



# COLOMBIA

## SELECTED ISSUES

March 2024

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March 13, 2024

Approved By  
**Western Hemisphere  
Department**

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# UNPACKING LOW PRODUCTIVITY IN COLOMBIA: EVIDENCE FROM FIRM-LEVEL DATA<sup>1</sup>

*Colombia's Total Factor Productivity (TFP) has fallen and stagnated over the past three decades, although the factors behind this broad-based decline have differed across sectors. Using firm-level data, we show that while the mining TFP declines were dominated by lower within-firm productivity, in the case of manufacturing and agriculture positive reallocation effects (more productive firms gaining market shares) played a buffering role. Across the board, the lack of entry of new productive firms contributes to missing TFP growth. We also find evidence of significant resource misallocation—notably in services, agriculture, and construction industries—indicating that policies to reduce misallocation can significantly boost aggregate productivity and growth.*

## A. Stylized Facts about TFP Growth

**1. Colombia's productivity declined in the 1990s and has stagnated since.** Productivity, measured by the Solow residual (the growth of output that cannot be explained by the growth of inputs like capital and labor), declined by more than 10 percent in the 1990s in Colombia and has stagnated at that low level until 2019. More recent estimates suggest that TFP has not grown since 2019, as productivity growth in the post-pandemic years was just enough to offset the pandemic decline (DANE, 2023). Similar declines can be observed in Latin American peers like Brazil and Mexico, while Peru and Chile fared better. The regional TFP trajectories, however, stand low in sharp contrast compared to high-productivity growth emerging markets such as China, India, or Korea, whose productivity has grown by some 20-40 percent.

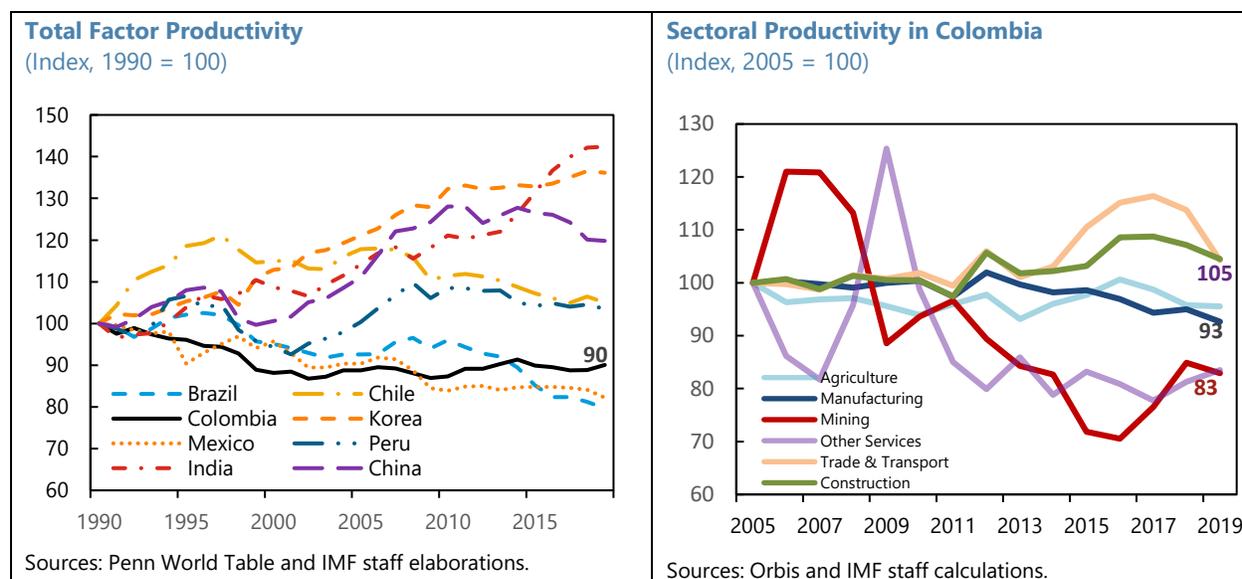
**2. Firm-level data suggests that TFP declines are broad-based across many sectors, notably in mining and manufacturing.** Using detailed firm-level data for 150,000 firms between 2005-2019 from the Orbis database, we estimate firm-level productivity using the methodology of De Loecker and Warzynski (2012) and Akerberg, Caves, and Frazer (2015).<sup>2</sup> Compared to datasets used in other papers on Colombia's productivity, the Orbis database covers more industries and is continuous since 2005.<sup>3</sup> We calculate sectoral TFP as a weighted average of firm-level TFP, where weights are the industry revenue shares. As shown in the text chart below, TFP decline in Colombia was broad-based and occurred in many sectors, notably in mining and manufacturing industries. Mining saw the largest TFP decline, reaching a trough of -30 percent following the oil price collapse in late 2014 but has since somewhat recovered. Notably, the 2008-2016 oil boom, which saw large foreign investment inflows and increase in oil production, did not help the industry improve TFP.

<sup>1</sup> Prepared by Vu Chau and Marco Arena.

<sup>2</sup> The Orbis database contains 600,000 firms in Colombia; however, only 150,000 firms have sufficient data to estimate TFP.

<sup>3</sup> Casas (2015) and Casas (2016) study the productivity growth of manufacturing firms using data from the "Superintendencia de Sociedades," which has a good coverage of manufacturing firms included in the Annual Manufacturing Survey (EMS) between 2005-2013. However, a change in accounting standard in 2014 creates a break in the series that renders the data unusable for a longer period of study.

Manufacturing TFP declined by around 7 percent between 2005-2019, with heterogeneous performances between the subsectors. The largest TFP declines were observed in the manufacturing of concrete, electrical equipment, basic iron and steel, and special-purpose machinery.



3. TFP improved in construction, trade, and transport industries during 2014-2019, likely reflecting the benefits of large infrastructure improvements in this period. TFP in these sectors boomed after 2015 and increased by 5-10 percent compared to pre-GFC levels. Notably, most improvements were achieved after 2014, coinciding with the implementation period of the 4<sup>th</sup> Generation (4G) infrastructure agenda, where substantial road and intermodal transport concessions were made.

## B. Understanding the Nature of TFP Decline: A Decomposition

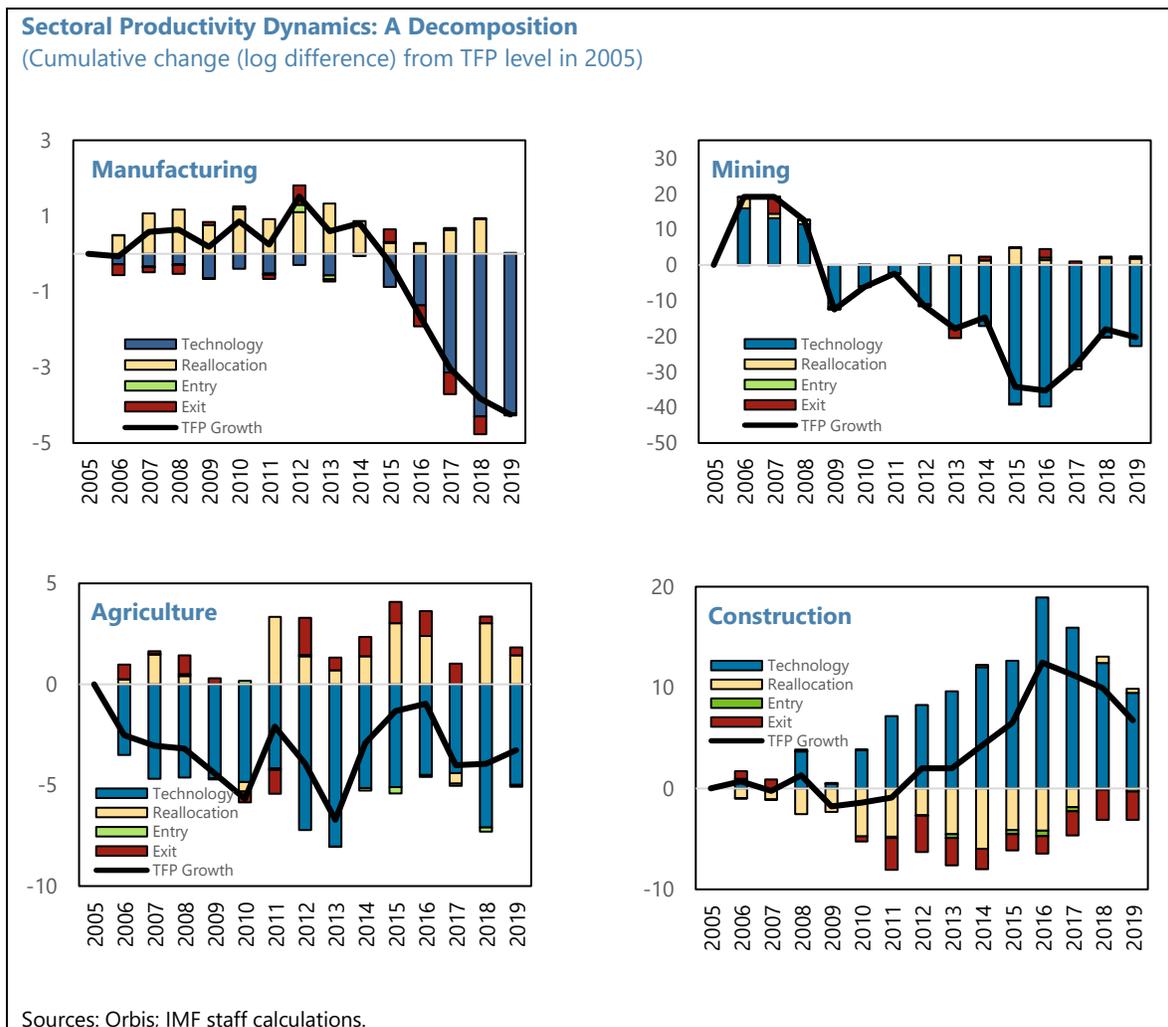
4. **Leveraging firm-level data, we perform a decomposition to better understand the nature of TFP declines across sectors.** We follow the dynamic Olley-Pakes decomposition methodology proposed by Melitz and Polanec (2015) to unpack change in aggregate TFP into four potential causes:

- **Technology:** Aggregate TFP change due to firm-level TFP, holding fixed market shares.
- **Reallocation:** Aggregate TFP rises (declines) because high (low) TFP firms have gotten bigger, thus accounting for a larger share in aggregate TFP.
- **Entry:** Aggregate TFP rises (declines) because new entrants are more (less) productive compared to incumbents on average.
- **Exit:** Aggregate TFP rises (declines) because low (high) TFP firms exit the industry.

In particular, let aggregate TFP for a sector  $s$  be defined as a weighted average of the TFP of firms in that sector:  $z_{s,t} = \sum_{f \in I} \omega_{f,t} z_{f,t}$ , where  $z$  denotes log TFP and  $\omega$  denotes firm share within the industry (either output share or value added). We can decompose the change in aggregate TFP between two periods into four terms corresponding to the four causes above:

$$z_{s,t} - z_{s,t-1} = \underbrace{\sum_{f \in I} \omega_{f,t-1}^I \cdot \Delta z_{f,t}}_{Technology} + \underbrace{\sum_{f \in I} \Delta \omega_{f,t}^I \cdot z_{f,t}}_{Reallocation} + \underbrace{\omega_{N,t}(\bar{z}_{N,t} - \bar{z}_{I,t})}_{Entry} - \underbrace{\omega_{E,t-1}(\bar{z}_{E,t-1} - \bar{z}_{I,t-1})}_{Exit}$$

where  $I$ ,  $N$ , and  $E$  denote the set of incumbents, new entrants, and exiting firms respectively;  $\omega_N$  and  $\omega_E$  are total market shares of entrants and exiting firms; and  $\bar{z}$  denotes the average productivity of each respective group. The weights in technology and reallocation terms, denoted  $\omega^I$ , are not industry weights but rather weights among the surviving incumbents.



**5. Decomposition results show that the dynamics of TFP and their compositions are heterogeneous across sectors.** In particular, the TFP decline in *mining* mostly reflects the *technology* channel, i.e. aggregate TFP falls because of TFP declines at the firm level, instead of any composition effect. Behind the mining TFP decline could be declining ore grades, higher capital expenditures (which could be due to geological reasons), and higher fixed operating costs (Lala, 2016).<sup>4</sup> Interestingly, between 2005-2015, *manufacturing* enjoys an improvement in TFP due to the *reallocation* channel, i.e. high TFP firms got larger. After 2015, the *technology* channel dominates and leads to an overall decline of manufacturing TFP. In *agriculture*, we also observe a dominating negative impact from firm-level productivity decline, though that is partially mitigated by a better reallocation effect as well as the exit of inefficient firms. The *construction* industry is the mirror image of agriculture, with firm-level productivity improvement leading to the rise of TFP of the whole sector.

**6. While we see sizable effects of firm exits, firm entry plays little role in TFP dynamics, potentially indicating bottlenecks impeding firm entry.** Less than 10 percent of firms in our sample are “new” firms, and not only are they smaller, but they also tend to have lower TFP than the average incumbent. This stands in contrast to firm exits, which indeed contribute to aggregate TFP dynamics (red bars). A deeper analysis into the lack of entry to uncover potential barriers to entry could usefully guide policies.

### C. Quantifying Misallocation and Its Growth Impact

**7. While the previous exercise provides a good description of the firm-level data, it is silent on the “distance to frontier.”** The decomposition performed above, also termed the “statistical approach” by Baqaee and Farhi (2020), is a useful way to understand moments of the detailed firm-level data, such as the weighted-mean sectoral productivity, but does not say anything about the gap between TFP (or output) from its potential. For example, consider a hypothetical firm that is highly productive but initially small. Assume that the firm was able to grow its market share over time, but its growth was hindered by financial market frictions that prevented access to capital. The decomposition above would show an improvement in TFP due to reallocation but would not reveal the fact that TFP could have been much higher had the productive firm been able to access capital and grow more.

**8. To better capture distance to frontier, we quantify resources misallocation and its growth impact.** We follow the methodology of Hsieh and Klenow (2009), which detects potential distortions in the factor and/or output markets that would prevent the first-best allocation of resources in the economy by looking at the dispersions in the marginal product of capital and labor, based on the premise that in an environment without distortions and perfect competitive markets, firms would allocate capital and labor until their marginal products are equalized across firms. In their framework, each firm  $i$  faces two types of firm-specific implicit taxes, one affecting the capital

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<sup>4</sup> Lala (2016) mentions higher costs of raw materials like energy and explosives as a major factor weighing on productivity. Our TFP estimation relies on costs of goods sold and should not be affected by changes in variable costs over time. However, it would be affected by changes in fixed costs (e.g., management costs).

and labor input choices (e.g., financial frictions which make borrowing expensive for some firms) and another affecting capital and labor proportionately (e.g., size-dependent taxes or distribution costs that disproportionately affect smaller firms). Let  $\tau_i^K$  and  $\tau_i^Y$  denote those two “taxes,” respectively. The *revenue productivity* (or TFPR), defined as the ratio of revenue to weighted input uses, can be shown to be proportional to the distortions:

$$TFPR_i \equiv \frac{P_i Y_i}{K_i^\alpha L_i^{1-\alpha}} \propto \frac{(1 + \tau_i^K)^\alpha}{1 - \tau_i^Y}$$

where  $\alpha$  is the capital share. In a world without distortions ( $\tau^K = \tau^Y = 0$ ), revenue productivity would be equalized across all firms. The presence of distortions would create dispersion in the revenue productivity across firms. Hsieh and Klenow (2008) show that, under some (rather restrictive) assumptions, the loss of TFP relative to a first-best scenario where there is no misallocation is given by the dispersion of firm-level revenue productivity:

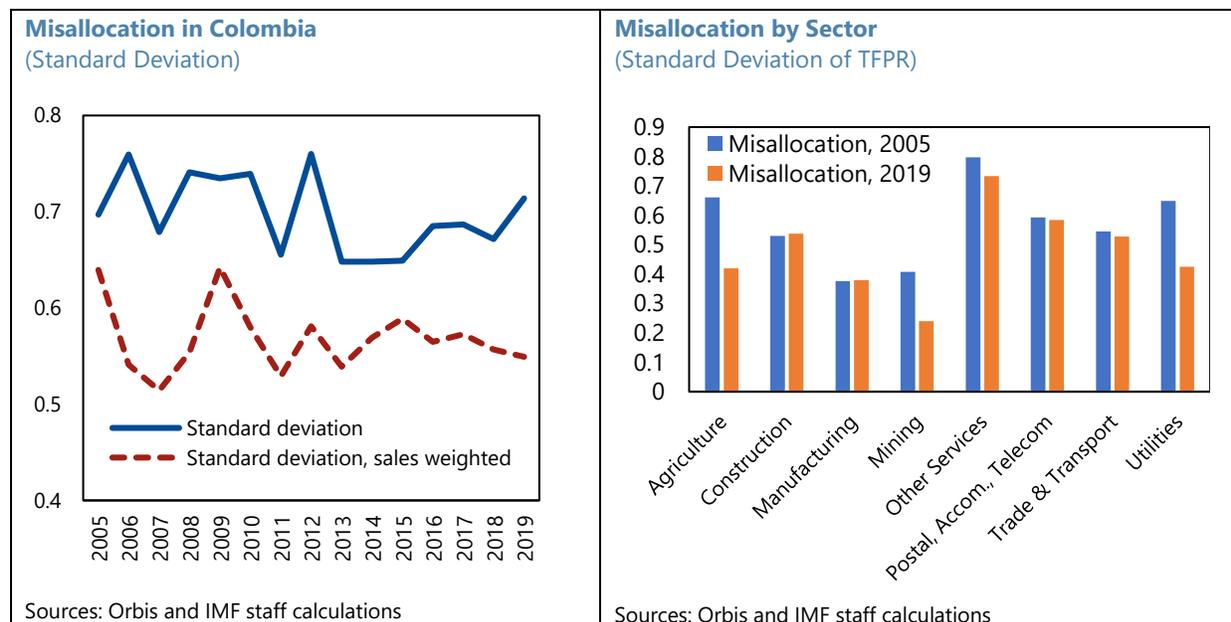
$$\log(TFPR) - \log(TFPR^*) = -\frac{\sigma}{2} \text{var}(\log(TFPR_i)).$$

**9. Our calculations show that misallocation is sizable in Colombia, and gradually reducing misallocation could lead to large TFP and output gains.** The standard deviation of log revenue productivity is around 0.7 in Colombia in 2005, slightly higher than the level of misallocation in other emerging markets in the same year (0.63 for China and 0.67 for India (Hsieh and Klenow, 2009)). The United States, which provides a reference for “good allocation of resources,” has a standard deviation of around 0.45 for revenue TFP (Hsieh and Klenow, 2009). Using the Hsieh and Klenow (2009) formula, with an elasticity of substitution between goods of  $\sigma = 3$ , reducing misallocation in Colombia to the level observed in the United States would increase TFP by  $\frac{3}{2} * (0.7^2 - 0.45^2) \approx 43$  percent. As a back-of-envelope exercise, reducing misallocation from 0.7 to 0.6 over two decades could result in 20 percent higher TFP, or almost 1 percent higher potential growth annually.<sup>5</sup>

**10. The level of misallocation differs across sectors.** We find that resource allocation has improved in most sectors in Colombia since 2005, especially in agriculture, utilities, and mining industries.<sup>6</sup> Meanwhile, misallocation remains high in services, including postal, accommodation, and telecommunication.

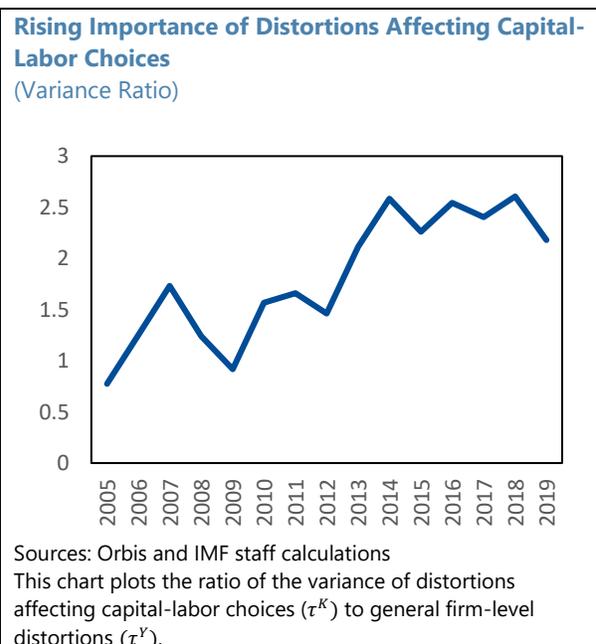
<sup>5</sup> Hsieh and Klenow (2009) estimate that China reduced its TFPR from 0.74 to 0.63 between 1998 and 2005, whereas India’s misallocation level stays about the same in the same period. The scenario as described assumes that Colombia would be able to reduce misallocation at half the rate of China during 1998-2005.

<sup>6</sup> That resource allocation has improved in mining and raising TFP could appear at odds with the overall mining TFP decline, but they are not. Misallocation relates to the gap between actual and potential TFP, so it is possible that potential TFP has declined, causing a decline in actual TFP, even though the gap between actual and potential has narrowed. In other words, without the misallocation improvement, TFP would have been worse in this sector.



## 11. Distortions affecting input choices (capital versus labor) can exacerbate resource

**misallocation across firms.** Recall that we have two sources of dispersion in productivity: firm-level implicit taxes  $\tau^K$ , which affects the capital-labor input choice, and  $\tau^Y$ , which represents general distortions that firms face. The figure below plots the ratio of the variance of the capital-labor distortions versus that of the general distortion. The ratio has generally been larger than 1, indicating a larger role of capital-labor distortions, and has been rising since 2005.<sup>7</sup> Going forward, understanding TFP dispersion and misallocation requires a deeper dive into factors that distort the capital-labor choice, such as collateral constraints or financial market underdevelopment (see Galindo and



<sup>7</sup> The apparent increase of the variance of labor-capital input distortions after 2012 may appear contradictory with the positive developments in the labor market in that period. Particularly, Colombia reduced payroll taxes in 2012 under the 1607/2012 Act, which helped lower hiring costs and reduce informality (Fernandez and Villar, 2017; Garlati-Bertoldi, 2018). It is important to note that changes in the relative price of capital and labor *per se* would not impact TFP dispersion, unless such changes affect firms differentially. For example, if labor costs were reduced more for big firms than small firms, it could lead to an increase in dispersion. The uptick could also be due to measurement issues, as firms could start reporting more formal labor. Another potential explanation could be that financial conditions

(continued)

Meléndez Arjona (2013) for example about the lack of access to external financing by small firms).

## D. Conclusion

**12. Low productivity in Colombia, observed in many sectors and caused in part by resource misallocation, has negatively weighed on economic growth for decades.** On the positive side, improving TFP is a promising avenue to boost sustainable growth, alongside increasing the labor force (e.g., by integrating Venezuelan immigrants) and the capital stock (by encouraging investment). Section B has shown positive TFP impacts from good business dynamism (exits of unproductive firms and reallocation towards productive ones), while the lack of productive new firms contributes to low TFP. Policies that encourage business dynamism and alleviate barriers that prevent firms from entering, innovating, and becoming formal could help to improve TFP.

**13. Misallocation of factors of production appear to pose a sizable growth cost for Colombia, though progress in reducing misallocation has been made in recent years.** It should be emphasized that the paper does not identify the causes of misallocation, which could be industry- and firm-specific bottlenecks, such as taxes, adverse incentives, access to financing, labor market rigidities, red tape, or policy uncertainty. Policies to improve misallocation could be derived from studies that explore the causes of misallocation and industry-specific problems. In general, such policies should be based on the principles of leveling the playing field, encouraging investment, and removing distortions. More broadly, improving resource allocation would include streamlining regulations, lowering labor market rigidity, providing more policy certainty (e.g., on regulated prices), and removing bottlenecks that keep firms smaller and outside the recorded economy, among others.

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tightened for some firms during the period of commodity price collapse that happened shortly after. More work is needed to better understand how relative changes impact firms of different sizes and potential implications for misallocation, including the potential relative changes from the current labor reform proposal that could raise wage and non-wage costs (see Annex I of the Staff Report).

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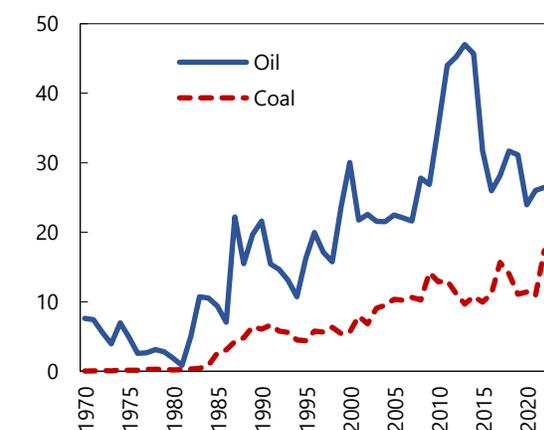
## BUILDING ON STRENGTHS: PAST LESSONS FOR DIVERSIFYING EXPORTS<sup>1</sup>

*As the world reduces its energy demand from fossil fuels, Colombia also needs to diversify its production and exports to safeguard fiscal and balance of payments sustainability. How to successfully diversify remains an open question. From historical episodes of successful diversification, we document that export diversification more often occurs through the intensive margin (i.e., producing a more balanced mix of existing products) rather than extensive margin (venturing into new products) and that it is easier to grow an industry with some initial comparative advantage. Export diversification can also be achieved by upgrading export quality, and Colombia still has room to grow in most industries. Going forward, improving business climate, including by alleviating bottlenecks that prevent firm entry and growth, could help foster a more successful export diversification.*

### A. Introduction

**1. Colombia's economy is highly dependent on oil and coal, whose importance has grown over time.** Since 2000, oil exports accounted for about 20–30 percent of annual total goods and services exports, except for the oil boom in the years following the 2008 Global Financial Crisis, where the oil share reached a peak of almost 50 percent in 2013. Coal export shares have also steadily increased from 5.6 percent in 2000 to a peak of 16.8 percent in 2022. In 2023, oil and coal together account for about 47 percent of goods exports, the equivalent of around 5 percent of GDP. Oil is also an important part of public finances, with oil-related revenues accounting for an average of 9 percent of the non-financial public sector's revenue.

**Oil and Coal Shares of Exports**  
(Percent)



Sources: Haver and IMF staff elaborations.

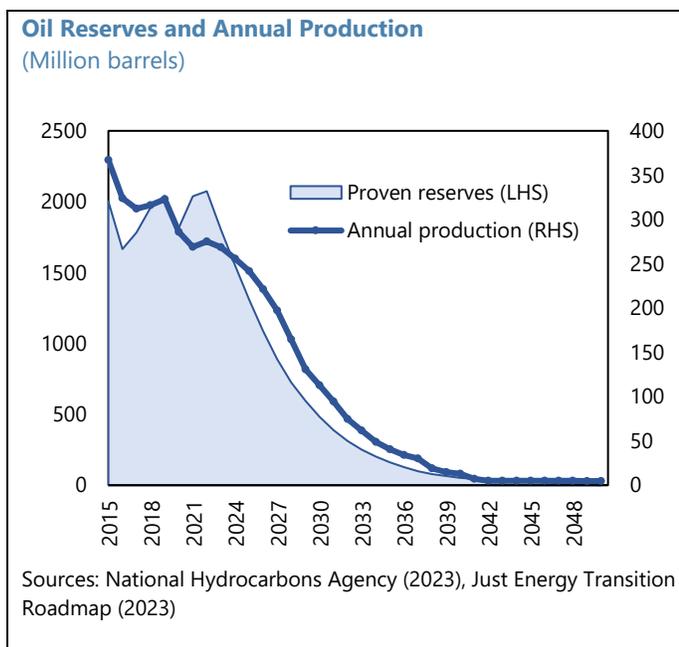
**2. The global green energy transition will pose significant challenges to Colombia's economy.** As countries work towards reaching their net zero emission goals, the energy

consumption from fossil fuels is bound to decline. In particular, the International Energy Agency projected that while oil and natural gas consumption would peak in 2030 and decline slowly and only by 5 percent by 2050, coal consumption would peak over the next few years and decline by 40 percent by 2050 (IEA, 2023). The projected paths of energy consumption, however, are subject to large uncertainty and could be hastened by faster-than-expected developments of renewable energy and electric vehicle technologies. Another uncertainty comes from the evolution of the prices of fossil fuels. Boer et. al. (2023) suggests that oil prices could be between 25 USD and 130 USD per

<sup>1</sup> Prepared by Vu Chau and Marco Arena.

barrel by 2030, depending on whether the energy transition is led by demand-side policies (which curb demand and depress oil prices) or supply-side policies (which dampen supply and increase oil prices). As a result, while the global energy transition does not necessarily imply negative impacts on oil producers like Colombia, the high level of uncertainty poses significant risks to these countries.

**3. Besides external challenges, Colombia's declining energy reserves also gives additional urgency to the energy transition.** Recent estimates show that the existing proven reserves are only enough to cover 7.5 years of production at the current rate (National Hydrocarbons Agency, 2023). This is due in part to geological reasons, as no important discovery has added to reserves over the past decade. Annual oil production, which currently stands at around 275 million barrels, is expected to halve by 2030 and approaches zero by 2040. Similarly, oil reserves are expected to drop by 75 percent in this decade, though enhanced recovery and contingent reserves could help moderate the pace of decline.



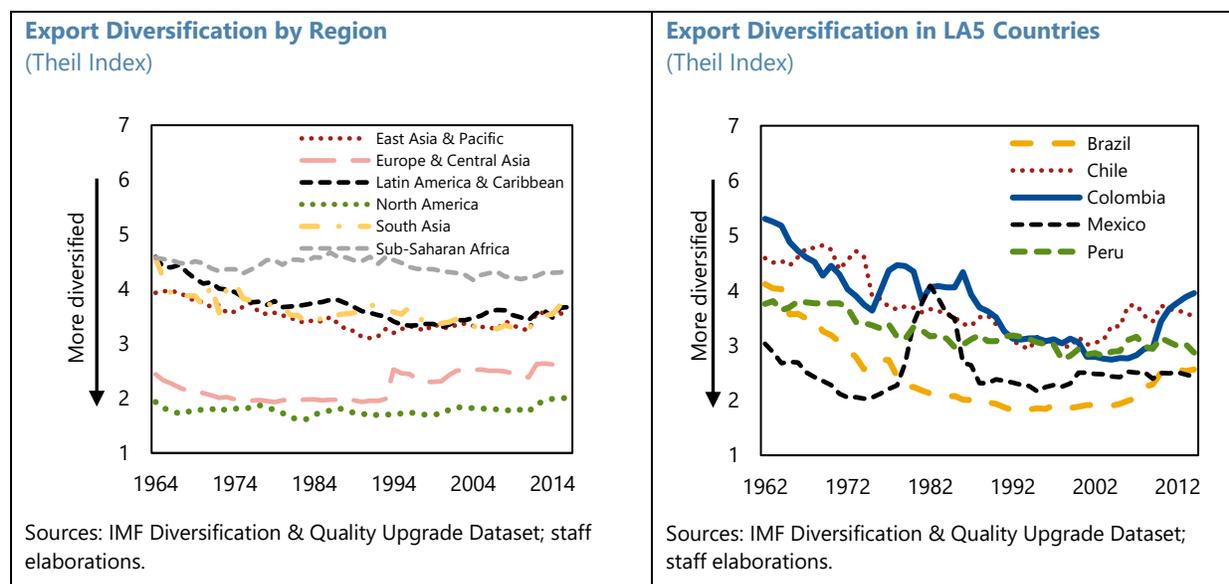
**4. Export diversification needs to be an integral part of Colombia's development strategy.** Colombia's goods exports remain highly concentrated in energy, and while services have become more diversified and are growing, they still account for less than one-third of total exports (IMF, 2023). At the same time, participation in the global value chains (GVCs) remains low and below peers (IMF, 2023). How to successfully diversify a country's export basket remains an open question. Key design choices include, but are not limited to, whether diversification should happen by venturing into new industries/products (extensive margin) or producing a more balanced mix of existing products (intensive margin), and whether to focus on existing comparative advantages or develop new ones. Another policy design choice relates to defining the role of the state and how it should interact with the private sector in the diversification efforts.

**5. In this chapter, we draw lessons from successful diversification episodes in other countries, with a focus on the policy design questions mentioned above.** Using historical data on diversification going back to the 1960s (Papageorgiou et al., 2013 and 2020), we document the diversification trends of Colombia, regional peers, and other countries in the world. In Section B, we note the significant diversification progress that Colombia has made during 1960s-1990s, which stalled in the 2000s and even reversed after the 2008 GFC. During this period, Colombia's diversification was achieved more through the intensive margins, in line with emerging Asian manufacturing hubs. Section C analyzes the revealed comparative advantage (RCA) and argues that

developing existing advantages is better than starting from scratch, as it implies larger and faster progress. Section D focuses on quality upgrading, noting that Colombia still has room to improve export quality in most industries, which could raise exports of higher value-added goods and improve diversification. Finally, Section E discusses potential impediments to export diversification and suggests that government policies to alleviate these impediments could foster a more successful diversification.

## B. Export Diversification since the 1960s

**6. Latin America significantly diversified exports between 1964-2000, although this progress stalled since** (text chart). We measure diversification by the Theil index, which measures the “entropic distance” between the actual export basket and a hypothetical perfectly balanced basket. The Theil index is given by  $T = \frac{1}{n} \sum_{k=1}^n \frac{x_k}{\bar{x}} \ln \left( \frac{x_k}{\bar{x}} \right)$ , where  $n$  is the number of active export product lines,  $x_k$  is the value of a particular export, and  $\bar{x} \equiv \frac{1}{n} \sum_{k=1}^n x_k$  is the average exports. A higher Theil index means less diversified exports.<sup>2</sup> The Text Chart below plots the diversification dynamics of different regions (left panel) and of the LA5 countries (right panel) between 1964-2014. Starting at the same low level of diversification as South Asia and Sub-Saharan Africa in 1964 (and lower than East Asia, Europe, and America), Latin America made important strides in diversifying exports between 1964-2000, with the progress on par with Asian countries. The diversification in this period corresponds to a large wave of trade liberalization, especially between 1985-1995 (Irwin, 2022). However, the progress has stagnated since 2000 and even reversed after the 2008 Global Financial Crisis.



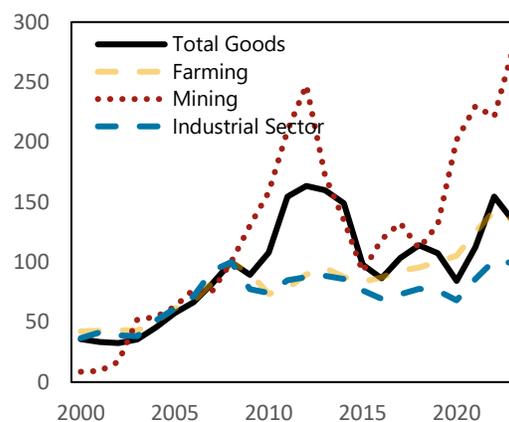
<sup>2</sup> In this chapter, we employ the Export Diversification and Quality Upgrading dataset developed by IMF staff, which calculates the Theil index for 200 countries from 1962-2014. More details on the dataset construction can be found in Henn, Papageorgiou, and Spatafora (2013) and Papageorgiou, Spatafora, and Wang (2015).

**7. While Colombia's diversification progress before 2000 exceeded the regional peers, there has been a larger reversal since the 2008 GFC.** Colombia's exports become more diversified (reduced its Theil index by more than 2 points) between 1962 and 2002, a larger success than most LA5 peers. Starting from the lowest level of diversification, Colombia largely caught up to Chile, Peru, and Mexico by 2000. The diversification progress during this period could be credited to the relatively better macroeconomic stability, very strong and continuously improving institutions, and improving security and social conditions, especially since the 1990s.<sup>3</sup> However, the trend sharply reversed after 2008 following the post-GFC oil boom when oil became a larger share of exports, undoing the diversification progress of 2 decades. This abrupt reversal was larger in Colombia compared to LA5 peers (except for Brazil).

**8. Notably, the reversal was led not only by the booming mining sector, but also by the dented growth in non-mining exports (see text chart).** In particular, while farming and industrial export values doubled between 2000-2008, they abruptly fell and stagnated after 2008.<sup>4</sup> Whether the oil boom *caused* other sectors to become uncompetitive and stop growing remains an open question that is beyond the scope of this chapter.

**9. Colombia's remarkable diversification progress was achieved by exporting a more balanced mix of existing products rather than by exporting new products.** Colombia's diversification gain from 1962-2000 is among the highest in the world (text chart), placing third only after the UAE and Lebanon.<sup>5</sup> Except for the case of oil-dominant nations (UAE and Qatar), most top diversifiers relied on the intensive margin rather than extensive for improving exports. More than  $\frac{3}{4}$  of Colombia's gain during this period was due to the intensive margin, as is the case for other commodity exporters (New Zealand and Chile) as well as emerging Asian manufacturing hubs (Thailand, Indonesia, India, Malaysia).

**Non-Mining Exports Growth Slowed after the 2008 Oil Boom**  
(Export value (FOB mil USD), 2008 = 100)

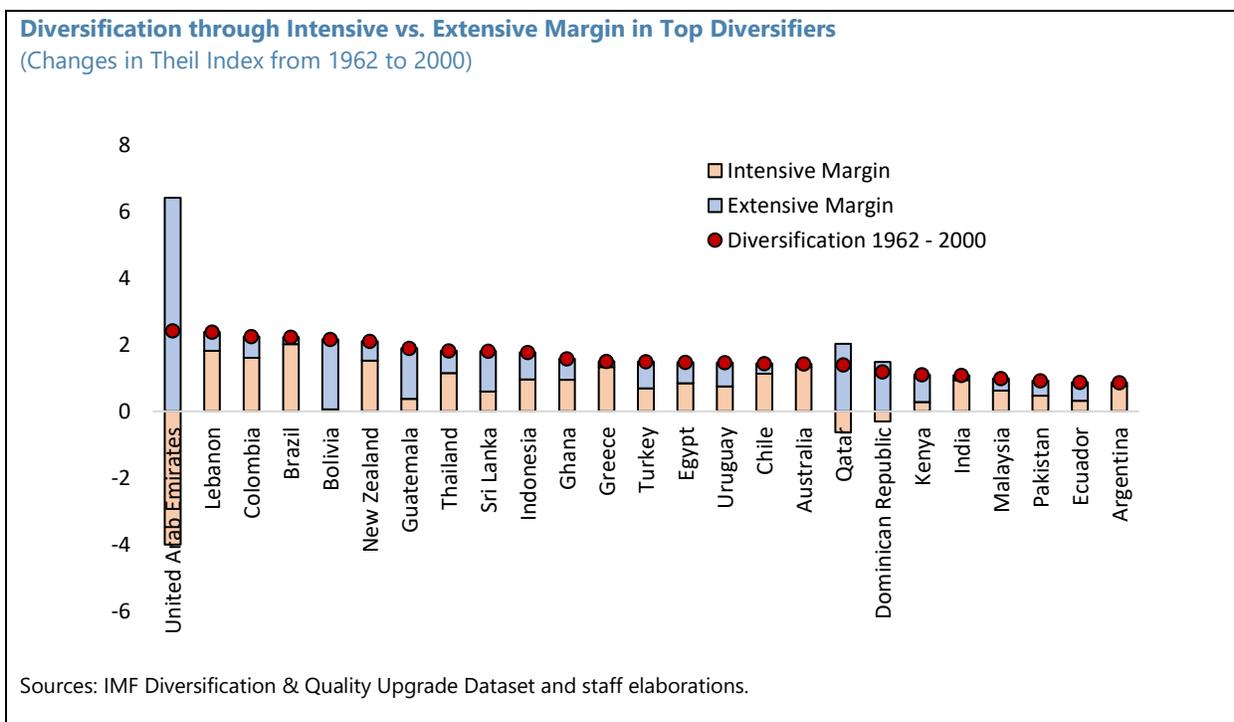


Sources: Haver and IMF staff elaborations.

<sup>3</sup> Colombia's macroeconomic stability during this period was relatively better than regional peers, characterized by strong fiscal discipline, with deficits staying consistently below 1 percent before 1980 and 3 percent before 1995; no sovereign default; elevated but controlled inflation, which came down after the adoption of inflation targeting; and a gradual move towards the flexible exchange rate regime (Osorio-Rodriguez, David and Perez-Reyna, 2016).

<sup>4</sup> Export volumes show similar trends.

<sup>5</sup> The sample contains more than 200 countries, among them many small island nations. For a sharper comparison, we focus on countries with GDP above the median level in the starting year in this text chart.



### C. Changing Comparative Advantage: Starting Point Matters

**10. Comparative advantages could evolve but may have high inertia.** Which products a country exports ultimately reflects its comparative advantages, either in technology (Ricardo) or endowment (Heckscher-Ohlin), and comparative advantages could change over time (Ocampo, 2016). The ease of exporting new products and changing the export basket is linked to how easily comparative advantages can change. Our previous finding that the intensive margin was important for diversification in many countries suggests that comparative advantages carry high inertia.

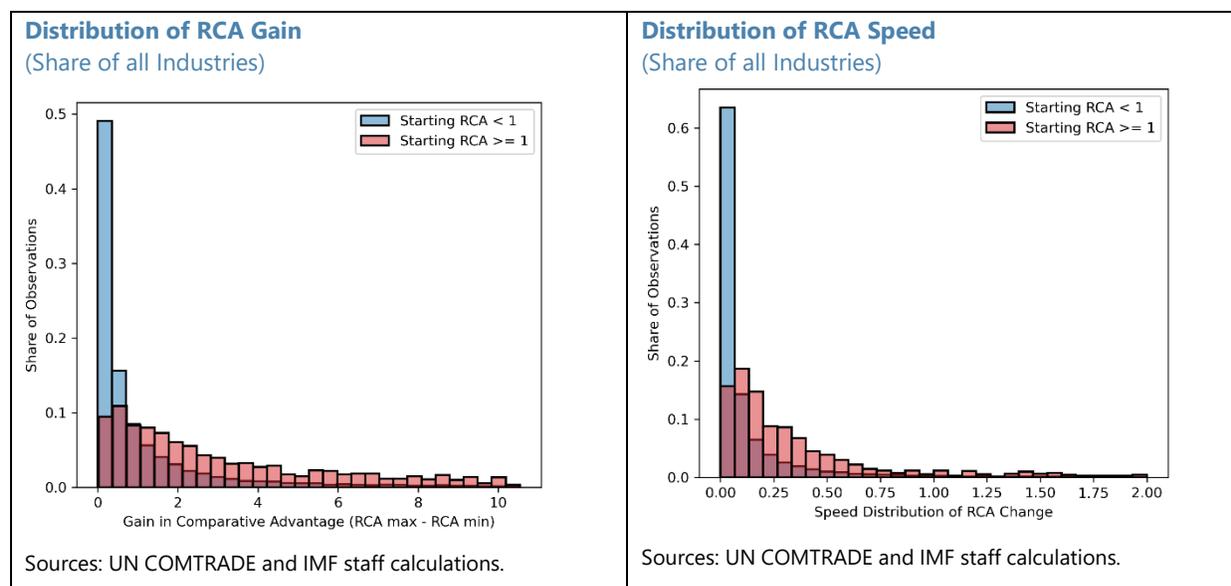
**11. To understand better the feasibility and pace at which comparative advantages can change, we draw from historical international experiences.** In particular, using UN COMTRADE data during 1988-2022 for all HS 4-digit industries and countries, we compute the Revealed Comparative Advantage (RCA) index for each industry  $s$ , country  $c$ , and year  $t$ :

$$\text{Revealed Comparative Advantage}_{s,c,t} = \frac{\text{Share of } s \text{ in domestic exports}}{\text{Share of } s \text{ in world exports}}$$

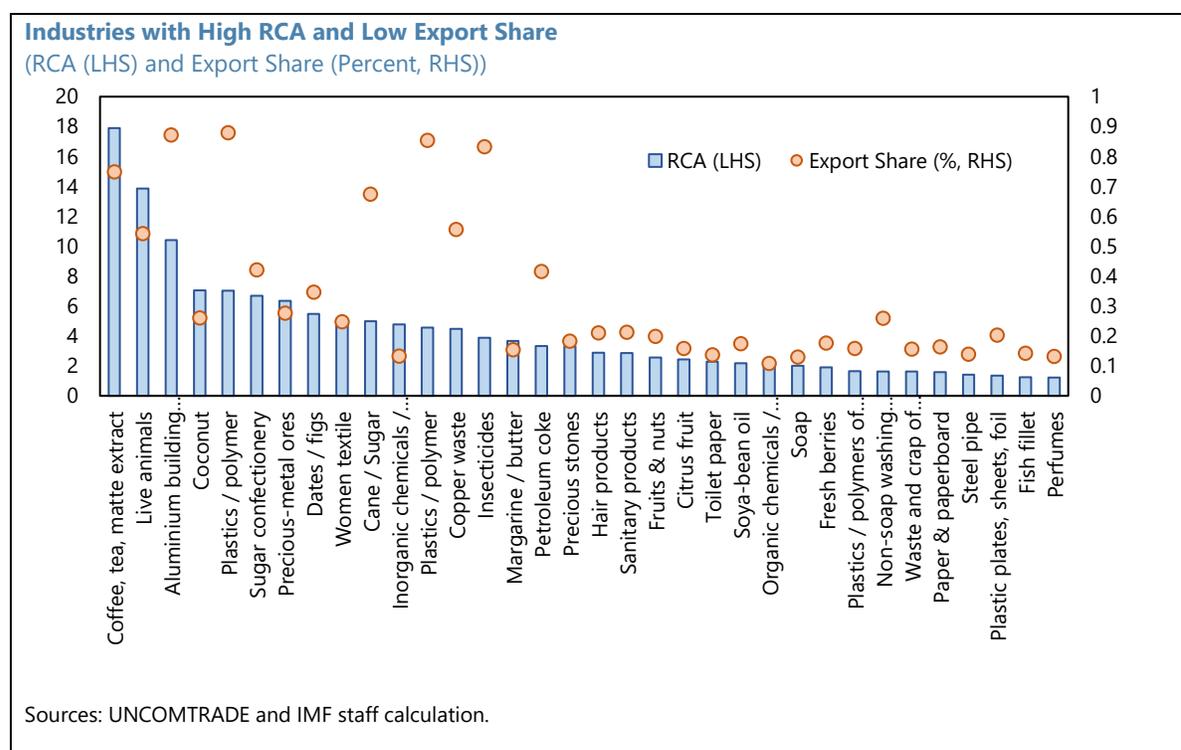
A country has a comparative advantage in exporting  $s$  if its RCA is larger than one. For each country-industry, we identify the maximum *RCA gain*, defined as the changes in RCA from trough to peak over the sample years, as well as the *speed*, i.e. maximum gain divided by number of years between trough and peak. The chart below plots the distribution of *gain* and *speed*, separating industries with initial comparative advantage ( $RCA > 1$ ) and those without.

**12. Industries with higher initial RCAs tend to grow more and faster.** Almost half of industries with initial RCAs less than 1 (first bar, blue distribution) experience virtually no change in RCA throughout our samples. The red distribution has a heavier right tail, indicating that many industries with initial RCA > 1 significantly increased their RCA over time. The first blue bar in the “Speed” chart indicates that more than 60 percent of industries with initial RCA less than 1 have speed lower than 0.05, which mean that these industries would require more than 2 decades ( $1/0.05 = 20$  years) to develop comparative advantage (from RCA = 0 to RCA = 1). Meanwhile, the red distribution has a mean of 0.44, which indicates that it would take these industries more than 2 years to “double” their comparative advantage (going from having the global average export share of a product to having twice the global average). In other words, not only did industries with initial comparative advantages grow more, but they also grew faster.

**13. Historical evidence suggests that diversification could be more successful when built on existing comparative advantage.** Overall, the evidence suggests that countries would be able to diversify by more and faster if starting from an industry with some initial comparative advantage instead of “starting from scratch.” For Colombia, this implies there is export diversification potential in *agriculture products* (coffee extracts, live animals, coconut, sugar cane, soya-bean oil, etc.), *plastic and polymer products*, *chemical manufacturing* (inorganic chemicals/carbon, organic chemicals/acid, hygiene products), and *metal products* (aluminum building materials, precious-metal ores, copper, steel pipe).<sup>6</sup>



<sup>6</sup> These are industries/products that have RCA > 1 but still account for a low share of exports (less than 1 percent).



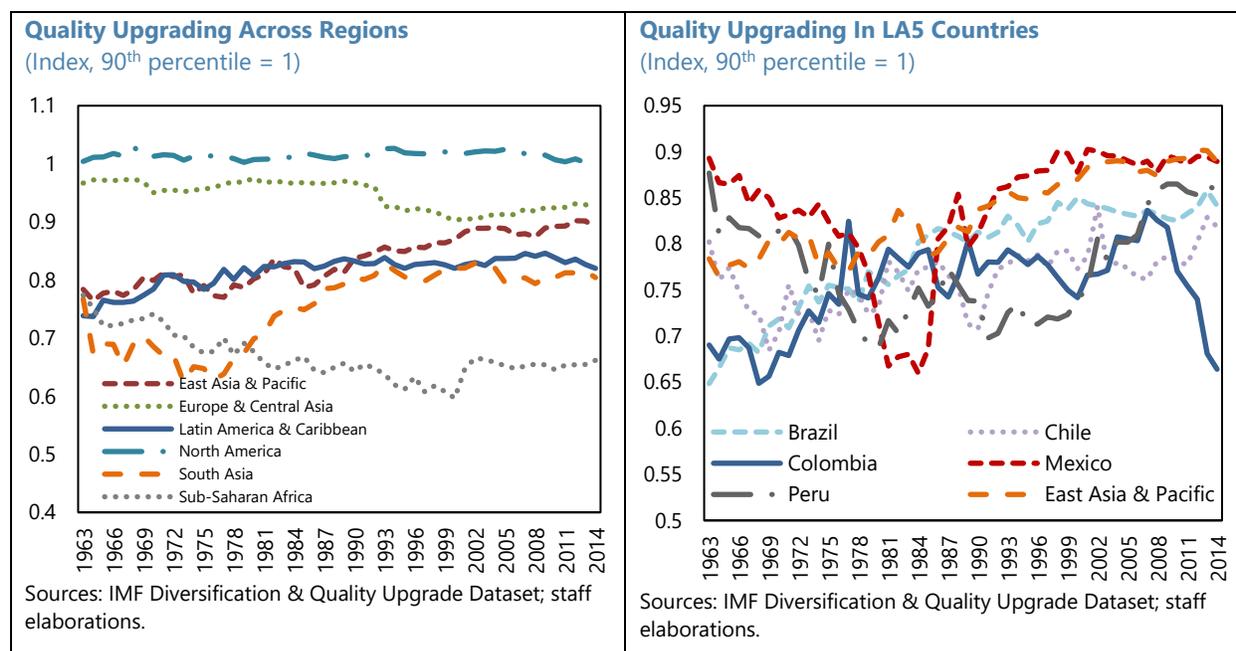
**14. Services have also contributed to export diversification and have potential for further development.** It is important to acknowledge that services have contributed to diversifying Colombia's exports, as its share of exports rose from an average of 13 percent in the 2000s to around 23 percent in 2023. Colombia has also diversified its services exports, both in the composition of products and of trade partners (IMF, 2023). By composition, travel exports account for half of services exports, and while its growth has led the increase of services share in total exports, the tourism share of services exports has not changed between 2000-2023. In fact, the largest growth comes from the category "Other Business Services," which grew its share from almost 4 percent in 2000 to 18 percent in 2023, led by a sharp growth of call center services.<sup>7</sup> The 14pp increase in export share of business services is roughly matched by a 10pp decline of transportation services and 3pp decline of financial services. Going forward, as remote work becomes more popular after the COVID-19 pandemic, increasing services exports in industries with high teleworkability content could also be a promising avenue, given Colombia's labor cost advantage compared to that of advanced economies (Hausmann and Bustos, 2021). Continuing to enhance services exports could play an important role in the overall diversification strategy.

## D. Quality Upgrade: Room for Growth in Colombia

**15. One important avenue of growing non-traditional exports is upgrading export quality and increasing value added.** Diversifying by growing the export share of non-traditional products

<sup>7</sup> Besides call centers, this category includes other services like R&D, management consulting, legal, tax, administration, etc.

can be achieved not only by producing larger volumes, but also by increasing their unit values. This, in turn, can be achieved by upgrading quality and increasing value added. In this section, we analyze the trend of quality upgrading across countries between 1962-2014.<sup>8</sup>

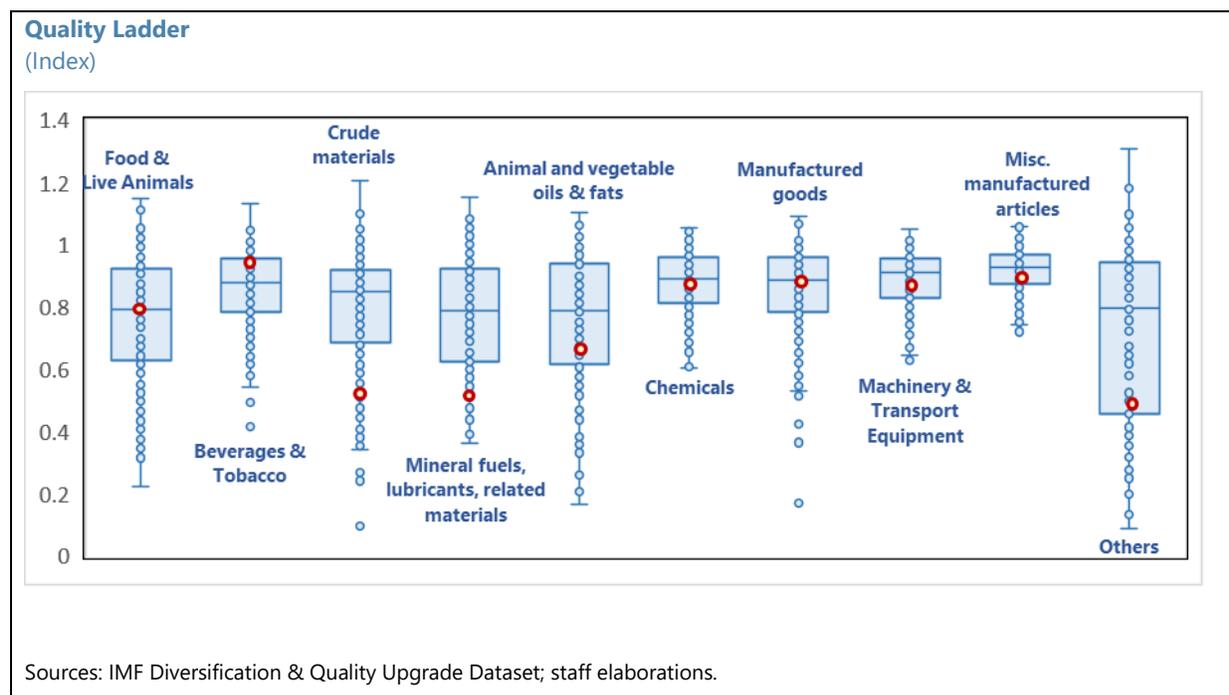


**16. Latin America improved export quality before 1980 at the same pace with East Asia but has since stalled.** From the same starting point, Latin America was able to grow quality in lockstep with East Asia & Pacific but has stalled since mid-1980s while East Asia continues to improve quality and has by now largely caught up with Europe. Among LA5 countries, Colombia and Brazil made the most progress in terms of quality upgrading, catching up to East Asia by mid-1980s. However, progress also stalled in Colombia in the 1990s, followed by a sharp reversal after the Financial Crisis. This could be due to a composition effect, as the export share of oil, which have lower quality compared to other goods, expanded. Similar to the export diversification trends noted in Section B, this decline in quality due to oil exports was observed only in Colombia among the LA5.

**17. Colombia still has room for quality upgrading in many export industries.** Colombia's export quality is relatively high in general. For example, the *Beverages & Tobacco* industry is at the 75<sup>th</sup> percentile of the quality ladder across countries, while *Crude materials exc. fuels* and *Mineral fuels* rank low, perhaps because Colombia exports more crude than refined petroleum. Quality is at the median level and relatively close to the frontier in the export industries of *Chemicals*,

<sup>8</sup> Export quality can be measured by the unit value of exports, though this measure is typically contaminated by factors not related to the quality of export products itself. For example, a shirt exported from country A could have a higher unit value than a shirt exported from country B, but it could indicate either higher quality or just that country A exports to higher-income destinations without a difference in quality. Papageorgiou et. al. (2015) provides cross-country data on export quality by purging such contaminating factors from unit values. The data is available for 200 countries between 1962 – 2014.

*Manufactured goods, and Machinery and Transport Equipment*, which could serve as good starting points for quality upgrading.



### 18. More granular sectoral analysis is needed to quantify the cost of upgrading quality.

The analysis here is silent on the cost of upgrading quality to the frontier, and the distance to frontier could be indicative of the investment costs required. For example, we find that the quality of crude materials and mineral fuels exports is low, but improving quality in this area could require costly investments to develop refining capacity. As such, the quality measurement presented here could serve as a starting point for a more granular sectoral analysis that identifies where quality could be upgraded more easily and efficiently.

## E. Summary and Policy Implications

### 19. Colombia has much potential to diversify its exports, as it did so successfully in the past, by building on existing strengths.

Diversification would be more successful if based on growing export industries with existing comparative advantages, including by upgrading export quality. It might not be cost-effective, including in terms of time, to build industries from scratch or upgrade quality if quality is currently too far from the global frontier.

### 20. Public policies, especially those that address market failure and improve business climate, play an important role in fostering a successful export diversification.

The government, in consultation with the private sector and stakeholders, could play an important role in identifying potential avenues for development and strengthening the export diversification strategy. Furthermore, fostering a successful diversification requires improving firm productivity and resource allocation (see Chapter 1 on productivity), which can be achieved by policies that level the

playing field (e.g., removing distortions that affect firms of different sizes or sectors differentially). Public policies can help tackle market failures: these could include upgrading public goods such as infrastructure, or addressing coordination failures such as ensuring that education policies build the labor skills needed in the growth industries.<sup>9</sup> Finally, diversification policies should be based on encouraging investment and participation of the private sector, as public resources alone would not be sufficient (nor efficient) to meet Colombia's ambitious diversification and climate goals.

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<sup>9</sup> One such coordination problem could be the linkage between industries and the labor market, where the lack of the needed skills and labor market rigidities could inhibit growth in other sectors. In this regard, policies to improve human capital and reduce rigidities could help facilitate export diversification.

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# TWIN DEFICITS: DOES THE COMPOSITION OF THE FISCAL ADJUSTMENT MATTER FOR CORRECTING EXTERNAL IMBALANCES?<sup>1</sup>

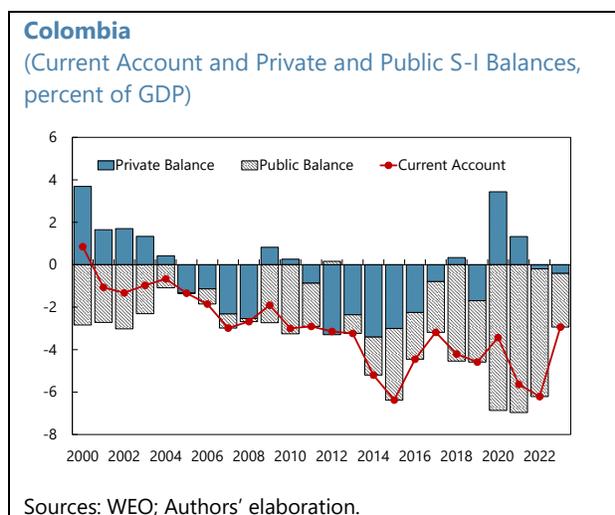
The study assesses the relationship between fiscal consolidation and current account adjustments for a sample of Latin American and Caribbean countries and advanced economies, exploring whether fiscal consolidation characteristics—revenue or expenditure driven— affect the current account adjustment. The study finds that fiscal consolidation leads to a rise in the external current account balance, in line with the “twin deficits” hypothesis, with a depreciation in the real effective exchange rate typically accompanying the external adjustment process. Both tax- and spending-based fiscal consolidations contribute to improve the current account balance.

## A. Context and Purpose of the Study

**1. Colombia’s current account has persistently had a deficit since 2005. As discussed by Cárdenas and López (2019), the current account deficit went from 1.8 percent of GDP in 2006 to 5.2 percent in 2014. During that period, annual real GDP growth was 4.8 percent, on average, and the increase in domestic demand was 5.9 percent. The sharp decline in terms of trade witnessed since mid-2014 negatively affected the country’s productive capacity and led to a decline in external revenue.**

**2. The public saving-investment balance has been an important contributor to the current account deficit since the oil price shock in 2014-15.** Colombia’s savings/investment imbalance went from -6.4 percent of GDP in 2015 to -3.2 percent in 2017.

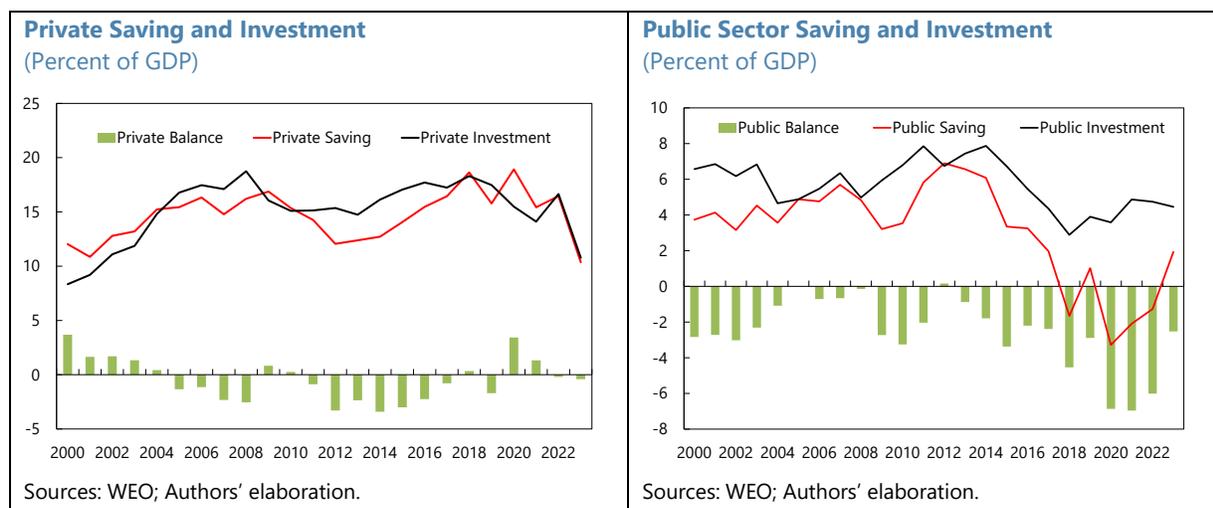
This adjustment was mainly driven by the private sector, which lowered its investment rate and raised its savings rate. The public sector kept its investment rate relatively stable, focusing on spending resources to develop infrastructure, while its net savings went from surplus to deficit (Cárdenas and López, 2019).<sup>2</sup> Although there was no significant change in the aggregate savings rate for the economy during this period, private savings increased by slightly more than one percentage point of GDP, while public savings declined. The adjustment process of the current account deficit was interrupted in 2018 and 2019 in the context of a demand-growth recovery. The



<sup>1</sup> Prepared by Marco Arena, Roberto Perrelli, and Sergio Rodríguez.

<sup>2</sup> Net savings fell because the oil price shock lowered oil revenues, but investment remained stable because of infrastructure expenditure.

current account deficit in 2018 was mainly explained by a deterioration of the saving-investment balance of the public sector. In 2019, while there was a correction in the public saving-investment balance, it was still the major contributor of the current account deficit. While the policies implemented during the pandemic supported the resilience of the economy and its recovery, they also contributed to the current account deterioration observed in 2021 and 2022.



**3. The correlation between the public saving-investment ratio balance and the current account ratio has increased, especially after the GFC.** When comparing the correlation between the periods 2000-2019 and 2010-2019, we observe an increase in the latter period. While the fiscal rule was observed, there was an increase in the public debt ratio. These developments brought to the fore the policy discussion known in the literature as twin-deficits, i.e., the hypothesis that an economy's fiscal and current account balances move in the same direction.<sup>3</sup> The latter raises the question of whether reducing budget deficits (making progress along one dimension) is likely to facilitate progress in terms of limiting external imbalances.

**4. Recent (cross-country) papers estimate that a fiscal consolidation of one percent of GDP improves the current account balance between 0.6 and 0.8 percent of GDP** (Bluedorn and Leigh, 2011; Furceri and Zdzienicka, 2018; Carriere-Swallow et al, 2021; and IMF External Sector Report, 2021). Moreover, to our knowledge, only one study (External Sustainability Report, 2021) estimates, as part of their robustness checks, the effect of the composition of fiscal adjustments on the current account for a cross-country sample including both advanced and emerging market economies, finding that both tax-based and spending-based fiscal consolidations raise the current account balance by the same magnitude as the baseline specification.<sup>4</sup> At the country level

<sup>3</sup> The twin deficits story was invoked to explain the experience of the United States in the 1980s.

<sup>4</sup> Abbas et al (2011) find that, on average, across different estimation methods, a strengthening in the fiscal balance by 1 percentage point of GDP is associated with a current account improvement of about 0.3 percentage point of GDP. The association is stronger in emerging markets and low-income countries; in economies that are more open to (continued)

(Colombia), Garrido-Tejada et al (2021) do not reject the presence of the twin deficits, but statistical causality occurs from the external balance to the public balance, contrary to what the Keynesian theory of open economy predicts. The authors estimate that a shock of one percentage point of the external imbalance increases the public imbalance on average by 0.25 percentage points in the second year and 0.32 percentage points in the third year. The fiscal impact of an external shock is also found to be greater after the crisis.<sup>5</sup>

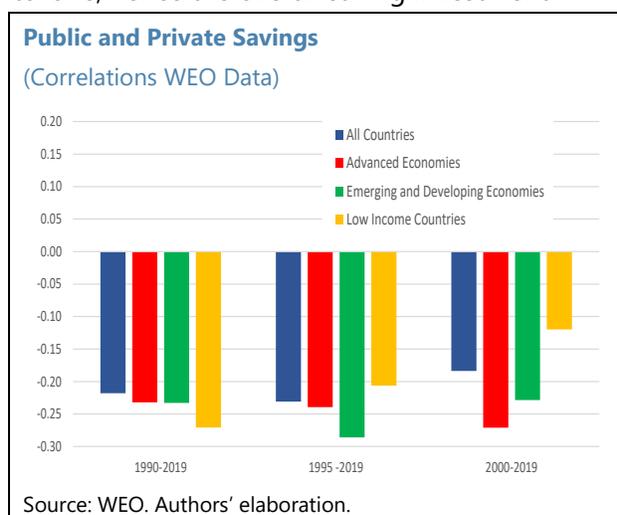
**5. In this context, the purpose of this study is twofold:** (i) first, we analyze the relationship between private and public savings to have an initial indication of whether increases in public saving could contribute to national saving, and (ii) second, we assess whether fiscal adjustments contribute to addressing external imbalances taking into account country's initial conditions (e.g., level of debt, international investment position), and composition of fiscal adjustments. We implement this analysis for a sample of advanced and Latin American and Caribbean economies separately.

## B. Public Savings and Private Saving: An Initial Exploratory Analysis

**6. Private and public savings are negatively correlated, but the correlation is less than perfect.** In other words, an increase in public savings is associated with a reduction in private savings. However, such reduction is less than one-to-one, hence the overall saving investment balance can improve. These findings hold in a large sample of countries with different economic development, and during different time periods. For emerging market economies (EMs), the estimated correlation is around -0.25; for the most recent sample period (2000-2019) it is about -0.23. For advanced economies (AEs), the correlation has strengthened in most recent years, while for low-income countries (LICs) it has weakened.

### 7. Correlations vary across countries.

Table 1 lists the countries with relatively high correlation between public and private savings for 2000-2019. For AEs, statistically significant correlations are negative, in line with the aggregate estimates discussed above. Among the EMs and LICs, some have larger negative (positive) correlations (in absolute value) than that of the country group, suggesting that for these countries an improvement in public savings may have a weaker (reinforcing) effect on the overall saving-investment balance. In the case of Colombia, the correlation is -0.61 meaning that an increase in public savings would only be partially offset by a decline in private savings; i.e., overall, there would



trade; and when the economy is somewhat overheated to begin with. In addition, the authors find that the effect is, however, weaker during episodes of large fiscal policy and current account changes, suggesting that fiscal policy may have a more limited role in correcting large external imbalances.

<sup>5</sup> Previous studies done the Colombia: Ramos and Rincón (2000), Galeano and Rojas (2017), and Ávila (2020).

be an increase in national savings.<sup>6</sup> The strength of the association between public and private savings indeed varies with some country characteristics (Table 2). The magnitude of the correlation is influenced by country characteristics: oil exporter, level of debt ratio, IIP, and/or degree of dependence on FDI. Larger correlations are observed for net external borrowers, larger recipients of FDI, larger exporters of manufactures, and oil exporters at the lower percentile of the distribution of oil exports.

**Table 1. Colombia: Correlation between Public Savings and Private Savings, 2000-2019**

	AEs		EMs		LICs
Australia	-0.94	Ecuador	-0.90	Cameroon	-0.97
Spain	-0.93	Costa Rica	-0.88	Zambia	-0.80
Korea	-0.90	Bulgaria	-0.84	Vietnam	-0.78
New Zealand	-0.89	Barbados	-0.82	CAR	-0.71
Latvia	-0.86	UAE	-0.81	Kenya	-0.67
Cyprus	-0.80	Colombia	-0.61	Nepal	0.45
Belgium	-0.77	Tunisia	0.51	Mauritania	0.45
United States	-0.76	India	0.53	Ghana	0.49
United Kingdom	-0.76	Bolivia	0.55	Togo	0.64
Greece	-0.73	Namibia	0.62	Senegal	0.66

Largest correlations statistically significant.

Source: Authors' calculations using WEO data.

**Table 2. Colombia: Correlation between Public Savings and Private Savings, 2000-2019**  
By variable capturing country characteristics (Variable in percent of GDP)

Variable	Countries at <sup>1/</sup>		Colombia's Percentile
	Top 25 percent	Bottom 25 percent	
Net IIP	0.00	-0.61	52
Fuel exports	0.08	-0.38	79
Manufacturing exports	-0.41	-0.11	39
FDI	-0.48	0.14	49

Source: Authors' calculations using WEO data.

<sup>1/</sup>Percentiles estimated using the 2000-2005 average for the variables listed. Number of countries in each quartile ranges between 30 (Net IIP) and 45 (FDI).

## C. Fiscal Policy Adjustments and the Current Account

### Identification of Fiscal Shocks

**8. This study uses a “narrative approach” to estimate the effect of fiscal policy changes (Romer and Romer, 2010).** This methodology identifies tax and government changes (actions) that

<sup>6</sup> The correlation for the period 1980-2023 is -0.41 (see Annex VI of the Staff Report).

are not motivated by a response to the near-term economic outlook but, instead, by an objective to reduce budget deficits and ensure fiscal sustainability. As indicated by the authors, this type of fiscal changes (actions) represents a response to past decisions and economic conditions rather than to prospective conditions. To implement the narrative approach, we use and follow the External Sector Report (2021), which merges existing multi-country narrative databases and identifies additional fiscal policy changes up to 2019.<sup>7</sup> We include 30 economies in our sample (16 advanced economies and 14 Latin American and Caribbean countries).<sup>8</sup>

Table 3 provides basic statistics of identified fiscal policy changes following the narrative approach. Each policy change is expressed in terms of its budgetary impact as a share of GDP. In a number of cases, these policy changes enter with a negative sign, as in the case of temporary tax increases that are subsequently reversed, for example (7 cases were identified for advanced economies and 9 for Latin American and Caribbean countries).

**Table 3. Colombia: Identified Fiscal Policy Changes – Expected Yield of Measures at Announcement**  
(In percent of GDP)

	Advanced Economies (1978-2019)		Latin America and the Caribbean (1989-2019)	
	Tax-Based	Expenditure-Based	Tax-Based	Expenditure-Based
Average	1.07	1.04	0.78	1.27
Median	0.79	0.78	0.62	1.05
Minimum	0.02	-0.31	-0.90	-0.50
Maximum	5.23	5.01	4.10	3.80
<i>Memo:</i>				
Number of Policy Changes	85	152	56	24

Source: Authors' elaboration based on External Sector Report (2021).

<sup>7</sup> The studies of Alesina et al. (2018), and Carriere-Swallow, David, and Leigh (2021) provide, together, information for 30 economies (16 advanced economies and 14 Latin American countries). The External Sector Report (ESR, 2021) merges these existing multi-country narrative databases, includes additional economies (e.g., China and India), and identifies additional fiscal policy changes up to 2019. For advanced economies, the starting point is the data set of Alesina et al. (2018) for 16 Organization for Economic Co-operation and Development economies for 1978–2014. For Latin American economies, the ESR starting point is the data set of Carriere-Swallow, David, and Leigh (2021), which includes 14 countries in Latin America and the Caribbean for 1989–2016. For the period 2016–2019 (Advanced Economies) and 2017–2019 (Latin America), we examine contemporaneous policy documents (OECD Economic Surveys, IMF Article IV Staff Reports) to assess the motivation and timing of discretionary policy actions, including changes in both taxes and/or spending. We cross-checked our results (whether the fiscal policy change was tax- or expenditure-based) with the ESR database. We are thankful to Daniel Leigh and Cian Allen for their valuable help to do the cross-check.

<sup>8</sup> The sample of countries includes Argentina, Australia, Austria, Belgium, Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Denmark, the Dominican Republic, Ecuador, Finland, France, Germany, Guatemala, India, Ireland, Italy, Jamaica, Japan, Mexico, Paraguay, Peru, Portugal, Spain, Sweden, the United Kingdom, the United States, and Uruguay.

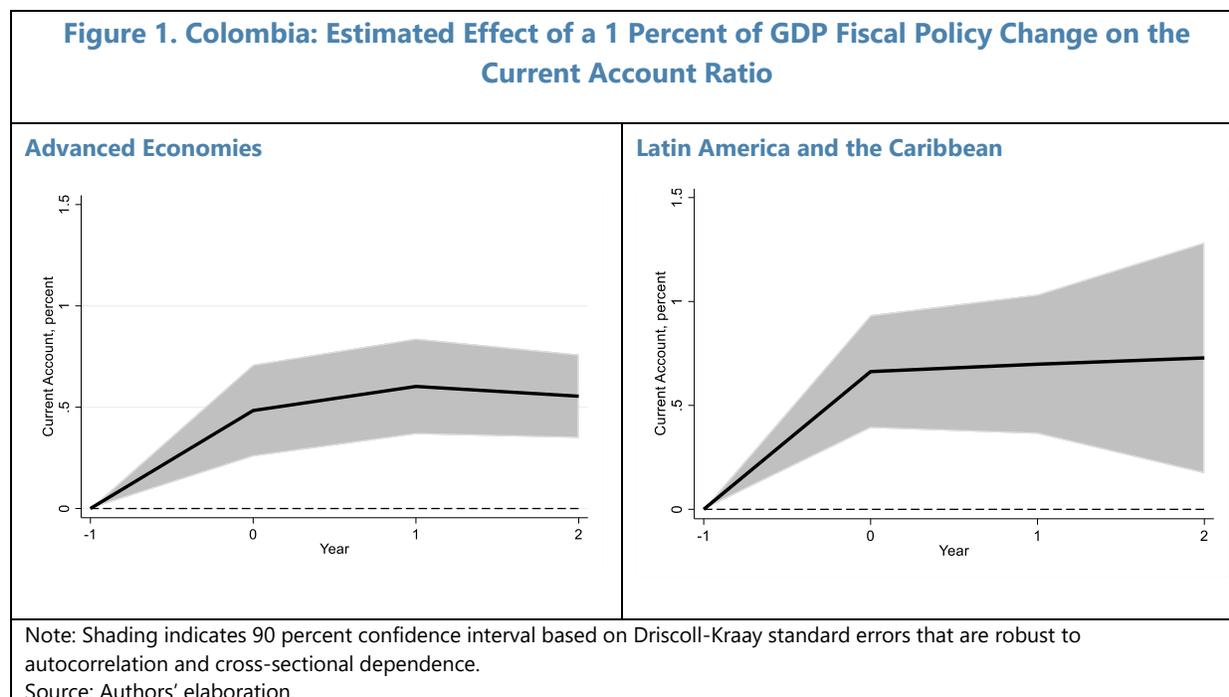
## Methodology and Data

**9. Following Carriere-Swallow et al (2021), we estimate the macroeconomic effects of fiscal consolidations using the local projection method (LP) proposed by Jordà (2005).** One of the advantages of this procedure, as discussed by the authors, is that it does not constrain the shape of the impulse response functions and is therefore less sensitive to misspecification than estimates obtained from VAR models.

The benchmark specification for different horizons ( $h=0, 1, 2$ ) in years is as follows:

$$y_{i,t+h} - y_{i,t-1} = \alpha_i^h + \gamma_t^h + \beta^h \sum_{s=t}^{t+h} FC_{i,s} + \delta X_{i,t} + \varepsilon_{i,t+h} \quad (1)$$

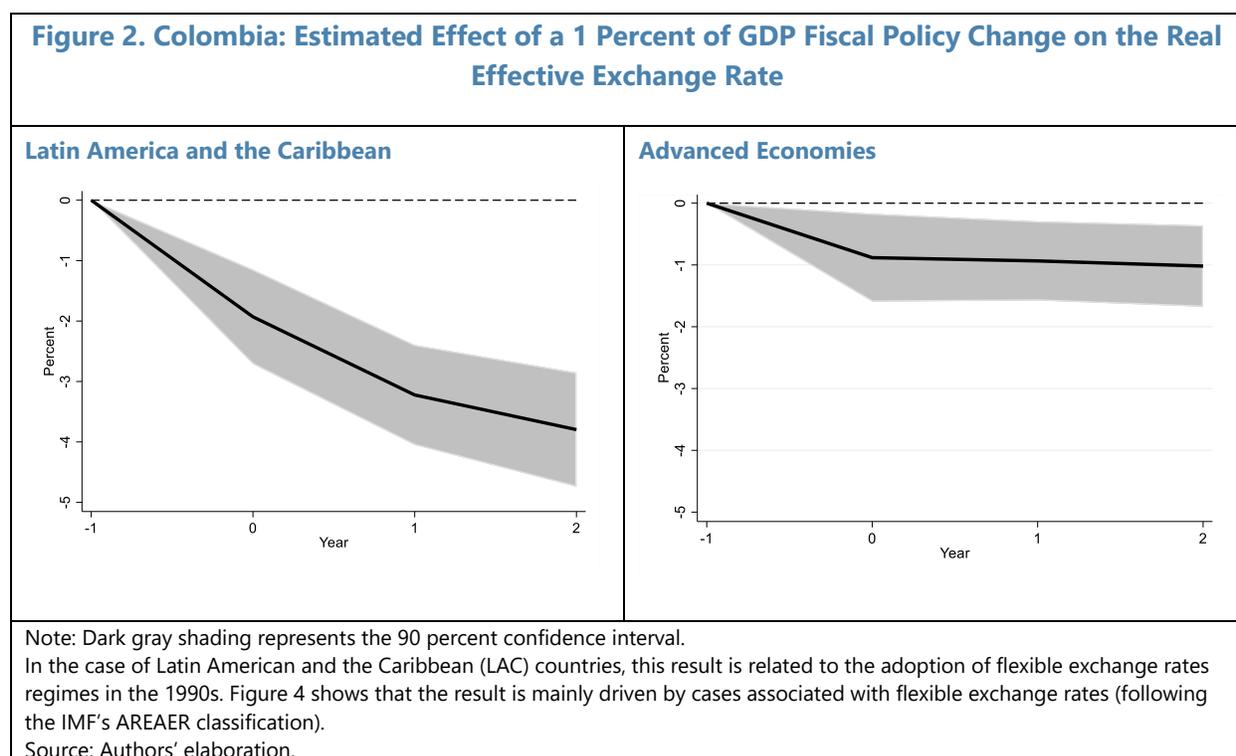
where  $y$  is the macroeconomic variable of interest (the current account balance as a share of GDP, or the log of the real effective exchange rate);  $FC$  denotes our measure of fiscal consolidation in percent of GDP; and  $X_t$  is a set of control variables that includes two lags of the current account balance as a share of GDP and two lags of the fiscal shocks, and dummies reflecting periods of crisis (Laeven and Valencia, 2020), sudden stops (David and Gonçalves, 2019). We include time ( $\gamma_t^h$ ) and country ( $\alpha_i^h$ ) fixed effects to capture common shocks and time-invariant features of fiscal policy and the current account ratio, respectively. The vector of controls  $X_t$  also includes the contemporaneous growth rate and two lags of the terms of trade (Gruss and Kebhaj, 2019). The coefficient  $\beta^h$  estimates the response of the current account-to-GDP ratio—or the relevant macroeconomic variable of interest—to the cumulative fiscal shock over a given horizon.



**10. Fiscal consolidation leads to a lasting improvement in the external current account balance in both samples of countries.** Figure 2 reports impulse responses obtained from

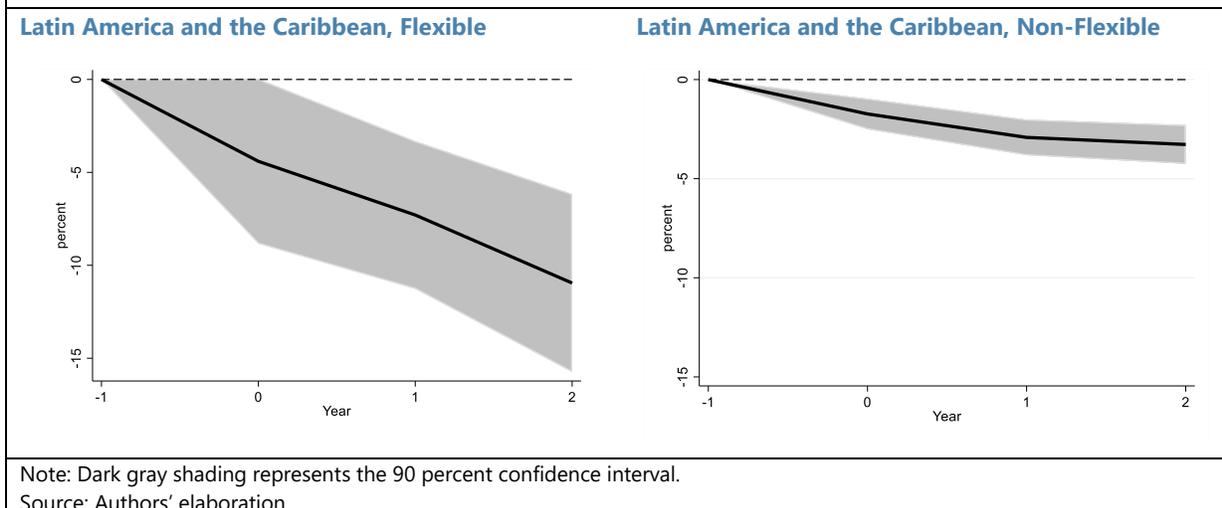
estimation of Equation 1. The figure displays the response of the current account ratio following a fiscal policy change (shock) of 1 percent of GDP, and thus corresponds to a “multiplier” estimate at each horizon. The results suggest that fiscal policy changes in advanced economies lead to contraction in the current account ratio of about 0.6 percent with a 90 percent confidence interval of 0.4-0.8 percent. In the case of Latin American and Caribbean (LAC) countries, fiscal policy changes are estimated to lead to a contraction in the current account ratio of 0.7 percent after two years, with a 90 percent confidence interval of 0.2-1.3 percent.<sup>9</sup> These results are similar to the ones presented in Carriere-Swallow et al (2021).

**11. Fiscal consolidation has a larger impact on the real exchange rate in LAC, facilitating the current account adjustment.** As shown by Carriere-Swallow et al. (2021), fiscal consolidation could lead to a real exchange rate depreciation, a channel that facilitates an improvement in the current account balance, as implicated by many open-economy macro models with non-Ricardian features. We replicate the baseline analysis (equation 1) where the log of the real effective exchange rate is now the variable of interest. Figure 3 depicts the impact of fiscal shocks on the real effective exchange rate. The results suggest that the magnitude of the estimated effects is larger in the LAC sample, with an estimated depreciation of about 4 percent within two years compared to a depreciation of around 1.0 percent for advanced economies over the same period.



<sup>9</sup> In the case of Latin America and the Caribbean countries, the estimated contraction is 0.8 when using commodity terms of trade (Gruss and Kebhaj, 2019). Results did not change after the inclusion of the growth rate of external demand as part of the control variables.

**Figure 3. Colombia: Response of the REER Fiscal Policy Changes Depending on the Exchange Rate Regime**  
(In Percent)



## Tax-Based vs. Spending-Based Consolidations

**12. We also investigate whether the type of consolidation matters for the external adjustment.** The majority of studies using the narrative approach have assessed whether spending-based and tax-based fiscal consolidations have different multiplier effects on GDP. Regarding the effect of fiscal consolidations on the current account, the ESR (2021) finds that the point estimate of tax-based consolidations (0.69) is slightly higher than spending-based consolidations (0.60) for a sample of 33 countries including both advanced economies and emerging market economies.

We assess the differential impact of spending-based versus tax-based consolidations by estimating the following equation, where  $TB_{i,t}$  is an indicator variable that is equal to 1 when a tax-based consolidation is underway, and zero otherwise. The vector of control variables includes the commodity terms of trade and its lags, as well as two lags of change in the current account ratio, and two lags of the narrative consolidation shocks (irrespective of whether they were tax-based or spending-based):

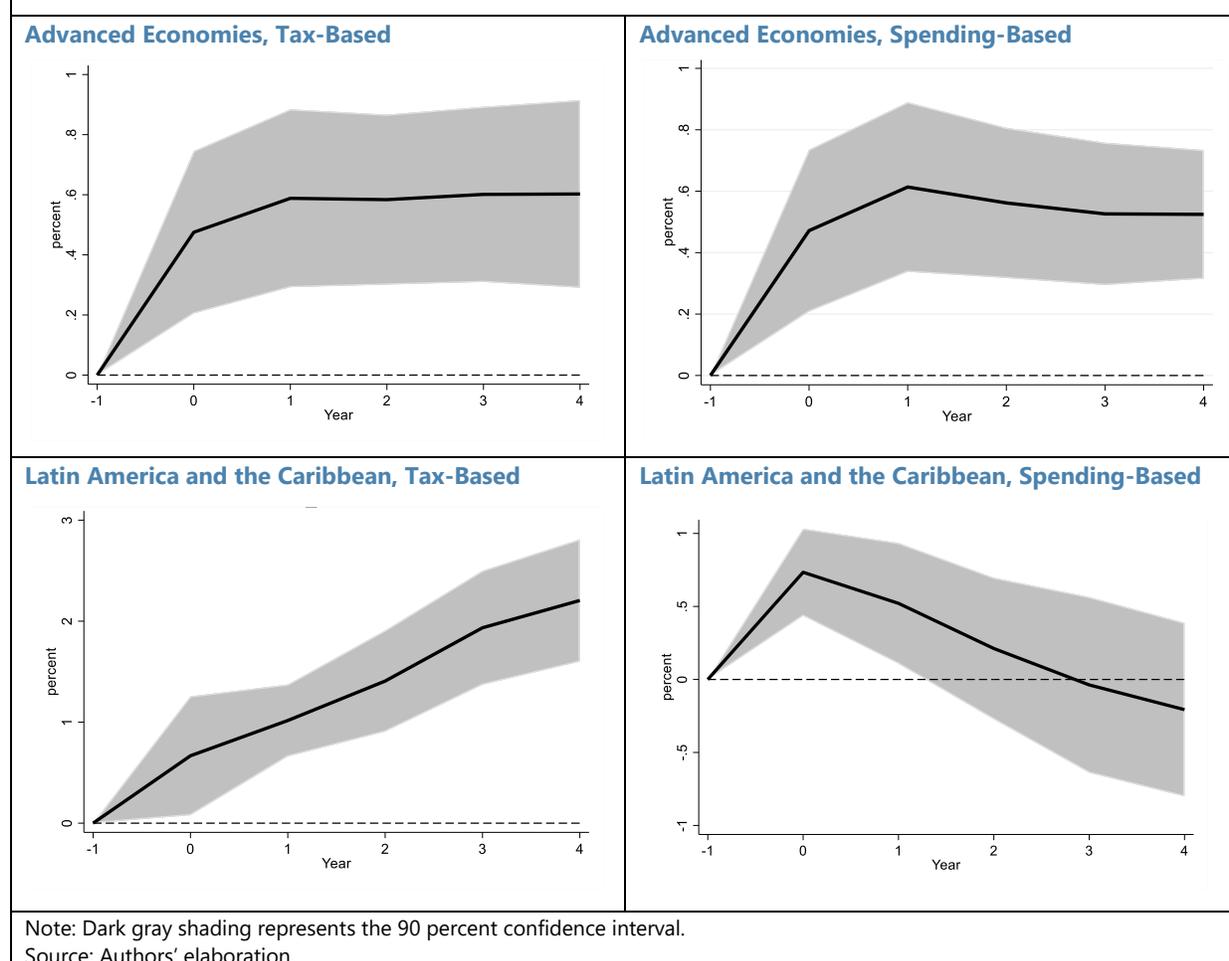
$$y_{i,t+h} - y_{i,t-1} = \alpha_i^h + \gamma_t^h + (\beta_e^h EB_{i,t} + \beta_t^h TB_{i,t}) \sum_{s=t}^{t+h} FC_{i,s} + \delta X_{i,t} + \varepsilon_{i,t+h} \quad (2)$$

**13. Both tax-based and spending-based consolidations contribute to improve the current account balance.** In the case of advanced economies (Figure 5), while the point estimate shows a larger current account response for tax-based consolidations (0.60) compared to spending-based consolidations (0.52), the difference is not statistically significant.<sup>10</sup> For the sample of LAC countries,

<sup>10</sup> For a sample of 33 economies, including both advanced economies and emerging markets, the IMF's External Sector Report (2021) find that the current account response to tax-based consolidations is slightly higher than the response to spending-based ones (0.69 percent vs. 0.60 percent), but the difference is not statistically significant.

though, tax-based consolidations appear to have larger and more persistent effects on the current account, raising it by 2 percent of GDP after 4 years compared with the effect of spending-based consolidations of 0.76 percent of GDP on impact then declining over time. However, differences in the characteristics of consolidation episodes between advanced economies and LAC could be driving the results.<sup>11</sup> As such, for LAC we cannot conclusively say which type of consolidation is more effective on the current account.

**Figure 4. Colombia: Impact of Fiscal Consolidations on the Current Account Ratio: Tax- vs. Expenditure-Based Fiscal Consolidations**



<sup>11</sup> The result could be driven by the fact that i) there are few expenditure-based consolidation episodes in LAC, and ii) more than half of those episodes have not been in consecutive years in LAC, unlike in advanced economies. In the sample of LAC countries, only 10 out of the 24 identified fiscal policy changes (42 percent) happened in consecutive years compared to 75 percent in the sample of advanced economies, i.e., we do not observe persistence for spending-based fiscal policy changes for the sample of LAC countries. We estimate a first-order autoregressive panel specification for the sample of LAC countries and the estimated coefficient for spending-based consolidations is 0.09 (statistically significant at 10 percent) compared to 0.16 (statistically significant at 1 percent) for tax-based consolidations. The opposite is observed in the sample of advanced economies where the estimated coefficient of a first-order autoregressive panel specification is 0.43 (statistically significant at 1 percent) for spending-based consolidations compared to 0.13 (statistically significant at 1 percent) for tax-based consolidations.

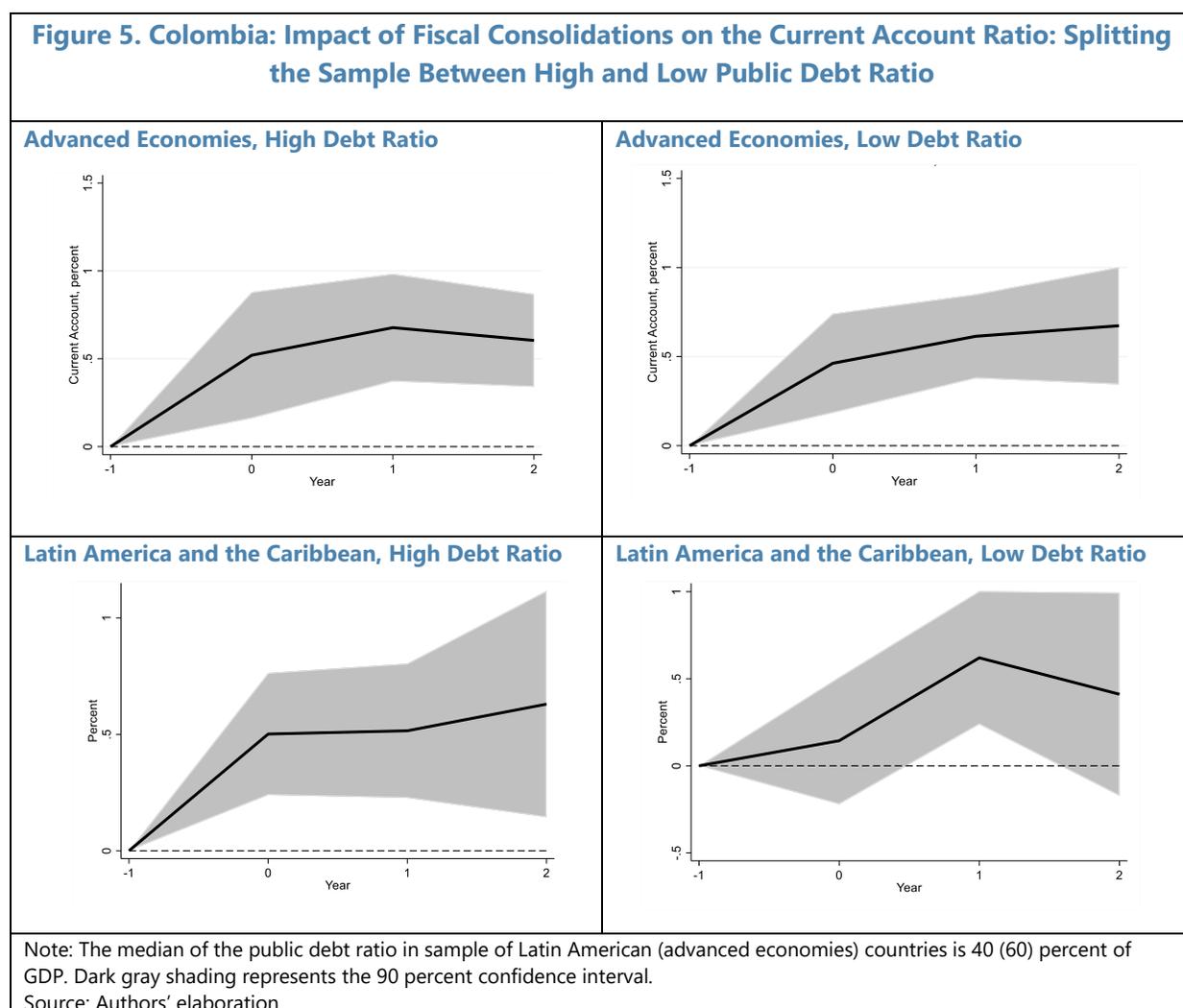
**Role of Initial Conditions**

**14. We examine whether fiscal consolidations have heterogenous effects depending on country’s initial conditions (public debt ratio and international investment position ratio-IIP).**

Following Jordà and Taylor (2016), we carry out the estimation of the baseline model (equation 1) on two bins of data depending on whether the country is experiencing a “high” (denoted by the *g* subscript) or a “low” (denoted by *l*) public debt (IIP) ratio:

$$y_{i,t+h} - y_{i,t-1} = S_{t-1}(\alpha_{gi}^h + \gamma_{gt}^h + \beta_g^h \sum_{s=t}^{t+h} FC_{i,s} + \delta_g X_{i,t}) + (1 - S_{t-1})(\alpha_{li}^h + \gamma_{lt}^h + \beta_l^h \sum_{s=t}^{t+h} FC_{i,s} + \delta_l X_{i,t}) + \varepsilon_{i,t+h} \quad (3)$$

The state indicator variable  $S_{t-1}$  takes the values 0 or 1 depending on whether the variables public debt ratio and IIP are above or below the median of their distribution in the data sample.<sup>12</sup>

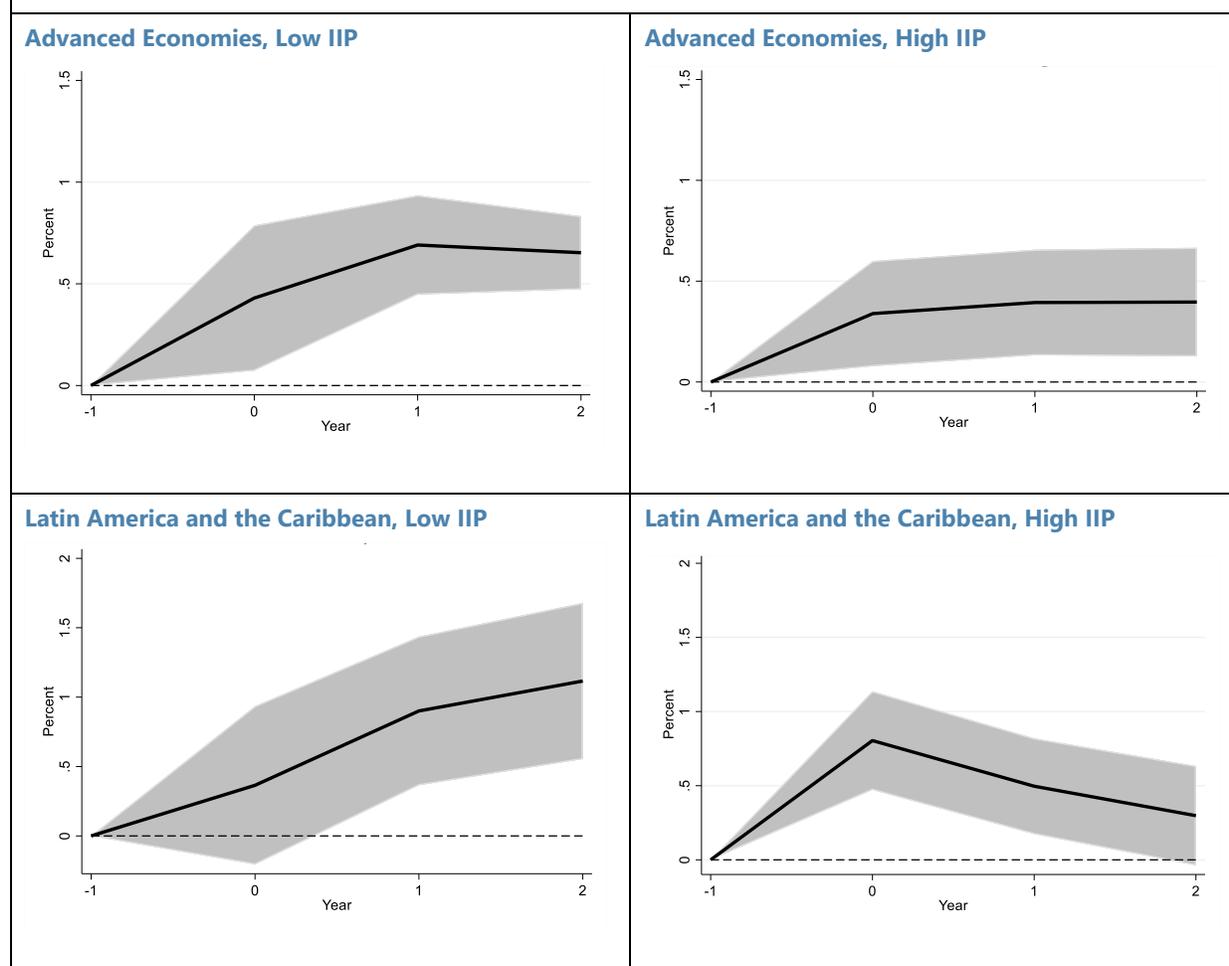


<sup>12</sup> For the public debt ratio (IIP), the median is 40 (-30) percent of GDP for the sample of Latin American countries and 60 (-11.5) percent of GDP for the sample of advanced economies.

**15. Our results do not suggest statistically significant differences regarding the effects of fiscal consolidations on the current account depending on the level of public debt ratio.**

Following Nickel and Tudyka (2014), Furceri and Zdzienicka (2018) discuss that the effect of a fiscal shock on the current account may be weaker in countries with higher public debt. The latter would be related to debt sustainability concerns that might affect the effectiveness of fiscal policy. The authors mention that economic agents may question the credibility of the fiscal actions in a high-debt environment and not respond to policy changes. Figure 5 shows that while the point estimate for AEs is larger in the case of low public debt, the results are not statistically different between low and high public debt ratios. In the case of LAC countries, the results are not statistically different either. However, in the case of the IIP ratio (Figure 6), for both AEs and LAC countries, the impact of fiscal consolidation on the current account is larger the lower the IIP ratio.

**Figure 6. Colombia: Impact of Fiscal Consolidations on the Current Account Ratio: Splitting the Sample Between High and Low Public IIP Ratio**



Note: Dark gray shading represents the 90 percent confidence interval.

Source: Authors' elaboration.

## D. Robustness Checks

**16. A series of robustness checks is performed** to gauge the sensitivity of the baseline results to: sensitivity to outliers, using only non-negative fiscal policy changes (shocks), and addressing potential endogeneity.

*Sensitivity to outliers:* As discussed in Carriere-Swallow et al (2021), large or small fiscal consolidations are worth considering but it is natural to question how important they are in driving the results. We therefore re-estimate the baseline equation after dropping the largest and smallest 1 percent of the fiscal policy changes. As Table 4 reports, the estimates without extreme outliers are similar to the baseline results.

*Fiscal policy changes reflecting just consolidations:* When we restrict the fiscal policy changes to just consolidations (positive increases in tax revenues, reduction in fiscal spending), the results are similar to the baseline ones.

*Augmented inverse propensity score weighting (AIPW) estimator:* One possible concern regarding consolidations identified with the narrative approach is that these episodes might be predicted by past variables. To address this concern, Jordà and Taylor (2016) propose the use of an augmented inverse propensity score weighting (AIPW) estimator. The weights used are based on the predicted component of the narrative episodes obtained from a probit model of the probability of treatment.<sup>13</sup> As discussed by Carriere-Swallow et al (2021), the intuition behind this estimation strategy is that less weight is given to consolidations that are better predicted by a vector of control variables. Regarding the group of LAC countries, Table 4 reports a statistically significant estimate but lower (0.51) than our baseline estimates (0.73) after two years. However, if we use the variable commodity-terms of trade instead of terms of trade, the results are similar to the baseline ones. In the case of advanced economies, the augmented inverse propensity score weighting estimator yields a significant and slightly higher point estimate of 1.0 percent, compared with 0.6 percent in the baseline specification. Although the point estimates and standard errors are rescaled to be comparable to the previous shock of 1 percent of GDP, it should be noted that the results are not exactly comparable as the shock was transformed into a binary treatment variable.

<sup>13</sup> The narrative fiscal shocks are converted into a binary variable. The first-stage probit model includes the following determinants of the probability of treatment,  $p_i$ : past fiscal consolidations (two lags); two lags of the change in the current account ratio to GDP; the change in the terms of trade index (or commodity terms of trade) and two of its lags; the lagged debt-to-GDP ratio; dummies reflecting periods of crisis (Laeven and Valencia, 2020), sudden stops (David and Gonçalves, 2019); and country fixed effects.

**Table 4. Colombia: Estimation Results: Effect of a 1 Percent of GDP Fiscal Consolidation in Year  $t+h$  (Percent)**

Specification	Country Group					
	Latin America and the Caribbean			Advanced Economies		
	h=0	h=1	h=2	h=0	h=1	h=2
Baseline	0.69*** (0.15)	0.72*** (0.19)	0.73** (0.33)	0.48*** (0.14)	0.61*** (0.14)	0.57*** (0.12)
Without Outliers	0.46* (0.26)	0.63*** (0.17)	0.66** (0.33)	0.34** (0.11)	0.52*** (0.13)	0.55*** (0.13)
Fiscal Policy Shocks (consolidations)	0.72*** (0.15)	0.74*** (0.19)	0.74*** (0.14)	0.47** (0.14)	0.60*** (0.14)	0.57*** (0.12)
AIPW Matching Estimator	0.72*** (0.19)	0.93*** (0.29)	0.51* (0.33)	0.18* (0.11)	0.65*** (0.16)	1.04*** (0.19)
AIPW Matching Estimator (using commodity ToT)	0.71*** (0.21)	0.93*** (0.30)	0.67** (0.34)	0.21* (0.11)	0.68*** (0.17)	1.05*** (0.20)

Notes: Country and time fixed effects included in all regressions. Driscoll-Kraay standard errors in parentheses. For the AIPW estimates empirical sandwich standard errors (clustered by country) are reported. \*Significant at 10%; \*\*significant at 5%; \*\*\*significant at 1%.

Source: Authors' elaboration.

## E. Preliminary Conclusions

**17. For a large sample of countries, public savings tend to be negatively, but imperfectly, correlated with private savings,** suggesting that an increase in public savings can improve the current account (overall saving-investment balance). The strength of such association, however, varies significantly across countries, with some countries displaying positive correlations, suggesting that an improvement in public savings may have a stronger impact on the current account balance due to country-specific characteristics. In the case of Colombia, the results suggest a negative and statistically significant correlation between public and private savings, which would imply that an increase in public savings would only be partially offset by a decline in private savings.

**18. Fiscal consolidations can help reducing current account imbalances.** The results suggest that fiscal consolidations improve the external current account balance in both AEs and LAC, in line with the "twin deficits" hypothesis. A depreciation in the real effective exchange rate typically accompanies the external adjustment process and appears to be larger for the sample of Latin American and Caribbean countries. Both tax- and spending-based consolidations contribute to improve the current account balance. However, the impact of spending-based consolidations in the sample of LAC countries would be affected by the low number of identified consolidation episodes. Regarding country's initial conditions, no statistically significant differences were found between high and low public debt ratio cases. Lower IIP appears to amplify the effects of fiscal consolidation.

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