REFERENCES FOR FIGURES AND TABLES:

OLD = MARCH 10 (WE HAVE TABLES OLD AND FIGURES OLD)

NEW = WITH 7-YEAR ROLLING WINDOWS (WE HAVE REGRESSIONS NEW AND FIGURES NEW)

THE LATIN AMERICAN GROWTH SHORTFALL: PRODUCTIVITY AND INEQUALITY

(CHAPTER 1 - BACKGROUND PAPER 3)

EDUARDO FERNANDEZ-ARIAS

NICOLAS FERNANDEZ-ARIAS

Final Draft

The countries of Latin America and the Caribbean (LAC) have experienced poor economic performance for a long time, interrupted only by brief periods of unsustained rapid growth. This paper examines the contribution of improvements in productivity, as measured by the growth rate of total factor productivity or TFP. It analyzes LAC economic performance by decomposing per capita GDP growth into two terms: the estimated growth contribution of factor accumulation per capita (including both physical and human capital) and the productivity improvement in the use of the factors of production in place (growth of TFP). It is important to highlight that this is an accounting decomposition of growth sources, and therefore descriptive in nature rather than a causal attribution of the ultimate drivers of output growth. As is customary in growth accounting, the growth of TFP is obtained as a residual accounting for observed output per worker growth beyond the estimated direct contribution of factor accumulation, in turn inferred from a production function. In this decomposition, TFP growth reflects both technology-related advances not embodied in capital investments as well as changes in public sector activity and market conditions that affect the aggregate efficiency with which the factors of production available in the economy are utilized.

This paper demonstrates that looking at the experience through the lens of productivity growth, as opposed to factor accumulation, holds the key to understanding LAC underperformance and, further, that this distinction informs productive development policies. For example, while the promotion of faster factor accumulation is typically a costly process involving the diversion of resources to investment, improvements in productivity may be “simply” produced by better, sounder policies and institutions involving little if any economic cost. That low productivity growth is the weak link in observed underperformance would be a reason for optimism regarding LAC’s future economic development. However, failing productivity may also reflect entrenched dysfunctional political economy features that are highly resistant to change, which would be a reason for pessimism, at least in the short term. It is therefore critical to identify the drivers of low productivity growth.

The paper is organized as follows. The first section (LAC Economic Performance) characterizes the economic performance of LAC over time and shows that the evolution of productivity growth is the main driver of its income per capita growth dynamics. The second section (LAC Performance Gaps) gauges LAC performance, comparing it to extra-regional benchmarks and documenting how lower growth has led to a decline in its relative output per capita, both with respect to developing country peers as well as to the developed countries it aspires to catch up to. In particular, it finds that lower productivity growth is the key factor underlying underperformance. The third section (LAC Performance in Panel Regressions) formalizes the previous comparative approach within a regression framework to statistically assess LAC and LAC countries growth gaps over time. Finally, the fourth section (Productivity Growth and Inequality) extends the regression framework to look empirically at the connection between economic underperformance and inequality, exploring the hypothesis that low productivity growth and high inequality, two salient characteristics of the region, are linked. The last section concludes.

1. **LAC ECONOMIC PERFORMANCE**

Per capita output growth in LAC over the past decades has been remarkably unstable. Figure 1 summarizes the situation looking at real per capita GDP annual growth over the period 1962-2017, representing the region by a simple average over the sixteen countries for which complete data is available.[[1]](#footnote-1) At the yearly frequency, it clearly shows the growth collapse of the LAC debt crisis of the 1980s, starting in earnest in 1983, and to a lesser extent the brief growth collapse of 2009 associated with the global Great Recession.

Figure 1 (Fig 1 Old)

Growth rates at yearly frequencies, however, may fail to be informative of the structural characteristics and trends this paper is set to analyze because they are contaminated by business cycle fluctuations. In order to control for the business cycle in a parsimonious manner, in what follows we consider average annual growth rates over periods of seven years (1962-68, 1969-75, 1976-1982, 1983-89, 1990-96, 1997-2003, 2004-10, 2011-17).[[2]](#footnote-2) This periodization also has the advantage of conforming a balanced panel of four periods around the year 1990, which is often regarded as pivotal, starting a new era of market reforms and macroeconomic prudence in the region after the debt crisis.

Filtering business cycle noise taking 7-year averages in this way, the trend line in Figure 1 still shows substantial instability of per capita output growth within a band of about 0 to 3 percent per annum. By and large, there are two main growth phases: before and after 1990. Growth before 1990 appears to be reasonably strong at the beginning in the first two periods but falters in the late seventies and collapses in the eighties during the debt crisis, as mentioned above. Growth after 1990 recovered and has been sustained but, overall, has not reached the levels of the sixties and early seventies. (A more in-depth analysis in the next section will shed light on this issue and show that progress after 1990 has been effectively more successful than it appears in Figure 1.)

The growth patterns depicted in Figure 1 can also be observed when considering the median LAC country (instead of the mean country, Figure 2) and, by and large, in each one of the sixteen countries (Figure 3). The main exceptions were Chile, Colombia and to some extent Uruguay, which appear to have escaped the growth collapse of the debt crisis (while in countries such as Costa Rica and Jamaica the crisis materialized a bit earlier and in countries like Brazil and Barbados it came right after). The experience of relatively higher growth in the earlier periods is especially true in the case of Brazil (as well as Dominican Republic), which explains why in an aggregate sense, due to the dominant relative size of Brazil within LAC, growth around 1970 is sometimes regarded as the golden years of LAC growth. Venezuela is a singular case, experiencing its worst growth collapse in the last period.

Figure 2 (Fig 2 Old)

Figure 3 (Fig 3 Old)

To go deeper in the analysis and gauge the role of productivity growth, we first perform a traditional growth accounting exercise in which we decompose per-capita output growth into per-capita factor accumulation and productivity growth. In order to focus the analysis on productivity growth, we lump together the (per-capita) output growth contribution of the accumulation of all factors of production. This includes the accumulation of physical capital per capita through net investment as well as growth in human capital per capita, including both increases in labor force participation as well as improvements in the average productive skills of the labor force.[[3]](#footnote-3) We perform an additive decomposition of the per-capita output growth rate for each country into these two broad sources of growth, namely productivity improvement and factor accumulation. Country growth rates are averaged over the 7 years of each period, to obtain decompositions for each period, and averaged over the 16 LAC countries, to produce decompositions for LAC as a whole. (See Statistical Appendix for sources and methods utilized).

Decomposing per-capita GDP growth into the contributions of factor accumulation and total factor productivity growth, it is clear that, in an accounting sense, per-capita output growth in LAC has been sustained by factor accumulation. Table 1 exhibits this decomposition by period and shows that, in fact, productivity growth has often detracted from output growth. Productivity growth has made a null (actually slightly negative) contribution to cumulative or long-term output growth in LAC, both before and after 1990. Factor accumulation, on the contrary, has consistently made a positive contribution, virtually the same before and after 1990, and is the reason why LAC´s per capita output grew at all. This predominance of factor accumulation holds true in each one of the 16 countries (Figure 4 and Figure 5). Even in the countries in which productivity growth made a long-term contribution, the contribution of factor accumulation usually dwarfs it (Figure 4).

Table 1 (Table 1 old)

Figure 4 (Figure 4 old)

Figure 5 (Figure 5 old)

It is important to recognize what drives TFP growth. In part, TFP growth reflects the economy-wide adoption of technology-related advances that are not embodied in capital investments.[[4]](#footnote-4) In this regard, low TFP growth would point to slow technology absorption and/or poor adoption of disembodied new knowledge by firms. However, technology use at the firm level is not the only determinant of TFP. In particular, the level of TFP also reflects the overall efficiency with which factors of production are allocated throughout the economy. Suboptimal deployment of public investments and economic distortions in market conditions that are not successfully addressed by public policy (or actually caused by it) lead to investment misallocation across the economy and would be reflected in low TFP. Therefore, worsening misallocation would translate into low TFP growth. Furthermore, factors leading to misallocation may themselves distort technology use decisions and be the reason of slow technology improvement, another source of low TFP growth. Therefore, it is important to look broadly at public activities and market conditions that affect the aggregate effectiveness with which the factors of production available in the economy are utilized. In particular, the root of productivity deficits may be associated with aggregate resource misallocation rather than narrow technology-specific considerations. The previous finding of a small contribution of TFP growth suggests the existence of persistent resource misallocation in LAC countries.

Nevertheless, the dominant role of factor accumulation in long-term growth does not mean that productivity growth was irrelevant to account for the experience of LAC. Table 1 suggests that in the periods when LAC performance is particularly high or low, so is productivity growth. To see this more closely, we compute the correlation between per-capita GDP growth and its two components over the eight periods, obtaining that the correlation with productivity growth is 0.78 while that with factor accumulation is only 0.48 (results are similar if changes in growth rates, that is accelerations, are considered instead). The conclusion is that the main driver of the unstable dynamics of LAC output growth is unstable productivity growth, which matches the international evidence uncovered by Easterly and Levine (2001).

The analysis in this section sets the stage of LAC’s experience and is informative to assess its performance. However, it cannot answer to what extent this performance is unsatisfactory (is per capita output growth unsuitably low?) and, if so, what are the factors that failure. The next section will refine this analysis by looking at benchmarks to assess LAC performance and answer these questions.

1. **LAC PERFOMANCE GAPS**

Measuring comparative performance relative to benchmark countries is useful to assess whether growth is below what is needed or could be expected and, concerning growth diagnosis, to detect anomalies revealing specific domestic failures. Underperformance relative to a norm is a key analytic tool to gauge poor performance and discover its drivers. This section makes intensive use of this approach in a number of ways.

***The Evidence from Comparative Development Analysis***

Before refining the growth accounting methods utilized in the previous section with a comparative approach, it is useful to review the insights gained from the literature of comparative development analyses on this very subject of the role of productivity in LAC performance. This literature looks at the stocks of factors of production in place (physical and human capital, capital for short) and the level of total factor productivity with which they are utilized to explain the level of output per capita in LAC countries. To answer the question of whether low output is due to low capital or low productivity, it looks at the corresponding output, capital and productivity gaps relative to benchmarks. Since the stock of capital and the level of productivity with which it is utilized result from the cumulative effect of changes over time (net additions to capital and changes in productivity), the findings in this literature are closely related to those from growth accounting over long periods of time.

This brief review of LAC comparative development analysis draws heavily from Daude and Fernandez-Arias (2010) and Fernandez-Arias and Rodriguez Apolinar (2014). The main point to highlight from these papers is that low productivity is the main culprit of LAC’s disappointingly low GDP per capita. This conclusion is based on a number of claims and observations:

1. LAC productivity is only about 50% of that of the US (taken as the leading country) and, in contrast to theory and evidence elsewhere, the gap is now wider than it was at the onset of the debt crisis. As mentioned in the previous section, resource misallocation would produce low levels of TFP and is a natural candidate to explain this finding.
2. LAC’s per capita output gap with the US is increasingly accounted by the productivity gap (rather than by the gap in the stocks of production factors in place).
3. The diversity of country output per capita around the world is matched by a corresponding diversity of productivity levels: the correlation between the two is 0.95. LAC is no exception: the correlation across LAC countries is 0.80. (These high correlations can be rationalized by the positive feedback loop between higher productivity and higher factor accumulation: higher aggregate productivity provides incentives to higher factor accumulation and higher factor accumulation may include new vintage capital and skills facilitating higher aggregate productivity).
4. Despite distortions in markets and policies underlying factor accumulation, if the region’s productivity gap were closed, its per capita output gap would largely disappear over time because of the correspondingly enhanced incentives to invest.
5. However, concerning the reverse direction of causality from factor accumulation to productivity, LAC’s investment in physical capital appears to be less effective than in other regions in fostering higher aggregate productivity. The implication is that investment with more spillovers, rather than more garden-variety investment, is needed to make a dent to the productivity shortfall from this angle.

These are all pieces of evidence supporting the idea that LAC’s growth underperformance is not associated with the accumulation effort, working through what can be thought as the extensive margin, but with the failure to generate productivity growth.

***Comparative Growth Accounting***

Turning to comparative growth accounting, Figure 6 and Figure 7 extend the information in Figure 4 and Figure 5 by showing the contributions of factor accumulation and productivity to per capita output growth for each one of the 71 countries in our world sample. The question in this comparative approach is whether LAC countries are anomalous in this world context in ways that are helpful to assess and diagnose their growth experience.

Figure 6 (Fig 6 old)

Figure 7 (Fig 7 old)

Our first step is to consider growth accounting gaps between LAC and four benchmarks: all 55 non-LAC countries, the 4 East Asian tigers, the 14 African countries and the United States (see Statistical Appendix for further details on how this world sample was assembled). Each one of the benchmarks is useful to probe different dimensions. The rest of the world or Non-LAC countries could be considered as the norm, the normal country experience around the world. The specific extra-regional benchmarks represent interesting contrasting scenarios. The East Asian tigers are the paradigmatic development success story of the period. The African countries, on the contrary, conform a scenario of unsatisfactory development. In each case, we consider the mean country, constructed as the simple average of country growth rates (of those in the LAC region and in each benchmark grouping). Finally, the US benchmark represents the productivity frontier and, more generally, the development frontier towards which successful development ought to converge.

Tables 2, 3, 4 and 5 build on Table 1 showing annual growth gaps between LAC and each one of the four benchmarks, meaning LAC growth rates shown in Table 1 minus the corresponding growth rates of the benchmark (so that negative gaps are shortfalls). LAC’s poor performance can be characterized by the overall negative gaps in per capita output annual growth over the period. The shortfall is almost a full percentage point with respect to the rest of the world or Non-LAC countries, meaning that it is substantially below the norm. Had LAC grown over 1962-2017 at the normal rate, its current GDP per capita would be about 50% higher than it actually is. LAC’s per capita output growth is only marginally above Africa’s and is of course far below the East Asian tigers. LAC also grew more slowly than the most advanced country, the US, getting further behind from the frontier.

Table 2 (table 2 old)

Table 3 (table 3 old)

Table 4 (table 4 old)

Table 5 (table 5 old)

However, not all is bad news. The comparison between pre and post 1990 growth gaps shows clear progress. While LAC per capita output growth post 1990 is still substantially below the norm (Table 2), relative to pre 1990 this shortfall contracted by a full percentage point. This enormous progress is insufficient, but it erased most of the initial growth gap. Progress measured against the US (Table 5) is even larger. Post-1990, the mean country in LAC actually grew faster than the US. This comparative analysis uncovers that 1990 was in fact pivotal in terms of LAC growth bringing considerably better growth performance, a fact that was not apparent in the non-comparative analysis in the previous section (Table 1). In particular, high per capita output growth in LAC before the debt crisis shown in Table 1 is misleading: those early periods were also of high growth throughout the world (in fact, growth gaps in that timeframe are actually negative because the rest of the world actually grew faster, Table 2) and LAC growth success back then should not be attributed to a special virtue that it lost afterwards.

The key question is what is the role of productivity growth as a contributor to poor performance in this context. The first observation is that productivity growth in LAC is subpar. The four benchmarks consistently show that, overall, LAC has a substantial shortfall of productivity growth. And in this regard, progress after 1990 is not impressive. In fact, relative to the norm, the shortfall shrunk by half but it is still substantial (Table 2). It closed only marginally against the US (Table 5), with respect to which it continues to fail to catch up by a wide margin. (There is no progress with respect to Africa and the progress observed with respect to the East Asian tigers can be best attributed to their own slowdown after an exceptional acceleration.) It is a further matter of concern that, in all four benchmarks, the productivity growth shortfall in the last period ending in 2017 has widened relative to the previous one and is larger than the average shortfall after 1990.

In contrast, the growth contribution of factor accumulation in LAC does not appear to be subpar. Overall, it is virtually at par with the norm of all non-LAC countries, ahead with respect to Africa and, importantly, about half a percentage point above the US (it only lags with respect to the East Asian tigers, substantially as expected). This encouraging conclusion about the growth contribution of factor accumulation is reinforced by its performance after 1990, which was actually above the norm of non-LAC countries. In fact, factor accumulation has strengthened considerably after 1990 with respect to this norm, the East Asian tigers and the US.

The picture that emerges from this accounting analysis is that per capita output growth in LAC has been sustained by a healthy contribution of factor accumulation dragged down by subpar productivity growth. The elimination of the productivity growth shortfall would not only eliminate that gap but also incentivize higher factor accumulation, impacting further output growth. This picture is empirically consistent with the results of the comparative development analysis. LAC strengthened both sources of growth after 1990 but productivity growth remains subpar. With a normal rate of productivity growth, LAC would have a normal per capita output growth and would converge firmly to the US output per capita.

***Adjusting for Stage of Development***

In this section, we test the robustness of the conclusion of failing productivity growth in LAC by refining the comparison with benchmarks to account for expected transitional growth dynamics. It could be argued that the observed subpar performance of LAC countries is a temporary phase of a longer process. If it can be expected that LAC countries would organically speed up to attain normal growth results in due course, crude comparisons with benchmarks at a point in time could be misleading. In what follows, we look at how productivity and factor accumulation growth contributions tend to evolve over the course of economic development in order to adjust growth comparisons with benchmarks by stage of development.

A lower stage of development may be associated with high growth because low levels of the capital stock lead to higher investment returns (traditional transitional convergence) and also because there are more low-hanging fruits to facilitate catching up with the productivity frontier (emulating technology as well as sound economic policies and institutions). On the other hand, country characteristics that lower growth (e.g., dysfunctional policies and institutions) also lead to low levels of development, generating the opposite association between a country’s stage of development and its growth rate. Moreover, underdevelopment itself, whatever its root causes, may generate political economy conditions inimical to high growth rates. In this exercise, we do not take a position on the causal factors underlying the relationship between backwardness and growth. Our goal is simply a stylized description of how growth normally evolves over the course of economic development, so that a country’s normal or expected growth can be better ascertained taking into account its stage of development. Whether or not a lower stage of development is associated on average with a growth kick (unconditional transitional convergence) is an empirical matter.

For the purpose at hand, we measure the stage of development of a country as its output per capita relative to the US at any given point in time (in logarithmic terms). With this metric of stage of development, transitional convergence would imply that progress in development (per capita output closer to the US’s) is associated with less growth, yielding a negative coefficient. In contrast, transitional divergence would correspond to a positive coefficient. To the extent that a LAC country is at a different stage of development than the comparator, an adjustment would be needed to leave aside the effect of differences in stages of development and reflect the effective underlying growth shortfall. .

Table 6 shows three simple regressions to look at the dynamics of per capita output growth and the contributions of productivity and factor accumulation using the entire world panel controlling for stage of development as well as time fixed effects for each one of the eight periods to isolate worldwide shocks. The point estimate in the third column (per capita output growth) is approximately the sum of the point estimates in the other two columns (sources of growth). Our sample confirms the standard result of unconditional divergence in per capita output growth, meaning that backwardness is a drag to growth. This pessimistic result comes from a productivity growth rate that is lower for poorer countries, which more than offsets a (statistically insignificant) tendency of transitional convergence associated with the contribution of factor accumulation. (As a robustness test to this characterization of the normal growth evolution over the course of development that could be expected in LAC countries, Table 7 eliminates any possible contamination from LAC’s own experience by running the same set of regressions restricting the sample to Non-LAC countries, obtaining similar results.)

Table 6 (Table 10 old)

Table 7 (table 11 old)

Stage of development could potentially account for part of the growth gaps shown in Tables 2 through 5 because LAC and the benchmarks have different output per capita. In our sample, LAC countries are, on average, poorer than Non-LAC countries as well as East Asian tigers and the US. Therefore, relative to these benchmarks, shortfalls in overall growth and in productivity growth can be partly excused (because poorer countries are expected to do worse). However, the estimations of the effects of stage of development on growth comparisons tend to be small and do not change the overall qualitative conclusions of the previous section. Tables 8 through 11 show the adjusted growth gaps with respect to each benchmark based on the transitional dynamics estimations of Tables 6 and 7, and confirm that the qualitative conclusions derived from the raw gaps in Tables 2 through 5 remain valid, namely that failing per capita output growth in LAC can be traced to subpar productivity growth. If anything, these adjustments reinforce the conclusion that LAC’s productivity growth is failing by showing a substantial underlying shortfall also with respect to Africa.

Table 8 (table 6 old)

Table 9 (table 7 old)

Table 10 (table 8 old)

Table 11 (table 9 old)

Finally, in order to visualize growth gaps over time, we consider time series based on 7-year rolling windows. In this way, short-term effects are still filtered by 7-year averages but subperiods of interest are not assumed exogenously. In this visualization, window averages are shown at the window center (i.e., its fourth year). We consider the evolution of adjusted growth gaps in output per capita and its sources relative to non-LAC at the regional level and also by country. Results are shown in Figure 8 for LAC and Figures 9-11 for each LAC country. In these figures, the reader may recognize the dating of particular growth performance events in individual countries and trace them to their sources.

Figure 8 (Figure10 new, solo adjusted with baseline)

Figure 9 (Figure 11 new, solo adjusted with baseline)

Figure 10 (Figure 12 new, solo adjusted with baseline)

Figure11 (Figure 13 new, solo adjusted with baseline)

.

**3. LAC PERFOMANCE IN PANEL REGRESSIONS**

Finally, we use a panel regression framework to show in a more compact way how the performance of LAC countries deviates from the world experience and attach statistical significance to these deviations. Table 12 extends the basic set of three growth regressions of Table 6 adding a LAC dummy modeling a regional fixed effect to contrast its experience with the rest of the world. These growth regressions continue to control for stage of development as well as worldwide growth changes reflected in time period fixed effects, with the time series constructed using 7-year rolling windows within 1962-2017.

Table 12 (table 3 new)

This simple set of regressions shows stark results that reaffirm the conclusion that LAC’s per capita output growth is below expectation and that such shortfall is essentially due to abnormally low productivity growth, rather than factor accumulation weakness. In fact, the negative LAC fixed effect for productivity growth is large (and statistically significant with very high confidence) but not so the one for the contribution of factor accumulation, which translates into a considerable (and also statistically highly significant) overall per capita output growth shortfall relative to normal of 0.70 percentage points per year. LAC per capita output growth in the period 1962-2017 is substantially below expectation. The shortfall of productivity growth is the predominant component, amounting to about 90% of this overall growth shortfall. Because the regression controls for the per-capita output gap (whose estimated effect is about the same as in Table 6), these shortfalls are implicitly adjusted by stage of development.

Table 13 introduces two LAC dummies, pre and post 1990, and confirms that in the latter period there was substantial progress relative to the norm in both productivity growth and the contribution of factor accumulation, of about half percentage point each. Nevertheless, there is still a substantial shortfall in productivity growth of about 0.3 percentage points per year that more than offsets a factor accumulation contribution slightly above the norm. The conclusion is that in the current post 1990 regime the contribution of factor accumulation is in line with non-LAC but productivity growth, while improved relative to pre 1990, is still subpar.[[5]](#footnote-5)

Table 13 (Table 4 new)

How do individual LAC countries deviate from this average poor performance? Table 14 opens up the LAC dummy in Table 12 into a dummy for each LAC country. The conclusion is that the average analysis holds well in each one of the sixteen countries in our sample. It is remarkable that there is a productivity growth shortfall in every single LAC country in our sample, almost always highly significant, that leads to an overall shortfall in per capita output growth except in Dominican Republic and Chile (while the experience with factor accumulation is mixed, above the norm in a number of countries). Figure 12 visualizes the results showing productivity and factor accumulation (adjusted) growth gaps for each LAC country relative to the non-LAC as measured by their fixed effects over 1962-2017.

Table 14 (Table 5 new)

Figure 12 (Figure 9 new)

LAC progress in the mean country after 1990 is of course supported by improvements in a number of countries. Table 15 opens up the pre and post 1990 LAC dummies in Table 13 into country dummies to uncover country diversity in the evolution of (adjusted) growth gaps. In particular, Figure 13 shows the productivity growth shortfalls pre and post 1990 for each one of the sixteen LAC countries. After 1990 most countries improved their comparative productivity growth (with the exception of Barbados, Brazil and Colombia). Nevertheless, in the current post 1990 regime, based on these estimations, productivity growth in LAC countries in our sample is still largely subpar, with the exception of Argentina, Costa Rica, Dominican Republic, Trinidad and Tobago,[[6]](#footnote-6) and Uruguay. Furthermore, at par productivity growth (at the rate of a comparable Non LAC country) is not enough to converge to the rate of productivity growth of the US. In fact, even after 1990, productivity growth in every LAC country is below that in the US with the only exception of Uruguay. If the stricter success standard of converging to the productivity frontier is applied, virtually no LAC country has had successful productivity growth since 1990.

Table 15 (Table 6 new)

Figure 13 (Figure 8 new)

1. **PRODUCTIVITY GROWTH AND INEQUALITY**

This section explores connections between low productivity growth and high inequality, both salient characteristics of the region. The objective is to find clues that may help explain the growth gaps uncovered in the previous section.

There is a tentative consensus that inequality limits the opportunities of the disfavored, undermining human capital accumulation, and may cause lower and distorted investment due to political and economic instability (Ostry et. al 2014). In the extreme, it may lead to a fractious political economy threatening the workings of market economies. Inequality is also often associated with large informal sectors, which may lead to an economic fabric overwhelmed by stagnant traditional firms. It stands to reason to think that these factors may slow down productivity growth. By contrast, there is the opposite view that inequality fosters growth, for example because it facilitates the accumulation of a critical mass of investable resources.

The findings of empirical analyses on the relation of inequality and growth are not consistent or robust. One reason may be that such relation is contaminated by distortionary inequality policies, which may vary widely across time and space. Furthermore, it is clear that growth may also have an important effect on inequality, for example through compositional effects of the transition from traditional to modern economies (such as Kuznets’ transition from agriculture to manufacture and other processes of structural transformation nowadays). Similarly, underlying economic conditions may jointly impact growth and inequality, such as distortions leading to informal enterprises and segmented markets. This reverse causation and spurious correlation channels may statistically confound the causal impact of inequality on growth.

In the empirical analysis in this section we do not attempt to address these issues of omitted variables and reverse causation, and therefore do not claim any policy implication. We extend the basic regressions of the previous section to explore whether inequality accompanies poor growth experiences, with a focus on whether inequality is associated with the subpar productivity growth in LAC. Consistent with our previous approach of controlling for stage of development, we also condition the association between inequality and growth to the stage of development.[[7]](#footnote-7)

Inequality data for our sample is from the Standardized World Income Inequality Database (SWIID), by Solt (2020). This includes consistently estimated series of Gini indexes for Market Income (before redistribution) and for Disposable Income for the most extensive sample we found. Using this dataset we lost 6 countries from the growth panel, and for many other countries inequality information is missing for the first several years, before 1980. For this reason, the 3550 data points in our balanced panel are reduced to 2234.

Given this limitation, we first checked that the key findings in the previous section still hold in the smaller panel, namely LAC productivity growth underperformance, and then analyzed the issue of inequality within that sample.[[8]](#footnote-8) The main findings in the previous section concerning the LAC fixed effects holds in the smaller sample (shown in Tables 16 and 17). In particular, we find an equally significant shortfall of 0.66 for productivity growth (instead of 0.62) over the entire period. When pre-1990 and post-1990 LAC dummies are used, this smaller sample yields a somewhat larger shortfall pre-1990 and a similar post-1990 shortfall. Productivity growth is still marginally divergent (but insignificantly so). All in all, these findings associated to this smaller dataset are qualitatively similar to the ones found before and give support to using it to analyze the difference that inequality makes and whether it can be a plausible proximate explanation of the LAC growth underperformance estimated in the previous section.

Table 16 (table 9 new)

Table 17 (table 10 new)

Taking Tables 16 and 17 as our baseline for this section, our next step is to extend them including the income inequality Gini Index (Tables 18 and 19). More inequality corresponds to a higher Gini index, so that a negative coefficient estimate means that high inequality is associated with low growth.[[9]](#footnote-9) In both tables, this measure of income inequality appears to be a statistically significant adverse factor for productivity growth. But it is largely irrelevant for the overall growth of output per capita because it is positively associated with factor accumulation. Since the regression also includes the per-capita output gap as a control, the inequality effect is conditional on the stage of development. The question is: does income inequality account for the LAC productivity growth shortfalls? Is subpar LAC performance associated with being highly unequal (given its stage of development)? To answer the role of income inequality in LAC growth performance we need to look at how LAC fixed effects change when inequality effects are controlled for.

Table 18 (table 18 new)

Table 19 (table 23 new)

Concerning productivity growth, Table 18 shows that, compared to Table 16, the LAC productivity growth shortfall over the entire period is substantially reduced to a statistically insignificant estimation of 0.12 points (from 0.66 points). In other words, LAC high inequality may largely account for its productivity growth shortfall. In fact, in the post-1990 subperiod it appears to overexplain the productivity growth gap (Table 19).

Figure 14 shows the productivity growth gap accounted by inequality (and by the output per capita gap) over time for each country. The figure shows the adjustments to the underlying productivity growth gap, so that a positive number reflects the portion of the gap accounted by the corresponding factor. For example, the Gini index consistently accounts for a sizable portion of the gap (or may overexplain it) because each Latin American country is more unequal than the average extraregional country. However, in most countries this effect shows a tendency to decline over time.

Figure 14 (Figure 19 new, show only green and blue line, mark Bolivia and Venezuela as Gini not available in footnote)

However, inequality does not account for the shortfall of the overall income growth, because high inequality is also associated with an offsetting push to factor accumulation (compare Table 18 with Table 16)). Controlling for inequality, LAC appears to have a large shortfall in factor accumulation of 0.54 points so that the overall income per-capita growth gap largely remains. The comparison between Table 19 and 17 yields the same qualitative results in both the pre- and post-1990 subperiods. With regards to the post-1990 subperiod, once inequality is controlled for, LAC actually shows, if anything, above-par productivity growth offset by subpar factor accumulation (both gaps statistically insignificant). All this evidence is a reversal from the unconditional results obtained in Table 17, where productivity growth was weaker and factor accumulation was stronger. More work needs to be done to tease out the associations between inequality factors and sources of growth.

1. **CONCLUDING REMARKS**

Long-term growth performance in most countries of Latin America and the Caribbean has been poor. Output per capita growth has been unstable and low on average. By and large, LAC countries have grown more slowly than their peers around the world. Looking at the sources of output per capita growth gaps relative to the rest of the world, we find that the shortfall is in TFP or productivity growth, rather than factor accumulation. The productivity growth gap accounts for almost all the overall growth gap. While the productivity growth gap shrunk substantially after 1990, the same qualitative pattern remains true in most countries in this recent period.

We note that the level of TFP reflects not only the technology use throughout the economy but also the efficiency of resource allocation. In particular, misallocation of physical and human capital, both private and public, is reflected in a low level of TFP. Therefore changes in the failures leading to resource misallocation directly impact TFP growth. Furthermore, a distorted economy leading to resource misallocation may itself impede technology adoption and cause low TFP growth. A diagnosis of the sources of productivity growth gap identified in this paper needs to look at the evolution of resource misallocation relative to the benchmark.

We explored the association of inequality and growth to look at whether LAC’s high inequality may account for its poor growth performance. We found that there is evidence that inequality is an important factor that goes along the gap in long-term productivity growth, and fully accounts for the post-1990 gap. Whether inequality is its proximate cause or an epiphenomenon, this observation is relevant for diagnosing LAC’s sustained productivity growth gap. However, high inequality does not account for the shortfall in overall growth because it actually helped factor accumulation.

**STATISTICAL APPENDIX**

The data for growth accounting (Sections 1-3) is from *Penn World Tables* (PWT) version 9.1 (Feenstra et al. 2015). In all cases output-based versions of real GDP are used because they are more suitable for the comparisons of productive capacity (as opposed to expenditure-based versions that are affected by the evolution of terms of trade).

Following Feenstra et al. (2105), growth accounting exercises are based on the variable RGDPNA (real GDP using national-account growth rates), which is recommended for studies comparing (output-based) growth rates across countries. Total factor productivity is the corresponding variable RTFPNA as estimated by PWT. By contrast, output per capita with respect to the US, utilized to measure the distance to the frontier at each point in time, is based on the variable CGDPo ((Output-side) GDP at current PPPs), which is recommended to compare relative productive capacity across countries at a single point in time.

We put together a panel with annual information for 1961-2017 for 71 countries divided into the following groupings:

**(16)** **Latin America and the Caribbean (LAC):** Argentina, Barbados, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, Guatemala, Jamaica, Mexico, Peru, Trinidad and Tobago, Uruguay, Venezuela

**(55) Non-LAC countries,** divided into:

* + **United States**
  + **(4) East Asian Tigers:** Hong Kong, South Korea, Taiwan, Singapore
  + **(14) Africa:** Burkina Faso, Cameroon, Cote d’Ivoire, Egypt, Kenya, Morocco, Mozambique, Niger, Nigeria, Senegal, South Africa, Tunisia, Tanzania, Zimbabwe
  + **(36) Others:** Australia, Austria, Belgium, Canada, China, Cyprus, Denmark, Finland, France, Germany, Greece, Iceland, India, Indonesia, Iran, Ireland, Israel, Italy, Japan, Jordan, Luxembourg, Malaysia, Malta, Netherlands, New Zealand, Norway, Philippines, Portugal, Romania, Spain, Sri Lanka, Sweden, Switzerland, Thailand, Turkey, United Kingdom

The database was constructed as follows:

* Per capita variables are computed by dividing by population (variable POP), obtaining rgdpnaPerCapita and cgdpoPerCapita.
* Annual growth rates are estimated considering log differences, to obtain lrgdpnaPerCapita\_chg1 and lrtpfna\_chg1.
* Barbados, Cote d’Ivoire, Cameroon, Hong Kong, Indonesia, Mozambique, Niger, Romania, Senegal, Singapore, Tunisia, Tanzania, and Burkina Faso had missing TFP data in the first years (before 1964). For these countries, the missing variable LRTFPNA was estimated based on the predicted values of country specific regressions of lrtfpna\_chg1 on lrgdpnaPerCapita\_chg1 using the available sample for each country. We then extrapolated lrtfpna back to 1961 using the estimated growth rate.

The dataset was used as follows:

* The Non-TFP or overall factor accumulation contribution was obtained as a residual to account for Per capita output growth purged from TFP:

lrgdpnaPerCapita\_chg1\_nonTFP = lrgdpnaPerCapita\_chg1 − lrtfpna\_chg1

* In order to filter out the business cycle, the average of the annual growth rates above of seven years were considered with rolling windows (and assigned to pre and post-1990 observations depending on where the window, or most of it, lies). For the purpose of Sections 1 and 2, we considered fixed windows: 1962-68, 1969-75, 1976-1982, 1983-89, 1990-96, 1997-2003, 2004-10, 2011-17. The year 1990 divides the time span in equal parts, four subperiods before 1990 and four subperiods starting in 1990.

lrgdpnaPerCapita\_chg7\_nonTFP = lrgdpnaPerCapita\_chg7 − lrtfpna\_chg7

* The representative growth rate for each country grouping was obtained as a simple average of the growth rates of the corresponding countries.
* The per capita output distance measure to the US for each country (lcgdpoPerCapitaUSA) was constructed as the logarithm of the output per capita gap cgdpoPerCapita/cgdpoPerCapitaUSA in the period.

The dataset for section 4 includes inequality data from the Standardized World Income Inequality Database (SWIID), by Solt (2020). This includes consistently estimated series of Gini index for Disposable Income. The new smaller database contains some missing information before 1980 and includes only 65 (instead of 71 countries), of which 14 are LAC countries: Argentina, Barbados, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, Guatemala, Jamaica, Mexico, Peru, Trinidad and Tobago, Uruguay.

**References**

Barro, Robert (2000). “ Inequality and Growth in a Panel of Countries” *Journal of Economic Growth*, 2000, vol.5, issue 1, 5-32

Daude, Christian and Eduardo Fernandez-Arias (2010). “On the Role of Productivity and Factor Accumulation in Economic Development in Latin America and the Caribbean” IDB Working Paper 155. Washington, DC, United States: Research Department, Inter-American Development Bank.

Easterly, Robert and Levine (2001). “What have we learned from a decade of empirical research on growth?” *World Bank Economic Review* Volume 15, Issue 2.

Fernandez-Arias, Eduardo and Sergio Rodriguez-Apolinar (2014). IDB Working Paper 155. Washington, DC, United States: Research Department, Inter-American Development Bank.

Feenstra, Robert C., Robert Inklaar and Marcel P. Timmer (2015), "The Next Generation of the Penn World Table" American Economic Review, 105(10), 3150-3182

Loayza, Norman, Pablo Fajnzylber and César Calderón (2005). “Economic Growth in Latin America and the Caribbean”. World Bank. Washington, DC, United States.

Ostry, J D, A Berg and G D Tsangarides (2014), “Redistribution, Inequality, and Growth”, IMF Staff Discussion Note No. SDN/14/02, February

Solt, Frederick (2020) “Measuring Income Inequality Across Countries and Over Time: The Standardized World Income Inequality Database”, *Social Science Quarterly 101(3): 1183-1199,* SWIID Version 9.0, October 2020.

.

1. Data taken from Penn Word Tables version 9.1; see Statistical Appendix for details. LAC countries are Argentina, Bolivia, Brazil, Barbados, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, Guatemala, Jamaica, Mexico, Peru, Trinidad and Tobago, Uruguay and Venezuela. A balanced panel was considered, neglecting LAC countries with shorter time series for the relevant variables, in order to allow for simple and robust statistical analysis. [↑](#footnote-ref-1)
2. Alternatively, a filter can be used to estimate an estimated trend, as in Loayza, Fajnzylber and Calderón (2005) or Daude and Fernández-Arias (2010). Qualitative results are similar. Here this simpler method is used to gain comparability with the regression analysis in the subsequent sections. [↑](#footnote-ref-2)
3. As measured by the wage impact of the additional education received. [↑](#footnote-ref-3)
4. To the extent that physical capital services estimations successfully adjust for the quality of the capital stock, productivity estimations reflect only disembodied technological progress. Likewise, human capital measures incorporate quality improvements of the labor force headcount yielded by additional education. [↑](#footnote-ref-4)
5. Pre- and post-1990 dummies are statistically different at the 8.4% level. The post-1990 dummy is significantly different from zero at the 10.2 % level. [↑](#footnote-ref-5)
6. It is to be noted that productivity growth in Trinidad and Tobago plummeted in recent years to historically low levels. [↑](#footnote-ref-6)
7. As shown in Barro (2000), this conditioning may be important. In his growth model, he finds that inequality retards growth in poor countries and encourages growth in richer countries (and little overall relation). The vast majority of countries in our sample are in the richer set and we disregard this interaction. [↑](#footnote-ref-7)
8. We also experimented with a variety of extrapolating equations to estimate missing inequality information using income per-capita series as driving variables and allowing for country and time dummies in order to augment the restricted sample, but did not find any reliable specification to model the change of country Gini coefficients over time. [↑](#footnote-ref-8)
9. We also experimented with a quadratic term and did not obtain any evidence of a non-monotonic effect in our sample. [↑](#footnote-ref-9)