

SECTORAL COMPOSITION OF GROWTH AND POVERTY REDUCTION IN PERU: A REGIONAL APPROACH (2001-2016)

VICTOR GAMARRA ECHENIQUE¹

Abstract: Using GDP data disaggregated by region and sector, this paper examines the impact of the sectoral composition of growth on poverty reduction in Peru during the period 2001-2016, finding a considerable variation in the poverty-reducing effectiveness of growth across sectors, across space, and over time. The regressions appoint that growth in services sector had more direct poverty reducing effect than growth in either agriculture, mining or industry. Intersectoral relationships also have a significant impact on poverty reduction. Also, initial conditions related to human development affected the dynamics of poverty reduction. These results support the hypothesis that the sectoral structure of economic growth affects poverty independently from overall economic growth.

Keywords: *composition of growth, poverty reduction, pro-poor growth, economic growth, Peru.*

1.- Introduction

In the recent literature about poverty and growth, many authors have made it clear and there is almost no doubt that economic growth contributes significantly to poverty alleviation. Evidence from cross country regressions (Besley and Burgess, 2003; Dollar and Kraay, 2005; Kraay, 2005; and López, 2004) shows that growth is pro-poor, but at the same time, effect of economic growth on poverty reduction is not always the same (Loayza and Raddatz, 2005). There is an extensive literature which focus the relationships between poverty and growth are complex and depends on other variables and conditions (Loayza and Raddatz, 2005; Ravallion and Datt, 1996, 2001; Ferreira, Leite and Ravallion, 2010) within the country or region in which it is analyzed.

Some authors emphasize on socio-economic conditions of the population and institutions² as determinants of the relationship between growth and poverty reduction. Following Martin Ravallion discussion (Ravallion and Datt, 1996, 2001; Ferreira, Leite and Ravallion, 2010, Montalvo and Ravallion, 2009) on India, Brazil and China, the present paper seeks to contribute to the discussion about how much do the poor share in aggregate economic growth, and what factors explain differences (across space or over time) in the impacts of economic growth on poverty.

¹ Research and Teaching Assistant at Department of Economics, Pontificia Universidad Católica del Perú (PUCP). Lima, Perú. Email: victor.gamarrac@pucp.pe, victor.gamarrac@gmail.com

Acknowledgment: this paper is derived from the author's undergraduate thesis. The author thanks to professors Mario Tello and Javier Herrera, for their support, suggestions and useful comments. The acknowledgments extend to professors Jhonatan Clausen and Alejandro Granda for their useful comments. Also, special mention to Francisco Ferreira, Phillippe Leite and Martin Ravallion for sharing their programs of a study case made in Brazil. Finally, the author thanks to Hugo Gutierrez for his excellent research assistance. Any remaining errors are entirely the author's responsibility.

² Arias-Vazquez et. al. (2012) explains that study cases of Brazil, Indonesia and Mexico, there is evidence that the effects of growth are not uniform across contexts and may potentially differ based on institutional factors.

In this sense, this paper seeks to contribute to the literature on poverty dynamics and sectoral growth by analyzing the Peruvian case: a heterogeneous country on the periphery that has gone through a cycle of growth unprecedented in its history, which at the same time has marked differences in the urban-rural environment and wide heterogeneity in the dynamics of poverty between the regions that compose it. At national level, evidence shows that in GDP per capita is 66% above the level of 2002. Related to this super-cycle, poverty rate decreases 30 percent (Tello, 2015). However, looking beyond averages, we found that there are regions that have levels of poverty above 50%, particularly in poorest highlands regions³ (INEI, 2015).

Peru is an interesting case, given its high heterogeneity and initial conditions (over space). The sources of information consist of household surveys from 2001 to 2016, in annual format. GDP data disaggregated by sector and region have been available since 1970, as well as data on inflation rates and regional public expenditure (the latter only available since 2006). Following Ferreira et. al. (2010), we will use this data, in addition to the Population and Housing Census of 1993 (to obtain information on the initial conditions), to study the dynamics of poverty at a national, and regional level in the 2001-2016 period.

Results shows that both, heterogeneity in initial conditions and changes in the pattern of growth are significant, but in some case relatively small, incidence on poverty dynamics. Also, it is found that growth in the services sector was substantially more poverty-reducing than growth in either agriculture, mining or industry, but mining also plays a statically significant little impact role. These findings are consistent with those of Ravallion and Datt (1996) for India and Ferreira et. al. (2010) in Brazil. Related to regional heterogeneity, impact of agricultural, mining and service sector growth did not vary significantly across states, the impact of industrial growth did vary appreciably (again, similar to Ravallion and Datt, 2002, also for India; and Ferreira et. al., 2010, for Brazil).

On the other hand, initial conditions play a determining role for a later significant growth elasticity of poverty. These initial conditions are related to better educational levels and better infrastructure in the region in the provision of basic services. Moreover, there is evidence of a change in the poverty reduction dynamics after 2011, when the commodity boom came to an end, (lower growth rates). However, the bulk of Peru's poverty reduction during these last 6 years was accounted for by contemporaneous social protection spending, and to a lesser extent, by the investment made by the government. Additionally, a decomposition of Peru's dynamics of poverty into growth component and redistribution component was performed, and its results shows that most of the decline in poverty incidence was accounted for by greater redistribution in the social protection system, specifically, spending on education, on health, for the most part.

The paper is organized as follows. The following section reviews some of the linkages between growth and poverty (growth elasticity of poverty), sectoral composition of growth and how initial conditions (distribution of wealth, income or institutional settings) affect poverty dynamics. Then, Section 3 provides some background

³ The poorest regions of Peru are those of the north and central mountains, such as Cajamarca, Huancavelica, Apurímac, Ayacucho, among others, according to poverty maps developed by INEI (2007, 2009 and 2013).

information about initial conditions and changes in poverty and growth in Peru and in its regions over the 16 years of analysis. Section 4 describes the economic model and econometric approach, while Section 5 presents results and discussion about it. Finally, Section 6 concludes.

2.- What makes growth pro-poor? Background on the literature

As it was mentioned before, there is a consensus that economic growth is a necessary but not sufficient condition for poverty reduction. Cross countries studies have shown that growth is pro-poor. Barro (1997), Dollar and Kraay (2002), Ravallion and Chen (1996), and Adams (2002) find empirical evidence to affirm that economic growth reduces poverty. However, the effects have been uneven across countries and even, regions inside a specific country. Although the poor generally benefit from a growing economy, as Ferreira et. al. (2010) argue, there are some variation around the average benefits and within the country and across output growth. Following these authors, recent research has highlighted two main sources of variation in growth incidence: the sector composition of output growth, and initial conditions related to asset distribution, urbanization, and the levels of human capital and technology available in the economy (Ravallion and Datt, 2002, Alessina and Rodrik, 1994, 1996).

Loayza and Raddatz (2005) focuses on characteristics of output growth itself, rather than the demographic, social, or economic conditions of the population. They propose a different approach that growth, in certain sectors, is more poverty reducing than growth in others, and that a sector's poverty-reducing capacity is related to its intensity in the employment of unskilled labor and its productive and employment linkages. Based on the studies of Jung (1996), Khan (1999), and Ravallion and Datt (1996), these authors developed a model that formalize the mechanisms through which the sectoral composition of growth and associated labor intensity can affect workers' wages -and, thus, poverty alleviation- even in the absence of market segmentation (Loayza and Raddatz, 2005). Continuing with this discussion, Ravallion and Datt (1996, 2002) study the case to India. Ravallion and Chen (2007), and Montalvo and Ravallion (2009) does the same to China, and Ferreira et. al. (2010) performs an analysis for Brazil and its regions⁴. Results are variated, focusing that in developing countries with high level of rural population Agriculture output is more poverty alleviating, and for those that are more developed, services and in some cases, industry output are the one that are the most.

There are many factors that influence and determines if growth is more effective on reducing poverty. Some authors⁵ argue that distribution of consumption and wealth matters to the consumption or income of poor. This can lead to question if also the initial distribution matters to the subsequent rates of poverty reduction. There is a wide literature and arguments (Aghion et al., 1999; Dabla-Norris et. al., 2015; Kaldor, 1957), that aboard the implication of inequality and initial conditions, and how this can be

⁴ A case applied to Chile is made by Contreras (2001), and Thu Hang and Quoc Hoi (2012) study those dynamics in Vietnam.

⁵ See Grusky, Kanbur and Sen (2006), Balisacan (2003); Beteille (2003) and Ravallion (1997) for more information about poverty and inequality relationship.

harmful to the pace of economic growth in poor and unequal developing countries, arguing why high inequality can impede growth.

As Ravallion and Datt (1998) argue, high inequality is one of the most possible and recurrent problems that explain why the same rate of economic growth might be less effective in reducing poverty in one setting than another. So, the change in poverty caused by economic growth (we can call to this, the growth elasticity of poverty, as Bourguignon, 2003), will depend on other properties of that distribution. Empirical works evidence from cross-country regressions supports that higher initial income inequality entails a lower (absolute) elasticity of poverty to average incomes (Ravallion, 1997; Timmer, 1997; Barro, 1997; World Bank, 2000). So, it is expected that economies where inequality is low, one expects that the poor will tend to obtain a higher share of the gains from growth than in an economy in which inequality is high (Ravallion and Datt, 2002). In this sense, the contribution of this paper is to find the patterns of the growth-poverty relationship in a country on the periphery of Peru, and to compare these findings with those found by Ravallion in India, Brazil, and China (validating the importance of growth in the service sector for poverty reduction) and also, to study this poverty dynamics at a disaggregated level, grouping the regions of Peru according to their poverty rate. Also, similar to Ferreira's work, to find evidence that the initial levels of income, population and years of education are not so strong positively correlated with higher growth elasticities in the future (Galor, 2009).

Several studies, in this journal and in other publications, point out to the important positive impact of industry on the development of services, and other sectors. which usually favor the reduction of poverty. Kniivila(2007) insist on this question: *"industrialization is often essential for economic growth, and for long-run poverty reduction. The pattern of industrialization, however, impacts remarkably on how the poor benefit from growth"*.

3.- Peru: developing country through a super-cycle.

In the latest years, Peru has experienced an unprecedented economic growth in its history, caused by the boom in mining exports and the good international context (Mendoza, 2011), which was accompanied by a reduction of almost 30% in the poverty rate during the period 2002- 2011. However, this has been a phenomenon that seems to have come to an end. The history of Peru is more complicated than just those years. During the 1980s, Peru suffered from political and economic instability, going through one of its worst economic crises in its history during the second five-year period. This, together with the political crisis and terrorism, in addition to the official poor measurement of data and the lack of household surveys, mean that poverty measurement is done by private researchers and institutes. What is clear is that there was a stagnation of economic growth and zero reduction of poverty. On the contrary, inequality increased. Later, during the 1990s, Alberto Fujimori's regime carried out many of the economic reforms that have allowed the boom's economic growth. However, poverty during these years did not have a clear trend. It declined during the years before 1995, and then increased towards the end of 2000, because of the economic crisis, El Niño phenomena and political instability suffered by the country. Already in 2001, economic growth has been positive throughout the decade and the reduction of poverty has been almost 30%

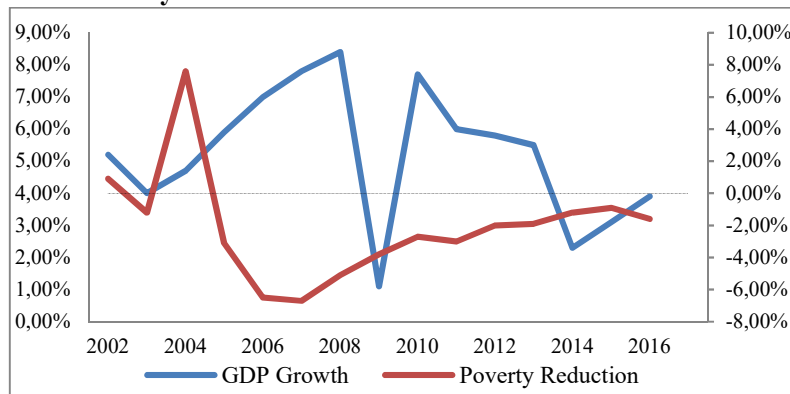
between 2002 and 2011, evidencing a positive trend in the dynamics of poverty reduction. In the studies for Peru, Yamada and Castro (2010) explain that during the 1980s and early 1990s there was no substantial reduction in poverty, in addition to the fact that the only times poverty is reduced is when the country is in a boom.

Table 1. Descriptive Statistics for Peru, 2001-2016.

Year	Headcount Index (%)			Real GDP	Direct contribution of each sector on GDP (%)				Gini Index	Inflation
	Total	Urban	Rural		Agriculture	Mining	Industry	Services		
2001	51.4	38.7	79.0	8,480	8.22	15.77	23.58	52.43	0,52	-0.13
2002	52.3	40.9	77.7	8,817	8.16	16.43	23.89	51.52	0,54	1.52
2003	51.1	40.3	75.8	9,061	7.93	16.41	23.84	51.81	0,53	2.48
2004	58.7	48.2	83.4	9,387	7.77	16.58	24.28	51.37	0,50	3.48
2005	55.6	44.5	82.5	9,851	7.58	17.23	24.46	50.73	0,51	1.49
2006	49.1	37.0	79.3	10,465	7.64	16.32	24.75	51.29	0,50	1.14
2007	42.4	30.1	74.0	11,224	7.31	15.65	25.45	51.58	0,50	3.93
2008	37.3	25.4	68.8	12,111	7.23	15.56	25.82	51.39	0,48	6.65
2009	33.5	21.3	66.7	12,107	7.16	15.47	24.78	52.58	0,47	0.25
2010	30.8	20.0	61.0	12,969	6.72	14.57	25.71	53.01	0,46	2.08
2011	27.8	18.0	56.1	13,634	6.82	13.72	25.85	53.61	0,45	4.74
2012	25.8	16.6	53.0	14,308	6.56	13.20	25.75	54.50	0,45	2.65
2013	23.9	16.1	48.0	14,977	6.37	13.13	25.90	54.60	0,44	2.86
2014	22.7	15.3	46.0	15,161	6.16	12.63	25.37	55.84	0,44	3.22
2015	21.8	14.5	45.2	15,485	6.17	13.36	23.93	56.55	0,44	4.40
2016	20,7	13,9	43,8	15,914	5.99	14.93	22.70	56.38	0,44	3.23

Source: Author's own calculation using INEI-ENAH0 and BCRP data. GDP and Real GDP (per -capita) are measured at 2007 prices. Gini index calculated based on per capita income.

Figure 1. Poverty Reduction and Economic Growth in Peru. 2002-2016.



Source: Author's own calculation using INEI data.

By contrast, the incidence of poverty increased in the late 1990s. Escobal et. al. (1998) studied poverty in the 1970s to the 1990s, noting the decline during the 1970s and 1980s, and effectively increasing during the 1990s, changing its composition drastically. Already in the 2000s, Garcia and Céspedes (2011) study the empirical relationship between economic growth and monetary poverty during the 2000s, finding that growth is pro-poor, finding evidence of the adverse effect of the financial crisis on poor population. Yamada and Castro (2012) analyze the relationship between poverty and inequality in Peru. Among their most important findings are that social spending by the

government is not significant for the reduction of income inequality. It is important to notice that besides the direct effect of each sector we should have into account also important indirect effects, particularly in the case of industry.

4.- Data sources and descriptive statistics

The main focus of this paper is to evidence heterogeneity on spatial and sectoral impacts of poverty on Peruvian regions. In this sense, it is used regional-level information on poverty, output by sector and very other information on public spending and inflation for a period of 16 years. Particularly, there are four main sources of information for the study. first, for information on poverty, these were obtained from Peruvian's annual national household survey (Encuesta Nacional de Hogares, ENAHO), which is fielded by the National Census Bureau (Instituto Nacional de Estadística e Informática, INEI). The ENAHO is raised quarterly, with the exception of the years 2001 to 2003⁶. The second main data source was the Regional Accounts Statistics, which contains GDP levels disaggregated by region and sector, from 2001 to 2016. Table 2 gives growth rates for GDP and for each of its four sector components, for each year in our sample. The aggregate growth rate has been positive throughout the period; however, there are some years in which the sectoral rate may have been negative, particularly after the year 2011.

Table 2. National GDP Growth Rates by Sector in Peru, 2001-2016.

Year	GDP Growth	Agriculture	Mining	Industry	Services
		Growth	Growth	Growth	Growth
2001	0.60%	-2.00%	9.90%	-0.70%	-0.70%
2002	5.20%	4.90%	10.00%	7.00%	3.70%
2003	4.00%	1.20%	4.00%	3.90%	4.70%
2004	4.70%	2.70%	6.00%	6.80%	4.00%
2005	5.90%	3.60%	10.30%	6.90%	4.80%
2006	7.00%	8.40%	1.90%	8.80%	8.70%
2007	7.80%	3.90%	4.20%	11.70%	9.20%
2008	8.40%	7.40%	8.10%	10.30%	8.30%
2009	1.10%	0.30%	0.60%	-2.90%	3.50%
2010	7.70%	1.00%	1.40%	11.80%	8.60%
2011	6.00%	8.10%	0.30%	7.10%	7.70%
2012	5.80%	1.80%	1.80%	5.40%	7.60%
2013	5.50%	2.60%	5.10%	6.30%	5.80%
2014	2.30%	-1.10%	-1.60%	0.20%	4.60%
2015	3.10%	3.70%	9.50%	-2.30%	4.90%
2016	3.90%	1.00%	16.30%	-1.30%	3.70%

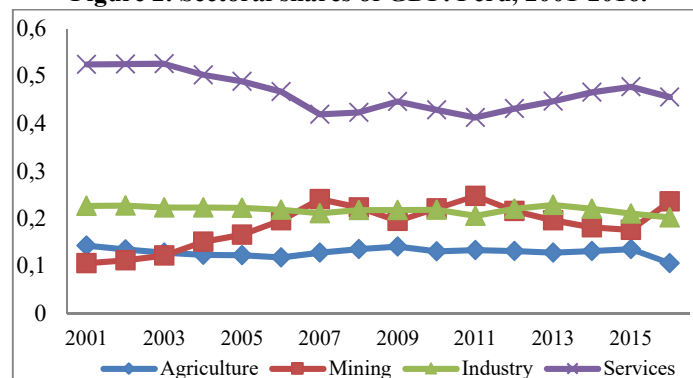
Source: Author's own calculation using INEI data.

Fig. 2 gives the evolution of the implied sector shares in GDP. The services sector is almost half of total GDP, and mining sector has doubled its share between 2001 and 2007, to the detriment of the services sector. The sectors agriculture and manufacture have remained constant throughout the analyzed period. In addition, regional and spatial heterogeneity is also important. Fig. 3 shows, on average, the shares of each sector within

⁶ Poverty measures are constructed by the same methodology used by INEI. We work with the headcount Index (H), which is the percentage of the population living in households with income per person below the poverty line (constructed by INEI).

the GDP of its region. Cases in which mining is very important attract attention, such as Ancash (ANC) and Cajamarca (CAJ). However, in some regions such as Amazonas (AMA), Huánuco (HUA), and San Martín (SMT), there is a predominance of the services sector in most regions and low participation of the agricultural sector, agriculture has high participation (regions, mostly jungle).

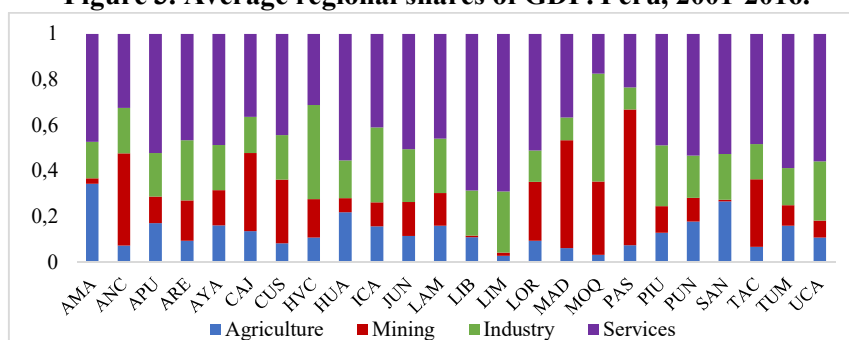
Figure 2. Sectoral shares of GDP. Peru, 2001-2016.



Source: Author's own calculation using INEI data.

When controlling for time-varying correlates of poverty reduction, it is included regional-level public expenditure statistics, disaggregated by type. This corresponds to the third source of information for the study: the database of government expenditure, at national, regional and local level (municipalities). This data is Regional and Municipal Expenditure Accounts (Seguimiento de la Ejecución Presupuestal - Consulta amigable), information of the Ministry of Economy and Finance (Ministerio de Economía y Finanzas-MEF). This data - following Ferreira et. al. division - is grouped a subset of the expenditure types presented there into “social expenditures” (including education, health, prevision, sanitation and culture), “social assistance” (transfer programs as ‘Juntos’, ‘Pension 65’, ‘Vaso de Leche’ and others) and “investment expenditures” (including equipment, installation, real estate and infrastructure purchase and construction). Annex A1 shows evolution of this data over period of analysis.

Figure 3. Average regional shares of GDP. Peru, 2001-2016.



Source: Author's own calculation using INEI data.

The fourth data source is the set of published summary statistics of the 1993 Census, published by INEI (1994), from which we obtained regional-level information on years

of schooling on the population, quality of their houses, actives they had and some other variables of interest, all disaggregated at the regional level⁷. Descriptive statistics for the main variables during the study period are presented in Table 1. These include mean household income per capita from the ENAHO survey, GDP per capita (with alternative deflators); the participation of each sector in GDP per capita; the inflation rate; and the national poverty and inequality indicators, over the 2001-2016 period.

5.- Econometric modelling and results.

Following Ferreira et. al (2010) and Ravallion and Datt (2002), this paper exploits spatial, temporal and sectoral variation in the data showed above to explain Peru's poverty dynamics. Having 24 regions provided by 16 Households Survey (2001 to 2016), the estimation is done by a fixed-effect panel regression, allowing coefficients to vary by groups of regions.

5.1.- Poverty and sectoral composition of growth: the econometric approach

Considering the following specification model in levels:

$$\ln P_{it} = \beta_i^A \ln Y_{it}^A + \beta_i^M \ln Y_{it}^M + \beta_i^I \ln Y_{it}^I + \beta_i^S \ln Y_{it}^S + \eta_i + \varepsilon_{it} \quad (1)$$

Where P_{it} denotes a poverty measure (in this case, it is used Poverty Headcount) in region i at year t . The superscript A denotes 'Agriculture' (Agricultural, Animal Breeding and Fishing) sector output; M denotes 'Mining' (Mining and Hydrocarbons) sector output; 'I' denotes 'Industry' (Manufactures and Construction) sector output; and S denotes 'Services' (Services) sector output. So, we can denote Y_{it}^J as GVA⁸ per-capita for sector $J = A, M, I, S$ in region i at year t . Regional fixed effects are included in the regression, as well as the error term ε_{it} , which might be auto-correlated (Ferreira et. al., 2010). That's why it is assumed that the error component will be an autoregressive process AR (1), defined as $\varepsilon_{it} = \rho \varepsilon_{it-1} + v_{it}$.

In this way, Equation (1) models the growth elasticity of poverty as constant elasticities over time (Ravallion and Datt, 2006). As it's known, the composition of GDP changes over time, as some sectors grow more than other, or the economic activity switches from Agriculture activities to manufacture industries or services over time, as the authors point out. So, due to this heterogeneity, it is not to be expected that growth in a given sector to have the same proportional impact on poverty when it accounts for a small share of overall output as when it accounts for a large share (Ferreira et. al., 2010). Similarly, the differential poverty impact of growth in one sector over another, at a given point in time, will naturally depend on the sector's size. To solve these issues, Ravallion and Datt (1996) propose a differences specification, eliminating fixed effects, in which the growth

⁷ Unlike the Brazilian case, the INEI population census does not include information regarding the income of the inhabitants, which is a limitation of the data. Later, the 1997 household survey is used to measure income inequality.

⁸ It is not possible to adopt the GDP approach because, according to INEI information, the regions of Peru have GVA (GDP-import duties), since the GDP is only calculable at the national level. Thus, Gross Value-Added (GVA) will be treated as GDP in the rest of the document.

rates are weighted by the initial output shares. So, following Ravallion and Datt, (1996; 2002) and Ferreira et. al., (2010), the specification is as follows:

$$\Delta \ln P_{it} = \beta_i^A s_{it-1}^A \Delta \ln Y_{it}^A + \beta_i^M s_{it-1}^M \Delta \ln Y_{it}^M + \beta_i^I s_{it-1}^I \Delta \ln Y_{it}^I + \beta_i^S s_{it-1}^S \Delta \ln Y_{it}^S + u_{it} \quad (2)$$

Where $s_{it-1}^J = Y_{it-1}^J / Y_{it-1}$ is the output share of sector J at the beginning of each period, and $u_{it} = \rho_i(\varepsilon_{it-1} - \varepsilon_{it-2}) + v_{it} - v_{it-1}$. Note that $\Delta \ln Y_{it} \cong \sum_J s_{it-1}^J \Delta \ln Y_{it}^J$, where $J = A, M, I, S$. This equation (2) allow a comparison or test whether the sectoral and geographic “pattern of growth” (Ferreira et. al., 2010), and this is done by a rejection of the null hypothesis that $H_0: \beta_i^A = \beta_i^M = \beta_i^I = \beta_i^S = \beta$. Authors point out that with specification (2), the β coefficients cannot be interpreted as elasticities, so, now those elasticities are estimated by the products of the regression coefficients and the output shares, this is $\beta_{it}^J s_{it-1}^J$ as a whole. Marín et. al. (2015) appoint that most of the models and cross-country studies that focus on growth-poverty relations can be considered a special case of eq. (2) where $\beta_i^A = \beta_i^M = \beta_i^I = \beta_i^S$. Also, eq. (2) allows to test if sectoral or geographic “pattern of growth” matters (Ferreira et. al.), this can be done rejecting the null hypothesis that $H_0: \beta_i^A = \beta_i^M = \beta_i^I = \beta_i^S = \beta$.

Table 3. Regressions for Poverty at Regional Level, 2001-2016.

		Coeff.	s.e.	
Real Agricultural Sector Output		0.109*	(0.065)	
Real Mining Sector Output		-0.053***	(0.017)	
Real Industrial Sector Output		K_i		
Real Service Sector Output		-0.500***	(0.133)	
		K_i		
Coast				
Ancash, -0.412 (0.300); Arequipa -0.898* (0.532); Ica 0.0397 (0.515), Libertad -0.0452 (0.485), Lambayeque 0.343 (0.329), Lima -0.119 (0.345), Moquegua, 0.322 (0.496), Piura -0.0270 (0.159), Tacna, -1.210 (0.916), Tumbes 0.319 (0.289)				
Highlands				
Apurimac -0.507*** (0.192), Ayacucho 0.220 (0.304), Cajamarca, 0.0741 (0.214), Cusco -0.476 (0.426), Huancavelica, 0.146 (0.436), Huanuco -0.451*** (0.161), Junin -0.0343 (0.460), Pasco 0.226 (0.277), Puno -0.368 (0.408)				
Jungle				
Amazonas -0.110 (0.231), Loreto 0.331** (0.154), Madre de Dios -0.585 (0.378) San Martin -0.0624 (0.398), Ucayali -0.654 (0.484)				
	Rho	0.063		
Number of Observations 360; Number of Groups 24; Time Periods 15				
Wald Chi 2	83.29***			
Hypothesis Tests		Chi 2(df)	df	p-value
<i>Pattern of growth does not matter</i>				
$H_0: \beta_i^j = \beta \forall j = \text{Agr, Min, Ind, Serv}$		147.33	95	0.001
<i>Sectoral growth matters but geography does not</i>				
$H_0: \beta_i^j = \beta^j \forall j = \text{Agr, Min, Ind, Serv}$		138.87	92	0.001
<i>Sectoral growth does not matter but geography does</i>				
$H_0: \beta_i^j = \beta_i \forall j = \text{Agr, Min, Ind, Serv}$		116.02	72	0.001
Source: INEI-ENAH0(2016). Author's own calculation. Note:*** p<0.01, ** p<0.05, * p<0.1				

As Ferreira et. al. (2010) and Marín et. al. (2015), equation (2) was initially estimated in its most ‘flexible form’, with no restrictions on the parameters (pool regression), which is equivalent to running separated regressions for each region except for a common residual variance restriction. The null hypothesis that the pattern of growth does not matter is easily rejected at the 1% level and it is reported in Table 3 (similar as the cases mentioned above). At 5% confidence level, hypothesis that the coefficient for agriculture, mining and services output were constant across states was not rejected.

Also, it was not rejected the null that the autocorrelation coefficient ρ is constant across states in both specifications. Then, pooling restrictions are imposed (Ferreira et. al., 2010), finding that growth in services sector had the greatest impact on poverty, followed by Mining sector. Neither industrial or agricultural growth were significant on decreasing poverty in Peru. In fact, we can see that the agricultural coefficient is positive, but statistically significant only at 10%. This result is consistent to Ferreira’s result, who find evidence that agricultural growth had, on average, no significant impact on poverty incidence in Brazil during 1985–2004. As it can be seen, the effect of Industry sector has not been homogeneous in all regions. It varies in significance and ranges values of -0.89 (Arequipa), -0.507 (Apurímac), -0.45 (Huánuco) and 0.33 (Loreto). Similar as the works of Ferreira and Ravallion in other development countries, it is found that services sector, due to its large share and labor intensity is more poverty reducing than other sectors (Ravallion and Datt, 1996, 2001; Ferreira, Leite and Ravallion, 2010, Montalvo and Ravallion, 2009). Coefficients on mining, industry and services sector growth varies considerably across states, and some of them have the wrong sign, and not all of them were significant for all regions.

5.2.- Determinants of the distributional effects

Following to Ferreira’s specification, it is known that first differences specifications in (2) controls for any time-invariant omitted variables, but it is possible that the estimation are biased by the presence of omitted poverty determinants that vary non-linear over time (Ferreira et. al., 2010). As they affirm, there may be distributional effects that are correlated with growth. These variables are, for example, changes in regional level-public expenditures⁹ that affect directly the welfare of poor people.

The other two variables that they and the other studies take into consideration are national aggregate social protection expenditures and the level of investment of the region (investment expenditures). To delimit regional and municipal government spending, similar as Ferreira et. al., three principal components are considered: health, education and social security. Once that the three variables are added to the basic model, the specification of Eq. (2) changes to:

$$\Delta \ln P_{it} = \beta_i^A s_{it-1}^A \Delta \ln Y_{it}^A + \beta_i^M s_{it-1}^M \Delta \ln Y_{it}^M + \beta_i^I s_{it-1}^I \Delta \ln Y_{it}^I + \beta_i^S s_{it-1}^S \Delta \ln Y_{it}^S + \gamma_1 \Delta \ln SOC_{it-1} + \gamma_2 \Delta \ln INV_{it-1} + \gamma_3 \Delta \ln SSA_{it-1} + \gamma_4 \Delta \ln CPI_{it-1} + u_{it} \quad (3)$$

⁹ According to the MEF database, expenditures are divided into expenditures incurred by the national government (2001-2016), expenditure incurred by regional governments (2004-2016), and expenditure incurred by local governments (2007-2016), due to the process of decentralization carried out by the Peruvian government during the decade of 2000.

Where the three new variables are “Regional Social Expenditures” (SOC), “Regional Investment Spending” (INV) and “Social Security and Social Assistance” (SSA)¹⁰. Additionally, it is included the Consumer Price Index to capture the effect of the changes in prices. As Ferreira et. al. (2010) appoints, these variables added in eq. (3) can be interpreted as distributional effects on poverty, given that the regression controls for the growth effect. This is part of the discussion of Bourguignon’s ‘Poverty-Inequality-Growth triangle’¹¹, and due to the characteristics of the regression, the terms in the sector-specific growth rates embody both a pure growth effect and a distributional effect associated with the pattern of growth, as it will be showed below.

Table 4. Regressions for Poverty and Determinants at Regional Level, 2001-2016.

		Coeff.	s.e.	
Real Agricultural Sector Output		-0.039	(0.060)	
Real Mining Sector Output		-0.049***	(0.016)	
Real Industrial Sector Output		K_i		
Real Service Sector Output		-0.425***	(0.133)	
Social Expenditure (SOC)		-0.628***	(0.109)	
Investment (INV)		-0.052***	(0.015)	
Social Assistant (SSA)		0.0035	(0.009)	
Inflation Rate (CPI)		-0.442*	(0.252)	
		K_i		
Coast				
Ancash -0.443* (0.269); Arequipa -1.259*** (0.486); Ica -0.027 (0.513); Libertad -0.131 (0.479); Lambayeque -0.088 (0.246); Lima -0.007 (0.373); Moquegua 0.170 (0.495); Piura -0.020 (0.131); Tacna -1.295* (0.723); Tumbes 0.499* (0.291)				
Highlands				
Apurimac -0.428** (0.166); Ayacucho 0.262 (0.264); Cajamarca 0.232* (0.140); Cusco -0.280 (0.442); Huancavelica 0.144 (0.329); Huanuco -0.295* (0.169); Junin -0.055 (0.406); Pasco 0.310 (0.310); Puno -0.622** (0.296)				
Jungle				
Amazonas 0.0854 (0.177); Loreto 0.191 (0.126); Madre de Dios -0.489 (0.362); San Martin -0.0184 (0.308); Ucayali -0.685 (0.488)				
	Rho	-0.011		
Number of Observations	360			
Number of Groups	24			
Time Periods	15			
Wald Chi 2	223.02***			
Hypothesis Tests		$Chi\ 2(df)$	df	$p\text{-value}$
<i>Pattern of growth does not matter</i>		150.63	95	0.0002
$H_0: \beta_i^j = \beta \ \forall j = \text{Agr, Min, Ind, Serv}$				
<i>Sectoral growth matters but geography does not</i>		147.56	92	0.0002
$H_0: \beta_i^j = \beta^j \ \forall j = \text{Agr, Min, Ind, Serv}$				
<i>Sectoral growth does not matter but geography does</i>		113.57	72	0.0013
$H_0: \beta_i^j = \beta_i \ \forall j = \text{Agr, Min, Ind, Serv}$				
Source: INEI-ENAH0 (2016). Author's own calculation. Note: *** p<0.01, ** p<0.05, * p<0.1				

¹⁰ See annexes for more detail on definition and sources for these variables.

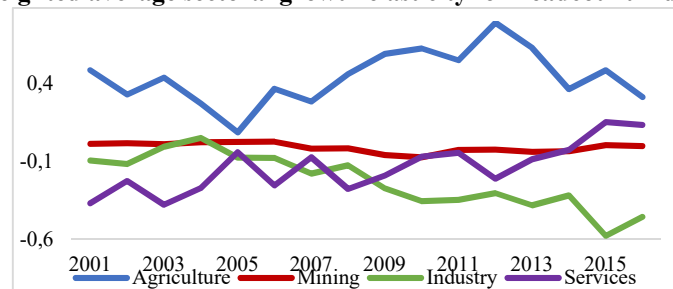
¹¹ Bourguignon postulates that poverty, or a change in poverty, can be explained as a function of growth, distribution and change in distribution. The reduction of poverty is given by both effects, so that the change in poverty can be specified as a function of growth, income distribution and change, whether the change in poverty. $\Delta Poverty \cong F(Growth, Distribution, \Delta Distribution)$. See Bourguignon (2003) for details.

Similar as the previous section, pooling restriction hypotheses are tested on the fully flexible model. Results are shown in table 4. In this table, it is showed that impact of service sector growth remains significantly negative, constant across states, and the largest in absolute value. However, the coefficient of the agriculture sector varies substantially and loses all significance¹².

The coefficients of the industry sector vary, but the negative significance of some of them is maintained. In relation to the coefficients of public expenditure, social public spending (SOC) is the one that has had the highest incidence in the reduction of poverty. Then, the government's investment spending (INV) has been much smaller in magnitude, but significant. By contrast, social security and assistance (SSA) spending by the Government had a non-significant poverty-reducing distributional effect. This is an unexpected result, because conditional transfer programs, such as 'Juntos' or 'Pensión 65', has evidence of having effects on poverty reduction.

However, if the effects of such social programs are disaggregated in the regions, it is found that there are regions not so affected by these social programs. Moreover, 'Juntos' is an intergenerational cash transfer program for escaping poverty, so that its effects begin to be seen after its implementation (implemented in 2004). Similar as Ferreira et. al. (2010), GDP shares-adjusted elasticity ($\beta_i^J s_{it-1}^J$) are aggregated across states with populational weights. Figure 4, shows the evolution of the poverty responses to growth in each sector over time. It can be seen that growth elasticity of poverty has varied over time, except for the case of mining. It is seen that, initially, the GDP services was more poverty-reducing, and the industrial was almost equal to 0, but the trend has been reversed. However, in relation to the agricultural GDP, this has remained with positive coefficient during much of the period.

Figure 4. Weighted average sectoral growth elasticity for headcount index. 2001-2016.



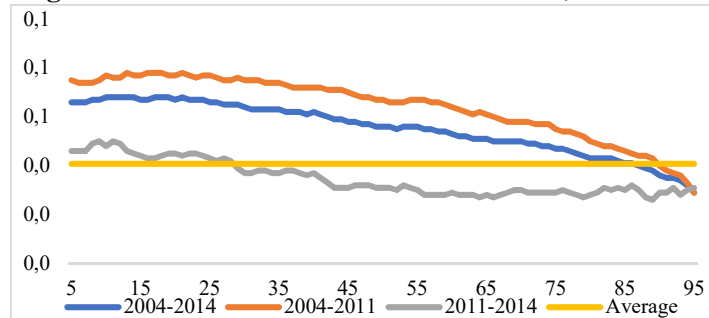
Source: Author's own calculation using INEI data.

Also, it is showed in Figure 5, the temporal pattern of the poverty dynamics in the Growth Incidence Curve (GIC). Following Ferreira et. al, the GIC captures graphically the annualized growth rate of per capita income for every percentile of the income distribution between two points in time. The Growth Incidence Curve is a conceptually useful tool to analyze the impact of aggregate economic growth over a wide range of the distribution (Ravallion and Chen, 2003). So, Figure 5 gives GIC for the whole period

¹² In the case of Brazil, the agricultural coefficient was positive before the reforms—implying that growth in the sector was associated with increases in poverty—but shifted to a negative coefficient post-1994, albeit non-significant in both cases.

available¹³ (2004–2014), and for each sub-period (2004–2011 and 2011–2014). The periods are defined by the lower growth rates reported after 2011 (financial crisis and end of natural resources boom). In addition, regional and spatial heterogeneity is also important. Not only was average annual growth clearly higher in 2004–2011 than during 2011–2014, but its incidence was quite different. The incomes of the poor grew faster than those of the rich in the first sub-period. This is evidence of pro-poor growth, causing inequality to decrease and increasing growth elasticity of poverty. But analyzing the second sub-period, incomes of the lowest-income percentiles have not grown more significantly than the incomes of the highest, causing inequality to increase, or that it is not reduced as much as in other years, and reducing the growth elasticity of poverty. Fig. 4 appears to show a change in the pattern of poverty reduction in Peru, which seems to be different in 2004–2011 and in 2011–2014.

Figure 5. Growth Incidence Curve for Peru, 2004-2014.



Source: Author's own calculation using LAC Equity Lab (World Bank).

The GIC helps to find evidence that, after 2011, the dynamics of poverty reduction have cooled. There is need to consider some specific facts. First, growth was somewhat higher in the first period than in the second. Second, social security and social assistance transfers were poverty-reducing in the whole period. Although transfer levels began to rise in the first period (see Annex A1), they continued to grow substantially in the second. Since the final effects of each of these candidate factors on Peru's poverty dynamics depend not only on the magnitude of the coefficients (or of the elasticities, in the case of sectoral outputs), but also on changes in the levels of the independent variables, the next subsection presents the decomposition of the observed poverty changes (following Ferreira et. al.) that is based on Eq. (3). By holding each right-hand-side variable constant at a time, it is decomposed average poverty changes in each period into its various components.

5.3.- Decomposition of the rate of poverty reduction

In the paper presented by Ferreira, Leite and Ravallion, they argued that, when the rate of poverty reduction is given by Eq. (3) one can decompose its mean ($E(\Delta \ln P_{it})$) into a

¹³ The GIC curve was calculated using LAC Equity Lab tabulations and SEDLAC (CEDLAS and World Bank) WDI for LAC interpolations. Since the numbers presented here are based on SEDLAC, a regional data harmonization effort that increases cross-country comparability, they may differ from official statistics reported by governments and national statistical offices. The LAC aggregate is based on 17 countries in the region for which microdata are available. In cases where data are unavailable for a given country in a given year, values have been interpolated using WDI data to calculate regional measures.

pure growth component, a component due to the sectoral composition of growth and components due to other factors and the state-specific trends. The pure growth component is defined as:

$$G = E \left[\left(\beta_i^A s_{it-1}^A + \beta_i^M s_{it-1}^M + \sum_i \beta_i^I s_{it-1}^I + \beta_i^S s_{it-1}^S \right) \Delta \ln Y_{it} \right] \quad (4)$$

This is the contribution to poverty reduction of a (hypothetical) balanced growth process (Ferreira et. al., 2010) in which $\Delta \ln Y_{it}^E = \Delta \ln Y_{it}^M = \Delta \ln Y_{it}^I = \Delta \ln Y_{it}^S$. The sectoral component of the mean rate of poverty reduction is given by:

$$S = E \left[\beta_i^A s_{it-1}^A (\Delta \ln Y_{it}^E - \Delta \ln Y_{it}) + \beta_i^M s_{it-1}^M (\Delta \ln Y_{it}^M - \Delta \ln Y_{it}) + \sum_i \beta_i^I s_{it-1}^I (\Delta \ln Y_{it}^I - \Delta \ln Y_{it}) + \beta_i^S s_{it-1}^S (\Delta \ln Y_{it}^S - \Delta \ln Y_{it}) \right] \quad (5)$$

This term can be interpreted as the contribution to changes in poverty of changes in the sectoral composition of output, during the growth process (Ferreira et. al.). The contribution of State expenditures, or redistribution component expenditures (combining both social assistance, investment and social security) is:

$$R = \gamma_1 \Delta \ln SOC_{it-1} + \gamma_2 \Delta \ln INV_{it-1} + \gamma_3 \Delta \ln SSA_{it-1} \quad (6)$$

Finally, contribution of Inflation is given by:

$$\pi = \gamma_4 \Delta \ln CPI_{it-1} \quad (7)$$

It is readily verified that:

$$E(\Delta \ln P_{it}) = G + S + R + \pi \quad (8)$$

given that $E(u_{it}) = 0$. Results of the decomposition in Eq. (8) are presented in Table 5. Also, both sub period analyzed in the GIC are showed. Regional poverty dynamics were different between periods. The annual growth in Headcount index was 9.6 % in average. However, there is a 2% difference between the two periods. In the first period poverty was reduced by 10.3% per year, while in the second, 8.3%. The pure growth component has had little impact, with the sectoral sector being more poverty reducing, but becoming slightly less poverty-decreasing in the second period, reflecting a decline in the importance of the services sector (the most poverty-reducing sector) in GDP (see Fig. 3).

Table 5. Decomposition of overall poverty reduction. 2001-2016.

	Pre 2011	Post 2011	Total
Annual growth in the headcount index	-0.1034	-0.0827	-0.0960
Components			
Pure Growth (G)	-0.0038	-0.0032	-0.0036
Sectoral pattern of growth (S)	-0.0137	-0.0036	-0.0101
Social expenditure, investment and social assistance (R)	-0.0480	-0.0487	-0.0482
Inflation (π)	-0.0021	-0.0002	-0.0014
Residual	-0.0362	-0.0342	-0.0354

Source: INEI-ENAH0 (2016). Author's own calculation

However, Social expenditure, investment and social assistance represented the largest component of poverty reduction, both in the first and second periods, capturing much of the reduction of poverty in the second period. This evidence that, during the period 2011-2016, much of the reduction in poverty came from the redistributive component, rather than from the growth component (as mentioned, during that period there were lower

GDP growth rates). The effect of inflation, which had been a strong driver of rising poverty before stabilizing reforms and the change of central bank reserve system, remains very small (and negative), as one would have expected from the dramatic reduction in the inflation rate (Ferreira et. al., 2010). With the aim of analyzing the dynamics of poverty reduction, the same breakdown is shown at the regional level. Annex A2 shows the results. It confirms the greater reduction effect of poverty by the redistributive component of government spending, in addition to the low contribution of the pure growth component to the reduction of poverty.

5.4.- On the role played by state-level initial conditions

Finally, consistent with the studies of Ravallion and Chen (2006) and Ferreira et al (2010), it is explored the impacts of the initial conditions on the dynamics of poverty reduction. Particularly, it is investigated whether the responsiveness of poverty to sector-specific growth, and also on initial conditions such as initial GDP (Galor and Moav, 2004; Galor and Zeira, 1988). The way this is done is including a set of covariates in Eq. (4):

$$\Delta \ln P_{it} = \beta_i^A s_{it-1}^A \Delta \ln Y_{it}^A + \beta_i^M s_{it-1}^M \Delta \ln Y_{it}^M + \beta_i^I s_{it-1}^I \Delta \ln Y_{it}^I + \beta_i^S s_{it-1}^S \Delta \ln Y_{it}^S + \sum_k \gamma_k \ln X_k^{93} + u_{it} \quad (9)$$

First, it starts by restricting our initial conditions to state-level GDP per capita (in 1993) and a measure of household income inequality (the Gini index) in 1997¹⁴. The reason of choosing year 1993 responds to testing the initial conditions of the population that will be analyzed later by using of the Population and Housing Census of 1993. The 1997 Gini index (obtained from ENAHO) is used due to of lack of data (household income is not reported in the census, which is used to build the index), and income inequality does not change dramatically among years (Forbes, 2000; Kakwani and Pernia, 2000; Kakwani, 2000; Li and Zou, 1998; Gottschalk, 1997).

As shown in Table 7, there is a negative coefficient for initial GDP (as expected) per capita but the effect of initial inequality is non-significant Headcount index¹⁵. To make matters worse, the significance of the services sector is lost, something that had not happened in previous regressions, maybe due to high correlation between initial GDP and contemporary GDP rates. Nevertheless, other results are largely maintained: social protection expenditures remain negative and significant; the same as investments, but regional-level social assistance spending becomes positive. Nonetheless, restricting the model with initial conditions to initial output and inequality levels is not terribly informative, however.

In the next step, following Ferreira's specification, those variables are replaced by some other determinants, such initial levels of human capital (average level of education reached by adults and illiteracy rate), infrastructure (share of households with access to electricity), and urbanization rate (percentage of the population engaged in agricultural

¹⁴ The Gini index is calculated from the 1997 ENAHO, available but with some measurement errors, less observations than the surveys since 2001 and taken only in the last quarter of 1997, which makes it not a so reliable, but given the limitation of the data, it is used

¹⁵ The income measures used to compute the Gini indices are from the 1997 National Household Survey, and thus measured with even greater error than in others standard household surveys. The lack of significance might reflect this greater measurement error.

activities). All of these variables come from the 1993 Census and are thus measured eight years prior to the beginning of our study period, making exogeneity rather plausible.

Table 7. Regressions for Poverty with Initial Conditions for GDP and Inequality. 2001-2016.

	Coeff.	s.e.
Real Agricultural Sector Output	-0.0966*	(0.037)
Real Mining Sector Output	-0.0041	(0.014)
Real Industrial Sector Output	-0.0592	(0.071)
Real Service Sector Output	-0.2240	(0.140)
Social Expenditure (SOC)	-0.373**	(0.173)
Investment (INV)	-0.0372**	(0.015)
Social Assistant (SSA)	0.0241**	(0.010)
Inflation rate (CPI)	0.0947	(0.327)
<i>Initial Conditions</i>		
Gini Index of Household per capita income	0.00654	(0.020)
GDP per-cápita	-0.0215**	(0.010)
Number of Observations	360	
Number of Groups	24	
Time Periods	15	
Wald Chi 2	266.82***	

Source: INEI-ENAH0 (2016). Author's own calculation. Note: *** p<0.01, ** p<0.05, * p<0.1

Results are shown in Table 8. Coefficients on two out of the four initial conditions are significant, and have the expected signs, except for agricultural employed and Illiteracy rate, in the headcount regression. A more educated labor force and regions with better infrastructure for access to basic services (initially) were all associated with a greater subsequent elasticity of poverty reduction.

Table 8. Regressions for Poverty with Initial Conditions for human development. 2001-2016.

	Coeff.	s.e.
Real Agricultural Sector Output	-0.0926	(0.060)
Real Mining Sector Output	-0.0006	(0.016)
Real Industrial Sector Output	-0.0783	(0.077)
Real Service Sector Output	-0.2240	(0.140)
Social Expenditure (SOC)	-0.373**	(0.173)
Investment (INV)	-0.0372**	(0.015)
Social Assistant (SSA)	0.0241**	(0.010)
Inflation rate (CPI)	0.0947	(0.327)
<i>1993 Census Variables at regional level</i>		
Average years of Education	-0.0192*	(0.009)
Illiteracy rate	-0.106	(0.267)
Access to electricity	-0.0966*	(0.011)
Agricultural Employed	-0.0003	(0.001)
Number of Observations	360	
Number of Groups	24	
Time Periods	15	
Wald Chi 2	266.82***	

Source: INEI-ENAH0 (2016). Author's own calculation. Note: *** p<0.01, ** p<0.05, * p<0.1

Growth in the services sector remains more effective in reducing poverty than growth in either agriculture or manufacturing, but non-significant. Coefficient on social security and investments remains negative and statistically significant in both periods, but social assistance transfers remains positive and significant. Thus, the coefficient on inflation remains non-significant.

6.- Conclusions.

This paper has carried out a study of the dynamics of poverty reduction considering the spatial and spatial heterogeneity of the data, as well as the analysis of the redistribution of income and the initial conditions of the regions and their influence on the dynamics of poverty reduction. Although poverty reduction in 2002-2011 was almost 30%, regional dynamics have been far from the same. Both the structure of the GDP (components) and the period of analysis (period post 2011) influence this dynamic.

In this paper, it's analyzed three possible sets of factors that determine the distributional component of poverty reduction, which underpins that elasticity: changes in the sectoral pattern of growth; heterogeneity in initial conditions that account for spatial variation in the elasticity; and contemporaneous changes in macroeconomic and redistribution policies (Ferreira et. al., 2010). Marked differences in the poverty-reducing effect of growth across different sectors are founded, with growth in the services sector being consistently more pro-poor than either agriculture or industry. The poverty-reducing effect of growth in the industrial sector varied markedly across regions, as it was remarked on Section 2.

Growth was more pro-poor between 2001 and 2016 in regions where, in 1993, there are better educational levels and better infrastructure - provision of basic services. But the largest sources of poverty reduction over this period arose from contemporaneous changes in government policies in income redistribution. In particular, they were driven by the expansion in social security and, to a lesser extent, regional investment. Surprisingly, social assistance spending by the government was not poverty reducing during the whole period. This result may be explained in the sense that many of the social programs have been developed since 2011, and those that started before 2011, as is the case of 'Juntos', it is a trans-generational program for the emergence of poverty. Both effects suggest that there is much that governments can do to alleviate poverty in the medium-run, even during economic slowdowns.

In conclusion, are there policy recommendations derived from these findings? Changes in the sectoral composition of output during these years had a statistically significant effect but were not quantitatively important. The main recommendations of this paper are that, when a country can afford it, a well-designed expansion in the social protection system can play an important role in sustaining poverty reduction during a period of economic growth. Even when growth rates are not so high, social protection policy can continue to reduce poverty, albeit to a lesser extent. In the long run, sustained poverty reduction requires sustained economic growth. In the short- to medium-run, distributionally-aware public policy can make important contributions. Also, the dynamics of poverty reduction are affected by geographical and sectoral patterns, so poverty reduction policies must consider these heterogeneities, the characteristics of the population and the composition of the productive structure of each region.

References

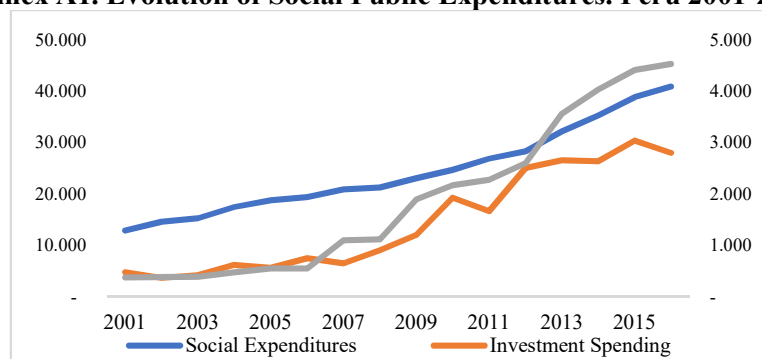
- Adams, R. (2002). Economic Growth, Inequality and Poverty: Findings from a New Data Set. World Bank Policy Research Working Paper no. 2972, February 14.
- Aghion, P., Caroli, E., & García-Peñalosa, C. (1999). Inequality and Economic Growth: The Perspective of the New Growth Theories. *Journal of Economic Literature*.
- Alesina, A. & Rodrik, D. (1994). Distributive Politics and Economic Growth, *Quarterly Journal of Economics*, 109(2), 465-490.
- Alesina A. & Perotti R. (1996). Income distribution, political instability and investment. *European Economic Review* 40.
- Anand, S., & Kanbur, R. (1993). The Kuznets process and the inequality-development relationship. *Journal of Development Economics* 40, 25– 52.
- Balisacan, A. M. (2003). Poverty and inequality. The Philippine economy: Development, policies, and challenges, 311-341.
- Barro, R.J. (1997). *Determinants of Economic Growth: A Cross-Country Empirical Study*. Cambridge, MA.
- Barro R. (1999). Inequality, growth and investment. National Bureau of Economic Research, Working Paper N° 7038.
- Besley, T., & Burgess, R. (2003). Having Global Poverty. *Journal of Economic Perspectives*, 17(3), pp. 3-22.
- Beteille, A. (2003). Poverty and inequality. *Economic and Political Weekly*, 4455-4463.
- Bourguignon, F. (2003). The Growth Elasticity of Poverty Reduction: Explaining Heterogeneity across Countries and Time Periods. World Bank.
- Clausen, J. & Flor, J. (2014). Sobre la naturaleza multidimensional de la pobreza humana: propuesta conceptual e implementación empírica para el caso peruano. Documento de trabajo N° 387. Departamento de Economía. Pontificia Universidad Católica del Perú.
- Dabla-Norris, M. E., Kochhar, M. K., Suphaphiphat, M. N., Ricka, M. F., & Tsounta, E. (2015). Causes and consequences of income inequality: a global perspective. International Monetary Fund.
- Dollar, D. & Kraay, A. (2002). Growth is Good for the Poor. *Journal of Economic Growth*, 7(3), pp. 195-225.
- Escobal, J. & Ponce, C. (2008). Dinámicas Provinciales de Pobreza en el Perú 1993-2005. Working paper N° 11. Rimisp Latin American Center of Rural Development.
- Escobal, J. & Ponce, C. (2008). Polarización y Segregación en la Distribución del Ingreso en el Perú: Trayectorias Desiguales. Documento de Investigación 62. GRADE.
- Escobal, J., Saavedra, J. & Torero, M. (1999). Los activos de los pobres en el Perú. Working paper N° 7601. IDB Publications, Inter-American Development Bank.
- Escobal, J & Armas, C. (2015). Estructura Agraria y Dinámica de Pobreza Rural en el Perú. Documento de investigación 79. Grupo de Análisis para el Desarrollo.
- Ferreira, F., Leite, P. & Ravallion, M. (2007). Poverty Reduction without Economic Growth? Explaining Brazil's Poverty Dynamics, 1985-2004. *Journal of Development Economics* N°93. Pp. 20-36.
- Fields, G., (1980). *Poverty, Inequality and Development*. Cambridge Univ. Press, New York.
- Forbes, K. J. (2000). A Reassessment of the Relationship between Inequality and Growth. *American Economic Review*, 869-887.
- Galor, O. (2009). *Inequality and Economic Development: The Modern Perspective*. Elgar Reference Collection, Northampton, MA, USA.

- Galor, O. & Moav, O. (2004). From Physical to Human Capital Accumulation: Inequality and the Process of Development. *Review of Economic Studies*, Vol. 71, No. 4, pp.1001–1026.
- Galor, O. & Zeira, J. (1988). Income Distribution and Investment in Human Capital: Macroeconomics Implications. Working Paper No. 197. Hebrew University.
- García, J. & Céspedes, N. (2011). Pobreza y Crecimiento Económico: Tendencias durante la década del 2000. Serie de Documentos de Trabajo. Banco Central de Reserva del Perú.
- Gottschalk, P. (1997). Inequality, income growth, and mobility: The basic facts. *The Journal of Economic Perspectives*, 11(2), 21-40.
- Granda, A. (2016). Crecimiento, pobreza monetaria y desigualdad en la última década. *Revista Moneda* No 168. Banco Central de Reserva del Perú.
- Grusky, D. B., Kanbur, S. R., & Sen, A. K. (2006). Poverty and inequality. Stanford University Press.
- Hang, P. T. (2016). Sectoral composition of growth and poverty reduction in Vietnam. *VNU Journal of Science: Economics and Business*, 28(2).
- Herrera, J., & Cozzubo, A. (2016). La Vulnerabilidad de los hogares a la pobreza en el Perú, 2004-2014. Documento de Trabajo No 429. Departamento de Economía. PUCP.
- INEI. (1993). IX Censo de Población y IV de Vivienda 1993. Instituto Nacional de Estadística e Informática.
- INEI (2015). Mapa de Pobreza Provincial y Distrital (2013). Publicaciones digitales INEI. Instituto Nacional de Estadística e Informática.
- INEI. (2015). Evolución de la Pobreza Monetaria: 2009-2015. Informe Técnico. Instituto Nacional de Estadística e Informática.
- Iradian, G. (2005). Inequality, Poverty and Growth: Cross-Country Evidence. International Monetary Fund Working Paper. Middle East and Central Asia Department.
- Kaldor, N. (1957). A Model of Economic Growth. *The Economic Journal*, Vol. 67, No. 268, pp. 591–627.
- Kakwani, N. (2000). On measuring growth and inequality components of poverty with application to Thailand. *Journal of Quantitative Economics*, 16(1), 67-80.
- Kakwani, N., & Pernia, E. M. (2000). What is pro-poor growth? *Asian development review*, 18(1), 1-16.
- Kniivila, M. (2007). "Industrial development and economic growth: Implications for poverty reduction and income inequality", Chapter 3.1. in book published by UN(2007). *Industry Development for the 21st Century. Sustainable Development Perspectives*. United Nations. Department of social and Economic Affairs, NY., pp.295-332.
- Kraay, A. (2005). Aid, growth, and poverty. *Macroeconomic Management of Foreign Aid: Opportunities and Pitfalls*. Forthcoming. International Monetary Fund, Washington, DC.
- Kraay, A. (2006). When is growth pro-poor? Evidence from a panel of countries. *Journal of development economics*, 80(1), 198-227.
- Kuznets, S. (1955). Economic Growth and Income Inequality. *American Economic Review*. Vol.45 No 1, 1-28.
- Li, H., & Zou, H. F. (1998). Income inequality is not harmful for growth: theory and evidence. *Review of development economics*, 2(3), 318-334.
- Loayza, N. & Raddatz, C. (2005). The Composition of Growth Matters for Poverty Alleviation. The World Bank.

- Loayza, N. & Rigolini, J. (2015). The Local Impact of Mining on Poverty and Inequality: Evidence from the Commodity Boom in Perú. Working Paper N° 33. Peruvian Economic Association.
- Loayza, N., Mier, A. & Rigolini, J. (2013). Poverty, Inequality, and the Local Natural Resource Curse. Discussion paper N° 7226. Institute for the Study of Labor (IZA).
- Lopez, J. (2004). Pro-Growth, Pro-Poor: Is There a Trade off? Policy Research Paper No. 3378, World Bank, Washington, D.C.
- López, H. (2006). Pro Poor Growth in Latin America. En: "Poverty Reduction and Growth: Virtuous and Vicious Circles". The World Bank. Washington D.C.
- Mauro, R. (2005). Pobreza y Desigualdad en el Perú: Los Promedios no bastan. Recurso Electrónico. Extracted from: <http://econwpa.repec.org/eps/dev/papers/0509/0509016.pdf>
- Mendoza, W. (2013). Milagro Peruano: ¿Buena suerte o buenas políticas? Revista Economía. Vol. XXXVI, N° 72. Pp. 35-90.
- Montalvo, J. & Ravallion, M. (2009). The Pattern of Growth and Poverty Reduction in China. Policy Research Working Paper 5069. Development Research Group. World Bank.
- Sen, A. (1999). Development as Freedom. Oxford University Press. New York.
- Ravallion, M., (1997). Can high inequality developing countries escape absolute poverty? Economics Letters 56, 51– 57.
- Ravallion, M. (2001). Measuring aggregate welfare in developing countries: how well do national accounts and surveys agree? Policy Research Working Paper, World Bank, Washington, DC.
- Ravallion, M. & Chen, S. (1997). What can new survey data tell us about recent changes in distribution and poverty? World Bank Economic Review 11 (2), 357– 382.
- Ravallion, M. & Datt, G. (1996). How important to India's poor is the sectoral composition of economic growth? The World Bank Economic Review, 10(1), 1-25.
- Ravallion, M. & Datt, G. (1998). Farm Productivity and Rural Poverty in India. Journal of Development Studies, April, vol. 34 (4), pp.62-85.
- Ravallion, M. & Datt, G. (2002). Why has economic growth been more pro-poor in some states of India than others? Journal of Development Economics 68, pp. 381– 400
- Sen, A. (1999). Development as Freedom. Oxford University Press. New York.
- Tello, M. (2015). Poverty, Growth, Structural Change and Social Inclusion Programs: A Regional Analysis of Peru. Regional and Sectoral Economics Studies, Vol. 15-2. Latin American Centre, School of Interdisciplinary Area Studies. University of Oxford.
- Timmer, P., 1997. How well do the poor connect to the growth process? Mimeo. University of California, San Diego.
- Yamada, G & Montero, R. (2008). Desempleo, Pobreza y estrategias de protección social: Perú 1998-2005. Documento de discusión. Centro de Investigación de la Universidad el Pacífico.
- Yamada, G. & Castro, J. (2010). La Economía Peruana en la última década: Mejor desempeño y mayor resiliencia a las crisis. Documento de discusión. Centro de Investigación de la Universidad el Pacífico.
- Yamada, G., Castro, J. & Bacigalupo, J. (2012). Desigualdad Monetaria en un Contexto de Rápido Crecimiento Económico: El Caso reciente del Perú. Documento de Discusión. Centro de Investigación de la Universidad del Pacífico.
- Yamada G. & Castro J. (2012). Poverty, Inequality and Social Policies in Perú: As poor as it gets. Documento de Discusión. Centro de Investigación de la Universidad del Pacífico.

Annex on line at the journal Website: <http://www.usc.es/economet/rses.htm>

Annex

Annex A1. Evolution of Social Public Expenditures. Perú 2001-2016.

Source: Ministerio de Economía (MEF). Values in millions of soles. Social expenditures in left axle, and Investment spending and Social assistance in right axle.

Annex A2. Average decomposition of overall poverty reduction by regions.

Region	Pure Growth (G)	Sectoral pattern of Growth (S)	Social expenditure and assistance (R)	Inflation (π)	Residual
Amazonas	-0.0019	-0.0151	-0.0737	-0.0010	0.0038
Ancash	-0.0063	-0.0066	-0.0495	-0.0016	-0.0451
Apurímac	-0.0084	-0.0478	-0.0659	-0.0020	0.0289
Arequipa	-0.0076	-0.0168	-0.0436	-0.0018	-0.0651
Ayacucho	0.0007	-0.0070	-0.0583	-0.0011	-0.0453
Cajamarca	-0.0012	-0.0014	-0.0677	-0.0010	-0.0010
Cusco	-0.0098	-0.0512	-0.0528	-0.0019	-0.0354
Huancavelica	-0.0005	-0.0045	-0.0729	-0.0013	-0.0339
Huánuco	-0.0054	-0.0103	-0.0589	-0.0011	-0.0206
Ica	-0.0029	-0.0041	-0.0445	-0.0017	-0.0826
Junín	-0.0019	-0.0033	-0.0479	-0.0014	-0.0886
Libertad	-0.0010	-0.0030	-0.0465	-0.0014	-0.0492
Lambayeque	-0.0034	-0.0085	-0.0448	-0.0017	-0.0964
Lima	-0.0034	-0.0035	-0.0399	-0.0013	-0.0173
Loreto	0.0003	-0.0008	-0.0549	-0.0014	-0.0014
Madre de Dios	-0.0211	-0.0164	-0.0587	-0.0008	0.0084
Moquegua	0.0105	0.0010	-0.0471	-0.0015	-0.1367
Pasco	-0.0005	0.0032	-0.0428	-0.0014	-0.0381
Piura	-0.0025	-0.0037	-0.0502	-0.0011	-0.0284
Puno	-0.0064	-0.0020	-0.0508	-0.0020	-0.0208
San Martín	-0.0015	-0.0943	-0.0502	-0.0014	-0.0472
Tacna	-0.0095	-0.0084	-0.0430	-0.0016	0.0085
Tumbes	0.0014	-0.0546	-0.0459	-0.0012	-0.0144
Ucayali	-0.0084	-0.0039	-0.0550	-0.0012	-0.0438

Source: INEI-ENAH0 (2016). Author's own calculation