UNDP LAC WORKING PAPER SERIES

BACKGROUND PAPER OF THE REGIONAL HUMAN DEVELOPMENT REPORT 2021

04

UNDP LAC
WORKING PAPER SERIES

THE LATIN AMERICAN GROWTH SHORTFALL: PRODUCTIVITY AND INEQUALITY

MARCH 2021

Eduardo Fernández-Arias
Independent consultant
Nicolás Fernández-Arias
Princeton University

THE LATIN AMERICAN GROWTH SHORTFALL: PRODUCTIVITY AND INEQUALITY

Eduardo Fernández-Arias[1]
Nicolás Fernández-Arias[2]

Abstract

We analyze the per capita output growth performance since 1960 of countries in Latin America and the Caribbean (LAC) and assess the respective contributions of production factors and productivity measured by total factor productivity (TFP), the overall efficiency with which accumulated factors are utilized. Using a worldwide panel of countries, we find, first, strong evidence that, relative to countries with the same output per capita, LAC countries have a large average per capita growth shortfall (of 0.7% per annum) that is almost entirely driven by subpar productivity growth. This finding holds across LAC countries. Second, while the growth performance of LAC countries has generally improved substantially since 1990, regional productivity growth remains subpar, and the productivity gap with respect to the United States has widened in virtually all LAC countries. We then ask to what extent income inequality is statistically associated with productivity growth and, in this way, shed light on the nature of the region's growing productivity shortfall. We find that, in fact, the high Gini index of disposable income in LAC countries goes a long way to account for the subpar productivity growth. However, high inequality is also associated with a high rate of factor accumulation and does not account for the region's poor per capita output growth.

JEL Code: O11, O40, O47, D63, N16
Keywords: Latin America growth, growth accounting, growth convergence, aggregate productivity growth, growth and inequality

Background Paper for the UNDP LAC Regional Human Development Report 2021. The views and recommendations presented in this paper are from the authors and do not necessarily represent the official position of UNDP.

[1] Independent consultant. United States. fernandezariaseduardo@gmail.com
[2] PhD Candidate in Economics, Princeton University. United States. fernandezarias.nicolas@gmail.com

Recommended citation: Fernández-Arias, E., and Fernández-Arias, N. (2021). The Latin American Growth Shortfall: Productivity and Inequality. UNDP LAC Working Paper No. 04. Background Paper for the UNDP LAC Regional Human Development Report 2021.

1. Introduction

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 measured by the growth rate of total factor productivity (TFP). It analyzes LAC economic performance by decomposing per capita growth in gross domestic product (GDP) 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 the observed growth in output per worker 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.

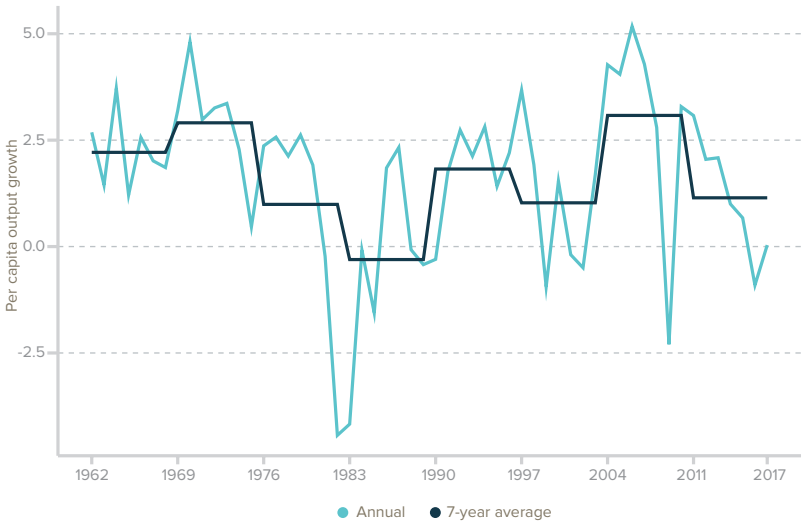
This paper demonstrates that a look at the experience through the lens of productivity growth, as opposed to factor accumulation, holds the key to understanding LAC underperformance and, further, that this distinction informs productive development policies. For example, while the promotion of more rapid 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 thus 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 the growth dynamics of the region's output per capita. The second section (LAC Performance Gaps) gauges LAC performance, comparing it with extra-regional benchmarks and documenting that lower growth has led to a decline in relative output per capita with respect to both developing country peers and 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 assess statistically the growth gaps of LAC and LAC countries over time. 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.

2. LAC economic performance

Per capita output growth in LAC has been remarkably unstable over recent decades. Figure 1 summarizes the situation by looking at real per capita GDP annual growth over 1962–2017, representing the region by a simple average over the 16 countries on which complete data are available.[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. LAC historical per capita output growth dynamics Mean country, %



Source: Own calculations based on Penn World Tables (PWT).

Growth rates at yearly frequencies may fail to be informative on the structural characteristics and trends this paper is set to analyze because they are contaminated by business cycle fluctuations. To control for the business cycle in a parsimonious manner in what follows, we consider average annual growth rates over periods of seven years (1962–1968, 1969–1975, 1976–1982, 1983–1989, 1990–1996, 1997–2003, 2004–2010, 2011–2017).[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 because it is associated with the start of a new era of market reforms and macroeconomic prudence in the region after the debt crisis.

Filtering business cycle noise by taking 7-year averages in this way, the trend line in Figure 1 still shows substantial instability in per capita output growth within a band of about 0 percent to

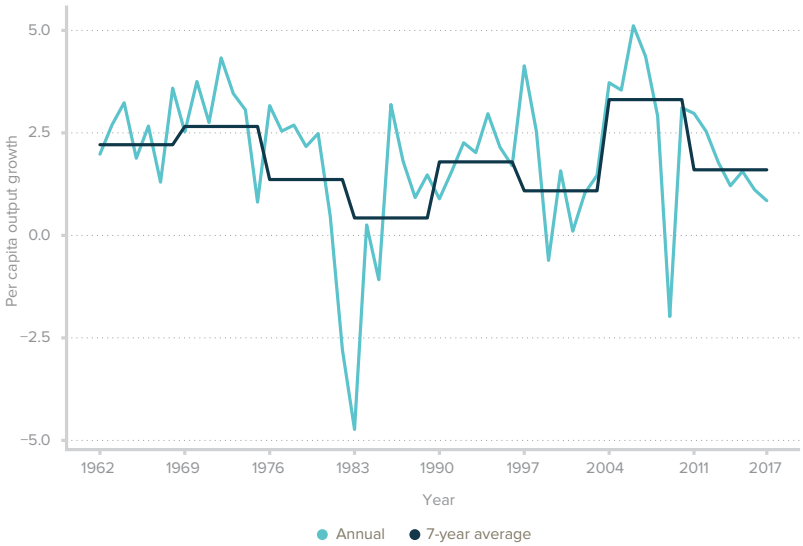
[1] LAC countries are Argentina, Barbados, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, Guatemala, Jamaica, Mexico, Peru, Trinidad and Tobago, Uruguay and Venezuela. A balanced panel was considered, neglecting LAC countries with shorter time series for the relevant variables, to allow for simple and robust statistical analysis. Data are taken from Penn World Table (database, version 9.10), Groningen Growth and Development Centre, Faculty of Economics and Business, University of Groningen, Groningen, the Netherlands, https://www.rug.nl/ggdc/productivity/pwt/. See the Statistical Appendix for details.

[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). The qualitative results are similar. Here, this simpler method is used to gain comparability with the regression analysis in the subsequent sections.

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 1970s and collapses in the 1980s during the debt crisis. Growth after 1990 recovered and has been sustained but, overall, has not reached the levels of the 1960s and early 1970s. (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 appears in Figure 1.)

The growth patterns depicted in Figure 1 can also be observed by considering the median LAC country (instead of the mean country, Figure 2) and, by and large, each of the 16 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 such as Brazil and Barbados, it came immediately 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, because of the dominant relative size of Brazil within LAC, growth around 1970 is sometimes regarded as the onset of the golden years of LAC growth. Venezuela is a singular case, experiencing its worst growth collapse in the recent period.

Figure 2. LAC historical per capita output growth dynamics Median country, %



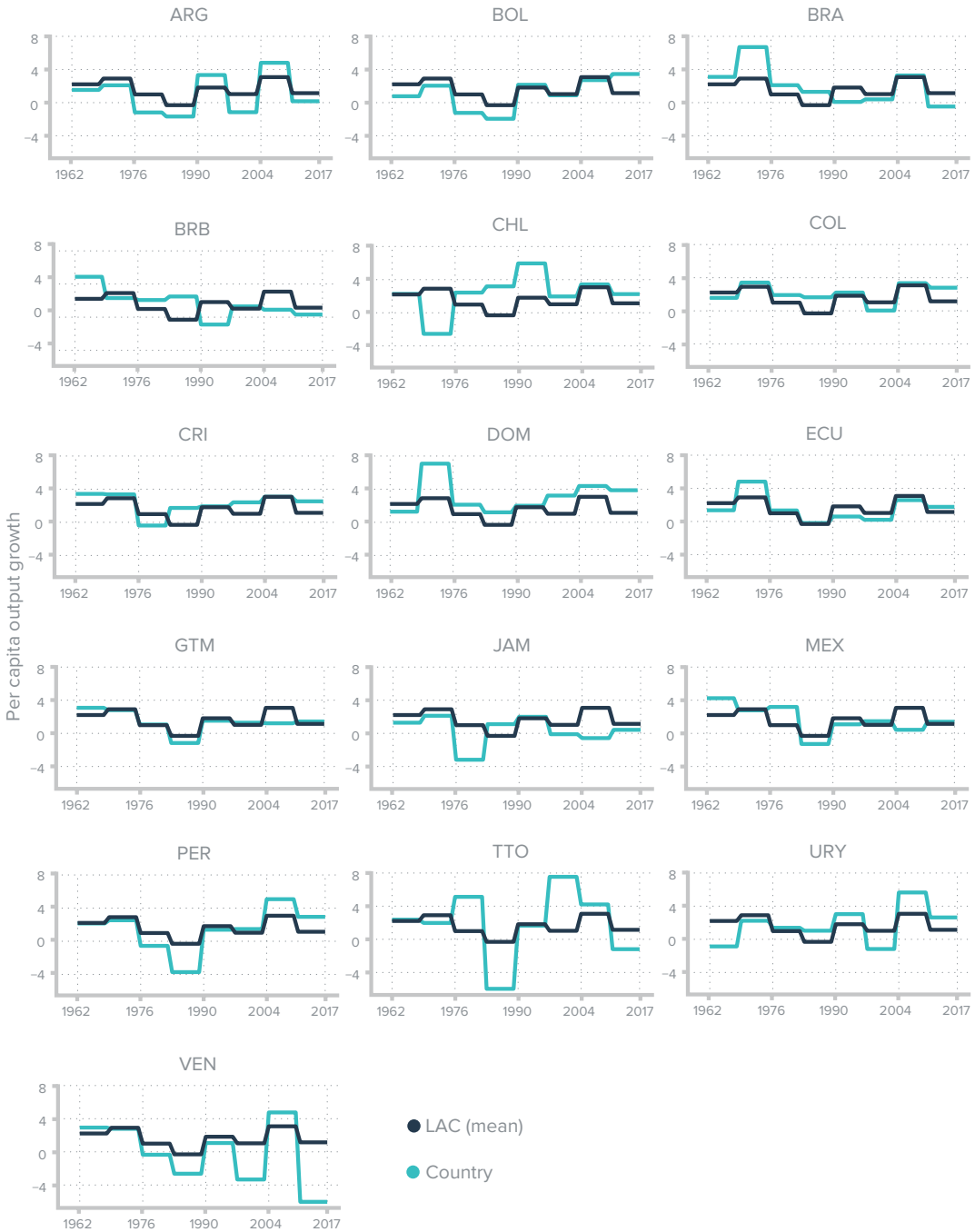
Source: Own calculations based on Penn World Tables (PWT).

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. To focus the analysis on productivity growth, we lump together the contribution of the accumulation of all factors of production to (per capita) output growth. 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 and improvements in the average productive skills of the labor force.[3] We perform an additive decomposition of the per capita output growth rate in each country into these two broad sources

[3] As measured by the wage impact of the additional education received.

of growth, namely, productivity improvement and factor accumulation. Country growth rates are averaged over the seven years of each period to obtain decompositions for each period, and they are averaged over the 16 LAC countries to produce decompositions for LAC as a whole. (See the Statistical Appendix for the sources and methods utilized.)

Figure 3. LAC historical per capita output growth dynamics Individual countries, %



Source: Own calculations based on Penn World Tables (PWT).

Decomposing per capita GDP growth into the contributions of factor accumulation and total factor productivity growth, it becomes 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, in contrast, 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.

Table 1. LAC per capita output growth decomposition.

Period end	Productivity	Factors	Total
1968	1.05	1.16	2.21
1975	0.24	2.67	2.91
1982	1.72	2.71	0.99
1989	-1.07	0.76	-0.31
1996	0.54	1.29	1.82
2003	-0.77	1.80	1.03
2010	0.77	2.31	3.08
2017	-0.87	2.01	1.15
Averages			
Average pre 1990	-0.37	1.83	1.45
Average post 1990	-0.08	1.85	1.77
Overall average	-0.23	1.84	1.61

Source: Own calculations based on Penn World Tables (PWT).

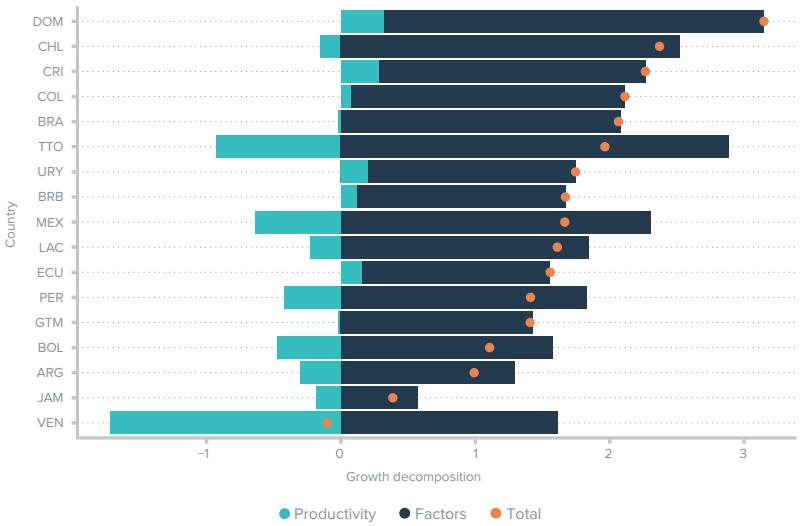
It is important to recognize what drives TFP growth. In part, TFP growth reflects the economy-wide adoption of technology-related advances that are not embodied in capital investments.[4] In this regard, low TFP growth points to slow technology absorption or the poor adoption of disembodied new knowledge 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.[5] The 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 become the reason for slow technological improvement, another source of low TFP growth. It is therefore important to look broadly at public activities and market conditions that influence the aggregate effectiveness

[4] To the extent that physical capital service estimations successfully adjust for the quality of the capital stock, productivity estimations reflect only disembodied technological progress. Likewise, human capital measures incorporate quality improvements in the labor force headcount yielded by additional education.

[5] The effect of the efficiency of the allocation on TFP has been explored in a large literature starting with Restuccia & Rogerson (2008) and Hsieh & Klenow (2009).

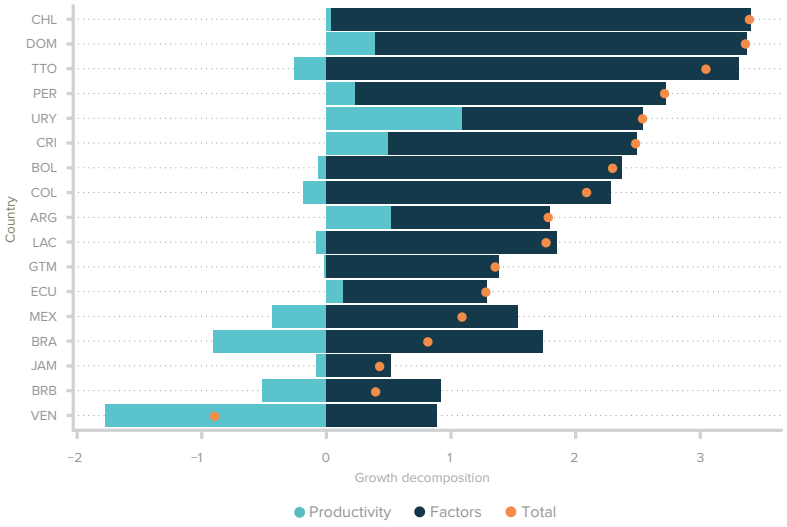
with which the factors of production available in the economy are utilized. In particular, the root of productivity deficits may be associated with aggregate resource misallocation rather than narrow technology-specific considerations. The previous finding of a small contribution of TFP growth suggests the existence of persistent resource misallocation in LAC countries.

Figure 4. Decomposition of per capita output growth in LAC countries 1962–2017, annualized, %



Source: Own calculations based on Penn World Tables (PWT).

Figure 5. Decomposition of per capita output growth in LAC countries 1990–2017, annualized, %



Source: Own calculations based on Penn World Tables (PWT).

Nonetheless, the dominant role of factor accumulation in long-term growth does not mean that productivity growth was irrelevant in accounting for the experience of LAC. Table 1 suggests that, during the periods when LAC performance is particularly high or low, so is produc-

tivity growth. To examine this more closely, we compute the correlation between per capita GDP growth and its two components over the eight periods, revealing that the correlation with productivity growth is 0.78, while the correlation with factor accumulation is only 0.48. (The 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 for LAC's experience and is informative in the assessment of the region's performance. However, it cannot answer the extent to which this performance is unsatisfactory (is per capita output growth unsuitably low?) and, if so, what are the factors behind the failure. The next section refines this analysis by looking at benchmarks to analyze LAC's performance and answer these questions.

3. LAC perfomance gaps

Measuring comparative performance relative to benchmark countries is useful in assessing whether growth is less than what is needed or what might have been expected and, concerning growth diagnosis, in detecting anomalies that reveal specific domestic failures. Underperformance relative to a norm is a key analytic tool in gauging poor performance and discovering the drivers. This section makes intensive use of this approach in a number of ways.

3.1. The Evidence from Comparative Development Analysis

Before refining the growth accounting methods utilized in the previous section through the application of 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 TFP 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. Because 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 on Daude and Fernández-Arias (2010) and Fernández-Arias and Rodríguez Apolinar (2016). The main point to highlight from these papers is that low productivity is the main culprit in LAC's disappointingly low GDP per capita. This conclusion is based on a number of claims and observations, as follows:

LAC productivity is only about 50% of that of the Unite States (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. Resource misallocation would have produced low levels of TFP and is a natural candidate to explain this finding.

LAC's per capita output gap with the United States is increasingly being explained by the productivity gap (rather than by the gap in the stocks of production factors in place).

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 may be rationalized by pointing to the positive feedback loop between higher productivity and higher factor accumulation: higher aggregate productivity provides incentives for higher factor accumulation, and higher factor accumulation may include new vintage capital and skills that facilitate higher aggregate productivity).

Despite the 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.

However, concerning the reverse direction of causality from factor accumulation to productivity, investment in physical capital appears to be less effective in LAC than in other regions in fostering higher aggregate productivity. This suggests that it has smaller productivity spillovers.

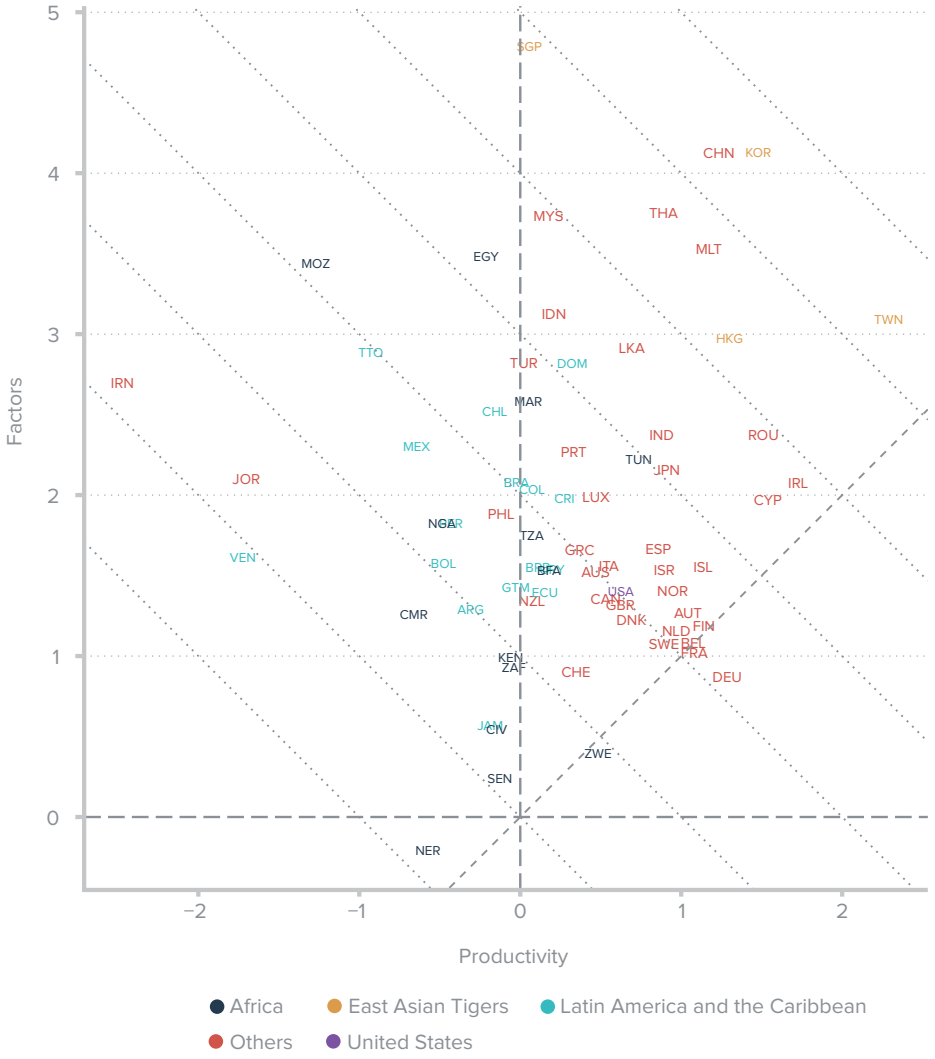
These are all pieces of evidence supporting the idea that LAC's growth underperformance is not associated with the accumulation effort but with the failure to generate productivity growth.

3.2. Comparative Growth Accounting

For 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 (total growth can be read on the iso-growth lines). In virtually all cases, factor growth exceeds productivity growth (that is, the points are above the 45-degree line). The question in this comparative approach is whether LAC countries are anomalous in this world context in ways that are helpful for the assessment and diagnosis of their growth experience.

Our first step is to consider the growth accounting gaps between LAC and four benchmarks: all 55 non-LAC economies, 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 in probing various dimensions. The rest of the world or non-LAC economies could be considered as the norm, that is, 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 to 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.

Figure 6. Decomposition of per capita output growth worldwide 1962–2017, annualized, %



Source: Own calculations based on Penn World Tables (PWT).

Tables 2–5 build on Table 1 to show the annual growth gaps between LAC and each of the four benchmarks, meaning the 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 economies, 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 far below the corresponding rate among the East Asian tigers. LAC also grew more slowly than the most advanced country, the United States, thereby falling further behind the frontier.

Figure 7. Decomposition of per capita output growth worldwide 1990–2017, annualized, %

Source: Own calculations based on Penn World Tables (PWT).

However, not all is bad news. The comparison between pre- and post-1990 growth gaps shows clear progress. While per capita output growth in LAC post-1990 is still substantially below the norm (Table 2), the shortfall contracted by a full percentage point relative to pre-1990. This enormous progress is insufficient, but it erased most of the initial growth gap. Progress measured against the United States is even greater (Table 5). Post-1990, the mean country in LAC actually grew more quickly than the United States. This comparative analysis reveals that 1990 was, in fact, pivotal. The growth in LAC was characterized by 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 periods of high growth throughout the world (in fact, growth gaps during that timeframe are actually negative because the rest of the world actually grew more quickly (Table 2), and LAC growth success back then should not be attributed to a special virtue that LAC subsequently lost.

Table 2. LAC per capita output growth gap: non-LAC benchmark

Period end	Productivity	Factors	Total
1968	-0.33	-0.73	-1.05
1975	-0.50	0.04	-0.45
1982	-1.59	0.04	-1.55
1989	-1.35	-0.90	-2.25
1996	0.17	-0.32	-0.15
2003	-1.34	0.19	-1.15
2010	0.45	0.36	0.81
2017	-1.17	0.34	-0.83
Averages			
Average pre 1990	0.94	-0.39	-1.33
Average post 1990	-0.47	0.14	-0.33
Overall average	-0.71	-0.12	-0.83

Source: Own calculations based on Penn World Tables (PWT).

Table 3. LAC per capita output growth gap: Africa benchmark

Period end	Productivity	Factors	Total
1968	0.79	0.09	0.88
1975	-0.43	1.08	0.65
1982	-0.31	0.25	-0.07
1989	-0.40	0.53	0.13
1996	1.02	0.52	1.53
2003	-1.48	1.03	-0.46
2010	0.59	-0.22	0.37
2017	-0.47	-0.55	-1.02
Averages			
Average pre 1990	-0.09	0.49	0.40
Average post 1990	-0.09	0.19	0.11
Overall average	-0.09	0.34	0.25

Source: Own calculations based on Penn World Tables (PWT).

Table 4. LAC per capita output growth gap: EAT benchmark

Period end	Productivity	Factors	Total
1968	-1.00	-2.14	-3.14
1975	-1.21	-2.89	-4.10
1982	-2.89	-2.85	-5.75
1989	-3.73	-3.22	-6.95
1996	-0.59	-3.10	-3.68
2003	-0.76	-0.72	-1.48
2010	-0.92	-0.23	-1.15
2017	-1.04	-0.11	-1.15
Averages			
Average pre 1990	-2.21	-2.77	-4.98
Average post 1990	-0.83	-1.04	-1.87
Overall average	-1.52	-1.91	-3.43

Source: Own calculations based on Penn World Tables (PWT).

Table 5. LAC per capita output growth gap: USA benchmark

Period end	Productivity	Factors	Total
1968	-0.26	-1.40	-1.66
1975	0.40	1.11	1.51
1982	-1.55	0.81	-0.74
1989	-2.43	-1.23	-3.66
1996	-0.12	0.37	0.25
2003	-1.84	0.67	-1.17
2010	0.21	2.09	2.30
2017	-1.28	1.06	-0.23
Averages			
Average pre 1990	-0.96	-0.18	-1.14
Average post 1990	-0.76	1.05	0.29
Overall average	-0.86	0.44	-0.42

Source: Own calculations based on Penn World Tables (PWT).

The key question revolves around 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 in productivity growth. And progress after 1990 has not been impressive. Indeed, relative to the norm, the shortfall shrank by half, but it was still substantial (Table 2). It closed only marginally against the United States (Table 5), remaining substantially negative. (There is no progress with respect to Africa, and the progress observed with respect to the East Asian tigers can be attributed to the slowdown among the latter after an exceptional acceleration.) It is also concerning that, in all four benchmarks, the productivity growth shortfall in the period ending in 2017 widened relative to the previous period and was 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 among all non-LAC economies, ahead with respect to Africa, and, importantly, about a half percentage point above the United States. (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 economies. In fact, factor accumulation strengthened considerably after 1990 with respect to this norm, the East Asian tigers and the United States.

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 that was dragged back by subpar productivity growth. The elimination of the productivity growth shortfall would not only have eliminated this gap, but also incentivized higher factor accumulation, thereby producing 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 remained subpar. With a normal rate of productivity growth, LAC would have had normal per capita output growth and would have converged firmly to US output per capita.

3.3. 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 using benchmarks to account for expected transitional growth

dynamics. It may be argued that the observed subpar performance of LAC countries is a temporary phase in a longer process. If the LAC countries can be anticipated to speed up organically to attain normal growth results in due course, crude comparisons with benchmarks at a point in time might be misleading. In what follows, we look at how the contributions of growth in productivity and factor accumulation tend to evolve over the course of economic development to understand how 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 capital stock lead to higher investment returns (traditional transitional convergence) and also because there is more low-hanging fruit to facilitate catching up with the productivity frontier (emulating technology as well as sound economic policies and institutions). Yet, country characteristics that lower growth—for instance, dysfunctional policies and institutions—also lead to low levels of development, generating the opposite association between the stage of development and the growth rate of a country. Moreover, underdevelopment itself, whatever the 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 accurately ascertained, taking into account the 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 United States at any given time (in logarithmic terms). With this metric of stage of development, transitional convergence would imply that progress in development (per capita output closer to that of the United States) 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 aid in investigating the dynamics of per capita output growth and the contributions of productivity and factor accumulation using the entire world panel. They control for stage of development and time fixed effects for each of the eight periods to isolate worldwide shocks. The point estimates in the third column (per capita output growth) of Table 6 are approximately the sum of the point estimates in the other two columns (sources of growth).[6] Our sample confirms the standard result of unconditional divergence in per capita output growth, meaning that backwardness is a drag on growth. In our analysis, this pessimistic result derives from a productivity growth rate that is lower among poorer countries, which more than offsets a (statistically insignificant) tendency of transitional convergence associated with the contribution of factor accumulation. (As a robustness test of 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 economies, obtaining similar results.)

[6] Each regression was estimated using OLS (with clustered robust standard errors). While the three separate specifications have correlated errors, a joint SUR regression would not make a difference because they include the same regressors.

Table 6. Growth dynamics worldwide

	(1) Productivity growth	(2) Factor accumulation	(3) Per capita output growth
Per capita output gap (rel. USA)	0.26***	-0.054	0.20*
	(0.079)	(0.12)	(0.12)
year=1968	1.36***	-0.046	1.32***
	(0.33)	(0.26)	(0.37)
year=1975	0.65**	0.87***	1.53***
	(0.31)	(0.31)	(0.37)
year=1982	-0.47	0.92***	0.45
	(0.33)	(0.31)	(0.40)
year=1989	0.022	-0.31	-0.29
	(0.28)	(0.29)	(0.37)
year=1996	0.44*	-0.23	0.21
	(0.26)	(0.25)	(0.29)
year=2003	0.30	-0.11	0.19
	(0.35)	(0.24)	(0.30)
year=2010	0.42	0.28	0.70**
	(0.27)	(0.21)	(0.27)
year=2017	0	0	0
	(.)	(.)	(.)
Constant	0.34	1.69***	2.03***
	(0.23)	(0.23)	(0.27)
Observations	568	568	568

Source: Own calculations based on Penn World Tables (PWT).
Standard errors in parentheses. Clustering is at country level.
Regression equation: $g_{it} = \alpha + \gamma_t + \beta(log(\frac{cgdpo_{it}}{pop_{it}}) - log(\frac{cgdpo_{USA,t}}{pop_{USA,t}})) + \epsilon_{it}$
$* \ p < 0.1, \ ** \ p < 0.05, \ *** \ p < 0.01$

Stage of development could potentially account for part of the growth gaps shown in Tables 2–5 because LAC and the benchmarks have different outputs per capita. In our sample, LAC countries are, on average, poorer than non-LAC economies, the East Asian tigers and the United States. Relative to these benchmarks, shortfalls in overall growth and in productivity growth may therefore 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. Figures 8–11 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 2–5 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 7. Growth dynamics in non-LAC countries

	(1) Productivity growth	(2) Factor accumulation	(3) Per capita output growth
Per capita output gap (rel. USA)	0.27***	-0.096	0.17
	(0.080)	(0.13)	(0.13)
year=1968	1.20***	0.17	1.37***
	(0.36)	(0.30)	(0.42)
year=1975	0.52	0.92**	1.44***
	(0.36)	(0.37)	(0.42)
year=1982	-0.36	0.97**	0.61
	(0.39)	(0.38)	(0.46)
year=1989	0.067	-0.042	0.025
	(0.31)	(0.31)	(0.42)
year=1996	0.15	-0.095	0.051
	(0.24)	(0.29)	(0.32)
year=2003	0.34	-0.086	0.25
	(0.37)	(0.29)	(0.33)
year=2010	0.055	0.27	0.32
	(0.24)	(0.25)	(0.25)
year=2017	0	0	0
	(.)	(.)	(.)
Constant	0.60***	1.57***	2.16***
	(0.18)	(0.25)	(0.29)
Observations	440	440	440

Source: Own calculations based on Penn World Tables (PWT).
Standard errors in parentheses. Clustering is at country level.
Regression equation: $g_{it} = \alpha + \gamma_t + \beta(log(\frac{cgdpo_{it}}{pop_{it}}) - log(\frac{cgdpo_{USAt}}{pop_{USAt}})) + \epsilon_{it}$
$* \ p < 0.1, \ ** \ p < 0.05, \ *** \ p < 0.01$
Notes: Only non-LAC sample.

Table 8. LAC per capita output growth gap: non-LAC benchmark

Period end	Productivity	Productivity (adj.)	Productivity (adj., robust)	Factors	Factors (adj.)	Factors (adj., robust)	Total	Total (adj.)	Total (adj., robust)
1968	-0.33	-0.33	-0.33	-0.73	-0.73	-0.73	-1.05	-1.06	-1.06
1975	-0.50	-0.48	-0.47	0.04	0.04	0.04	-0.45	-0.44	-0.44
1982	-1.59	-1.55	-1.55	0.04	0.03	0.03	-1.55	-1.52	-1.52
1989	-1.35	-1.28	-1.27	-0.90	-0.92	-0.93	-2.25	-2.19	-2.20
1996	0.17	0.24	0.25	-0.32	-0.34	-0.35	-0.15	-0.09	-0.10
2003	-1.34	-1.25	-1.24	0.19	0.17	0.15	-1.15	-1.08	-1.09
2010	0.45	0.53	0.54	0.36	0.34	0.33	0.81	0.88	0.86
2017	-1.17	-1.09	-1.09	0.34	0.32	0.31	-0.83	-0.77	-0.78
Averages									
Average pre 1990	-0.94	-0.91	-0.91	-0.39	-0.39	-0.40	-1.33	-1.30	-1.30
Average post 1990	-0.47	-0.39	-0.39	0.14	0.12	0.11	-0.33	-0.27	-0.28
Overall average	-0.71	-0.65	-0.65	-0.12	-0.13	-0.14	-0.83	-0.78	-0.79

Source: Own calculations based on Penn World Tables (PWT).

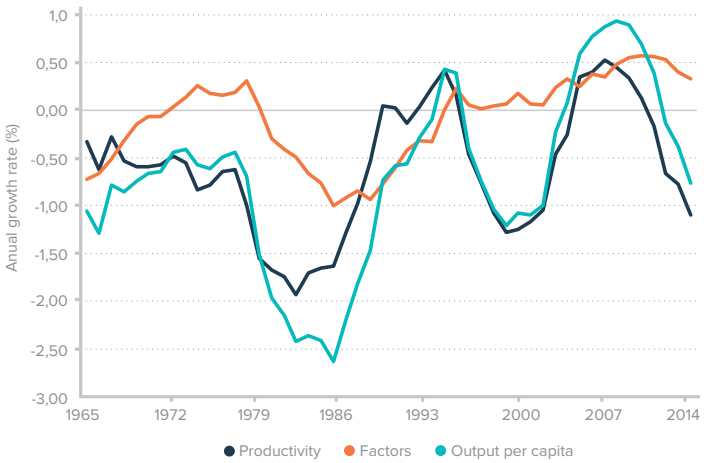
Table 9. LAC per capita output growth gap: EAT benchmark

Period end	Productivity	Productivity (adj.)	Productivity (adj., robust)	Factors	Factors (adj.)	Factors (adj., robust)	Total	Total (adj.)	Total (adj., robust)
1968	-1.00	-1.09	-1.09	-2.14	-2.12	-2.11	-3.14	-3.21	-3.20
1975	-1.21	-1.19	-1.19	-2.89	-2.89	-2.89	-4.10	-4.08	-4.08
1982	-2.89	-2.78	-2.77	-2.85	-2.88	-2.90	-5.75	-5.66	-5.67
1989	-3.73	-3.51	-3.50	-3.22	-3.26	-3.30	-6.95	-6.77	-6.80
1996	-0.59	-0.29	-0.28	-3.10	-3.16	-3.21	-3.68	-3.45	-3.49
2003	-0.76	-0.41	-0.40	-0.72	-0.79	-0.85	-1.48	-1.21	-1.25
2010	-0.92	-0.57	-0.56	-0.23	-0.30	-0.36	-1.15	-0.88	-0.92
2017	-1.04	-0.71	-0.70	-0.11	-0.18	-0.23	-1.15	-0.89	-0.94
Averages									
Average pre 1990	-2.21	-2.14	-2.14	-2.77	-2.79	-2.80	-4.98	-4.93	-4.94
Average post 1990	-0.83	-0.50	-0.49	-1.04	-1.11	-1.16	-1.87	-1.61	-1.65
Overall average	-1.52	-1.32	-1.31	-1.91	-1.95	-1.98	-3.43	-3.27	-3.29

Source: Own calculations based on Penn World Tables (PWT).

To visualize growth gaps over time, we consider time series based on seven-year rolling windows. In this way, short-term effects are still filtered by seven-year averages, but subperiods of interest are not assumed exogenously. In this visualization, window averages are shown at the window center (that is, the fourth year). We consider the evolution of adjusted growth gaps in output per capita and the sources relative to non-LAC economies 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. LAC vs non–LAC growth gaps, adjusted for stage of development



Source: Own calculations based on Penn World Tables (PWT).

Table 10. LAC per capita output growth gap: AFR benchmark

Period end	Productivity	Productivity (adj.)	Productivity (adj., robust)	Factors	Factors (adj.)	Factors (adj., robust)	Total	Total (adj.)	Total (adj., robust)
1968	0.79	0.53	0.52	0.09	0.14	0.19	0.88	0.68	0.71
1975	-0.43	-0.70	-0.71	1.08	1.14	1.18	0.65	0.44	0.47
1982	-0.31	-0.58	-0.59	0.25	0.30	0.35	-0.07	-0.28	-0.25
1989	-0.40	-0.67	-0.68	0.53	0.59	0.63	0.13	-0.08	-0.05
1996	1.02	0.70	0.69	0.52	0.58	0.63	1.53	1.28	1.32
2003	-1.48	-1.81	-1.83	1.03	1.10	1.15	-0.46	-0.72	-0.67
2010	0.59	0.24	0.23	-0.22	-0.15	-0.09	0.37	0.10	0.14
2017	-0.47	-0.81	-0.82	-0.55	-0.48	-0.42	-1.02	-1.29	-1.25
Averages									
Average pre 1990	-0.09	-0.35	-0.36	0.49	0.54	0.59	0.40	0.19	0.22
Average post 1990	-0.09	-0.42	-0.43	0.19	0.26	0.32	0.11	-0.16	-0.11
Overall average	-0.09	-0.39	-0.40	0.34	0.40	0.45	0.25	0.02	0.05

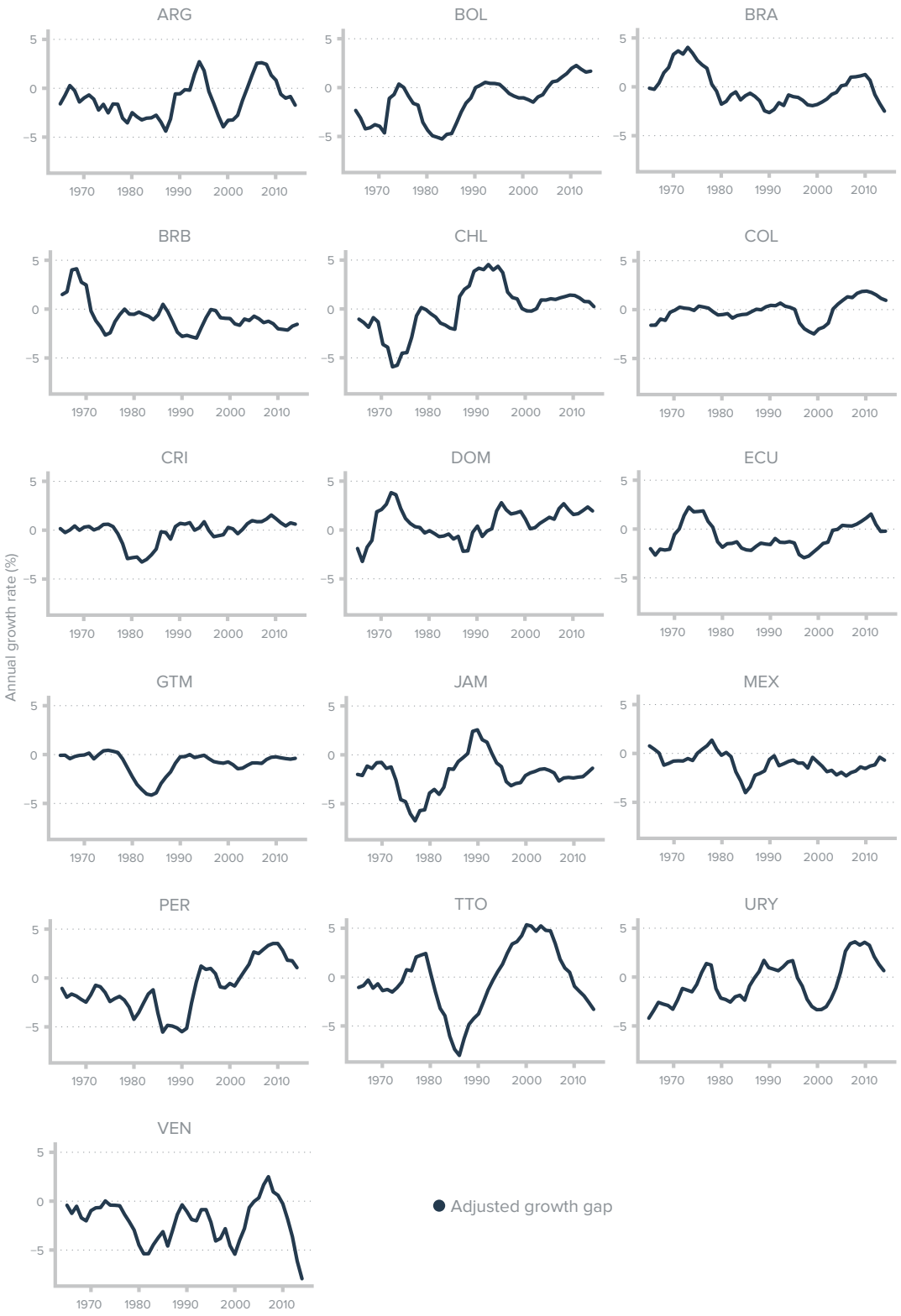
Source: Own calculations based on Penn World Tables (PWT).

Table 11. LAC per capita output growth gap: USA benchmark

Period end	Productivity	Productivity (adj.)	Productivity (adj., robust)	Factors	Factors (adj.)	Factors (adj., robust)	Total	Total (adj.)	Total (adj., robust)
1968	-0.26	0.13	0.15	-1.40	-1.48	-1.55	-1.66	-1.35	-1.40
1975	0.40	0.78	0.80	1.11	1.03	0.97	1.51	1.82	1.77
1982	-1.55	-1.16	-1.14	0.81	0.73	0.66	-0.74	-0.43	-0.48
1989	-2.43	-1.99	-1.97	-1.23	-1.32	-1.39	-3.66	-3.31	-3.37
1996	-0.12	0.32	0.33	0.37	0.28	0.20	0.25	0.59	0.53
2003	-1.84	-1.40	-1.38	0.67	0.58	0.51	-1.17	-0.82	-0.88
2010	0.21	0.61	0.63	2.09	2.01	1.94	2.30	2.62	2.57
2017	-1.28	-0.92	-0.91	1.06	0.98	0.92	-0.23	0.06	0.01
Averages									
Average pre 1990	-0.96	-0.56	-0.54	-0.18	-0.26	-0.33	-1.14	-0.82	-0.87
Average post 1990	-0.76	-0.35	-0.33	1.05	0.96	0.89	0.29	0.61	0.56
Overall average	-0.86	-0.45	-0.44	0.44	0.35	0.28	-0.42	-0.10	-0.16

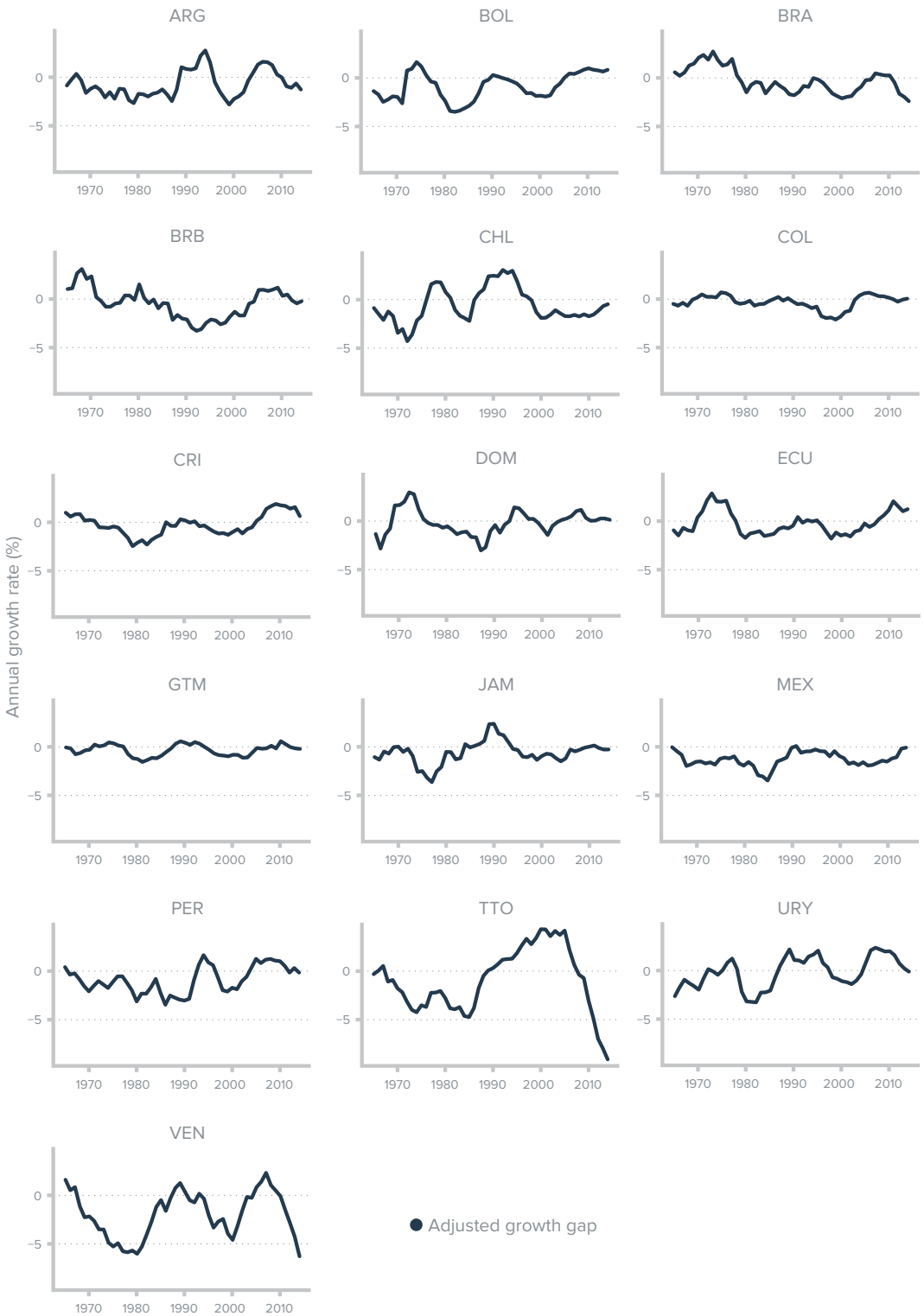
Source: Own calculations based on Penn World Tables (PWT).

Figure 9. Country–level gap vs. non–LAC after adjusting for stage of development



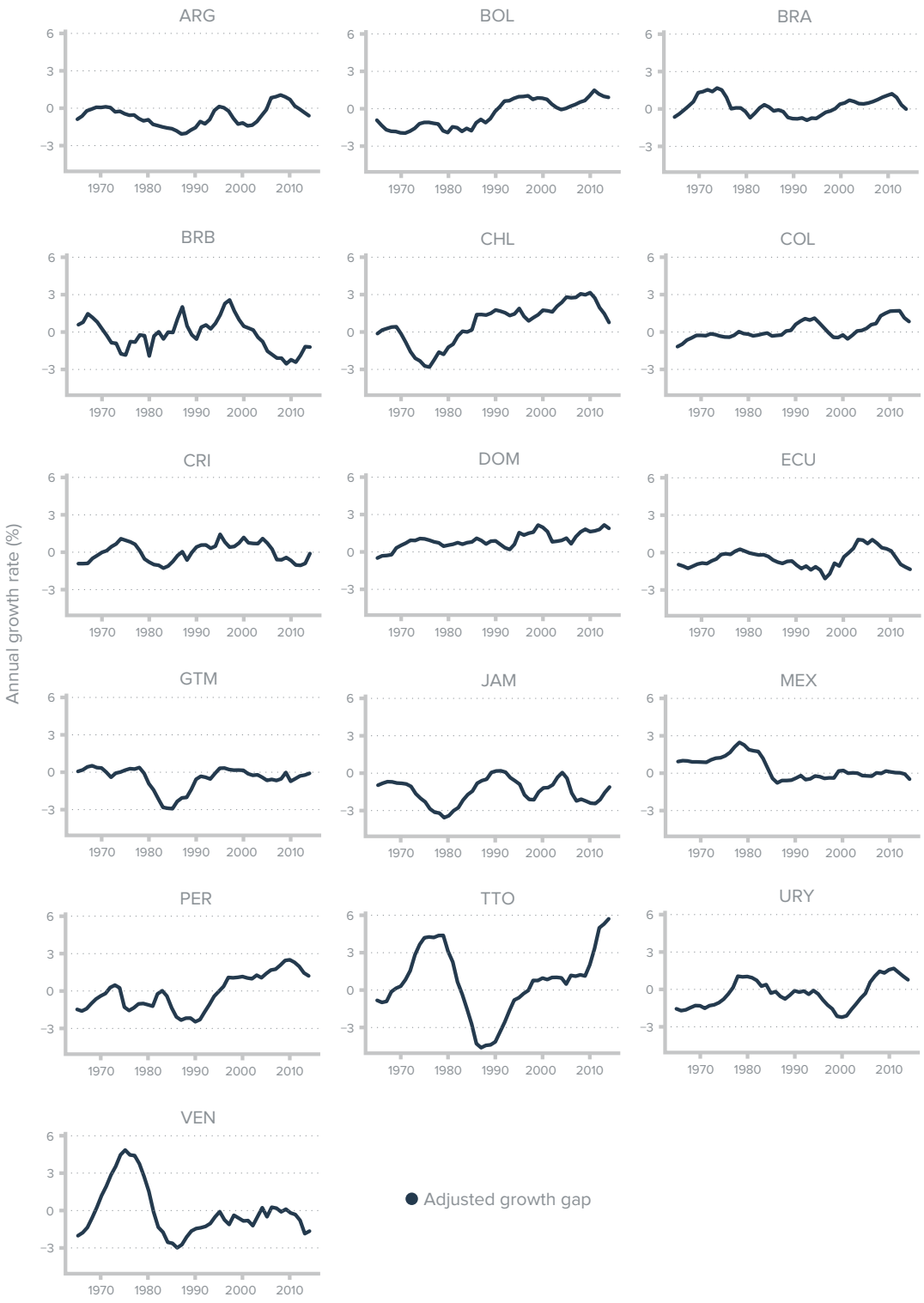
Source: Own calculations based on Penn World Tables (PWT).

Figure 10. Country–level gap vs. non–LAC after adjusting for stage of development



Source: Own calculations based on Penn World Tables (PWT).

Figure 11. Country–level gap vs. non–LAC after adjusting for stage of development



Source: Own calculations based on Penn World Tables (PWT).

4. LAC perfomance in panel regressions

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 by adding a LAC dummy modelling a regional fixed effect to contrast the LAC 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 seven-year rolling windows within 1962–2017.

Table 12. Statistical significance of LAC growth gap (Non-LAC Benchmark)

	(1) Productivity growth	(2) Factor accumulation	(3) Per capita output growth
Per capita output gap (rel. USA)	0.22***	-0.033	0.18
	(0.076)	(0.13)	(0.13)
LAC	-0.62***	-0.086	-0.70**
	(0.17)	(0.22)	(0.28)
Observations	3550	3550	3550

Source: Own calculations based on Penn World Tables (PWT).
Standard errors in parentheses. Clustering is at country level.
Regression equation: $g_{it} = \alpha + \sigma 1_{LAC} + \gamma_t + \beta(log(\frac{cgdpo_{it}}{pop_{it}}) - log(\frac{cgdpo_{USA,t}}{pop_{USA,t}})) + \epsilon_{it}$
$^{*}\ p < 0.1,\ ^{**}\ p < 0.05,\ ^{***}\ p < 0.01$

This simple set of regressions shows stark results that reaffirm the conclusion that LAC's per capita output growth is below expectation and that the shortfall is essentially caused by 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 high confidence), but this is not the case of the one for the contribution of factor accumulation, which translates into a considerable (and also statistically highly significant) overall per capita output growth shortfall of 0.70 percentage points per year relative to normal. LAC per capita output growth in 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 (the estimated effect of which 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 improvement in both productivity and factor growth gaps of about half of a percentage point. Nonetheless, 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 indicators, but productivity growth, while improved relative to pre-1990, is still subpar.[7]

[7] 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.

Table 13. Statistical significance of LAC growth gap, pre- and post-1990 (Non-LAC Benchmark)

	(1) Productivity growth	(2) Factor accumulation	(3) Per capita output growth
Per capita output gap (rel. USA)	0.22***	-0.030	0.19
	(0.076)	(0.13)	(0.13)
LAC × pre 1990	-0.93***	-0.33	-1.26***
	(0.28)	(0.28)	(0.38)
LAC × post 1990	-0.31	0.16	-0.15
	(0.19)	(0.26)	(0.34)
Observations	3550	3550	3550

Source: Own calculations based on Penn World Tables (PWT).
Standard errors in parentheses. Clustering is at country level.
Regression equation: $g_{it} = \alpha + \sigma_1 1_{LAC,pre1990} + \sigma_2 1_{LAC,post1990} + \gamma_t + \beta(log(\frac{cgdpo_{it}}{pop_{it}}) - log(\frac{cgdpo_{USAt}}{pop_{USAt}})) + \epsilon_{it}$
$* \ p < 0.1, \ ** \ p < 0.05, \ *** \ p < 0.01$

How do individual LAC countries deviate from this poor average 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 of the 16 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 Chile and Dominican Republic (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 group as measured by the fixed effects over 1962–2017.

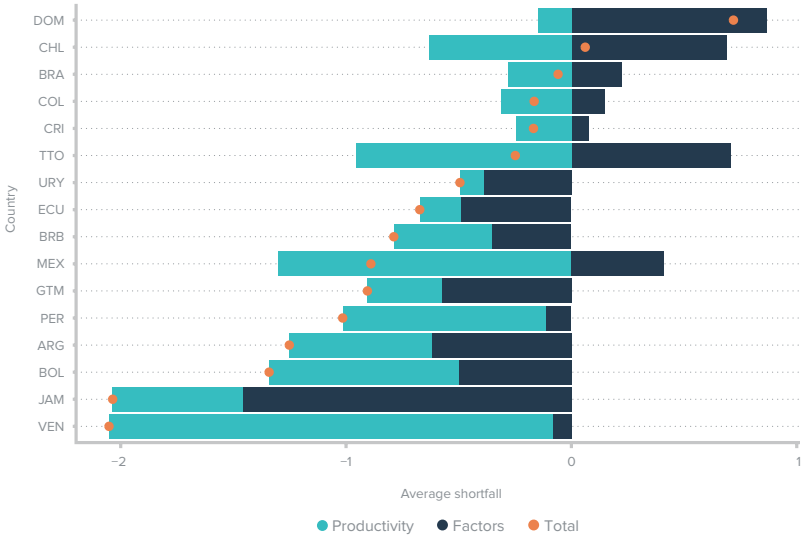
Table 14. Statistical significance of LAC individual country growth gaps (Non-LAC Benchmark)

	(1) Productivity growth	(2) Factor accumulation	(3) Per capita output growth
Per capita output gap (relative to USA)	0.23***	-0.055	0.17
ARG	-0.63***	-0.62***	-1.25***
BOL	-0.84***	-0.50*	-1.34***
BRA	-0.28**	0.22	-0.059
BRB	-0.43***	-0.35**	-0.79***
CHL	-0.63***	0.69***	0.061
COL	-0.31***	0.15	-0.17
CRI	-0.25**	0.078	-0.17
DOM	-0.15	0.87***	0.72***
ECU	-0.18	-0.49***	-0.67***
GTM	-0.33**	-0.57***	-0.91***
JAM	-0.58***	-1.46***	-2.04***
MEX	-1.30***	0.41***	-0.89***
PER	-0.90***	-0.12	-1.01***
TTO	-0.96***	0.71***	-0.25
URY	-0.10	-0.39**	-0.49**
VEN	-1.97***	-0.083	-2.05***
Observations	3550	3550	3550

Source: Own calculations based on Penn World Tables (PWT).
Standard errors omitted for clarity. Clustering is at country level.

Regression equation: $g_{it} = \alpha + \omega_i + \gamma_t + \beta(log(\frac{cgdpo_{it}}{pop_{it}}) - log(\frac{cgdpo_{USAt}}{pop_{USAt}})) + \epsilon_{it}$
$* \ p < 0.1, \ ** \ p < 0.05, \ *** \ p < 0.01$

Figure 12. Decomposition of country per capita output growth shortfalls in LAC countries. 1962–2017, annualized, %, computed based on country fixed effects from regression analysis.



Source: Own calculations based on Penn World Tables (PWT).

The progress in the mean country of LAC after 1990 is 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 16 LAC countries. After 1990, comparative productivity growth improved in most countries (they are above the 45-degree line), with the exception of Barbados, Brazil and Colombia). Nonetheless, in the current post-1990 regime, based on these estimations, productivity growth in the LAC countries in our sample is still largely subpar, with the exception of Argentina, Costa Rica, Dominican Republic, Trinidad and Tobago, and Uruguay.[8] Furthermore, at par productivity growth (at the rate of a comparable non LAC country) is not sufficient to converge to the rate of productivity growth of the United States. In fact, even after 1990, productivity growth in every LAC country is below that in the United States 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.

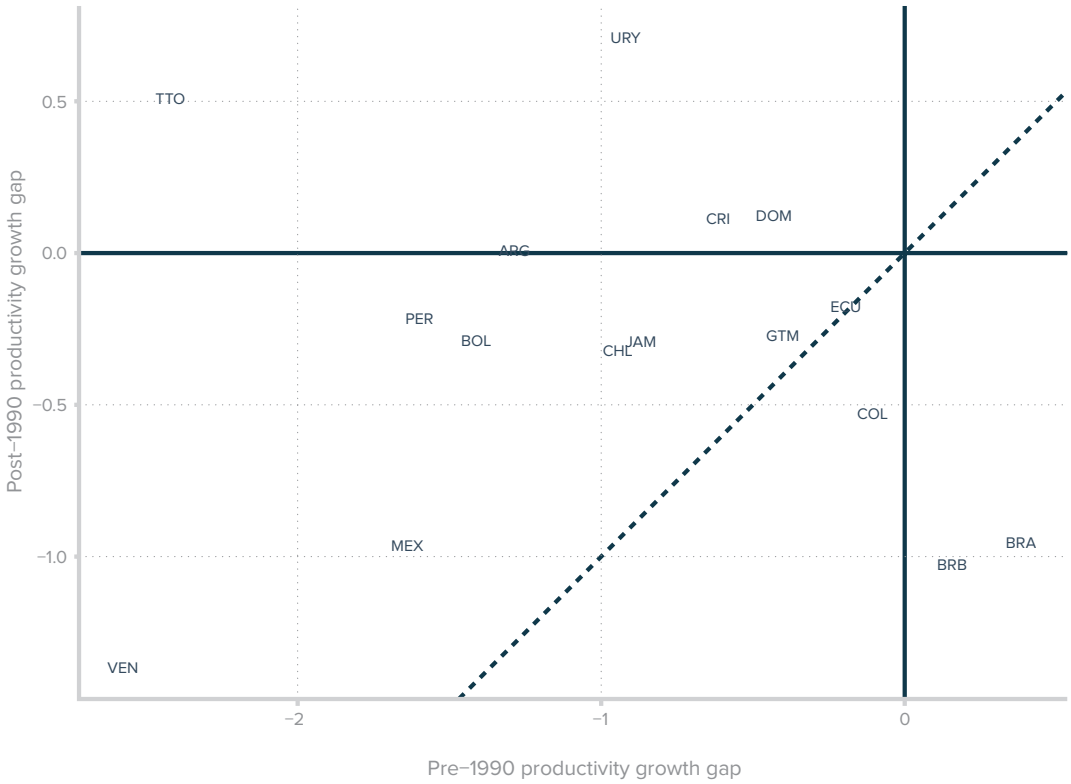
[8] Productivity growth in Trinidad and Tobago has plummeted to historically low levels in recent years.

Table 15. Statistical significance of LAC individual country growth gaps, pre- and post-1990 (Non-LAC Benchmark)

	(1) Productivity growth	(2) Factor accumulation	(3) Per capita output growth
Per capita output gap (relative to USA)	0.23***	-0.057	0.18
ARG × post1990=0	-1.28***	-0.87***	-2.14***
ARG × post1990=1	0.011	-0.37**	-0.36*
BOL × post1990=0	-1.39***	-1.55***	-2.94***
BOL × post1990=1	-0.27	0.54**	0.27
BRA × post1990=0	0.39**	0.30	0.70**
BRA × post1990=1	-0.95***	0.14	-0.81***
BRB × post1990=0	0.16	-0.21	-0.059
BRB × post1990=1	-1.03***	-0.49***	-1.52***
CHL × post1990=0	-0.94***	-0.55***	-1.49***
CHL × post1990=1	-0.32***	1.93***	1.61***
COL × post1990=0	-0.10	-0.31	-0.41
COL × post1990=1	-0.52***	0.60***	0.079
CRI × post1990=0	-0.61***	-0.17	-0.77***
CRI × post1990=1	0.12	0.32*	0.44**
DOM × post1990=0	-0.42**	0.51**	0.087
DOM × post1990=1	0.13	1.23***	1.36***
ECU × post1990=0	-0.19	-0.51**	-0.70**
ECU × post1990=1	-0.17	-0.48**	-0.65***
GTM × post1990=0	-0.39*	-0.83***	-1.22***
GTM × post1990=1	-0.26*	-0.33	-0.59**
JAM × post1990=0	-0.86***	-1.68***	-2.54***
JAM × post1990=1	-0.28*	-1.24***	-1.53***
MEX × post1990=0	-1.64***	0.97***	-0.67**
MEX × post1990=1	-0.96***	-0.15	-1.11***
PER × post1990=0	-1.58***	-1.01***	-2.60***
PER × post1990=1	-0.21	0.78***	0.58**
TTO × post1990=0	-2.43***	0.56***	-1.87***
TTO × post1990=1	0.50***	0.86***	1.36***
URY × post1990=0	-0.92***	-0.54***	-1.46***
URY × post1990=1	0.71***	-0.24	0.47**
VEN × post1990=0	-2.58***	0.50**	-2.07***
VEN × post1990=1	-1.36***	-0.67***	-2.03***
nonLAC × post1990=0	0	0	0
nonLAC × post1990=1	0	0	0
Observations	3550	3550	3550

Source: Own calculations based on Penn World Tables (PWT).
Variable is equal to 1 if t > 1990, 0 otherwise. Estimated values of !i for each country i shown above.
Standard errors omitted for clarity. Clustering is at country level.
Regression equation: $g_{it} = \alpha + \omega_{i\tau} + \gamma_t + \beta(log(\frac{cgdpo_{it}}{pop_{it}}) - log(\frac{cgdpo_{USAt}}{pop_{USAt}})) + \epsilon_{it}$
$^{*}\ p < 0.1,\ ^{**}\ p < 0.05,\ ^{***}\ p < 0.01$

Figure 13. LAC productivity growth gap. Pre– and Post–1990



Source: Own calculations based on Penn World Tables (PWT).

5. 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 because of political and economic instability (Ostry et al. 2014). In the extreme, it may lead to a fractious political economy that threatens 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 productivity growth. By contrast, there is the opposite view that inequality fosters growth because, for example, 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 a relationship is contaminated by distortionary inequality policies, which may vary widely across space and time. Furthermore, it is clear that growth may also have an important effect on inequality, through, for instance, the compositional effects of the transition from traditional to modern economies, such as Kuznets' transition from agriculture to manufacturing and other current processes of structural trans-

formation. Similarly, underlying economic conditions may impact growth and inequality, such as distortions that favor the emergence of informal enterprises and segmented markets. The 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.[9]

Inequality data on our sample is from the SWIID database.[10] This includes consistently estimated series of the Gini index on disposable income for the most extensive sample we found. Using this dataset, we lost six countries from the growth panel, and, on 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, the underperformance of LAC productivity growth, and then analyzed the issue of inequality within that sample.[11] The main findings in the previous section concerning 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, the findings associated with this smaller dataset are qualitatively similar to the ones found previously and support using it to analyze the difference that inequality makes and whether it may be a plausible proximate explanation of the underperformance of LAC productivity growth estimated in the previous section.

---

[9] As shown by Barro (2000), this conditioning may be important. In his growth model, Barro finds that inequality retards growth in poor countries and encourages growth in richer countries (with little overall relationship). The vast majority of countries in our sample are in the richer set, and we disregard this interaction.

[10] See Solt (2020); SWIID (Standardized World Income Inequality Database), Frederick Solt, Department of Political Science, University of Iowa, Iowa City, IA, http://fsolt.org/swiid/.

[11] We also experimented with a variety of extrapolating equations to estimate missing inequality information using output per capita series as driving variables and, to augment the restricted sample, allowed country and time dummies, but did not find any reliable specification to model the change in country Gini indexes over time.

Table 16. Statistical significance of LAC growth gap (Non-LAC Benchmark, country-years with gini data)

	(1) Productivity growth	(2) Factor accumulation	(3) Per capita output growth
Per capita output gap (rel. USA)	0.030 (0.11)	-0.19 (0.16)	-0.16 (0.16)
LAC	-0.66*** (0.19)	-0.062 (0.25)	-0.72** (0.30)
Observations	2234	2234	2234

Source: Own calculations based on Penn World Tables (PWT).
Standard errors in parentheses. Clustering is at country level.
Regression equation: $g_{it} = \alpha + \sigma 1_{LAC} + \gamma_t + \beta(log(\frac{cgdpo_{it}}{pop_{it}}) - log(\frac{cgdpo_{USAt}}{pop_{USAt}})) + \epsilon_{it}$
$^{*}\ p < 0.1,\ ^{**}\ p < 0.05,\ ^{***}\ p < 0.01$

Table 17. Statistical significance of LAC growth gap, pre- and post-1990 (Non-LAC Benchmark,country-years with gini data)

	(1) Productivity growth	(2) Factor accumulation	(3) Per capita output growth
Per capita output gap (rel. USA)	0.029 (0.11)	-0.20 (0.16)	-0.17 (0.16)
LAC × pre 1990	-1.38*** (0.33)	-0.47 (0.35)	-1.84*** (0.47)
LAC × post 1990	-0.27 (0.23)	0.16 (0.30)	-0.10 (0.36)
Observations	2234	2234	2234

Source: Own calculations based on Penn World Tables (PWT).
Standard errors in parentheses. Clustering is at country level.
Regression equation: $g_{it} = \alpha + \sigma_1 1_{LAC,pre1990} + \sigma_2 1_{LAC,post1990} + \gamma_t + \beta(log(\frac{cgdpo_{it}}{pop_{it}}) - log(\frac{cgdpo_{USAt}}{pop_{USAt}})) + \varepsilon_{it}$
$^{*}\ p < 0.1,\ ^{**}\ p < 0.05,\ ^{***}\ p < 0.01$

Taking Tables 16 and 17 as our baseline for this section, our next step is to extend the data, 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.[12] In both tables, this measure of income inequality appears to be an adverse factor for productivity growth with very high statistical significance. But it is largely irrelevant for the overall growth of output per capita because of its offsetting positive association 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. Having established that inequality is a productivity covariate worth exploring, the question becomes the following: can income inequality account for the LAC productivity growth shortfall? More generally, is subpar LAC overall growth performance associated with a highly unequal status (given the stage of development in LAC)? To answer this question we examine how LAC fixed effect estimates change when we control for income inequality.

[12] We also experimented with a quadratic term and did not obtain any evidence of a nonmonotonic effect in our sample.

Table 18. Statistical significance of LAC growth gap (Non-LAC Benchmark)

	(1) Productivity growth	(2) Factor accumulation	(3) Per capita output growth
Gini coefficient	-0.058***	0.050	-0.0073
	(0.014)	(0.035)	(0.033)
Per capita output gap (rel. USA)	-0.27**	0.071	-0.20
	(0.14)	(0.25)	(0.23)
LAC	-0.12	-0.54	-0.66
	(0.21)	(0.45)	(0.48)
Observations	2234	2234	2234

Source: Own calculations based on Penn World Tables (PWT).
Standard errors in parentheses. Clustering is at country level.
Regression equation: $g_{it} = \alpha + \sigma 1_{LAC} + \gamma_t + \beta_1 Gini_{it} + \beta_2 (log(\frac{cgdpo_{it}}{pop_{it}}) - log(\frac{cgdpo_{USAt}}{pop_{USAt}})) + \varepsilon_{it}$
$^{*}\ p < 0.1,\ ^{**}\ p < 0.05,\ ^{***}\ p < 0.01$

Table 19. Statistical significance of LAC growth gap, pre- and post-1990 (Non-LAC Benchmark)

	(1) Productivity growth	(2) Factor accumulation	(3) Per capita output growth
Gini coefficient	-0.055***	0.053	-0.0020
	(0.013)	(0.036)	(0.033)
Per capita output gap (rel. USA)	-0.26	0.082	-0.18
	(0.13)	(0.25)	(0.22)
LAC × pre 1990	-0.78**	-1.04*	-1.82***
	(0.37)	(0.57)	(0.63)
LAC × post 1990	0.21	-0.29	-0.087
	(0.24)	(0.44)	(0.50)
Observations	2234	2234	2234

Source: Own calculations based on Penn World Tables (PWT).
Standard errors in parentheses. Clustering is at country level.
Regression equation: $g_{it} = \alpha + \sigma_1 1_{LAC,pre1990} + \sigma_2 1_{LAC,post1990} + \gamma_t + \beta_1 Gini_{it} + \beta_2 (log(\frac{cgdpo_{it}}{pop_{it}}) - log(\frac{cgdpo_{USAt}}{pop_{USAt}})) + \varepsilon_{it}$
$^{*}\ p < 0.1,\ ^{**}\ p < 0.05,\ ^{***}\ p < 0.01$

Concerning productivity growth, Table 18 shows that, compared with 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, high inequality in LAC may largely account for the productivity growth shortfall. In fact, in the post-1990 subperiod, it appears that it overexplains the productivity growth gap (Table 19).

Figure 14 shows the productivity growth gap accounted for by inequality in each country over time, so that a positive number reflects the portion of the gap accounted for by inequality. Because each Latin American country is more unequal than the average extraregional country, the Gini index consistently accounts for a portion of the productivity growth gap (or may overexplain it).[13] Nonetheless, in most countries, this inequality effect shows a tendency to decline over time as the inequality gap in LAC countries tend to diminish.

[13] Bolivia and Venezuela were dropped because of a lack of inequality data.

Figure 14. Adjustments for Gini index vs. non–LAC

Source: Own calculations based on Penn World Tables (PWT).

However, inequality does not account for the shortfall of overall per-capita output growth because high inequality is also associated with faster factor accumulation (compare Table 18 with Table 16)). When we control for inequality, LAC exhibits a large shortfall in factor accumulation, 0.54 points, so the unexplained overall gap in per capita output growth 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 we control for inequality, LAC actually shows above-par productivity growth, which is offset by subpar factor accumulation (both gaps are statistically insignificant). Thus, controlling for inequality reverses the unconditional results shown in Table 16 and Table 17, where LAC pro-

ductivity growth was weaker and factor accumulation was stronger. We leave for future work the in-depth analysis of the links between inequality and the sources of growth.

6. Concluding remarks

The 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 the gap in output per capita growth 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 technology use throughout an 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. Changes in the failures leading to resource misallocation thus directly impact TFP growth. Furthermore, resource misallocation may itself impede technology adoption and cause low TFP growth. Diagnosing the sources of the gap in productivity growth identified in this paper requires the consideration of resource misallocation and its drivers.

We have explored the association of inequality and growth to look at whether LAC's high inequality may account for the region's poor growth performance. We find that there is evidence that inequality is an important factor associated with the gap in long-term productivity growth and fully accounts for the post-1990 gap. Whether inequality is a proximate cause or an epiphenomenon, this observation is relevant for diagnosing LAC's sustained gap in productivity growth. Nevertheless, high inequality does not account for the shortfall in overall growth because it actually appears to facilitate factor accumulation.

7. Statistical appendix

The data for the growth accounting (Sections 1–3) are from the Penn World Table, version 9.1.[14] 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 trends in the terms of trade).

Following Feenstra, Inklaar, and Timmer (2015), growth accounting exercises are based on the variable real GDP using national-account growth rates (RGDPNA), which is recommended for studies comparing (output-based) growth rates across countries. TFP is the corresponding variable RTFPNA estimated in the Penn World Table. By contrast, output per capita with

14. See Feenstra, Inklaar, and Timmer (2015); Penn World Table (database, version 9.10), Groningen Growth and Development Centre, Faculty of Economics and Business, University of Groningen, Groningen, the Netherlands, https://www.rug.nl/ggdc/productivity/pwt/.

respect to the United States, utilized to measure the distance to the frontier at each point in time, is based on the variable output-side GDP at current purchasing power parities (CGDPo), which is recommended for comparisons of relative productive capacity across countries at a single point in time.

We put together a panel with annual information for 71 countries in 1961–2017 that are divided into the following groups:

(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 economies, divided into the following:

- United States
- (4) East Asian tigers: Hong Kong SAR, China; Republic of Korea; Singapore; and Taiwan, China
- (14) Africa: Burkina Faso, Cameroon, Côte d'Ivoire, Egypt, Kenya, Morocco, Mozambique, Niger, Nigeria, Senegal, South Africa, Tunisia, Tanzania, and 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, the Netherlands, New Zealand, Norway, Philippines, Portugal, Romania, Spain, Sri Lanka, Sweden, Switzerland, Thailand, Turkey, and the 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; Burkina Faso; Cameroon; Côte d'Ivoire; Hong Kong SAR, China; Indonesia; Mozambique; Niger; Romania; Senegal; Singapore; Tunisia; and Tanzania had missing TFP data in the first years (before 1964). For these economies, the missing variable LRTFPNA was estimated based on the predicted values of economy-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 used was 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

To filter out the business cycle, the average of the annual growth rates during seven-year periods were considered with rolling windows (and assigned to pre- and post-1990 observations depending on where the window or most of it lay). For the purpose of sections 1 and 2, we considered fixed windows: 1962–68, 1969–1975, 1976–1982, 1983–1989, 1990–1996, 1997–2003, 2004–2010, and 2011–2017. The year 1990 divides the time span into 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 United States for each country (*lcgdpoPerCapitaUSA*) was constructed as the logarithm of the output per capita *gap cgdpoPerCapita/cgdpoPerCapitaUSA* during the period.

The dataset for section 4 includes inequality data of the Standardized World Income Inequality Database (SWIID), by Solt (2020).15 This includes consistently estimated series of the Gini index of disposable income. The new, smaller database contains some missing information before 1980 and includes only 65 countries (instead of 71), of which 14 are LAC countries: Argentina, Barbados, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, Guatemala, Jamaica, Mexico, Peru, Trinidad and Tobago, and Uruguay.

[15] See Solt (2020); SWIID (Standardized World Income Inequality Database), Frederick Solt, Department of Political Science, University of Iowa, Iowa City, IA, http://fsolt.org/swiid/.

References

Barro, Robert J. (2000). "Inequality and Growth in a Panel of Countries". *Journal of Economic Growth*, 5 (1): 5–32.

Daude, Christian, and Eduardo Fernández-Arias. (2010). "On the Role of Productivity and Factor Accumulation in Economic Development in Latin America and the Caribbean". IDB Working Paper IDB-WP-155 (February), Research Department, Inter-American Development Bank, Washington, DC.

Easterly, William Russell, and Ross E. Levine. (2001). "What Have We Learned from a Decade of Empirical Research on Growth? It's Not Factor Accumulation: Stylized Facts and Growth Models". *World Bank Economic Review*, 15 (2): 177–219.

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

Fernández-Arias, Eduardo, and Sergio Rodríguez-Apolinar. (2016). "The Productivity Gap in Latin America: Lessons from 50 Years of Development". IDB Working Paper IDB-WP-692 (May), Research Department, Inter-American Development Bank, Washington, DC.

Hsieh, Chang-Tai and Peter J. Klenow (2009), "Misallocation and Manufacturing TFP in China and India,"Quarterly Journal of Economics, 124(4), 1403–1448.Loayza, Norman V., Pablo Fajnzylber, and César Calderón. (2005). *Economic Growth in Latin America and the Caribbean: Stylized Facts, Explanations, and Forecasts*. Report 32180. Washington, DC: World Bank.

Ostry, Jonathan D., Andrew Berg, and Charalambos G. Tsangarides. 2014. "Redistribution, Inequality, and Growth". IMF Staff Discussion Note SDN/14/02 (February), International Monetary Fund, Washington, DC.

Restuccia, Diego and Richard Rogerson (2008), "Policy Distortions and Aggregate Productivity with Heterogeneous Plants,"Review of Economic Dynamics, 11, 707–720.

Solt, Frederick. (2020). "Measuring Income Inequality across Countries and Over Time: The Standardized World Income Inequality Database". *Social Science Quarterly*, 101 (3): 1183–1199.

COMPLETE LIST OF BACKGROUND PAPERS OF THE UNDP LAC REGIONAL HUMAN DEVELOPMENT REPORT 2021

Working paper 01
The Changing Picture of Inequality in Latin America: Evidence for Three Decades
Leonardo Gasparini / Guillermo Cruces

Working paper 02
Intergenerational Mobility in Latin America in Comparative Perspective
Florencia Torche

Working paper 03
Longer-run Perspectives on Intergenerational Mobility in Latin America: 1933-1992
Guido Neidhöfer

Working paper 04
The Latin American Growth Shortfall: Productivity and Inequality
Eduardo Fernández-Arias / Nicolás Fernández-Arias

Working paper 05
Big Business and the Inequality Trap in Latin America: Taxes, Collusion, and Undue Influence
Ben Ross Schneider

Working paper 06
Lobbying for Inequality? How Business Elites Shape Differently Policy in El Salvador, Honduras, and Guatemala
Mónica Pachón / Javier Brolo

Working paper 07
How do Labor Unions Affect Inequality and Efficiency in Latin America and the Caribbean?
Lucas Ronconi

Working paper 08
The Political Economy of the Telecommunications Reform in Mexico
Alejandro Castañeda / Daniel Ruiz

Working paper 09
The Impact of Labor Market Institutions on Markups and Markdowns: Evidence from Manufacturing and Service Sectors in Uruguay
Carlos Casacuberta / Néstor Gandelman

Working paper 10
Labor Market Concentration and Earnings: Evidence from Chile
Álvaro García-Marín

Working paper 11
Market Concentration, Market Fragmentation, and Inequality in Latin America
Marcela Eslava / Marcela Meléndez / Nicolás Urdaneta

Working paper 12
The Effects of Violence on Inequality in Latin America and the Caribbean: A Research Agenda
Ana Arjona

Working paper 13
Inequality and Crime in Latin America and the Caribbean: New Data for an Old Question
Ernesto Schargrodsky / Lucía Freira

Working paper 14
Mercados laborales fragmentados y el Sistema de Protección Social en Colombia
Francisco Alvarado / Marcela Meléndez / Marcela Pantoja

COMPLETE LIST OF BACKGROUND PAPERS OF THE UNDP LAC REGIONAL HUMAN DEVELOPMENT REPORT 2021

Working paper 15
¿Cuán eficaz es la protección social en Chile?
Matías Morales / Camila Olate

Working paper 16
Proteccion social, formalidad y subsidios cruzados: evidencia para la Argentina
María Laura Alzua / Ana Pacheco

Working paper 17
Políticas de protección social y laboral en el Perú. Una espiral de buenas intenciones, malos resultados y peores respuestas
Hugo Ñopo

Working paper 18
Políticas de protección social y laboral en la República Dominicana
Sócrates Barinas / Hugo Ñopo

Working paper 19
Políticas de protección social y laboral en Ecuador
Hugo Ñopo / Alejandra Peña

Working paper 20
Social Protection in Jamaica: Strenghts and Limitations of its Redistributive Mechanisms
Manuel Mera

Working paper 21
¿Cuán efectiva es la protección social en Honduras?
Andrés Ham / Sergio Membreño-Cedillo

Working paper 22
Informal and Small: How Labor Market Institutions Affect Inequality, Income Volatility and Labor Productivity in Brazil
Sergio Firpo / Alysson Portella

Working paper 23
El sistema de protección social y laboral en México: contribución paradójica a la lucha contra la desigualdad
Alejandra Correa / Maite García de Alba / Alejandra Martínez / Cynthia Martínez / Annabelle Sulmont

Working paper 24
Time for a New Course: An Essay on Social Protection and Growth in Latin America
Santiago Levy / Guillermo Cruces

Working paper 25
Implications of Minimum Wage Policies for Labour Markets with High Informality and Frictions
Luca Flabbi