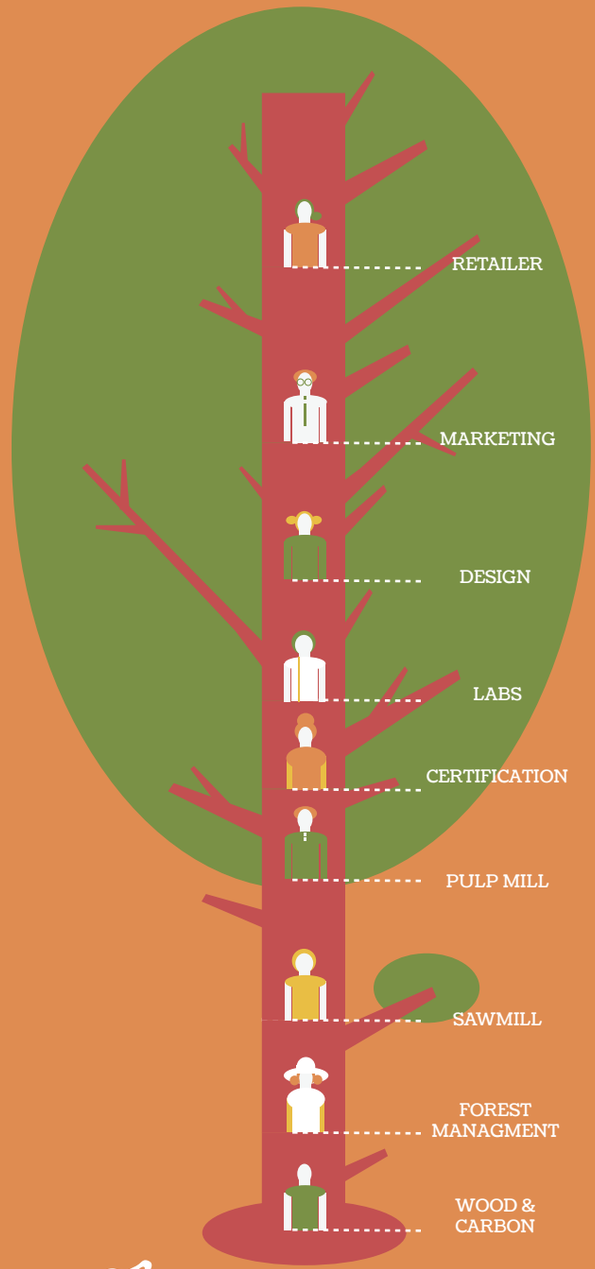
FLAGSHIP REPORT

Natural Resources and Development > Edition 2015 / 2016

RICH IN NATURAL RESOURCES, POOR IN JOBS?

Revisiting the evidence linking employment and trade specialisation in South America



This is not a tree

(it is the forest and timber value chain)

RED SUR
Red Sudamericana de Economía Aplicada

Flagship Report Natural Resources and Development > 2015 / 2016
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Revisiting the evidence linking employment and trade specialisation in South America

Luis Piera 1992 Piso 3 - Edificio Mercosur, CP 11200, Montevideo, Uruguay

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ACRONYMS >

AP Agricultural GVC in Paraguay
bps Basis points
CEDLAS Centro de Estudios Distributivos Laborales y Sociales
CIAT Inter American Center of Tax Administrations
DA Dollar appreciation
DLD Domestic liability dollarization
ECLAC Economic Commission for Latin America and the Caribbean
ERJ State of Rio de Janeiro
FD First dividend
FDI Foreign direct investment
FF Federal funds
FU Forest and timber GVC in Uruguay
GDP Gross domestic product
GTAP Global trade analysis project
GVCS Global value chains
ICT Information and communication technologies
IFIP International financial investment position
IFP Net international financial investment position over GDP
ILO International Labour Organization
IMF International Monetary Fund
I-O Input-output
ISI Import substitution industrialization
KIMS Knowledge-intensive suppliers
LA The livestock sector in Argentina
LDCS Less developed countries
MC Mining in Chile
NIFP Net international financial position
NPV Net present value
O&G Oil and gas
OECD Organization for Economic Cooperation and Development
PPP Purchasing power parity
PSM Propensity score matching
QS Quantitative easing
R&D Research & development
REER Real effective exchange rate
SD Second dividend
T&P Timber and pulp
TIVA Trade in value added
UNCTAD United Nation Conference on Trade and Development
UNDP United Nations Development Programme
UNESCO United Nations Educational, Scientific and Cultural Organization
US United States
WB World Bank
WIOD World Input-Output Database
WTO World Trade Organization

INTRODUCTION

The second edition of the Natural Resources and Development Flagship Report, produced by the South American Network on Applied Economics/Red Sur, addresses two key concerns for the world as a whole and for the South American region in particular.

The first has to do with a new scenario in the global economy. At the beginning of the new millennium South America benefited strongly from a period of high commodity prices and low interest rates, mainly driven by Chinese demand and a "weak" dollar. As we discussed in the first edition of the Natural Resources and Development Report, the region as a whole, and some countries in particular, wasted the opportunities created by the commodities boom. In particular, in many cases governments failed to make significant improvements in areas such as productive diversification, innovation capabilities or infrastructure, even in a context of fiscal bonanza. However, growth rates were high and there was progress towards resolving long-standing social problems, especially in the field of poverty.

But as history shows us, if anything characterises the prices of natural resource-based goods it is their volatility and the existence of pronounced booms and busts cycles. As we know, we have now entered a downward phase, as a consequence of the Chinese slowdown and a "strong" dollar, and the prices of the region's most relevant commodities have fallen significantly, which is especially striking in the case of oil.

While concerns about the future of the global economy are not exclusive for South America, the fact is that, according to the latest forecasts, the region faces the worst growth prospects in 2016 vis-à-vis the rest of the world, somewhat predictable considering its continual dependence on natural resources exports.

Some countries are better prepared than others to face the turbulences of the new scenario; particularly those who made a more prudent management of the revenues generated during the boom and kept more sound macroeconomic policies. But even they will need to adjust to the new global conditions and this will involve pressures in both economic and social terms. And in this context, the need to address the "hard" development agenda, as well as to deepen the improvements in macroeconomic management and governance rules, are revitalized. These issues are discussed in Chapter 1 of this report.

At the same time, the transition to the "new normality" of China and the apparent end of the near-zero interest rates policy in the US are not the only factors behind the adjustment that the global economy is facing. These issues coexist with others that generate warning signals, including the still unresolved legacy of the systemic crisis of 2008 and other longer-term processes such as population aging and climate change.

One of these long-term processes that has recently generated much attention in intellectual and political circles has to do with the effects of technological change on the quantity and quality of future jobs. Here the concerns are not

› By Andrés López

so much macroeconomic, but rather social: how will economies, governments and societies as a whole adapt to a world in which many of the tasks performed today by humans could be automated?

A debate between more or less "pessimistic" and "optimistic" views on the long-term consequences of this process has been taking place in the last years (the latter views being mainly based on the fact that ever since the first Industrial Revolution, mankind has been inventing labour saving techniques). But in any case a somehow long and painful adjustment process is inevitable, in which many skills will become obsolete, and new opportunities will emerge which will require of systematic efforts not only from the educational system, but also from governments, firms and the civil society.

This key debate for our future has a link with an older one, very well known in our region, that is, the extent to which sectors based on natural resources have the ability to create jobs in sufficient quantity and quality to contribute to the generation of societies with full employment and low levels of income distribution inequalities.

It is clear that, under the conditions described above, the answer to this question cannot be based merely on the extrapolation of the past, given that the process of jobs automation may have very heterogeneous impacts on different types of industries and activities. In turn, the dynamics of the process will also be affected by the asymmetries in population structures across countries and the divergent speeds of evolution in the demographic transition.

Notwithstanding the uncertainty surrounding the future evolution of this process, there is a need to rethink the traditional framework on which the debate on the relation between natural resource-based activities and employment has been based so far. We need to move on from a sectoral approach towards a value chain approach. This means not only taking into account the indirect jobs created by/associated to agriculture and extractive industries, but also pay a close attention to the characteristics of these jobs and what kind of activities are performed by the workers in the different stages of the value chain. In particular, a central issue is whether workers perform manual and/or routine tasks or, on the contrary, they perform intellectual and/or non-routine tasks. The consequences derived from an integration in value chains based on the former or the latter type of jobs are completely different, both from the point of view of the dynamics of income distribution and real wages, and have as well a strong impact on productivity. They also affect the future ability of each country to generate full employment for its population.

The results of quantitative and qualitative analysis presented in Chapter 2 of the report show that there is nothing deterministic in the relationship between a country´s pattern of specialisation at the sectoral level and the quantity and quality of the jobs it generates. The central issue involves understanding the role that the economies play in the different value chains and the ability of their education and training systems to generate the talents and skills required to take advantage of opportunities for "climbing" within those chains. This report aims at shedding light on the challenges emerging in this new scenario and the alternatives that South American countries have to face.

CHAPTER
#1

HISTORY DOES NOT REPEAT ITSELF, BUT DOES IT RHYME?

Natural resource-rich South America confronting a strong dollar

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1. INTRODUCTION

In the afternoon of August 12, 1982, three telephones rang insistently in the Washington D.C. offices of Jacques de Larosiere, the executive director of the International Monetary Fund (IMF), Donald Regan, the United States (US) Treasury Secretary, and Paul Volcker, chairman of the Federal Reserve Board. They all heard Jesus Silva Herzog's desperate message: *"We are going to miss next month's payments of banking loans"* (Boughton, 2001). It was an unofficial message coming from an official source: the very Finance Minister of Mexico. Soon Brazil, Argentina and other then-called Less Developed Countries (LDCs) would follow Mexico's destiny. That was the beginning of the first wave of global turbulence in the largely ungoverned post-Bretton Woods international arena; that was, of course, the beginning of the LDCs crisis, and also the start of Latin America's Lost Decade.

Almost twenty years later, on December 23, 2001, the newly-appointed, about-to-be-fired, interim president of Argentina, Adolfo Rodriguez Saa, decided to take the bull by the horns and announced in the Congress that *"the Argentine government will suspend the payment of the foreign debt"* (see Honorable Cámara de Diputados de la Nación Argentina, transcript of the legislative assembly, December 22/23). That marked the final episode of a five-year sequence of crises in emerging markets involving Russia and many Asian and Latin American countries.

Oil-rich Mexico went bankrupt in the early-1980s. Argentina, a crops-rich country, went bankrupt in the late-1990s / the early-2000s. What do these two periods have in common? A sudden but sizable deterioration in the external context for emerging, natural resource-rich countries. This change, in turn, was characterized by a tightening in the US monetary policy, which shifts from an environment of low interest rates and a depreciated currency to one of high interest rates and an appreciated currency. This single-country monetary policy decision by the Federal Reserve Board represents an unintended change in the monetary and exchange rate stance for many other countries –mainly emerging countries– which are somewhat pegged to the dollar.

This type of change in the external context is also seen in a huge drop in commodity prices, which reduces export proceeds (and tax revenues as well) in commodity-rich countries. The concurrent deceleration in global growth depresses exports worldwide, and to add insult to injury, the increase in US interest rates can trigger a capital flow reversal from emerging markets.

These four shocks to emerging, natural-resource rich countries (a stronger dollar, lower commodity prices, lower international trade, and a capital flows reversal) are not unrelated; instead, they all have to do with the US monetary

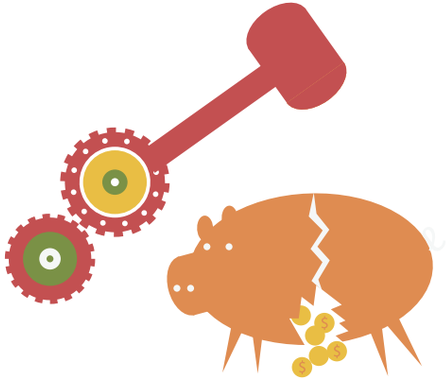
› The author of this chapter is Ramiro Albrieu.

policy. First, a strong dollar means weak prices not only for other currencies non pegged to the dollar, but also for any other good whose prices are denominated in dollars, such as commodities; second, disinflation policies in the United States negatively affect global growth and thus international trade; third, high US interest rates strain financial relations everywhere.

Thus, for an emerging commodity exporter country, it is all about how to manage a stronger dollar because it means lower export prices, lower export quantities, a lower value of the internationally-accepted collateral (natural wealth), and higher interest rates. Capital flow reversals and "flight to quality" dynamics can worsen the outlook.

1982... 2001... this is history. Why bother now? Because the international economy is again entering a period with a stronger dollar, and as Mark Twain supposedly said: *"History does not repeat itself, but it rhymes"*. Testing Twain's phrase for South American countries –which are emerging, natural-resource rich countries– is the core of this chapter.

To that end, we first date episodes of dollar appreciation in the past, and then review the macroeconomic record of South America under these dollar appreciation episodes. Second, we apply a set of metrics to evaluate whether today's external conditions for South America are similar to those in past episodes. Third, we move on to South American vulnerabilities or propagation mechanisms to determine whether South America is currently better prepared for facing the change in the external context. Finally, once we have presented the country-specific shocks and vulnerabilities, we analyze the scope for policy making, which, in turn, will be highly related to the available policy space.



2. DOLLAR APPRECIATION EPISODES AND NATURAL RESOURCE-RICH SOUTH AMERICA

Dollar appreciation episodes, or bad old days for South America

Since the collapse of the Bretton Woods system in the early 1970s, we have lived in a world without proper supranational institutions governing international relations. And any measure of the size of these relations (both in trade and finance) yields the same results: we are living in a more globalized world than ever. It is not surprising, then, that the increasing spillovers and externalities across countries have become harder to address.

This is particularly true when we refer to monetary and exchange rate policies. Since the early 1970s, inflation and disinflation policies in advanced economies have shaped global finance (see Rey, 2015) and affected South American international trade through the above-mentioned channels.

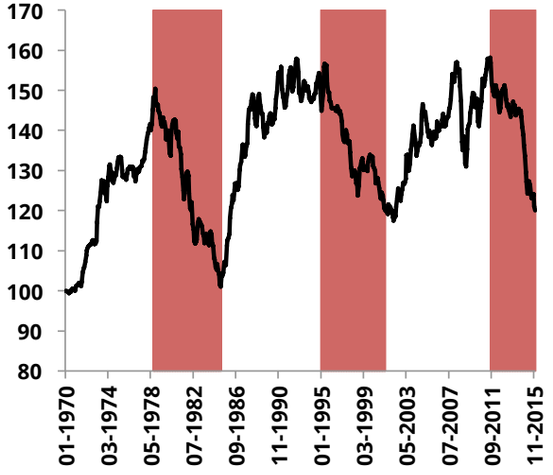
What were these US monetary policy cycles like? Figure 1 plots the US real effective exchange rate (REER) from 1970 on. We highlight the periods of an appreciating dollar (hereinafter, DA episodes) in red. They correspond broadly to three periods[1], namely, the "Volcker disinflation" in 1979-85, the

1 > Druck *et al.* (2015) estimate a two-regime Markov-switching model and find the same dating from dollar appreciation and depreciation periods.

"Clinton strong dollar policy" in 1996-2001 and the beginning of the "monetary policy lift-off" from 2013 on. During the first DA episode the dollar appreciated in real terms by more than 30 percent between 1979 and 1985 and the Federal Funds (FF) rate went from 7.90 percent in 1978 to 16.40 percent in 1981. In the second DA episode the real appreciation between 1996 and 2001 registered some 20 percent, while the FF rate remains near zero (it increased by 25 basis points in December 17, 2015, reaching 0.25%-0.50%), the dollar appreciated in real terms by some 25 percent between late 2012 and late 2015.

Figure #1_ Dollar swings during the second globalization.

(Real effective exchange rates, Jan-1970=100)



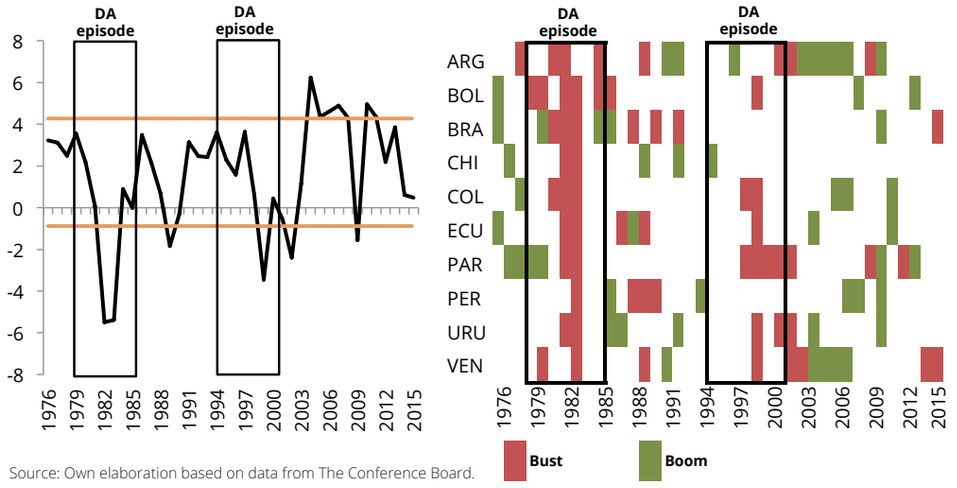
Source: Own elaboration based on BIS data.

Not surprisingly, past DA episodes coincided with episodes of severe growth decelerations in South America. Figure 2 plots the growth rate of GDP for South American countries[2] in terms of Purchasing Power Parity (PPP). In order to discriminate "excess volatility" situations from "normal volatility" ones, we date booms (busts) to periods where growth is above (below) the mean plus (minus) one standard deviation. The left-hand side figure plots the average growth rate; it is easy to see that DA episodes coincide with extreme growth downturns. The right-hand side of the figure plots country-specific growth dynamics, dating booms in green and busts in red. Note that during the first DA episode all the countries in the sample experienced an excessive downturn episode, dated broadly in 1982-83. During the second DA episode seven out of ten countries experienced a deep downturn. Brazil, Chile, and Peru managed to avoid this situation given the adverse external context. Finally, during the current DA episode Brazil and Venezuela are experiencing a deep downturn.

2 > In what follows we will take a subset of South American countries as a unit of analysis. These include Argentina, Bolivia, Brazil, Colombia, Chile, Ecuador, Paraguay, Peru, Uruguay and Venezuela.

Figure #2_ Bad old days I.

Dollar appreciation episodes and growth dynamics in South America



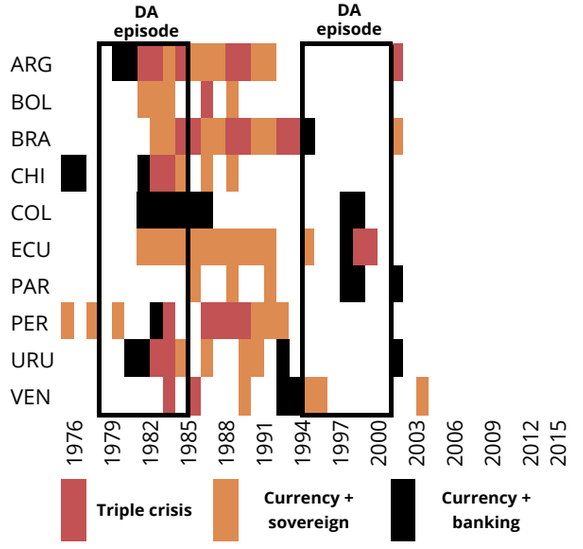
Source: Own elaboration based on data from The Conference Board.

Loayza and Hnatkovska (2004) called these negative extreme volatility episodes that we dated in Figure 2 "growth crises". Of course, growth crises can have country-specific origins triggered by factors unrelated to the balance of payments, such as political unrest, inflation-induced tensions and the like. In order to link these output crises with the dynamics triggered by the appreciation of the dollar, Figure 3 dates episodes of stress in South American foreign exchange markets. More specifically, we follow Reinhart and Rogoff's (2009) metrics for detecting currency, banking and external sovereign crises. As currency crisis episodes are usually related to the balance-sheet deterioration of key domestic agents (typically, the public sector and the financial sector) we date two types of "twin" crises, namely, Kaminsky and Reinhart's (2000) banking and currency crises (in black) and external public debt and currency crises (in orange) and a "triple" crisis that matches currency, banking and external public debt crises.

Again, the first DA episode is colorful, meaning that growth crises are concurrent with financial crises, and in many cases –Argentina, Brazil, Chile, Peru, Uruguay and Venezuela– with triple crises. Crises were rarer around the second DA episode, suggesting that some learning process could have taken place over time. This seems to be the case of Bolivia, Chile and Peru. Yet, it was certainly not the case of crisis-prone Argentina, Uruguay, and Venezuela.

Figure #3_ Bad old days II.

Dollar appreciation episodes and crises in South America



Source: Own elaboration based on updated data from Reinhart and Rogoff (2009).

Better prepared this time?

The purely white part of Figure 3 corresponds to the period 2004-14, and signals some optimism about the likely effect of the current DA episode. After the last sequence of crises in the late 1990s, emerging economies redefined their approach to globalization. The new policy scheme was designed to diminish the role of international capital flows in the macroeconomy, the former being damaging to the latter because of its sudden movements and its market procyclicality[3], what a recent BIS report coined "excess financial elasticity" (BIS, 2015, p. 15).

Because of these damaging effects, many emerging economies opted for a policy framework based on fiscal and monetary policies of a countercyclical nature, debt policies aimed at developing bond markets in local currencies, and macroprudential policies aimed at reducing the dollarization of the domestic financial system. In the South American case, Albrieu and Fanelli (2010), and Vegh and Vulletin (2014) remarked that saving during the booming years (2004-08) had paid off, given that the region was on average able to respond to the subprime crisis with countercyclical (expansionary) policies without incurring a growth collapse, something that had not been possible in previous crises.

Public debt and banking de-dollarization also paid off, as the overall economy's net foreign liabilities fell during the subprime crisis (by some 5 percent of GDP), while it increased dramatically (by some 20 percent) in past crisis episodes.

Two factors suggest we should curb our optimism about the current DA episode. The first maintains that, while there is a lot more policy maneuver (depreciation is less damaging in low-indebted, net creditor economies), the region failed to delink from the dollar movements (see Figure 4).

Figure #4_ The dollar zone, 2013-15.

Note: the blacker the area, the more pegged it is to the dollar; Source: Own elaboration based on BIS data.

3 >Emerging markets seemed to agree with Mark Twain's opinion of bankers: *"A banker is a fellow who lends you his umbrella when the sun is shining and wants it back the minute it begins to rain".*

Second, the subprime crisis occurred almost seven years ago; many things may be different now. In advanced economies, the monetary policy response to the subprime crisis was an unprecedented easing marked by near-zero interest rates and sizable asset purchases programs. This means, of course, a considerable amount of liquidity trying to find a place to land. With over-indebted governments, firms, and households in advanced economies, emerging economies became natural candidates.

In this context, it may well be the case that South American countries, relatively immune during the subprime crisis, have since been building up vulnerabilities. That is why a reassessment of the risks and possible outcomes arising from the change in US monetary policy still seems necessary.

A framework of analysis

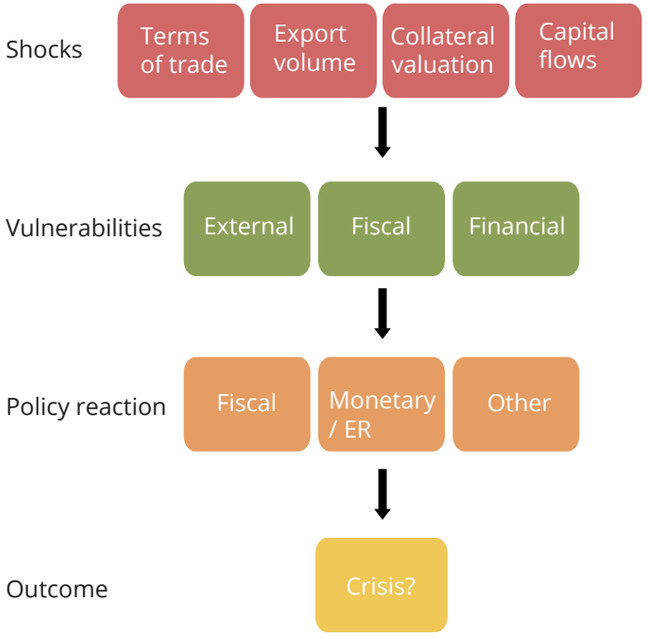
Almost by definition, it is difficult to detect crises in advance. Ex post it is easy to find a story that matches the facts; from the extensive it is more about pessimists versus optimists. Nevertheless, we can borrow from extensive literature on crises in emerging markets that finds some "stylized facts" and analyze the role of external shocks, domestic vulnerabilities, and policy responses to prevent or induce a crisis.

More specifically, our framework of analysis is shown in Figure 5. There we include the main factors involved in an episode of extreme volatility, or crisis.

First, there are the **external shocks**. These are purely exogenous disturbances that modify the conditions in foreign currency markets. It includes changes in the terms of trade (price of exports over price of imports) and export volumes, both affecting the current account. It also takes into account a sudden stop in foreign financing and a drop in its value of the main collateral, which affect both the availability of funds (effects on the capital account) and/or the costs (effects on the interest payments and thus the current account).

The inclusion of the changes in collateral valuation as a separate shock is important because we are analyzing economies where wealth is concentrated in natural resources. According to World Bank estimates, in 2005 2.5 percent of total wealth in high-income countries was natural capital, while it averaged some 20 percent in South America. It is important because the quality of a given collateral is less associated with its mean or trend value than with the volatility of its value. As Gary Gorton (2010) stated, good collaterals are those that are information-insensitive, which makes its value less volatile than those of other assets.

Figure #5_ Shocks and crises in South America: a framework.



Source: Own elaboration.

Why could natural wealth fail to meet this condition? Natural wealth is estimated as the discounted value of future rents generated by its use, which in turn depends on commodity prices. As they are more volatile than the price of manufactures, natural resource-rich economies may have the structural problem of poor and volatile collateral for foreign lending (see Caballero, 2000).

A second part of the framework deals with **vulnerabilities**, that is, the domestic factors that can amplify the effects of the negative shock. We will first review a set of indicators related to the balance of payments, and then examine other "usual suspects", that is, amplifying mechanisms associated with possible comovements between external fragility, on the one hand, and balance-sheet vulnerability in the public sector and the financial system on the other hand. For each set of vulnerabilities (external, fiscal, and financial) we need to assess the risks by analyzing the relevant stock variables (such as net foreign assets and public debt), flow variables (the current account, the growth in domestic credit) and those that point to hidden risks (e.g. the ratio of interest payments to exports).

Once we have measured the shocks and detected the vulnerability, we can analyze the **policy reaction.** In this case we refer to the ability of governments to counteract the real and financial effects of the shock, or rapidly reduce the vulnerability when detected. In this case, we will first review exchange rate and monetary policies (which, in turn, involves nominal exchange rate and interest rate policies), and then move on to other policies (fiscal, debt, wage, etc.) when necessary.

3. SHOCKS

This section presents evidence on how a stronger-dollar and lower-commodity-price external context is transmitted to South American economies. In the first place, it shows the effects on emerging markets as a whole and in South America in particular. Secondly, it looks at the specific channels (shocks) through which the contagion spread from its epicenter in the US to the region. It examines both the financial and the real channels.

A new world for South America?

US monetary policy during the subprime crisis was exceptionally loose. Not only did it lower the policy interest rate to zero, but it also implemented huge programs to purchase "toxic" assets, the so-called "quantitative easing" (QE). QE programs almost tripled the US monetary base between mid-2008 and mid-2012[4]. In 2013 the Fed decided to gradually reduce the amount of assets to purchase (the onset of the "tapering") and it is expected to increase the policy rate any time soon (the "lift-off"), and in December 17, 2015 it increased the monetary policy interest rate for the first time in a decade.

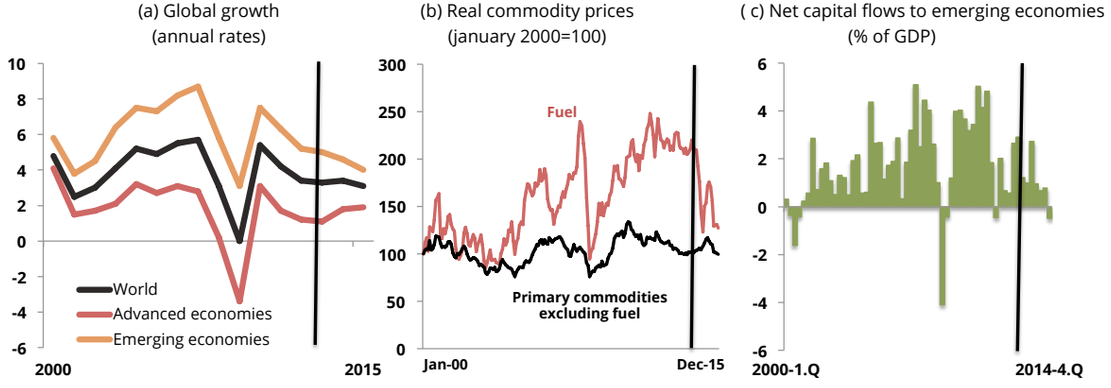
Leaving aside the slowdown in the Chinese economy, the Fed's tapering + lift-off new monetary policy strategy (lift-off, for short) constitutes the core of the shocks affecting the global economy today. How?

First, US monetary tightening implies less global liquidity, both for trade and finance. In trade, it led to a deceleration in international transactions; in

4 > A comprehensive survey of unconventional monetary policy strategies in advanced economies can be found in Fawley and Neely (2013).

finance, it led to turbulences in emerging markets related to news coming from the Fed (the "taper tantrum"). All these factors affected global growth, which is decelerating and rotating, this time from emerging to advanced economies. Since the beginning of the lift-off, the IMF estimates an average global growth rate of 3.2 percent, while in previous, post-subprime crisis years (2010-13) it averaged 4.1 percent (see Figure 6a and IMF 2015a). The split between advanced and emerging economies shows the growth rotation: while in advanced economies it somewhat accelerated (from 1.7 percent to 1.9 percent), in emerging economies it decelerated markedly (from 6 percent to 4.3 percent). Among the latter, commodity exporters were badly hit: their growth rate decelerated from 5.4 percent to 2.9 percent.

Figure #6_ A new world order?



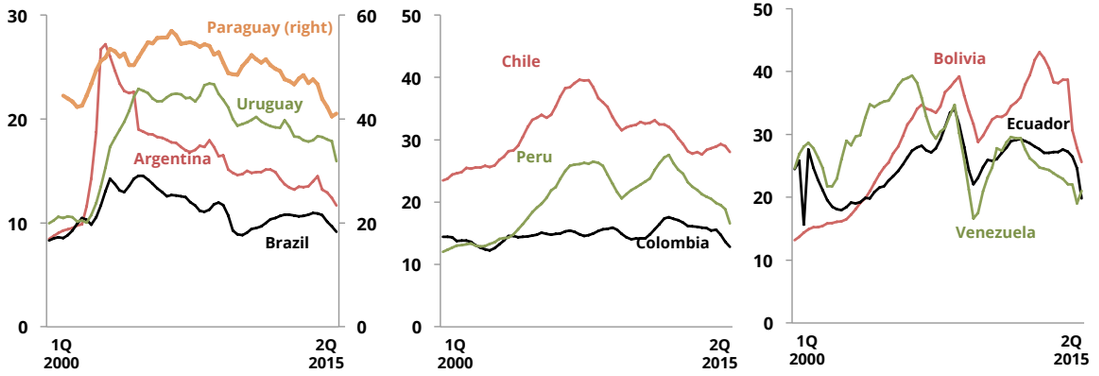
Source: Own elaboration based on IMF and World Bank data.

Second, an appreciation of the dollar is correlated with a drop in the dollar price of commodities (see Frankel, 1989). Thus, the lift-off also generated a collapse in the real price of fuel of about 50 percent (see Figure 6b). Non-fuel commodities, in turn, experienced nearly a 30-percent loss. These averages hide heterogeneities that may count when analyzing South American countries. Indeed, Díaz Alejandro (1983) coined the term "commodity lottery" when referring to a commodity-dependent but commodity-diverse region such as South America. We will return to this issue later.

The third channel connecting US monetary policy with the global economy is capital flows. Two main factors are at play. First, changes in the US interest rate translated into interest rate movements elsewhere, given that in financially-connected economies some parity relations between the cost of money holds (of course, financial repression could reduce this comovement, see Aizenman *et al*., 2015). Second, US interest rate movements affect risk pricing: low interest rates imply low funding costs for financial intermediaries, which encourage search-for-the-yield strategies and thus reduce the price of risk (high interest rates operate in the opposite direction). This "risk-taking" channel, as Borio and Zhu (2012) called it, impinges on capital flows: the higher the price of risk, the lower the capital inflows to emerging economies. Since the beginning of the lift-off, net capital flows to emerging economies have been volatile and, on average, of a lower magnitude than in the previous, post-subprime crisis period (see Figure 6c).

Thus, US monetary tightening is bad news for emerging economies[5]. How is it affecting South America in particular?

Figure #7_ US monetary tightening and South America I: trade effects.
Exports of goods / GDP



Source: Own elaboration based on IADB data.

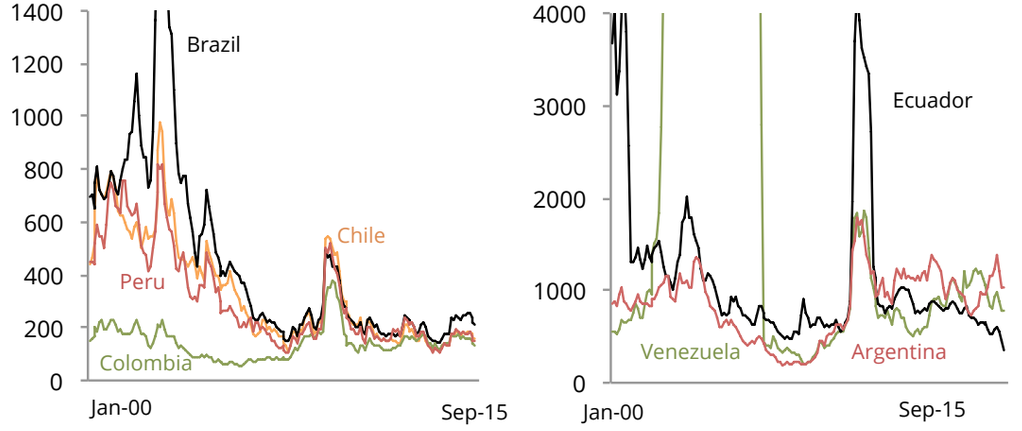
The first, sizable effect is the reduction in export proceeds, motivated both for price and quantity changes. In Southern agricultural countries (Argentina, Brazil, Paraguay and Uruguay) the annual loss in export income between mid-2013 and mid-2015 averaged some 1.5 percent of GDP. In this group, Brazil was the less-hit economy, largely because of its more-closed, more-diversified status (Paraguay shows the exact opposite case). Similar results can be found in mineral-rich countries of the Pacific (Chile, Colombia and Peru). In this case there is deep heterogeneity: while Chilean exports remained invariant in terms of GDP, Peru's annual loss yielded some 3 percent of GDP. Finally, the biggest effect corresponds to fuel-rich countries in the region (Bolivia, Ecuador and Venezuela). There, export proceeds experienced an annual drop of 6 percent of GDP. If we project Venezuelan exports assuming invariant export volumes and IMF's (2015a) forecast for GDP, its annual exports proceeds dropped by some 5 percent (GDP fell vis-à-vis oil prices).

The second effect has to do with the repricing of risk and the consequent increase in the cost of external financing. Here we need to discriminate not only by economic structure (and thus potential trade balance divergences) but also by the liquidity needs and the domestic imbalances that each country built up during the pre-lift-off stage. The IMF's (2010) well-known split between "more financially-integrated" and "less financially-integrated" economies helped differentiate asset classes before the beginning of the lift-off, but now it does not seem to be working all that well. Take Brazil and Bolivia, for example. September 2015 data show that financially-integrated Brazil's sovereign spread over US bonds yields 490 basis points (bps), while less-financially-integrated Bolivia's spread yields 330 bps.

5 > See Arteta *et al.* (2015) for further details.

Figure #8_ US monetary tightening and South America II: financial effects.

Sovereign bond spread over US treasury (in basis points)



Source: Own elaboration based on World Bank data.

Venezuela and Ecuador seem to be hit the hardest by the new financial conditions. From September 2014 to September 2015, EMBI's country risk assessment indicates a severe deterioration in the asset class for the Venezuelan economy. Quantitatively, it almost doubles: from 1600 bps to 3000 bps (over US rates). In the case of the fully-dollarized, oil-dependent Ecuador, its EMBI was less than 500 bps a year ago and in September 2015 it rose to 1400bp.

In the other countries in the region, financial conditions tightened, but the impact was somewhat manageable. As a general rule, spreads increased by some 100/150 bps.

Digging a little deeper: detecting and measuring the external shocks affecting South American countries

As was shown above, international trade and finance operated as major transmission channels of the strong dollar policy towards South America, both because of the lower volume of trade and the lower price of commodities and because of the tightening of capital flows and the repricing of risk.

Is this situation analogous to what the region experienced in the past? Does this turbulence coming from US monetary policy spillovers resemble those faced in the early 1980s or the late 1990s?

To gauge the size of the disruptions in trade and finance (and thus, the likely adverse effects in currency markets) it is necessary to adopt a standard of 'normality' for the variables under analysis. With this in mind, we will use the deviations with respect to the long-term values, using observations at an annual frequency for the period 1976-2015, which fully covers the period of financial globalization. The threshold from which it is considered to be an exceptionally strong or unusual shock is a standard deviation. When the performance of a given period rises above a deviation, a "boom" is considered to exist in the variable under analysis and when it falls below, there is a "bust". Another way

to characterize the size of a shock is to evaluate the degree of synchronization across the region. We hold that a bust or boom is generalized if it affects more than 25 percent of the countries in the group.

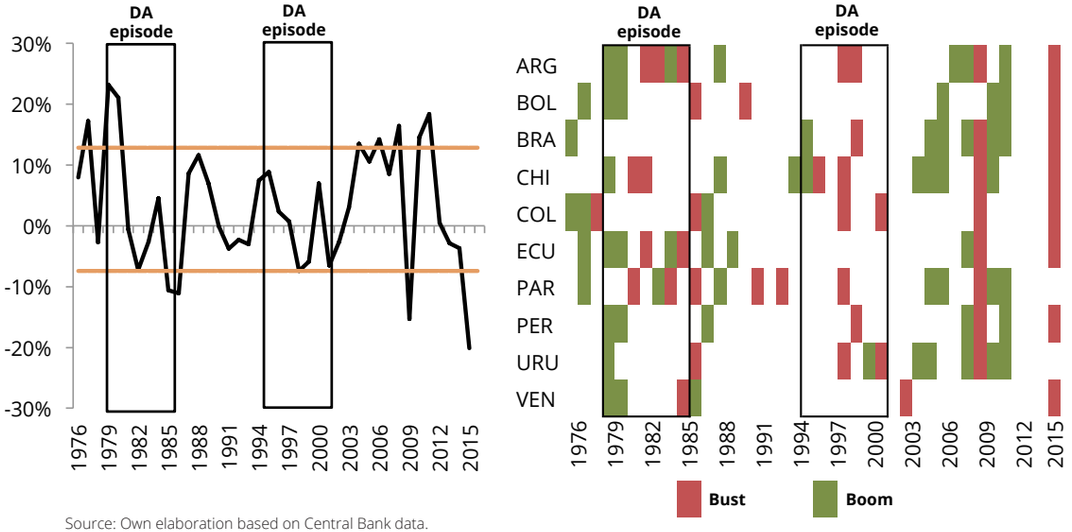
Let us start by analyzing how the trade shocks triggered by the recent events compare with those observed in previous DA episodes.

Figure 9 deals with shocks to export prices. On the left-hand side figure we plot the average annual growth of South American export prices. The orange lines show the "normality" bounds, implying that export prices outside these limits are either booming or busting. On the right-hand side of the figure, in turn, we present a country-specific dating for the export price shock, highlighting the booms in green and the busts in red. We also show the past episodes of dollar appreciation (labeled DA episodes) in black.

On average, South America experienced four export price bust episodes: 1984-85, 1997, 2009, and the current juncture. Two facts stand out. First, three out of four busts happened during DA episodes. Second, the remaining bust was brief, i.e., it was followed by a boom immediately afterwards.

Figure #9_ The strong dollar and trade shocks to South America I: Export prices.

left: regional average; right: country-specific dynamics



Source: Own elaboration based on Central Bank data.
Note: ARG: Argentina; BOL: Bolivia; BRA: Brazil; CHI: Chile; COL: Colombia; ECU: Ecuador; PAR: Paraguay; PER: Peru; URU: Uruguay; VEN: Venezuela.

Both facts indicate that as South America is a net commodity exporter and commodities are priced in dollars, extreme volatility episodes for export prices will largely be influenced by US monetary policy swings.

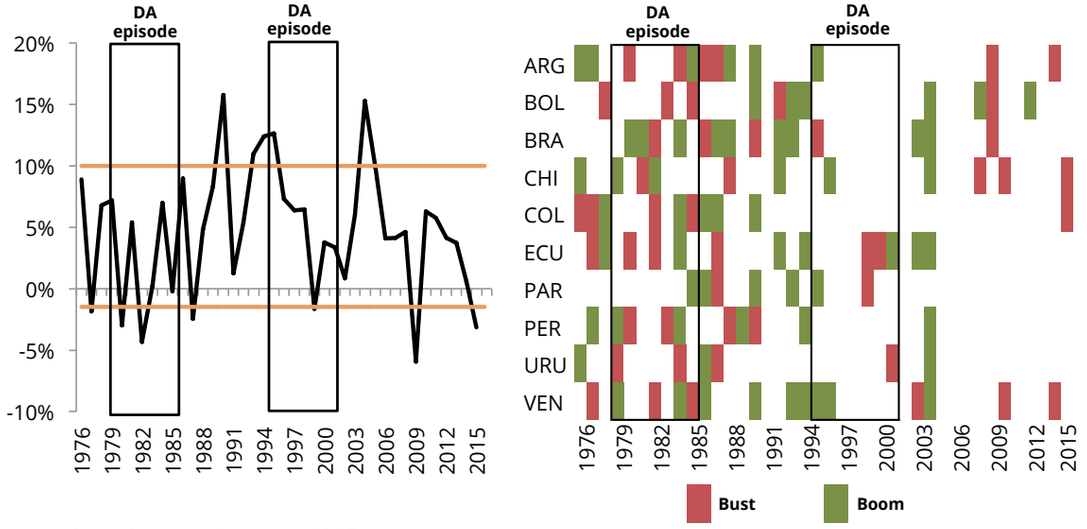
The right-hand side of the figure reveals an even more interesting story. There we can see that country-specific boom-bust cycles are frequent, thus Diaz Alejandro's commodity lottery phrase. For one thing, there are only two years in the full sample when no single country's export prices are either booming or busting. Additionally, synchronized busts occurred almost exclusively under DA episodes (the 2009 bust is the remaining episode).

Finally, note that the current dolar appreciation has already generated a kind of deep, synchronized export price shock that the region had experienced during past currency crises.

What about export volumes? Figure 10 below replicates the previous analysis for percentage changes in export volumes. Note that the "commodity boom" of the early-2000s was a price boom, not a quantity boom. As to busts, we can date seven: 1977, 1980, 1982, 1987, 1999, 2009, and 2015.

Figure #10_ The strong dollar and trade shocks to South America II: Export volume.

left: regional average; right: country-specific dynamics



Source: Own elaboration based on ECLAC data.
Note: ARG: Argentina; BOL: Bolivia; BRA: Brazil; CHI: Chile; COL: Colombia; ECU: Ecuador; PAR: Paraguay; PER: Peru; URU: Uruguay; VEN: Venezuela.

Four of them –all mild– occurred during DA episodes. The most serious bust since the mid-1970s is the 2009 episode, which trade economists called "The Great Trade Collapse" (Baldwin, 2009). Behind these movements –and their worldwide synchronicity– lies the predominance of global value chains and trade-in-tasks transactions. We will return to this issue in Chapter 2.

Figure 10b plots country-specific dynamics. Nine out of the ten countries in the sample experienced one or more busts during the first DA episode. In contrast, during the second DA episode export volume busts were concentrated in four countries: Brazil, Ecuador, Paraguay and Uruguay. During the current DA episode, four countries (Argentina, Chile, Colombia, and Venezuela) are undergoing an export volume bust. Nonetheless, it is too soon to eliminate the possibility of a wider and deeper collapse on global trade.

Let us examine financial shocks. First, we will analyze the role of natural resource wealth (and its changes) as a collateral for international credit, and then we will address the issue of capital inflows.

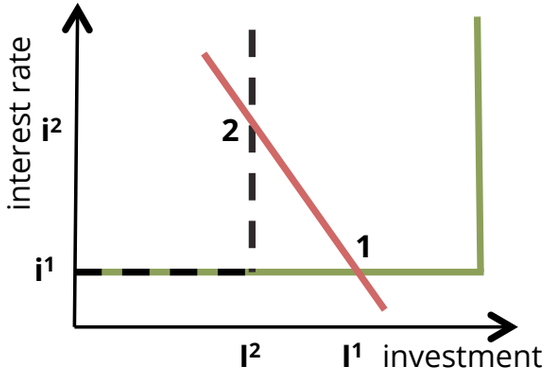
To understand the importance of the internationally accepted collateral for cross-border lending we need to discuss some abstract issues (anxious readers can jump to page 23). Let us assume that domestic investment is solely financed by international credit. With a decreasing marginal product of capital, investment depends inversely on the interest rate; that is the red line in Figure 11.

Regarding the credit supply, let us assume that investors can borrow all they want at the international interest rate should they offer an asset of equal value that the lender can call in case of default on the credit[7]. Credit provisions beyond the value of the collateral are inaccessible.

What happens if the amount of collateral exceeds the demand for credit? The over-provision case is shown in Figure 11, the red line against the green line. In this case, the equilibrium is reached at point 1, where supply meets demand, investment is I^1 and the interest rate is i^1, the international interest rate.

Figure #11_ The role of the collateral value in the credit market.

Equilibrium with collateral over-provision (solid green line) and collateral under-provision (dashed black line)



Source: Own elaboration.

7 > In real-life finance, because of both microeconomic and macroeconomic imperfections found in financial markets, creditors can only pledge a fraction of their collaterals in new loans. But the assumption of full pledgeability does not affect our analysis.

The outlook is more complicated if the value of the collateral is lower than the demand for credit at the international interest rate. In this collateral under-provision case, the credit supply is not the green line, but the dashed black one. The equilibrium is reached at point 2, where investment is lower (I2) and the interest rate is higher (i2) than in the over-provision case.

Now we can incorporate natural resources into the analysis. In many emerging, natural resource-rich economies, natural assets represent the main asset pledgeable as collateral in international markets (Manzano and Rigobon, 2007; Humphreys *et al.*, 2007). The downside is evident if we take into account that (a) natural wealth is calculated as the net present value of future rents and (b) commodity prices are highly volatile. This means that structural factors associated with the volatility of export prices will affect the availability of foreign lending due to this "collateral" channel.

How well does this story match South American reality? One way to answer this question is to look at the types of shocks that alters wealth –and, thus, collateral values– in the region vis-à-vis the rest of the world. Using World Bank's (2011) country specific estimates of reproducible capital (the sum of physical capital and urban land) and natural capital, and assuming that there are no other types of assets (neither foreign wealth nor intangible wealth), we can compute two sources of aggregate wealth changes: those coming from reproducible capital and those coming from natural capital. We can expect wealth variability in natural resource-rich countries to be explained mostly by changes in natural wealth, while it should be just the opposite in capital reproducible-rich countries.

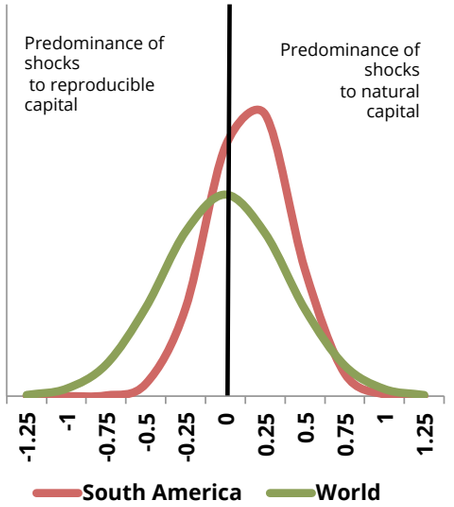
So, let us call wc the value of reproducible wealth and wn the value of natural wealth (wt=wc+wn being total wealth). Variance decomposition would have

yielded accurate estimates for the relative role of shocks[8]. Unfortunately, worldwide, comparable wealth accounts –those in the World Bank (2011)– are only available at three points in time: 1995, 2000 and 2005. Thus, we turn to plan B, by which we take the percentage changes in reproducible wealth in absolute terms (|gc|) weighted by its share in total wealth (w^c / w^t=Φ) as a proxy for the size of shocks to wealth originated by this type of asset (the same for natural wealth). More specifically, our metrics for the relative importance of shocks to wealth originated by swings in the value of natural assets is simply the difference between shocks to w^n and w^c[9]. The changes are taken between 1995 and 2005.

We plot bell curves for this difference in Figure 12, the green one corresponding to the world and the red one to South America. Note that despite its within-heterogeneity, a common factor across South American countries is a strong bias to changes in natural capital as the main factor affecting total wealth.

Figure #12_ Shocks to wealth: the South American bias.

Equilibrium with collateral over-provision (solid green line) and collateral under-provision (dashed black line)



Source: Own elaboration.

With this bias in mind, we can ask: what happened to natural wealth during the DA episodes?

As we said, there is no annual series for World Bank estimates of natural wealth. Against this backdrop, we replicated the World Bank's methodology for ten goods (covering those that really matter, from soybeans and beef to oil and copper) to obtain country-specific, annual estimates for South American countries[10].

8 > $var(w^t)= var(w^c)+ var(n^n)+ 2*cov (w^c,w^n)$.
9 > that is $(1-\Phi)|g^n| - \Phi|g^c|$.

10 > See the details of the estimation in Annex 1.

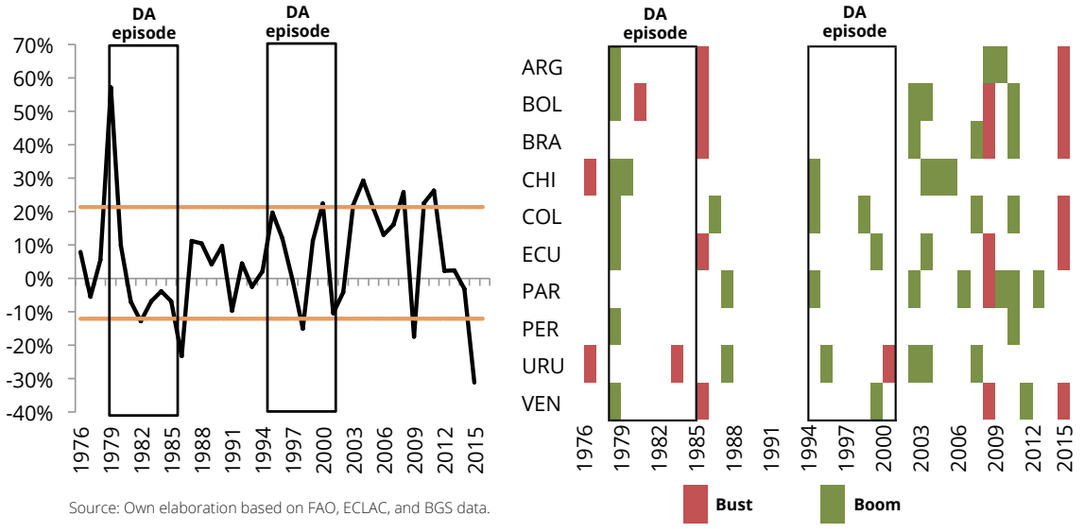
Figure 13 shows the evolution of changes in natural wealth. Values for 2015 are estimated with prices as of September.

We plot the average growth of natural wealth for South American countries on the left. Note that we found four episodes of natural wealth busts: 1985-86, 1998, 2009, and 2014-15. Again, three of them are concurrent with DA episodes. The busts of the 1980s, 2009 and 2014-15 share a common feature: wealth booms anteceded them all. This may have worsened things given that large revisions in wealth are usually associated with economic crises (see Heymann and Stiglitz, 2014). Indeed, Manzano and Rigobon (2007) show how the Lost Decade in the region was largely explained by excessive debt accumulation during the late-1970s, good times in terms of the value of collaterals; after the drop in commodity prices in the early-1980s, the "debt overhang" scenario predominated.

The right-hand side of Figure 13 plots country-specific dynamics for natural wealth shocks. First, keep in mind that Brazil, Colombia, Paraguay and Peru managed to avoid large natural wealth revisions during the 1980s; the remaining countries went from boom to bust between the late 1970s and the mid-1980s, which broadly coincides with the first DA episode. During the second DA episode, in turn, wealth revisions were quite rare.

Figure #13_ The strong dollar and financial shocks to South America I: Collateral quality degradation.

left: regional average; right: country-specific dynamics



Source: Own elaboration based on FAO, ECLAC, and BGS data.

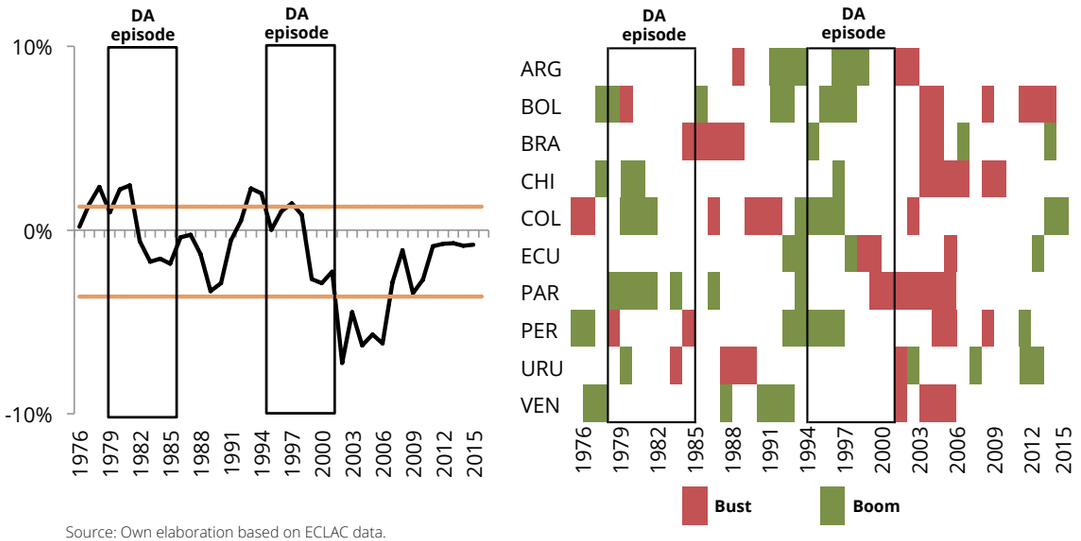
During the current DA episode, wealth collapses were generalized, and involved crop-rich (Argentina) and fuel-rich countries (Bolivia, Colombia, Ecuador and Venezuela). Brazil, being crop and fuel rich, also sustained a natural wealth bust. Somewhat more diversified and biased towards cattle-related activities, Paraguay and Uruguay managed to avoid the wealth collapse, while mineral-rich Chile and Peru experienced downside wealth revisions because export prices adjusted smoothly.

Again, it is interesting to note that in the ongoing DA episode a wealth boom anteceded the wealth bust. An environment of low international interest rates, liquidity abundance and high collateral values may have created a *perfect storm* in the region and other emerging regions.

What about capital flows? How important were these types of shocks when evaluated from a long-term standpoint? One way to shed light on this question is to see whether there was a sudden outflow of capital that placed the region on the path to a sudden stop in the sense intended by Calvo *et al.* (2008). Figure 14 presents some evidence in this regard. The indicator shown computes the performance of net capital inflows defined as the difference between the change in reserves and the trade balance. Calvo and his coauthors identifies a situation as a sudden stop provided there is a net outflow (negative inflow) and the flows have fallen below a minimum threshold; as in other cases, the minimum threshold defined as the average of the 1976-2015 period less a standard deviation. The figure also shows the country specific dynamics on the right-hand side.

Figure #14_ The strong dollar and financial shocks to South America II: Sudden stops.

left: regional average; right: country-specific dynamics



Source: Own elaboration based on ECLAC data.
Note: ARG: Argentina; BOL: Bolivia; BRA: Brazil; CHI: Chile; COL: Colombia; ECU: Ecuador; PAR: Paraguay; PER: Peru; URU: Uruguay; VEN: Venezuela.

The charts clearly show that, for the region as a whole, the financial shocks of the 1980s and 1990s were more severe than the current one: although there is a reversal in regional capital flows in all three events, the scale is considerably smaller in the case of the subprime crisis. In fact, although the reversal was significant, the phenomenon does not constitute a sudden stop for the region as a whole since the amount of capital outflows does not fall below the minimum threshold.

This contrasts with what happened in the early 1980s and late 1990s in which the reversals did indeed constitute sudden stops. As the lift-off is in its first stages, it is too soon to evaluate its effects on capital flows to emerging markets –and to South America in particular.

4. VULNERABILITIES

A macroeconomic shock of a given size and characteristics may have very different impacts depending on the vulnerability of the economy that receives it. Accordingly, in addition to characterizing the shocks, it is just as important to assess the risk factors that determine the economy's degree of vulnerability (Edwards, 2007; ECLAC, 2008), that is, the likelihood that bad news can turn into a crisis.

How can we measure vulnerability to external shocks? Fortunately for us (unfortunately for the region), the recurrence of crises in South America led to a huge effort –both in theoretical economics and in empirical economics– to understanding the causes and consequences of these types of events.

In the specific case of external shocks, previous research shows that vulnerability is linked to a set of indicators related to the fiscal, external and financial fronts (ECLAC, 2008). Accordingly, we will review a series of regional indicators that are linked to the economy's vulnerability to changes in ex ante terms of the foreign exchange market (what we will call "currency risk"). Naturally, we will take the period prior to the external shocks since vulnerability must be evaluated in ex ante terms.

As the shocks we have just discussed have to do with the foreign currency market, we will start by discussing financial vulnerability. In every case, we will review two types of indicators: balance-sheet related indicators and flow indicators.

Let us start with purely external vulnerability indicators. The figure below shows the performance of external vulnerability using the net international financial investment position over GDP (IFP) as an indicator. This indicator is defined as the difference between external financial assets and external financial liabilities of the economy as a whole.

In the past DA episodes, crises were accompanied by significant external fragility reflected in net financial obligations that amounted to around 20 percent of GDP. And during the DA episodes things worsened as the IFP fell sharply (particularly during the first episode). This time, though, the region entered the DA episode in a completely different situation: on average, South American countries are now net foreign creditors in international financial markets.

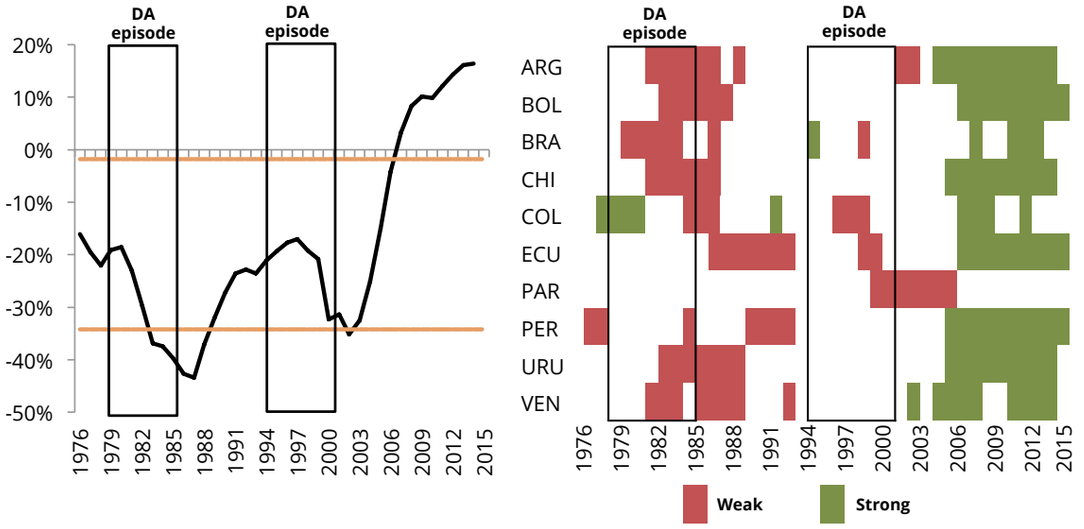
When analyzing country-specific dynamics (the right-hand side of the figure), many interesting issues arise. First, there is a common trend: Paraguay notwithstanding, all countries seem to have learned about previous crises when it comes to international indebtedness (see a detailed analysis along these lines in Albrieu, 2015). Indeed, during the current DA episode almost all countries have positions that could be labeled "strong" according to their own history[11]. Chow *et al.* (2015) show that this strong stance regarding foreign balance sheets is quite generalized among emerging markets elsewhere.

11 > Of course, for a developing country to be a net creditor in international markets, and in particular, to be a financier of the United States, it would hardly be the best development policy. But when it comes to crises, it serves a purpose.

Figure #15_ The strong dollar and foreign vulnerabilities, South America I.

International financial investment position over GDP

left: regional average; right: country-specific dynamics



Source: Own elaboration based on ECLAC data.
Note: ARG: Argentina; BOL: Bolivia; BRA: Brazil; CHI: Chile; COL: Colombia; ECU: Ecuador; PAR: Paraguay; PER: Peru; URU: Uruguay; VEN: Venezuela.

Second, these averages hide big cross-country differences. In countries like Argentina, Bolivia, Uruguay or Venezuela, the IFP is positive; it is negative in Brazil, Chile and Colombia. Indeed, the strong average position in the left-hand figure is largely owing to Venezuela's and Bolivia's strong creditor positions. In 2012, for example, net foreign financial assets in Venezuela accounted for almost half of its GDP.

There were two factors behind this improvement. On the one hand, total external debt levels diminished considerably in the region in 2003-13, shrinking from 62 percent to 27 percent of GDP. On the other hand, South American governments decided to reduce their own balance-sheet risks against foreign financial shocks. We will return to this issue later.

Vulnerabilities arising from foreign liabilities must be addressed in greater detail. We left aside the dynamics of foreign direct investment in our previous analysis, given that it is considered relatively stable and, crucially, leaves the currency risk in the hands of the lender: if a depreciation of the local currency occurs, the dollar value of the liability corrects downward *pari passu* the value of the local currency.

Turning to financial markets, portfolio equity assets are also denominated in local currency, thus leaving the (foreign) lender holding the currency risk. Debt and banking loans are generally denominated in "hard" currency (dollar, euro or yen). In this case a currency depreciation event does not affect the dollar value of the liabilities, but it damages domestic agents' net worth whenever its proceeds in local currency are not indexed by the value of the hard currency in which the debt or the loan was denominated (consider the government, or firms operating in non-tradable sectors). Thus, in the debt and bank loan cases, the currency risk remains largely on the debtor side.

Adverse balance sheet effects of a currency depreciation arising from net debt and loans in a debtor position can be so large that countries may decide not to modify the exchange rate when necessary what Calvo and Reinhart (2002) coined the "fear of floating".

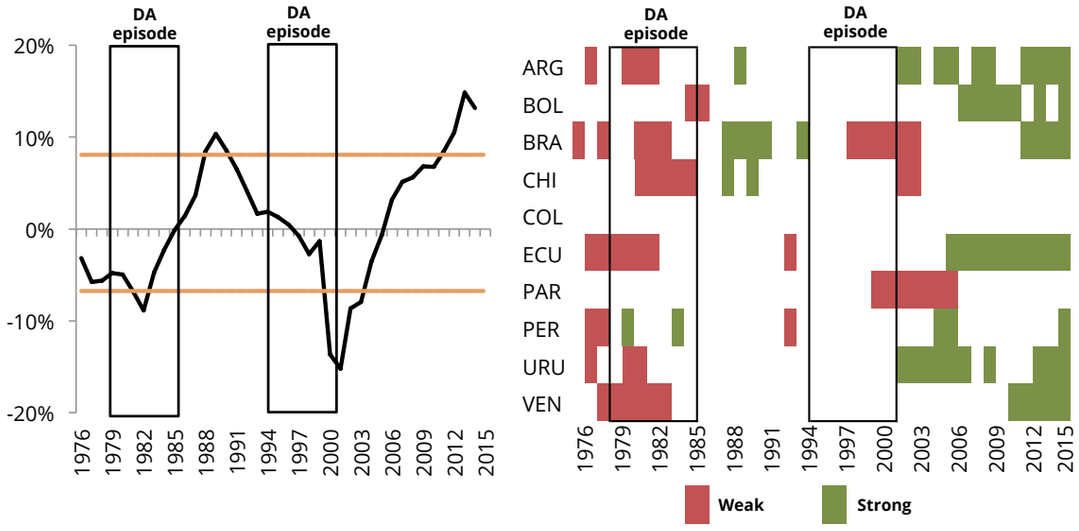
How is South America doing regarding foreign debt and loans? Let us focus on the private sector. Figure 16, left side, exhibits the South American average net international position of the private sector in the debt+loans account (over GDP). Note that it was negative (a net debtor position) during the past DA episodes, but now appears to be different: South America is a net creditor in private foreign debt and loan markets[12]. The importance of this fact cannot be understated; it may well be what makes the difference this time. In reference to Latin America, Ceballos *et al.* (2014, p. 10) yielded similar results:

"Such a change in the structure of the external assets and liabilities might play a key contributing role in avoiding the downside risks of financial globalization".

Figure #16_ The strong dollar and foreign vulnerabilities, South America II.

International investment position over GDP, debt + other investment

left: regional average; right: country-specific dynamics



Source: Own elaboration based on Central Banks.
Note: ARG: Argentina; BOL: Bolivia; BRA: Brazil; CHI: Chile; COL: Colombia; ECU: Ecuador; PAR: Paraguay; PER: Peru; URU: Uruguay; VEN: Venezuela.

As to country-specific dynamics, during the first DA episode weak positions regarding foreign loans were the norm. At that time, some observers considered foreign private debt and foreign loans to the private sector two variables that did not require government surveillance. Private sector decisions would fully incorporate any risks involved (notably currency risks) prior to engaging in any financial transaction. So why ban them?

12 > The other period when this position became positive was at the end of the Lost Decade, after a long period of stagnation, debt nationalizations, and private deleveraging.

The most studied case during this episode is Chile. Between 1978 and 1981, the net position of the Southern country in these types of assets went from -9 percent to -25 percent of GDP, mainly through lending channeled by banks. During the lending boom, the IMF's outlook was largely optimistic about Chile's financial policies, mainly because the government had decided to stay out of the credit market (see Robichek, 1981). When some financial institutions went bankrupt, the government implemented sizable bailout plans. Then, when the debt crisis exploded in neighboring countries, the situation only worsened. Ultimately, the Central Bank of Chile had to nationalize private debt, something that most South American countries were also forced to do in varying ways.

The drastic consequences of building up vulnerabilities in foreign private sector debt were somewhat unexpected, but a lot of moral hazard behavior was involved, that is, situations where agents take additional risks because they believe someone else will share the losses should a bad scenario materialize. In this case, the third party is the government, who ex post has all the incentives to bailout banks given that their fall can be costly for the "real side" of the economy, and given the loss of wealth for depositors and the disruption in expenditures for creditors. Private debtors and foreign creditors are well aware of the incentives.[13]

Díaz Alejandro (1985, p.15), referring to the sequence of crises in the early 1980s, wrote:

"Foreign lenders take the government announcements that will not rescue local private investors, especially banks, with non-guaranteed external (or domestic) liabilities even less seriously than depositors take the threat of a loss of their money".

Net positions of the private sector may not give us an accurate measure of the effects of currency risks in balance sheets. The above-mentioned incentives, the fact that assets and liabilities can be distributed unevenly across the private sectors, and many other factors, can all make it difficult to "call" any private sector foreign asset to match any private sector foreign liability. Besides, foreign-currency denominated contracts *between* domestic agents can also be subject to currency risks, and hence, macroeconomic tensions. That is why an analysis of the evolution of gross domestic agents' liabilities in foreign currency provides a better picture of the overall currency risks involved.

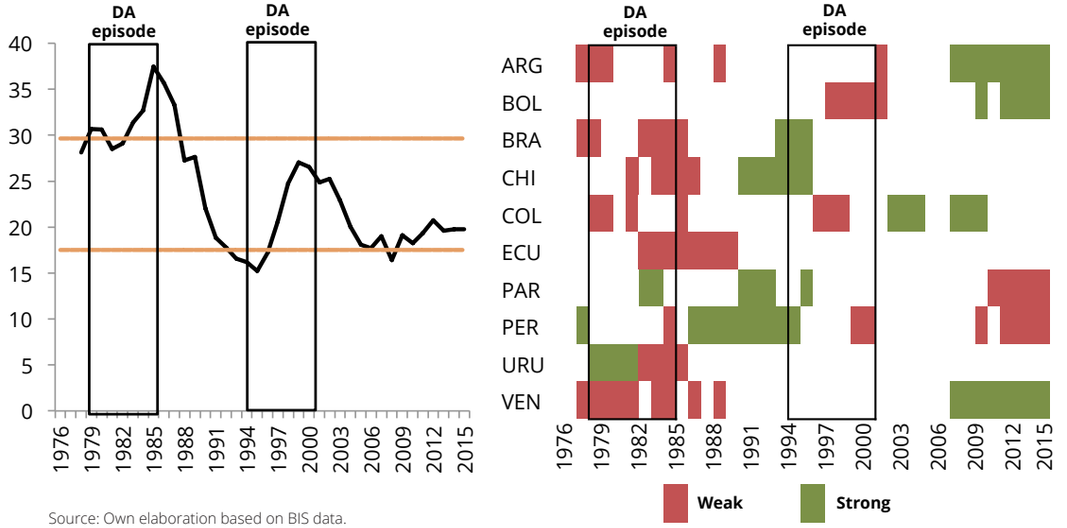
Following Calvo *et al.* (2008) we will take the Domestic Liability Dollarization (DLD), which measures the size of foreign-exchange denominated domestic debts towards the domestic system (Calvo *et al.*, 2008, p. 2). Why take these linkages between foreign currency markets and the banking system? Because the latter is the main private source of international liquidity. Due to the lack of data on deposit dollarization for the first DA episode, we will take the domestic banks' foreign borrowing as a share of GDP as a proxy. The corresponding analysis is summarized in Figure 17.

13 > Here is a tricky question for policy makers: Once the government has bailed out banks and nationalized foreign debt, what prevents the private sector from doing it again? Tirole (2002) makes a detailed study of time inconsistency (ex ante it is better not to intervene, but ex post it is better to intervene).

Figure #17_ The strong dollar and foreign vulnerabilities, South America III.

Consolidated foreign claims of BIS reporting banks to GDP (%)

left: regional average; right: country-specific dynamics



Source: Own elaboration based on BIS data.
Note: ARG: Argentina; BOL: Bolivia; BRA: Brazil; CHI: Chile; COL: Colombia; ECU: Ecuador; PAR: Paraguay; PER: Peru; URU: Uruguay; VEN: Venezuela.

In the left-hand figure, note that during both past DA episodes the banks' foreign debt increased sharply on average in South America. In contrast, this time it remained relatively constant and at relatively low levels. The second factor is that financial globalization based on banking activities was more important during the 1980s than from the early 1990s on.

As to country-specific dynamics, during the first DA episode the weak position of South American countries regarding this indicator was widespread. In the second DA episode the outlook was more heterogeneous, with weak positions (Argentina, Bolivia, Colombia and Peru) and strong positions (Brazil, Chile and Paraguay). And the choice type of instrument changed –from banking loans to market debt (not shown in the figure).

The heterogeneity is now found in the current DA episode, but with changing roles: Argentina, Bolivia and Venezuela hold the stronger positions (largely because they have been out of the international financial system) while Paraguay's and Peru's positions are rather weak. If we include the data on deposit dollarization taken from Levy Yeyati (2006) and national central banks, we obtain a richer indicator of DLD, although our sample begins in 1995. In this case, weaker positions can be found in Ecuador and Paraguay, and to a lesser extent in Chile and Peru. Uruguay has managed to reduce its exposure and now registers historically low values, but the level of dollarization is still high in comparative terms.

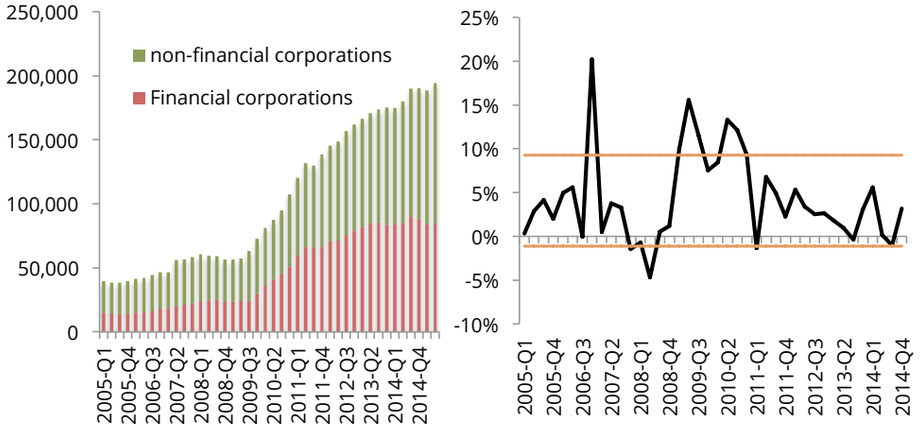
These data are still too aggregate to be able to assess vulnerabilities in the private sector. The problem here is that, even if there are elephants in the room, risks could be hiding in blind spots in terms of regulation. That is why considering comparable, publicly available data may not be the best way to derive a picture of currency risks for a given economy.

These comments are particularly true when it comes to foreign corporate debt. In effect, bond issuance by private corporations in foreign markets is a largely un-measured and un-regulated arena (BIS, 2015, p.11).

Figure #18_ The strong dollar and foreign vulnerabilities, South America IV.

International debt securities of firms, amounts outstanding

(a) US million (b) quarterly growth

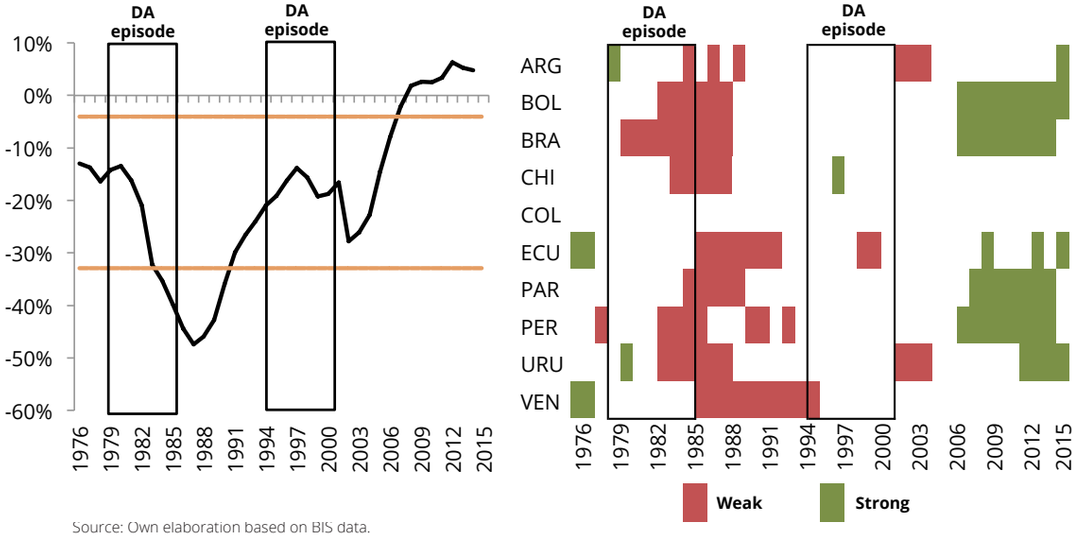


Source: Own elaboration based on BIS data.

Figure #19_ The strong dollar and foreign vulnerabilities, South America IV.

International financial investment position, public sector (%)

left: regional average; right: country-specific dynamics



Source: Own elaboration based on BIS data.
Note: ARG: Argentina; BOL: Bolivia; BRA: Brazil; CHI: Chile; COL: Colombia; ECU: Ecuador; PAR: Paraguay; PER: Peru; URU: Uruguay; VEN: Venezuela.

To address this issue, Figure 18 shows the amounts of outstanding corporate debt securities issued in international markets as estimated by the BIS. Note first that during the post-subprime crisis there was a boom in international issuance with total debt in dollar terms being two or three times larger than during the period 2005-08.[14] Our metrics for excessive values yield the following result: three episodes of foreign corporate debt booms were found; two of them belong to the post-subprime crisis period.

Let us conclude the analysis of currency risks in the balance sheet of the private sector and move to the public sector[15]. Note that Figure 3 illustrates an important point: currency crises in South America are more likely to be accompanied by external sovereign crises than by private sector (banking) crises. So, let us now analyze currency risks in the public sector balance sheet.

14 > This trend is also well documented in Powell (2015, pp. 30-32) and Rodrigues Bastos *et al.* (2015).

15 > More information regarding fragilities in the private sector can be found in Powell (2014).

The first candidate is the international financial investment position of the public sector, calculated as international reserves minus external public debt over GDP (Figure 19). On average, the difference in the current DA episode is striking. In past DA episodes, net financial foreign liabilities at the beginning accounted for -20 percent / -10 percent of GDP. This time, South American governments enter the dollar appreciation phase as net creditors (for some 5 percent of GDP). During the first DA episode, events spiralled out of control, and the governments' net financial foreign liabilities rose to 50 percent of GDP. This dramatic increase in the external fragility of the public sector was the exact counterpart of the private sector's deleveraging exhibited in Figure 16[16]. As Díaz Alejandro (1984b, p. 377) noted, massive bailouts and nationalizations yielded a scenario in the mid-1980s characterized by "public debt, private assets".

Turning to country-specific dynamics, note that during the first DA episode, Brazil's weak position in the early stages of the first DA episode signals a particular case. In effect, the biggest country in the region pursued a rather different financial policy to the other countries, one aimed at avoiding any credit boom coming from capital flows. But the government did take advantage of the benign scenario prior to 1982. In the second DA episode, in turn, South American governments managed to avoid weak positions, but some pockets of vulnerability remained (Ecuador and Argentina). Finally, during the current episode no South American government with a weak position exists; instead, seven countries enter the new DA episode with strong positions regarding the pubic sector's net foreign financial liabilities.

How can we explain this change? There were two factors behind this improvement. On the one hand, the region's external indebtedness levels diminished considerably after the second DA episode. Between 2004 and 2014 it shrank from 32 percent to 11 percent of GDP. If we leave Argentina aside because of the effects of the debt restructuring in 2003-05, the picture shows little change: external public debt decreases from 28 percent to 11 percent of GDP. Two-digit debt reductions in terms of GDP were to be found in Argentina, Bolivia, Ecuador, Paraguay, Peru, Uruguay, and Paraguay.

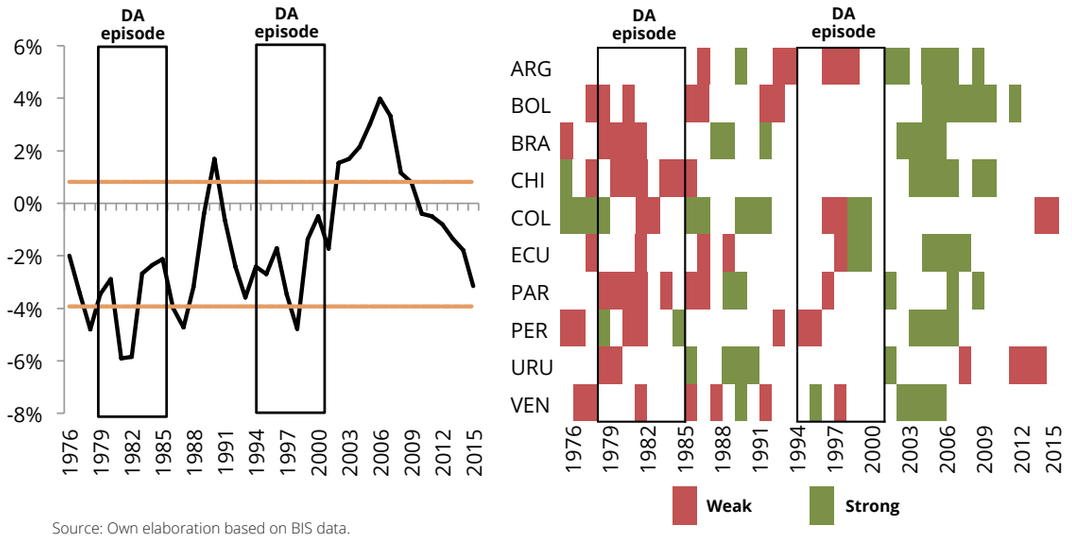
On the other hand, South American governments decided to self-insure against financial shocks by accumulating foreign reserves. Within this new framework, between 2004 and 2014 the region's international reserves increased from 13 percent to 20 percent of GDP despite the phenomenal growth in regional GDP. This trend hides deep heterogeneity: international reserves in countries such as Bolivia, Peru and Uruguay represent more than 30 percent of GDP, in others like Argentina, Ecuador or Venezuela they account for less than 10 percent of GDP. We have reviewed the main indicators associated with balance sheets. To check potential liquidity problems, we will address flow indicators.

16 > The sequence "private debt surges–banking crises-sovereign crises" seems to be a common feature of crises both in advanced and developing economies at least since the early eighteenth century. See Reinhart and Rogoff (2011).

Figure #20_ The strong dollar and foreign vulnerabilities, South America V.

Current account (% of GDP)

left: regional average; right: country-specific dynamics



Source: Own elaboration based on BIS data.
Note: ARG: Argentina; BOL: Bolivia; BRA: Brazil; CHI: Chile; COL: Colombia; ECU: Ecuador; PAR: Paraguay; PER: Peru; URU: Uruguay; VEN: Venezuela.

We start with the current account over GDP (Figure 20). This is important. If an economy is running a current account deficit, it will have to finance it either by issuing new debt or by decreasing the stock of international reserves.

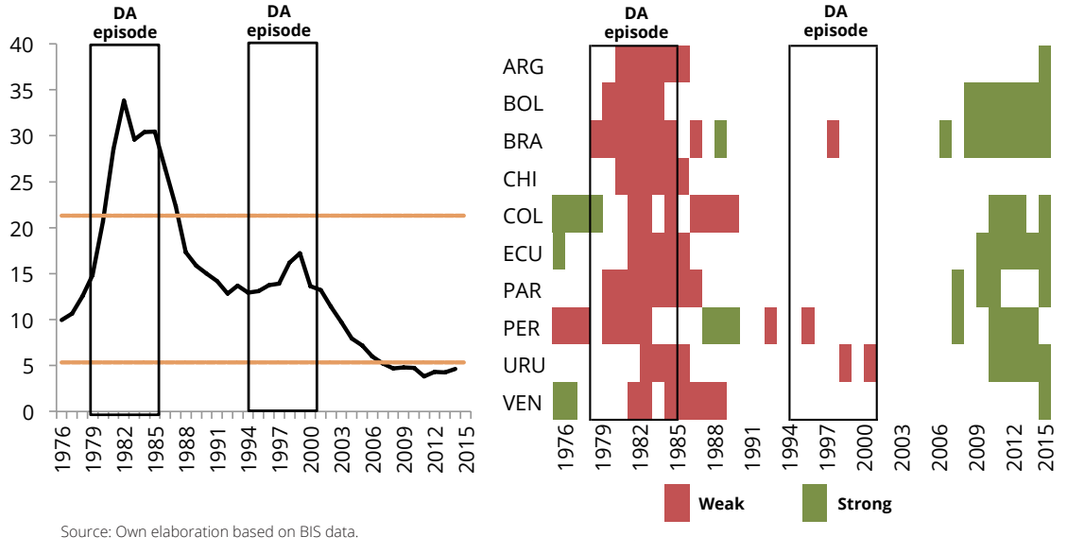
The evidence regarding this indicator shows a similar pattern to the stock of net foreign liabilities for the first decade of the 21st century: there were considerable improvements in South America, and they were widespread (Colombia and Uruguay may be the exception). However, the current account has deteriorated sharply in recent years, and it is estimated that the region will run a current account deficit of around 3 percent of GDP in 2015, showing that some Dutch disease dynamics may have been at play since the boom of commodity prices in 2007-08.[17]

Cross-country deviations from these averages were rare during the first DA episode (nine out of ten countries had weak positions at the beginning of the episode), but since the early 1990s country-specific factors and policies seem to have played a more important role. As to the current DA episode, even if weak positions are not the norm, the period of strong current account surpluses is over.

Figure #21_ The strong dollar and foreign vulnerabilities, South America VI.

Interest payments on external debt / gross exports

left: regional average; right: country-specific dynamics



Source: Own elaboration based on BIS data.
Note: ARG: Argentina; BOL: Bolivia; BRA: Brazil; CHI: Chile; COL: Colombia; ECU: Ecuador; PAR: Paraguay; PER: Peru; URU: Uruguay; VEN: Venezuela.

17 > Country studies and general trends about Dutch disease in South America can be found in Albrieu *et al.* (2013).

Our second flow indicator is also widely used when assessing countries' external vulnerabilities in the short run: the ratio of interest payments on external debt to exports (Figure 21).

Note that we can determine two periods. One that broadly coincides with the first DA episode, where interest payments represented up to 30 percent of total export proceeds; two, the last decade, when interest payments represented less than 5 percent of gross exports. US interest rates US interest rates are still in near-zero territory, so it is too soon to know what will happen. But the pre-lift-off position is the best one found since the beginning of the financial globalization in the mid-1970s.

Finally, during the second DA episode interest payments did increase in terms of exports, but only slightly.

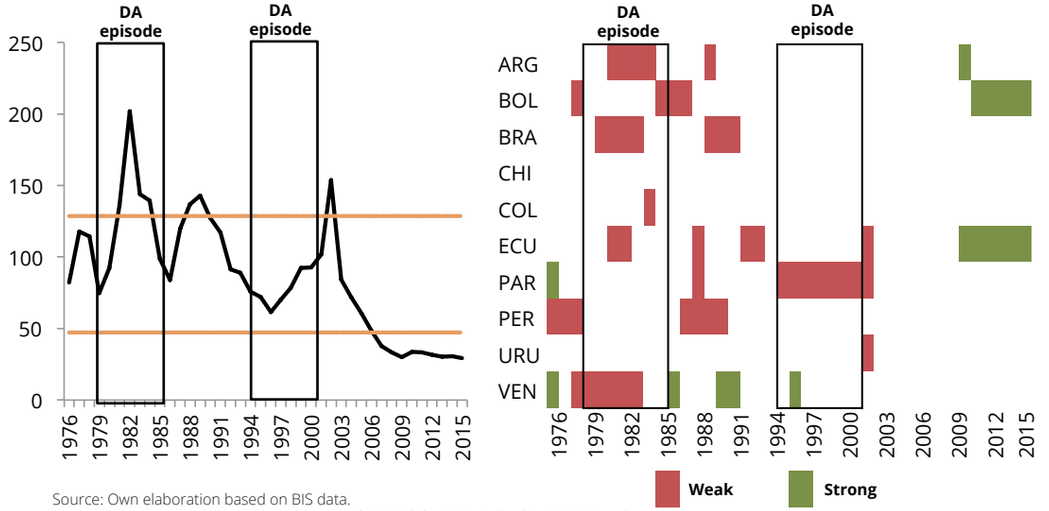
Regarding country-specific dynamics, note that the two periods highlighted above are quite representative: weak stances in the 1990s were found in all the countries in the sample, while the current strong stance is found in all countries but Chile.

Our last flow indicator is the ratio of short-term debt to international reserves. This indicator is important because it is a more accurate measure of an economy's capability to meet its short-term obligations.

Figure #22_ The strong dollar and foreign vulnerabilities, South America VII.

Short-term external debt / international reserves

left: regional average; right: country-specific dynamics



Source: Own elaboration based on BIS data.
Note: ARG: Argentina; BOL: Bolivia; BRA: Brazil; CHI: Chile; COL: Colombia; ECU: Ecuador; PAR: Paraguay; PER: Peru; URU: Uruguay; VEN: Venezuela. Data for Chile is missing.

The outlook is, on average, quite similar to that found in the previous indicator. During past DA episodes it increased sharply, surpassing 100 percent. In other words, DA episodes are periods of stress when it comes to the dynamics of short-term debt and international reserves. The current DA episode, in turn, finds the region experiencing its lowest average ratio for this indicator since the mid-1970s.

Huge differences arise when analyzing the evolution of this indicator on a country-by-country basis. In Argentina and Venezuela short-term external debt represents 60 percent / 65 percent of international reserves, while in Bolivia and Peru it is 5 percent / 10 percent. In the middle are Brazil's and Ecuador's ratios at some 15 percent / 20 percent, while Colombia's, Paraguay's and Uruguay's register 30 percent / 40 percent.

5. NEW REALITY, NEW POLICIES

Shocks and vulnerabilities: taking stock

Figure 23 below summarizes our analysis regarding external shocks arising from the appreciation of the dollar and the vulnerabilities present in South American countries to these adverse shocks, taking into account country-specific dynamics over the last four decades.[18]

From this figure we can first conclude that for regional dynamics current shocks to South American countries are of a similar magnitude to those observed in past DA episodes when it comes to export volumes, export prices, and collateral values; regarding capital flows, the evidence at the time of writing this chapter (February 2016) does not signal sudden stops in foreign financing. Of course, US normalization is on track but interest rates are still near zero lower bound; it may be too soon to evaluate the size of the financial shock.

Regarding foreign vulnerabilities, South American economies seems to be much better prepared for global turbulences than in the past: net foreign liabilities are

18 > Our vulnerability analysis includes an extended set of variables. A full cross-country historical analysis of external shocks and vulnerabilities can be found in Annex 2.

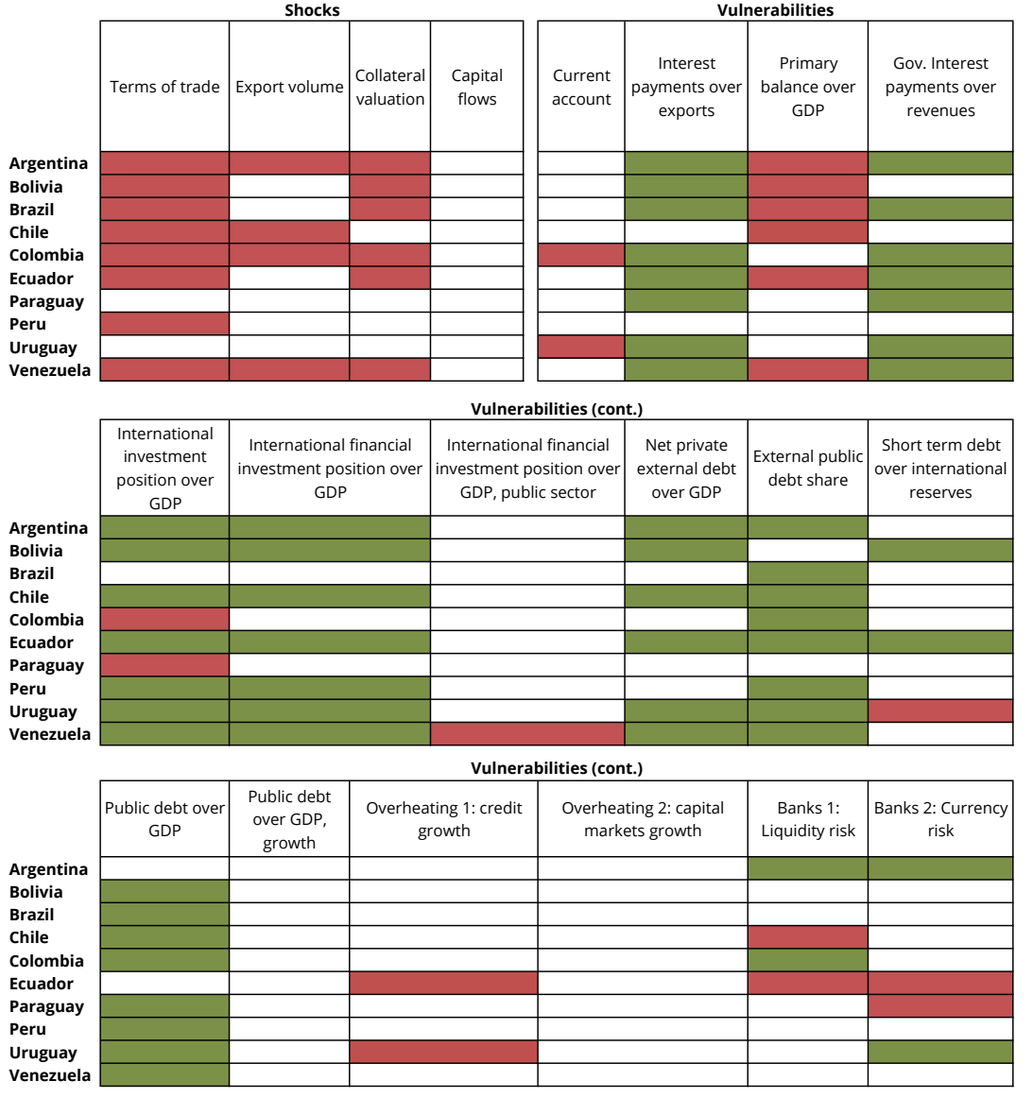
either low or negative; capital inflows into the region are concentrated in direct investment and portfolio equity, which lowers currency risks. Downside risks are to be found everywhere in the deterioration in the current account and in financially-integrated economies like Chile or Brazil in the hard-to-measure evolution of foreign corporate debt.

With respect to the nexuses between foreign and public sector risks, the outlook is also better than in the past. Governments managed to avoid issuing excessive debt denominated in foreign currency, central banks piled-up huge amounts of reserves, and some fiscal consolidation was at play. Country-specific factors, nonetheless, create divergences among countries that may matter in the near future. Argentina and Venezuela, for example, have shown bigger public sector vulnerabilities than, for example, Chile or Bolivia.

Turning to the linkages between currency markets and the domestic banking system, the outlook is not as weak as in past episodes, but they are not as strong as in the government sector. First, many countries failed to fully de-dollarize financial contracts within the private sector. Peru, Paraguay and Uruguay are cases in point. Second, the easy financial conditions and commodity booms in the aftermath of the subprime crisis permeated the domestic financial system, fueling credit and a capital markets boom that overheated the economy (Brazil and Venezuela).

To fully evaluate the resilience of South American economies to the global adverse scenario, we should incorporate one final dimension, that is, the ability of governments to respond to these adverse shocks. What follows is this chapter with an analysis of the available policy space to (a) offset tensions in foreign markets with exchange rate movements (exchange rate policies), and (b) offset the real effects of the shocks (counter-cyclical policies).

Figure #23_ External shocks and vulnerabilities in South America, circa 2014-15.



BOX
#1

Who's next in the line? Forecasting currency crises in crisis-prone emerging markets[1]

New currency crises in emerging markets? After several years of stability and growth in emerging countries, instability would now seem to be travelling South. The reason? The US is normalizing its monetary policy, which means that the dollar is appreciating and global interest rates are on the rise. As we discussed in this chapter, this new stance in US monetary policy has spread to emerging markets in the form of several shocks to their currency markets: a fall in commodity prices, a drop in export volumes, and tighter financial conditions. Two sets of factors are key to making a country-by-country evaluation to determine whether this new global scenario can translate into a currency crisis at home. Let's first analyze the size of the shocks and second see how resilient the economy is to these adverse shocks. Taking this into account, the box assesses the likelihood of a currency crisis in emerging markets.

Our empirical strategy. We estimated two LOGIT models to assess the likelihood of a currency crisis based on the "usual suspects", namely, trade and financial external shocks on the one hand, and macroeconomic vulnerabilities on the other. In our first specification (Model 1) we model the dichotomous outcome variable (currency crisis / no currency crisis) as a linear near combination of the predictor variables. In our second specification (Model 2) we segmented the segmented variables (when appropriate). We use data from some 200 countries covering the period 1970-2014.

Table#1_ Analysis of maximum likelihood estimates

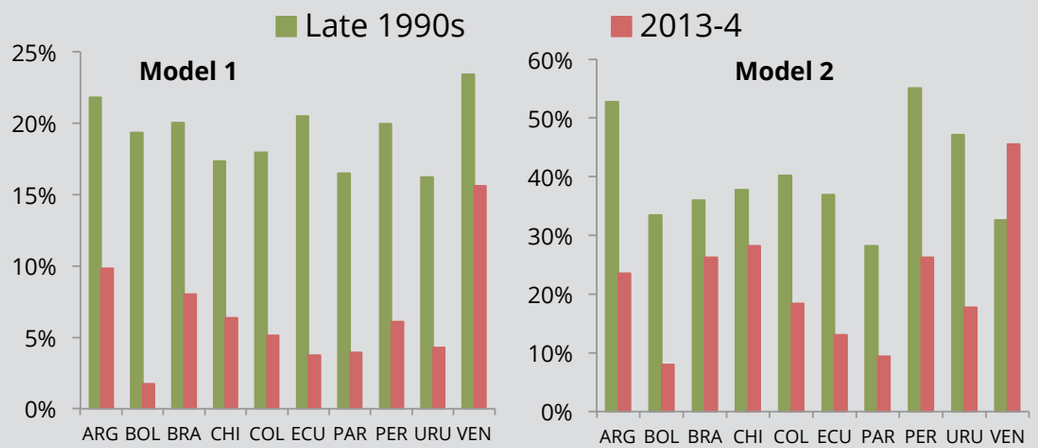
Model 1			Model 2			
Parameter	Estimate	Pr > ChiSq	Parameter	Segment	Estimate	Pr > ChiSq
Intercept	-0.4676	0.2271	Intercept		0.299	0.4525
Export volume index	-0.0105	<.0001	Export volume index		-0.00877	<.0001
Terms of trade	-0.00392	0.1004	Consolidated foreign claims of banks to GDP (%)		-0.00341	0.1202
Interest rate, public debt	6.6614	0.0426	Short-term debt (% of total reserves)	<100	-0.6769	0.0006
External debt stocks (% of exports of goods, services	0.0019	<.0001	External public debt (% GDP)	<100	-1.8493	0.0007
External debt stocks (% of GNI)	-0.00337	0.0354	External debt stocks (% of GNI)	<100	1.3211	0.0074

Our results. Table B1 shows the results. We left aside a subset of variables without explanatory power and segmented another subset of variables where some nonlinearities were present. As was expected, economies with smaller trade shocks (proxied by export volume levels) are less likely to experience a currency crisis. As for financial shocks, the bigger the shock (proxied by the effective interest rate paid by the government), the higher the likelihood is of a currency crisis. Regarding vulnerabilities, our model highlights the stock of external obligations (total external debt, public external debt, and consolidated foreign claims of BIS reporting banks, all in terms of GDP) as well as short-term indicators (short-term debt in terms of total reserves).

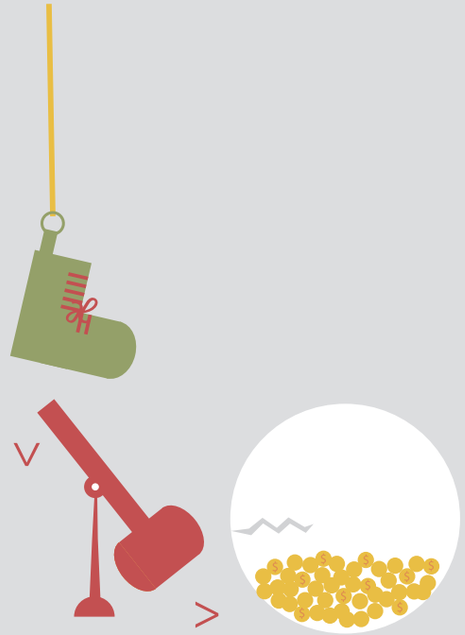
1 > This box summarizes Albrieu (2016).

Is South America better prepared this time? With these estimations at hand we can assess the likelihood of a crisis in every South American country. We highlight two periods: the late 1990s and 2013-14. Note that as a general rule South American countries managed their macroeconomies during the boom years in the early 21st century to reduce the risk of a currency crisis. Nevertheless, Venezuela and Argentina stand out for adverse reasons: progress in these countries was mild. Indeed, in our segmented estimation Venezuela's currency risk has been even higher now than it was in the late 1990s. In contrast, Bolivia, Peru and Uruguay have evidenced a huge resilience to external shocks.

Figure B1_ Crisis probabilities in South American countries.



Source: Albrieu (2016).

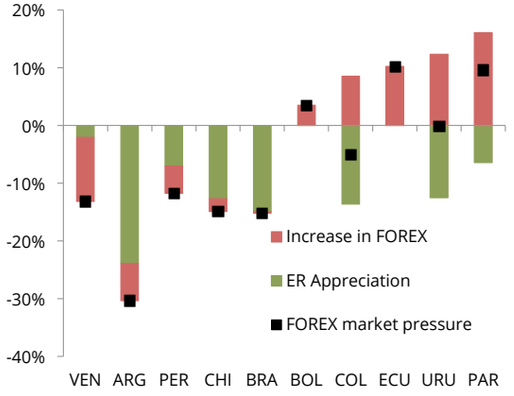


Policy space and policy reactions

Monetary and exchange rate policies also presented significant improvements compared to the past DA episodes. First, the augmented version of inflation targeting regimes, following Chang and Velasco (2014), implied exchange systems that showed greater flexibility, allowing the currency to absorb a big share of the external shock and to depreciate in response to the shortage of foreign currency without triggering a currency crisis (Figure 24).

Figure #24_ Exchange market pressure and exchange rate policy in South America.

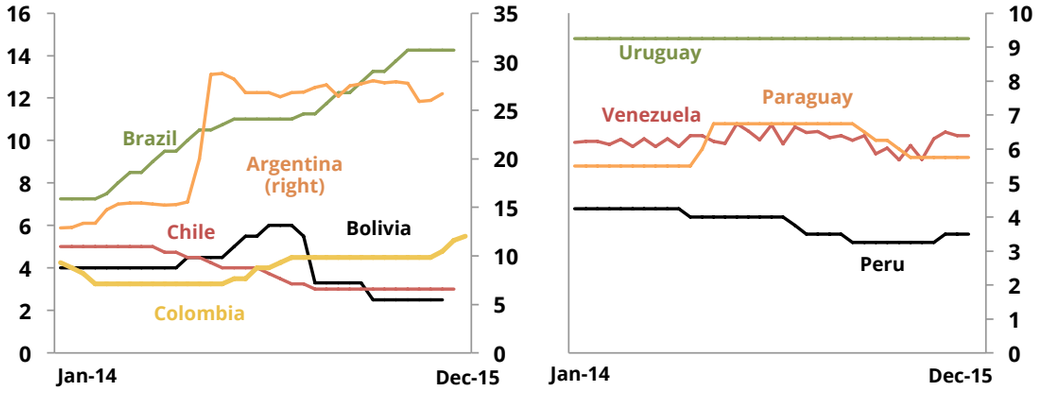
Cumulative growth, Jan.-2014 to Sept.-2015



Source: Own research based on IADB data.
Note: the exchange rate pressure index is the weighted sum of growth in reserves and the nominal exchange rate with the US (where positive growth implies an appreciation of domestic currency).
See Aizenman and Hutchison (2012).

Again, these averages hide major heterogeneities. Fully (de jure) dollarized Ecuador was unable to let the exchange rate absorb the shock; partially dollarized banking systems in countries like Peru also limited exchange-rate flexibility; inflation-prone Venezuela tried to avoid exchange-rate movements because of their inflationary effects. In many of the remaining countries, exchange-rate depreciation was (and still is) a powerful tool to avoid a painful external adjustment.

Figure #25_ Monetary policy rates in South America.



Source: Own elaboration based on IADB.

Let us digress here about the less-than-expected exchange market pressure in Ecuador and in high-inflation, low-reserves Argentina and Venezuela. Behind these benign dynamics is China and its financial loans to natural resource-rich, "rebel" countries around the world, operating as a high-politics-related counterbalance to market sentiment. In the South American case, a variety of instruments, ranging from swap arrangements between central banks to commodity-backed loans (Gallagher *et al.*, 2012). It is difficult to fix an accurate estimate of the

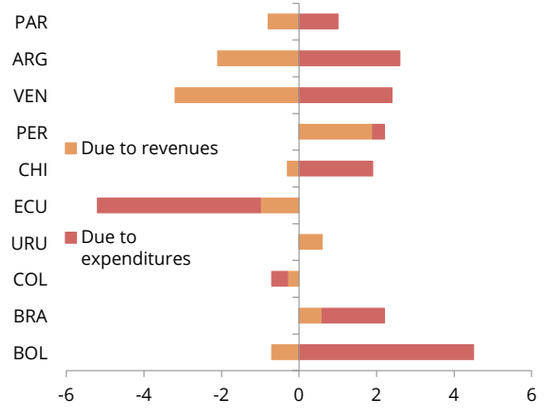
magnitude of these exchanges given that China's finance is channeled mainly through offshore financial centers. Reinhart (2015) estimated that between 2009 and 2014 China's loans to Venezuela rose from virtually zero to 18 percent of the Caribbean economy's GDP. In Ecuador, it represents some 11 percent of GDP, while in Argentina it is estimated at 4 percent of GDP.

Ideally, central banks must cut key monetary policy interest rates to boost demand in the context of adverse shocks, such as the ones we are analyzing here. But in a context of increasing financial integration, it is hard for central banks to set interest rates according to domestic objectives; in turn, the global financial cycle of Rey (2015) seems to dominate the monetary stance everywhere.

This decoupling in the policy rate to domestic conditions is important in South America (IMF, 2015b). As we show in Figure 25, policy rates have been relatively invariant over the last year amid the big shocks hitting the region.

What about fiscal policy? Short-term aggregate demand concerns call for counter-cyclicality, that is, for increasing expenditures and cutting taxes. Interestingly, some counter-cyclicality arises automatically due to the linkages between export proceeds and tax revenues. Indeed, according to Gomez Sabaini and Jimenez (2015), circa 2013 the government revenues related to the exports of non-renewables goods (oil, gas and metals) yielded some 12 percent of GDP in countries like Venezuela, Bolivia, and Ecuador, while in Brazil and Argentina it accounted for less than 2 percent of GDP. Of course, even if this automatically impacts in taxes, this hardly boosts disposable income and, hence, fosters consumption.

Figure #26_ Fiscal Impulse determinants.



Source: Own elaboration based on IADB data.
Note: Changes in expenditures / GDP and revenues / GDP. In the latter, a negative sign implies an increase in the indicator.

The reduced fiscal space severely affected the governments' ability to increase expenditure without a corresponding increase in tax revenue (including the inflationary tax, of course). For that reason, the fiscal impulse (defined as the difference between the change in primary expenditures and the change in tax revenues) was rather small in 2014 and it is expected to play an even smaller role than it did during the subprime crisis.

Conclusion

A period of tight US monetary policy has begun. It represents a shift from a global environment of low interest rates and a depreciated dollar to one of high interest rates and an appreciated dollar. From the perspective of South American countries, in turn, it is certainly bad news. Indeed, it is related to a drop in commodity prices, a deceleration in global growth as it depresses exports worldwide, a dramatic reduction in the internationally-accepted collateral for debt issue and an increase in funding costs.

How is the region coping with this adverse external context?

Regarding **shocks**, there are sizable effects on the reduction in export proceeds motivated both by price and quantity changes. In southern agricultural countries (Argentina, Brazil, Paraguay and Uruguay) the annual loss in export income between mid-2013 and mid-2015 averaged some 1.5 percent of GDP. In this group, Brazil was less affected largely because of its more closed, more diversified status (Paraguay is the exact opposite case). Similar results can be found in mineral-rich countries of the Pacific (Chile, Colombia and Peru). In this case there is a deep heterogeneity: while Chilean exports remained invariant in terms of GDP, Peru's annual loss yielded some 3 percent of GDP. Finally, the biggest effect corresponds to fuel-rich countries in the region (Bolivia, Ecuador and Venezuela). What about the impact on natural wealth and, hence, the collateral value? According to our metrics, wealth collapses were generalized, and involved crop-rich (Argentina) and fuel-rich countries (Bolivia, Colombia, Ecuador and Venezuela). Brazil, being crop and fuel rich also sustained a natural wealth bust. More diversified Paraguay and Uruguay managed to avoid the wealth collapse, while mineral-rich Chile and Peru experienced downside wealth revisions because export prices adjusted somewhat smoothly.

And financial conditions? Financial conditions in the other countries in the region tightened, but the impact was somewhat manageable. As a general rule, spreads increased by some 100/150 bps. This contrasts with what happened in the early 1980s and the late 1990s when the reversals did indeed constitute sudden stops. As the lift-off is in its early stages, it is too soon to evaluate its effects on capital flows to emerging markets–and to South America in particular.

Regarding **vulnerabilities**, in the past crises were accompanied by significant external fragility. This time, though, the region is in a completely different situation: on average, South American countries are now net foreign creditors in international financial markets. Of course, these averages hide big cross-country differences. In countries like Argentina, Bolivia, Uruguay or Venezuela, the Net International Financial Position (NIFP) is positive; it is negative in Brazil, Chile and Colombia.

Resilience to adverse external shocks can also be found in the public sector. On average, the difference in the current episode of dollar appreciation with those of the past is striking. In past DA episodes, net financial foreign liabilities at the beginning accounted for -20 percent / -10 percent of GDP. This time, South American governments enter the dollar appreciation phase as net creditors (for some 5 percent of GDP).

Notwithstanding these developments, dollarization and pockets of vulnerability in private sector debt markets remain a cause for concern. Weaker positions can be found in Ecuador and Paraguay, and to a lesser extent in Chile and Peru. Uruguay has managed to reduce its exposure and now registers historically low values, but the level of dollarization is still high in comparative terms.

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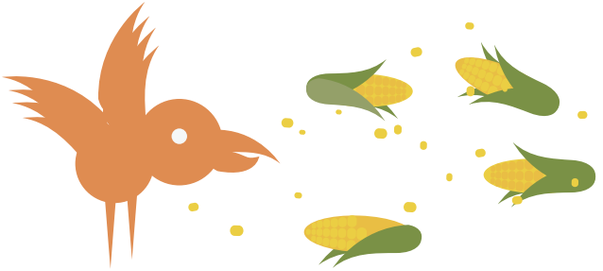


ANNEX
#1

Estimating natural resource wealth in South America

In 2006, in its book "Where is the Wealth of the Nations?" the WB assesses the whole wealth in the countries by measuring the reproducible capital, natural capital, and intangible capital. The document concludes that in most of the low income countries, natural capital represents a more substancial proportion of the wealth than in high-income countries. This emphasizes the importance of *preserving* the natural capital and that the development and growth can not be mantained if it is only based on the depletion of the environment (that is, in the transformation and exhaustion of the natural capital). These opinions are reaffirmed in the works of 2011 entitled *"The Changing Wealth of Nations: Measuring Sustainable Development in the New Millennium"*, which corrects some methodological points and reaches similar conclusions.

To measure the natural capital, the BM uses the market values/prices, obtaining a proxy of valuation based in the mineral resources, the timber-related, and the non-timber related, the farmland and the protected areas. The value of the stock of natural resources is based in the country data about physical stocks and an estimate of the yield of the natural resources, world prices and cost of local extraction. The formula employed by the WB follows the standard concept of portfolio theory of the Net Present Value (NPV) and settles a discount rate of 4% with a lifespan of 25 years -a generation– for all of the resources. The NPV of the future rents is used to estimate the income of the natural capital of a country in a *given* span.

All the components included in the proxy of the natural capital by the WB are calculated by using market value. As some of the natural assets and services of the ecosystems have no market value, this assessment approach normally tends to be restrictive. The estimate of the natural wealth is constricted by the data (e.g., the shoal and the water of the undersoil are not considered). Nevertheless, the methodology applied to estimate the natural capital in "Where is the Wealth of Nations?" is based in well established principles of economy and contributes to the development of methodologies for measuring, assessing and valuation of the natural capital. In addition, up to now, methodology looks like the one to resolve with simplicity, the mechanics of calculation in a standard, broad enough and flexible way.

Our guestimate

To replicate the WB estimation of the natural capital for all the countries of the region with a yearly frequency is a task that exceeds this report.

So, we choose a simplified way, strictly following the WB methodology but instead of considering all the items involved, reduces the evaluation to ten products that in our opinion represent a good proxy of the structural specificities of South American countries (see figure A1 for the participation of these goods in total exports in 2014).

The items considered:

Crops: maize, soybeans and wheat.
Subsoil assets: oil, gas, iron ore and gold.
Pasture land: beef, poultry and sheep.

Figure #A1_ Share in total exports, circa 2014.

	Total	Crops				Subsoil						Pasture land			
		Maize	Soybeans	Wheat	Total	Oil	Gas	Copper	Iron ore	Gold	Total	Bovine	Poultry	Sheep	Total
Argentina	43%	5%	28%	1%	34%	2%	1%	1%	0%	3%	7%	2%	0%	0%	2%
Bolivia	78%	0%	8%	0%	8%	5%	46%	0%	9%	11%	70%	0%	0%	0%	0%
Brazil	42%	2%	14%	1%	16%	7%	0%	1%	11%	1%	21%	3%	3%	0%	6%
Chile	53%	0%	0%	0%	1%	0%	0%	50%	2%	0%	52%	0%	0%	0%	0%
Colombia	51%	0%	0%	0%	0%	47%	1%	0%	1%	3%	51%	0%	0%	0%	0%
Ecuador	55%	0%	0%	0%	0%	51%	0%	0%	1%	3%	55%	0%	0%	0%	0%
Paraguay	57%	4%	39%	1%	43%	0%	0%	0%	0%	0%	0%	13%	0%	0%	13%
Peru	51%	0%	0%	0%	0%	4%	0%	24%	8%	15%	50%	0%	0%	0%	0%
Uruguay	43%	0%	18%	3%	21%	0%	0%	0%	0%	1%	1%	20%	0%	1%	21%
Venezuela	86%	0%	0%	0%	0%	85%	0%	0%	1%	0%	86%	0%	0%	0%	0%

Source: ECLAC.

ANNEX
#2

Strong dollar, external shocks and vulnerabilities in South American countries: a chartbook

Preliminary notes

External shocks. We use the deviations with respect to the long-term growth values, using observations at an annual frequency for the period 1976-2015, which fully covers the period of financial globalization. The threshold from which it is considered to be an exceptionally strong or unusual shock is a standard deviation. When the performance of a given period rises above a deviation (the upper bound) , a "boom" is considered to exist in the variable under analysis and when it falls below (the lower bound), there is a "bust".

We consider the following shocks:

Changes in export prices.
Changes in export growth.
Changes in the value of natural wealth.
Capital inflows (net resource transfer).

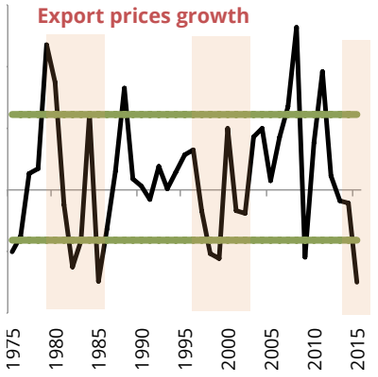
Vulnerabilities. Previous research shows that vulnerability is linked to a set of indicators related to the fiscal, external and financial fronts. Accordingly, we review a series of indicators that are linked to the economy's vulnerability to changes in the conditions of the foreign exchange market. Naturally, we take the period prior to the external shocks since vulnerability must be evaluated in ex ante terms. Strong positions are those above the upper bound and weak positions are those below the lower bound.

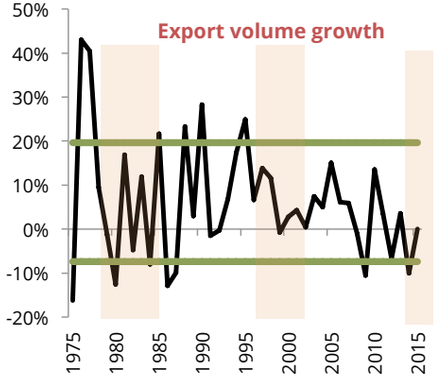
As the shocks we discuss have to do with the foreign currency market, we focus on financial vulnerability. We review two types of indicators: stock, balance-sheet related indicators (International financial investment position –IFIP-, government net foreign financial assets, net debt assets, and banks' foreig claims) and flow indicators (current account and the ratio of interest payments on external debt over exports).

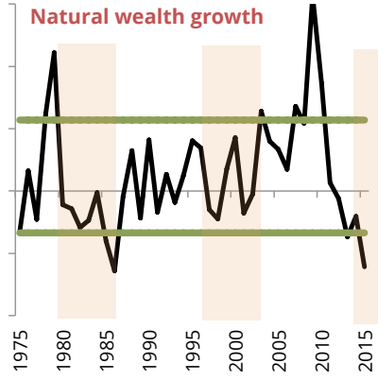
Dollar appreciation episodes. Finally, dollar appreciation episodes are shown in light-orange bars.

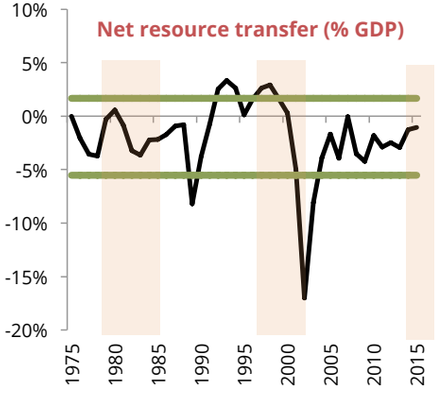
ARGENTINA

Shocks









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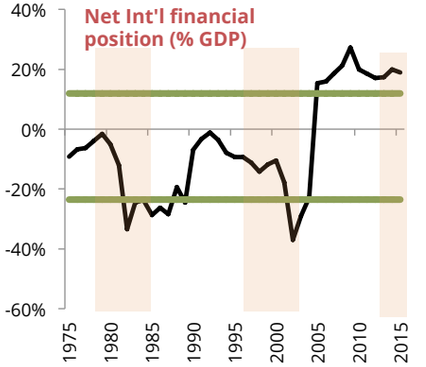
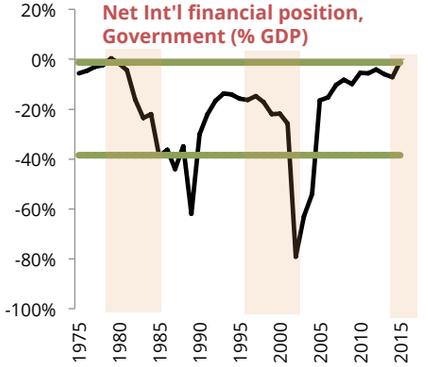
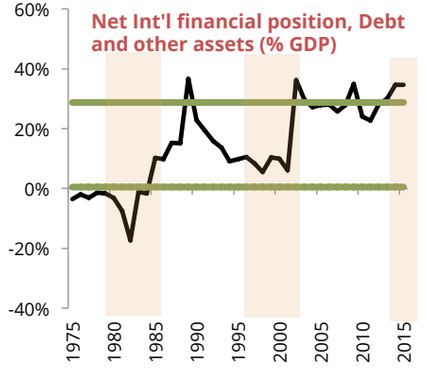
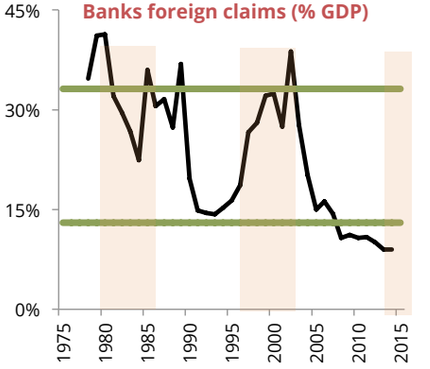
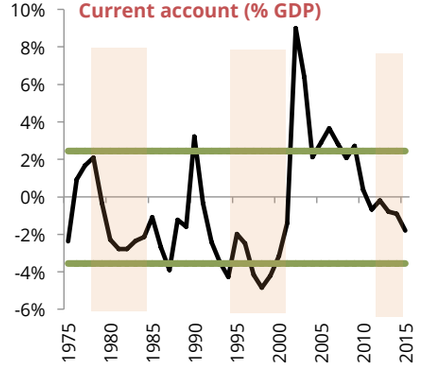
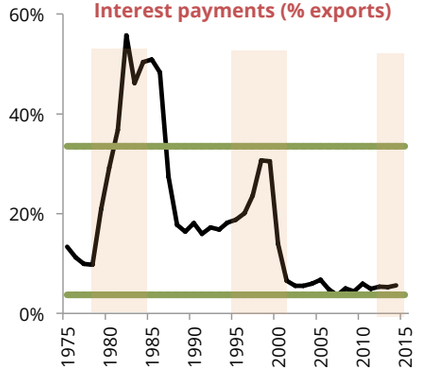






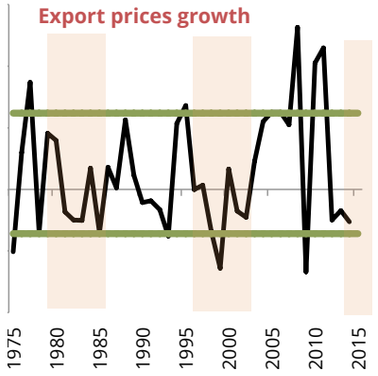


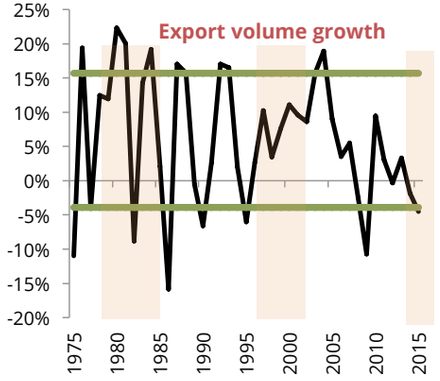


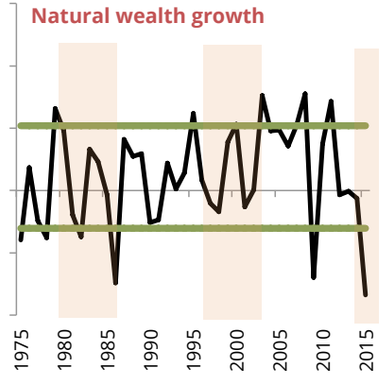


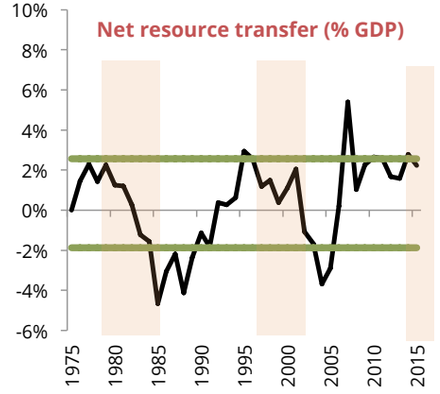
BRAZIL

Shocks

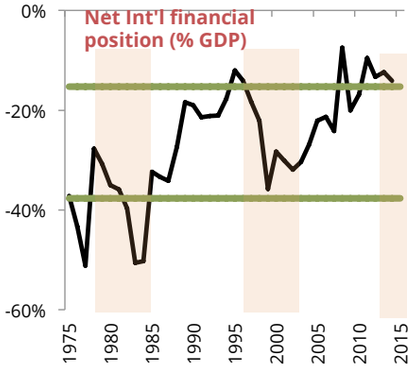


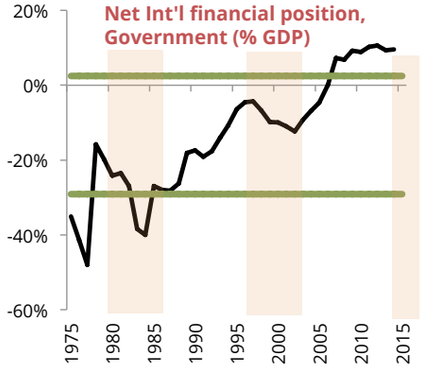


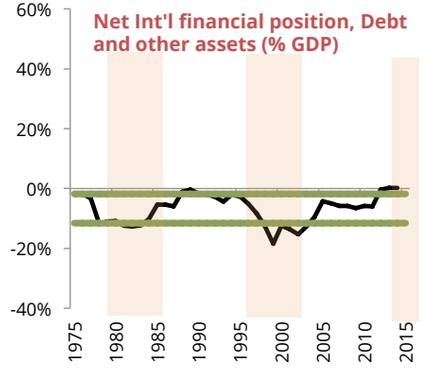


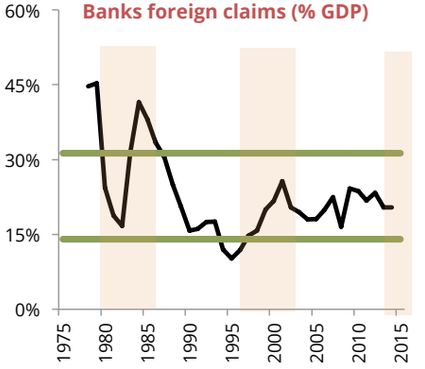


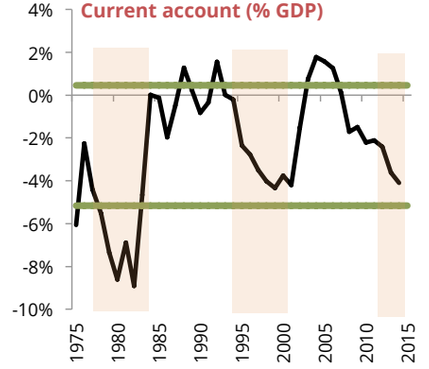
Vulnerabilities

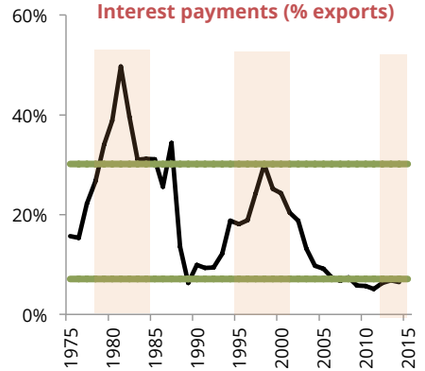






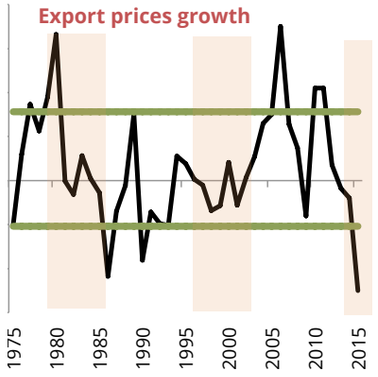


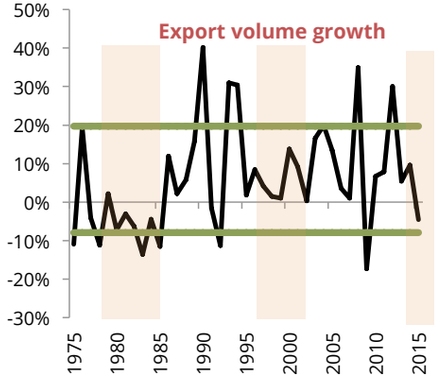


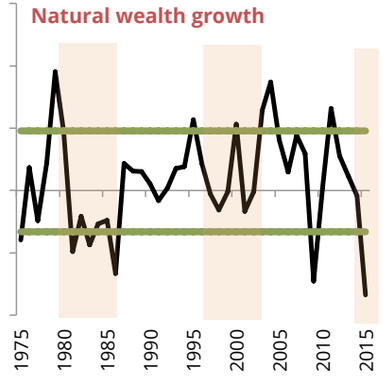


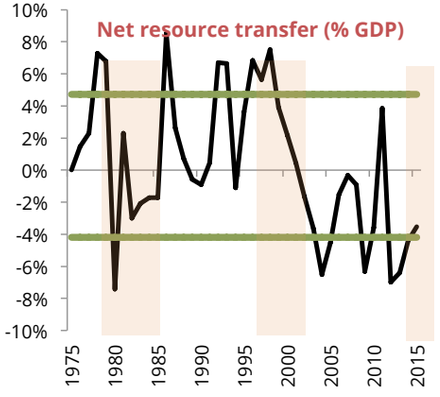
BOLIVIA

Shocks









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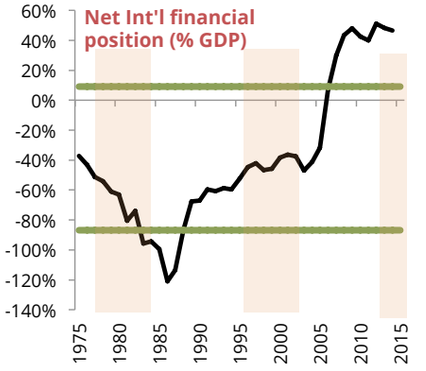
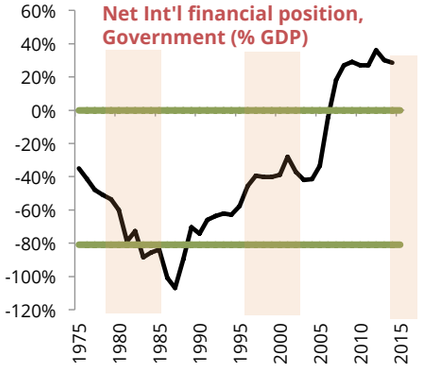
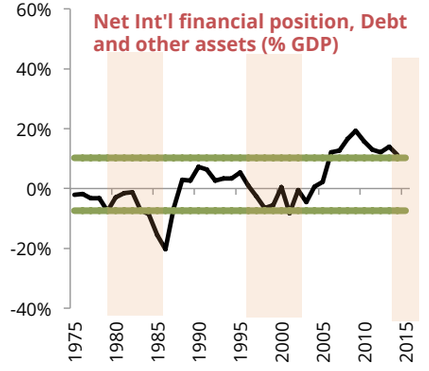
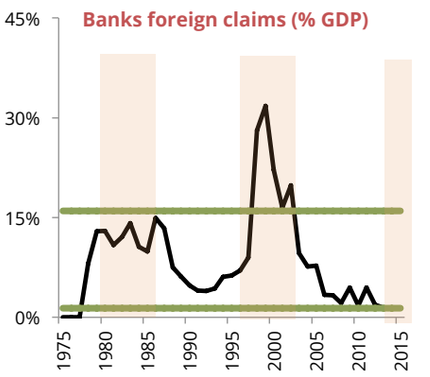
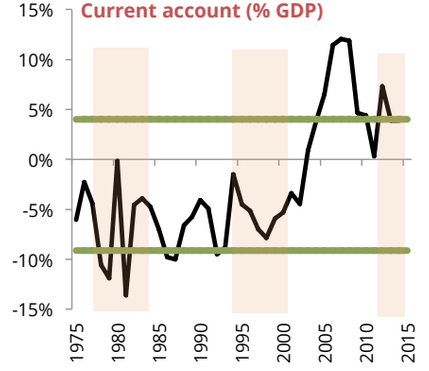
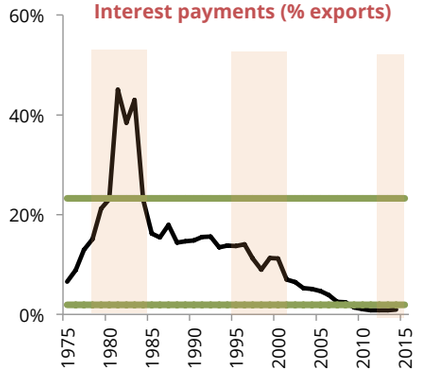






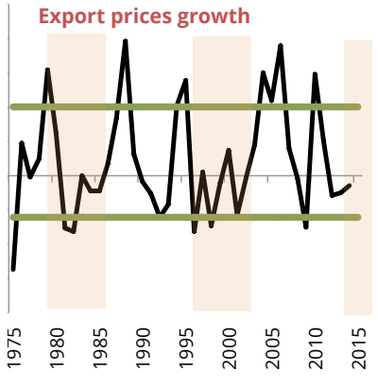


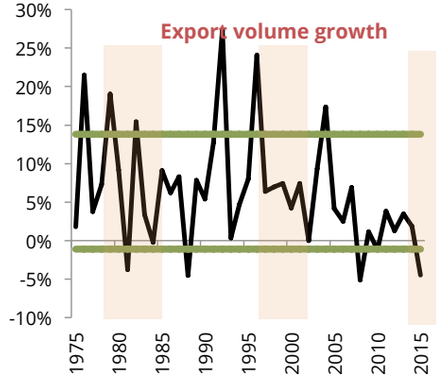


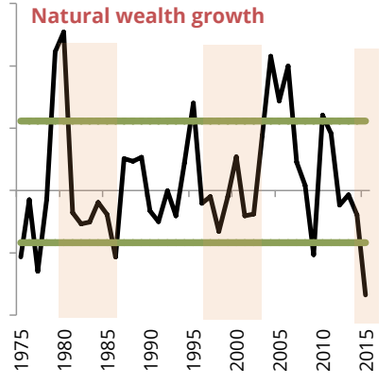


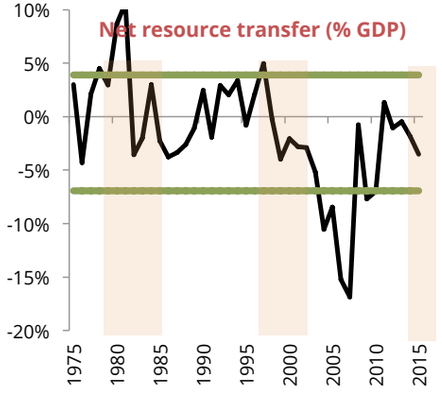
CHILE

Shocks

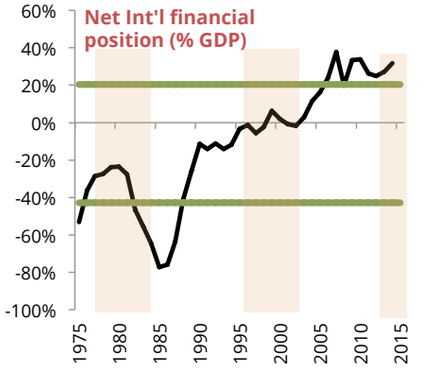


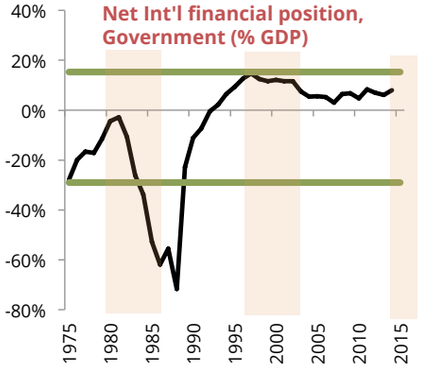


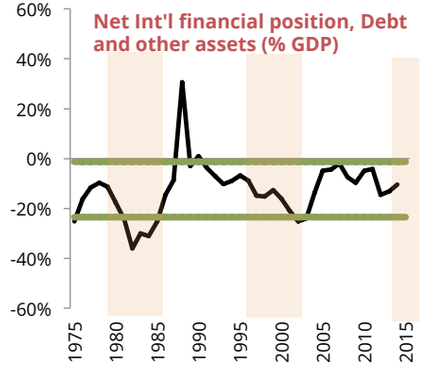


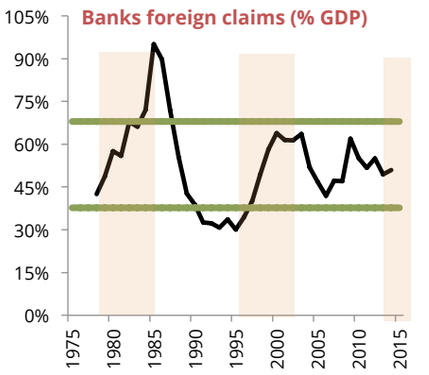


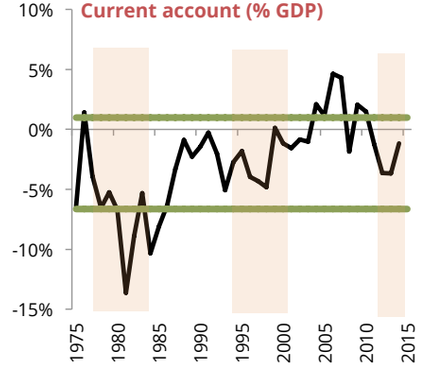
Vulnerabilities

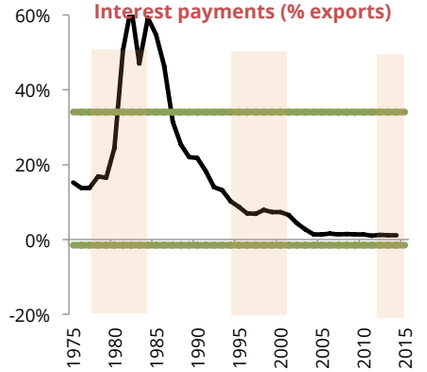






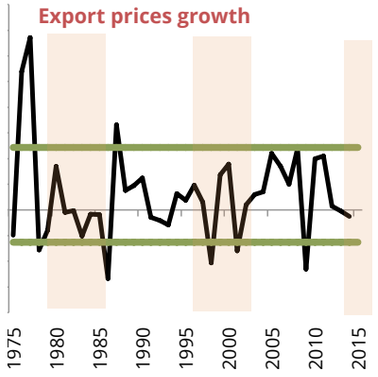


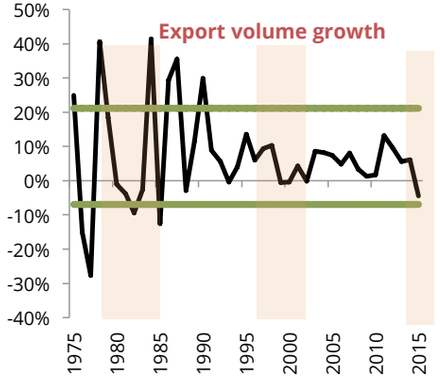


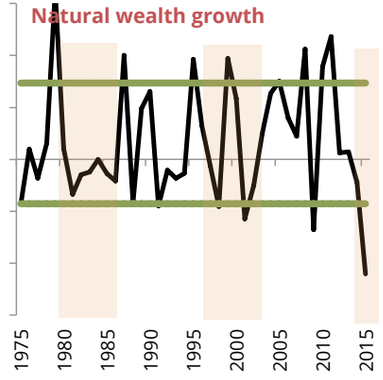


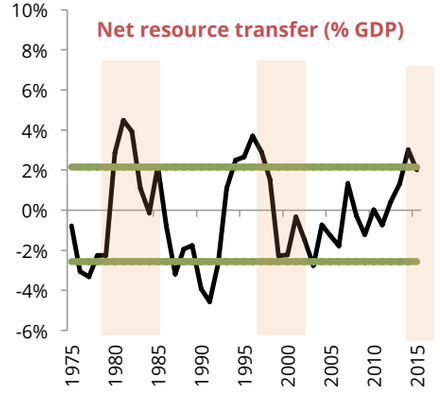
COLOMBIA

Shocks

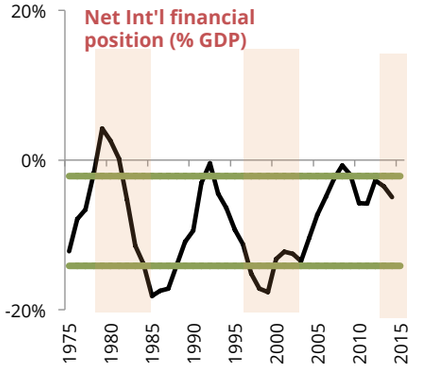


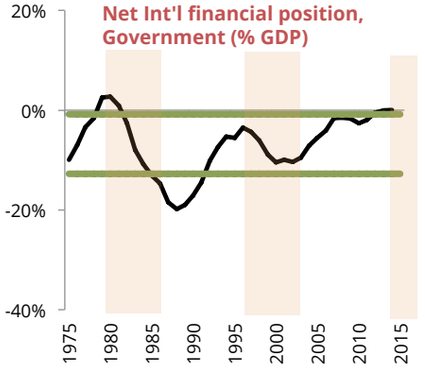


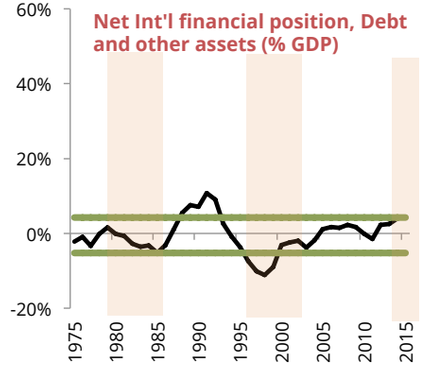


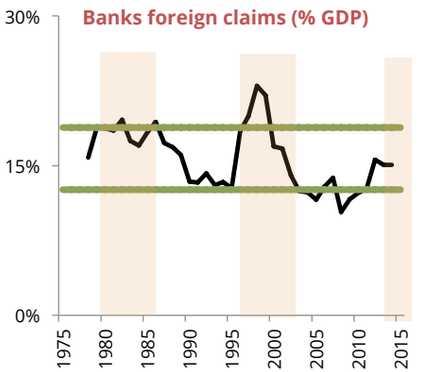


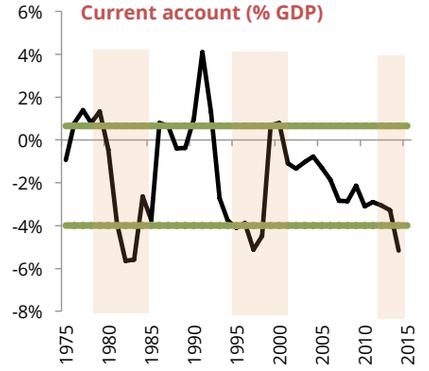
Vulnerabilities

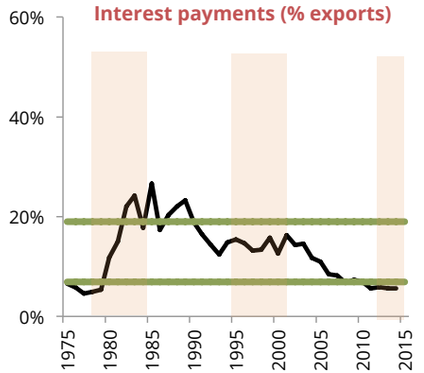






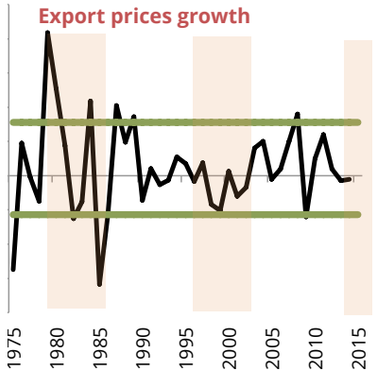


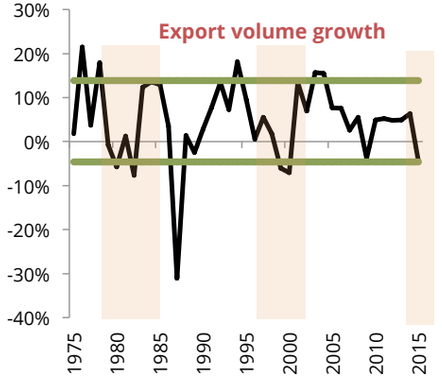


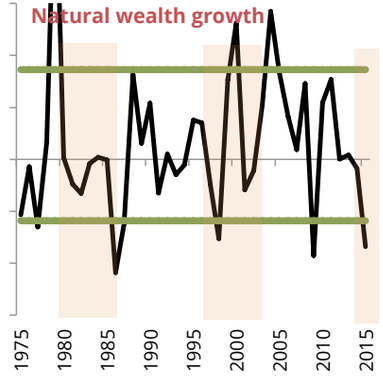


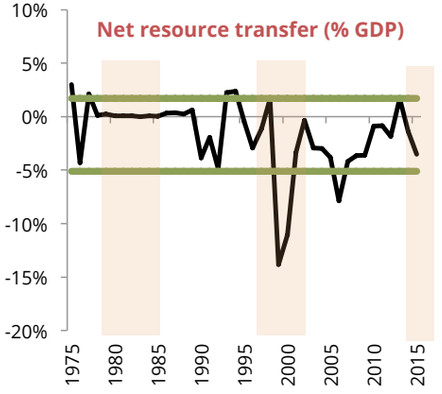
ECUADOR

Shocks

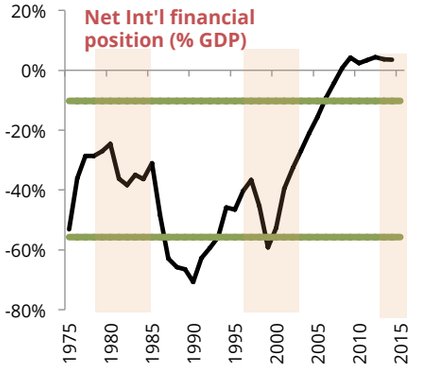


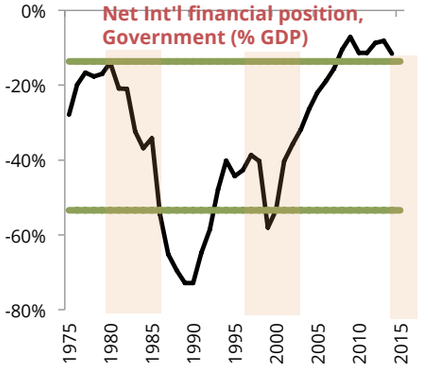


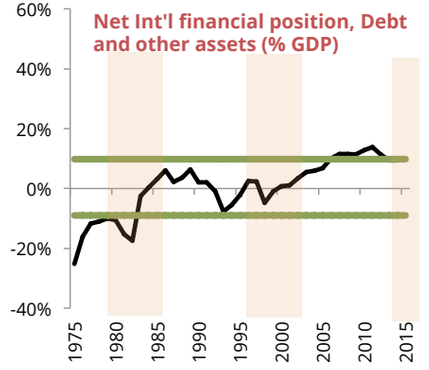


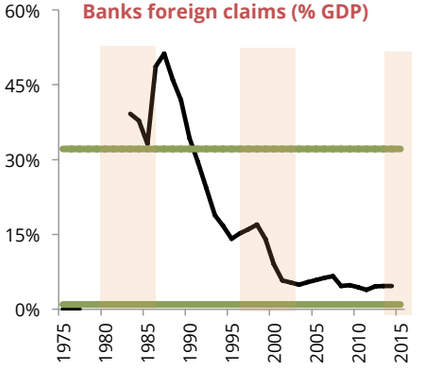


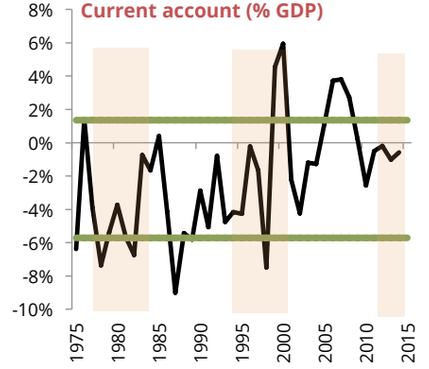
Vulnerabilities

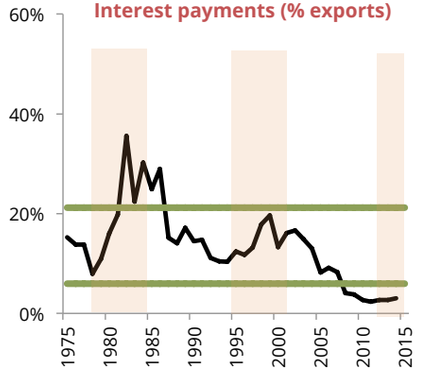






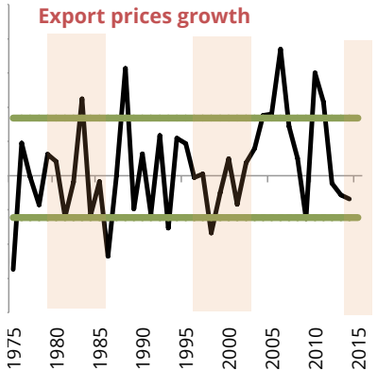


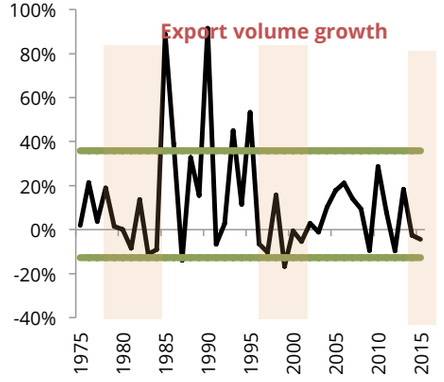


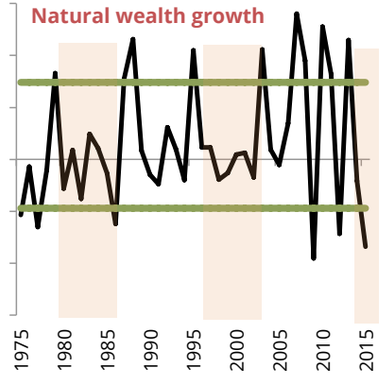


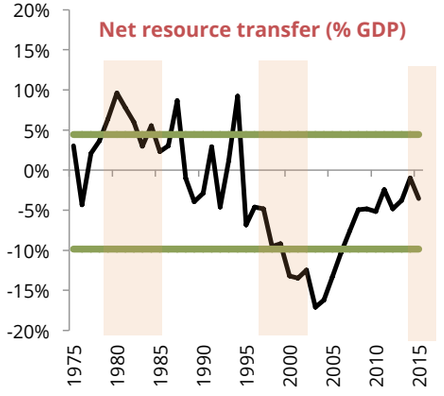
PARAGUAY

Shocks

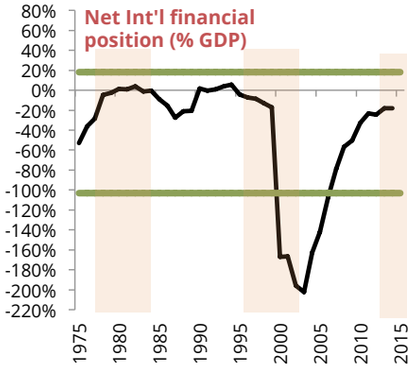


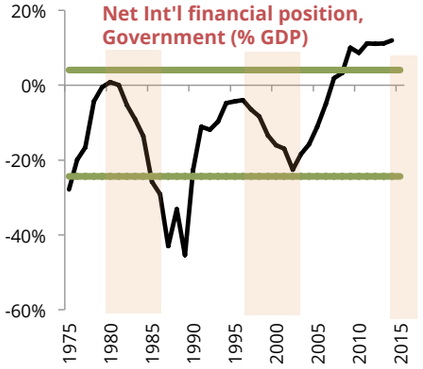


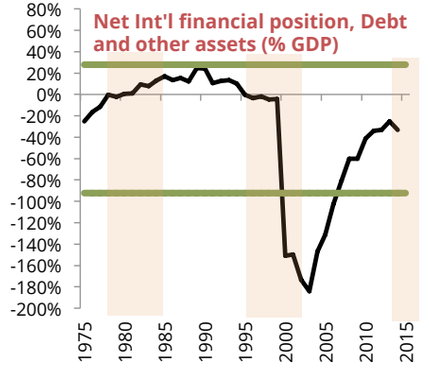


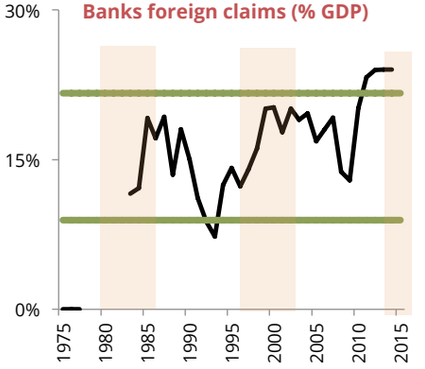


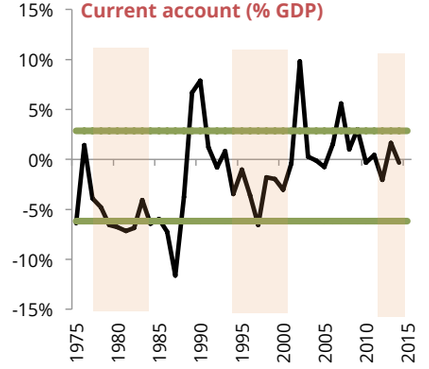
Vulnerabilities

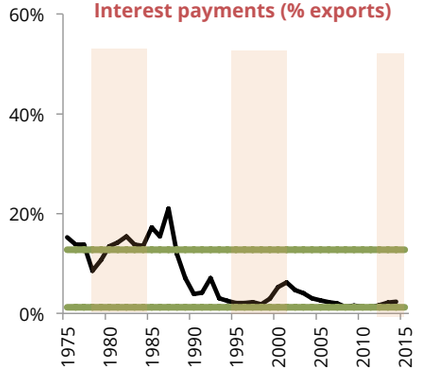






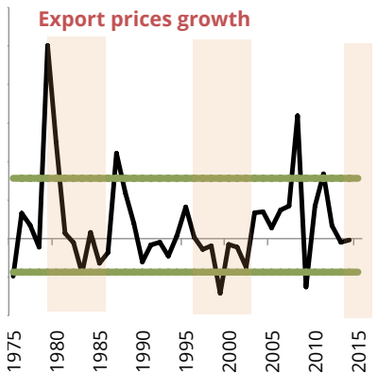


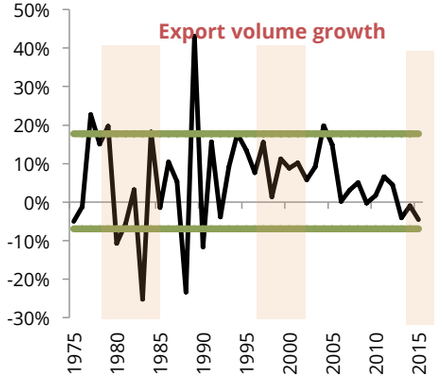


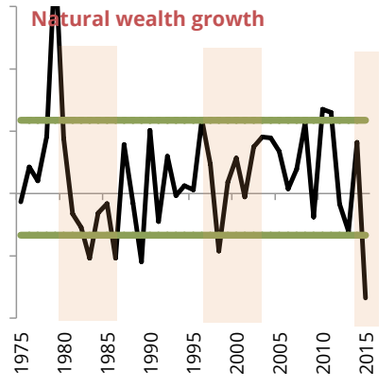


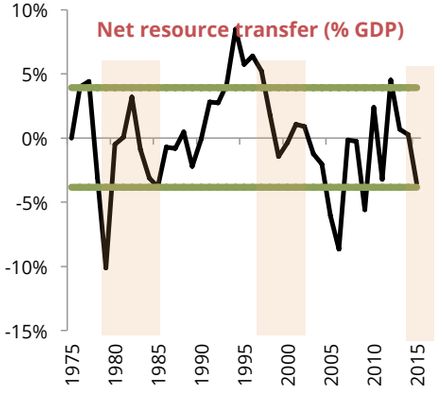
PERU

Shocks

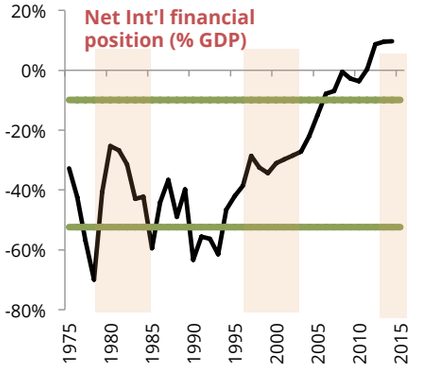


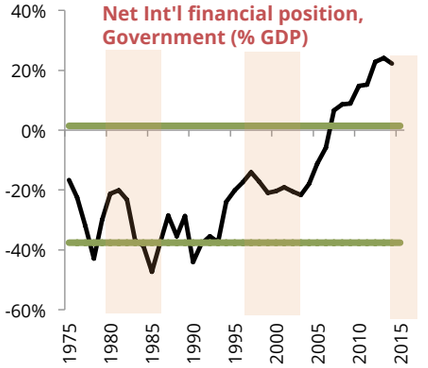


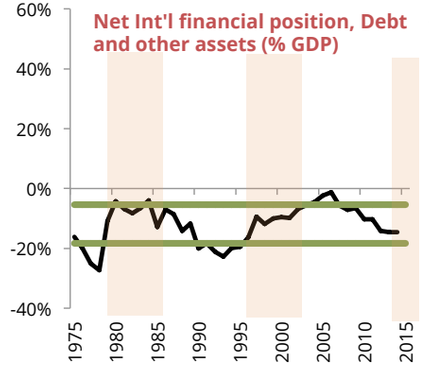


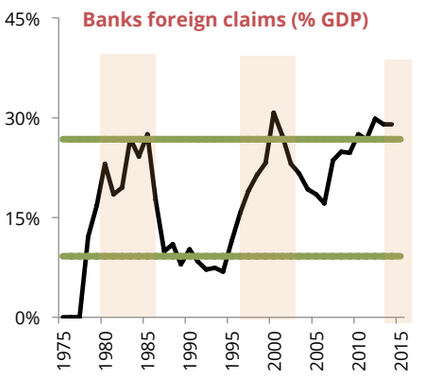


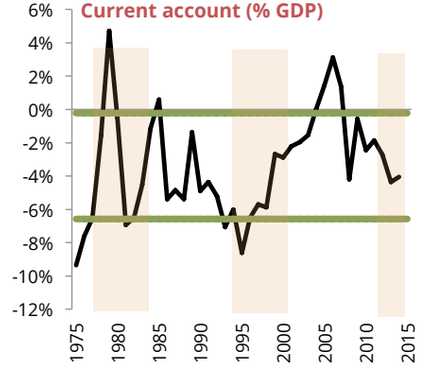
Vulnerabilities

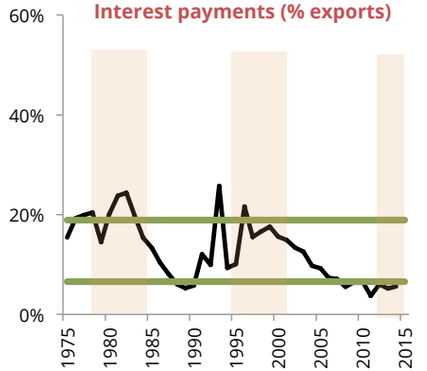






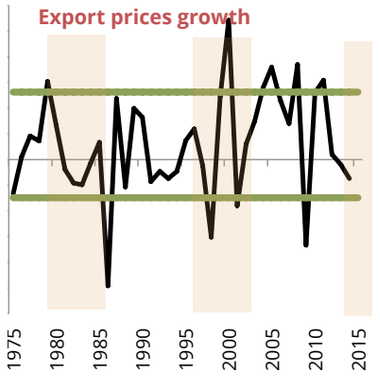


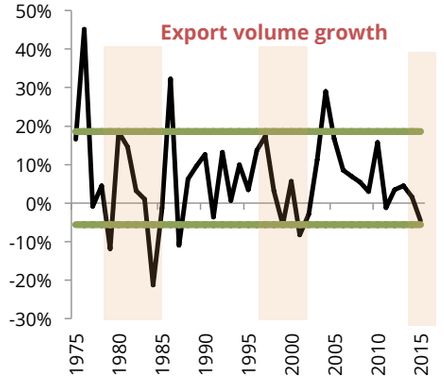


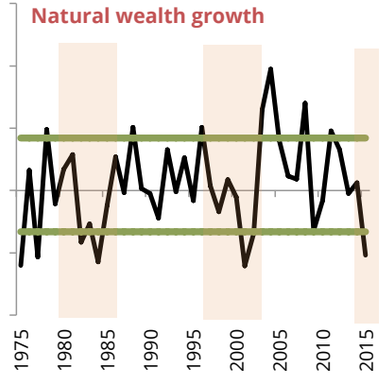


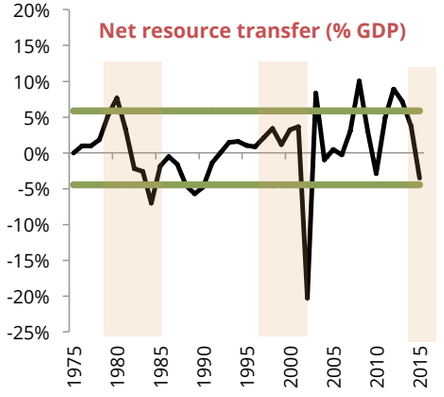
URUGUAY

Shocks

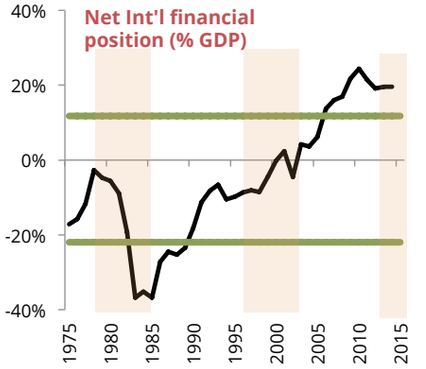


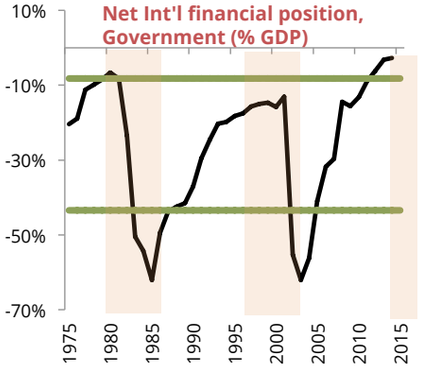


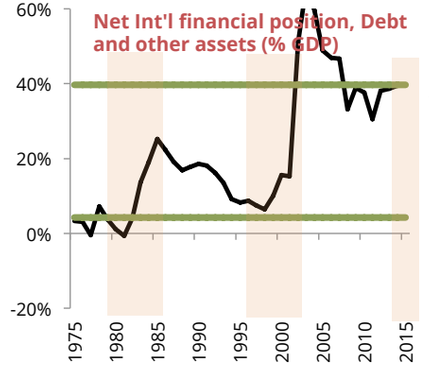


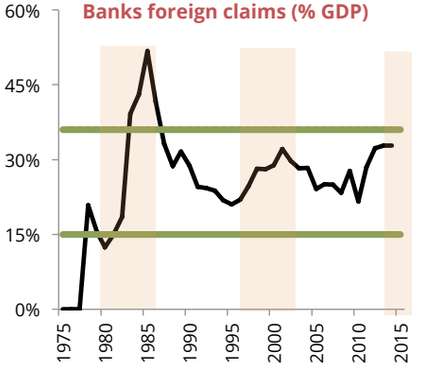


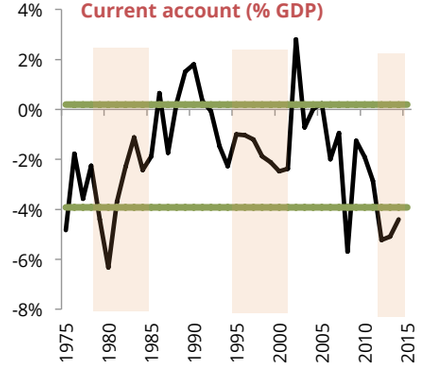
Vulnerabilities

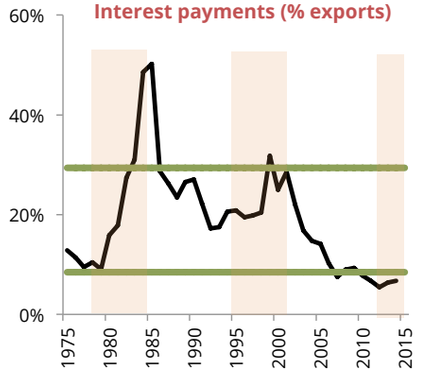






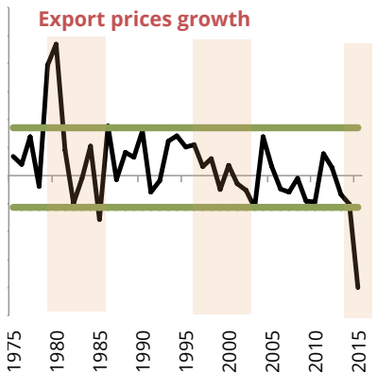


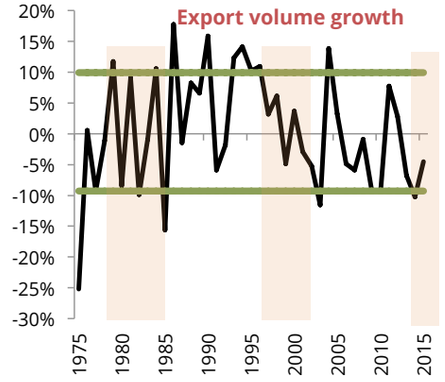


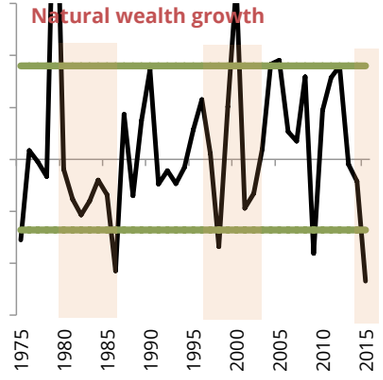


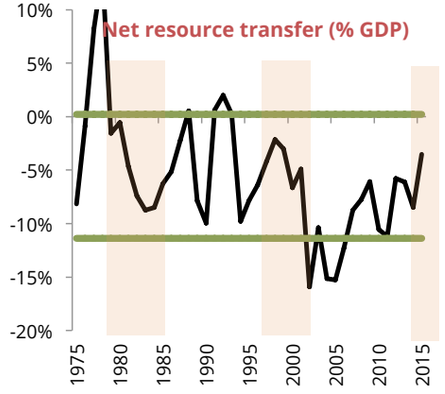
VENEZUELA

Shocks

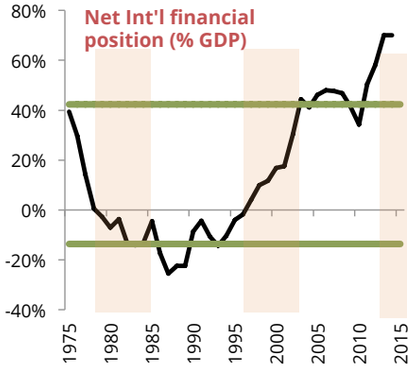


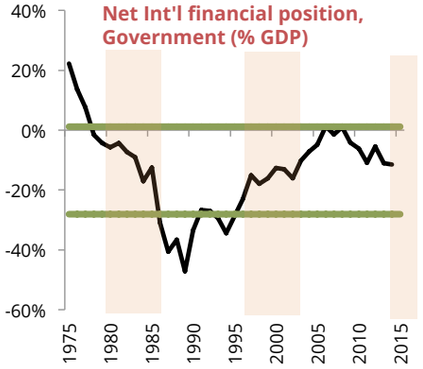


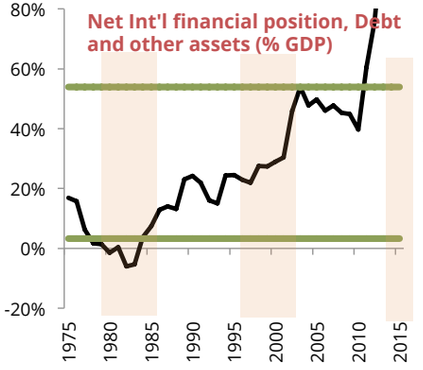


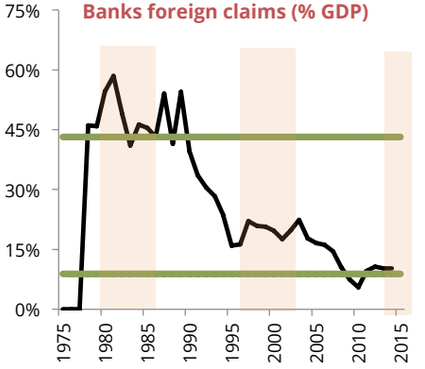


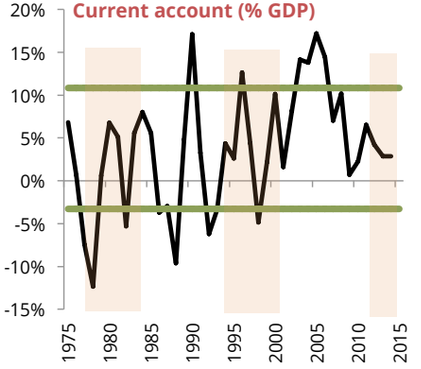
Vulnerabilities

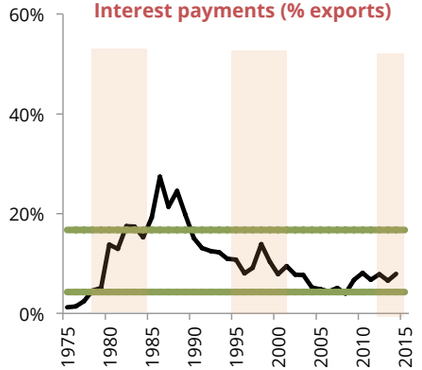


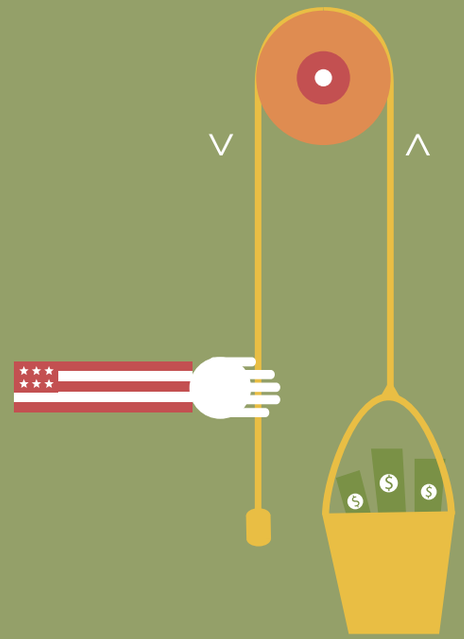












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CHAPTER #2

CURSED GOODS, CURSED JOBS, OR IT'S NOTHING LIKE THAT?

International trade, natural resources and employment in South America, revisited

RED SUR
Red Sudamericana de Economía Aplicada

1. INTRODUCTION

First presented in *The Strategy for Economic Development* in 1958, Albert O. Hirschman's once influential view of economic development as an unbalanced process where "one thing leads to another" is hot again.

A battery of new empirical approaches has recently emerged aimed at filling Hirschman's views with data both from micro-case studies and macro–global input-output tables (Ahmad, 2013; Amador and Cabral, 2014). According to these approaches, each country adds labor, capital and ideas to international production networks, or global value chains (GVCs).

Assessing each country's position in GVCs and the value they add to global networks may be a better way to evaluate the costs and benefits of globalization than using the traditional trade-patterns approach.

Furthermore, the global allocation of each unit of activity that is necessary to produce output (labeled a "task"), from highly complex ones to routine and simple ones, may indicate which countries are benefiting from international trade cooperation and which are not. The link with labor markets is simple. As many tasks are allocated to labor, the emergence of global production networks have not only led to new patterns of trade specialization, but also to a new international division of labor (what Gereffi [2007] called "the great global job shift").

The relationship between international trade and employment has long been central to development theory and policy in South America. For one thing, one of the main reasons behind Raul Prebisch's pessimism about a natural resource intensive, export-led growth strategy for the region was related to its less-than-needed "*productive absorption of manpower*" (Prebisch, 1963, pp. 23-30). We can translate Prebisch's thoughts to modern GVCs' jargon by saying that a relative bias to upstream stages in global production networks yields low labor shares –and in particular, low shares of high-skill labor-. Thus, going back to Prebisch's and ECLAC's policy prescriptions, policies aimed at counteracting the forces of comparative advantage (coined "industrialization policies") had to be put in place to accelerate jobs creation, foster high-productivity jobs, and –as the ultimate goal- develop South American countries.

We will organize this chapter on trade, natural resources and employment in South America around Hirschman's idea of linkages, or how "things lead to other things". But unlike Hirschman's analysis which explores economic activity outcomes, we will focus on jobs.

Following Hirschman's (1977) generalized approach, we will study purely "physical", input-output linkages related to natural resources and go beyond these production linkages to explore the income (or consumption) effects, as

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well as the "fiscal" linkage, that is, the state's ability to levy taxes (from these activities) and channel the proceeds to productive investment (Hirschman, 1977, p. 71).

Regarding the latter, we ask whether the higher specialization in natural-resource activities both in exports and production observed in the last 15 to 20 years has had a bearing on development outcomes, with a particular focus on job-related outcomes. Some questions we will address about this "generalized linkage" macro-perspective are the following:

> Did some *Dutch* disease effects exist in terms of aggregate and sectoral employment?

> Was there some *Natural-resource-curse* effect in terms of aggregate skills and task intensity?

> How have labor-market changes affected social indicators, such as inequality?

Regarding the production linkages, the main operative difficulty here is that official, publicly available statistics on the connections between international trade, production and employment were not made for these new features of globalization (Baldwin, 2006). Thus, we will take advantage of a variety of new techniques, databases and novel case studies to explore the role of South American countries in GVCs through production linkages, not only in terms of value added and the rents the GVC generates, but also in terms of the quality and quantity of jobs involved.

With this micro-perspective in mind, we will try to answer the following questions:

> What are the main features of GVCs associated with natural resources? What is the role of South America in GVCs?

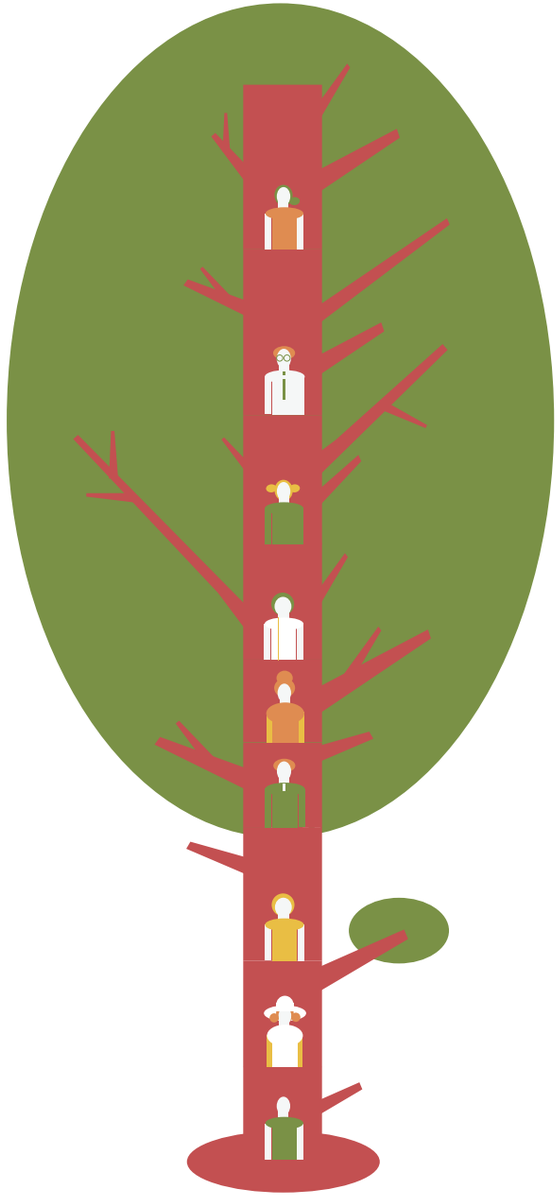
> How is GVC participation affecting employment growth?

> Is GVC participation leading to social upgrading in terms of job quality and wage equality?

Again, our focus will be employment. Make no mistake: economic development happens through jobs. Jobs are the major determinants of living standards, productivity, and social cohesion (World Bank, 2013). Through a job and an income, people can rise from poverty and raise consumption. More productive jobs help people foster global productivity. And decent jobs help people attain a sense of belonging and positively affect the design of collective decision-making mechanisms. Thus, our generalized linkage approach will take the fiscal and income effects together. To that end, it will ask to what extent South American economies are taking advantage of their role in global production networks to improve labor markets conditions at home. As direct effects are expected to be somewhat small, indirect effects through the above-mentioned linkages may be playing a major role in connecting international trade patterns with labor market dynamics.

The rest of the chapter is organized as follows. Section 2 provides a bird's eye view of the recent changes in international trade that have a bearing on domestic labor market dynamics everywhere. Sections 3 and 4 question

whether a relative specialization in upstream activities in global value chains and international trade in the first decade and a half of the 21st century was conducive to South American development and improved labor market conditions. More specifically, Section 3 follows a macro-perspective by looking at aggregate dynamics linking the overall natural resource-intensive, export-led growth strategy with the quantity and quality of jobs. Section 4, in turn, tries to derive more clues about what is going on given the microeconomic evidence (the case studies).



2. INTERNATIONAL TRADE AND JOBS IN THE 21ST CENTURY: A NEW LANDSCAPE

A short story

What is a good? Basically, a good is a mix of endowments, information and ideas (or imagination). The first element –endowments– arises naturally because, as Parmenides once argued, *nihil fit ex nihilo*, or "nothing comes from nothing". The second element, information, is important because endowments are arranged in uncommon, hard-to-get ways to make up specific goods, and these arrangements have to do with the way we process information (i.e., with our knowledge). The third element, imagination or ideas, is what gives the arrangements over endowments an unambiguous meaning. The latter includes both inventions (generation of ideas) and innovations (the application of these ideas to marketable products and processes), as was studied by Joseph Schumpeter (1942). The latter is also the lion's share in terms of labor contribution; ultimately says César Hidalgo (2015), man-made goods are essentially "crystals of imagination", that is, goods that existed first in someone's head and then in the world. For endowments, it is just the opposite: they are "out there" first.

Obtaining the endowments, arranging them in a specific way and deciding how to do that (imagining) are different tasks of what we call the "production process" of making a good. To fix the idea, imagine a good as a jigsaw puzzle portraying, say, The Last Supper. In this puzzle we need pieces made of endowments; we also need to arrange them in a specific way to yield the image. But we also need Leonardo da Vinci, who created the image. And of course, John Spilsbury, the Englishman who invented jigsaw puzzles in the mid-eighteenth century.

Is it better for a single person to try to do all the tasks unilaterally or through cooperation with others? The answer is, of course, "it depends". Think of a person with an idea but no endowments or the skills to arrange these endowments. If endowments are hard to get, or their property rights are defined in advance, it may be better to acquire them from others instead of trying to produce them from scratch. If arrangements require specific skills that this person does not have, again it may be better to engage in the exchange with those having these skills instead of trying to do it alone.

These are examples of cooperation in the production process. The tricky issue here is that cooperation also has costs. Besides communication problems, consider that cooperation means sharing information, and there is a risk –from this person's perspective– of an unintended sharing of ideas (the key part of the production process). Benefits and the costs of cooperation, thus, will shape the allocation of tasks in the production process.

Let's stay with puzzles and John Spilsbury to address the issue of cooperation and task allocation. Having learned from Thomas Jefferys, King George III's geographer, Mr. Spilsbury *crystallized* the first jigsaw puzzle: a dissected wood map of the world. Being a well-known cartographer, he thought he could create something enjoyable (and more profitable!) out of teaching geography. And that is how he *imagined* the puzzle.

His business flourished. In two years he was selling eight different puzzles to Britain's wealthiest families. We can make conjectures about new challenges and doubts emerging for Mr. Spilsbury as he was getting older and wanted to provide some stable flow of income for his wife and daughter. To that end he needed to expand the business, and in so doing he needed someone else to cooperate with him. Someone cheaper than a partner: an apprentice.

Here we can imagine multiple doubts and questions in Mr. Spilsbury's mind once he met Harry Ashby, the candidate:

> "Is Harry Ashby good enough to learn about puzzle-making?" That is, given that Spilsbury was thinking of outsourcing some tasks of the production process, Ashby's ability to absorb the new knowledge about the uncommon arrangements necessary to create the puzzle was key to success.

> "Is Harry Ashby smart enough to start his own business to soon?" Given that Spilsbury was about to cooperate and share information, what could prevent the apprentice from learning all there was to know about puzzles (i.e., to learn its full meaning) and start competing with him? (Of course, some barriers to entry in the puzzle business would address this issue).

> "What is it that I have to teach him?" Was it possible for Mr. Spilsbury to fully describe the tasks needed to bring about a puzzle? Here we need to remember Michael Polanyi's famous dictum regarding tacit knowledge, "We can know more

than we can say" (Polanyi, 1967, p. 4). "If-then-do" types of rules can be of help but they represent only a fraction of the necessary tasks to make the puzzle.

It is possible to highlight three issues in Spilsbury's story that matter to our discussion of global labor market shifts associated with the new international trade patterns: population aging, fragmentation in the production process, and task automation (the "if-then-do" rules). Indeed, turning to present-day, global issues, these three forces are shaping world trade and labor markets.

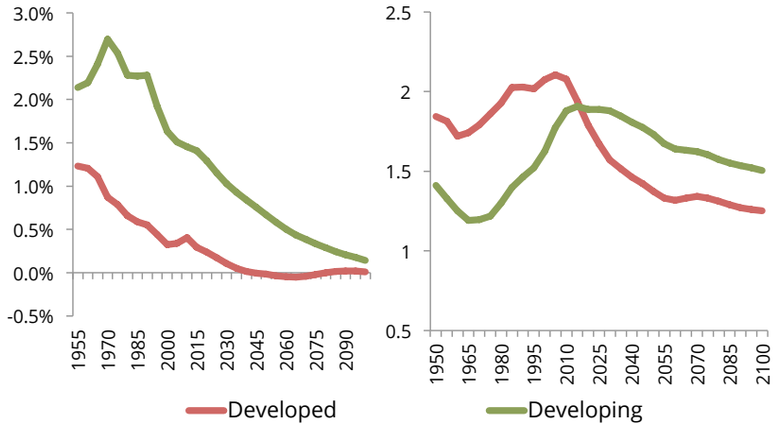
The three forces shaping the global allocation of tasks in production

Let's start with **population aging** and labor force dynamics. Every country undergoes a particular evolution in the population's age structure called the demographic transition. During this evolution, an economy transits from a stage where the share of the population under 15 is high and total population is growing at high rates to another where the working-age population's share is high and total population growth is lower, and then on to a final one where the elderly take center stage and population growth is negligible (or even negative).

Interestingly, the timing of the demographic transition is desynchronized across emerging and advanced economies, resulting in what we can call an asymmetric demographic transition (see Fanelli, 2015). Indeed, advanced economies are getting old and population growth is approaching zero, while emerging countries are either "adult" (such as China or Brazil) or "child" (India and South Africa) and population growth is on average below 1 percent per year (see Figure 1).

Figure #1_ Asymmetric demography: advanced vs. emerging economies.

(a) Population growth (b) Inverse dependency ratio



Note: Forecast values assume the UN medium fertility variant scenario for 2015-2100.
Source: Own elaboration based on data from UN population division.

Still more interestingly, there seems to be a relationship between population structure and economic growth[1], meaning that countries may be able to accelerate growth when the working population is prominent, what Bloom *et al.* (2003) called the "demographic dividend".

This dividend, in turn, can be discomposed in two effects. The first dividend (FD) is a purely demographic one as there is a period when there are more workers, thus increasing GDP per capita (invariant GDP per worker). The second dividend (SD), in contrast, measures the potential connections between demographics and productivity (of GDP per worker). There is ample evidence that in the past many countries took advantage of low dependency ratios to accelerate the pace of physical and human capital accumulation. The evidence goes from East-Asian miracles (Higgins, 1998) to the very Industrial Revolution (Galor, 2011).

Of course, it does not mean that emerging countries' destiny is to be a developed economy thanks to demography; it just means that they have a chance to be one because of the growth in the labor force. Considering our previous discussions, getting involved in ideas-related jobs is key. Without proper jobs to match the increase in labor supply, the dividend can turn into a burden (or a disaster, as Canning *et al*. -2015- pose for the African case). And without proper policies to foster physical and human capital accumulation during the dividend stage, it can hardly be a permanent effect.

For the purposes of this chapter, two issues emerge. First, the world labor force is moving south. In 1950, of the 1,500 million people belonging to the working-age population some 530 (34 percent) were living in advanced economies. In 2000, of the 4,500 million working-age population, 830 were advanced economies' inhabitants (21 percent). In 2050, it is expected that the working-age population will number 6,100 million with only 740 belonging to advanced economies (12 percent). Thus, advanced economies seem to be playing Spilsbury's role in our story, while emerging economies play Ashby's.

Second, the only sure thing about demographic dividends is the change in the population structure; there is a big difference between having a larger labor force and increasing the amount of productive jobs. Indeed, policies in emerging economies oriented to job creation, human capital accumulation

1 > The relationship between population structure and the macroeconomy goes well beyond productivity, involving fiscal and current account issues, among others. For an overview see Fanelli and Albrieu (2015) and World Bank (2013).

and skills formation are going to be key on the development agenda in the coming decades, considering that in the next 20 years some 1,000 million jobs must be created in emerging economies. As the World Bank (2015) says,

"Getting policies right in light of demographic trends could well be the difference between eliminating extreme poverty, boosting shared prosperity, and reaching broader development goals by 2030 and falling short and leaving major gaps in the development agenda for the next generation"
(World Bank, 2015, p. 212).

The second new force shaping trade and labor markets is **production fragmentation.** The global production pattern changed dramatically over the recent decades. What is different now? For many decades countries cooperated selling endowments in exchange for final goods, while cross-border flows of information and ideas were rather limited (mainly through foreign direct investment and capital goods exchanges). This has been changing dramatically over the last two decades, leading to a different kind of globalization (what Richard Baldwin -2006- called "the second unbundling"). As Jones (2000) stated,

"Production processes that have traditionally been vertically connected, so that all activity takes place in one location, are now frequently broken up or fragmented so that regions that are especially well suited to the production of parts of the process can now be utilized in producing these fragments"
(Jones, 2000, p. 115).

This is a structural change comparable to the one that occurred during the mid-19th century. At that time the main driver was the steam engine; this time it is the new Information and Communication Technologies (ICT). ICT dramatically reduced coordination costs and opened new opportunities to take advantage of cost differentials (mainly wage gaps) across countries.

These new cost-arbitrage strategies boosted offshoring (the reallocation of a business process from one country to another) and outsourcing (contracting out of a business process to another party). Offshoring and outsourcing, in turn, are behind the deep, irreversible process of the international fragmentation of production that we are witnessing –and the corresponding increasing role for intermediate goods in global trade-.

In light of these novelties, it was only natural for researchers and policy makers to start re-thinking international trade both empirically and theoretically. On the empirical ground, the trade-in-final-goods traditional approach is being replaced by a variety of global input-output analyses (see Box 1 for a summary of these approaches) and sectoral microeconomic studies. On the theoretical ground, the main novelty is the redefinition of comparative advantage and specialization not in terms of final goods but in terms of stages of production or tasks that add value to global production processes (Grossman and Rossi-Hansberg, 2008).

BOX
#1

Global input-output analysis. A review of existing databases

Currently, trade in value added is estimated on the basis of international input-output (I-O) tables which illustrate the economic connections between countries. There is not a unique, comprehensive database covering world trade. Instead, several initiatives have sought to estimate inter-country I-O tables for a subset of countries. The most widely used databases are as follows,

> **Trade in Value Added** (TiVA) database. The joint OECD–WTO initiative considers the value added by each country in the production of goods and services that are consumed worldwide. Includes 61 economies covering OECD, EU28, G20, most East and South-east Asian economies and a selection of South American countries. The industry list covers 34 unique industrial sectors, including 16 manufacturing and 14 services sectors. The years covered are 1995, 2000, 2005 and 2008 to 2011. More information in http://www.oecd.org/sti/ind/measuringtradeinvalue-addedanoecd-wtojointinitiative.htm

> **World Input-Output Database** (WIOD). Funded by the European Commission, WIOD provides time-series of world input-output tables for forty countries worldwide and a model for the rest of the world, covering the period from 1995 to 2011. It is better suited to analyse the consequences of product fragmentation, for example for shifting patterns in demand for skills in labour markets, or for local emissions of air pollutants. More information in http://www.wiod.org/new_site/home.htm

> The **UNCTAD-Eora** GVC Database. It uses input-output tables to estimate the import-content ratio in exportable products and value added trade. Values are derived from the Eora global multi-region input-output (MRIO) table. The Eora MRIO brings together a variety of primary data sources from 187 countries and 500 sectors in the period 1990-2010. More information in www.worldmrio.com.

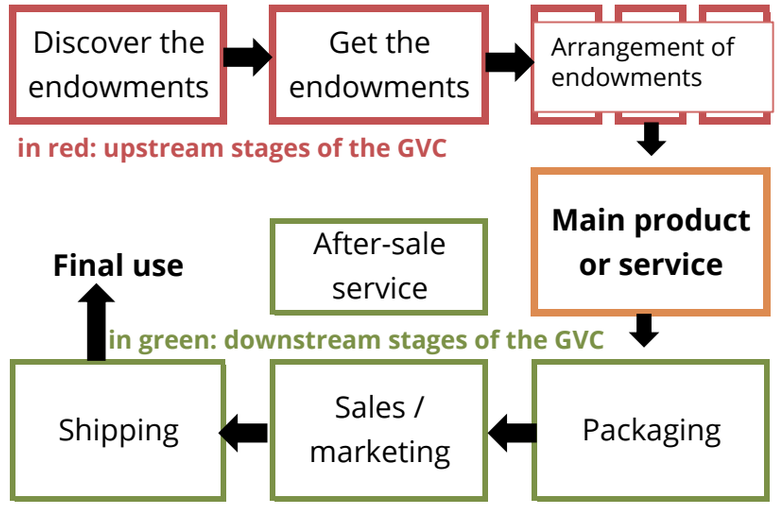
> **Global Trade Analysis Project** (GTAP) database. Coordinating by the Center for Global Trade Analysis in Purdue University, GTAP is a global network of researchers and policy makers conducting quantitative analysis of international policy issues.

Both advances belong to the relatively new (and for sure growing) literature on globalization as a process mainly driven by Global Value Chains (or GVC for short). In a broader sense, the GVC analysis takes into account *"The cross-border flows of goods, investment, services, know-how and people associated with international production networks"* (Baldwin 2012, p. 1).

A narrower definition, more suitable to our analysis, is as follows: *"The value chain describes the full range of activities that firms and workers do to bring a product from its conception to its end use and beyond. This includes activities such as design, production, marketing, distribution and support to the final consumer"* (Global Value Chains Initiative, https://globalvaluechains.org/concept-tools).

Figure 2 shows a canonical global value chain, where it is possible to measure how far each production stage is from the final use of the good being produced (or its demand). Upstream stages are typically related to raw material provision or intangibles (such as research and development), while downstream stages are near the final use and have to do with packaging, logistics, sales and customer services.

Figure #2_ A canonical value chain.



Source: Own elaboration.

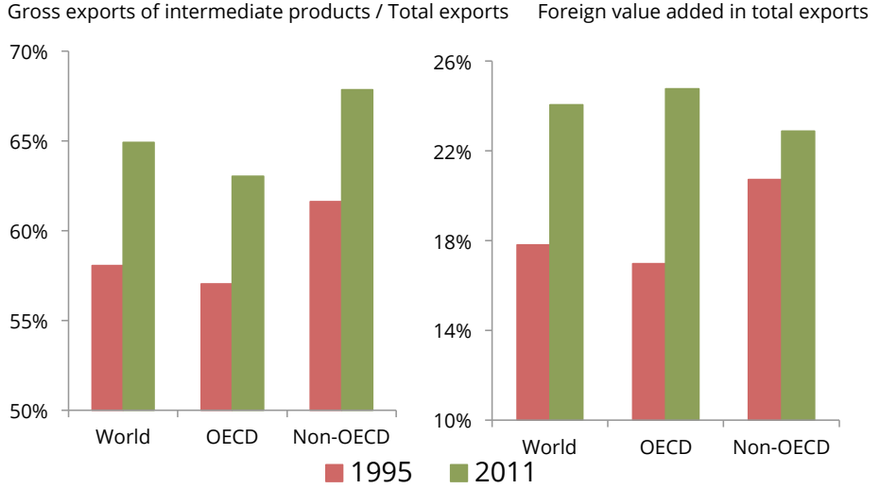
Is the emergence of GVC that important for trade, jobs, and development? The problem here is that there is no comparable worldwide statistics on the subject. The current system for measuring international trade tried to capture "old-fashioned", pre-GVC transactions (Baldwin, 2013). As Andreas Maurer and Christoper Degain from WTO put it, what you see with the current trade recording system is not what you get from current international trade.[2]

2 > More precisely, *"current trade recording systems struggle with the adequate reporting of globalisation phenomena in respect to goods for processing, merchanting, intra-firm trade, valuation (transfer pricing) which may introduce some bias in these aggregates"* (Maurer and Degain, 2010).

Against this backdrop, the joint OECD–WTO Trade in Value-Added (TiVA) database is a good starting point. In its 2015 edition, it estimates the value added for 61 countries (plus one extra called "rest of the world") in the production of goods and services that are consumed worldwide.

Figure 3 shows two variables that can account for the above-mentioned structural changes. The first one has to do with the role of intermediate goods in international trade. A higher share of this type of good indicates a greater penetration of GVCs. According to TiVA, in 2011 some 2/3 of total exports were made of intermediate products, when it was some 58 percent in 1995. The shares are bigger in emerging countries, reaching some 68 percent. The second indicator is the foreign value added embedded in exports. Again, a higher share of the import-content of exports may indicate a greater penetration of GVCs. Note there that a quarter of total exports are made from other countries' goods. Again, the comparison with 1995 shows an increasing trend for the trade in value added.

Figure #3_ Production fragmentation and the new features of international trade.



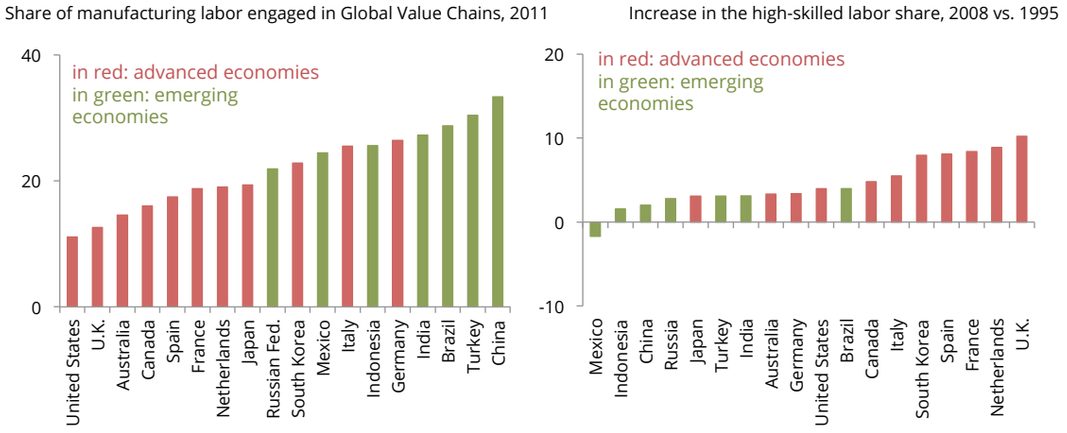
Source: Own elaboration based on TiVA database.

These trends can be found in other databases. Timmer *et al.* (2014), for example, analyzed a set of 560 products and determined that for 85 of every 100 of them the share of foreign value added in production increased between 1995 and 2008.

How are these new trends related to labor market outcomes? In general, globalization affects domestic labor markets in three ways (Winkler, 2009). First, increasing international trade in intermediate goods and services led to some cost and regulation arbitrage forces across domestic labor markets. Second, migration can directly modify labor market conditions. And third, foreign direct investment (FDI) and product fragmentation impinge on employment, both quantitatively and qualitatively. Of course, quantity and quality effects are closely related. For one thing, locational decisions by firms, and their incentives to disperse the production process, are closely related to cross-country gaps in costs, wages being one of the main costs. We will return to this issue later.

Thinking specifically of GVCs, the global distribution of the tasks that are necessary to bring about a specific good also implies a global division of labor. It is not a marginal effect. ILO (2015a), for example, estimated that worldwide more than one in five jobs are related to GVCs. Timmer *et al.* (2014) studied the manufacturing sector and detected two additional features. First, the share of jobs related to GVCs is greater in emerging economies than in high income economies (see Figure 4a). Second, the high-skilled share in value added is increasing both in advanced and emerging economies (Figure 4b). Thus, in terms of our story, Spilsbury is indeed cooperating with Ashby, and some idea-related tasks are being shared in the process.

Figure #4_ Jobs in global value chains.



Source: Own elaboration based on Timmer *et al.* (2014).

The third force is related to a new kind of division of labor, that between men and machines (a debate sometimes referred to as **task automation**). The industrial revolution was of course a big driver in economic growth and it meant substituting labor for machines in physical tasks; now, the ICT revolution means replacing machines for labor in cognitive tasks. Despite a revival in technological anxiety (Mokyr *et al.*, 2015) a jobless world is still science fiction (luckily). Instead, it is the world's labor markets that are now in a reorganizing mood. Frank Levy and Richard Murnane put it clearly in their influential book *The New Division of Labor,*

"More than two centuries ago, Adam Smith used the word 'division of labor` to describe an earlier upheaval [...] In today's economy Smith's words have taken on new meanings. There is a new division of labor between people and computers. And there is a growing division within human labor itself, a division between those who can and those who cannot do valued work in an economy filled with computers"
(Levy and Murnane, 2003, p. 2).

To understand this structural change we need to differentiate between tasks and skills. As we said before, a task is a unit of work activity that produces output while a skill is a worker's endowment of capabilities (exogenously given or acquired by human capital investment) for performing various tasks (Acemoglu and Autor, 2010). Skills do not directly produce output; they can be applied to perform specific tasks in the production process when it is cost-effective from the firms' perspective, and this is the case when it is neither technologically feasible nor economically cheaper to assign this task to a machine.

And here is where the ICT revolution is shaping the labor market. Boosting technological progress and deflating the cost of computers, communication devices and the like (the so-called "ICT capital") generate two effects. First, it gives fluidity to the boundaries between "capital tasks" and "labor tasks" (Autor, 2013). This competition between capital and labor is particularly strong in a set of tasks that we can call "routine" tasks, that is, the ones that rely on rule-based logic (the If-Then-Do type of tasks we mentioned above). Second, it opens new job opportunities related to the application of these new technologies; jobs that are not based on rules and, thus, are not subject to machine competition. Autor, Levy and Murnane (2003) summarized these two effects in the following way:

"1) computer capital substitutes for workers in carrying out a limited and well-defined set of cognitive and manual activities, those that can

be accomplished by following explicit rules (what we term "routine tasks"); and (2) that computer capital complements workers in carrying out problem-solving and complex communication activities ("non-routine" tasks)".

Interestingly, the distinction between routine and non-routine tasks is not the same as between skilled/unskilled labor (or high/low earnings). Instead, non-routine (non-rule-based) tasks can be either manual, low-wage tasks (such as driving a truck) or cognitive, high-wage tasks (consider Gregory House's differential diagnosis), given that people perform better than machines at specific sets of tasks, such as pattern recognition, expert thinking or personal communication. Routine tasks, in turn, can be purely physical and thus require a low stock of (built) human capital –like a job on an assembly line– or they can be cognitive and involve several skills (such as accounting services). And, of course, we cannot forget that the very ability to routinize tasks is limited not only by a person's own cognitive limitations (Polanyi's Paradox) but also by previous experience that shapes what this person thinks may or may not happen[3].

How is automation affecting labor markets? In the case of advanced economies, where labor costs are relatively high, the substitution effect is particularly strong. Indeed, Frey and Osborne (2013) estimated that half of the American jobs are at risk of being replaced by computers.

These adverse automation effects are reinforced by the increasing role of global value chains in trade. For one thing, the growing ability to decode and automatize an increasing number of tasks allows firms to computerize the production process, but not only that: it can foster the offshoring of these same tasks to countries where labor is cheaper.[4] In our story, something similar happened: decoding the tasks needed to make a puzzle allowed Spilsbury to co-operate with Ashby. That's why in the short and medium run task codification and the predominance of GVCs can benefit labor markets in emerging economies by generating new jobs and increase the demand for high-skilled workers when costs differ; as Baldwin summarized,

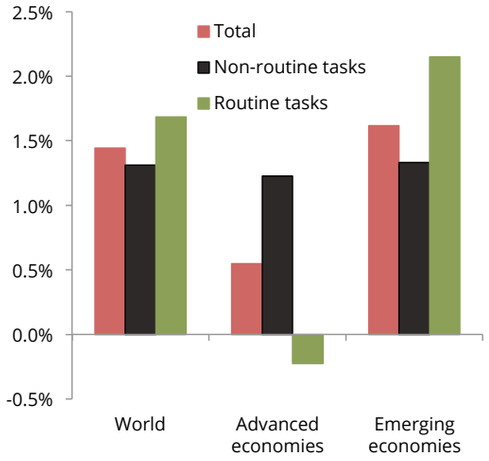
"ICT made it possible, wage differences made it profitable"
(Baldwin, 2013).[5]

Are jobs disappearing? Figure 5 shows the annual growth of jobs over the 2000-15 period, according to ILO (2015b). Annual employment growth was some 1.5 percent, broadly in line with the labor force growth. Put it differently, the progress in automation does not produce a "jobless world" as fears in public opinion seem to support (see Autor 2015 for an up-to-date debate about this issue).

3 > The distinction between actual events and man-made recreations (and forecasts) of events is masterfully summarized by Mark Twain's phrase *"Truth is stranger than fiction, but it is because fiction is obliged to stick to possibilities. Truth isn't".*

4 > With this idea in mind, Alan Blinder (2009) estimated that one-fourth of American jobs are under the threat of offshoring in the short run. See Cheung and Rossiter (2008) for an analysis of other advanced economies.
5 > In the long run emerging economies can be equally affected by automation, and some reshoring can emerge. See Citi-GPS (2016) and World Bank (2016).

Figure #5_ Annual growth in employment, 2000-2015.



Source: Own elaboration based on ILO data (2015b).

Note also the divergent trends when we discriminate between advanced and emerging economies. In the former, total employment is growing slowly (0.5 percent per year, again in line with the labor force) owing to a contraction in routine (rule-based) jobs. That is the "vanishing middle" or "shrinking middle" in labor markets found in the United States and other advanced economies (see Tuzemen and Willis, 2003, and Ernst, 2015). In the latter, in turn, total employment is growing faster (1.7 percent per year) with non-routine jobs somewhat lagging behind. Indeed, routine jobs grew at an annual rate of 2 percent between 2000 and 2015, while non-routine jobs grew at 1.3 percent.

The three global forces we have mentioned (population aging, product fragmentation, and task automation) are changing international trade and as a deeper process modifying global growth patterns. As a broad trend, we can see a global reallocation of jobs, covering not only basic tasks, such as the extraction of endowments, but also information-processing and even idea-related jobs. Offshoring in the latter tasks is somewhat slower, meaning that high-skilled, cognitive jobs are still easier to find in advanced economies (Timmer *et al.*, 2014).

BOX #2

Jobs and climate change action. A fourth force of structural change?

A fourth force of structural change in labor markets may have begun last December following the Paris climate agreement, in which 196 countries agreed to limit the increase in global temperature to below 2ºC above pre-industrial levels. This means, as Sachs (2015) notes, that the "business as usual" behavior that led to the dramatic increase in global temperatures must be replaced by more sustainable behavior. This new paradigm, in turn, has to do with moving away from fossil fuels to cleaner energies and severely modifying the use of land (particularly in agriculture).

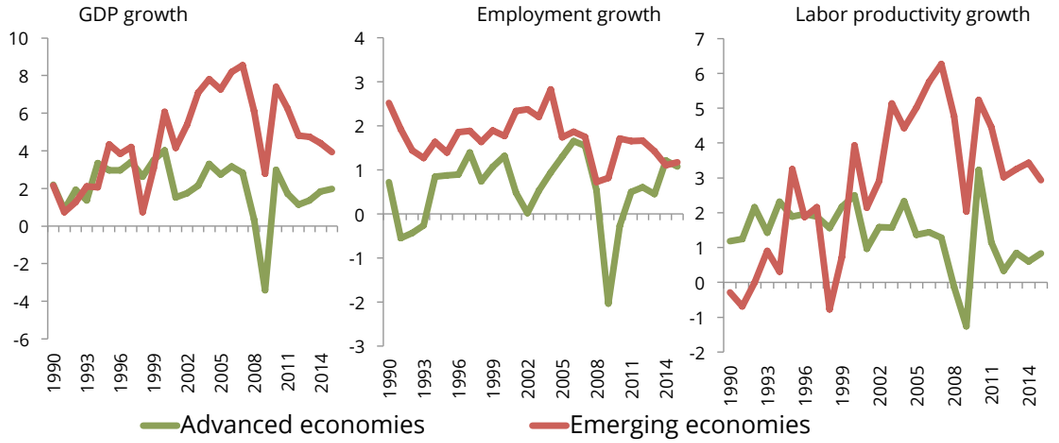
If the signatories comply with the agreement, the global labor market will experience deep changes. UNDP (2015) distinguishes three developments. First, *job termination* in highly polluting industries: coal mines, cod fisheries, forestry industries, steel plants are all endangered (as are the jobs they generate). Second, *job transformation* in agriculture: the current heavy use of fertilizers and water and the degradation of soils are all unsustainable. Finally, *new job opportunities* in new energy sources: the wind, the sun and others are all sustainable but have yet to be explored (at least in developing countries).

As a result, global growth drivers are moving south, in spite of the on-going turbulence discussed in Chapter 1. The basic features of the global structural change underway are shown in Figure 6. In the mid-1990s the contribution of emerging economies to global GDP was some 40 percent. In 2015 they accounted for more than 55 percent, and they are expected to contribute above 60 percent in the early-2020s (see IMF, 2015). Note in Figure 5a that growth divergences between emerging and advanced economies actually began in the mid-1990s and remain –though less pronounced– after the subprime crisis.

The growth divergence is related to the demographic factors mentioned above. Employment growth has been on average higher in the emerging world than in the advanced one (Figure 6). However, the biggest asymmetry lies not in the quantity of labor but in the ability of each unit of labor to yield output: productivity growth has been on average three times higher in the former than in the latter for the period 2000-15 (in the 1990s productivity growth was twice as high in advanced economies than in emerging economies).[6]

As a by-product of these dynamics, global growth accelerated. This, in turn, led to a remarkable growth in the demand for endowments, fuelling not only market growth but also the relative price of these endowments. In 2001-2015, the prices of energy commodities were, for example, about three times higher in real terms than the average registered for the period 1985-2000; food and metals indexes were 15 percent higher, and raw materials 20 percent.

Figure #6_ Global growth dynamics, 1990-2015.



Source: Own elaboration based on The Conference Board Total Economy Database.

Falling short of reproducible inputs (physical and human capital), as well as institutional quality in comparative terms, this change also signifies good news for emerging economies.

Note, however, that the label "emerging markets" includes a variety of economies, ranging from, say, small Costa Rica to huge China; from labor-abundant India to natural-resource rich Botswana; from poor Mozambique to upper middle-income Turkey. The story we are describing may not be an accurate description for every emerging economy. We need to address specific features found in South American economies in order to assess their performance in this new world.

6 > Indeed, this productivity effect has been so strong that some authors have worried about a "jobless" growth pattern in emerging markets. For a discussion, see Kucera and Roncolato (2012).

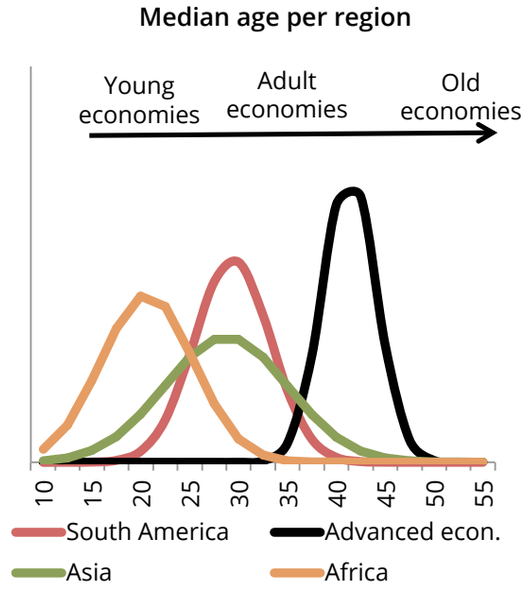
3. WHAT DOES IT MEAN TO SOUTH AMERICA?

Turning to South American countries, this new environment is of course benign, but it can hardly be a panacea for the region. More specifically, we should ask: What do these global structural changes represent for the region?

First, all South American countries are experiencing the dividend stage in the demographic transition (Figure 7a). Differences exist. Countries like Brazil or Uruguay are near the end of the dividend period, while others such as Ecuador or Peru have just entered this period.[7] In figures, some 3 million workers are entering the South American labor force every year.

Second, we apply Antras (2012) *et al.'s* methodology to assess South American countries' position in global value chains, in terms of the distance from final demand.[8]

Figure #7a_ Global structural change and South America, c. 2015.



Source: Own elaboration based on ILO (2015b) and United Nations data.

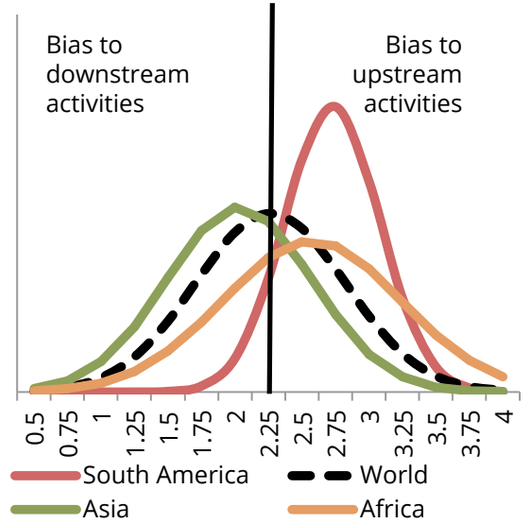
The main outcome, as figure 7b shows, is that the position of the region is biased to upstream activities, just the opposite of what occurs iin other emerging regions, such as Asia. It means that the region specializes in exporting intermediate goods that other countries use as inputs in their exports. In other words, South American specialization in natural resources implies being positioned more at the beginning of the chain, contrasting with Mexico and many central American countries (Blyde, 2014). This feature of upstreamness is particularly true in mineral -or fuel- rich countries.

7 > See World Bank (2015b) for a distinction between early-dividend and late-dividend countries.

8 > More specifically, following Chor (2014) we compute the weighted average measure of the upstreamness of each country j's exports as follows: $Uj=\sum i\ Xij/Xj*Ui$. Here, Ui is the upstreamness of industry i as calculated from the 2002 US Input-Output Tables, with Xii being the value of country j's exports in industry i, and Xj being the total value of country j's exports.

Figure #7b_ Global structural change and South America, c. 2015.

Position in the GVC



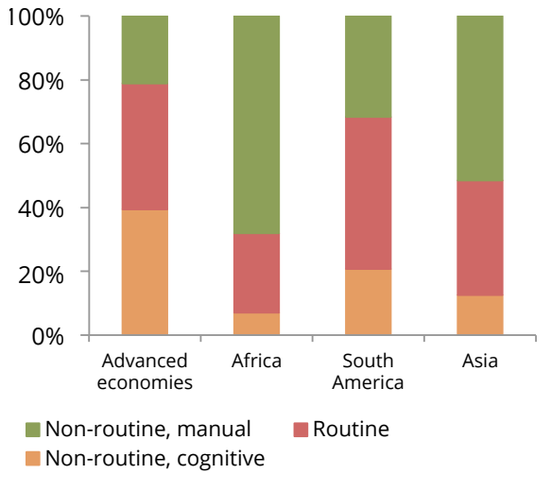
Source: Own elaboration based on ILO (2015b) and United Nations data.

Third, South American labor markets are characterized by a relative specialization in routine and non-routine cognitive tasks if we compare them with other emerging regions, such as Asia or Africa (Figure 7c). This means two things. On the one hand, a segment of actual jobs is at risk because of task automation, and thus competes with worldwide deflating costs. On the other hand, the relative specialization in non-routine, cognitive tasks opens an opportunity to compete in the markets for the generation of ideas.[9]

9 > We are referring to regional trends, and for a subset of the emerging world (notably, Eastern Europe is excluded from our analysis). This result can be different when moving to country cases.

Figure #7c_ Global structural change and South America, c. 2015.

Task share in labor markets



Source: Own elaboration based on ILO (2015b) and United Nations data.

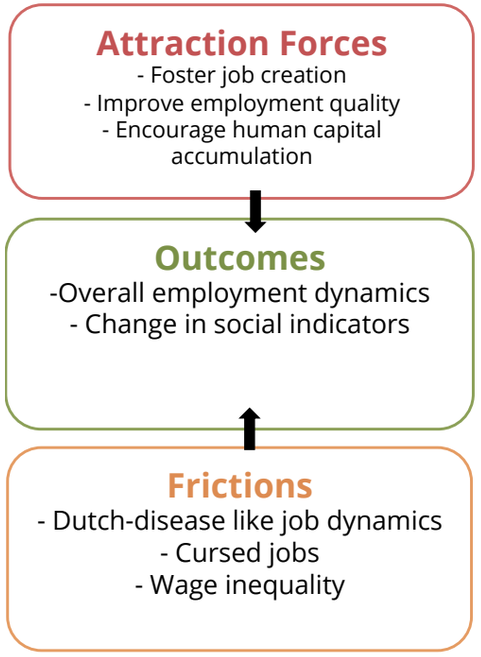
Given these structural features found in South American countries, what can be expected for their labor markets by participating in global value chains?

To answer this question we can borrow from the "generalized linkages" approach of Hirschman (1977). This German-born, US-educated economist, in turn, borrows from the staples theory that many Canadian economists and historians developed in the first half of the 20th century to explain how the North found its way based on its endowments (natural resources). He mixed this literature with his own linkages approach first presented in 1958 to take into account not only pure-production connections but also overall income effects and fiscal effects.[10] In contrast to these studies, we will not focus on economic activity but on its effects on labor markets.

Thus, this macro perspective tries to evaluate the overall development and labor market outcomes of the new features of globalization for emerging economies that fit South American features, that is, economies that are rich in natural resources, undergoing the demographic bonus stage and better prepared to absorb new ideas in relation to other parts of the emerging world. Figure 8 presents the main issues at stake.

Attraction forces are multiple. First, a deeper integration with global markets can accelerate economic growth, thus fostering employment creation in many sectors (including services). Second, employment quality can be enhanced because global markets make it possible to participate in more sophisticated production processes, which are important when the absorptive capacity is higher than in other parts of the emerging world, as is the South American case. Employment quality can also be improved by increasing formality and better overall working conditions. Third, better terms of trade and bigger markets for exports raise national income, and this can be good for the evolution of wages in terms of tradable goods. Fourth, higher exports can avoid Thirlwall's (1979) type of balance of payments constraints. Fifth, properly spent, higher fiscal revenues can make a difference in many ways: by investing in human capital or more indirectly by providing public goods (the fiscal linkage).

Figure #8_ The global jobs reallocation and South America. A macro-view.



Source: Own elaboration.

As there are attraction forces at play, there are also frictions to be taken into account. The first one is the possibility that some adverse, Dutch disease effects arise due to the real exchange rate appreciation. It can hurt competitiveness in other sectors, thus resulting in otherwise faster employment growth.

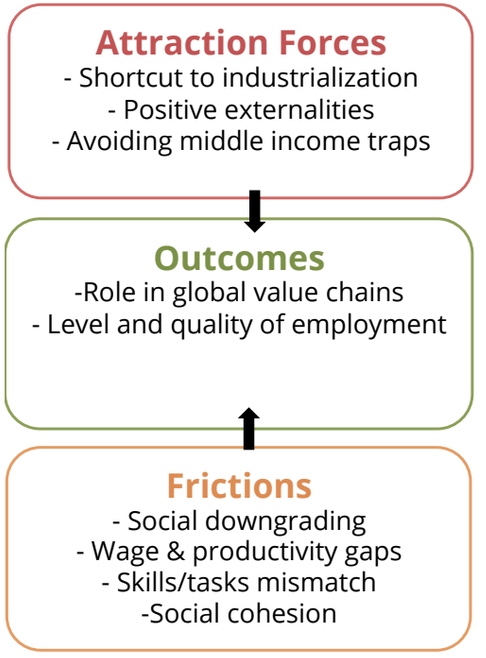
The second friction is related to the quality of jobs. What if the global division of labor results in the predominance of informal, low-skilled, badly paid jobs for the region? Put differently, what if a bias toward natural resource-related economic structure led to cursed jobs?

10 > This approach is close to the new literature that finds a not-that-close relationship between economic development and a specific economic structure. See, for example, Gill *et al.*'s (2014) study on Eurasia.

The third friction has to do with inequality. Simple Stolper-Samuelson dynamics in South America would match a trade structure determined by comparative advantage with an increase in the relative price of land in terms of labor. And, if the region were relatively abundant in high-skilled labor, it would match an increase in the gap between high-skilled labor and low-skilled labor (the skill premium).

What about the micro approach? Considering the purely productive linkages, we ask: what makes GVCs so attractive? Well, there are factors of attraction at play (see Figure 9). First, GVC participation can be a shortcut to industrialization, provided that a country can join instead of build a supply chain from scratch, as was the main goal back in the Import Substitution Industrialization (ISI) days (Baldwin, 2014). Second, GVC participation, besides its direct effects, creates incentives to invest in human capital and in public goods, which, in turn, can positively affect productivity in the rest of the economy. Third, it can alleviate tensions in countries that, having followed export-led, cheap labor growth strategies for decades, find themselves trapped in their inability to compete in high-skilled markets (of course, it can also work in the opposite way, by strengthening the "cheap labor" status of the country, as we will see below).

Figure #9_ The global jobs reallocation, GVCs, and South America II. Gravity, frictions and outcomes.



Source: Own elaboration.

Being part of a GVC can also have negative effects that must be taken into account. Among these frictions, one of the most relevant is the potential coexistence of economic upgrading with social downgrading (Barrientos *et al.*, 2010; Bernhardt and Milberg, 2011). After all, reallocation decisions are deeply influenced by cost differences and regulatory arbitrage, which may lead to a "race to the bottom" competition among countries with deleterious effects on working conditions. Even without this competition mechanism active, simple Heckscher-Ohlin-Samuelson dynamics, where trade is driven by relative

endowments, would yield similar results. The main problem here is that a consistent framework to fully understand the nexus between economic and social upgrading is still needed (Milberg and Walker, 2011).

A second friction is related to labor market duality. Participation in GVCs, even in the best-case scenario where high-skilled tasks are involved, increases productivity in the set of firms participating in the GVC; there is no automatic mechanism that spills the increase in productivity over to other firms and other sectors (Blair, 2007). The resulting wage and productivity gaps can damage the social pact, thus hurting social cohesion.

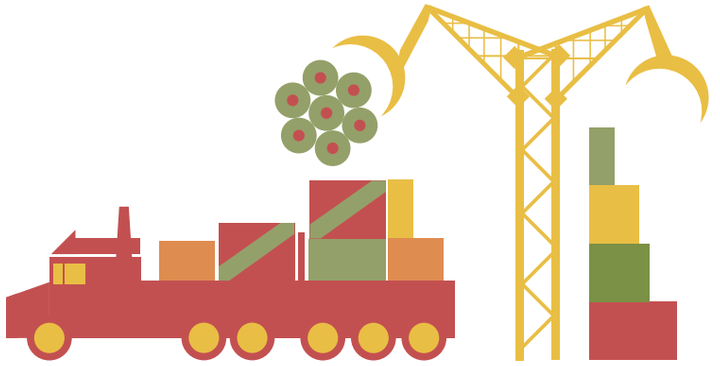
A third friction arises inside the national system of skill formation and knowledge dissemination when the necessary tasks to gain from GVCs' participation are not found. This mismatch between the production tasks and the stock of workers' skills can prevent an economy from upgrading in GVCs.

Given all these frictions, some authors argue that at the end of the day any GVC participation strategy must be evaluated against its effects on workforce development, that is,

"the process by which a territory's initial endowment of human capital is converted into a source of competitive advantage for firms and industries in the territory through education, training and relevant services such as labor market intermediation, exchange and information"

(Barrientos *et al.,* 2011, p. 3).

Note that the search for industrialization can lead to social downgrading as entering existing GVCs in more downstream activities can be detrimental to job quality and working conditions (see Baldwin, 2013).



4. THE JOBS EFFECTS OF UPSTREAMNESS IN SOUTH AMERICA (I): EVIDENCE FROM THE MACRO PERSPECTIVE

Is upstreamness bad for the labor market? We will review the evidence concerning the evolution of labor markets in South America over the period starting in the mid-1990s and ending in the mid-2010s. During this period -and in particular over the last decade, during the booming years- a bias towards natural resources (and thus upstream activities) in the structure of South American exports can be found.

Dutch disease in labor markets? upstreamness and employment growth

One of the main fears of specializing in upstream stages in global production networks (i.e., being a provider of natural resources to the international economy) is its adverse effects on growth dynamics in other sectors of the economy, and, hence, on employment growth for the overall economy. Here we are not discriminating among jobs related to the generation of ideas or the management of somewhat complex information; we only want to assess whether South American economies were able to generate enough jobs for their increasing labor force. We will address the issue of employment quality later.

The literature linking specialization in natural resources and underdevelopment is extensive. Regarding labor markets, W. Max Corden and J. Peter Neary found two negative spillover effects of specializing in this area. First, the resource movement effect moves labor from other sectors to the booming sector; and second, the spending effect, which reduces competitiveness in the non-booming tradable sector, hurts employment there (Corden and Neary, 1982).

Did something like that happen during the last decade?

We first start with employment and unemployment rates (Figure 10). First note that South America's aggregate employment rates increased sharply in the last decade. In many cases, countries like Brazil, Chile and Paraguay could revert the trend of the previous decade.

Most economies could sustain the growth in employment. Proof of this is that the impact of the 2008-09 global crisis in South American labor markets was much more moderate than prior episodes of the same nature. In turn, the lower volatility of employment in the region during the downturn of the global economy occurred without major fluctuations in labor income, accounting for less cyclical volatility in the labor market compared to previous periods (see also World Bank, 2012).

Job creation in the region led to a significant decline in unemployment rates. The simple average of the unemployment rate of the ten economies under analysis stood at around 9.5 percent of the labor force in 2004 and fell to some 6 percent a decade later. In countries with a more flexible labor market, such as Bolivia and Peru, unemployment registered among the lowest rates in the region.

Figure #10_Labor market rates in South America.

	Employment rate (Employment to population ratio)			Unemployment rate (Unemployed to labor force ratio)		
Country	**1994**	**2004**	**2014**	**1994**	**2004**	**2014**
Argentina	51	54	56	12.1	12.6	8.2
Bolivia	65	68	71	5.0	4.3	2.7
Brazil	65	63	65	6.0	8.9	6.8
Colombia	49	57	61	12.0	14.3	10.1
Chile	52	50	58	8.1	8.8	6.4
Ecuador	59	66	66	7.7	6.7	4.6
Paraguay	69	65	67	6.2	7.4	4.5
Peru	61	65	73	5.4	5.2	4.2
Uruguay	58	58	61	7.5	7.6	7.0
Venezuela	54	57	60	8.6	15.0	8.6

Source: Own elaboration based on ILO (2015a).

In contrast, Colombia's unemployment rate still marks the two-digit figures, and in macroeconomically turbulent, more volatile Argentina and Venezuela, it is still above 8 percent.

Figure 11 presents the evolution of the gross level of employment and its volatility over the last two decades.

Figure #11_ Total employment patterns, 1994-2014.

Total employment									
	Levels (millions)			Annual changes					
Country	**1994**	**2004**	**2014**	**1994-2004**	**2004-2014**	**2004-2008**	**2009-2010**	**2011-2013**	**2014-2015**
Argentina	12,299	15,248	17,753	0.98%	2.75%	4.31%	0.42%	1.57%	0.72%
Bolivia	2,851	3,827	5,018	2.91%	2.91%	3.12%	2.52%	2.65%	2.28%
Brazil	69,294	83,860	100,278	1.82%	2.08%	2.30%	1.27%	1.93%	1.25%
Colombia	11,390	16,807	21,572	4.66%	2.31%	2.26%	3.65%	2.90%	1.70%
Chile	5,182	6,015	8,162	1.47%	3.29%	3.33%	3.73%	2.95%	1.41%
Ecuador	4,116	6,004	7,375	3.06%	2.76%	2.40%	2.78%	2.68%	1.83%
Paraguay	1,915	2,393	3,158	2.33%	2.89%	3.91%	1.73%	2.78%	2.43%
Peru	9,080	12,047	16,118	3.34%	3.04%	2.98%	2.51%	1.98%	1.74%
Uruguay	1,377	1,465	1,639	0.88%	1.15%	0.96%	1.19%	1.00%	0.34%
Venezuela	7,433	10,261	13,172	3.25%	2.80%	3.23%	0.86%	2.50%	0.75%

Source: Own elaboration based on ILO (2015a).

There we can see that the acceleration in employment growth during the last decade is basically confined to a subset of South American countries (Argentina, Brazil, Chile, Paraguay and Uruguay). In fuel-dependent Colombia, Ecuador and Venezuela employment growth decelerated during the booming years, showing that some Dutch disease effect may be active in the South American labor markets.

What about the volatility of employment? Commodity exporting countries may find it hard to isolate the swings in the real economy from the high volatility of its external trade. This inability, in turn, can be transmitted to labor markets as a volatile pattern for employment growth.

As Figure 11 shows, more volatile employment patterns can be found in Argentina and Venezuela, followed by Chile, Paraguay and Colombia. In particular, in the last years of growth deceleration in emerging economies (2014-15), employment growth decelerated sharply in Argentina and Venezuela, and, to a lesser extent, in Peru, Bolivia and Brazil. Anaemic markets for exports are a large part of the story in Paraguay, Peru and Bolivia, while domestic aggregate demand factors may have been more important in Argentina, Brazil and Venezuela (see World Bank, 2015a).

What has happened to sectorial employment? Did the boom in natural resources harm employment in other sectors? A word of caution here because we are considering countries that exhibit deep structural differences despite their bias towards natural resources in economic structure. Regarding the role of the primary sector in employment, we see that Ecuador's, Peru's and Bolivia's primary sectors account for more than 25 percent of wage employment at one end of the spectrum, and that Argentina, Venezuela and Uruguay account for less than 10 percent at the other end. However, South American countries share a similar weight in the manufacturing industry (approximately 10/13 percent) and thus the relative importance of the services sector is also heterogeneous.

Figure #12_ Sectoral employment patterns, 1994-2014.

Employment by sector (annual changes, unless specified)									
	Agriculture & mining			Manufacturing			Services		
Country	**1994-2004**	**2004-2014**	**share 2014**	**1994-2004**	**2004-2014**	**share 2014**	**1994-2004**	**2004-2014**	**share 2014**
Argentina	6.63%	-0.52%	1.1%	-3.66%	1.99%	12.7%	2.01%	2.95%	98.8%
Bolivia	2.28%	0.84%	30.0%	1.73%	2.27%	10.6%	3.96%	4.46%	69.9%
Brazil	-1.23%	-1.44%	14.8%	2.78%	1.78%	12.9%	2.96%	3.10%	85.0%
Colombia	3.79%	-0.39%	12.9%	2.69%	0.56%	8.5%	5.27%	3.25%	87.0%
Chile	-0.48%	1.53%	12.3%	-0.20%	1.09%	10.7%	2.34%	4.04%	87.6%
Ecuador	3.08%	1.09%	25.7%	1.38%	3.00%	11.3%	3.46%	3.55%	74.1%
Paraguay	0.97%	-0.17%	23.4%	2.74%	-6.89%	0.1%	3.39%	6.17%	76.6%
Peru	2.02%	-0.15%	25.5%	2.27%	3.55%	10.2%	4.55%	4.68%	74.4%
Uruguay	0.97%	-0.57%	9.5%	-0.52%	-0.38%	11.8%	1.20%	1.68%	90.4%
Venezuela	3.62%	-0.47%	9.2%	1.57%	1.79%	11.8%	3.64%	3.45%	90.7%

Source: Own elaboration based on ILO (2015a).

If we consider employment trends by sector (see Figure 12) a stylised fact arises despite the above-mentioned heterogeneities. Contrary to what can be expected from a decade's growth driven by external demand for resource-intensive products, the primary sector was the least dynamic in terms of job creation. In fact in Argentina, Brazil, Colombia, Paraguay, Peru, Uruguay and Venezuela, the first of these sectors contracted jobs during the period 2004-14. The manufacturing sectors showed mixed results; Brazilian and Colombian jobs were hurt the most. Not surprisingly, these countries show the deepest exchange rate appreciations in the region. As a result of these dynamics, shares in employment in the primary and manufacturing sectors fell in all countries (with the exception of Bolivia and Argentina in the first and second sector, respectively).

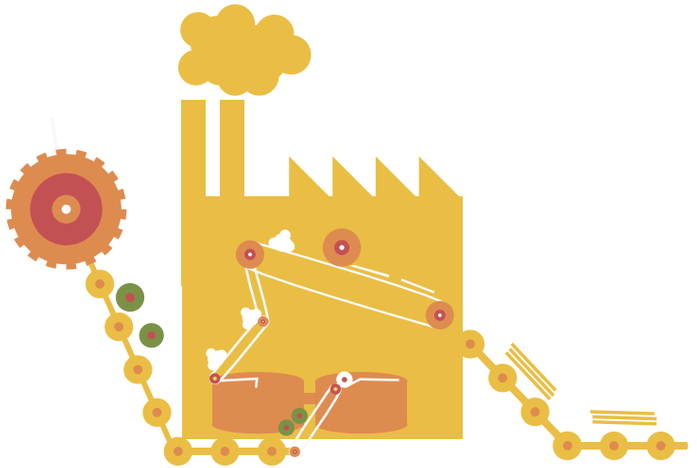
As an aggregate trend, the highest rates of employment growth can be found in the services sector, particularly construction, trade, financial and business services. If we look at more disaggregated data, we can see that wholesale and retail trade, restaurant and hotel sectors were the largest contributors to the change in employment, with the exception of Bolivia, where social services were more important, and in Ecuador, where the construction sector contributed in equal measure to the retail trade. It is precisely social services, construction and financial services and businesses that explained a significant proportion of the new jobs created throughout the region in the last decade.

In sum, the above results show positive overall trends, some negative overall trends, and a great deal of heterogeneity across the countries in the region.

Regarding the first, during a particularly favorable period for the terms of trade of South American economies, it is notable that the labor market did not show the adverse effects expected by the theory of natural-resource intensive economies. Indeed, South American economies were able to absorb an increasing share of the population in productive activities as the demographic transition was following its course, and the services sector led the way. This result may be associated with the following causes (not exclusive): i) strong momentum of domestic demand, fuelled by massive capital inflows (both FDI and financial flows), which, in turn, put pressure on the exchange rate (thus reversing the current account surpluses seen in the first half of the period); ii)

the natural outcome of the development process, which determines a growing importance of services in the economy; and iii) the effects of globalization through vertical disintegration and the fragmentation of production processes that determine the outsourcing of activities to other companies and foreign countries (usually services) with the consequent increase in value added in the services sectors at the expense of industrial activities.

Regarding the downsides and heterogeneities, note that employment growth accelerated during the boom, but this improvement was neither as generalized nor as sustainable as was expected. For one thing, in countries like Colombia or Ecuador employment creation decelerated in 2004-14 compared to the period 1994-2004. Besides, in many countries employment growth was unable to decouple from the global commodity cycle, thus showing an excessive volatility that may have had deleterious effects on welfare.



Cursed goods, cursed jobs? Upstreamness and employment quality

A second fear of upstreamness does not have to do with the quantity but with the quality of jobs. Does a bias towards upstream activities actually yield worse jobs? Or, using Lederman and Maloney's (2011) terminology, can upstreamness disincentive the creation of "smart" goods? Considering jobs, the question should be: can upstreamness foster or discourage jobs related to ideas and imagination? We will try to answer these questions by examining workers' skills, workers' status, and the type of task workers perform in the production process.

Let us start with the educational levels of South American workers. This will provide a picture of the stock of capabilities that workers have (their skills). Figure 13 below shows the distribution of employees in 2003 and 2013 according to three levels of skills: i) low level = incomplete secondary, ii) medium level = complete secondary and higher incomplete, and iii) high level = complete higher education.

First note that within a decade the percentage of low-skilled employees fell across the region. The most remarkable progress to reduce the share of low-skilled workers in labor supply was in Peru and Brazil, while Chile's and Uruguay's progress was mild. Uruguay is also the country with the highest weight of low-skilled workers within the salaried workforce.

Figure #13_ Employment and skills in South America, 2003-2013.

	Employment shares by skill content					
	2003			2013		
	Low	**Medium**	**High**	**Low**	**Medium**	**High**
Argentina	48%	33%	19%	36%	41%	23%
Bolivia	43%	37%	20%	30%	47%	23%
Brazil	58%	33%	9%	43%	43%	14%
Colombia	40%	41%	19%	31%	44%	25%
Chile	42%	40%	18%	37%	44%	19%
Ecuador	58%	35%	7%	48%	34%	18%
Paraguay	63%	29%	8%	46%	36%	18%
Peru	33%	39%	28%	26%	43%	31%
Uruguay	69%	20%	11%	64%	23%	13%

Source: Own elaboration based on CEDLAS.

However, when comparing the qualification levels between countries, we must not overlook that it refers to the salaried workers, who typically have higher levels of skills than non-salaried workers, who are mostly self-employed or independent workers. This means that the lower the proportion of salaried employees in total employment, the more selective is this subset of workers in terms of skills (i.e., those with a higher level of skills). The opposite is true in countries where salaried workers have greater weight; in this case the skill distribution of employees tends to be equated with the skill distribution of total employment. The share of salaried labor is very different in the countries of the region, highlighting Chile, Argentina and Uruguay as countries with higher percentages of wage labor (over 70 percent of employees), compared to countries like Bolivia, Colombia and Peru, where it is below 50 percent.

This improvement in South America's educational levels has been observed since the early 1990s and has been well documented (see for example Cruces, García-Domenech and Gasparini, 2011). This improvement was widespread and affected the young and the different socio-economic segments of the population, allowing for a significant reduction in educational inequality in the region.

Figure 14 shows the skill distribution within each sector in 2013.

Figure #14_ Sectoral distribution of skills in South America, 2013.

		Argentina	Bolivia	Brazil	Colombia	Chile	Ecuador	Paraguay	Peru	Uruguay
Total	low-skill	36%	30%	43%	31%	37%	48%	46%	26%	64%
	med-skill	41%	47%	43%	44%	44%	34%	36%	43%	23%
	high-skill	23%	23%	14%	25%	18%	19%	18%	31%	13%
Agriculture & mining	low-skill	43%	64%	84%	54%	79%	83%	90%	61%	89%
	med-skill	35%	28%	14%	35%	17%	15%	8%	30%	7%
	high-skill	22%	8%	2%	11%	4%	2%	2%	9%	3%
Manufacturing	low-skill	44%	34%	44%	36%	32%	50%	58%	26%	74%
	med-skill	43%	58%	48%	50%	56%	41%	35%	53%	20%
	high-skill	12%	8%	9%	14%	12%	9%	7%	21%	6%
Utilities	low-skill	37%	30%	24%	24%	27%	29%	17%	18%	57%
	med-skill	42%	42%	51%	56%	47%	33%	49%	33%	29%
	high-skill	21%	29%	25%	21%	25%	38%	34%	49%	14%
Construction	low-skill	70%	57%	71%	49%	59%	73%	78%	38%	89%
	med-skill	25%	39%	25%	39%	34%	22%	19%	46%	8%
	high-skill	5%	4%	4%	12%	7%	5%	2%	16%	2%
Wholesale and retail trade	low-skill	38%	27%	43%	25%	34%	38%	44%	23%	70%
	med-skill	52%	64%	51%	60%	56%	51%	47%	56%	26%
	high-skill	10%	10%	6%	15%	10%	11%	10%	21%	4%
Transport	low-skill	43%	30%	44%	28%	28%	37%	42%	22%	66%
	med-skill	45%	54%	49%	51%	56%	46%	40%	60%	26%
	high-skill	12%	16%	7%	21%	16%	17%	18%	19%	7%
Financial and business serv.	low-skill	20%	13%	24%	14%	18%	25%	20%	8%	38%
	med-skill	51%	57%	52%	44%	49%	46%	48%	52%	43%
	high-skill	30%	31%	24%	41%	33%	29%	31%	40%	19%
Social services	low-skill	34%	19%	39%	25%	32%	29%	42%	17%	54%
	med-skill	31%	37%	38%	36%	36%	28%	32%	29%	21%
	high-skill	35%	43%	23%	40%	32%	43%	26%	54%	25%
Public administration	low-skill	20%	16%	22%	14%	7%	18%	15%	15%	52%
	med-skill	46%	52%	49%	39%	54%	43%	45%	37%	28%
	high-skill	34%	32%	29%	47%	40%	40%	39%	48%	21%

Source: Own elaboration based on CEDLAS.

Significant sectoral heterogeneity can be observed. In one corner is the primary sector and construction as the least skill-intensive; in the other corner are social, financial and business services and public administration as those that demand more skilled workers.

Looking at the variation in the intensity of skilled labor (defined as the share with complete secondary and higher education), we see that educational upgrading was a widespread phenomenon although the intensity differed across sectors and countries. Brazil stands out for its significant (15 percent on average) and homogeneous across-sectors evolution. The remaining countries showed greater sectorial heterogeneity. Uruguay is notable for minor changes in the percentage of skilled workers (rates actually fell in all sectors except in social services –where it did not change– and in financial services and public administration, where it increased).

Let us examine the link between the sectoral bias in employment growth and the skill-content of labor demand. The fact that manufacturing is losing ground in detriment to the services sector might suggest that employment growth was led by less skill-intensive sectors (typically found in services) hindering sectors with higher productivity and high skill-intensity (typically the industry). The evidence tends to reject this hypothesis given that the services sectors are primarily responsible for the generation of qualified jobs.

However, the heterogeneity within the services sector is very large in terms of productivity and the intensity in the use of skilled labor. Transport or construction sectors are very different from the financial services and business and personal services. While some are less skill-intensive, it is also true that other increasingly sophisticated services have the potential to drive productivity and economic growth. In any case, what seems clear is that the fall in the weight of the industrial sectors and the variety of outsourcing processes do not necessarily determine a bias towards less productive and low skill-intensive activities. In other words, the increase in services in South American economies per se does not signify a setback for higher aggregate productivity. We will return to this issue later.

Let us now move on to employment status. To that end, we will discuss the evolution of labor informality in South American countries. We will take the legalistic approach that defines informality as the absence of social security coverage. Figure 15 can be of help.

Figure #15_ Total and sectorial informality rate in South America, 2003-2013.

		Argentina	Bolivia	Brazil	Colombia	Chile	Ecuador	Paraguay	Peru	Uruguay
Total	2003	50%	67%	35%	22%	41%	67%	84%	76%	28%
	2013	34%	53%	23%	15%	39%	46%	54%	61%	13%
Agriculture & mining	2003	63%	76%	65%	30%	66%	88%	91%	94%	46%
	2013	33%	66%	53%	21%	68%	76%	71%	93%	22%
Manufacturing	2003	44%	75%	20%	18%	30%	60%	83%	82%	28%
	2013	29%	64%	12%	10%	27%	38%	55%	61%	11%
Utilities	2003	8%	11%	7%	6%	9%	33%	75%	32%	1%
	2013	9%	20%	4%	6%	5%	8%	16%	8%	2%
Construction	2003	79%	88%	53%	24%	65%	93%	92%	97%	40%
	2013	67%	84%	33%	14%	54%	82%	69%	90%	17%
Wholesale and retail trade	2003	56%	80%	34%	21%	52%	70%	91%	80%	33%
	2013	40%	72%	22%	16%	52%	46%	65%	67%	14%
Transport	2003	45%	90%	23%	22%	35%	77%	90%	72%	18%
	2013	34%	65%	14%	16%	27%	44%	60%	43%	7%
Financial & Business serv.	2003	34%	60%	19%	15%	15%	47%	74%	81%	20%
	2013	22%	39%	11%	9%	15%	15%	31%	49%	6%
Social services	2003	56%	53%	42%	26%	39%	55%	80%	74%	35%
	2013	37%	38%	29%	19%	37%	28%	45%	64%	17%
Public administration	2003	28%	13%	15%	10%	8%	21%	72%	29%	1%
	2013	11%	17%	11%	10%	2%	3%	27%	21%	0%

Source: Own elaboration based on CEDLAS.

Social security coverage in the region and its link to the labor market has been analyzed in several studies (see e.g., ECLAC, 2013; Rofman *et al.*, 2008; Auerbach *et al.,* 2007). These studies found that the probability of access to social security depends on supply factors, such as age and educational level, and demand factors, such as the size of the company and the sector. ECLAC (2015), for example, shows that the variables associated with the activity sector are very relevant, highlighting some common patterns between countries such as the least coverage in construction and, to a lesser extent, trade and agriculture.

If we examine the incidence of informality among wage earners[11], the differences between the South American economies are surprisingly high. On the one hand Uruguay and Chile are the countries where the incidence of this phenomenon is more limited, affecting only 13-15 percent of employed workers. On the other are Paraguay and Peru, where about 80 percent of workers lack social security coverage.

Undoubtedly one of the most remarkable results in South American labor markets in the last decade was the sharp decline in informality. The falling rate of informality of employees between 2003 and 2013 registered 30 points in Peru, 22 points in Ecuador and around 15 points in Argentina, Bolivia, Brazil, Paraguay and Uruguay and more modestly in Chile (7 percent) and Colombia (2 percent between 2008 and 2013) (see Figure 15).

Examining the progress across sectors reveals widespread results, although the sectors with the highest incidence of informality remains the primary, construction and trade sectors.

What is behind the drop in informality? It is possible to link this remarkable decline in informality to divergent sectorial employment dynamics (the "labor demand composition" effect) and to improving educational levels of the workforce (the "labor supply composition" effect). Specifically, we ask to what extent the fall in informality can be explained by these two composition effects or by a "genuine" increase in the propensity to engage in the social security system.

11 > It is important to note that this analysis is restricted to salaried workers. A reality observed in all countries of the region is the low propensity to social security registration of non-salaried workers, in particular the unskilled self-employed. In fact, the proportion of self-employed is a measure of job insecurity that is highly correlated with the informality of employees.

BOX
#3

Decomposing informality changes in South America

The rate of informality in a given time (It) can be expressed as the weighted average of informality in each sector j s educational level, as shown in the following expression:

$$I_t = \sum_s \alpha_t^s [\sum_j \alpha j_t^s I_{jt}^s] \quad (1)$$

A_t coefficient s ^ s is the weight of the sector in total employment α_jt year t ^ s is the weight that the group of workers j (skill level) has within the sector s in year t. Finally I_jt ^ s is the specific rate of informal workers with skills levels in the sector j at time t s.

From expression (1) it is possible to decompose the variation in the rate of informal between time t-1 and time t, as follows:

$$I_t - I_{t-1} = \sum_s (\alpha_t^s - \alpha_{t-1}^s)[\sum_j \alpha_{jt-1} I_{jt-1s}^s] \quad \text{> Demand effect (sectoral movements)}$$

$$+ \sum_s \alpha_t^s [\sum_j (\alpha_{jt}^s - \alpha_{jt-1}^s) I_{jt-1}^s] \quad \text{> Supply effect (skill changes)}$$

$$+ \sum_s \alpha_t^s [\sum_j \alpha_{jt}^s (I_{jt}^s - I_{jt-1}^s] \quad \text{> Other effect}$$

(2)

The summands on the right side of the above expression cover three components that can be broken varying the rate of informality in a given period: i) the sectoral composition effect, ii) the composition effect by rating and iii) the change net informality of composition effects. We assume that the condition of informality is explained by demand factors that differ from one sector to another and supply factors closely related to the level of training of the workforce. Then changes in the composition of employment by sector and rating over time may be, by themselves, a cause of the change in the rate of labor informality. However, more interesting, you can also change the propensity for informality within the same segment of employment, what we call a net or independent variation in composition effect or “genuine” change in informality. Naturally, the sign of each component can be positive or negative.

More specifically, we assume that the informality condition is explained by demand factors that differ from one sector to another, by supply factors that are closely related to the level of training of the workforce, and by other factors unrelated to those mentioned above (see box 4 for details). So, changes in the composition of employment by sector and skills over time may be, in themselves, a cause for the change in the rate of labor informality (the so-called "composition effect"). However, we can also detect changes in the propensity for informality within the same segment of employment (either by status or skills), the so-called "genuine" change in informality. Naturally, the sign of each component can be positive or negative.

Figure 16 presents the results of the decomposition of the variation of informality between 2003 and 2013. The results are qualitatively similar in nine countries. Overall, the three components contributed to the decline in informality, except in Uruguay where the demand (or sectoral) composition had a positive effect. Nonetheless, this effect seems to be small and confined to a subset of South American countries (notably, Bolivia). However, the size of the effect was very different in the three components. In all cases, informality fell more than what can be explained by both demand and supply composition effects.

Figure #16_ Total and sectoral informality rate in South America, 2003-2013.

	Reduction in the informality rate							
	Total		Due to demand composition		Due to supply composition		Other factors	
Country	**%**	**share**	**%**	**share**	**%**	**share**	**%**	**Share**
Argentina	-1.6	100	0.0	0	-0.4	23	-1.2	77
Bolivia	-1.7	100	-0.3	18	-0.3	20	-1.1	62
Brazil	-1.3	100	-0.1	8	-0.4	31	-0.8	61
Colombia	-0.7	100	0.0	3	-0.2	23	-0.5	74
Chile	-0.5	100	0.0	8	-0.3	57	-0.2	35
Ecuador	-2.2	100	0.0	0	-0.4	17	-1.8	83
Paraguay	-3.4	100	0.0	0	-0.1	4	-3.3	97
Peru	-1.6	100	-0.1	5	-0.6	37	-1.0	58
Uruguay	-1.4	100	0.0	-1	-0.1	10	-1.3	91

Source: Own elaboration based on CEDLAS.

This result suggests that the existence of determinants of informality fall beyond the sectorial bias of growth and the improvement in educational factors. Undoubtedly the most stable macroeconomic environment favored greater coverage, creating incentives for both employers and workers formalization. However, while informality has traditionally shown countercyclical behavior, progress made in previous periods of growth, as in the 1990s, were much more modest. Although more evidence is still necessary, other significant changes that fostered the fall in informality were

the institutional reforms in labor markets and social protection schemes that presumably induced a change in the behavior of workers (e.g., the extension of health insurance, see for example Bérgolo and Crosses -2011- for the Uruguayan case).

Finally, employment quality is related to the types of tasks workers do in the production process. As was said, good jobs are those that require cognitive, non-routine tasks. These jobs are related to imagination and ideas. In contrast, cognitive, routine tasks can be well remunerated but have to do with managing information and are thus subject to cost competition (with machines and workers elsewhere). Finally, machines cannot perform non-routine, manual tasks. But these tasks are not complex for a human and thus are subject to wage arbitrage.

Figure #17_ Task content of jobs in South America, 1994-2014.

	Non-routine, manual					Routine					Non-routine, cognitive				
	Shares			Annual changes		Shares			Annual changes		Share			Annual changes	
Country	**1994**	**2004**	**2014**	**1994-2004**	**2004-2014**	**1994**	**2004**	**2014**	**1994-2004**	**2004-2014**	**1994**	**2004**	**2014**	**1994-2004**	**2004-2014**
Argentina	18%	21%	21%	3.6%	1.9%	54%	53%	54%	0.2%	3.5%	28%	26%	25%	0.9%	2.1%
Bolivia	55%	51%	43%	2.4%	1.2%	35%	39%	41%	4.7%	3.6%	11%	10%	17%	2.8%	8.1%
Brazil	42%	43%	31%	1.8%	-1.1%	45%	41%	48%	1.2%	3.8%	13%	16%	21%	4.0%	5.3%
Colombia	34%	37%	37%	5.4%	2.5%	52%	48%	45%	3.8%	1.7%	14%	16%	18%	5.9%	3.6%
Chile	21%	22%	19%	2.1%	1.6%	63%	60%	56%	0.8%	2.8%	16%	18%	25%	3.0%	6.5%
Ecuador	29%	33%	34%	3.9%	3.8%	59%	55%	51%	2.5%	1.9%	12%	12%	15%	3.9%	4.5%
Paraguay	43%	46%	39%	2.8%	1.4%	47%	42%	42%	1.6%	2.9%	10%	11%	19%	3.8%	8.9%
Peru	32%	32%	29%	3.1%	2.1%	57%	55%	56%	3.2%	3.1%	11%	13%	15%	5.0%	4.8%
Uruguay	21%	22%	24%	1.0%	2.3%	59%	58%	54%	0.7%	0.4%	20%	20%	22%	1.3%	2.1%
Venezuela	28%	30%	45%	4.8%	7.6%	50%	46%	36%	2.0%	0.6%	21%	23%	19%	4.2%	1.6%
Average	32%	34%	32%	3%	2%	52%	50%	48%	2%	2%	16%	17%	20%	3%	5%

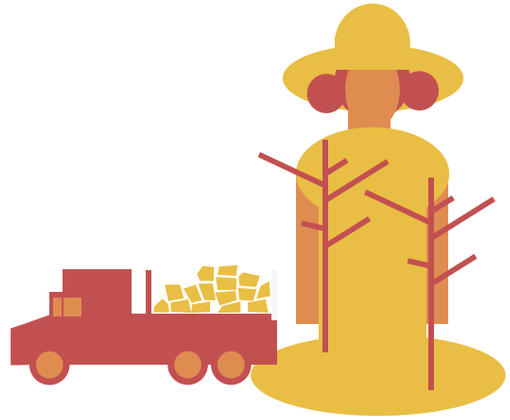
Source: Own elaboration based on ILO (2015a).

Figure 17 presents the evolution of the task content of jobs in the region. On average, the share of non-routine, cognitive tasks increased sharply over the last decade at about twice the speed of non-routine manual and routine tasks. Going to country-specific dynamics, note that over the last decade there has been a process of regional catch up given that backward countries outperformed relative to other developing regions. The most remarkable cases are Bolivia and Paraguay, where the share of this type of task increased from 10 percent / 11 percent to 17 percent / 19 percent, respectively. Impressive advances can also be found in previously well-positioned countries such as Chile and Brazil, while Argentina and Venezuela show disappointing outcomes (see Aedo *et al.*, 2013, for a further analysis and some contrasting results). The rest of the countries progressed mildly.

What was the counterpart of these dynamics for non-routine, cognitive jobs? In both Bolivia and Paraguay the share of non-routine manual jobs decreased *pari passu* the evolution of the role of the cognitive tasks. In Brazil the share of routine tasks increased drastically, which implied a huge decline in the share of non-routine manual jobs and it may indicate that the largest country in the region may have benefited from global offshoring. In Chile the larger share of non-routine cognitive tasks matched a diminishing role for both non-routine manual and routine jobs, while Venezuela seems to fit the cursed goods-cursed jobs theory pretty well. Finally, Colombia, Ecuador and Uruguay evidence a degree of labor market polarization (see Ariza, 2014, for the Colombian case).

In sum, there is nothing deterministic in the relationship between the level of a given country's upstreamness and the quality of jobs it yields. On the one hand, the evidence presented here about the recent South American record

shows that it is possible to bias an economic structure towards natural resources and increase the skill content of jobs, foster labor market formality and participate in the skill-intensive, non-routine markets where imagination and ideas are traded. On the other hand, our analysis also shows that many country-specific factors can prevent an economy from profiting from trade in terms of job quality. Indeed the outcome for the region seems as positive on average as heterogeneous when going to country-specific dynamics.



Upstreamness and labor market inequality

During the 2000s inequality levels were significantly reduced in most of the region after experiencing an upward trend in the 1990s. This reduction was deeply connected to the improvements in employment growth and employment quality that was just mentioned. Indeed, the World Bank (2012) found that the main driver to reduce overall household income inequality during the 2000s was the fall in the inequality of income.

Figure 18 presents the evolution of the Gini coefficients for hourly wages over the period 1994-2014. The fall in inequality was high in Ecuador, Uruguay, Argentina and Bolivia; in Paraguay, Chile, Peru and Colombia the progress was milder, while Brazil's wage inequality actually grew during the last decade (although total income inequality fell during this period). In many cases (remarkably in Argentina, Bolivia and Uruguay), these trends reverted what had happened during the 1990s, when labor inequality increased.

Figure #18_ Gini coefficients of hourly wages.

	Gini coefficients				
	Levels			Annual changes	
Country	**1994**	**2004**	**2014**	**1994-2004**	**2004-2014**
Argentina	0.39	0.45	0.38	14.1%	-14.6%
Bolivia	0.54	0.59	0.51	9.3%	-13.6%
Brazil	0.59	0.55	0.60	-6.0%	8.4%
Colombia	0.55	0.55	0.53	-0.4%	-2.9%
Chile	n.d.	0.56	0.50	n.d.	-9.8%
Ecuador	0.55	0.54	0.43	-1.7%	-20.9%
Paraguay	0.56	0.56	0.50	0.9%	-10.8%
Peru	0.54	0.53	0.50	-1.6%	-4.5%
Uruguay	0.42	0.49	0.40	16.7%	-17.9%
Venezuela	0.43	0.43	n.d.	-0.3%	n.d.

Source: Own elaboration based on data from CEDLAS.

What lies behind the compression in wage inequality? The reduction in two major wage gaps: the educational or skills gap and the gender gap. The average years of schooling of workers in the whole of Latin America increased approximately three years (de la Torre *et al.*, 2012). At the same time, in the 2000s female participation in the workforce continued to grow, albeit at a slower pace than in previous decades. The fall in informality noted above also seems to have played an important role in reducing the inequality of labor income (Amarante and Arim, 2015).

But both phenomena alone cannot explain the decline in income inequality generated in the labor market. Growing evidence about the fall in the return to skills (the so-called "skill premium") offers a fundamental explanation. Note that it does not refute our hypothesis of an increasing participation in the global labor markets where ideas and complex information are traded; instead, it gives us a complex picture where this outcome can be explained by some mismatch between skills and tasks.

Indeed, the wage differential for workers with a secondary and tertiary education and workers with a primary or less education began a downward trend in the 2000s after having increased in the 1990s (see, for example, Lustig and Gasparini, 2011; Lustig, Lopez-Calva and Ortiz-Suarez, 2013).

Figure 19 shows the available data on skill premiums for South American countries taken from the CEDLAS database. There, each number represents the coefficients of an educational dummy in Mincer-like equations[12]. Although there is no clear trend for the returns to primary school, we can see a decreasing trend for the returns to secondary and tertiary (college) education.

This stylised fact of falling returns to education in most South American countries contrasts with trends in the developed world and in other developing regions, where the reward for education has increased steadily over the past 30 years. The causes of this phenomenon, however, have not been established unequivocally.

12 > In this equation earnings are regressed against years of schooling and other control variables.

Figure #19_ Skills premium in South America 1994-2014.

Men									
	Primary			Secondary			College		
Country	**1994**	**2004**	**2014**	**1994**	**2004**	**2014**	**1994**	**2004**	**2014**
Argentina	0.18	0.15	0.24	0.43	0.36	0.28	0.72	0.61	0.45
Bolivia	0.19	0.30	0.31	0.25	0.14	0.15	0.96	1.19	0.71
Brazil	0.49	0.34	0.22	0.45	0.42	0.25	0.91	1.05	0.90
Chile	0.04	0.16	0.14	0.41	0.39	0.23	0.51	0.98	0.85
Colombia	n.d.	0.17	0.15	n.d.	0.45	0.28	n.d.	1.14	1.07
Ecuador	0.15	0.14	0.08	0.38	0.36	0.29	0.57	0.92	0.67
Paraguay	0.19	0.11	0.19	0.63	0.52	0.33	0.73	0.80	0.78
Peru	0.19	0.09	0.13	0.21	0.25	0.20	0.59	0.63	0.47
Uruguay	0.15	0.19	0.21	0.47	0.62	0.47	0.57	0.84	0.55
Venezuela	0.19	0.27	0.00	0.35	0.34	0.00	0.47	0.53	n.d.

Women									
	Primary			Secondary			College		
Country	**1994**	**2004**	**2014**	**1994**	**2004**	**2014**	**1994**	**2004**	**2014**
Argentina	-0.01	0.12	0.07	0.43	0.25	0.26	0.40	0.43	0.34
Bolivia	0.13	0.13	0.20	0.35	0.57	0.26	1.36	0.87	0.87
Brazil	0.42	0.27	0.19	0.42	0.36	0.19	0.76	0.98	0.90
Chile	-0.04	0.20	0.15	0.54	0.46	0.31	0.33	1.20	1.00
Colombia	0.00	0.14	0.12	0.00	0.39	0.26	0.00	0.93	0.99
Ecuador	0.09	0.16	0.10	0.66	0.43	0.28	0.64	0.71	0.37
Paraguay	0.22	0.13	0.00	0.78	0.61	0.33	0.49	0.73	0.95
Peru	0.23	0.04	0.13	0.26	0.30	0.10	0.57	0.51	0.45
Uruguay	0.07	0.18	0.13	0.70	0.57	0.53	0.49	0.65	0.61
Venezuela	0.11	0.14	0.00	0.24	0.37	0.00	0.39	0.52	0.00

Source: Own elaboration based on data from CEDLAS.

BOX
#4

Is the decline in the skill premium related to upstreamness? The case of Uruguay

The Uruguayan case is presented as an interesting object of study to the extent that since 2008 there is a steady decline in the indicators of inequality, while a fall in returns to education. In this box we disaggregate the potential effects of commodity prices at the sectoral level, which may be different effects on returns to education to the overall result. Changes in the structure of relative prices had been the only relevant phenomenon in Uruguay between 2005 and 2011, the sectoral bias of the changes observed during the rise of commodity prices have had a significant effect in the fall of income inequality of workers in the tradable sector.

Under the framework of an extension of the HO model estimation model proposed by Haskel and Salughter (1999, 2002) we apply a methodology based in mandated-wage equations to identify the effect of price changes and biased technological change by sector on the skill premium.

Changes in factors' remunerations associated with changes in the price level or technological progress have as theoretical support the rationale behind Stopler-Samuelson theorem. Given the conditions established in the HO model, a price increase of outputs or a technological change biased towards any sector generates variations in profitability, so that the sectors concerned will expand demanding more of the factor in which they are more intensive, altering the structure of remuneration of the factors of production. Thus, these relationships can be represented by the following equation:

$$\sum_j V_{kjt} \Delta \log W_{jt} = \Delta \log P_{kt} + \Delta \log TFP_{kt} \quad (1)$$

Vijtes where the proportion of j factor in the cost structure of sector k at time t and the ΔlogWJt is the change in reumneration of the factor j in the economy. The right side of the equation represents the sum of the change in the measurement technology through TFP (Δ log TFPkt) and prices (ΔlogPkt).

Mandated-wage equations empirically explore the effects outlined in equation (1). These equations estimate the changes in the remuneration of factors of production that would be consistent with the Stolper-Samuelson effect, yielding an estimate of changes in the skill premium associated only with a change in relative prices (equation 2). Moreover, the estimate of the equation (3) quantifies the change in the remuneration of factors originating from technological change, i.e.:

$$\Delta \log P_{kt} = \sum_i \beta_j \log V_{kj} + \varepsilon_k \quad (2)$$

$$\Delta \log PTF_k = \sum_j \beta_j V_{kj} + \varepsilon_k \quad (3)$$

Where the Vkj regressors are the proportion of j factor costs in k's industry structure. Thus, coefficients β can be interpreted as the change in returns for mandated by a change in factor prices (equation 2) or a change in technology (equation 3). In this box we use a model with three factors capital (Ka), skilled labor (lime) and unskilled labor (no lime).

In the table B1 we exhibit the results of equation (2). It is noted that by taking as reference the complete secondary qualification, wage changes mandated by price changes for skilled workers would be -0.11%. Meanwhile, under the same classification it would be expected to unskilled workers had a wage increase of 26%, while the return on equity should have increased about 17%.

Table B1. Mandated - Wage Equations

	Weighted	Unweighted
Vcali	-0,114	0,029
	0,1	0,097
Vno_cali	0,26	0,176
	0.043**	0.059**
Vka	0,173	0,073
		0,109
P-value (Vcali-Vno_cali)	0,009	0,3181

Source: Own estimates based on ECH, INE and BCU.
Note: significance at 1% level (***), significance at 5% level (**), significance at 10% level (*). The observations are weighted by the share of the sector in total employment. The price variation is between 2006 and 2010, and the participation structure of the factors is the average between 2008 and 2010.

Also, in Table B1 we see that the fall in skill premiums for education-induced change in the structure of relative prices would have been significant if taken as a threshold for considering the qualifications of workers completing high school. Meanwhile, if weights are not used in the estimates, we obtain that the null hypothesis of no change in the wage premium for education is not rejected.

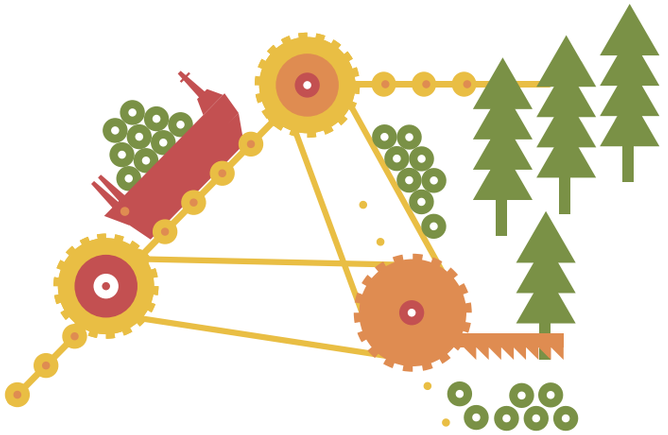
In sum, the results indicate that in the event that changes in the structure of relative prices had been the only relevant phenomenon in Uruguay between 2005 and 2011, the sectoral bias of the changes observed during the boom in commodity prices would have had a significant effect in the fall of income inequality of workers in the tradable sector. This is considering the qualified from the complete secondary work, while the fall in inequality would not be significant if we consider the completion of tertiary studies for this system.

A first group of hypotheses sets the imbalance in the growth of supply and demand for skilled labor as a factor explaining the decline in returns to education. Of these, some refer to the significant progress in the coverage of secondary and tertiary education in many Latin American countries that increased the average educational level of inflows into the labor market, generating more "abundant" qualified work (see, for example, Lopez-Calva and Lustig, 2010; Azevedo *et al.*, 2010; Barros *et al.*, 2010). Other explanations assign greater importance to changes in labor demand towards less knowledge-intensive sectors, given the increasing role of the primary sectors and some services in overall growth (see e.g. de la Torre *et al.*, 2012; Gasparini *et al.*, 2011).

Other hypotheses focus on the quality of education so the fall in returns reflects the disconnection between the skills provided by the educational system and the skills demanded by the labor market.

Finally, a third group emphasizes the transformation of labor market institutions. The increases in minimum wages and the expansion of collective bargaining favor the flattening of the wage pyramid and a higher compression in the lower end of the earnings distribution.

However, the causes (and consequences beyond the fall of inequality) of this singular phenomenon of South American economies is a puzzle that has yet to be resolved. Whatever the case may be, the overall evidence points to the fact that upstreamness in the global economy is not related to increasing inequality in the labor market, quite the opposite. The bad news is that the compression in the skill premium has to do with a fall in the return to education, which, in turn, may be related both to labor supply and demand factors.



5. THE JOBS EFFECTS OF UPSTREAMNESS IN SOUTH AMERICA (II): EVIDENCE FROM THE MICRO PERSPECTIVE

When debating the application of his Theory of Fractals to finance, the mathematician Benoit Mandelbrot forcefully argues that visual inspection can have a higher explanatory power than any statistics. We do not know if that was the case for finance, but it is probably the case with respect to global value chains and their employment effects. Simply put, official statistics do not measure these types of linkages. That is why this section will focus on lessons from case studies on employment patterns in natural resource-related activities in South America.

There is extensive literature on global value chains based on case studies.[13] As a general rule, these studies take the firm's or sector's perspective and examine commercial relationships; therefore, they focus on what has been called "economic upgrading" (Rossi, 2011, p. 53) but not specifically on jobs and wellbeing. There might be an implicit assumption in this kind of study that economic upgrading has always led to better jobs and improved wellbeing. But as we choose to study the labor market dynamics related to GVCs, we will take another path. Thus, borrowing loosely on the literature on workforce development (Gereffi *et al.*, 2011) and social upgrading (Barrientos *et al.*, 2011; Bernhardt and Milberg, 2013), we will assess to what extent GVCs' participation led to improving labor market conditions in South America. According to the discussions in the previous section, we will examine the patterns of employment growth, employment quality and wage inequality and focus on attraction forces to participate in GVCs, as well as the frictions they can generate.

From a worker's perspective, being part of a GVC does not necessarily mean a better job or better working conditions. As was mentioned earlier, joining a GVC can imply a bias towards routine tasks, such as extracting the endowments and making the first round of arrangements. Few cognitive non-routine ideas-related jobs can be expected of such participation in GVC.

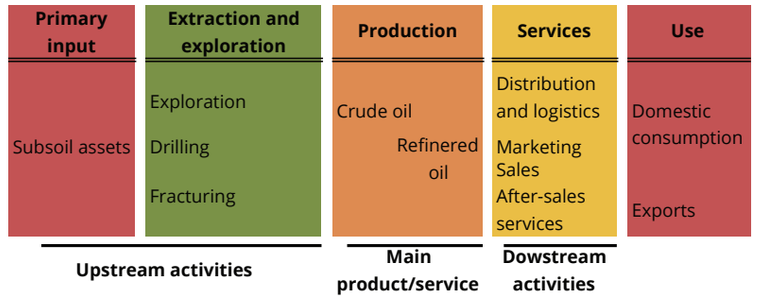
As it is clear in the literature, it is not easy to find precise metrics for the ideas or non-routine content of jobs. Our strategy is to analyse the skill content of jobs in our case studies and, if possible, to evaluate to what extent Research & Development (R&D) activities are performed in the region.

More specifically, we will analyse the cases of the mineral sector in Peru's municipalities, the oil sector in Rio de Janeiro in Brazil, and the forest sector in northeastern Argentina. Figure 20 shows the canonical value chain of the three case studies (oil and gas, timber and pulp, and mining).

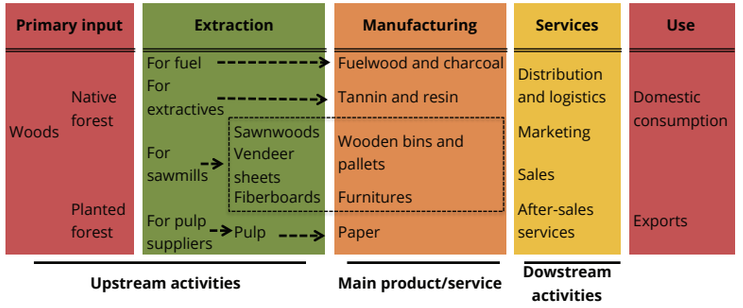
13 > A comprehensive list can be found in https://globalvaluechains.org/publications.

Figure #20_ Canonical GVCs under analysis.

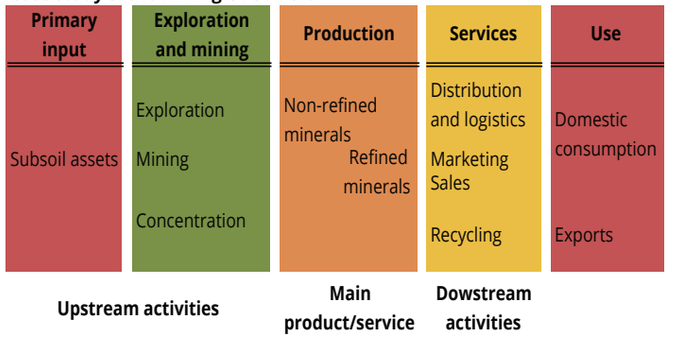
Case study 1: the Oil GVC / Brazil



Case study 2: the Timber and Pulp GVC / Argentina



Case study 3: the mining GVC / Peru



Source: Own elaboration.

The Oil GVC in Rio de Janeiro, Brazil[14]

Oil and gas (O&G) extraction activity increased sharply in Brazil during the 2000s, a period of the O&G concession auctions under the terms of the Petroleum Law. The activity is concentrated in offshore platforms in the Campos Basin in the state of Rio de Janeiro (ERJ), consolidating it as the Brazilian state with the most job occupations in the sector (some 65 percent, circa 2010).

The case study was conducted in two stages. The first step consisted of using an input-output (I-O) matrix that could show the impact of the O&G sector on local employment by identifying the intermediate consumption needed for the operation of this activity. The second stage made a qualitative analysis aimed at complementing the quantitative information yielded in the I-O analysis.

14 > Details on this case study can be found in Hasenclever *et al.* (2015).

BOX #5

Skills and R&D in natural resource-related GVCs in South America: lessons from previous Red Sur studies

As part of the activities of the Annual Report 2014 we studied four networks of knowledge related to innovation activities in natural resource-related GVCs: the livestock sector in Argentina (LA, for short), mining in Chile (MC), agricultural GVC in Paraguay (AP) and the forest and timber GVC in Uruguay (FU). For the study some fifty actors/firms were interviewed (see Red Sur 2014 and Arza *et al.* for more details).

In this box we assess the capacities of actors in each GVC studied. The various indicators used show varying degrees of capacity building, with the MC reaching the highest values and the AP reaching the lowest values.

In the MC the distribution of skills seems quite fair and there is a high minimum capacity in all participating actors: 25% of the actors/firms who have less capacity presents a ratio of professional/occupied higher than 83%. That is, it is the GVC that has, in terms of skills, the highest ability for creating and disseminating knowledge. Ideas-related jobs, thus, are present in this case.

At the other extreme is the AP, which has relatively low values for indicators of capabilities, especially with regard to the percentage of professionals to total occupied by each actor/firm. The distribution of capabilities is not good either. For one thing, over 60% of actors/firms interviewed have less than 20% of graduates in its staff.

The LA is a GVC with a high level of training of human resources. On average 70% of employees have tertiary education, but with a coefficient of variation of 43%, meaning that there is considerable dispersion in capabilities within the GVC. This also implies that the minimum capacity in the network is relatively low. Thus, the lower 25%, that is the quarter of the actors/firms with less capacity, has a graduate/staff ratio of 25%. That is, compared with MC, this GVC seems to have less potential for dissemination and creation of knowledge.

Finally, FU also has a high proportion of professionals in the total employed (63%), although the distribution is not good, something that we also find in the timber and forest sector in Argentina.

Figure B2 - Average capabilities of GVCs under analysis.

	Graduates from university / total staff			
	of the GVC	of each actor / firm		
		Average	Lower 25%	Variation coef.
Livestock GVC, Argentina	53.2	70.3	25.4	43.3
Mining GVC, Chile	58.6	86.8	83.6	27.2
Agricultural GVC, Paraguay	53	18	8.4	67
Forest and timber GVC, Uruguay	31.3	62.9	46.8	41.3

Source: Arza *et al.* (2014)

We also evaluated the ideas and imagination-content of jobs by analysing R&D activities in the GVCs. We discriminate between two types of activity, that is, the diffusion of existing knowledge (training) and the exploration or creation of new knowledge.

Figure B3 shows the outcome of this measure. The first thing that stands out in this figure, if we look at column 4, is that no network has a ratio of exploration to diffusion greater than 100%, indicating that all networks are mostly spreading existing knowledge. However, there are differences among the different networks. Here again we find that the MC is showing the highest capacities, with 47% of the links involving exploration and innovation; then there is the FU and LA, and finally the AP. Here, however, it is striking that the differences are more marked than in the previous cases.

In addition, the analysis of capabilities invites us to think that on all networks exists good potential for the dissemination of knowledge. The MC would be an ideal case, although the results may be biased by the sample construction. While the AP is the one with the less capacity in absolute terms and new knowledge generation is practically zero.

Figure B3 - Research & Development links in GVCs under analysis.

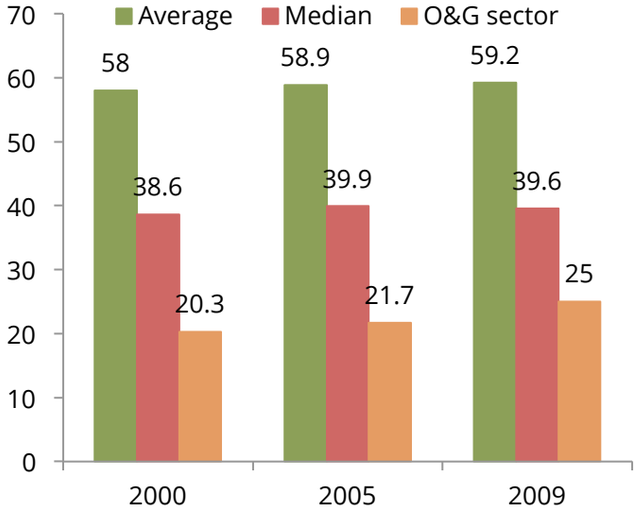
		R&D linkages				
		Total	New knowledge (1)	Existing knowledge (2)	(1) / (2)	
Livestock GVC, Argentina	Quantity	52	15	37	40.5%	43.3
	% of total	100.0%	28.8%	71.2%		
Mining GVC, Chile	Quantity	19	9	10	90.0%	27.2
	% of total	100.0%	47.4%	52.6%		
Agricultural GVC, Paraguay	Quantity	36	1	35	2.9%	67
	% of total	100.0%	2.8%	97.2%		
Forest and timber GVC, Uruguay	Quantity	42	16	26	61.5%	41.3
	% of total	100.0%	38.1%	61.9%		

Source: Arza *et al.* (2014).

The LA has a high average of new knowledge to diffusion but the distribution across actors/firms is highly heterogenous. Nevertheless, there are multiple linkages connecting actors/firms, which means that the diffusion of knowledge is particularly high in this case. Finally, FU has good average skills but a high dispersión. Unlike the LA, it ensures a relatively high capacity for most of the actors of the network and at the same time a significant proportion of linkages among actors/firms.

Let us start with employment dynamics. The computation of the jobs multiplier (both direct and indirect effects) associated with this sector is low in comparative terms, as is to be expected considering that this type of activity is capital intensive. As Figure 21 shows, a demand for the O&G sector to the amount of R$1,000,000.00 generated –directly and indirectly– only 20.3 occupations in 2000, 21.7 in 2005 and 25.0 in 2009, well below the average (around 58.5) and median (around 39.0) multipliers of the 55 activities covered by the economy-wide I-O Matrix. In fact, the sector ranks as one of the activities with less potential to generate direct and indirect jobs in the Brazilian economy.

Figure #21_ Jobs multiplier (per 1m real).



Source: Hasenclever *et al.* (2015).

Note that despite the low capability to mobilize direct and indirect jobs, the O&G activity showed a clear increase in this indicator over the 2000s, coinciding with the period when this activity had experienced strong productivity growth and was the specific target of public policies for the development of the GVC. Comparing 2000 with 2009, the multiplier occupations of this sector grew by 23.4 percent (the sixth activity in terms of growth multiplier). Between 2005 and 2009, growth was 15.4 percent (the third activity variation of the multiplier).

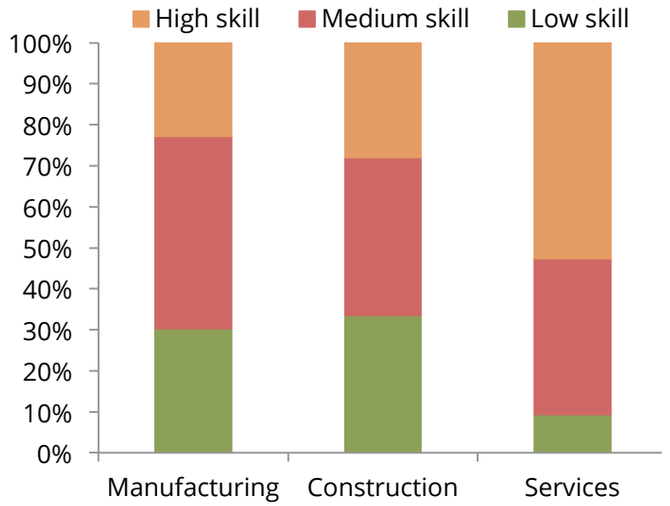
Regarding ideas-related jobs and wages, the very evolution of the activity led to an upgrade in terms of skills. In 2000, in this GVC workers with medium skills prevailed with 52.4 percent of the jobs, followed by those with basic skills at 27.7 percent, and finally those with high skills at 19.4 percent. This skills profile has changed considerably in the decade, with most of the occupations filled by people with medium skills, showing a 61.6 percent growth in 2010. There was also a greater relative increase in occupations in the high skills sector, which grew 644 percent between 2000 and 2010, jumping from 2,348 to 17,466 top-level occupations; in ERJ alone it rose from 1,368 to 11,833, a 765 percent increase.

This evolution in skills is coupled with vigorous technological change in Brazil's sector, with exploration migrating from onshore oil fields to offshore shallow water (water depth up to 300 meters) in the 1960s and 1970s, with prospecting in deeper waters (300-1500 meters) in the 1980s, and more recently with new technologies reaching more than 2000 meters.

What about the spillovers to other sectors? The O&G value chain comprises large segments of trade, services and manufacturing that have a significantly

higher concentration of high education and well paid occupations compared to the overall economy. This suggests much greater requirements in terms of education in occupations linked to suppliers of the O&G sector itself. Thus, despite being quantitatively limited compared to other production chains, its effects on employment quality may be sizable.

Figure #22_ Jobs skills in O&G upstream linkages.



Source: Hasenclever *et al.* (2015).

Regarding attractions to and frictions from GVC participation, the first positive factor is the possible productivity gains associated with economies of scale. With respect to the size of firms, we can see a greater concentration of occupations in large establishments in the O&G extraction industry, both in Brazil and the ERJ in the 2000s. Indeed, such a concentration has deepened over the past decade given that in 2003, 67 percent of the occupations in the O& G value chain were generated by large companies, a figure that rose to 74 percent in 2010. Over the decade the growth in employment in large companies was some 500 percent while it grew by 125 percent in the SMEs.

As to middle-income trap dynamics, the O&G value chain shows that upstreamness is not necessarily related to low-paid, low-skill jobs. This activity concentrated 30-40 percent more of high school occupations than the Brazilian median at the beginning of the period, raising the concentration to about 100 percent more than the median in the late-2000s, both for Brazil and the ERJ. Even if this educational gap is important, it is important to consider that, if we were to only consider graduate degrees, that is, Master and PhD degrees, the differential concentration in favor of the O&G value chain would be even more significant in view of the high share of Masters and PhDs in intensive research activities carried out by state-owned Petrobras.

The timber and pulp value chain in Misiones, Argentina[15]

Argentina's industry based on planted forests (timber and pulp, or T&P) is located in the Mesopotamian region. The three provinces that make up this region –Entre Rios, Corrientes and Misiones– account for three-quarters of the country's forest areas. Within this region, production is concentrated in the province of Misiones, where some 360,000 hectares are planted forests (35 percent of the national total). The T&P value chain is a key activity for Misiones's economy. According to various estimates, between 50 percent and 65 percent of GDP is generated directly or indirectly by the forest industry sector throughout the value chain.

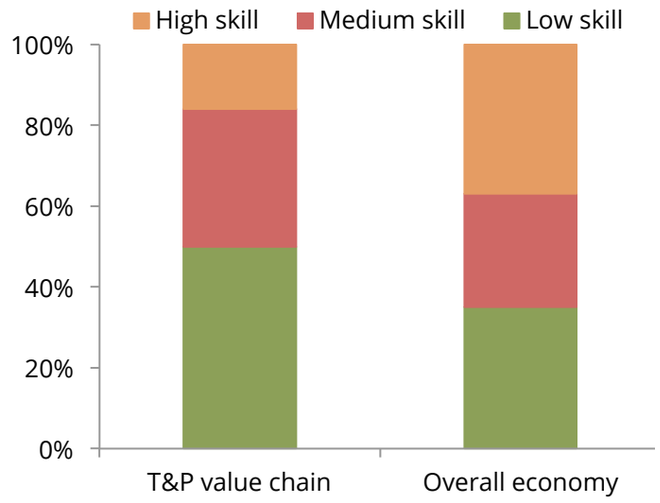
The Argentine forestry sector consists of a variety of activities ranging from the primary production of wood in native and planted forests to the manufacture of consumer goods such as paper, furniture and houses. To incorporate this variety of sectors into the analysis, the case study took a qualitative approach based on field research in all of the segments involved.

Regarding employment dynamics, the forestry sector has traditionally been a major employer in the province of Misiones. Considering only registered employment data between 1996 and 2010, the forest industry activity directly employed 16 percent of all workers in the private sector on average. The industry's participation in formal employment is relatively similar to that of other relevant activities in the region, such as agribusiness, and falls below registered employment in the retail sector, which has been gaining weight in the structure of provincial employment since the middle of the last decade. Within the forest industry activity, the wood processing stage is the main generator of employment. Indeed, it represents more than half of those employed in the T&P value chain sector registered in this segment of the GVC.

In general, the educational level of the inhabitants of Misiones is low relative to what happens in other provinces. In this context, the forestry sector registered even lower educational levels. In 2012, 50 percent of those employed in the sector had a complete or incomplete primary education, while workers with high school or college education registered 15 percent. As shown in the figure above, the forestry sector tends to absorb workers with a lower educational level than the rest of the private sector.

15 > See Ramos *et al.* (2015) for further information about this case.

Figure #23_ Jobs skills in the T&P value chain and in the overall economy, Misiones, 2012.

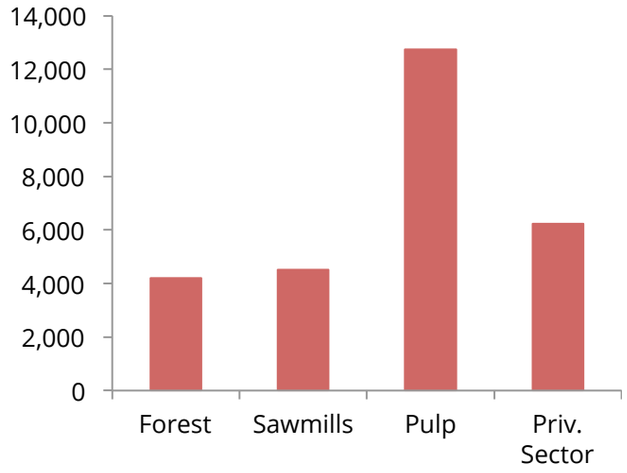


Source: Ramos *et al.* (2015).

At the level of the segments of the value chain we can see that the wood industrialization sector is the most backward in the formal education profile: 3 out of 4 workers have not concluded secondary school. In contrast, in the pulp industry 3 out of 4 workers have finished secondary school. That is, participation in the T&P value chain can be good or bad for job quality and the idea-content of jobs; it all depends on their position in the value chain.

As the following figure shows, wage differentials across different segments of the T&P value chain are very significant. In some years the salaries of the pulp and paper industry tripled that of the primary forest sector. The average level of wages in the processing industry (sawmills) is also very low. In fact, these latter sectors are two of the three sectors that receive the lowest pay of all the private sectors in the province, including agriculture and livestock.

Figure #24_ Jobs skills in the T&P value chain and in the overall economy, Misiones, 2012.



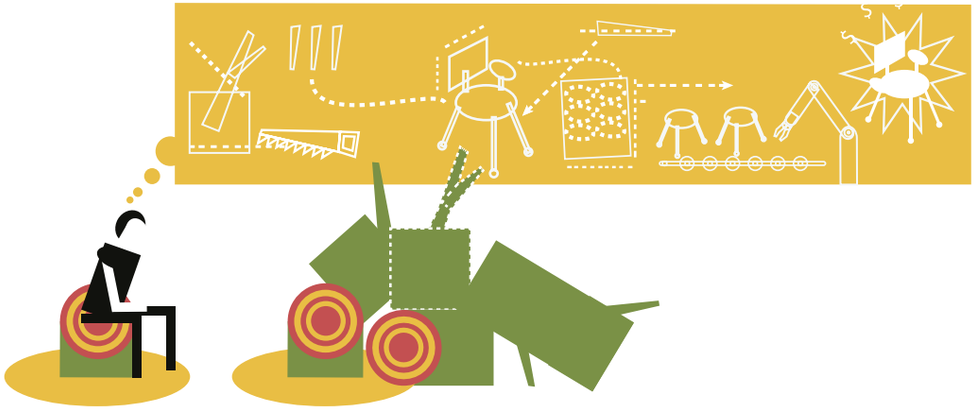
Source: Ramos *et al.* (2015).

Gaps in employment quality within the T&P value chain go well beyond wages. Forest workers performing tasks in the bush obtain a basic minimum wage and are then paid for production (tons, hectares, etc.). This means for example that workers are not paid when it rains. Formality rates in this segment are some 55 percent / 60 percent, while it is nearly 100 percent in the pulp sector.

What are the upsides of participating in the T&P value chain? The main opportunity lies in the ability to absorb new technologies given the existing stock of human capital associated with the idea-intensive stages of the GVC. After 50 years of research and the development of capabilities, Misiones has qualified human resources, a large body of knowledge in the forestry sector and a set of educational institutions that work to meet the sector's demands. Indeed, Argentina is at the forefront in the development of improved varieties, such as Loblolly Pine seeds.

What about the downsides and frictions? The main friction is related to the high degree of heterogeneity both between the agents involved in the sector and from the point of view of the techno-productive processes that the industry applies. Logically, these differences are accompanied by a well-differentiated demand for occupational profiles and skills. The heterogeneity verified in the chain responds to differences not only of a techno-productive order but also of a cultural nature and business management. At both the logging stage and the first and second stages of transformation, this activity presents huge segmentation resulting from the use of very different production technologies, which, in turn, led to dual working environments.

A second friction, related to the issue of economies of scale, has to do with the cost of mechanization and thus productivity catch-up. In processing stages, the move from manual labor to mechanization reaches its limits primarily because of the high cost of equipment (which can run some USD 500,000). In turn, the widespread adoption of these technologies calls for a structure that can provide services that meet the necessary technical assistance and high qualification of personnel who operate the equipment.



The mining value chain in southern Peru[16]

Mining activity in Peru is located in the south of the country. The activity itself is quite heterogeneous. There is large-scale, international-competitive mining (extraction on a large scale) and small-scale mining. The former is conducted by multinationals or large local firms associated via joint ventures; the latter involves local, mainly self-employed Peruvian citizens. The mining sector (responsible for most of the production) acquires capital goods (machinery) involving the transfer of foreign technology and productivity improvements in the recipient country. As a result of large-scale mining, a few knowledge-intensive suppliers (or KIMS) have developed. The KIMS can collaborate to generate technologies and innovations that reduce the ecological footprint of mining. For example, they encourage the development of environmental services for world-class mining, a system of accreditation and monitoring of environmental services under high standards, among others.

To estimate the effect of mining on employment, the case study took a quantitative approach, borrowing from the growing literature on impact assessment through propensity score matching (PSM) models, taking the unit of analysis as the Peruvian municipalities in the period 1993-2008. The quasi-experimental quantitative analysis was complemented by interviews with the main stakeholders and a detailed analysis of key municipalities.

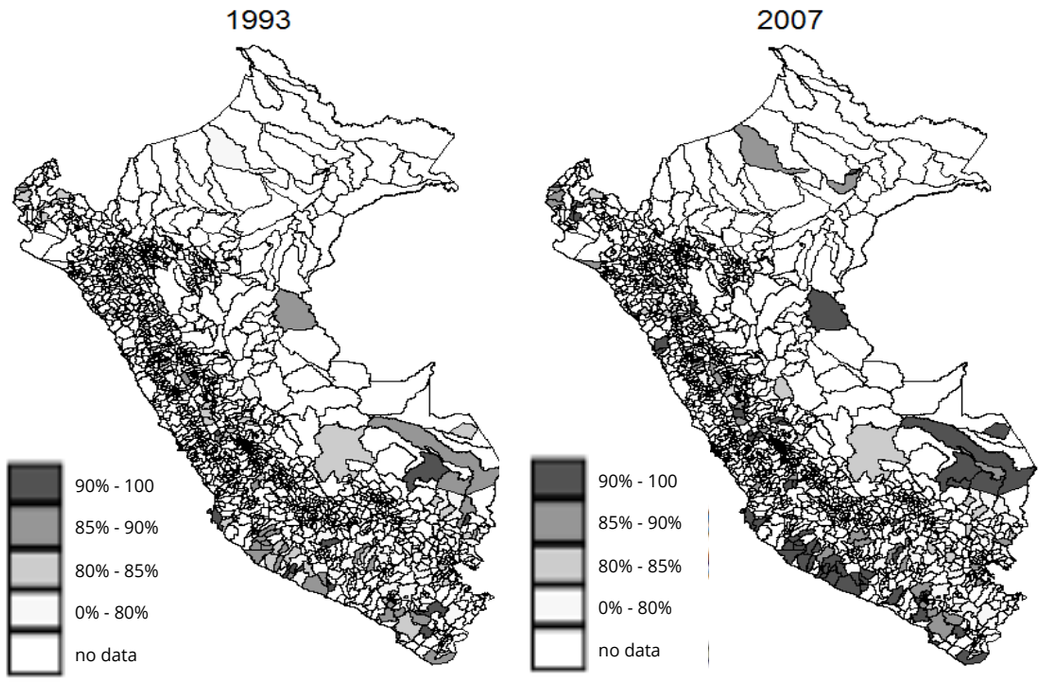
Employment growth has risen in the mining districts, be they new or old in business. Figure 25 plots employment rates in the mining districts from 1993 and 2007. Note that greater employment growth can be found in the southern region and in the Peruvian jungle, corresponding to the exploitation of new deposits of copper, gold and oil.

Considering the share of employment by agriculture, mining, manufacturing and services, we can see that the development of mining naturally raises the share of employment in this sector. However, the mobility of workers comes mainly from the agricultural sector. This mobility is healthy as workers are entering an area with higher productivity and they can acquire new skills to enable them to access more qualified jobs.

The effects on employment are in line with several empirical studies. They found a positive correlation between job creation and the growth in mining and energy activities. What is somewhat against the public opinion is that if we split this rate between skilled and unskilled workers, we found that the majority of the beneficiaries of increased employment were the more qualified people, whose employment rate was 5-7 percent higher in the mining districts.

16 > See Beteta *et al.* (2015) for details about this case.

Figure #25_ Employment rates in Peruvian municipalities.



Source: Beteta *et al.* (2015).

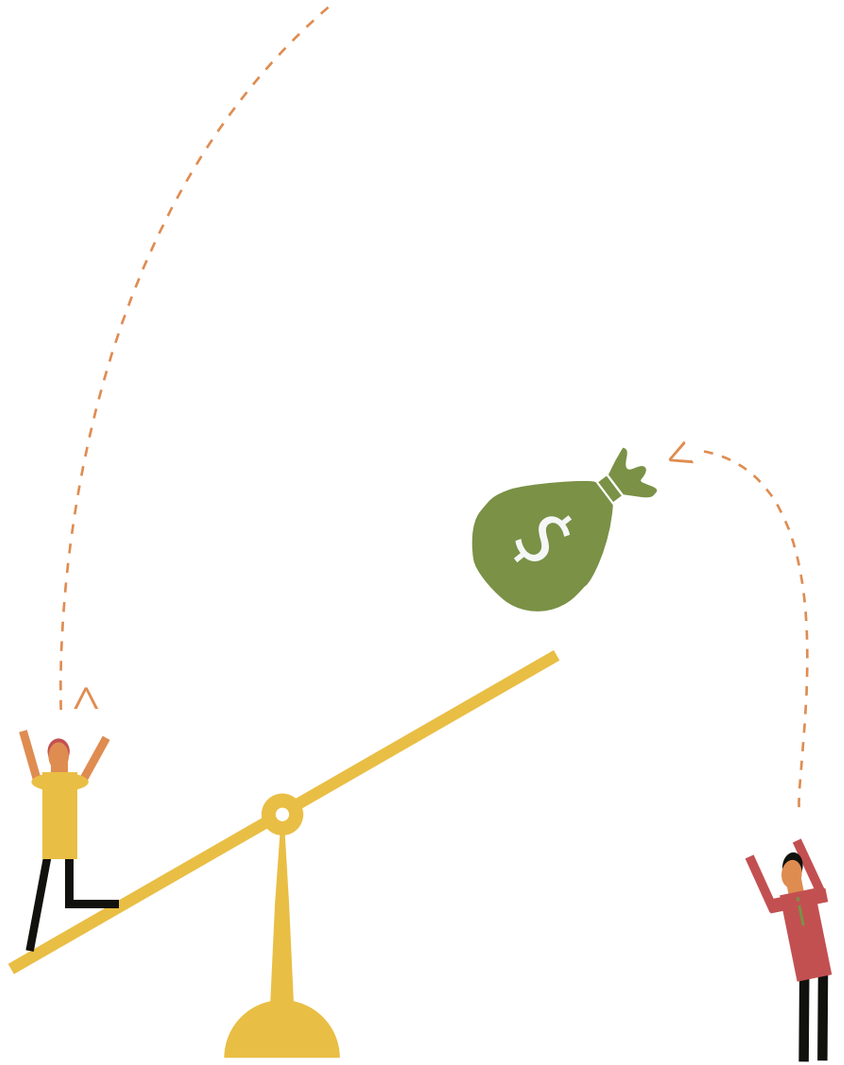
This pattern is partly related to social demands and local laws that encourage foreign companies to hire local labor, in addition to increasing demand for local products and services. In both cases skilled labor turned out to benefit the most.

Moreover, the case study shows that the development of mining projects has a positive effect on diversification. This would indicate that not only a transfer of jobs occurs from agriculture to mining, but also to other sectors generating productive linkages that benefit the demand for labor –particularly skilled labor– in various sectors.

However, many frictions prevail. Matching between skills and tasks depends on conditions that are not always present. Take Arequipa and Huanuco as contrasting examples.

Arequipa is the second region with the highest value of mining production in Peru (concentrating more than 15 percent), characterized by a high-scale production. Arequipa is one of the most developed regions in Peru, with a population of over one million inhabitants. This enabled the development of an overall demand and domestic market. The educational levels and the mandatory education system have allowed a critical mass of the local population to benefit from the demand for skills in the big mining companies. Some 42 percent of the economically active population has a high educational level (secondary or higher), the highest in the country, surpassing Peru's capital. That is, much of the skilled labor of these companies comes from the region, boosting the domestic economy and therefore other sectors in the economy, such as construction.

The other case study was in the province of Puerto Inca, in the Huanuco region. The absence of the required skills hinders the exploitation of agglomeration economies. This region was not traditionally considered a mining region; however, illegal miners have proliferated. These illegal activities are carried out in riverbeds giving rise to high pollution levels and mostly informal employment without paying any state taxes or respecting environmental standards. Areas with the potential to develop this type of mining are mainly found in the jungle, making it even more difficult to reinforce public policies. In these areas native communities, protected areas and a delicate natural ecosystems coexist that are vulnerable to the environmental impact that informal mining produces. Apart from the impact on the environment and health, illegal mining has generated child labor, illiteracy, prostitution and insecurity. The low level of education in these areas affects everyone so the authorities cannot apply a simple redistributive rule. Mainly immersed in subsistence farming, local people do not feel part of the development promises of mining and rather perceive the effects of pollution and territorial rearrangement (they are often forced to relocate). This obviously leads to the rejection by the local population and the generation of social conflicts (such as in the case of Espinar in Cusco).



Conclusion

In this chapter we study the linkages between trade, natural resources and employment in South America following both macro and micro (case studies) approaches. We can summarize our main conclusions in terms of the issues presented in the introduction.

- **About labor markets and employment growth.** The evidence show positive overall trends, some negative overall trends, and a great deal of heterogeneity across the countries in the region. Regarding the first, during a particularly favorable period for the terms of trade of South American economies, it is notable that the labor market did not show the adverse effects expected by the theory of natural-resource intensive economies. Indeed, South American economies were able to absorb an increasing share of the population in productive activities as the demographic transition was following its course, and the services sector led the way. Regarding the downsides and heterogeneities, employment growth accelerated during the boom, but this improvement was neither as generalized nor as sustainable as expected. For one thing, in countries like Colombia or Ecuador employment creation decelerated in 2004-14 compared to the period 1994-2004. Besides, in many countries employment growth was unable to decouple from the global commodity cycle, thus showing an excessive volatility that could have had deleterious effects on welfare.

- **About "cursed jobs" and job quality.** We found that there is nothing deterministic in the relationship between the level of a given country's upstreamness and the quality of jobs it yields. On the one hand, the evidence presented here about the recent South American record shows that it is possible to bias an economic structure towards natural resources and increase the skill content of jobs, foster labor market formality and participate in the skill-intensive, non-routine markets where imagination and ideas are traded. On the other hand, our analysis also shows that many country-specific factors can prevent an economy from profiting from trade in terms of job quality. Indeed, the outcome for the region seems as positive on average as heterogeneous when going to country-specific dynamics.

- **About labor markets and inequality.** Our main conclusion is that upstreamness in the global economy is not related to increasing inequality in the labor market, quite the opposite. The bad news is that the compression in the skill premium observed in this period has to do with a fall in the return to education, which, in turn, may be related both to labor supply and demand factors.

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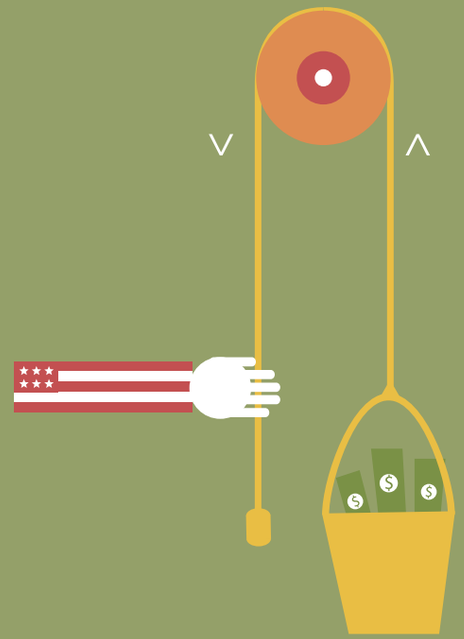

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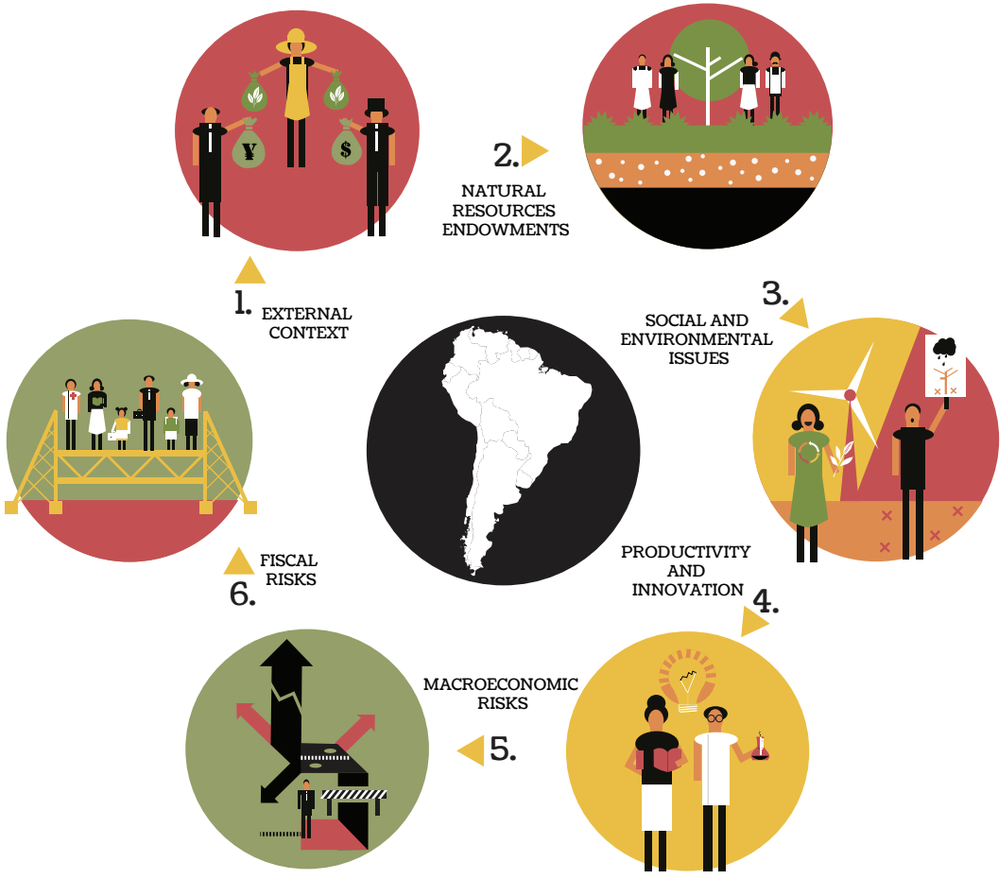
CHAPTER #3

TOPICS IN NUMBERS

Updated data on the different dimensions linking natural resources to economic development

The change in global dynamics has reopened the debate on the benefits and costs of a development strategy based on natural resources.
Therefore, the policy maker faces a number of challenging questions. The information presented here –organized by the different dimensions involved– aims to provide a comprehensive and up-to-date view to respond to these questions.



INDEX

> 1 EXTERNAL CONTEXT

The questions are:

1 > How did the global economy evolve, and in particular the markets of the main export goods?

2 > How did international commodity prices evolve?

3 > How did the terms of trade evolve?

4 > Are the current trends sustainable, or significant changes are to be expected?

Box #1. GDP Growth															
	2000	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
World average	4,8	2,5	2,9	4,0	5,4	4,9	5,5	5,7	3,1	0,0	5,4	4,2	3,4	3,4	3,4
Advanced economies	4,1	1,5	1,7	2,1	3,2	2,7	3,1	2,8	0,2	-3,4	3,1	1,7	1,2	1,4	1,8
United States	4,1	1,0	1,8	2,8	3,8	3,3	2,7	1,8	-0,3	-2,8	2,5	1,6	2,3	2,2	2,4
Germany	3,2	1,8	0,0	-0,7	0,7	0,9	3,9	3,4	0,8	-5,6	3,9	3,7	0,6	0,2	1,6
Emerging economies	5,8	3,8	4,5	6,4	7,9	7,2	8,2	8,7	5,8	3,1	7,4	6,2	5,2	5,0	4,6
China	8,4	8,3	9,1	10,0	10,1	11,3	12,7	14,2	9,6	9,2	10,4	9,3	7,8	7,8	7,4
India	4,0	4,9	3,9	7,9	7,8	9,3	9,3	9,8	3,9	8,5	10,3	6,6	5,1	6,9	7,2

Source: IMF.

Box #2. Prices of main South American exports goods (2005=100)																	
	2000	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**Var. 2013-2014**	**Var. 2000-2014**
Copper	49,4	43,0	42,4	48,4	77,9	100,0	183,1	194,0	189,4	140,5	205,0	240,0	216,5	199,4	186,7	-6%	278%
Soybean oil	71,0	70,0	82,7	100,9	119,1	100,0	111,2	161,3	228,7	158,8	186,6	245,2	232,3	204,0	163,9	-20%	131%
Soybean meal	91,0	87,8	89,4	104,3	125,0	100,0	94,3	128,1	178,8	174,6	161,0	184,1	230,0	232,0	226,9	-2%	149%
Soybean crop	82,0	75,6	84,6	104,5	124,0	100,0	97,5	142,2	203,2	169,7	172,5	217,0	241,0	231,8	205,2	-11%	150%
Natural gas	74,4	66,4	62,9	70,8	83,8	100,0	114,5	119,6	164,8	106,5	133,4	221,2	258,0	246,3	241,7	-2%	225%
Iron ore	44,3	46,2	45,1	49,2	58,3	100,0	119,0	130,3	219,0	284,6	521,9	596,9	457,2	481,5	344,5	-28%	678%
Oil (crude)	52,9	45,6	46,8	54,2	70,8	100,0	120,5	133,3	181,9	115,8	148,1	194,9	196,8	195,1	180,4	-8%	241%
Gold	62,7	60,9	69,7	81,7	92,0	100,0	135,9	156,6	196,0	218,7	275,3	352,8	375,3	317,3	284,5	-10%	354%

Source: IMF.

Box #3. Terms of trade (2000=100)														
Country	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**Average (2001-2013)**
Argentina	99,32	98,73	107,22	109,21	106,89	113,35	117,55	133,21	127,06	126,57	135,04	134,51	131,17	118,45
Bolivia	95,77	96,20	98,53	104,05	111,83	139,81	142,07	143,92	139,38	157,60	174,97	180,90	174,24	135,33
Brazil	99,64	98,38	96,98	97,86	99,18	104,41	106,61	110,39	107,78	125,07	134,94	127,10	126,18	110,35
Chile	93,29	97,17	102,78	124,87	139,76	183,20	189,46	164,78	166,74	204,01	205,34	193,63	187,53	157,89
Colombia	94,25	92,49	95,19	102,30	110,99	115,22	124,41	138,11	118,80	134,35	150,23	150,38	144,12	120,83
Ecuador	84,59	86,81	89,77	91,48	102,39	109,91	112,99	123,98	109,74	120,81	132,89	134,88	134,46	110,36
Peru	95,60	98,45	102,23	111,32	119,41	152,08	157,58	136,65	129,13	152,47	171,88	163,42	153,80	134,16
Paraguay	100,20	96,65	101,44	104,28	97,39	95,52	100,07	107,34	104,96	104,96	107,46	108,52	105,17	102,61
Uruguay	104,04	102,60	103,48	99,92	90,74	88,58	88,75	94,09	96,88	100,00	101,78	105,66	107,82	98,80
Venezuela	82,22	87,58	98,71	118,08	154,41	184,40	202,12	249,47	181,66	215,93	259,51	262,09	254,63	180,83
South America	94,89	95,51	99,63	106,34	113,30	128,65	134,16	140,20	128,21	144,18	157,40	156,11	151,91	126,96
Control group	101,39	100,57	100,13	102,88	108,97	112,34	114,03	120,62	113,00	117,19	123,64	120,84	119,84	111,96
Evolution	(-)	(-)	(-)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)

Source: World Bank.

Box #4. Purchasing power of exports of goods and services (2000=100)																
Country	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**Var. 2013-2014**	**Var. 2000-2014**
Argentina	101,76	98,21	113,69	121,49	138,11	156,49	178,53	198,48	178,78	210,71	241,45	233,52	225,45	199,98	-11%	200%
Bolivia	111,25	118,11	144,91	180,54	218,45	272,64	280,39	371,13	304,27	373,24	444,36	587,59	610,72	653,21	7%	653%
Brazil	107,78	115,19	129,81	156,14	174,98	193,67	212,44	223,24	195,75	243,82	276,65	262,73	262,73	251,25	-4%	251%
Chile	99,63	104,13	118,47	160,51	188,28	246,45	272,19	234,07	231,58	281,70	298,38	283,35	283,91	279,67	-1%	280%
Colombia	100,30	98,06	106,63	127,90	155,96	174,40	195,93	214,90	206,87	243,21	311,17	325,03	321,03	311,20	-3%	311%
Ecuador	96,27	104,83	120,86	139,72	166,12	190,99	202,46	234,80	200,35	229,21	263,97	281,52	299,84	319,37	7%	319%
Peru	102,07	110,30	124,32	158,00	194,67	248,94	271,47	262,62	256,86	307,51	353,06	364,24	337,94	318,70	-6%	319%
Paraguay	94,77	94,02	96,18	108,02	119,30	141,85	168,66	197,83	179,60	227,94	250,73	230,46	270,12	265,41	-2%	265%
Uruguay	93,27	81,14	86,60	109,69	117,68	124,47	138,36	156,34	173,59	195,97	210,70	219,34	219,11	224,77	3%	225%
Venezuela	80,54	80,31	78,68	106,55	144,74	164,96	170,40	209,87	139,94	149,28	194,33	201,70	184,33	154,21	-16%	154%

Source: ECLAC.

> 2 NATURAL RESOURCES ENDOWMENTS

The most reliable estimates say that natural wealth per capita of the region doubles the global average. But, does it correspond with the reality of all countries equally? Furthermore, the economic and export structure of the countries in the region differs significantly, so the relative endowments of natural resources may vary significantly from one country to another, as will also the magnitude of the income derived from these resources.

Some questions are relevant here:

1 > How was the evolution of the discovery and exploitation of natural resources in each country analyzed?

2 > What is the level of natural wealth in each of those countries?

3 > Which is in each case the magnitude of the revenues associated with natural resources?

Box #5. Natural capital 2005 USD per capita				
Country	**1995**	**2000**	**2005**	**Var. 1995/2005**
Argentina	5.848,32	5.749,98	10.266,82	76%
Bolivia	8.191,51	7.159,04	8.305,49	1%
Brazil	10.620,78	13.317,86	14.978,40	41%
Chile	11.194,29	13.231,28	18.869,97	69%
Colombia	7.601,48	10.302,44	7.613,96	0%
Ecuador	14.402,37	27.027,27	22.453,58	56%
Paraguay	..	..	..	
Peru	4.026,41	5.049,29	5.817,83	44%
Uruguay	5.204,78	5.770,93	8.287,91	59%
Venezuela	31.294,45	26.552,50	30.567,37	-2%
South America	10.931,60	12.684,51	14.129,04	29%
Control group	30.398,80	41.816,65	38.468,29	27%
Evolution	(-)	(-)	(-)	(+)

Source: World Bank.

Box #6. Subsoil assets 2005 USD per capita				
Country	**1995**	**2000**	**2005**	**Var. 1995 /2005**
Argentina	699,32	1.117,25	2.727,23	290%
Bolivia	707,39	780,88	2.191,38	210%
Brazil	741,77	816,90	2.321,09	213%
Chile	5.006,92	4.684,27	9.562,67	91%
Colombia	1.270,38	965,05	1.488,08	17%
Ecuador	4.139,73	4.275,14	6.441,67	56%
Paraguay	..	..	..	
Peru	532,91	526,49	1.047,42	97%
Uruguay	-	-	-	
Venezuela	22.775,54	20.369,72	24.090,45	6%
South America	3.986,00	3.726,19	5.541,11	39%
Control group	8.274,01	11.671,32	19.055,92	130%
Evolution	**(-)**	**(-)**	**(-)**	**(-)**

Source: World Bank.

Box #7. Minerals 2005 USD per capita				
Country	**1995**	**2000**	**2005**	**Var. 1995 /2005**
Argentina	2,30	28,35	144,01	6164%
Bolivia	9,68	17,67	22,97	137%
Brazil	331,16	358,68	854,41	158%
Chile	4.780,08	4.486,69	9.289,07	94%
Colombia	44,16	42,66	111,01	151%
Ecuador	0,73	0,04	11,77	1503%
Paraguay	..	..	..	
Peru	147,73	116,01	510,12	245%
Uruguay	-	-	-	
Venezuela	269,77	205,57	396,65	47%
South America	620,62	583,96	1.260,00	103%
Control group	661,41	758,75	1.396,02	111%
Evolution	**(-)**	**(-)**	**(-)**	**(-)**

Source: World Bank.

Box #8. Natural gas 2005 USD per capita				
Country	**1995**	**2000**	**2005**	**Var. 1995 /2005**
Argentina	322,65	511,03	1.205,74	274%
Bolivia	413,68	436,95	1.424,29	244%
Brazil	26,47	37,66	136,85	417%
Chile	135,19	160,02	226,71	68%
Colombia	146,18	171,20	309,96	112%
Ecuador	-	-	-	
Paraguay	..	..	..	
Peru	-	-	-	
Uruguay	-	-	-	
Venezuela	2.316,12	2.295,39	2.741,32	18%
South America	373,36	401,36	671,65	80%
Control group	2.426,07	4.048,69	8.113,79	234%
Evolution	**(-)**	**(-)**	**(-)**	**(-)**

Source: World Bank.

Box #9. Oil 2005 USD per capita				
Country	**1995**	**2000**	**2005**	**Var. 1995 /2005**
Argentina	374,37	577,87	1.377,48	268%
Bolivia	284,04	326,26	744,13	162%
Brazil	384,14	420,56	1.329,83	246%
Chile	91,65	37,55	44,88	-51%
Colombia	1.080,04	751,20	953,42	-12%
Ecuador	4.139,00	4.275,09	6.429,89	55%
Paraguay	..	..	..	
Peru	385,19	410,48	537,21	39%
Uruguay	-	-	-	
Venezuela	20.189,65	17.868,76	20.927,98	4%
South America	2.992,01	2.740,86	3.593,87	20%
Control group	5.182,71	6.863,88	9.335,88	80%
Evolution	**(-)**	**(-)**	**(-)**	**(-)**

Source: World Bank.

Box #10. Coal 2005 USD per capita				
Country	**1995**	**2000**	**2005**	**Var. 1995 /2005**
Argentina	-	-	-	
Bolivia	-	-	-	
Brazil	-	-	-	
Chile	-	-	2,01	
Colombia	-	-	113,69	
Ecuador	-	-	-	
Paraguay	..	..	..	
Peru	-	-	0,10	
Uruguay	-	-	-	
Venezuela	-	-	24,51	
South America	-	-	15,59	
Control group	3,82	-	210,23	
Evolution	**(-)**	**s.d.**	**(-)**	

Source: World Bank.

Box #11. Crops 2005 USD per capita				
Country	**1995**	**2000**	**2005**	**Var. 1995 /2005**
Argentina	2.537,14	2.786,42	4.996,12	97%
Bolivia	2.430,07	2.337,49	2.563,29	5%
Brazil	5.022,99	8.206,57	6.829,60	36%
Chile	2.552,76	3.134,43	2.553,85	0%
Colombia	3.626,32	4.838,75	2.941,63	-19%
Ecuador	5.007,46	6.748,25	3.504,67	-30%
Paraguay	..	..	..	
Peru	1.761,74	2.515,02	1.988,26	13%
Uruguay	1.273,68	1.303,12	2.372,39	86%
Venezuela	2.252,23	1.876,13	1.514,43	-33%
South America	2.940,49	3.749,58	3.251,58	11%
Control group	2.946,03	3.987,54	2.343,82	-20%
Evolution	**(-)**	**(-)**	**(+)**	**(+)**

Source: World Bank.

Box #12. Hard Coal 2005 USD per capita				
Country	**1995**	**2000**	**2005**	**Var. 1995 /2005**
Argentina	-	-	-	
Bolivia	-	-	-	
Brazil	-	-	-	
Chile	-	-	2,01	
Colombia	-	-	113,69	
Ecuador	-	-	-	
Paraguay		-		
Peru	-	-	0,10	
Uruguay	-	-	-	
Venezuela	-	-	24,51	
South America	-	-	15,59	
Control group	0,00	-	186,59	
Evolution	**(-)**	**s.d.**	**(-)**	

Source: World Bank.

Box #13. Forest 2005 USD per capita				
Country	**1995**	**2000**	**2005**	**Var. 1995 /2005**
Argentina	99,68	107,97	196,98	98%
Bolivia	1.183,01	1.206,72	1.466,02	24%
Brazil	567,71	742,32	598,83	5%
Chile	117,46	271,69	245,41	109%
Colombia	300,31	325,03	320,57	7%
Ecuador	213,62	271,54	170,22	-20%
Paraguay	..	..	..	
Peru	560,28	616,61	583,15	4%
Uruguay	41,50	68,98	122,83	196%
Venezuela	581,75	429,33	407,91	-30%
South America	407,26	448,91	456,88	12%
Control group	1.512,29	2.263,53	1.878,76	24%
Evolution	**(-)**	**(-)**	**(-)**	**(-)**

Source: World Bank.

Box #14. Pasture land 2005 USD per capita				
Country	**1995**	**2000**	**2005**	**Var. 1995 /2005**
Argentina	1.912,87	1.276,49	1.760,23	-8%
Bolivia	617,30	505,38	690,68	12%
Brazil	1.942,73	1.432,01	1.259,59	-35%
Chile	1.112,03	1.596,77	1.086,36	-2%
Colombia	1.125,62	2.017,98	1.033,47	-8%
Ecuador	1.553,06	2.578,77	2.322,27	50%
Paraguay	..	..	..	
Peru	395,06	552,92	568,45	44%
Uruguay	2.329,26	3.201,09	3.580,80	54%
Venezuela	1.289,54	860,94	867,10	-33%
South America	1.364,16	1.558,04	1.463,22	7%
Control group	8.082,87	10.144,57	6.095,83	-25%
Evolution	**(-)**	**(-)**	**(-)**	**(+)**

Source: World Bank.

Box #15. Protected areas 2005 USD per capita				
Country	**1995**	**2000**	**2005**	**Var. 1995 /2005**
Argentina	335,60	278,97	319,90	-5%
Bolivia	338,16	572,39	443,04	31%
Brazil	1.521,07	1.221,77	1.042,45	-31%
Chile	1.276,99	1.143,51	1.793,27	40%
Colombia	736,69	1.669,43	992,82	35%
Ecuador	1.791,99	11.130,72	9.723,33	443%
Paraguay	..	..	..	
Peru	143,84	308,09	602,95	319%
Uruguay	11,17	23,31	19,15	71%
Venezuela	3.817,58	2.738,24	3.136,28	-18%
South America	1.108,12	2.120,71	2.008,13	81%
Control group	6.611,87	8.252,84	6.611,94	0%
Evolution	**(-)**	**(-)**	**(-)**	**(+)**

Source: World Bank.

Box #16. Soft coal 2005 USD per capita				
Country	**1995**	**2000**	**2005**	**Var. 1995 /2005**
Argentina	-	-	-	
Bolivia	-	-	-	
Brazil	-	-	-	
Chile	-	-	-	
Colombia	-	-	-	
Ecuador	-	-	-	
Paraguay	..	..	..	
Peru	-	-	-	
Uruguay	-	-	-	
Venezuela	-	-	-	
South America	-	-	-	
Control group	3,82	-	23,64	518%
Evolution	**(-)**	**s.d.**	**(-)**	

Source: World Bank.

Box #17. Wood 2005 USD per capita				
Country	**1995**	**2000**	**2005**	**Var. 1995 /2005**
Argentina	263,72	182,89	266,36	1%
Bolivia	2.915,57	1.756,18	951,07	-67%
Brazil	824,50	898,29	2.926,84	255%
Chile	1.128,12	2.400,61	3.628,40	222%
Colombia	542,16	486,20	837,39	54%
Ecuador	1.696,51	2.022,85	291,43	
Paraguay	..	..	..	
Peru	632,58	530,15	1.027,60	62%
Uruguay	1.549,17	1.174,43	2.192,73	42%
Venezuela	577,81	278,13	551,21	-5%
South America	1.125,57	1.081,08	1.408,11	25%
Control group	2.971,72	5.496,83	2.482,02	-16%
Evolution	**(-)**	**(-)**	**(-)**	**(+)**

Source: World Bank.

Box #18. Natural resource rents (% GDP)																
Country	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**Var. 2013-2012**	**Var. 2000-2013**
Argentina	3,95	3,66	8,69	9,40	8,30	10,12	9,71	8,01	8,85	5,02	5,03	5,01	4,26	3,78	-11,23%	-4,31%
Bolivia	8,55	10,22	9,02	15,51	22,95	38,62	38,26	36,60	39,68	17,22	19,49	22,05	18,26	16,10	-11,85%	88,28%
Brazil	3,53	3,83	4,81	5,41	5,38	6,41	6,68	7,36	8,00	4,69	6,10	6,23	6,12	6,12	0,01%	73,48%
Chile	8,31	7,97	8,13	8,99	13,27	14,58	22,74	23,04	21,56	16,21	19,18	19,76	17,37	16,06	-7,51%	93,23%
Colombia	7,13	5,39	5,17	6,47	7,44	8,09	9,25	8,55	11,71	7,16	9,21	11,83	10,25	9,70	-5,38%	36,14%
Ecuador	19,36	12,23	10,27	11,53	17,19	22,23	24,21	23,38	26,15	14,48	17,45	20,58	18,45	17,02	-7,78%	-12,13%
Peru	2,65	1,96	1,87	2,19	4,38	6,87	14,02	14,89	12,98	9,37	12,44	14,42	11,82	9,67	-18,12%	264,75%
Paraguay	3,98	4,54	5,92	6,46	5,16	5,05	5,94	5,28	4,69	5,25	6,46	4,41	5,08	4,46	-12,25%	12,09%
Uruguay	0,48	0,57	1,20	1,83	1,88	2,00	2,40	3,03	4,03	3,17	4,14	3,05	2,82	2,48	-12,05%	420,45%
Venezuela	26,29	21,20	25,60	30,97	37,81	44,10	42,69	33,45	33,91	18,73	20,00	33,03	26,01	26,03	0,07%	-1,01%

Source: World Bank.

> 3 SOCIAL AND ENVIRONMENTAL ISSUES

We have to admit that every innovation in the use of resources implies changes in the environment that can bring both benefits and costs (in the present and in the future). In many cases, these costs are not internalized by those who innovate (and usually receive most of the benefits). This can lead to conflicts of difficult resolution.

In this regard, the policy maker needs to know:

1 > Are there conflicts of this nature in South America?

2 > How important?

3 > How are these managed by the different governments in the region?

Box #19. Natural resources depletion														
% of Gross National Product														
Country	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Argentina	3,08	2,81	6,98	7,69	6,95	8,55	7,95	6,38	7,20	3,93	3,87	3,94	3,31	2,88
Bolivia	4,75	4,66	4,04	7,24	11,41	19,54	19,96	19,29	19,98	10,90	12,64	15,25	13,77	12,33
Brazil	2,55	2,73	3,42	3,75	3,55	4,17	4,32	4,56	5,01	2,98	3,58	3,65	3,60	3,52
Chile	4,82	3,60	3,51	4,49	8,00	8,54	14,78	14,22	12,01	9,28	10,22	10,21	9,09	8,32
Colombia	5,91	4,32	4,22	5,35	6,07	6,90	7,87	6,98	9,32	6,01	7,55	10,01	8,70	8,33
Ecuador	12,04	7,41	5,82	6,74	11,29	14,76	16,72	16,43	14,58	8,06	9,81	10,79	8,94	8,56
Paraguay	4,57	5,11	6,49	7,76	6,09	5,95	6,72	5,64	4,95	5,63	6,88	4,61	5,40	4,69
Peru	1,38	0,88	0,86	1,06	2,43	4,14	9,54	9,30	7,73	5,89	7,50	8,86	7,24	5,66
Uruguay	0,02	0,02	0,19	0,39	0,79	0,92	1,18	1,60	2,58	1,83	2,90	1,95	1,75	1,51
Venezuela	11,84	9,58	11,71	14,17	17,43	19,98	19,17	14,76	15,09	8,44	9,05	15,09	11,93	12,00
South America	5,10	4,11	4,72	5,86	7,40	9,35	10,82	9,92	9,84	6,30	7,40	8,44	7,37	6,78
Control group	3,25	2,76	2,31	2,48	2,83	3,69	3,72	3,56	4,55	2,50	2,80	2,99	2,53	2,27
Evolution*	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)

Source: World Development Indicators.
* minus when depletion is higher in South America.

Box #20. Adjusted savings														
% GNP														
Country	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Argentina	0,27	-0,31	-2,43	0,11	1,84	3,35	7,14	10,22	10,24	9,02	10,53	10,54	8,72	8,96
Bolivia	3,42	4,62	7,16	5,37	3,64	-2,91	1,17	4,73	5,07	8,52	9,03	6,56	8,26	7,87
Brazil	4,68	3,62	4,28	4,39	7,41	6,06	5,62	5,73	5,36	3,65	9,12	9,35	7,62	6,90
Chile	6,34	6,47	6,66	6,76	5,42	6,66	2,73	2,82	2,68	5,38	6,36	4,36	5,08	4,42
Colombia	-2,30	-1,07	1,00	1,75	3,74	4,09	4,64	4,49	2,57	4,42	2,47	1,60	2,42	2,96
Ecuador	3,79	2,43	4,05	2,41	-0,59	0,38	1,20	1,44	6,67	9,35	6,27	7,84	9,34	9,58
Paraguay	2,80	5,21	13,53	5,78	6,19	5,07	6,33	8,68	5,67	3,59	3,12	7,91	2,84	8,16
Peru	6,05	6,05	7,21	8,50	8,80	8,48	8,22	9,93	10,92	7,81	9,78	9,51	10,23	11,98
Uruguay	4,75	5,23	8,96	8,24	9,84	10,86	9,48	9,88	8,07	11,03	9,77	11,51	10,93	11,51
Venezuela	20,44	16,75	14,99	11,83	16,20	18,90	19,20	18,26	19,91	12,97	21,88	15,49	13,55	
South America	5,02	4,90	6,54	5,51	6,25	6,09	6,57	7,62	7,71	7,57	8,83	8,47	7,90	8,04
Control group	14,16	14,29	13,61	13,38	14,05	13,37	14,12	14,46	12,27	11,11	11,94	12,52	12,71	12,98
Evolution*	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)

Source: World Development Indicators, World Bank.
* minus when savings are lower in South America.

Box #21. Ecological footprint						
	Consumption ecological footprint	Crops	Pastures	Wood, paper and pulp	Fishing	Carbon footprint
Argentina	3,0	0,4	1,4	0,2	0,2	0,7
Bolivia	2,4	0,5	1,2	0,2	0,0	0,5
Chile	3,1	0,7	0,3	0,9	0,6	0,5
Colombia	1,9	0,3	0,8	0,1	0,0	0,5
Ecuador	1,9	0,4	0,4	0,2	0,1	0,7
Paraguay	3,4	0,3	1,7	0,9	0,0	0,4
Peru	1,8	0,5	0,2	0,2	0,4	0,3
Venezuela	2,3	0,5	0,4	0,1	0,2	1,1
World average	2,6	0,6	0,2	0,3	0,1	1,4
	Total biocapacity	Crops	Pastures	Wood, paper and pulp	Fishing	
Argentina	7,1	2,3	1,9	0,8	1,9	
Bolivia	19,3	0,7	2,7	15,8	0,1	
Chile	4,1	0,5	0,5	2,2	0,8	
Colombia	3,9	0,2	1,3	2,2	0,0	
Ecuador	2,3	0,3	0,4	1,3	0,2	
Paraguay	10,8	1,3	2,7	6,7	0,1	
Peru	4,1	0,4	0,6	2,7	0,3	
Venezuela	2,7	0,3	0,3	1,9	0,0	
World average	1,8	0,6	0,3	0,7	0,2	
Memo: ecological surplus or deficit						
	Total	Crops	Pastures	Wood, paper and pulp	Fishing	Carbon footprint
Argentina	4,1	1,9	0,6	0,6	1,7	-0,7
Bolivia	16,9	0,2	1,5	15,6	0,1	-0,5
Chile	1,0	-0,2	0,2	1,2	0,3	-0,5
Colombia	2,0	-0,1	0,5	2,1	0,0	-0,5
Ecuador	0,4	0,0	0,0	1,1	0,1	-0,7
Paraguay	7,4	1,0	1,0	5,8	0,1	-0,4
Peru	2,3	-0,1	0,3	2,5	-0,2	-0,3
Venezuela	0,3	-0,2	0,0	1,8	-0,1	-1,1
World average	-0,8	0,0	0,0	0,5	0,1	-1,4

Source: Global Footprint Network.

> 4 PRODUCTIVITY AND INNOVATION

We know that the welfare gains that the society can obtain from the exploitation of natural resources will depend crucially not so much on the quantity of the productive factors involved, but in the way these factors cooperate in the production process -what we know as productivity-.

The policymaker should ask him/herself:

1 > How was the evolution of productivity and job creation in the sectors associated with natural resources?

2 > How are the interactions and spillovers between these sectors and the rest of the economy?

3 > How did aggregate productivity evolve? What about the evolution of the productivity gap between regions, companies, sectors?

4 > What happened to the processes of generation and dissemination of knowledge? What kinds of jobs are we generating?

Box #22. Total Factor Productivity															
% growth															
Country	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Argentina	-1,34	-3,26	-6,10	4,43	3,27	3,60	1,81	2,10	-1,25	-4,21	5,05	0,56	-5,24	-1,64	-5,00
Bolivia	-0,73	-0,53	-0,20	0,39	0,00	2,98	2,24	1,68	2,46	0,55	-0,19	1,22	1,15	2,34	-0,48
Brazil	2,02	-0,05	0,37	-1,43	1,80	-0,72	-0,74	1,11	-0,68	-1,55	3,14	-0,31	-2,24	-0,20	-2,27
Chile	1,22	-0,35	-1,75	-1,08	2,19	1,58	-0,06	-0,04	-2,34	-4,73	0,35	-0,28	-0,05	-1,54	-3,59
Colombia	0,26	0,11	0,19	0,61	1,22	0,03	1,68	1,08	-1,47	-2,36	-1,02	0,70	-1,26	-0,44	-1,05
Ecuador	0,39	1,15	0,23	-0,79	2,61	-2,42	-0,30	-1,44	2,13	-3,57	-0,42	2,20	-0,79	-1,43	-2,77
Paraguay															
Peru	-0,38	-1,07	3,82	1,32	2,40	3,05	3,14	3,70	2,90	-3,80	2,31	-0,33	-1,25	-1,92	-4,46
Uruguay	-0,29	-3,56	-8,57	2,58	9,34	3,65	1,26	0,87	1,38	-1,77	2,82	0,99	1,93	1,43	0,06
Venezuela	1,97	0,99	-9,12	-8,03	15,06	4,58	1,33	-2,77	-3,24	-5,48	-4,55	1,08	2,75	-2,17	-9,14
South America	0,35	-0,73	-2,35	-0,22	4,21	1,81	1,15	0,70	-0,01	-2,99	0,83	0,65	-0,56	-0,62	-3,19
Control group	1,64	-0,03	0,41	0,30	0,99	0,27	0,15	-0,11	-2,33	-3,21	1,11	-0,12	-0,88	-0,89	-0,68
Evolution	(-)	(-)	(-)	(-)	(+)	(+)	(+)	(+)	(+)	(+)	(-)	(+)	(+)	(+)	(-)

Source: UNESCO.

Box #23. R&D expenditure																	
% GDP																	
Country	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Argentina	0,42	0,42	0,41	0,45	0,44	0,42	0,39	0,41	0,44	0,46	0,49	0,51	0,52	0,60	0,62	0,65	
Bolivia	0,33	0,32	0,29	0,30	0,29	0,29	0,28							0,16			
Brazil					1,02	1,04	0,98	0,96	0,90	0,97	1,01	1,10	1,11	1,17	1,16	1,21	
Chile												0,31	0,37	0,41	0,42		
Colombia	0,30	0,27			0,11	0,11	0,12	0,14	0,14	0,14	0,14	0,17	0,18	0,19	0,18	0,18	0,17
Ecuador	0,09	0,07	0,08			0,06	0,06	0,07			0,14	0,15	0,26				
Paraguay						0,09	0,11	0,09	0,08	0,09			0,06			0,05	
Peru		0,08	0,10	0,10	0,11	0,11	0,10	0,10	0,15								
Uruguay	0,27	0,35	0,19	0,22	0,21		0,24				0,36	0,40	0,36	0,44	0,41	0,43	
Venezuela																	
South America	0,28	0,25	0,21	0,27	0,36	0,30	0,28	0,29	0,34	0,42	0,43	0,44	0,41	0,49	0,56	0,50	0,17
Control group	1,93	2,06	2,02	2,19	2,19	2,37	2,20	2,38	2,42	2,30	2,46	2,29	2,56	2,50	2,58	2,42	2,58
Evolution	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)

Source: UNESCO.

Box #24. Over-15 population with tertiary education (complete or incomplete)													
In %													
Country	**1950**	**1955**	**1960**	**1965**	**1970**	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**
Argentina	1,02	1,94	3,22	3,80	4,42	6,58	7,42	10,24	13,19	10,90	8,73	10,35	11,18
Bolivia	1,77	2,21	2,63	3,39	4,10	4,82	6,46	8,04	9,40	11,45	12,90	17,81	20,78
Brazil	0,71	0,87	1,19	1,46	1,72	3,78	4,30	4,67	5,16	5,70	6,35	6,31	9,35
Chile	2,18	2,02	1,88	2,80	3,81	5,83	7,10	9,44	11,69	16,63	20,35	19,20	14,97
Colombia	0,77	0,93	1,26	1,61	2,25	2,81	4,51	6,14	8,16	9,53	9,59	7,71	20,53
Ecuador	0,79	1,01	1,21	1,73	2,40	3,13	7,11	10,10	11,65	13,14	13,96	12,69	9,31
Paraguay	0,66	0,85	1,04	1,53	1,76	2,59	3,13	5,23	6,56	6,93	6,59	3,02	7,86
Peru	1,83	2,04	2,24	3,44	4,42	7,66	10,04	13,51	18,57	20,43	26,52	31,08	16,62
Uruguay	3,56	3,95	4,28	4,60	5,45	6,53	7,13	8,19	9,62	10,95	9,84	7,91	7,63
Venezuela	1,15	1,25	1,33	2,04	2,69	4,85	6,39	9,09	10,52	11,28	12,09	14,02	13,07
South America	1,44	1,71	2,03	2,64	3,30	4,86	6,36	8,47	10,45	11,69	12,69	13,01	13,13
Control group	4,56	5,40	6,19	7,90	11,21	14,08	16,75	18,18	19,84	23,23	24,32	28,32	29,60
Evolution	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)

Source: Barro R. & J.W. Lee.

Box #25. Over-15 population with tertiary education (complete)													
In %													
Country	**1950**	**1955**	**1960**	**1965**	**1970**	**1975**	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010**
Argentina	0,63	1,22	1,95	2,21	2,52	3,64	3,43	4,99	5,77	4,32	3,10	3,09	2,87
Bolivia	0,85	1,05	1,25	1,60	1,87	2,24	2,82	3,33	3,83	4,67	5,27	7,25	8,43
Brazil	0,44	0,58	0,83	0,99	1,24	2,30	2,79	2,72	3,03	3,72	3,70	3,73	5,63
Chile	1,55	1,44	1,31	1,93	2,65	2,73	2,68	4,44	6,23	7,54	8,33	7,43	5,92
Colombia	0,56	0,73	1,04	1,49	1,86	2,33	4,07	5,54	7,37	8,61	8,66	6,60	18,55
Ecuador	0,40	0,51	0,60	0,84	1,09	1,33	3,55	4,56	5,83	6,23	6,98	6,16	5,19
Paraguay	0,39	0,51	0,65	0,95	1,18	1,37	1,97	2,53	3,36	3,44	3,74	1,51	3,88
Peru	1,18	1,51	1,46	2,21	3,05	5,07	6,93	9,71	13,79	15,53	20,54	24,37	12,27
Uruguay	0,81	0,93	1,01	1,07	1,54	2,13	2,65	3,38	4,22	5,46	4,50	3,67	3,50
Venezuela	0,26	0,50	0,54	0,77	1,01	1,77	2,45	2,49	2,43	2,52	2,70	2,97	2,96
South America	0,71	0,90	1,06	1,41	1,80	2,49	3,33	4,37	5,59	6,20	6,75	6,68	6,92
Control group	2,40	2,86	3,28	4,10	5,79	7,38	9,09	9,19	10,36	12,06	12,93	15,00	15,78
Evolution	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)

Source: Barro R. & J.W. Lee.

Box #26. Mean score in PISA 2012 - reading					
Country	**2000**	**2003**	**2006**	**2009**	**2012**
Argentina	418,25	-	373,72	398,26	395,98
Bolivia					
Brazil	396,03	402,80	392,89	411,75	410,12
Chile	409,56		442,09	449,37	441,40
Colombia			385,31	413,18	403,40
Ecuador					
Paraguay					
Peru	327,08			369,70	384,15
Uruguay		434,15	412,52	425,81	411,35
Venezuela					
South America	387,73	278,98	401,31	411,35	407,73
Control group	522,33	517,23	512,58	512,49	508,22
Evolution	(-)	(-)	(-)	(-)	(-)

Source: World Bank.

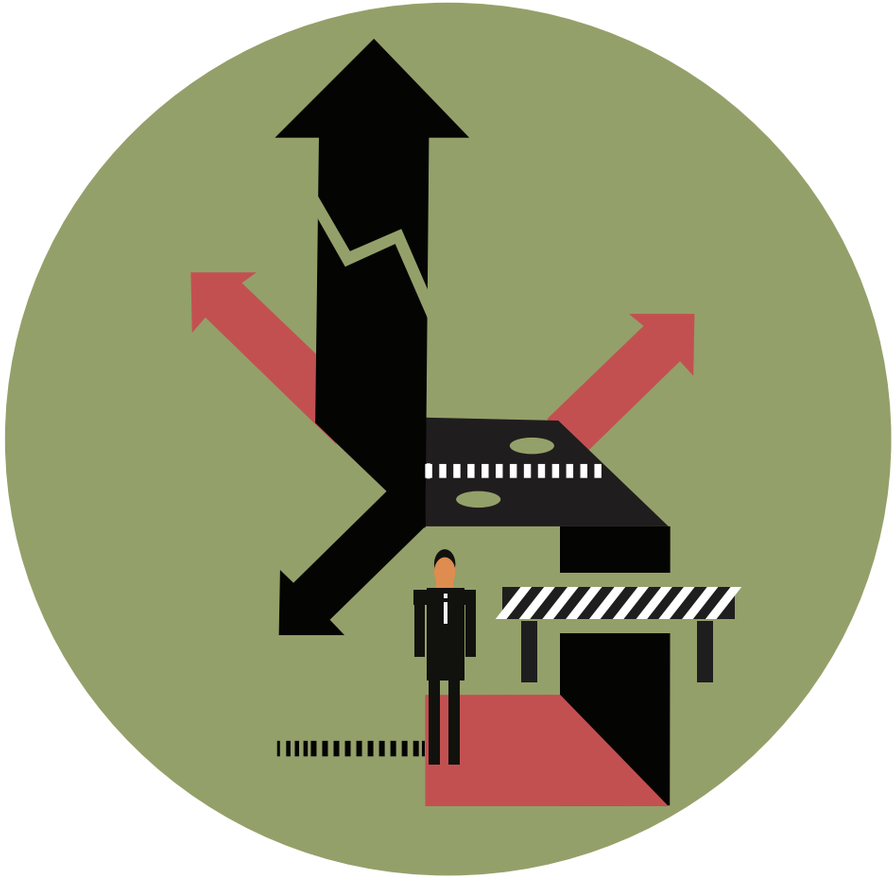
Box #27. Mean score in PISA 2012 - math					
Country	**2000**	**2003**	**2006**	**2009**	**2012**
Argentina	388,00		381,25	388,07	388,43
Bolivia					
Brazil	334,00	356,02	369,52	385,81	391,46
Chile	384,00		411,35	421,06	422,63
Colombia			369,98	380,85	376,49
Ecuador					
Paraguay					
Peru	292,00			365,11	368,10
Uruguay		422,20	426,80	426,72	409,29
Venezuela, RB					
South America	349,50	389,11	391,78	394,60	392,73
Control group	523,14	522,61	519,14	515,28	503,92
Evolution	(-)	(-)	(-)	(-)	(-)

Source: World Bank.

Box #28. Mean score in PISA 2012 - sciences					
Country	**2000**	**2003**	**2006**	**2009**	**2012**
Argentina	396,17		391,24	400,84	405,63
Bolivia					
Brazil	375,17	389,62	390,33	405,40	404,71
Chile	414,85		438,18	447,47	444,93
Colombia			388,04	401,75	398,68
Ecuador					
Paraguay					
Peru	333,34			369,35	373,11
Uruguay		438,37	428,13	427,21	415,84
Venezuela, RB					
South America	379,88	414,00	407,19	408,67	407,15
Control group	451,97	512,85	520,71	519,82	513,49
Evolution	(-)	(-)	(-)	(-)	(-)

Source: World Bank.

> 5 MACROECONOMIC RISKS



The concentration of the economic structure in natural resources can have macroeconomic effects associated with "the first and second moments" in the real prices of commodities. Thus, the success of the development strategy based on natural resources will not be neutral to the trend and volatility of prices of foreign trade, in turn these can lead to the problem of Dutch disease and high macroeconomic volatility.

In this sense it is necessary to consider the following questions:

1 > How did the real exchange rate evolve?

2 > What happened to labor costs?

3 > How was the evolution of the current account and its funding sources?

4 > To what extent were non-traditional tradable sectors able to offset the currency appreciation through sector-specific or systemic increases in productivity?

Box #29. Terms of trade volatility						
Country	**1990-1994**	**1995-1999**	**2000-2004**	**2005-2009**	**2010-2013**	**% change (2013-2010 vs 2009-2005)**
Argentina	12,58	3,90	4,40	9,44	3,38	-64%
Bolivia	9,41	4,72	3,00	11,90	8,66	-27%
Brazil	11,25	4,19	1,12	3,78	3,89	3%
Chile	4,96	13,04	11,08	17,31	7,39	-57%
Colombia	5,33	2,77	3,69	9,40	6,52	-31%
Ecuador	10,14	3,98	5,30	7,02	5,79	-17%
Peru	4,25	8,66	5,35	14,16	7,86	-44%
Paraguay	10,47	5,94	2,46	4,47	1,51	-66%
Uruguay	2,72	3,29	1,73	3,22	3,09	-4%
Venezuela, RB	9,57	7,91	12,35	31,48	18,73	-40%
South America	8,07	5,84	5,05	11,22	6,68	-35%
Control group	s/d.	s/d.	3,02	5,18	3,49	-28%
Relative volatility	s/d.	**s/d.**	**(+)**	**(+)**	**(+)**	**(+)**

Source: World Bank.

Box #30. Real effective exchange rate (2000=100)														
Country	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Argentina	95,3	222,3	208,1	216,3	219,0	224,4	213,9	191,0	187,4	174,4	165,2	143,6	139,4	150,3
Bolivia	101,1	100,7	112,2	120,0	120,6	121,8	120,4	106,5	97,4	102,5	100,6	95,6	90,6	83,4
Brazil	118,2	125,5	129,1	123,6	100,1	89,5	82,9	79,0	79,2	69,3	66,3	73,3	76,7	77,5
Chile	110,6	114,4	121,0	115,9	106,1	101,7	104,2	102,8	105,5	100,0	99,6	96,6	98,2	105,5
Colombia	103,1	104,9	117,7	107,7	94,8	96,6	86,8	83,5	87,3	79,2	77,6	74,2	76,4	82,2
Ecuador	71,8	62,8	61,6	64,7	67,2	68,3	73,0	73,8	68,5	70,1	71,2	68,4	66,9	65,0
Paraguay	103,0	115,9	124,3	119,9	121,9	107,9	98,0	85,2	93,0	91,3	81,7	83,0	78,9	75,8
Peru	96,4	94,8	97,5	98,9	100,4	102,6	104,3	100,5	98,0	95,0	96,7	89,6	89,9	91,7
Uruguay	100,9	113,5	145,8	146,6	120,7	119,0	118,7	108,3	105,5	94,3	92,4	89,6	84,1	82,5
Venezuela	93,9	119,6	138,1	142,8	144,2	136,2	124,1	101,4	76,7	75,2	104,7	86,6	88,6	58,9
South America	99,44	117,45	125,54	125,65	119,49	116,78	112,64	103,22	99,86	95,12	95,60	90,05	88,96	87,28
Control group	101,3	97,7	91,2	89,3	88,3	89,0	86,9	87,6	90,0	86,8	84,9	85,5	85,2	87,0
Relative REER	(-)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)

Source:
1- World Bank.
2- Brasil and Peru: BIS.
3- Argentina: inflation rate taken from private sources.

Box #31. Unit labor costs (2000=100)														
Country	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**Average**
Argentina	109,5	42,9	47,6	46,3	45,4	44,9	44,9	46,0	48,0	48,4	50,8	58,4	60,0	53,3
Bolivia	105,0	108,4	98,2	92,2	86,3	76,9	70,8	70,7	77,7	74,3	72,3			84,8
Brazil	80,5	73,3	65,1	65,6	79,2	89,1	92,9	95,5	97,8	106,9	112,5	105,4	100,2	89,5
Chile	90,1	87,9	81,5	82,6	88,0	90,6	87,2	86,3	89,8	92,5	90,7	92,5	91,7	88,6
Colombia	96,7	96,9	83,9	90,1	100,6	97,7	102,9	103,3	99,8	110,3	116,9	110,5	107,0	101,3
Paraguay	101,3	87,3	79,0	81,6	80,9	89,4	97,2	106,3	107,8	99,5	111,5	113,9	109,7	97,3
Peru	104,0	106,9	101,6	97,7	89,8	83,6	75,3	73,9	78,2	77,2	73,3	76,9		86,5
Uruguay	102,9	88,5	59,8	56,7	67,0	68,2	67,4	71,5	77,3	82,7	82,0	85,3	90,1	76,9
Venezuela	112,2	87,6	69,0	57,6	54,0	55,7	57,8	65,2	85,4	85,0	61,3	75,5	70,6	72,1
South America	100,2	86,6	76,2	74,5	76,8	77,3	77,4	79,9	84,6	86,3	85,7	89,8	89,9	83,4
Control group	99,42	103,41	111,56	113,20	114,63	112,73	116,40	116,03	120,37	124,33	125,66	120,25	115,85	115,41
Relative evolution	(+)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)

Source: ECLAC and World Bank.

Box #32. Current account balance																
% GDP																
Country	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**Average – period**
Argentina	-3,1	-1,4	9,0	6,4	1,8	2,6	3,4	2,6	1,8	2,5	-0,4	-0,7	-0,2	-0,8	-0,9	1,5
Bolivia	-5,3	-3,4	-4,4	1,0	3,7	5,9	11,2	11,4	11,9	4,3	3,9	0,3	8,3	3,3	0,7	3,5
Brazil	-3,8	-4,2	-1,5	0,8	1,8	1,6	1,3	0,1	-1,7	-1,5	-2,1	-2,0	-2,2	-3,4	-3,9	-1,4
Chile	-1,2	-1,5	-0,8	-1,1	2,6	1,5	4,6	4,1	-3,2	2,0	1,7	-1,2	-3,6	-3,7	-1,2	-0,1
Colombia	0,8	-1,1	-1,3	-1,0	-0,8	-1,3	-1,9	-2,9	-2,8	-2,1	-3,2	-3,1	-3,2	-3,4	-5,0	-2,1
Ecuador	4,0	-2,8	-4,3	-1,2	-1,3	1,1	3,7	3,7	2,8	0,5	-2,3	-0,3	-0,2	-1,0	-0,8	0,1
Paraguay	-3,0	-0,4	9,8	0,3	-0,1	-0,8	1,6	5,7	1,0	3,0	-0,3	0,5	-0,9	2,2	0,1	1,2
Peru	-2,9	-2,2	-1,9	-1,5	0,1	1,5	3,2	1,4	-4,2	-0,6	-2,4	-1,9	-2,7	-4,4	-4,1	-1,5
Uruguay	-2,5	-2,4	2,8	-0,7	0,0	0,2	-2,0	-0,9	-5,7	-1,3	-1,9	-2,9	-5,4	-5,2	-4,7	-2,2
Venezuela	10,1	1,6	8,2	14,1	13,8	17,5	14,4	6,9	10,2	0,7	3,2	8,2	3,7	2,4	4,3	8,0
South America	-0,69	-1,78	1,55	1,70	2,15	2,99	3,95	3,20	1,01	0,76	-0,37	-0,31	-0,66	-1,40	-1,55	0,70
Control group	3,1	4,1	3,1	3,3	3,4	3,4	3,7	2,7	2,8	2,3	2,8	3,0	2,6	3,0	2,8	3,1
Evolution	(-)	(-)	(-)	(-)	(-)	(-)	(+)	(+)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)

Source: IMF.

> 6 FISCAL RISKS

The issue related to the fiscal management of the income derived from natural resources must be considered, as well as the conflicts arising from such income.

The tension comes naturally considering the coexistence of market failures that justify the existence of public goods (plus pending social debts requiring specific transfers and expenses) and government failures that can make the management of state funds to be guided by private interests (rent seeking).

In this context, the policymaker needs information to answer the following questions:

1 > Which is the level of appropriation of tax revenues generated by natural resources?

2 > Is the government saving or investing part of the income taking into account the welfare of future generations?

3 > Which distributional impacts have this income generated?

4 > How have the current public spending, the public social spending and the provision of public goods evolved?

5 > What political, economic and especially fiscal institutions are underway and what are the current reform processes?

Box #33. Fiscal revenue from non-renewable natural resources				
% GDP				
Country	**2000-2004**	**2005-2008**	**2009-2012**	**Var.**
Argentina	2,26	2,51	3,00	19,5%
Bolivia	6,84	12,23	11,43	-6,6%
Brazil	1,71	2,73	2,26	-17,3%
Chile	1,48	7,23	3,84	-47,0%
Colombia	4,00	4,62	5,81	25,8%
Ecuador	5,95	7,90	12,35	56,2%
Paraguay				
Peru	2,10	4,07	3,21	-21,2%
Uruguay				
Venezuela	12,87	14,23	11,60	-18,5%
South America	4,65	6,94	6,69	-1,1%

Source: ECLAC-CIAT-OECD.

Box #34. Fiscal revenues																
% GDP																
Country	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**Average – period**
Argentina	20,6	19,8	19,2	21,7	24,2	24,0	24,1	24,9	26,9	27,8	29,6	29,8	31,5	33,4	35,6	26,2
Bolivia	25,6	25,1	24,5	24,1	26,8	30,9	34,3	34,4	38,9	35,8	33,2	36,2	37,8	39,2	38,5	32,4
Brazil	31,1	33,0	34,4	35,8	35,3	36,2	35,6	34,9	35,9	34,0	36,1	35,1	35,4	35,6	34,0	34,8
Chile	22,3	22,8	22,1	22,0	22,9	24,8	26,2	27,3	25,8	20,6	23,5	24,7	24,4	23,3	22,8	23,7
Colombia	23,5	24,6	24,5	25,1	25,2	25,7	27,3	27,2	26,4	26,7	26,1	26,7	28,3	28,3	28,2	26,2
Ecuador	23,7	21,1	22,2	21,3	22,3	22,0	24,1	26,4	35,7	29,4	33,3	39,3	39,5	39,4	38,8	29,2
Paraguay	20,3	20,7	18,1	18,9	19,9	19,4	21,3	20,3	20,0	20,8	20,8	23,3	23,6	22,1	23,7	20,9
Peru	19,4	18,6	18,1	18,3	18,4	19,7	21,1	21,9	22,2	19,8	20,9	22,1	22,2	22,3	22,4	20,5
Uruguay	25,8	27,0	26,4	27,6	27,9	28,3	28,6	28,9	27,1	29,2	30,1	28,7	28,5	30,5	30,1	28,3
Venezuela	32,7	27,3	29,5	32,3	34,4	37,6	37,7	33,1	31,4	24,6	21,2	27,9	23,5	23,4	28,8	29,7
South America	24,49	24,01	23,91	24,73	25,72	26,87	28,02	27,94	29,05	26,87	27,48	29,37	29,48	29,74	30,30	27,20
Control group	47,5	46,3	45,5	45,6	46,0	46,8	47,0	46,3	46,0	45,3	44,9	45,1	45,4	45,7	45,5	45,9
Evolution	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)

Source: IMF.

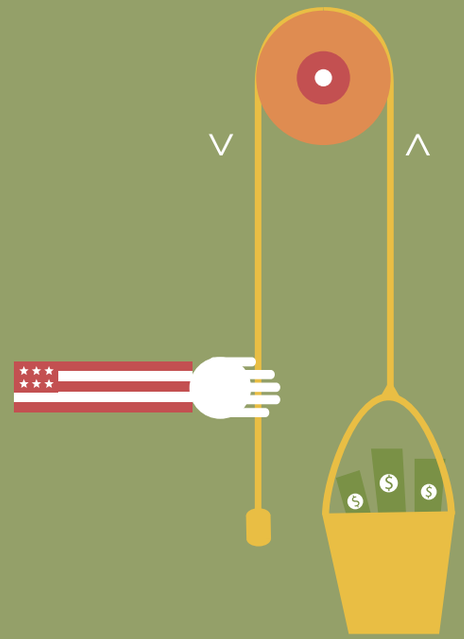
Box #35. Public social expenditure												
% GDP												
Country	**1991-1992**	**1993-1994**	**1995-1996**	**1997-1998**	**1999-2000**	**2001-2002**	**2003-2004**	**2005-2006**	**2007-2008**	**2009-2010**	**2011-2012**	**Average**
Argentina	19,70	20,65	20,65	19,95	21,60	20,95	19,00	20,40	23,45	27,80		21,42
Bolivia	5,75	7,15	4,90	6,80	7,45	8,55	8,70	8,10	7,80	6,50	7,90	7,24
Brazil	15,10	18,20	19,95	20,50	21,35	21,55	22,35	23,10	24,60	26,60		21,33
Chile	12,15	12,55	12,40	13,25	15,00	15,20	13,95	12,50	13,25	16,25	15,00	13,77
Colombia	6,30	8,10	13,00	12,80	10,90	11,15	10,55	12,05	12,55	14,05	13,00	11,31
Ecuador	3,95	3,90	4,45	3,70	3,15	4,45	4,20	4,70	5,85	8,05	8,20	4,96
Paraguay	5,05	7,05	8,50	8,65	9,70	8,25	7,35	8,70	8,80	11,00	11,00	8,55
Peru	...	...	...	...	8,55	9,50	9,55	9,20	8,80	9,70	9,10	9,20
Uruguay	...	...	...	19,68	20,54	22,61	20,13	20,29	22,86	24,08	24,16	21,79
Venezuela	12,05	10,05	9,85	11,90	13,85	16,50	17,40	19,75	20,55	16,95	15,40	14,93
South America	10,01	10,96	11,71	13,03	13,21	13,87	13,32	13,88	14,85	16,10	12,97	1,00
Control group	0,00	23,12	19,50	18,12	17,97	17,75	18,58	18,21	17,96	20,40	20,02	18,89
Evolution		(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)

Source: ECLAC and OECD.

Box #36. Public expenditure in infrastructure														
% GDP														
Country	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**Average – period**
Argentina		0,34	0,25	0,48	0,76	1,25	1,89	2,04	2,37	2,76	3,01	2,44	2,33	1,78
Bolivia	3,41	3,59	2,92	3,11	2,45	3,45	3,81	4,36	3,61	5,07	4,00	4,39	4,47	3,74
Brazil	1,18	1,43	1,24	0,90	0,96	0,48	0,41	1,23	1,33	1,53	1,42	1,27	1,40	1,14
Chile	1,04	1,07	1,30	1,11	0,96	1,32	1,64	1,46	1,70	1,20	1,21	1,12	1,22	1,26
Colombia	0,57	0,73	2,38	1,32	2,08	1,52	1,37	1,40	1,99	2,63	2,35	2,79	2,04	1,78
Ecuador			0,35	1,28	1,40	1,15	2,28	2,59	2,90	4,38	3,36	3,02	1,24	2,18
Paraguay				1,84	2,08	1,58	1,36	1,16	0,75	1,57	1,61	1,06	1,34	1,44
Peru	0,77	0,79	0,52	0,63	0,61	0,60	0,56	1,02	1,64	2,57	3,02	2,66	2,66	1,39
Uruguay			0,09	0,09	0,08	0,11	0,18	0,12	0,92	1,53	1,39	1,17	0,20	0,53
Venezuela														
South America (1)	0,28	0,33	0,54	0,74	0,82	0,87	1,03	1,15	1,27	1,60	1,53	1,43	1,01	1,69
Control group (1)	0,61	0,57	0,63	0,64	0,66	0,70	0,67	0,73	0,80	0,90	0,93	1,00		0,74
Evolution	(-)	(-)	(-)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)	(+)		(+)

(1) only transport expenditure.

Source: ECLAC and OECD.



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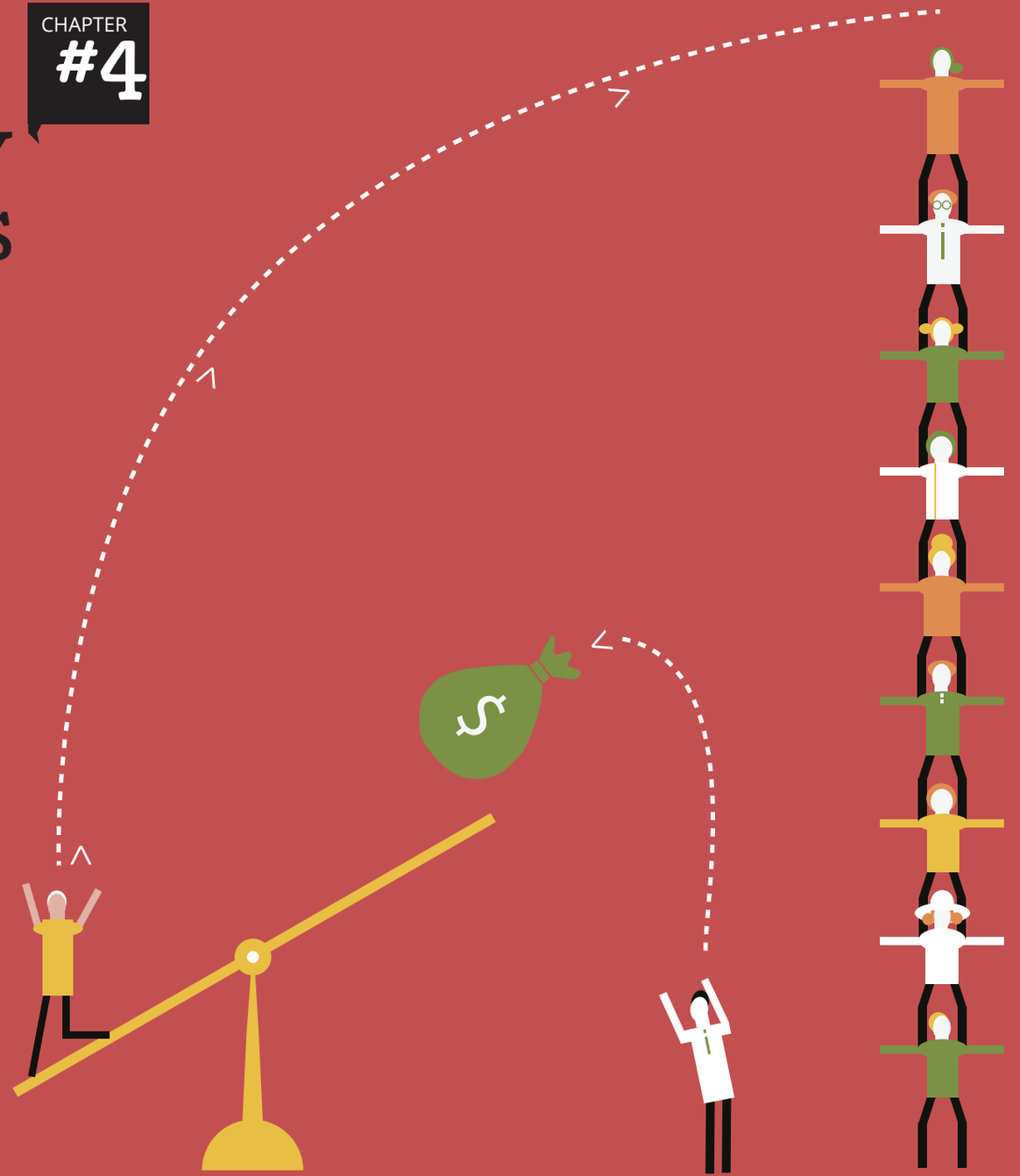
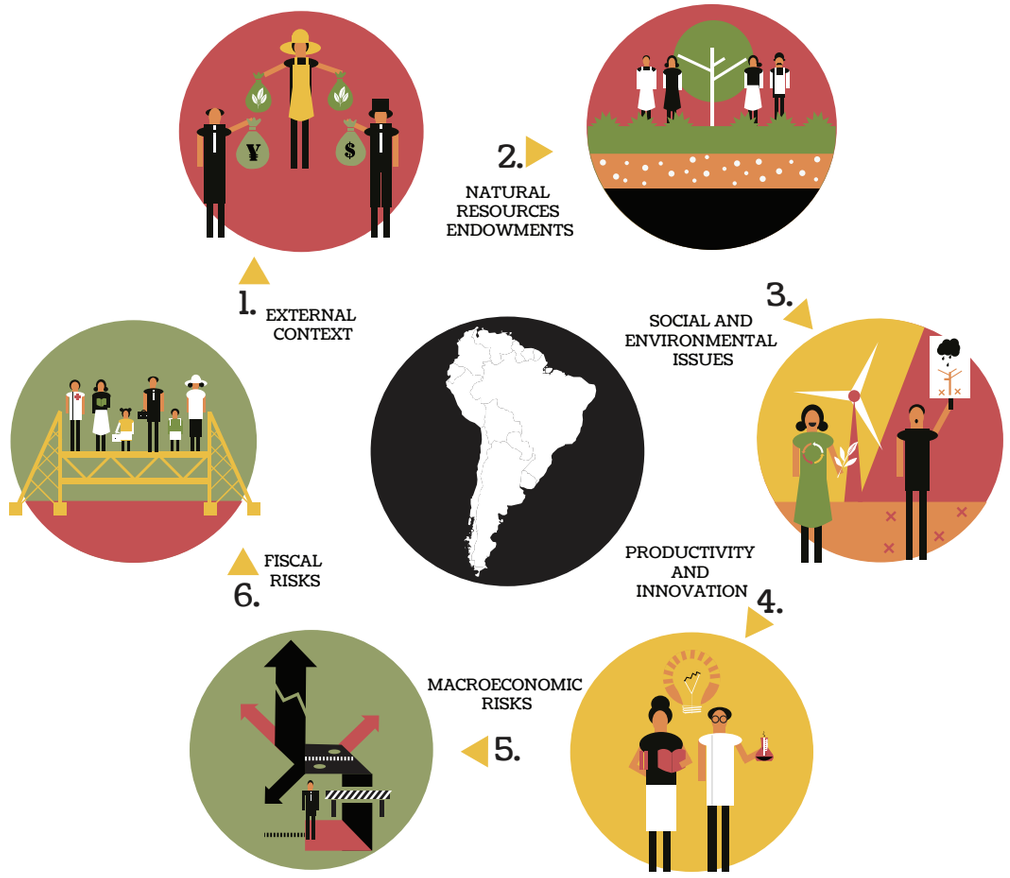
CHAPTER #4

COUNTRY PROFILES



The payoff matrix of a development strategy focus on natural resources depends on the specific characteristics of each country. In an augmented version of what Carlos Diaz Alejandro called the "commodity lottery", the decision maker must take into account that the performance will depend mainly on the interaction between the natural resource endowment and a set of idiosyncratic factors, from the institutional framework in which it operates and the existing rules and conventions, to the very story of what happened in the past in the incumbent country during booms and busts associated with natural resources. Therefore, in this section the analysis of the link between development and natural resources is done from the perspective of each of the countries in the region, trying to quantify -if possible- their performance on the various dimensions involved.

Positive evolution: when the changes improve the country's conditions.	+
Negative evolution: when the change worsen the country's conditions.	-
No data available.	...
No changes.	=



Argentina

EVALUATION BY DIMENSIONS

1. EXTERNAL CONTEXT

	Export quantities (2005=100)	Export prices (2005=100)	Terms of trade (2000=100)
c. 2003	82,80	89,30	107,22
c. 2013	113,09	169,33	134.5 (1)
c. 2014	101,77	166,60	131.16 (7)
EVOLUTION	−	−	−

2. NATURAL RESOURCES ENDOWMENTS

	Territory (km2)	Natural wealth per capita (USD 2005)	Natural Resource Rents (% GDP)
c. 2003	2780400,00	10266.82 (2)	9,40
c. 2013	2780400,00	n/d	4.25 (1)
c. 2014	2780400,00	n/d	3.77 (7)
EVOLUTION	=	•••	−

3. SOCIAL AND ENVIRONMENTAL ISSUES

	Natural Resource depletion (% GPN)	Net issuance of CO2eq for land use (Gg)	Natural Resource Conflict Index, scaled (b)
c. 2003	7,69	73504,16	37,71
c. 2013	3.31 (1)	67032.02 (1)	63,23
c. 2014	2.88 (7)	n/d	54,91
EVOLUTION	+	+	+

4. PRODUCTIVITY AND INNOVATION

	R & D expenditure (% GDP)	Years of schooling - average (Lee)	Total Factor Productivity (Conference Board) (2003=100)
c. 2003	0,41	8.73 (5)	100,00
c. 2013	0.65 (4)	9.51 (5)	103,58
c. 2014	s/d	s/d	98,41
EVOLUTION	+	+	−

5. MACROECONOMIC RISKS

	Volatility of Terms of Trade	Competitiveness (RER 2000=100)	Current Account (% GDP)
c. 2003	4.4 (8)	208,10	6,38
c. 2013	9.44 (8)	139,37	-0,81
c. 2014	3.38 (8)	150,29	-0,87
EVOLUTION	+	+	−

6. FISCAL RISKS

	Tax revenues derived from NR in % of total tax revenue (a)(c)	Government social spending (% GDP)	Infrastructure quality
c. 2003	4.5 (9)	19 (6)	s/d.
c. 2013	7.7 (9)	27.8 (6)	3,20
c. 2014	4.4 (9)		3,00
EVOLUTION	−	+	−

GENERAL EVALUATION

EXTERNAL INEQUALITY

GDP PPP per capita (millions of USD 1990 - Geary Khamis)

	2003	2014	% growth
COUNTRY	7546,81	10218,61	0,35
CONTROL GROUP	22311,41	24527,75	0,10
COMPARED	−	−	−

INTERNAL INEQUALITY

Human Development Index

	2000	2013	Evolution
COUNTRY	0,75	0,81	0,07
CONTROL GROUP	0,88	0,91	0,04
COMPARED	−	−	−

INTERTEMPORAL INEQUALITY

Adjusted net national savings (% GPN)

	2003	2013	% growth
COUNTRY	0,11	8,96	77,23
CONTROL GROUP	13,38	12,98	-0,03
COMPARED	−	−	+

(1) Year 2012
(2) Year 2005
(4) Year 2011
(5) Years 2000 and 2010
(6) Year 2003-2004 and 2011-2012
(7) Year 2013
(8) Average standard deviation 2000-2004; 2005-2009 and 2010-2013
(9) 2000-2003; 2005-2008; 2010-2013

(a) Only hydrocarbons and minerals. In order to standardize information we consider the total general government revenues net of social security contributions. However, in Argentina, Ecuador and Colombia takes into account the information of the nonfinancial public sector.
(b) Palazzo, G. (2015). Midiendo los Costos Sociales de la Abundancia de Recursos Naturales: Una nueva herramienta estadística. Red Sudamericana de Economía Aplicada - Premio Jóvenes Economistas, 2014, www.redsudamericana.org
(c) Gómez Sabaíni, J.C., J.P. Jiménez y D. Morán (2015); "El impacto fiscal de la explotación de los recursos naturales no renovables en los países de América Latina y el Caribe", Colección Documentos de Proyecto, CEPAL, LC/W.658, Santiago de Chile, United Nations.
Source: ECLAC, World Bank, UNDP, IMF, Conference Board, WEFORUM and FAO.

Bolivia

EVALUATION BY DIMENSIONS

1. EXTERNAL CONTEXT

	Export quantities (2005=100)	Export prices (2005=100)	Terms of trade (2000=100)
c. 2003	73,50	79,72	98,53
c. 2013	184,08	214,93	180.9 (1)
c. 2014	201,78	207,32	174.24 (7)
EVOLUTION	+	-	-

2. NATURAL RESOURCES ENDOWMENTS

	Territory (km2)	Natural wealth per capita (USD 2005)	Natural Resource Rents (% GDP)
c. 2003	1098580,00	8305.48 (2)	15,36
c. 2013	1098580,00	n/d.	18.26 (1)
c. 2014	1098580,00	n/d.	16.09 (7)
EVOLUTION	=	•••	-

3. SOCIAL AND ENVIRONMENTAL ISSUES

	Natural Resource depletion (% GPN)	Net issuance of CO2eq for land use (Gg)	Natural Resource Conflict Index, scaled (b)
c. 2003	7,24	79282,44	n/d.
c. 2013	13.77 (1)	90440.18 (1)	n/d.
c. 2014	12.32 (7)	n/d.	n/d.
EVOLUTION	+	-	•••

4. PRODUCTIVITY AND INNOVATION

	R & D expenditure (% GDP)	Years of schooling - average (Lee)	Total Factor Productivity (Conference Board) (2003=100)
c. 2003	0.276 (4)	8,29	100,00
c. 2013	0.157 (4)	8,25	115,33
c. 2014	n/d.	n/d.	114,78
EVOLUTION	-	-	-

5. MACROECONOMIC RISKS

	Volatility of Terms of Trade	Competitiveness (RER 2000=100)	Current Account (% GDP)
c. 2003	3.00 (8)	112,24	1,04
c. 2013	11.90 (8)	90,55	3,30
c. 2014	8.66 (8)	83,42	0,73
EVOLUTION	+	-	-

6. FISCAL RISKS

	Tax revenues derived from NR in % of total tax revenue (a)(c)	Government social spending (% GDP)	Infrastructure quality
c. 2003	11.3 (9)	8.7 (6)	n/d.
c. 2013	30.3 (9)	7.9 (6)	3,40
c. 2014	33.1 (9)	n/d.	3,60
EVOLUTION	+	-	+

GENERAL EVALUATION

EXTERNAL INEQUALITY

GDP PPP per capita (millions of USD 1990 - Geary Khamis)

	2003	2014	% growth
COUNTRY	2567,29	3514,67	0,37
CONTROL GROUP	22311,41	24527,75	0,10
COMPARED	-	-	+

INTERNAL INEQUALITY

Human Development Index

	2000	2013	Evolution
COUNTRY	0,61	0,67	0,09
CONTROL GROUP	0,88	0,91	0,04
COMPARED	-	-	+

INTERTEMPORAL INEQUALITY

Adjusted net national savings (% GPN)

	2003	2013	% growth
COUNTRY	5,37	7,87	0,47
CONTROL GROUP	13,38	12,98	-0,03
COMPARED	-	-	+

(1) Year 2012
(2) Year 2005
(4) Year 2011
(5) Years 2000 and 2010
(6) Year 2003-2004 and 2011-2012
(7) Year 2013
(8) Average standard deviation 2000-2004; 2005-2009 and 2010-2013
(9) 2000-2003; 2005-2008; 2010-2013

(a) Only hydrocarbons and minerals. In order to standardize information we consider the total general government revenues net of social security contributions. However, in Argentina, Ecuador and Colombia takes into account the information of the nonfinancial public sector.
(b) Palazzo, G. (2015). Midiendo los Costos Sociales de la Abundancia de Recursos Naturales: Una nueva herramienta estadística. Red Sudamericana de Economía Aplicada - Premio Jóvenes Economistas, 2014, www.redsudamericana.org
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Source: ECLAC, World Bank, UNDP, IMF, Conference Board, WEFORUM and FAO.

Brazil

EVALUATION BY DIMENSIONS

1. EXTERNAL CONTEXT

	Export quantities (2005=100)	Export prices (2005=100)	Terms of trade (2000=100)
c. 2003	77,10	79,63	96,98
c. 2013	110,55	182,72	127.09 (1)
c. 2014	108,55	174,79	126.17 (7)
EVOLUTION	-	-	-

2. NATURAL RESOURCES ENDOWMENTS

	Territory (km2)	Natural wealth per capita (USD 2005)	Natural Resource Rents (% GDP)
c. 2003	8514880,00	14978.40 (2)	5,93
c. 2013	8514880,00	n/d.	6.11 (1)
c. 2014	8514880,00	n/d.	6.11 (7)
EVOLUTION	=	•••	=

3. SOCIAL AND ENVIRONMENTAL ISSUES

	Natural Resource depletion (% GPN)	Net issuance of CO2eq for land use (Gg)	Natural Resource Conflict Index, scaled (b)
c. 2003	3,75	1198661,61	s/d.
c. 2013	3.6 (1)	810594.17(1)	s/d.
c. 2014	3.52(7)	n/d.	s/d.
EVOLUTION	+	+	•••

4. PRODUCTIVITY AND INNOVATION

	R & D expenditure (% GDP)	Years of schooling - average (Lee)	Total Factor Productivity (Conference Board) (2003=100)
c. 2003	0,96 (4)	6,52	100,00
c. 2013	1.21 (4)	7,89	99,49
c. 2014	n/d.	n/d.	97,23
EVOLUTION	+	+	-

5. MACROECONOMIC RISKS

	Volatility of Terms of Trade	Competitiveness (RER 2000=100)	Current Account (% GDP)
c. 2003	1.12 (8)	129,07	0,76
c. 2013	3.78 (8)	76,70	-3,63
c. 2014	3.89 (8)	77,52	-3,88
EVOLUTION	-	+	-

6. FISCAL RISKS

	Tax revenues derived from NR in % of total tax revenue (a) (c)	Government social spending (% GDP)	Infrastructure quality
c. 2003	2.8 (9)	22.35 (6)	n/d.
c. 2013	4.6 (9)	26.6 (6)	3,40
c. 2014	3.8 (9)	n/d.	3,10
EVOLUTION	-	+	+

GENERAL EVALUATION

EXTERNAL INEQUALITY

GDP PPP per capita (millions of USD 1990 - Geary Khamis)

	2003	2014	% growth
COUNTRY	5484,15	7080,81	0,29
CONTROL GROUP	22311,41	24527,75	0,10
COMPARED	-	-	+

INTERNAL INEQUALITY

Human Development Index

	2000	2013	Evolution
COUNTRY	0,68	0,74	0,09
CONTROL GROUP	0,88	0,91	0,04
COMPARED	-	-	+

INTERTEMPORAL INEQUALITY

Adjusted net national savings (% GPN)

	2003	2013	% growth
COUNTRY	4,39	6,90	0,57
CONTROL GROUP	13,38	12,98	-0,03
COMPARED	-	-	+

(1) Year 2012
(2) Year 2005
(4) Year 2011
(5) Years 2000 and 2010
(6) Year 2003-2004 and 2011-2012
(7) Year 2013
(8) Average standard deviation 2000-2004; 2005-2009 and 2010-2013
(9) 2000-2003; 2005-2008; 2010-2013

(a) Only hydrocarbons and minerals. In order to standardize information we consider the total general government revenues net of social security contributions. However, in Argentina, Ecuador and Colombia takes into account the information of the nonfinancial public sector.
(b) Palazzo, G. (2015). Midiendo los Costos Sociales de la Abundancia de Recursos Naturales: Una nueva herramienta estadística. Red Sudamericana de Economía Aplicada - Premio Jóvenes Economistas, 2014, www.redsudamericana.org
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Source: ECLAC, World Bank, UNDP, IMF, Conference Board, WEFORUM and FAO.

Chile

EVALUATION BY DIMENSIONS

1. EXTERNAL CONTEXT

	Export quantities (2005=100)	Export prices (2005=100)	Terms of trade (2000=100)
c. 2003	81,80	66,59	102,78
c. 2013	113,18	157,20	193.63 (1)
c. 2014	115,25	153,30	187.52 (7)
EVOLUTION	+	-	-

2. NATURAL RESOURCES ENDOWMENTS

	Territory (km2)	Natural wealth per capita (USD 2005)	Natural Resource Rents (% GDP)
c. 2003	756096,00	18869.96 (2)	9,00
c. 2013	756096,00	n/d.	17.36 (1)
c. 2014	756096,00	n/d.	16.06 (7)
EVOLUTION	=	•••	-

3. SOCIAL AND ENVIRONMENTAL ISSUES

	Natural Resource depletion (% GPN)	Net issuance of CO2eq for land use (Gg)	Natural Resource Conflict Index, scaled (b)
c. 2003	4,83	-7005,90	n/d.
c. 2013	9.08 (1)	-6987.56 (1)	n/d.
c. 2014	8.32 (7)	n/d.	n/d.
EVOLUTION	+	+	•••

4. PRODUCTIVITY AND INNOVATION

	R & D expenditure (% GDP)	Years of schooling - average (Lee)	Total Factor Productivity (Conference Board) (2003=100)
c. 2003	s/d.	9,07	100,00
c. 2013	0.42 (4)	9,78	95,01
c. 2014	n/d.	n/d.	91,60
EVOLUTION		+	-

5. MACROECONOMIC RISKS

	Volatility of Terms of Trade	Competitiveness (RER 2000=100)	Current Account (% GDP)
c. 2003	11.08 (8)	121,02	-1,09
c. 2013	17.31 (8)	98,16	-3,70
c. 2014	7.39 (8)	105,47	-1,16
EVOLUTION	+	+	+

6. FISCAL RISKS

	Tax revenues derived from NR in % of total tax revenue (a)(c)	Government social spending (% GDP)	Infrastructure quality
c. 2003	4 (9)	13.95 (6)	n/d.
c. 2013	27.7 (9)	15 (6)	5,00
c. 2014	15.3 (9)	n/d.	4,70
EVOLUTION	-	+	+

GENERAL EVALUATION

	EXTERNAL INEQUALITY			INTERNAL INEQUALITY			INTERTEMPORAL INEQUALITY		
	GDP PPP per capita (millions of USD 1990 - Geary Khamis)			Human Development Index			Adjusted net national savings (% GPN)		
	2003	2014	% growth	2000	2013	Evolution	2003	2013	% growth
COUNTRY	10840,04	16186,80	0,49	0,75	0,82	0,09	6,76	4,42	-0,35
CONTROL GROUP	22311,41	24527,75	0,10	0,88	0,91	0,04	13,38	12,98	-0,03
COMPARED	-	-	+	-	-	+	-	-	-

(1) Year 2012
(2) Year 2005
(4) Year 2011
(5) Years 2000 and 2010
(6) Year 2003-2004 and 2011-2012
(7) Year 2013
(8) Average standard deviation 2000-2004; 2005-2009 and 2010-2013
(9) 2000-2003; 2005-2008; 2010-2013

(a) Only hydrocarbons and minerals. In order to standardize information we consider the total general government revenues net of social security contributions. However, in Argentina, Ecuador and Colombia takes into account the information of the nonfinancial public sector.
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(c) Gómez Sabaíni, J.C., J.P. Jiménez y D. Morán (2015); "El impacto fiscal de la explotación de los recursos naturales no renovables en los países de América Latina y el Caribe", Colección Documentos de Proyecto, CEPAL, LC/W.658, Santiago de Chile, United Nations.
Source: ECLAC, World Bank, UNDP, IMF, Conference Board, WEFORUM and FAO.

Colombia

EVALUATION BY DIMENSIONS

1. EXTERNAL CONTEXT

	Export quantities (2005=100)	Export prices (2005=100)	Terms of trade (2000=100)
c. 2003	84,10	76,33	95,19
c. 2013	157,99	172,21	150.37 (1)
c. 2014	167,62	155,51	144.1 (7)
EVOLUTION	+	-	-

2. NATURAL RESOURCES ENDOWMENTS

	Territory (km2)	Natural wealth per capita (USD 2005)	Natural Resource Rents (% GDP)
c. 2003	1141750,00	7613.95 (2)	6,89
c. 2013	1141750,00	n/d.	10.25 (1)
c. 2014	1141750,00	n/d.	9.70 (7)
EVOLUTION	=	•••	-

3. SOCIAL AND ENVIRONMENTAL ISSUES

	Natural Resource depletion (% GPN)	Net issuance of CO2eq for land use (Gg)	Natural Resource Conflict Index, scaled (b)
c. 2003	5,35	45888,09	n/d.
c. 2013	8.7 (1)	45612.52 (1)	n/d.
c. 2014	8.33 (7)	n/d.	n/d.
EVOLUTION	+	+	•••

4. PRODUCTIVITY AND INNOVATION

	R & D expenditure (% GDP)	Years of schooling - average (Lee)	Total Factor Productivity (Conference Board) (2003=100)
c. 2003	0,14	6,90	100,00
c. 2013	0.17 (4)	8,95	98,10
c. 2014	n/d.	n/d.	97,07
EVOLUTION	+	+	-

5. MACROECONOMIC RISKS

	Volatility of Terms of Trade	Competitiveness (RER 2000=100)	Current Account (% GDP)
c. 2003	3.69 (8)	117,71	-1,05
c. 2013	9.40 (8)	76,41	-3,39
c. 2014	6.52 (8)	82,18	-5,01
EVOLUTION	+	+	-

6. FISCAL RISKS

	Tax revenues derived from NR in % of total tax revenue (a)(c)	Government social spending (% GDP)	Infrastructure quality
c. 2003	5.9 (9)	10.55 (6)	n/d.
c. 2013	8.8 (9)	13 (6)	3,30
c. 2014	12.8 (9)	n/d.	3,40
EVOLUTION	+	+	+

GENERAL EVALUATION

	EXTERNAL INEQUALITY			INTERNAL INEQUALITY			INTERTEMPORAL INEQUALITY		
	GDP PPP per capita (millions of USD 1990 - Geary Khamis)			Human Development Index			Adjusted net national savings (% GPN)		
	2003	2014	% growth	2000	2013	Evolution	2003	2013	% growth
COUNTRY	5613,90	8185,28	0,46	0,65	0,71	0,09	1,75	2,96	0,69
CONTROL GROUP	22311,41	24527,75	0,10	0,88	0,91	0,04	13,38	12,98	-0,03
COMPARED	-	-	+	-	-	+	-	-	+

(1) Year 2012
(2) Year 2005
(4) Year 2011
(5) Years 2000 and 2010
(6) Year 2003-2004 and 2011-2012
(7) Year 2013
(8) Average standard deviation 2000-2004; 2005-2009 and 2010-2013
(9) 2000-2003; 2005-2008; 2010-2013

(a) Only hydrocarbons and minerals. In order to standardize information we consider the total general government revenues net of social security contributions. However, in Argentina, Ecuador and Colombia takes into account the information of the nonfinancial public sector.
(b) Palazzo, G. (2015). Midiendo los Costos Sociales de la Abundancia de Recursos Naturales: Una nueva herramienta estadística. Red Sudamericana de Economía Aplicada - Premio Jóvenes Economistas, 2014, www.redsudamericana.org
(c) Gómez Sabaíni, J.C., J.P. Jiménez y D. Morán (2015); "El impacto fiscal de la explotación de los recursos naturales no renovables en los países de América Latina y el Caribe", Colección Documentos de Proyecto, CEPAL, LC/W.658, Santiago de Chile, United Nations.
Source: ECLAC, World Bank, UNDP, IMF, Conference Board, WEFORUM and FAO.

Ecuador

EVALUATION BY DIMENSIONS

1. EXTERNAL CONTEXT

	Export quantities (2005=100)	Export prices (2005=100)	Terms of trade (2000=100)
c. 2003	80,40	78,28	89,77
c. 2013	136,04	175,56	134.88 (1)
c. 2014	144,66	171,43	134.45 (7)
EVOLUTION	+	-	-

2. NATURAL RESOURCES ENDOWMENTS

	Territory (km2)	Natural wealth per capita (USD 2005)	Natural Resource Rents (% GDP)
c. 2003	256370,00	22453.57 (2)	11,53
c. 2013	256370,00	n/d.	18.45 (1)
c. 2014	256370,00	n/d.	17.01 (7)
EVOLUTION	=	•••	-

3. SOCIAL AND ENVIRONMENTAL ISSUES

	Natural Resource depletion (% GPN)	Net issuance of CO2eq for land use (Gg)	Natural Resource Conflict Index, scaled (b)
c. 2003	6,74	82897,74	n/d.
c. 2013	8.94 (1)	83186.29 (1)	n/d.
c. 2014	8.56 (7)	n/d.	n/d.
EVOLUTION	+	-	•••

4. PRODUCTIVITY AND INNOVATION

	R & D expenditure (% GDP)	Years of schooling - average (Lee)	Total Factor Productivity (Conference Board) (2003=100)
c. 2003	0,07	7,10	100,00
c. 2013	0.25953 (4)	7,60	96,45
c. 2014	n/d.	n/d.	93,78
EVOLUTION	+	+	-

5. MACROECONOMIC RISKS

	Volatility of Terms of Trade	Competitiveness (RER 2000=100)	Current Account (% GDP)
c. 2003	5.30 (8)	61,58	-1,19
c. 2013	7.02 (8)	66,89	-1,04
c. 2014	5.79 (8)	65,03	-0,83
EVOLUTION	+	-	+

6. FISCAL RISKS

	Tax revenues derived from NR in % of total tax revenue (a)(c)	Government social spending (% GDP)	Infrastructure quality
c. 2003	29.3 (9)	4.2 (6)	n/d.
c. 2013	35.3 (9)	8.2 (6)	4,20
c. 2014	40.3 (9)	n/d.	n/d.
EVOLUTION	+	+	•••

GENERAL EVALUATION

EXTERNAL INEQUALITY

GDP PPP per capita (millions of USD 1990 - Geary Khamis)

	2003	2014	% growth
COUNTRY	4185,90	5801,29	0,39
CONTROL GROUP	22311,41	24527,75	0,10
COMPARED	-	-	+

INTERNAL INEQUALITY

Human Development Index

	2000	2013	Evolution
COUNTRY	0,66	0,71	0,08
CONTROL GROUP	0,88	0,91	0,04
COMPARED	-	-	+

INTERTEMPORAL INEQUALITY

Adjusted net national savings (% GPN)

	2003	2013	% growth
COUNTRY	2,41	9,58	2,97
CONTROL GROUP	13,38	12,98	-0,03
COMPARED	-	-	+

(1) Year 2012
(2) Year 2005
(4) Year 2011
(5) Years 2000 and 2010
(6) Year 2003-2004 and 2011-2012
(7) Year 2013
(8) Average standard deviation 2000-2004; 2005-2009 and 2010-2013
(9) 2000-2003; 2005-2008; 2010-2013

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Source: ECLAC, World Bank, UNDP, IMF, Conference Board, WEFORUM and FAO.

Paraguay

EVALUATION BY DIMENSIONS

1. EXTERNAL CONTEXT

	Export quantities (2005=100)	Export prices (2005=100)	Terms of trade (2000=100)
c. 2003	77,10	91,69	101,44
c. 2013	203,25	139,20	108.52 (1)
c. 2014	198,14	137,89	105.17 (7)
EVOLUTION	-	-	-

2. NATURAL RESOURCES ENDOWMENTS

	Territory (km2)	Natural wealth per capita (USD 2005)	Natural Resource Rents (% GDP)
c. 2003	406750,00	n/d.	6,46
c. 2013	406752,00	n/d.	5.08 (1)
c. 2014	406752,00	n/d.	4.46 (7)
EVOLUTION	+	•••	-

3. SOCIAL AND ENVIRONMENTAL ISSUES

	Natural Resource depletion (% GPN)	Net issuance of CO2eq for land use (Gg)	Natural Resource Conflict Index, scaled (b)
c. 2003	7,76	74309,45	n/d.
c. 2013	5.40 (1)	74119.58 (1)	n/d.
c. 2014	4.69 (7)	n/d.	n/d.
EVOLUTION	+	+	•••

4. PRODUCTIVITY AND INNOVATION

	R & D expenditure (% GDP)	Years of schooling - average (Lee)	Total Factor Productivity (Conference Board) (2003=100)
c. 2003	0,09	6,23	n/d.
c. 2013	0.05 (4)	7,57	n/d.
c. 2014	n/d.	n/d.	n/d.
EVOLUTION	-	+	•••

5. MACROECONOMIC RISKS

	Volatility of Terms of Trade	Competitiveness (RER 2000=100)	Current Account (% GDP)
c. 2003	2.46 (8)	124,26	0,26
c. 2013	4.47 (8)	78,88	2,20
c. 2014	1.51 (8)	75,77	0,05
EVOLUTION	+	-	-

6. FISCAL RISKS

	Tax revenues derived from NR in % of total tax revenue (a)(c)	Government social spending (% GDP)	Infrastructure quality
c. 2003	n/d.	7.35 (6)	n/d.
c. 2013	n/d.	11 (6)	2,60
c. 2014	n/d.		2,70
EVOLUTION	•••	+	+

GENERAL EVALUATION

EXTERNAL INEQUALITY

GDP PPP per capita (millions of USD 1990 - Geary Khamis)

	2003	2014	% growth
COUNTRY	n/d	n/d	n/d
CONTROL GROUP	22311,41	24527,75	0,10
COMPARED	•••	•••	•••

INTERNAL INEQUALITY

Human Development Index

	2000	2013	Evolution
COUNTRY	0,62	0,68	0,08
CONTROL GROUP	0,88	0,91	0,04
COMPARED	-	-	+

INTERTEMPORAL INEQUALITY

Adjusted net national savings (% GPN)

	2003	2013	% growth
COUNTRY	5,78	8,16	0,41
CONTROL GROUP	13,38	12,98	-0,03
COMPARED	-	-	+

(1) Year 2012
(2) Year 2005
(4) Year 2011
(5) Years 2000 and 2010
(6) Year 2003-2004 and 2011-2012
(7) Year 2013
(8) Average standard deviation 2000-2004; 2005-2009 and 2010-2013
(9) 2000-2003; 2005-2008; 2010-2013

(a) Only hydrocarbons and minerals. In order to standardize information we consider the total general government revenues net of social security contributions. However, in Argentina, Ecuador and Colombia takes into account the information of the nonfinancial public sector.
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Source: ECLAC, World Bank, UNDP, IMF, Conference Board, WEFORUM and FAO.

Peru

EVALUATION BY DIMENSIONS

1. EXTERNAL CONTEXT

	Export quantities (2005=100)	Export prices (2005=100)	Terms of trade (2000=100)
c. 2003	72,60	74,47	102,23
c. 2013	117,59	201,08	163.42 (1)
c. 2014	116,44	189,28	153.79 (7)
EVOLUTION	-	-	-

2. NATURAL RESOURCES ENDOWMENTS

	Territory (km2)	Natural wealth per capita (USD 2005)	Natural Resource Rents (% GDP)
c. 2003	1285220,00	5817.83 (2)	2,75
c. 2013	1285220,00	n/d.	11.81 (1)
c. 2014	1285220,00	n/d.	9.67 (7)
EVOLUTION	=	•••	-

3. SOCIAL AND ENVIRONMENTAL ISSUES

	Natural Resource depletion (% GPN)	Net issuance of CO2eq for land use (Gg)	Natural Resource Conflict Index, scaled (b)
c. 2003	1,06	44667,87	n/d.
c. 2013	7.24 (1)	71260.35 (1)	n/d.
c. 2014	5.6 (7)	n/d.	n/d.
EVOLUTION	+	-	•••

4. PRODUCTIVITY AND INNOVATION

	R & D expenditure (% GDP)	Years of schooling - average (Lee)	Total Factor Productivity (Conference Board) (2003=100)
c. 2003	0,10	8,85	100,00
c. 2013	n/d.	8,88	110,36
c. 2014	n/d.	n/d.	105,43
EVOLUTION		+	-

5. MACROECONOMIC RISKS

	Volatility of Terms of Trade	Competitiveness (RER 2000=100)	Current Account (% GDP)
c. 2003	5.35 (8)	97,49	-1,52
c. 2013	14.16 (8)	89,95	-4,36
c. 2014	7.86 (8)	91,72	-4,06
EVOLUTION	+	+	+

6. FISCAL RISKS

	Tax revenues derived from NR in % of total tax revenue (a)(c)	Government social spending (% GDP)	Infrastructure quality
c. 2003	4.2 (9)	9.55	n/d.
c. 2013	16.5 (9)	9.1 (6)	3,60
c. 2014	14.5 (9)	n/d.	3,50
EVOLUTION	-	-	-

GENERAL EVALUATION

EXTERNAL INEQUALITY

GDP PPP per capita (millions of USD 1990 - Geary Khamis)

	2003	2014	% growth
COUNTRY	3936,93	6676,96	0,70
CONTROL GROUP	22311,41	24527,75	0,10
COMPARED	-	-	+

INTERNAL INEQUALITY

Human Development Index

	2000	2013	Evolution
COUNTRY	0,68	0,74	0,08
CONTROL GROUP	0,88	0,91	0,04
COMPARED	-	-	+

INTERTEMPORAL INEQUALITY

Adjusted net national savings (% GPN)

	2003	2013	% growth
COUNTRY	8,50	11,98	0,41
CONTROL GROUP	13,38	12,98	-0,03
COMPARED	-	-	+

(1) Year 2012
(2) Year 2005
(4) Year 2011
(5) Years 2000 and 2010
(6) Year 2003-2004 and 2011-2012
(7) Year 2013
(8) Average standard deviation 2000-2004; 2005-2009 and 2010-2013
(9) 2000-2003; 2005-2008; 2010-2013

(a) Only hydrocarbons and minerals. In order to standardize information we consider the total general government revenues net of social security contributions. However, in Argentina, Ecuador and Colombia takes into account the information of the nonfinancial public sector.
(b) Palazzo, G. (2015). Midiendo los Costos Sociales de la Abundancia de Recursos Naturales: Una nueva herramienta estadística. Red Sudamericana de Economía Aplicada - Premio Jóvenes Economistas, 2014, www.redsudamericana.org
(c) Gómez Sabaíni, J.C., J.P. Jiménez y D. Morán (2015); "El impacto fiscal de la explotación de los recursos naturales no renovables en los países de América Latina y el Caribe", Colección Documentos de Proyecto, CEPAL, LC/W.658, Santiago de Chile, United Nations.
Source: ECLAC, World Bank, UNDP, IMF, Conference Board, WEFORUM and FAO.

Uruguay

EVALUATION BY DIMENSIONS

1. EXTERNAL CONTEXT

	Export quantities (2005=100)	Export prices (2005=100)	Terms of trade (2000=100)
c. 2003	66,40	90,30	103,48
c. 2013	156,04	166,38	105.66 (1)
c. 2014	158,57	166,56	107.82 (7)
EVOLUTION	+	+	+

2. NATURAL RESOURCES ENDOWMENTS

	Territory (km2)	Natural wealth per capita (USD 2005)	Natural Resource Rents (% GDP)
c. 2003	176220,00	8287.90 (2)	1,82
c. 2013	176220,00	n/d.	2.82 (1)
c. 2014	176220,00	n/d.	2.48 (7)
EVOLUTION	=	•••	-

3. SOCIAL AND ENVIRONMENTAL ISSUES

	Natural Resource depletion (% GPN)	Net issuance of CO2eq for land use (Gg)	Natural Resource Conflict Index, scaled (b)
c. 2003	0,39	-9496,31	n/d.
c. 2013	1.75 (1)	-19797.12 (1)	n/d.
c. 2014	1.51 (7)	n/d.	n/d.
EVOLUTION	+	+	•••

4. PRODUCTIVITY AND INNOVATION

	R & D expenditure (% GDP)	Years of schooling - average (Lee)	Total Factor Productivity (Conference Board) (2003=100)
c. 2003	0.238 (4)	8,07	100,00
c. 2013	0.43 (4)	8,17	123,74
c. 2014	n/d.	n/d.	123,82
EVOLUTION	+	+	+

5. MACROECONOMIC RISKS

	Volatility of Terms of Trade	Competitiveness (RER 2000=100)	Current Account (% GDP)
c. 2003	1.73 (8)	145,83	-0,72
c. 2013	3.22 (8)	84,06	-5,24
c. 2014	3.09 (8)	82,50	-4,74
EVOLUTION	+	-	+

6. FISCAL RISKS

	Tax revenues derived from NR in % of total tax revenue (a)(c)	Government social spending (% GDP)	Infrastructure quality
c. 2003	n/d.	20.12 (6)	n/d.
c. 2013	n/d.	24.16 (6)	3,90
c. 2014	n/d.	n/d.	4,00
EVOLUTION	•••	+	+

GENERAL EVALUATION

EXTERNAL INEQUALITY

GDP PPP per capita (millions of USD 1990 - Geary Khamis)

	2003	2014	% growth
COUNTRY	7255,88	13380,39	0,84
CONTROL GROUP	22311,41	24527,75	0,10
COMPARED	-	-	+

INTERNAL INEQUALITY

Human Development Index

	2000	2013	Evolution
COUNTRY	0,74	0,79	0,07
CONTROL GROUP	0,88	0,91	0,04
COMPARED	-	-	+

INTERTEMPORAL INEQUALITY

Adjusted net national savings (% GPN)

	2003	2013	% growth
COUNTRY	8,24	11,51	0,40
CONTROL GROUP	13,38	12,98	-0,03
COMPARED	-	-	+

(1) Year 2012
(2) Year 2005
(4) Year 2011
(5) Years 2000 and 2010
(6) Year 2003-2004 and 2011-2012
(7) Year 2013
(8) Average standard deviation 2000-2004; 2005-2009 and 2010-2013
(9) 2000-2003; 2005-2008; 2010-2013

(a) Only hydrocarbons and minerals. In order to standardize information we consider the total general government revenues net of social security contributions. However, in Argentina, Ecuador and Colombia takes into account the information of the nonfinancial public sector.
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Source: ECLAC, World Bank, UNDP, IMF, Conference Board, WEFORUM and FAO.

Venezuela

EVALUATION BY DIMENSIONS

1. EXTERNAL CONTEXT

	Export quantities (2005=100)	Export prices (2005=100)	Terms of trade (2000=100)
c. 2003	85,10	58,14	98,71
c. 2013	75,53	210,79	262.08 (1)
c. 2014	67,77	195,87	254.6 (7)
EVOLUTION	-	-	-

2. NATURAL RESOURCES ENDOWMENTS

	Territory (km2)	Natural wealth per capita (USD 2005)	Natural Resource Rents (% GDP)
c. 2003	912050,00	30567.36 (2)	32,96
c. 2013	912050,00	n/d.	26.00 (1)
c. 2014	912050,00	n/d.	26.02 (7)
EVOLUTION	=	•••	+

3. SOCIAL AND ENVIRONMENTAL ISSUES

	Natural Resource depletion (% GPN)	Net issuance of CO2eq for land use (Gg)	Natural Resource Conflict Index, scaled (b)
c. 2003	14,17	118569,79	n/d.
c. 2013	11.93 (1)	112837.2 (1)	n/d.
c. 2014	12.00 (7)	n/d.	n/d.
EVOLUTION	-	+	

4. PRODUCTIVITY AND INNOVATION

	R & D expenditure (% GDP)	Years of schooling - average (Lee)	Total Factor Productivity (Conference Board) (2003=100)
c. 2003	n/d.	6,71	100,00
c. 2013	n/d.	8,41	105,16
c. 2014	n/d.	n/d.	95,55
EVOLUTION		+	-

5. MACROECONOMIC RISKS

	Volatility of Terms of Trade	Competitiveness (RER 2000=100)	Current Account (% GDP)
c. 2003	12.35 (8)	138,10	14,12
c. 2013	31.48 (8)	88,64	2,44
c. 2014	18.73 (8)	58,89	4,31
EVOLUTION	-	-	-

6. FISCAL RISKS

	Tax revenues derived from NR in % of total tax revenue (a)(c)	Government social spending (% GDP)	Infrastructure quality
c. 2003	48.2 (9)	17.4 (6)	n/d.
c. 2013	50.6 (9)	15.4 (6)	2,60
c. 2014	44.7 (9)	n/d.	2,60
EVOLUTION	-	-	=

GENERAL EVALUATION

EXTERNAL INEQUALITY

GDP PPP per capita (millions of USD 1990 - Geary Khamis)

	2003	2014	% growth
COUNTRY	6996,44	9844,95	0,41
CONTROL GROUP	22311,41	24527,75	0,10
COMPARED	-	-	+

INTERNAL INEQUALITY

Human Development Index

	2000	2013	Evolution
COUNTRY	0,68	0,76	0,13
CONTROL GROUP	0,88	0,91	0,04
COMPARED	-	-	+

INTERTEMPORAL INEQUALITY

Adjusted net national savings (% GPN)

	2003	2013	% growth
COUNTRY	11,83	13,55	0,15
CONTROL GROUP	13,38	12,71	-0,05
COMPARED	-	+	+

(1) Year 2012
(2) Year 2005
(4) Year 2011
(5) Years 2000 and 2010
(6) Year 2003-2004 and 2011-2012
(7) Year 2013
(8) Average standard deviation 2000-2004; 2005-2009 and 2010-2013
(9) 2000-2003; 2005-2008; 2010-2013

(a) Only hydrocarbons and minerals. In order to standardize information we consider the total general government revenues net of social security contributions. However, in Argentina, Ecuador and Colombia takes into account the information of the nonfinancial public sector.
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Source: ECLAC, World Bank, UNDP, IMF, Conference Board, WEFORUM and FAO.