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# Regional Poverty Dynamics in Peru: The Role of Growth and Inequality

Recent Evidence

by

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In the last decades Peru experienced an unprecedented reduction in poverty amid a strong and sustainable economic rebound following structural reforms introduced in the 1990s which paralleled a downtrend in income inequality. Using microdata from the National Survey of Households (ENAHO) this study formally tests the simultaneous role of growth and inequality on poverty outcomes from 2007 to 2019. Unlike previous research for the country, it focuses on regional poverty dynamics highlighting the implications of regional idiosyncrasies and how they interplayed with the variables studied. It further looks at how growth and inequality affected the poor from a spatial dimension, that is, considering the marked differences between rural and urban poverty within regions. The main finding is that growth strongly accounts for most of the poverty reduction observed in the country during the period investigated by increasing the incomes of the poor. By contrast, the role of inequality was uncertain and heavily dependent on the specification of the sample used. In the poorest regions and rural areas, income disparities restrained the power of growth for poverty alleviation. There, lack of access to essential public services amplified the unpleasant effects of inequality.

*Keywords: poverty, growth, inequality, Peru, informality.*

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# 1 Introduction

## 1.1 Research Problem

High inequality has long been a distinguished feature of Latin America (LAC, forthcoming) (OCDE, 2019a; Londoño & Székely, 2000; Deininger & Squire, 1996). Unable to catch-up with the developed world, some scholars put forward the role of inequality at explaining LAC's backwardness (Bértola et al., 2010; Ferranti et al., 2004). However, falling inequality in the region as observed in the last decades have redirected the scholar debate to the drivers and implications of such trend (ed. Bértola & Williamson, 2017; Amarante & Prado, 2017; Alvaredo & Gasparini, 2015; Lustig, Lopez-Calva, & Ortiz-Juárez, 2012).

Yet, looking exclusively at the dynamics of inequality would undermine the efficiency of policies aiming at fighting poverty, the greatest challenge in the developing world as recognised in the Sustainable Development Goals. By the same token, letting inequality take care of itself would be a bad gamble as the voluminous research on this score had underlined that inequality restrains the well-documented poverty-reducing effects of growth (Dabla-Norris et al., 2015; Ravallion, 2004).

The nurtured research devoted to uncovering the relationship between growth, poverty and inequality has been rather inconclusive. Studies on the effects of growth on poverty and inequality in the region have yielded an apparent trade-off between the role of sound macroeconomic policies aimed at securing economic stability and progressive redistribute polices to reach the worse-off in the income distribution ladder, mainly the poor (see Rodríguez-Castelán et al., 2016; Cornia, 2014; Tsounta & Osueke, 2014; Azevedo et al., 2013; Goni, Lopez & Servén, 2008) underscoring, instead, the importance of country specificity, constraining adequate options for policymaking.

Certainly, understanding the dynamics of poverty, inequality and growth is paramount for developing countries to establish the right development strategy (Bourguignon, 2004). The

study of Peru which by the end of the 1980s was considered a basket economy, but after two decades experienced a strong and sustainable economic rebound, will help to throw more light on this conundrum.

In the 1960s Peru was one of the Latin American countries with the highest inequality (Chong & Gradstein, 2007). However, since the 1990s the country embarked on a series of growth-enhancing structural reforms that parallel massive reduction of poverty, with more than 10 million people out of this condition, and a reverse of high inequality (World Bank, 2017a).

While research has shown that poverty in Peru mirrored economic growth –measured as GDP –, the role of inequality in this equation has been rather ambiguous (Granada, 2016; García & Céspedes, 2011; Yamada & Castro 2007). Accordingly, during the period above-mentioned, income distribution experienced unexpected swings, nonetheless, with a sharp downtrend towards the end of the last two decades alongside rapid growth (Expósito, Fernández-Serrano & Velasco, 2017; Granada, 2016; Yamada, Castro & Bacigalupo, 2012; Mendoza, Leyva & Flor, 2011). Hence, the extent to which inequality might have restrained or boosted poverty reduction in Peru has been little investigated, partly because data constrains.

Moreover, literature on the link between poverty, inequality, and growth, while available, has been dispersed, overlapping, and limited to mostly household data assembled from different methodologies which, as pointed by scholars, tends to mask information hindering adequate metrics for inequality (Korinek, Mistiaen & Ravallion, 2006).

Therefore, the purpose of this research is to lay out these facts hitting on two broad questions presented head-on: did recent economic growth spells in Peru (2007-2019) were pro-poor? If so, did inequality hamper or not poverty-reducing growth effects? Using newly compiled household data, addressing the above stated shortcomings, this research will look at regional poverty dynamics in the country including a spatial dimension in its analysis, that is, further distinguishing between rural and urban poverty outcomes within the regions. To the best knowledge of the author, this is the first attempt to empirically test the simulations of growth and inequality on poverty taking the approach thereof.

The main finding of this work gives support to previous evidence on the role of growth for poverty reduction in the country but stresses the role of inequality which proved to restrain the benefits of growth.

The study further seeks to contribute with evidence to have more informed policy making in the country, much more needed against the current global context that flags continuous headwinds for sustained poverty reduction. The economic and health fallout left by the ongoing Corona pandemic will likely push 5 million people into extreme poverty in LAC, a number that worsening-inequality scenarios would increase (Lakner et al., 2021) so, the right policies mix, aiming at both fuel economic growth and to address high levels of inequality in the poorest regions will help the country to shield from this and future perverse external shocks that disproportionately affect the poor and vulnerable-to-poverty groups.

## 1.2 Aim and Scope

The goal of this research is to throw more light on the relationship between growth-poverty-inequality in developing countries taking the case of Peru, which experienced a strong and sustained economic rebound after its “lost decade” in the 1980s. It focuses on the last economic growth spells spanning from 2007 to 2019 that includes the super economic cycle driven by the “commodity boom”. It is during this period that socioeconomic indicators swiftly swept. High GDP growth rates parallel drastic poverty cuts and declining income disparities.

It is worth stressing that this paper does not deal with the analysis on the determinants of poverty. Neither with the role of growth for poverty reduction which has been extensively studied. The study falls into the category of the growing body of literature extending the analysis of the former by including in its scope how distributional changes affect poverty outcomes following the pioneering works of Datt and Ravallion (1992), Kakwani (1993) and Bourguignon (2003, 2004). They look at the “triangle” growth-poverty-inequality and not at the bivariate relationship growth-poverty.

The empirical strategy to address the aim of the study is a Fixed Effect (FE) model that uses microdata from the National Survey of Households (ENAH). It links poverty outcomes with simultaneous changes in growth and inequality at regional level. This specification includes time-varying region’s characteristics picked up from data inspection and previous related studies. One limitation of the approach taken by the present study is that it does not directly addresses the channels through which growth and inequality affect poverty.

This shortcoming is partially addressed by looking at the documented forces identified in the literature through which the variables thereof operate namely labour market effects i.e. labour incomes and redistribute policies –here understood as those aimed at increasing the stock of Human Capital through investments in education, health, and infrastructure–. Using official data on social indicators and public expenditures, the study will abstract from the linkages through which both growth and inequality reach the poor.

### 1.3 Outline of the thesis

The remaining of the thesis is organised as follows. Section 2 gives contextual information on the socioeconomic development in Peru since 1980 and recent trends on growth, poverty and inequality which constitutes the departing point of this research. The section includes a review of the literature concerning the relationship growth-poverty-inequality and the empirical evidence for Peru. Section 3 formally deals with the research questions to be addressed in the study, the definitions, and the methodological approach adopted to conduct the analysis. This section summarises the main features of regional poverty reduction. Section 4 presents and discusses the main findings of the research. Finally, Section 5 concludes with a summary of the study and a short policy implications discussion. It includes prospects of research on the topic.

## 2 Background and Literature Review

This section presents a brief overview of the socioeconomic performance of the Peruvian economy since the late 1980s. It also reviews the literature and evidence on the link growth-poverty-inequality.

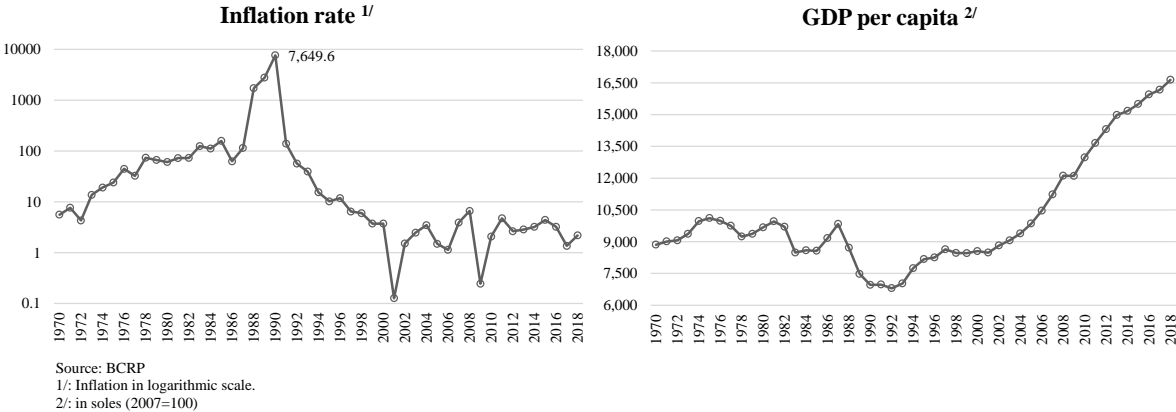
### 2.1 Peru's socioeconomic development

The last decades of the Peruvian economic history can be summarised in two marked periods: crisis and rapid recovery. During the 1980s the country experienced what has been referred in the literature for LAC as to its “lost decade”. Following an inward-looking, and poor economic policies –characterised by increasing fiscal spending and recurrent cyclical deficits–, the decade was marked by a hyper stagflation: Peruvian GDP and GDP per capita considerably contracted around 10% and 28%, respectively, while inflation reached a peak of 7,650% (Central Reserve Bank of Peru – BCRP, 2019a; Martinelli & Vega, 2018). See Figure 1.

Amid this backdrop, social indicators worsened. Income per capita fell below the levels observed in 1960s –a decade of record inequality (Chong, Galdo & Saavedra, 2008) – while

per capita consumption of the bottom 20% of the population decreased by 60%<sup>1</sup> (Llosa & Paniza, 2015; Glewwe & Hall, 1992). By the same token, poverty saw an upward trend going from 40.7% in 1985 to 54.2% in 1991 (Yamada & Castro, 2007).

Figure 1. Peru: economic indicators (1980-2018)



However, since the 1990s, the country’s socioeconomic performance drastically changed. Structural reforms were introduced aimed at enhancing the public finances through macroeconomic policies orientated to secure economic stability. These reforms included a

<sup>1</sup> Glewwe and Hall (1992) investigated of effects of policies adopted by the Peruvian Government during 1985-1990. The data compiled correspond to Lima -capital of the country- due to data constrains. One of the main findings of this work is the rise of poverty and a sharp reduction of consumption per capita of 50%, particularly pronounced for the poor population at the bottom 20% of the income/c consumption distribution ladder. With access to more data, Yamada and Castro (2007) reported a 3.2% annually reduction nationwide in this indicator for the period of 1985-1991.

strong commitment to fiscal rules, autonomy for the Central Bank, gradual liberalisation of markets, and opening of the economy through a freer trade policy (Martinelli & Vega, 2018; Baracat, et al., 2013).

The reforms underpinned the reduction in GDP's volatility and the rebound of the Peruvian economy (World Bank 2017a; Castillo, Montoya & Quineque, 2016). Since the 2000s, GDP growth averaged 5% annually<sup>2</sup>, and, by the end of 2018, inflation dropped to 2.2% (BCRP, 2019a). See Figure 1. This went in hand with an unprecedented reduction in poverty rates which fell from more than 50.7% in 1994 to 20.5% in 2018 (INEI, 2019a; Yamada & Castro, 2007). Other of poverty measures such as the poverty gap and the severity of poverty followed this downward trend (INEI, 2019a). This pattern holds for both different absolute measures (e.g., US\$ 1.9-day) and alternative measures (non-monetary) of poverty<sup>3</sup>.

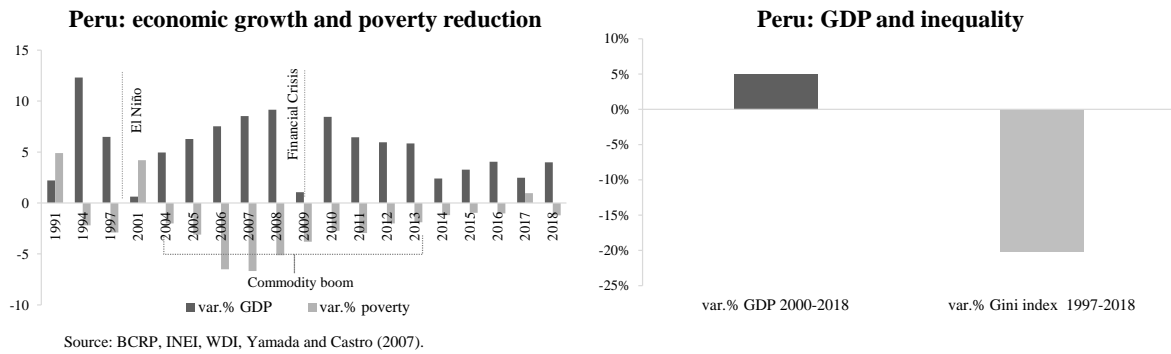
In a similar vein, inequality shortened although with a less clear trend during early 2000s. It worth nothing, however, that an accentuated turndown of inequality– measure as changes in the Gini Index– was observed since 2004 (World Bank, 2019b). See Figure 2.

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<sup>2</sup> This figure was 6.4% during the *commodity boom* cycle that took place during 2004-2013 (BCRP, 2019a).

<sup>3</sup> For instance, multidimensional poverty in Peru went from 20.2% in 2006 to 7.4% in 2018, moreover, the intensity in deprivation fell with improvements in areas related to education, health, and standards of living (United Nations Development Programme - UNDP & Oxford Poverty & Human Development Initiative - OPHI, 2020). Similarly, the country saw an upward trend in the Human Development Index - HDI in the last years, although at a much slower pace (UNDP, 2019).

Figure 2. Peru: socioeconomic indicators (1990-2018)



## 2.2 Previous Research

### 2.2.1 Linking economic growth, poverty, and inequality

The relationship between growth-poverty-inequality is not one that can be measure straightforward as the channels through which growth can affect poverty are various and *simultaneously* dependent on inequality outcomes. As better data and evidence became available, the literature has further elaborated on how of growth and inequality interplay for poverty reduction, yet it has hardly unanimously disentangled the relationship between them.

Influenced by the work of Kuznets (1955) and Lewis (1954), early studies on the effects of growth on poverty concluded that the former was, indeed, harmful for the poor as it tended to initially exacerbate income disparities. Certainly, during the 1970s and early 1980s, scholars were occupied verifying the inverted U-shaped Kuznets' curve in inequality alongside economic development episodes on a basis of cross-country analysis. Adelman and Morris (1973) strongly contented that benefits from growth were significantly captured by the rich. The authors put forward that Kuznetsian development raise not only relative inequality but tends to increase absolute poverty within lower income groups.

While Ahluwalia (1976) does not rule out *a priori* increasing-poverty scenarios amid economic growth, based on his analysis of countries at different development stages, he rejected Adelman



and Morris' hypothesis. Instead, he posits that *mean* income of the worse-off increases although at a much slower pace for those at upper income groups. Nonetheless, Ahluwalia himself agreed on upswings on inequality at early stages of economic development, a stylised fact that he verifies as independent of the pace of growth, echoing Paukert (1973)'s previous findings.

Chenery et al. (1974), on a more pessimistic side on the implications of Kuznets' postulates, reported zero or negative poverty-reducing effects of growth in less developed countries. Yet, as more data became available, exposing statistical biases entrenched in cross-section country analysis, previous finding on the effects of growth on poverty and inequality rendered questionable. Hence, the first studies undertaken considering time-series, and including more observations (developing countries) in their samples, showed that changes in inequality due growth *à la* Kuznets did not fit well for all countries (Bourguignon & Morrisson, 1998; Ram, 1988).

Thus, in marked contrast with the previous strand of the literature, the new economic thinking not only rejected the Kuznets' hypothesis, but failed at verifying any casual effect of growth on inequality, giving the former a more benign and preponderant role at reducing poverty. Accordingly, the work of Deininger and Squire (1996) suggested that there was not any systematic effect of growth on distributional changes while, according to the authors, data provided evidence for a strong negative link between growth and poverty. Ravallion (1995) further advanced that growth could lead to a decrease in the severity of poverty. These findings were reaffirmed by an ample literature on the topic including the work of Dollar and Kraay (2000), Dollar, Kleineberg and Kraay (2016) and Ravallion (2001).

Nevertheless this research body highlighted the pro-poor character of growth, it also shed light on the relevance of country factors shaping the poverty growth effects. For instances, Ravallion (1995) stated that growth did not have distributional effects, particularly, the relative position of the poor, but he acknowledges that economic growth does not account for the entire story for poverty reduction. He hypothesises about the potential role of initial conditions, "non-income" factors and changes in inequality as drivers of poverty outcomes besides economic growth. In Ravallion (1997) and (2001) he asserted that underlying high levels of inequality, as observed in developing countries, does restrain growth-poverty falls drawing attention to the importance of micro-country specific research to determine more accurately the outcomes in the process.

These views opened avenues for a vast literature focusing on inequality changes as countries grow. The work of Bruno, Ravallion and Squire (1999) underlined that as distributional changes tend to remain stable over time, growth reduces poverty. The authors observed that absolute poverty responded elastically to growth in 17 out of 20 countries studied. On one hand, this reinforced the *regular* pro-poor character of growth, and, on the other, the secular idea that changes in inequality are roughly uncorrelated with growth. Nonetheless, the authors draw attention to the negative effects of inequality on poverty. They formally estimated that high levels of inequality lower the benefits the poor get from growth, in other words, changes in distributional changes may, indeed, lead to substantial changes in poverty. These results were in line with earlier conclusions of Deininger and Squire (1996).

The upshot of these observations, based on more reliable data particularly for developing countries, is that both growth and inequality determine poverty outcomes. The corollary of this is an extensive and nurtured literature on measures to capture this bivariate relationship (Ravallion & Chen, 2001).

Interestingly, while the literature on this score reached a tentative consensus on that (i) inequality curbs the positive effects of growth, and (ii) growth does not either decrease or increase inequality, scholars had also inquired on potential causal effects of inequality on growth and, therefore, on poverty. The pioneering work of Galor and Zeira (1993), who at macroeconomic level analysis posit that initial distribution of wealth and income negatively affects output and investment, inhibiting countries' capacity to adjust to external shocks. The subsequent studies of Alesina and Rodrik (1994), Persson and Tabellini (1996), and Perotti (1996) point to that direction reaching the conclusion that greater ex-ante inequality renders lower growth.

More recent studies on this regard seem to validate this view and have looked further at the mechanisms through which inequality shapes growth and poverty, namely, the effects of *redistribution* policies. In a nutshell the main argument of this strand of the literature is that inequality can not only determine the pace and duration of growth spells (Berg et al., 2018; Berg, Ostry & Tsangaride, 2014; Berg, & Ostry, 2011), but also its effectiveness to reduce poverty (OECD 2018b; Dabla-Norris et al., 2015; Ravallion, 2004), the latter in accordance with prior findings.

Overall, literature has found it difficult to tease out the cause and effect of growth, poverty, and inequality, nor has been able to establish definitive relationships. Yet, in a too broad-brush assessment of it, it is possible to conclude that growth is essential for poverty reduction, but inequality matters as well. This is particularly important for policy-orientated discussions as the latter has been traditionally linked to redistributes polices amid structural reforms. And this is precisely the challenge to implement the right polices, as how inequality interplays with growth is, according to the evidence, highly subjected to country specificity (Ostry, Berg, Kothari, 2018; Bourguignon, 2004).

A final remark on the survey of the literature on growth-poverty-inequality is whether further differentiation between labour and wealth inequality –somehow masked in the analysis– yields the same conclusions stated above. This follows important studies (Lakner & Milanovic, 2016; Milanović, 2016; Piketty, 2014) calling forth efforts to implement more “progressive” redistribute polices as “the richest-rich” i.e., the top 1% are gaining more from current economic strategies and globalization. While important limitations of these studies have been pinpointed out (see for instance Ravallion, 2018; Góes, 2016; Krusell & Smith, 2015) some scholars had previously noted that growth-enhancing redistribute polices aimed at reducing poverty should concern wealth rather than income, as stressed by Bourguignon (2004).

However, in his seminal work Poverty–Growth–Inequality or “Triangle Model” Bourguignon himself asserts that income redistribute policies can, indeed, help the poor to accumulate wealth. Bearing this in mind and, to the fact that more recent data points out to wage or labour inequality as the main driver of inequality (Góes, 2016; Francese & Mulas-Granados, 2015), redistribute polices orientated to reduce income inequality remains –as noted above– a way to foster the poverty-reducing effects of growth. Evidence suggests that this has been, in part, the case of the recent turndown of poverty and inequality in LAC, including Peru, as it will be seen in the next subsection (Székely & Mendoza, 2017; Azevedo, Inchaust, & Sanfelice, 2013).

### 2.2.2 Evidence for Peru

While disperse and, to some extent, overlapping, taking as a whole, empirical evidence on the link growth, poverty, and inequality in Peru fits well the findings previously studied.

Earlier studies for the country showed that high levels of inequality coupled with economic deacceleration, that is, negative growth, resulted in increasing poverty in the country as

observed by Webb and Figueroa (1975), Glewwe and Hall (1992), and Yamada and Castro (2007). These authors underlined that worsening distributional changes, including a marked gap between rural and urban areas, tended to exacerbate the pervasive effects of stagnation experienced by the country, particularly in the 1980 decade.

The rapid growth observed since the 2000s, that followed suit the introduction of structural reforms in the preceding decade, triggered a genuine interest on a possible link between this pattern and the parallel reduction of poverty in the country, as suggested by the main economic theories. Escobal et al. (1998) noted that income distribution during the first years of the reforms improved income distribution in Peru. However, the effects of these policies aimed at securing economic growth on microeconomic welfare seemed to be diffuse since 2000s.

On one hand, scholars found a strong and negative impact of growth on both poverty and inequality (Mendonza & García, 2006; López-Calva & Lustig, 2010; Jaramillo & Saavedra, 2011). Yet, Francke and Iguñiz (2006) found worsening-inequality effects of growth drawing attention to potential problems in the household survey data used in the previous studies. Nonetheless, subsequent studies addressing this shortcoming in the main data source for the Peruvian case, showed a clearer picture of the effects of growth.

Using national accounts data and household data, Yamada and Castro (2007) showed that, certainly, inequality slightly increase from 1997 to 2004, but because of potential problems and efficiency of redistribute polices proxied in this study aby social expenditures in key areas (health, education, others). The authors contended that poverty mirrored shifts in economic growth, however, unpleasant effects of high levels of inequality counterweighted gains in poverty reduction.

These results were further supplemented by more recent rigorous studies accounting for a rebound in socioeconomic indicators in Peru<sup>4</sup>. García and Céspedes (2011) estimated the poverty-growth and poverty-inequality and decomposed the poverty reduction observed since 2000-2010 into the growth and redistribute components to assess the effects of growth during this period that investigated by Yamada and Castro (2007). They found that roughly 65% and 85% of poverty contraction was explained economic growth. Furthermore, they observed a decreased in inequality that might have reinforced this result.

This finding is also observed for this period by Mendoza, Leyva and Flor (2012) and Yamada, Castro and Bacigalupo (2012). The latter authors estimated that 25% of the reduction in the inequality was due to redistributed policies targeting the poor, while 75% equalizing effects of growth in the labour market that tended to reduce the gap between wages and salaries in the country.

Finally, Granada (2016) found in a pro-poor character in last growth episodes. According to his estimates 68% of the reduction of poverty was due economic growth and 32% a redistribute component between 2004 and 2015. He further observed that in Peru income per capita for the bottom 20% population increased 5% it so by 2% for the top 20%, reducing income disparities in the country.

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<sup>4</sup> The period analysed by Yamada and Castro (2007) includes an episode of economic contraction.

# 3 Data and Empirical Approach

## 3.1 Research questions

This paper explores the dynamics among recent economic growth spells in Peru and poverty and inequality outcomes focusing on the regions across the country. It seeks to answer two main questions (RQ):

- (i) Did growth lead to the reduction in poverty observed and was the role of inequality on this?
- (ii) Was the effect of growth felt evenly between and within regions? That is, in
  - a. Between lower, middle, and upper- income regions
  - b. Within regions, between rural and urban areas

The study further looks at the role of following documented channels through which growth and inequality operate for poverty reduction:

- c. Redistribute policies (fiscal packages including investments in human capital i.e. education and health services)
- d. Market forces (i.e. labour income)

## 3.2 Data and methods

The present study relies on household and national accounts data retrieved from the three major sources: the National Survey of Households (Encuesta Nacional de Hogares - ENAHO) retrieved from the National Statistics and Information Institute (Instituto Nacional de Estadística e Informática - INEI); the Integrated Public Sector Financial Administration System (SIAF-SP) from the Peruvian Ministry of Finance (MEF); and the Statistics of Educational

Quality (Estadísticas de la Calidad Educativa – ESCALE) obtained from the Peruvian Ministry of Education (Ministerio de Educación – MINEDU).

Conducted on annual and quarterly basis, the ENAHO provides comprehensive information at individual level namely regarding all households and its occupants. It is a continuous survey representative at national level because it is administered in both rural and urban areas covering the 24 Peruvian departamentos which are the first-level administrative subdivisions of the country. The study additionally includes the Constitutional Province of Callao and further distinguishes between Lima Metropolitan area and Lima Provinces<sup>5</sup>, hence, the study follows 26 regions in Peru from 2007 to 2019.

This comprehensive cross-national data allows to construct a balanced panel comprised of 12 waves of the ENAHO spanning over the period thereof, the most up to date information available for Peru. The study uses mainly information from 3 modules of the ENAHO for the construction of socioeconomic indicators and control variables. The first one, the Labour and Income module (ENAH001A-500) provides detailed information on employment, income, and expenditure of all households' members who are at least fourteen years old. With this information regional data on labour and disposable income, mean consumption, and within regional inequality –measured as Gini coefficients– are computed. One feature of this module is that it allows to estimate the level of regional labour informality, an important characteristic to consider in the Peruvian economy when assessing the effect of changes in economic growth and inequality on regional poverty (Herrera, 2017).

Social indicators are estimated based on the Household member's characteristics (ENAH001A-200) and Sumarias modules, respectively. The former contains information

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<sup>5</sup> Lima Provinces and Lima Metropolitana are both located in Lima departamento (Lima henceforth). Following INEI's criteria, the former includes 9 provinces of Lima (i.e. Barranca, Cajatambo, Canta, Cañete, Huaral, Huarochirí, Huaura, Oyón y Yauyos), while Lima Metropolitana refers only to Lima province that, in turn, is comprised by 43 sub districts.

mainly on population dynamics while the latter provides information on consumption at house level and poverty-associated indicators. For each region, total, rural, and urban poverty are calculated using INEI's yearly poverty lines. Poverty and labour-related indicators are linked employing household identification codes used in the survey's sample design.

To further assess the role of public policies on regional poverty, the study obtained information provided by MEF and Minedu. Public educational-related expenditures by regions are retrieved from the SIAF-SP system and supplemented with social indicators on Human Capital – understood as educational and health outcomes following Bezemer, Bolt & Lensink (2014)– and related-infrastructure public investments from ESCALE. The available information, however, is available for 25 out the 26 regions studied as they do not offer disaggregated information at district level for Lima, considering it as one region. Nonetheless this limitation, the analysis for the 24 remaining regions and Callao remains comprehensive at district level and, as previous research for the country suggests, results for Lima as one region are valid when assessing the performance of Peruvian regions on socioeconomic indicators as seen in Baldárrago and Salinas (2017).

### 3.3 Definitions and variables

#### 3.3.1 Who is poor in Peru?

This study will consider an absolute monetary poverty approach. This is because three-fold. While it is widely recognised that poverty is intrinsically a multidimensional phenome, a distinctive that this research acknowledges in line with a nurtured literature on the topic (see Alkire & Foster, 2011; Ferreira, 2011; Sen, 1993), and that solely focusing on measures derived from household income or consumption per capita would imply leaving aside important dimensions of welfare and look only to a one-dimensional aspect of it, it is also important to carefully consider the operational and definition of poverty which is sensitive to arbitrary welfare scaling (Ravallion, 2015).

Indeed, extending measures of welfare to poverty can yield fixed aggregated results difficult to disentangle from a policy perspective when non-monetary and monetary welfare aspects are set to a same scale i.e. single indexes which do not account for a varying responses of these



variables to either exogenous or endogenous shocks/changes, additionally constraining comparability between units of analysis (Bourguignon & Chakravarty, 2019; Ravallion, 1997). Secondly, an absolute metric provides a more suitable approach to address the aim of this research whose explicit goal is to evaluate changes in poverty rather than inequality, the former referred to as absolute levels of living<sup>6</sup>. Thus, as cogently stated in previous studies, absolute measures of poverty are relevant when surveying developing countries, particularly, middle-income countries where absolute standards of livings are more critical than definitions of well-being in relative terms (see for example Goldberg & Pavcnik, 2005).

Moreover, a relative poverty measure, that is, a pure a metric in distributional terms, will become independent of measures of growth, as noted by Bourguignon (2004). This might be at odds when investigating the effects of economic development on poverty, as relative changes in a country's income distribution might signal rising scenarios of relative poverty –how much increases (decreases) the income or consumption of one segment of the population *with respect* to other– even though growth might have conversely spurred people's standards of living, particularly at the lowest halves of the income distribution ladder, usually the poor (Bourguignon, 2004; Chen & Ravallion, 2013).

Hence, the layout of this research focuses on measures of absolute poverty. Accordingly, it considers as poor to those Peruvians leaving in households where its consumption falls below

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<sup>6</sup> For a thorough discussion on the definitions of poverty and inequality, and the desirable properties of poverty measures see Deaton (2005), Ravallion (2016) and Klase (2018).

the poverty line estimated by the INEI<sup>7</sup>. It is worth noting, however, that poverty lines in Peru are not fixed for the entire country as they are differently computed by region and updated on yearly basis.

### 3.3.2 Regional poverty: patterns and stylised facts

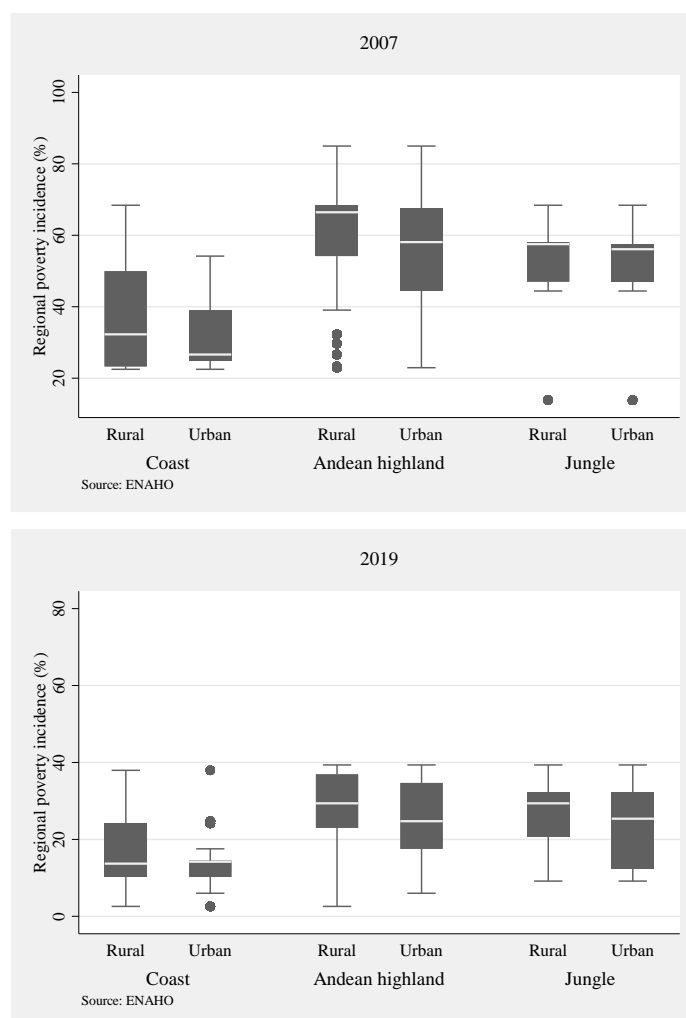
As discussed in section 2, poverty was reduced countrywide in the last decades amid strong economic rebound. On average regional poverty in Peru fell 26 pp. over the period of 2007-2019 with the largest reduction (48.1 pp.) in Huancavelica (the poorest region in 2019) and the lowest (4.7 pp.) in Madre de Dios (the third region with the lowest poverty rate in 2019). This is somehow expected as highlighted by the literature, poverty tends to *–everything else equal–* declined the most amongst regions (countries) with high levels of initial incidence. Thus, for Peru, at least 70% of the regions achieved reductions of at least 20 pp. (see Appendix A for information by region).

Yet, poverty levels varied enormously between and within regions. Coastal regions exhibited lower poverty rates compared to those in the southern Andean highlands with higher incidence in rural areas (see Figure 3). Notwithstanding these remained the poorest in 2019, they were also the regions that experienced the largest decreases during the studied period as noted above.

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<sup>7</sup> INEI's methodology consists of an estimation of both non-food and food components of per capita income or consumption at household level. The former refers to a basket of goods aimed at meeting a minimum energy nutrient-requirement for an average individual considering aspects such as sex, age, and area of residence, whereas the latter additionally includes expenditures to cover essential needs e.g. education, health, and housing. Households whose consumption is below the food-consumption poverty line are consider extreme poor, and those living below the non-food poverty line are poor (INEI, 2020). For this study poor are those living in households where consumption falls under the non-food poverty threshold.

Figure 3. Peru: poverty by natural region and area 2007 - 2019



The poorest regions share some features that, according to the literature, are strongly correlated with poverty. Chiefly among them are lower levels of educational attainment (i.e. low years of schooling and high share of the working population with only primary education), high levels of labour informality, and higher shares of native population. It is important to emphasise, however that, according to previous research for the country, controlling for other socio-demographic factors i.e. ethnicity, poverty in Peru remains a rural phenome (World Bank, 2015c). Not surprisingly, the poorest regions were also those with low levels of urban employment which has been associated to faster poverty decline in developing countries (Christiaensen & Todo, 2013).

Against this backdrop, an interesting picture emerges stressing the role of economic growth and inequality for poverty reduction. Hence, growth rates were substantially greater in the regions that made substantial progress at reducing poverty, suggesting a pro-poor character of the

economic development experienced by the country in last decades. One feature of this has been higher gains for the poor. For example, the income of the poor grew at a higher pace than the mean income in the most depressed regions. Yet, the role of inequality was ambiguous as it modestly dropped in the poorest regions and, in some of them, worsened as depicted in Table 1.

This first data inspection of the growth-equity patterns of the Peruvian economy seems to confirm the well-documented power of economic growth for poverty reduction and, at the same time, presents a rather blurring role of distributional changes across the studied regions within the country.

At first glance this challenges the notion that high levels of inequality render lower successive poverty reduction as reviewed in section 2. Nonetheless, literature has also underscored the slow pace at which inequality changes over the medium and long-run as observed for some of the poor Peruvian regions (Ravallion, 2005; Ferreira, 2010). Harnessing microdata from ENAHO, this research inquires and formally tests the role of both inequality and the power of growth spells for poverty reduction in Peru at regional level.

*Table 1. Features of poverty reduction for the 10% bottom regions 2007-2019*

	Huancavelica		Apurímac		Cajamarca		Ayacucho	
	2007	2009	2007	2009	2007	2009	2007	2009
<b>Poverty</b>	85.0	36.9	71.4	29.1	68.4	38.0	67.6	39.4
<b>Inequality</b>								
Market inequality	0.59	0.52	0.53	0.49	0.58	0.54	0.55	0.52
Disposable inequality	0.56	0.51	0.53	0.53	0.59	0.57	0.54	0.56
Consumption inequality	0.42	0.28	0.38	0.31	0.43	0.40	0.41	0.33
<b>Growth (annual average growth)</b>								
GDP	3.0%		12.1%		2.9%		5.9%	
GDP per capita	4.9%		12.2%		2.9%		5.6%	
Labour income (mean)	6.0%		8.2%		6.0%		6.1%	
Disposable income (mean)	5.7%		7.0%		5.1%		5.3%	
Consumption (mean)	9.1%		8.0%		7.1%		6.4%	
Labour income (poor)	6.3%		8.5%		5.4%		5.2%	
Disposable income (poor)	5.4%		7.0%		4.4%		4.1%	
<b>Regional factors</b>								
Native population (% population)	78.4	74.3	71.2	89.5	2.6	3.6	77.7	79.9
Years of schooling	7.1	7.9	8.3	8.7	7.7	7.8	8.2	8.4
Population with only primary education (% working population)	55.2	41.2	49.8	34.8	58.2	48.9	48.0	37.4
Informality rate	93.4	92.0	91.4	85.4	92.5	87.9	91.2	87.0
Urban employment	16.9	24.9	30.7	43.3	25.4	36.8	44.3	58.3

Source: ENAHO.

### 3.3.3 What is understood as inequality?

There is a robust literature on inequality yet, it can be broadly summarised as a measure that reflects “disparities in levels of living” (Ravallion, 2016). To capture this, scholars have developed and used different indicators such as the Theil Index, Gini Index and Mean Log Deviation (MLD). For the purpose of this research the Gini Index, calculated by region, will be used to measure how unequal are the regions of Peru. While this measure presents some limitations as stressed in Piketty (2014), it is a relative and straightforward way of measuring inequality that satisfies the so-called “transfer axiom”, a property that any measure of income dispersion should fulfil<sup>8</sup>.

Following Solt (2020) the study estimates market (before taxes and transfers) and disposable inequality (after taxes and transfers) using household data for each region and the country, focusing on the latter throughout the analysis. Results from this estimation and data yielded higher Gini coefficients for the country compared to those found in publicly available data from the World Bank and the Standardized World Income Inequality Database (SWIID), however, they follow the same downtrend over the studied period (see Appendix B for further details and results for Gini coefficients by region).

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<sup>8</sup> Atkinson (1970), Cowell (2000), Mornet et al. (2013), and Ravallion (2016) present a detailed discussion on measures of inequality hitting on this issue.

Table 2. Gini coefficients estimates 2007 - 2019

	SWIID		World Bank	Study	
	Disposable inequality	Market inequality		Disposable inequality	Market inequality
2007	50.6	53.8	50	56.5	55.4
2008	49.4	52.7	47.5	55.9	54.1
2009	48.5	51.8	47	56.2	54.1
2010	47.6	50.8	45.5	56.2	53.4
2011	46.5	49.7	44.7	55.3	52.0
2012	46.1	49.3	44.4	54.6	51.6
2013	45.6	48.8	43.9	54.0	50.7
2014	45	48.1	43.1	53.6	50.2
2015	45	48.2	43.4	53.2	49.9
2016	45.1	48.6	43.6	53.7	50.6
2017	45.1	48.5	43.3	53.2	49.8
2018	45	48.4	42.4	52.8	49.3
2019	n.d.	n.d.	41.5	52.1	48.6

Source: WDI, SWIID, ENAHO.

### 3.3.4 Variables: statistics and summary

As it will be reviewed in the following section, the study will implement a model that relates growth and inequality measures to assess changes in regional poverty in Peru. In this brief subsection the variables used for that purpose are presented in Table 2. See Appendix C for aggregate Panel data descriptive statistics.

Following one score of the literature on economic welfare for poverty reduction, this research uses as a measure of economic growth the income by region as in Fosu (2017), Dollar, Kleineberg and Kraay (2015, 2016), Ligon and Sadoulet (2008), Kalwij and Verschoor (2007), Besley and Burgess (2003), and Dollar and Kraay (2002)<sup>9</sup>. The reason behind this is straightforward. Firstly, the aim of the study is to look at how the poor in the regions of Peru fared during recent growth spells and, as previously noted by (Bourguignon, 2003, 2004), if

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<sup>9</sup> Other studies, looking at sectoral growth patterns have used instead measures of economic welfare the GDP and GDP per capita adjusted by its share over total GDP, other used income of the poor and GDP simultaneously. Examples of this can be found in Janvry and Sadoulet (2010), Ravallion and Datt (2002), and Bravo-Ortega and Lederman (2005).

there is some agreement amongst scholars is that growth affects the poor mainly through incomes which constitutes the main source to escape poverty.

Secondly, ENAHO allows to harness the information at microlevel, that is, looking at individual level that will inform the distributional function for each region, further distinguishing between income from labour and rents i.e. labour and disposable income. The study focuses on the former when addressing the channels through which growth and inequality affect the poor as labour (a “function” of human capital) is the main asset for them (Attanasio et al., 2001; Ziliak, 2003).

One concern about using such measure is the well-known debate around potential problems when using either income or expenditure data from household surveys, likely to be underestimated. Deaton (2001, 2005) has not only thoroughly discussed and stated the shortcomings related to the usage of this data, but the inconsistencies between the former and national accounts data (NAS), a view endorsed by Ravallion (2001, 2003).

Previous research for Peru had already underlined these flaws when assessing the welfare effects of economic growth (as in Francke & Iguñiz, 2006; García & Céspedes, 2011). Nevertheless, more recent studies have highlighted the convergence between the information provided by the national household data (the ENAHO) and the NAS from 2001 onwards (see for example Yamada, Castro & Bacigalupo, 2012).

*Table 3. Panel data descriptive statistics*

<b>Variable</b>		<b>Mean</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>	<b>Observations</b>
Net labour income	overall	11,587.5	3,669.8	4,211.6	22,313.6	N = 338
	between		3,080.1	7,006.8	18,469.6	n = 26
	within		2,077.9	5,545.1	16,047.4	T = 13
Disposable income	overall	10,652	3,548.9	4,016.1	21,084.0	N = 338
	between		3,133.2	6,227.1	17,742.5	n = 26
	within		1,768.5	5,484.8	14,921.3	T = 13
Mean consumption	overall	5,892.2	2,009.1	1,601.9	12,531.4	N = 338
	between		1,673.0	3,353.2	10,184.0	n = 26
	within		1,156.3	3,099.9	8,739.2	T = 13
Consumption inequality	overall	0.33	0.05	0.21	0.45	N = 338
	between		0.04	0.24	0.41	n = 26
	within		0.02	0.27	0.42	T = 13
Market inequality	overall	0.50	0.05	0.35	0.61	N = 338
	between		0.05	0.41	0.57	N = 338
	within		0.03	0.45	0.59	n = 26 T = 13
Disposable inequality	overall	0.53	0.05	0.37	0.64	N = 338
	between		0.05	0.42	0.61	n = 26
	within		0.02	0.48	0.60	T = 13
Unemployment rate	overall	3.43	1.44	0.49	8.90	N = 338
	between		1.23	1.43	6.06	n = 26
	within		0.78	1.51	7.04	T = 13
Urban employment	overall	66.6	21.30	16.83	100.00	N = 338
	between		21.46	21.07	100.00	n = 26
	within		3.12	56.55	74.89	T = 13
Informality rate	overall	79.3	9.50	53.75	94.35	N = 338
	between		9.34	58.51	91.56	n = 26
	within		2.47	73.41	86.41	T = 13

N: panel observations; n: number of regions; T: years covered.



<b>Variable</b>		<b>Mean</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>	<b>Observations</b>
Share of working population with at least primary education	overall	31.96	12.18	8.42	59.19	N = 338
	between		12.02	10.59	54.43	n = 26
	within		2.99	23.08	39.92	T = 13
Share of native population	overall	36.27	28.51	0.17	96.36	N = 338
	between		28.66	1.00	90.23	n = 26
	within		4.57	17.98	51.60	T = 13
Share of Afroperuvian population	overall	2.39	4.48	0.00	30.63	N = 338
	between		3.04	0.07	12.85	n = 26
	within		3.34	-6.33	25.34	T = 13
Share of white population	overall	3.31	3.00	0.00	16.82	N = 338
	between		2.69	0.17	10.83	n = 26
	within		1.40	-3.67	9.30	T = 13
Share of mixed population	overall	47.39	23.86	1.36	99.13	N = 338
	between		23.44	2.93	79.02	n = 26
	within		6.27	27.49	72.59	T = 13
Regional poverty	overall	29.51	17.03	2.36	84.98	N = 338
	between		14.84	6.62	54.64	n = 26
	within		8.83	8.81	59.85	T = 13
Rural regional poverty	overall	40.85	23.86	0.00	92.23	N = 338
	between		21.05	0.00	67.23	n = 26
	within		11.91	15.54	91.05	T = 13
Urban regional poverty	overall	20.34	10.35	1.56	54.41	N = 338
	between		8.17	5.78	35.49	n = 26
	within		6.53	6.20	45.68	T = 13

N: panel observations; n: number of regions; T: years covered.

### 3.4 Empirical strategy

The relationship between growth-poverty and inequality has been studied under the umbrella of three broad approaches summarised in Ferreira (2010). The first approach consists of a series of cross-country analysis that to a great extent echoed the specification of the tringle poverty-growth-inequality first introduced by Datt and Ravallion (1992) –aiming at directly decompose the contribution of growth and inequality on poverty changes– using data at aggregated level, defined by each economy’s general equilibrium (Ferreira, 2010). Yet, as noted by Ferreira

(2010), most of these studies had seldom estimated models directly addressing a *simultaneous* effect of the variables here studied using models as:

$$p(y) = \beta y + \gamma X + \varepsilon \quad (1)$$

Where  $p$  is a measure for poverty,  $y$  a measure for economic growth,  $X$  a vector of control variables, and  $\varepsilon$  the error term assumed to be a white noise error (see Ravallion & Chen, 1997). A second approach in the literature has been to incorporate data from NAS to throw more light on the contribution of different growth patterns to poverty reduction. They specifically look at the role of sectoral growth controlling for country-factors (see de Janvry & Sadoulet, 2010; Ferreira, Leite & Ravallion, 2010).

A third approach exploits microdata, that is, individual rather than aggregated information on incomes (as opposed to the first approach) to evaluate changes in poverty controlling for individual drivers of poverty that might be endogenous with variables contained in the vector  $X$  (Ferreira, 2010). In a nutshell, they attempt to decompose changes in poverty accounting for two marked effects i.e. growth and distributional effects whereby the main driver is changes in individual income (Bourguignon, 2004; Ferreira, 2010).

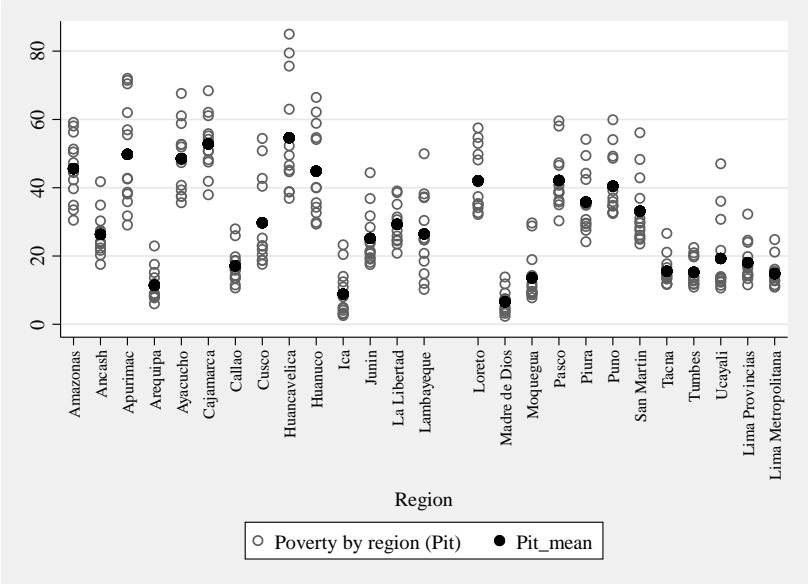
This research stands midway between the first and third approaches. It follows closely the specification of the first one, yet it draws on some features from the microeconomic approach. It focuses on the case of Peru instead of a pooled set comprised of different countries, a distinction that have proved to be relevant in the analysis of the subject here addressed (Bourguignon, 2002). For example, when using the dataset and approach of Dollar et al. (2016) –who investigated how changes in growth and inequality affect poverty–, results for Peru diverged from those aggregated for Latin America (LAC) (results from this exercise are reported in Appendix D).

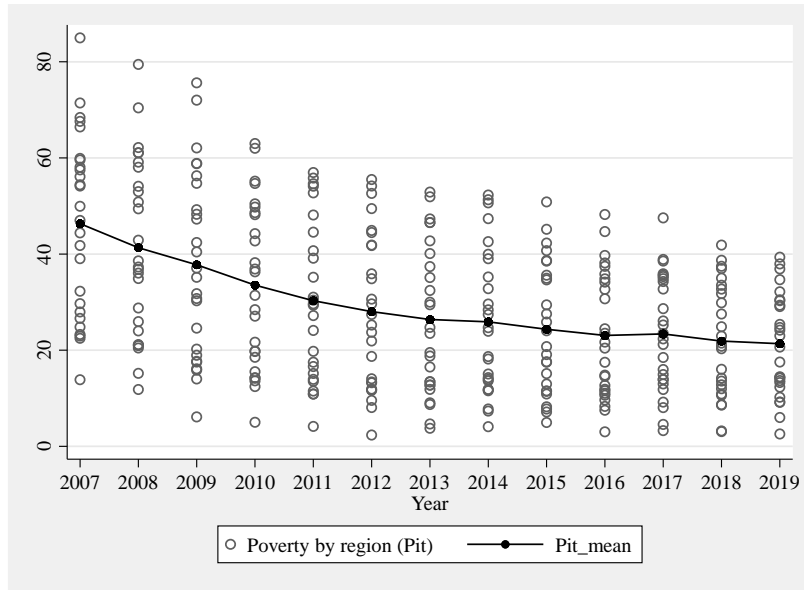
Additionally, harnessing data from ENAHO, the study uses individual income data (for the working population as detailed in subsection 3.2) to inform economic welfare measures by region. Thus, as underscore in Ferreira (2010), both growth and inequality measures weight changes in each of them driven by changes in individual data before scaling up to a regional level. Bearing this in mind, the model to estimate is an extended version of equation (1):

$$P_{it} = \alpha_i + \beta_1 y_{it} + \beta_2 g_{it} + \beta_3 X_{it-1} + \gamma_i t + \varepsilon_{it} \quad (2)$$

Where the  $i$  and  $t$  subscripts denote the spatial and time dimension here represented by each region and year included in the panel.  $y$  and  $g$  represent measures of economic growth and inequality i.e. income growth and Gini coefficients, respectively.  $X$  contains a set a control-variables introduced in lagged form to avoid problems of endogeneity (Ferreira, 2010). Recalling the features of poverty reduction in the poorest regions of Peru (see subsection 3.3.2) they are the informality rate, the unemployment rate, the urban employment rate, the share of the working population with only primary education.  $\varepsilon_{it}$  is the error term (assumed to be white noise following Ravallion & Chen, 1997).  $\alpha_i$  is a fixed effect representing time-invariant regional differences. A time trend is also included, represented by  $\gamma_{it}$ . This is because regional and time differences arise, as seen in Figure 4, that need to be considered when estimating (2).

Figure 4. Fixed Effects heterogeneity across regions and time





Equation (2) is estimated in logarithm form using Fixed Effects (FE) with robust standard errors to account, on one hand, for all those time-invariant regional characteristics that might bias the predictor or the outcome variable and, on the other, to control for potential heteroskedasticity and autocorrelation:

$$\ln P_{it} = \alpha_i + \beta_1 \ln y_{it} + \beta_2 \ln g_{it} + \beta_3 X_{it-1} + \gamma_i t + \varepsilon_{it} \quad (3)$$

Following the consensus of the empirical literature on the topic, the model above specified rules out distributional effects of growth. It is worth noting, however, that it does not consider potential feedbacks from inequality on growth which, as seen in the preceding section, has been hardly disentangled by the overwhelming empirical efforts devoted to it. Previous research had used the system generalized method of moments estimator (SYS-GMM) to account for this issue, yet as observed by Kraay (2015) problems related to weak internal instruments which this estimator relies on have yielded misleading interpretations on the effects of inequality on growth.

Alternative specifications accounting for either negative or positive effects of inequality on growth will necessarily require looking at the dynamics of these variables at regional level and empirically test for any of these effects on poverty outcomes, which is beyond the aim of this research. The FE model specification directly links the observed changes of both growth and inequality on poverty reduction but, from an econometric standpoint, does not assign any causal interpretation.

### 3.4.1 Robustness check

One can argue that problems related to the structure of measurement errors and model specification would possibly render biased estimates. This comes from the observation that time-varying measurement errors of the predictor variables are not necessarily uncorrelated with those for the latent variable (Ravallion & Chen, 1997), and that (3) will impose that the elasticities obtained remain constant (e.g. the growth-poverty elasticity) which might not be the case, particularly for developing countries (Ferreira, Leite & Ravallion, 2010; Ravallion & Datt, 2002).

To address these potential challenges in the model, as a robustness check, a first difference (FD) OLS estimation will be performed. This approach has the advantage –as in FE– to eliminate  $\alpha_i$  yielding the following model:

$$\Delta \ln P_{it} = \beta_1 \Delta \ln y_{it} + \beta_2 \Delta \ln g_{it} + \beta_3 \Delta X_{it-1} + \gamma_t + \Delta \varepsilon_{it} \quad (4)$$

Results are reported in Appendix F. They report the same patterns found when estimating (3) using the FE approach. Yet, FD is able to pick up a negative correlation between inequality and poverty for the bottom 40% of the regions (at income level). The next sections discuss the main findings.

# 4 Empirical Analysis

## 4.1 Results

This section reports how poverty has been changing between 2007 and 2019 and what relationship this has have with changes in standards of living proxied here as economic and relative welfare measures.

The main findings of this research are summarised in Table 4, they address RQ1. It shows that poverty changes in Peru have been strongly associated to changes in economic growth, but also to changes along the income distribution in the country, though to a lesser extent. The first column of Table 3 presents the estimates for a baseline model whereby regional features namely, informality, unemployment, urban employment, and the level of education of the working population are not controlled for. In this model economic growth has a stronger role in ameliorating poverty and inequality plays a secondary, but relevant role (note that it is significant at 10% level).

Yet, as column 3 suggests, structural barrier such as those mentioned above not only accounted to a great extent for a loss of power of economic growth at reducing poverty, but sheds light on that inequality mattered in this context (discussed in section 4.2).

*Table 4. Economic growth & inequality for poverty reduction. Fixed Effects Model*

	Peru baseline	Peru baseline	Peru Full model
Average growth	-1.41*** (0.121)	-1.28*** (0.170)	-1.22*** (0.142)
Inequality	1.05* (0.586)	1.37** (0.609)	1.08** (0.462)
Observations	338	338	337
R-squared	0.71	0.75	0.77
Time fixed effects	No	Yes	Yes
Regional controls	No	No	Yes

Dependent variable is natural log of regional poverty. Robust standard errors in brackets. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels. Growth rates are calculated as annual of natural log of disposable income over the indicated period. Inequality refers to within disposable regional inequality.

One interesting feature on this regard pertains to how well performed the worse-off regions, *usually* those with higher rates of poverty during the period reviewed. Table 5 deals with this issue and reports results for (two) restricted samples clustered by relative income position and by poverty incidence based on the World Bank’s (2013d) definition of shared prosperity (focused on the bottom 40% of the income distribution). The picture that emerges is that one where growth accounts for most of the poverty reduction in the most deprived regions in the country. There changes in poverty moved equiproportionately with changes in mean incomes.

*Table 5. Economic growth & inequality for poverty reduction for the Bottom 40% regions*

	Bottom 40%	
	Income level	Poverty level
Average growth	-1.11*** (0.077)	-1.00*** (0.067)
Inequality	0.51* (0.275)	0.15 (0.255)
Observations	142	129
R-squared	0.88	0.90
Time fixed effects	Yes	Yes
Regional controls	Yes	Yes

Dependent variable is natural log of regional poverty. Standard errors in brackets. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels. Growth rates are calculated as average natural log of disposable income over the studied period. Inequality refers to within disposable regional inequality.

Moreover, a further distinction between regions based on the first criteria i.e. income strata status and quintiles (as inquired in RQ2 a.), presents a rather uncertain role of inequality in the poorest regions (see Appendix E). It confirms the bias towards economic growth as the driver of poverty changes –predominantly in the top performer regions–, yet it raises an interesting point. Stubborn inequality (although not statistically significant) hurt progress in the poorest regions. This aspect is of a particular importance because while the character of growth was pro-poor in all the stratifications, inequality’s role heavily depended on a spatial dimension, a salient feature of developing and emerging countries (Ravallion & Datt, 2002).

Indeed, as mentioned in section 3.3.2 poverty in Peru has substantially been larger in rural areas. In these settings the effects of growth and inequality on poverty unfolded differently. Addressing RQ2 b., Table 6 shows that economic growth was key, and statistically significant, for both rural and urban poverty, however, it was stronger in urban areas. Conversely, falling inequality had a more preponderant role in rural areas, although not statistically significant.

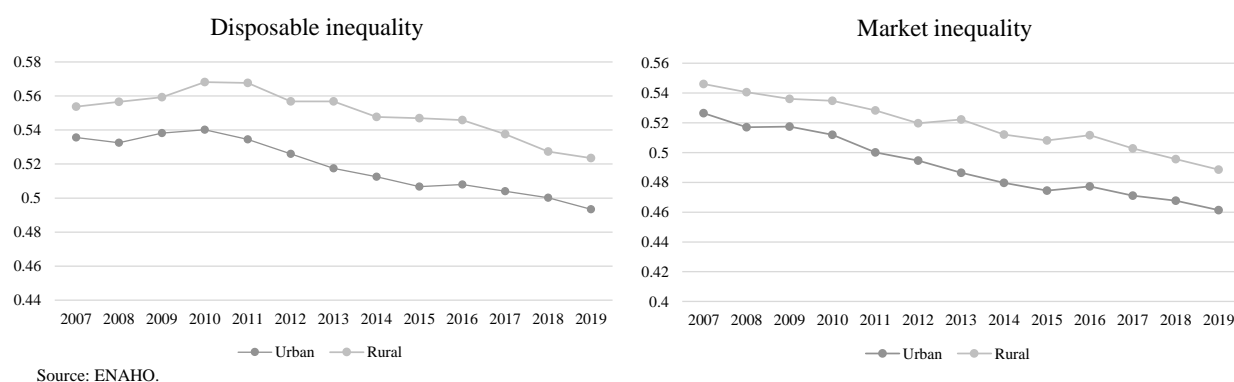
Table 6. Economic growth & inequality for rural & urban poverty reduction

	Rural poverty	Urban poverty
Average growth	-1.14*** (0.183)	-1.22*** (0.174)
Inequality	1.34 (0.798)	0.92 (0.549)
Observations	313	337
R-squared	0.64	0.66
Time fixed effects	Yes	Yes
Regional controls	Yes	Yes

Dependent variable is natural log of regional poverty. Robust standard errors in brackets. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels. Growth rates are calculated as average annual of natural log of disposable income over the studied period. Inequality refers to within disposable regional inequality.

At first glance this seems to be at odds with what the data shows, that is, a steeper inequality downtrend in urban areas (see Figure 5). The study interprets these results considering the role of redistribute policies –here understood as those mainly oriented to invest in human capital– implemented in Peru during the studied period, much needed in the rural areas but with little muscle to equip the poor to find ways out of poverty (Céspedes 2017; Yamada, Castro & Bacigalupo, 2012; Yamada & Castro, 2007).

Figure 5. Regional inequality trends (mean)





## 4.2 The role of inequality and redistribute polices

To critical assess distributional changes in the context described above, the study takes a closer look at the changes along *all* the income distribution within regions and links this to the rural-urban dynamics. This is because, as posited in the literature, the Gini index, might not pick up gains for the middle-strata (Ravallion, 2010; Zhang & Kanbur, 2001) that from a poverty perspective would undermine our understanding on how growth and inequality interplay.

On disaggregating information about these changes, previous results (Table 6) are then more meaningful. Accordingly, evidence suggests that in the poorest rural areas there was little or no systematic change in the income share accruing to the poorest halves of the population. From this point of view the winners of regional prosperity were the population middle strata. Paradoxically, growth rates for the labour income of the poorest grew even more than those observed for the rest of income distribution. This suggests that persistent and inequality limited the benefits of economic growth that reached the poor by expanding their incomes. In urban areas, growth was less constrained by inequality allowing to harness, to a greater extent, the opportunities from growth. See Table 7.

*Table 7. Income growth rates and income share changes 2007 – 2019*

	Rural				Urban			
	Labour income		Share (%)		Labour income		Share (%)	
	2007	2019	2007	2019	2007	2019	2007	2019
Quintile 1	1,048	2,459	2.7	3.0	3,054	6,241	2.9	3.7
Quintile 2	2,173	4,943	7.6	8.1	5,918	11,462	8.4	10.3
Quintile 3	3,634	8,383	13.6	14.7	8,589	16,186	13.4	15.5
Quintile 4	5,975	13,459	21.8	23.9	13,590	24,509	20.1	22.4
Quintile 5			54.3	50.3			55.2	48.1

Source: ENAHO.

The study interprets these results as a marked lack of access to the necessary public goods – human and physical capital to build on episodes of economic growth–, traditionally associated to deficient redistribute policies (Thorbecke & Ouyang in Andersson & Axelsson, 2017, pp. 241-250).

Following Bezemer et al. (2014) the investigation abstracts about this possibility by regressing the outcome variable (rural and urban poverty) on a series of variables related to public investment in human capital (literacy rates, children stunting rates, public spending allocated to education and infrastructure for education) using an OLS approach (results are reported in

Appendix G). It shows that poverty is strongly correlated to them and that more efficient redistribute policies –particularly in rural areas– would have improved poverty outcomes by reducing disparities that, as seen in Table 6, are harmful for pro-poor growth.

### 4.3 Discussion

The aim of this research is to investigate the role of economic growth and inequality on poverty outcomes during growth spells in Peru spanning from 2007 to 2019. The main findings confirm the pro-poor character of the last growth episodes in the country, in line with previous studies for the country (as in Casas & Yamada, 2005; Céspedes, 2011; Mendoza, Leyva & Flor, 2012; Yamada, Castro & Bacigalupo, 2012; Granada, 2016). At country level, previous research observed positive effects of economic growth on poverty reduction. This work looks at the dynamics of the variables studied at regional level and observes the same pattern but finds that unpleasant inequality hampered the power of growth, and it is behind some regional differences. From a spatial perspective, growth's gravitational pull was stronger in urban areas. The same was true for those regions with better initial conditions.

The growth poverty-reducing effects has long been investigated in the literature and observed in a large list of countries, including LAC countries such as Peru (Ferreira et al., 2013; Lustig, Lopez-Calva & Ortiz-Juarez, 2013). This stylised fact for the country finds support in this research. Growth was not only able to reduce poverty in all regions in Peru but burst the progress in those that had already taken-off. Hence, between regions, the gap was reduced when using mean income as yardstick.

The study relates this finding to one of the most salient features of the development process of the Peruvian economy observed during the last decades, the emergence of a middle-income. Indeed, only more prosperous regions could underpin not only a size increase but less vulnerability-to-poverty of the middle-class in the country (López-Calva & Ortiz-Juarez, 2014; BCRP, 2015b, Cárdenas, Kharas & Hena, 2011). Yet, if economic progress was equally felt within (and between) regions was to, a large extent, subjected to regional idiosyncrasies, including employment informality, educational attainment of the working population and persistent high levels of inequality also recognised differently in Brazil (Ferreira, Leite & Ravallion, 2010; Sotomayor, 2019), Chile (Contreras, 2001), Colombia (Fields & Schultz, 1980), India (Ravallion & Datt, 2002) and China (Benjamin, 2007). This is a critical aspect for

the literature on the role of growth for development in the country, as previous work contending limited effects of growth on raising living standards in Peru paid little attention to this (see for example Mendoza, Leyva y Flor, 2011).

Sizable differences between regions have also raise concerns about unbalanced gains from a more prosperous economy. Indeed, as seen from the previous results economic growth was stronger in the already better-off regions with higher incomes. On this issue, previous studies have traced this pattern to the role of inequality (as in Ravallion & Datt, 2002) also observed in this study. However, this research's results provide evidence on that income shares accruing the poorest regions increased confirming the overall falling tendency on inequality across regions. Moreover, this pattern shed lights on the role of initial inequality at lessening the pace at which growth reduces poverty, which accounts for most of the observed poverty reduction across the regions in line with earlier studies conducted at aggregated level for the country (for more recent studies see Céspedes, 2011; Yamada, Castro & Bacigalupo, 2012; Granada, 2016).

Embedded in this discussion is the well-documented rural-urban dualism in Peru and its determinants for poverty. The study's results further supplement this evidence gauging the role of inequality as one of the barriers obstructing the pathways out of poverty brought about by growth, particularly in rural areas (also pick up in Yamada & Castro, 2007). This argument finds grounds on the observation that most of the significant progress at reducing poverty in this area has been driven by economic growth by expanding family's labour income (Flachsbarth et al., 2018; Morley, 2017; de Janvry & Sadoulet, 2000).

Nonetheless, escaping poverty was, in turn, largely determined by access to public assets such as education and physical infrastructure which accounted for most of the considerable disparities in standards of living across regions in the country (López & della Maggiora, 2000; Escobal & Torero, 2000; Escobal, 2001). In a related paper, Olavarria-Gambi (2003) shed light on the importance of this aspect for the poverty-reduction trajectory Chile embarked on amidst sustained economic growth. Escobal and Torero (2005) further investigated how Peruvian households' access to public services and assets impacted poverty outcomes, arriving to a similar conclusion. That is, geographical factors e.g. rural domains matter when one takes into account limited access to essential public services.

Therein, inequality acts as a structural barrier for growth and poverty reduction, as observed in this research and Urrunaga and Aparicio (2012), but also found in other countries in the region

(see Bourguignon, Ferreira & Leite, 2008 to gain insights from the case of Brazil). Indeed, there is a nurtured literature on the role of these services as determinants of poverty and other social outcomes as they enable the poor to secure the means to increase both their income and consumption (Ghosh, 2014; Castro, 2006).

In Peru public expenditures on this regard have closely followed the expansion of the economy, yet with limited affects. Castro (2006) found that a contraction of GDP per capita led to a 4% decline in the social spending, thus the last growth episodes allowed the country to increase these public investments which averaged 9.2% annually in the last decade (MEF, 2019). Programmes such as Health Insurance and conditional cash transfers were also introduced in the fiscal package. Despite remarkable progress at extending these programmes covering the poor, evidence suggests that comprehensive reforms are needed to improve the quality in the provision of essential public services, particularly in remote rural areas (World Bank, 2017a; Córtez & Calvo, 1997).

This is a crucial aspect as it is not the expansion of the allocation of resources, but the efficiency of the public spending in key areas e.g. public investments in human capital that have proved the most efficient way to fight poverty (Bezemer, Bolt & Lensink, 2014; Ghosh, 2014; Thorbecke & Ouyang, in Andersson & Axelsson, 2017, pp. 241-250; Londoño de la Cuesta, 1996). The study links this to persistent inequality, especially in rural areas across the regions, that otherwise, would have further fostered poverty reduction. Consequently, designing and implementing more progressive and efficient redistribute policies appears as an important instrument in the policy toolkit to tackle poverty.

# 5 Conclusion

## 5.1 Conclusions

The goal of this research is to explore the growth-poverty-inequality relationship during the economic growth experienced during the last thirteen-year economic growth episode in Peru at regional level. For that purpose, using microdata from the National Survey of Households – ENAHO a fixed model is used to inquiry and test the simultaneous role of growth and inequality on poverty reduction as observed in country following a strong economic rebound after a decade of economic shrinking and worsening social indicators (poverty and income inequality).

The main finding of the assessment here conducted confirm previous findings on the power of economic growth at reducing the incidence of poverty. This holds for all the empirical specifications and proved statistically significant. Indeed, the poorest regions were those that experienced large cuts of poverty rates. The study links this to an increase in the labour income of the poor, particularly in the bottom regions. Regional differences played differently across region restraining, in most of the cases, the effects of growth. This is not surprising as for instance, according to data inspection (high) informality and (low) education attainment was a prominent feature in impoverished regions.

By contrast, the correlation of inequality and poverty was rather dependent on the specification of the sample used. Accordingly, when looking at aggregated regional level inequality was statically significant (10%) suggesting that improvements in income disparities helped reduced poverty during the studied period. This goes in line with the inequality downtrend at country level observed during the studied period. However, when clustering the sample by regional income status (low, middle, and upper), quintiles and area (rural and urban) inequality loses it statistical significance and signals different outcomes according to these specifications.

The study pays special attention to the results for the poorest regions where inequality fell but remained high despite remarkable economic growth. In the poorest quintile inequality hurt the poverty reduction trend. Table 8 summarises this information:

Table 8. Summary results

	Peru Full model	Bottom 40% (income level)	Lower income	I Quintile	Rural	Urban
Growth	Negative***	Negative***	Negative***	Negative***	Negative***	Negative***
Inequality	Positive**	Positive*	Positive	Negative	Positive	Positive

\*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels.

Economic growth was stronger in the better-off and urban areas. In poor rural areas, larger cuts in inequality would have helped to poverty alleviation. The study associates this pattern to a prominent lack of access to basic public services e.g. human capital –education and health– and physical-related investments that enable people finding ways out of poverty.

Overall, it must be concluded that growth has been the sharpest tool for poverty reduction during the last years of sustained economic expansion. This being said, the role of inequality should not be overlooked. It has proved to either foster or hamper the positive impact of growth. Persistent inequality is a symptom that “trickle down” does not automatically occurs. To great extent the state’s ability to deliver quality and essential services where most needed plays a critical role on reducing disparities and therefore, fully harness the benefits of growth.

## 5.2 Policy implications and future research

The preceding sections have shown the relative importance of both growth and inequality to alleviate poverty that has implications from a policy perspective. The study hits on two of them. First, given the strong correlation between growth and poverty here found, growth-enhancing reforms emerge as the most efficient policy instrument to fight poverty, particularly when economic growth in Peru is losing momentum.

Second, letting inequality take care of itself would be a bad policymaking bet. Redistribution contributes to poverty outcomes by amplifying (reducing) the effects of growth and, therefore, the pace at which the latter reduces poverty (Bourguignon, 2003). Indeed, not only huge disparities can unduly distort the poverty-reducing growth effects, but to perpetuate poverty by

constraining access to essential public goods. Against this backdrop, increasing expenditures on redistribute policies orientated to address this matter is welcome, however, enhancing the efficiency of social spending is more important.

Targeting the poor, but also the vulnerable-to-poverty groups should inform these policies which might encompass a wide range of measures (Rodrik & Stantcheva, 2021). Conditional Cash Transfers (CCT) expenditures have increased in Peru and helped indeed to lessen poverty. Research on this have underscored their contribution to poverty reduction, accounting for around 20% of the poverty reduction observed at country level (Castro, Yamada & Bacigalupo, 2012). Had not been these programmes implemented, poverty would have recorded on average 2 pp. more than the observed rate in 2016 and 3.6 pp. more in rural areas, where most of the poor live (Céspedes, 2017).

But research have noted that the bulk of poverty reduction (70%) was due to equalizing effects of growth on the labour market, that is, to increases in incomes of the poor and the “just-above-the-poverty-line” income groups (Granada, 2016; Castro, Yamada & Bacigalupo, 2012; Céspedes, 2011). Bearing this and this research’s results in mind, long-term policies addressing sizable disparities in the countries through redistribute policies should (i) fine tune the process of targeting the poor and (ii) put emphasis on making them more efficient and progressive. By progressive, the study refers to policies aiming to create the conditions in the most deprived areas to secure the growth spills onto poverty. As discussed in previous sections this includes enhancing public investments on public assets such as education, health, and physical-related infrastructure.

The heated debate on possible trade-offs between growth-equity reforms needs to be further investigated in this context (see for example Ostry, Berg & Kothari, 2018). However, as seen in the last thirteen years in Peru, there is no reason to rule out the possibility of having sustained growth that parallels disparities reductions. On the contrary, during the period investigated, in *most* cases, and at aggregated level, inequality mirrored economic growth development. Pursuing both would leave huge payoffs to the country.

Yet, further research is required to inquiry on the patterns of growth on poverty outcomes. Differences in sectoral growth can have different effects on poverty (Bolt, Lensink & Raster, 2017; de Janvry & Sadoulet, 2010; Ferreira, Leite & Ravallion, 2010; Ravallion & Datt, 2002). This is relevant for Peru because as noted by Xinshen, McMillan, and Rodrik (2017), the

country has experienced a structural transformation in the last decades, that is, a migration of workers from low-productive (rural agriculture) to more productive modern sectors (services and manufacturing). This might have distinct implications for the workers engaged in different economic sectors, particularly those employed in farm activities which constitute the majority of the poor in Peru (INEI, 2018).

It is precisely this sector the one that has undergone a pronounced transformation in the last decades. The structural change observed brought down the contribution of agriculture on the economy and over the total employment, yet it remained a key sector in the economy as overall productivity in the sector grew (Morris et al., 2017). Large cuts in the incidence of poverty have been associated to gains in productivity in the sector (Castellares, Regalado & Huarancca, 2018; Morley, 2017). This literature can be improved by looking at the dynamics of growth and inequality for those who remain and transitioned to other sectors amid the country's structural adjustment.

Finally, studying more in-depth regional idiosyncrasies for poverty alleviation is crucial to more accurately understand how growth and inequality interplay with them. Addressing the roots of high levels of informality, for instance, can inform future research on the topic here studied. Pinpointing the links through which these factors operate and the feedbacks from growth and inequality would enhance the analysis to further inform the policymaking in the country.



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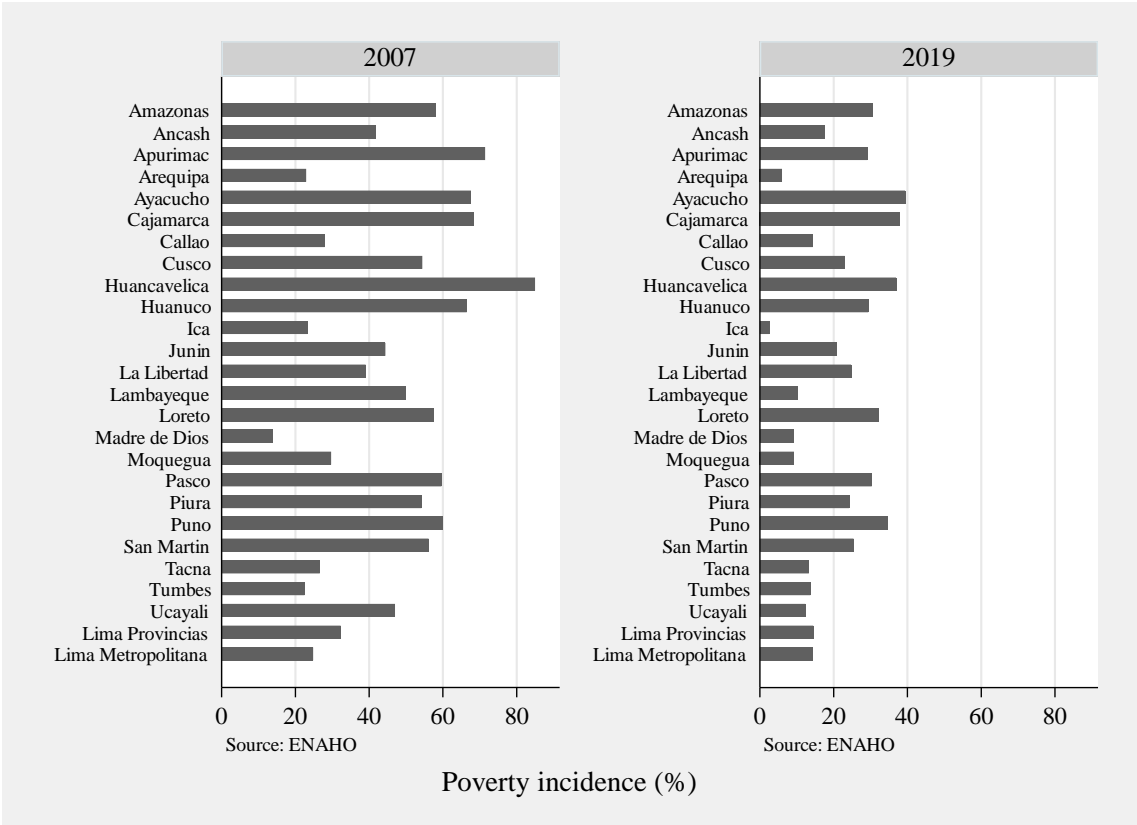
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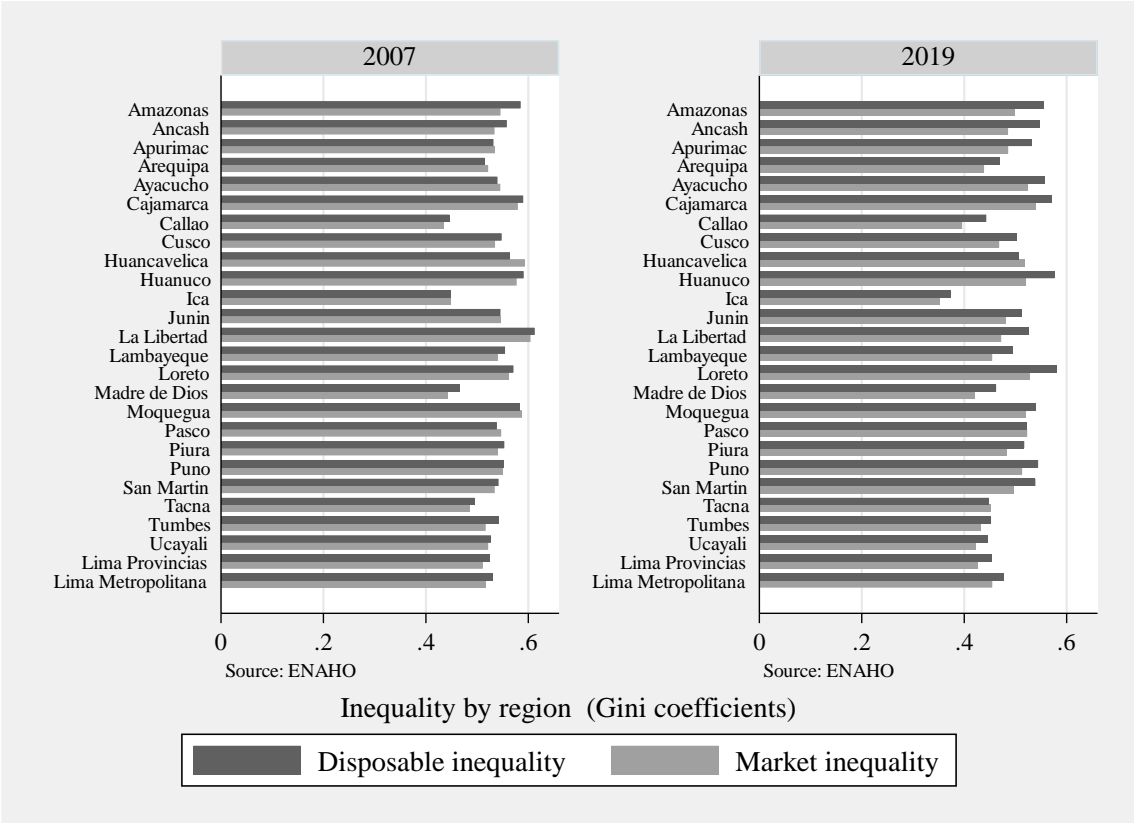
# Appendix A

Figure 6. Poverty rate by region 2007 – 2019



# Appendix B

Figure 7. Gini Coefficients by region 2007-2019



# Appendix C

*Table 9. Aggregated Panel data descriptive statistics*

<b>Variables</b>	<b>N</b>	<b>Mean</b>	<b>Sd</b>	<b>Min</b>	<b>Max</b>
Net labour income	338	11,588	3,670	4,212	22,314
Disposable income	338	10,652	3,549	4,016	21,084
Mean consumption	338	5,892	2,009	1,602	12,531
Consumption inequality	338	0.332	0.0471	0.215	0.455
Market inequality by region	338	0.503	0.0516	0.353	0.611
Disposable inequality by region	338	0.531	0.0530	0.374	0.643
Unemployment rate by region	338	3.426	1.442	0.486	8.901
Urban employment by region	338	66.60	21.30	16.83	100
Informality by region	338	79.30	9.501	53.75	94.35
Share of primary by region	338	31.96	12.18	8.423	59.19
Share of native by region	338	36.27	28.51	0.170	96.36
Poverty by region	338	29.51	17.03	2.356	84.98
Rural poverty by region	338	40.85	23.86	0	92.23
Urban poverty by region	338	20.34	10.35	1.559	54.41

Source: ENAHO

# Appendix D

*Table 10. Poverty and economic growth for LAC*

Dependent variable: growth in income of the poor

LAC region	Bottom 20 percent			Bottom 40 percent		
	All-spells	Five-yr-spells	Long-spells	All-spells	Five-yr-spells	Long-spells
Average growth	1.222*** (0.075)	1.037*** (0.160)	0.936*** (0.218)	1.052*** (0.047)	0.947*** (0.112)	0.951*** (0.170)
R-squared	0.584	0.527	0.415	0.756	0.729	0.623
Share of variance due to growth	0.478	0.508	0.443	0.719	0.770	0.655
Wald-test, slope=1	0.00798	0.817	0.771	0.283	0.642	0.778

Source: Dollar, Kleinerberg and Kraay (2016). The table reports results from OLS regressions of growth in incomes of the poor on growth in average incomes. The share of the variation in income of the poor that is due to variation in overall incomes is reported. Wald-test reports the p-value of the of the null hypothesis that the estimated slope is equal to one.

*Table 11. Poverty and economic growth for Peru*

Dependent variable: growth in income of the poor

Peru	Bottom 20 percent		Bottom 40 percent	
	All-spells	Five-yr-spells	All-spells	Five-yr-spells
Average growth	0.887*** (0.210)	1.830* (0.264)	0.987*** (0.191)	1.620 (0.485)
Observations	12	3	12	3
R-squared	0.366	0.960	0.547	0.848
Wald-test, slope=1	0.603	0.196	0.948	0.422

Robust standard errors in brackets. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels. The table reports results from OLS regressions of growth in incomes of the poor on growth in average incomes. Growth rates are calculated as average annual log differences over different spells following Dollar, Kleinerberg and Kraay (2016) which also provides the data used. Wald-test reports the p-value of the of the null hypothesis that the estimated slope is equal to one.

# Appendix E

Table 12. Economic growth & inequality for poverty reduction by regional income status

	Lower income	Middle income	Upper income
Average growth	-1.08*** (0.071)	-1.14*** (0.189)	-2.14*** (0.286)
Inequality	0.30 (0.253)	1.21*** (0.382)	0.84 (0.611)
Observations	116	117	104
R-squared	0.91	0.87	0.79
Time fixed effects	Yes	Yes	Yes
Regional controls	Yes	Yes	Yes

Dependent variable is natural log of regional poverty. Standard errors in brackets. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels. Growth rates are calculated as average natural log of disposable over the studied period. Inequality refers to within disposable regional inequality

Table 13. Economic growth & inequality for poverty reduction by quintile

	I Quintile	II Quintile	III Quintile	IV Quintile	V Quintile
Average growth	-1.05*** (0.097)	-1.12*** (0.196)	-0.72** (0.327)	-2.73*** (0.504)	-2.39*** (0.362)
Inequality	-0.30 (0.329)	1.59*** (0.512)	0.36 (0.595)	1.62* (0.917)	1.09 (0.796)
Observations	78	64	65	65	65
R-squared	0.92	0.95	0.88	0.92	0.84
Time fixed effects	Yes	Yes	Yes	Yes	Yes
Regional controls	Yes	Yes	Yes	Yes	Yes

Dependent variable is natural log of regional poverty. Standard errors in brackets. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels. Growth rates are calculated as average natural log of disposable over the studied period. Inequality refers to within disposable regional inequality.

# Appendix F

*Table 14. Economic growth & inequality for poverty reduction. First Difference Model*

	Peru baseline	Peru baseline	Peru Full model
Average growth	-0.92*** (0.177)	-0.68*** (0.172)	-0.69*** (0.169)
Inequality	0.58** (0.292)	0.63** (0.304)	0.59* (0.314)
Observations	312	312	312
R-squared	0.09	0.16	0.21
Time trend	No	Yes	Yes
Regional controls	No	No	Yes

Dependent variable is natural log of regional poverty. Robust standard errors in brackets. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels. Growth rates are calculated as average annual of natural log differences over the indicated period. Inequality refers to within disposable regional inequality.

*Table 15. Economic growth & inequality for poverty reduction for the Bottom 40% regions. First Difference Model*

	Bottom 40% Income level	Bottom 40% Poverty level
Average growth	-0.41*** (0.131)	-0.39*** (0.142)
Inequality	-0.14 (0.237)	0.09 (0.235)
Observations	132	120
R-squared	0.24	0.16
Time trend	Yes	Yes
Regional controls	Yes	Yes

Dependent variable is natural log of regional poverty. Robust standard errors in brackets. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels. Growth rates are calculated as average annual of natural log differences over the studied period. Inequality refers to within disposable regional inequality

Table 16. Economic growth & inequality for poverty reduction. First Difference Model for urban and rural poverty

	Rural poverty	Urban poverty
Average growth	-0.27* (0.197)	-1.09*** (0.252)
Inequality	0.54* (0.296)	0.46 (0.436)
Observations	288	312
R-squared	0.13	0.17
Time fixed effects	Yes	
Regional controls	Yes	Yes
Time trend		Yes

Dependent variable is natural log of regional poverty. Robust standard errors in brackets. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels. Growth rates are calculated as average annual of natural log differences over the studied period. Inequality refers to within disposable regional inequality

# Appendix G

*Table 17. Public investments in human capital & Rural Poverty*

	Public expenditure	Stunting rate 2009-2019	Adult Illiteracy rate	Years of schooling	Infrastructure
Public spending on education (% total public spending)	1.401*** (0.136)				
Children stunting rate (% of children under 5)		1.153*** (0.048)			
Illiteracy rate (aged 15+)			3.089*** (0.124)		
Years of schooling				-10.016*** (0.498)	
Infrastructure for education					-0.402*** (0.045)
Observations	325	275	338	338	338
R-squared	0.33	0.73	0.71	0.57	0.34

Dependent variable is regional poverty. Robust standard errors in brackets. \*, \*\* and \*\*\* denote statistical significance at 1%, 5% and 10% probability levels. Sources: ENAHO, MEF and Minedu.

*Table 18. Public investments in Human Capital & Urban Poverty*

	Public expenditure	Stunting rate 2009-2019	Adult Illiteracy rate	Years of schooling	Infrastructure
Public spending on education (% total public spending)	0.629*** (0.089)				
Children stunting rate (% of children under 5)		0.474*** (0.046)			
Illiteracy rate (aged 15+)			1.275*** (0.111)		
Years of schooling				-4.272*** (0.387)	
Infrastructure for education					-0.193*** (0.029)
Observations	325	275	338	338	338
R-squared	0.22	0.42	0.38	0.33	0.24

Dependent variable is regional poverty. Robust standard errors in brackets. \*, \*\* and \*\*\* denote statistical significance at 1%, 5% and 10% probability levels. Sources: ENAHO, MEF and Minedu.