

The pattern of growth and the expansion of the middle class in Peru

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The pattern of growth and the expansion of the middle class in Peru¹

Liliana Castilleja-Vargas and Sheyla Enciso

Summary

The structure and the sectoral composition of Peruvian economy during the most recent period of economic prosperity has had a fundamental role in the expansion of the middle class. Following a macroeconomic analysis of data panel at a departmental level, it is proved that in the pattern of the sectoral and territorial growth of the country, the services sector supported the expansion of the middle class in most of the departments, resulting in a convergence dynamics among them. Thus, in those departments with major setbacks in terms of income, inequality and access to basic services, the impact of the services sector in the expansion of the middle class was greater. This analysis is complemented with data at the household level, which shows that work and income coming from employment in the services sector were the main driving forces behind economic progress, mainly from work in the informal private sector and self-employment.

Key Words: Multisectoral growth, regional differences, middle class, pro-middle-class growth

Clasification JEL: O41, O47

1. Introduction

As from early 2000, it was observed in Peru a significant decrease in poverty, together with an upward social mobility process that expanded the middle-class. In particular, the boom of commodities from the period 2000-2013 resulted in an unprecedented expansion of the middle class in countries exporting primary goods. This was the case of Peru, which produced metal mining including copper, being one of its main export products.

This positive shock made an impact in household through different channels, mainly in labor market and the role of public finance. In effect, a greater demand for labor generated more jobs and higher incomes from different economic activities, but mainly from the services sector², with greater strength in informal labor in the private sector and self-employment, as this note describes.

¹ This study is framed within Technical Cooperation (CT) RGT3253, executed by the Country Department Andean Group (CAN) of IDB, whose aim is to foster economic growth in Andean region through the analysis of factors which promoted the expansion of the middle class, as well as the identification of potential *spillovers* the consolidation of this segment may present over growth and institutions. Comments, omissions, and errors are exclusive responsibility of the authors.

² In this note services sector, also known as tertiary sector, includes economic activities of construction, commerce, and all type of services.

To this date, the services sector represents 65% of the GDP, in comparison with the 20% that represents the primary sector and the 15% of the manufacturing sector, and encompasses 64% of the economically active population (EAP), in comparison with the 27% that represents the primary sector and 10% in the case of the manufacturing sector.

Using the classification of socioeconomic groups based on their income level, which includes the concept of economic security of the World Bank, which has been widely adopted in several studies of the IDB, the population within the range of medium income, also known as middle class, includes those who live in households with per capita income between US\$5 and US\$ 62 per day, adjusted by purchasing power parity (PPP of 2011). This is a wide group, and based on this classification, it can be divided into two categories. One may be called vulnerable middle class, having per capita income between US\$5 and US\$12.4 per day according to PPP 2011, and the other category called consolidated middle class, having a per capita income between US\$12.4 and US\$62 per day. Meanwhile, the poor sector includes those with per capita income below US\$5 (Ferreira et al., 2016)³.

The threshold of US\$ 12.4 separates both categories of middle class based on the income level and it is sustained in the concept of economic security. This threshold adopts a 10% probability to fall into poverty as an “operative” dividing line between economic security and vulnerability to poverty. In this way, the definition of middle class is anchored, consolidated to economic security and with a probability of less than 10% to fall into poverty (Duryea and Robles, 2016). The probability to fall into poverty increases significantly when people have income below this level.

For methodological purposes of the analysis, the category of total middle class is adopted which includes vulnerable and consolidated sectors. Under this threshold, the middle-class population in Peru increased from 49.6% in 2000 to 75.1% in 2017, implying an increase of 25.5 percentage points. Given the relatively constant share of population with high income, the increase of the middle class represents the same magnitude of people which fell into poverty during that period, from 49.8% in 2000 to 23.8% in 2017.

Given this context, the purpose of this note is to understand, from a macroeconomic perspective, how productive sectors of Peruvian economy contributed to increasing social mobility, considering the heterogeneity in the territorial dynamics at departmental level. Likewise, it is analyzed whether economic policy played a pro-middle-class role. In the case of fiscal policy, the impact of public expenditure by allocation and the impact of inflation in the case of monetary policy.

In order to analyze how the dynamics of growth, sectoral as well as territorial, contributed to the expansion of middle class in Peru during the period 2007-2017, the model proposed by Ferreira et al (2010) is used, incorporating control variables and initial conditions of the departments to identify if there is a convergence dynamics among them⁴.

The results confirm and show that, among productive sectors, the services sector, which includes activities related to commerce and construction among others, supported the expansion of middle class during that period. Likewise, this pattern of growth has been accompanied by a convergence dynamic in Peru, being the services sector the one which contributed the most to the expansion

³ Ferreira et al. (2012) and Ferreira et al. (2016).

⁴ In the annex tables showing econometric results are presented.

of the middle class in departments with less favorable initial socioeconomic conditions. The impact of the GDP growth was stronger in those departments which lagged in terms of initial conditions of development, inequality, access to basic services, among others. At the same time, the impact of this sector on the expansion of the middle class was greater in those departments which kept high rates of informal labor or employment in small enterprises during the period under study. As far as public expenditure is concerned, it also promoted middle class growth, but to a lesser extent. The evidence presented in this note suggests that this was the case of public expenditure allocated to infrastructure and social development.

Econometric analysis is complemented with a decomposition analysis to show that expansion of middle class is explained mainly by an increase in the income coming from the services sector, which mostly included informal labor and self-employment jobs, while the increase in formal labor played a minor role.

2. Growth and social mobility during the boom

Peru is one of the countries in the region that experienced greater improvements in terms of economic growth and social progress within the last fifteen years. Peruvian economy has gone through an outstanding transformation in the last quarter of the century, from instability and economic worsening during the seventies and eighties to becoming one of the most dynamic economies in Latin America, leading economic growth in the region.

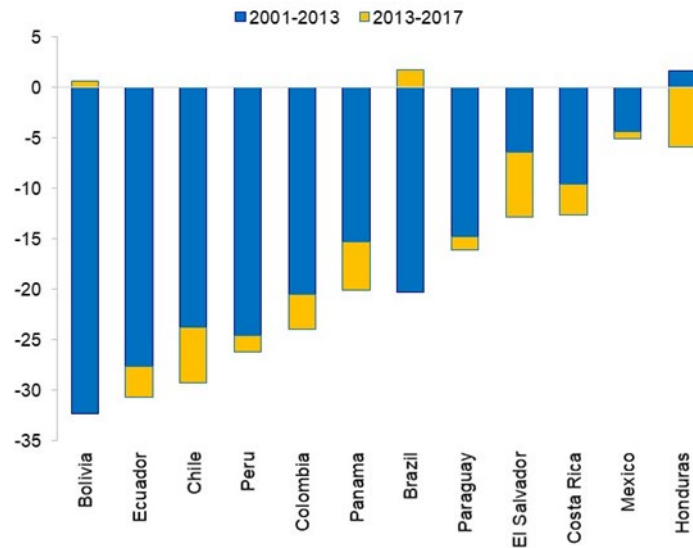
The beginning of the decade 2000 signaled a new beginning for Peru with an unprecedented economic expansion, turning into an upper middle-income country⁵ in 2008. Between 2000 and 2018, Peruvian economy has grown at an average rate of 4.9% and per capita income has grown at a rate of 3.7%, both rates above rates of similar economies and even beyond the United States, achieving GDP per capita of US\$ 7.118 in 2018.

Furthermore, a decrease in poverty together with an upward social mobility process were observed during the period, which expanded middle class socioeconomic segment and, to a lesser extent, reduced income inequality⁶. Using comparative data from ECLAC (CEPAL in Spanish), Peru is among the countries which shows the largest reduction in the rate of monetary poverty, from 45.1% in 2001 to 20.5% in 2013 (see graph 1). Additionally, Peru is among the exporting countries of commodities of the region that has experienced the largest increase of total middle class in recent years, even above the average (see graph 2).

⁵ According to the classification of the World Bank.

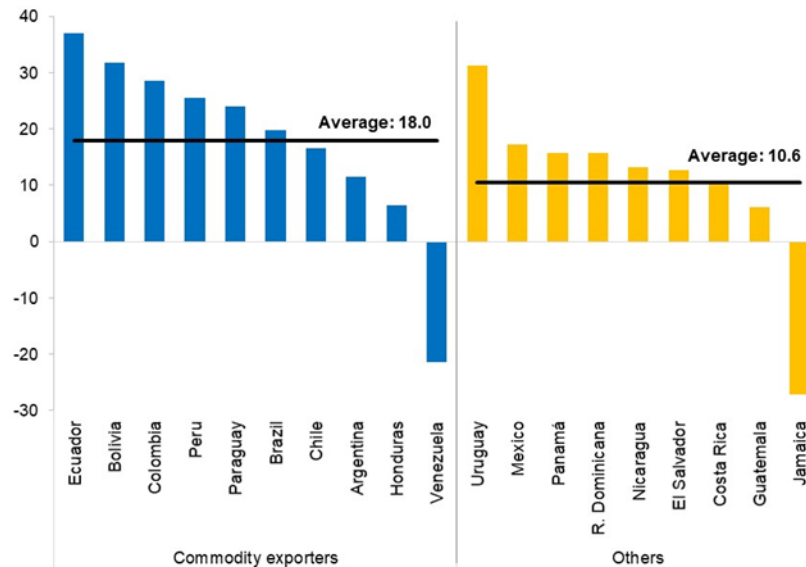
⁶ Inequality in the distribution of income also decreased, and Gini coefficient went from 0.51 in 2005 to 0.43 in 2017 (and 0.44 in 2016) according to data from INEI. This index has a range from zero to one, where zero implies perfect inequality in distribution of income, while one represents extreme concentration. However, inequality is still at relatively high levels and the dynamics shows geographic differences which perpetuate the gap urban-rural and interregional.

Graph 1. Poverty reduction in Latin America and The Caribbean
(porcentaje points)



Note: Given data availability: Bolivia and Colombia (2002), Chile (2003), Mexico (2000, 2014 and 2016), Honduras (2016).
Source: Own elaboration with data from ECLAC (2019).

Graph 2. Median class expansion in Latin America and The Caribbean, 2000-2017
(porcentaje points)

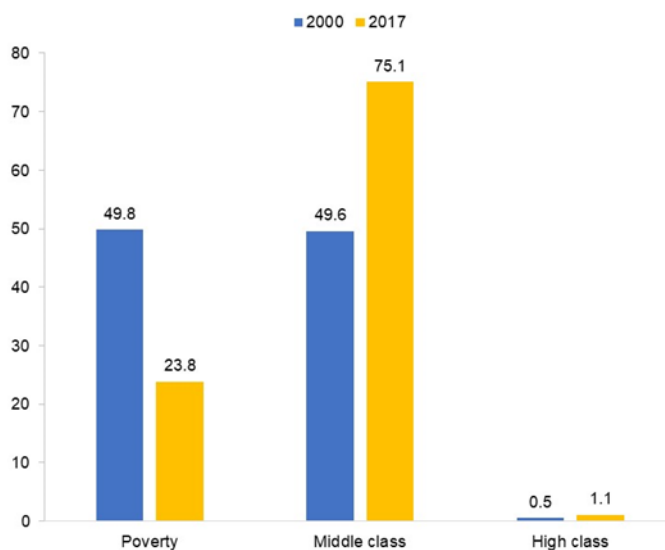


Source: Own elaboration with data from IADB Sociómetro.

This phenomenon is mainly explained by the economic dynamism that Peru and the region in general experienced under a positive external environment (Ferreira et al., 2013). Numerous studies came to the conclusion that economic growth during the boom period explains a decrease in poverty rate between 70% and 85%, while several distribution factors explain the decrease

between 30% and 15%⁷. In particular, the factor that contributed the most to poverty reduction was labor income growth, whose strong dynamism favored middle class boosting socioeconomic mobility, followed by a higher share of employment in the work market⁸. Even though labor share grew from 70.2% in 2000 to 76.3% in 2014⁹, economic growth favored more the poorer socioeconomic segments, given that the increase in annual labor income was five times higher in those deciles than in higher ones¹⁰.

Graph 3. Social mobility in Peru, 2000-2017
(% of total population)



Source: Own elaboration with data from IADB Sociómetro.

Using data from IADB Sociometro which feeds from National Household Survey (ENAHO, in Spanish) in Peru, it is observed that due to this upward social mobility dynamics, population in the middle class segment expanded from 49.8% at the beginning of 2000 to 75.1% of current Peruvian population (see graph 3). Therefore, nowadays three quarters of Peruvian population have a level of income which, according to international standards, can be classified as middle class. This transformation is an achievement worth celebrating, which may bring about significant economic and social benefits for the country.

⁷ Robles and Robles (2016) estimate that economic growth explains 70% of the decrease in poverty, while the distribution factor 30% during 2004-2013. Estimates by UNDP (2013) calculate similar figures, during 2000-2012: 71.6% is the growth effect and 28.4% the distribution effect. Estimates by Ferreira et al. (2013) calculate 85% and 15%, respectively.

⁸ Robles and Robles (2016) estimate that labor income contributed to a 60% of the reduction in poverty incidence during 2004-2013. Public transfers included in “Juntos” program only contributed to 6% in poverty decrease, increasing, on the other hand, family income dependence in 10 percentage points, and reducing dependence on labor income in 6 percentage points during that period.

⁹ There is a significant gender gap in labor participation, with a difference of 17 percentage points (p.p.) between men and women (85.6% for men 68.3% for women). When disaggregating race and ethnicity in this data, it is observed that contrary to what happens for the total population, afro descendent and indigenous women have a more active participation in the labor market than men. Specifically, 82% of indigenous women participate in labor market, as opposed to 69.1% of men. In the case of afro descendants the difference in labor market participation is 14 p.p. (69.1% and 65.2% respectively) (INEI).

¹⁰ García and Céspedes (2011); Yamada et al. (2012).

The economic dynamics experienced by Peru and the rest of the region in general has been partially interrupted by a less favorable international context in recent years. Facing a decline in the prices of commodities, the economic growth of the entire region including Peru has slowed down, posing the challenge to sustain socioeconomic transformation and, at the same time, highlighting the fragility of the progress achieved. A recent study on income dynamics in the region shows that a significant part of the middle class is still exposed to a considerable risk of falling into poverty: 14% of people belonging to the middle class in 2003 experienced at least one poverty episode during the following ten years (Stampini et al., 2015). Given this scenario, it is essential to regain the growth path and to generate the conditions to consolidate the middle class.

3. Pro-middle-class growth: evidence at a household level

Socioeconomic progress in Peru during the last decades has resulted from a combination of structural reforms, solid macroeconomic policies, and favorable external conditions. Oil shock during the seventies, debt crisis in the eighties and the adoption of distorted policies, like multiple exchange rate, caused external and internal imbalances. In the mid-nineties, Peru adopted a stabilization program and started an ongoing process of structural reforms that consolidated macroeconomic stability and laid the foundations for the sustainable growth of the last 15 years¹¹.

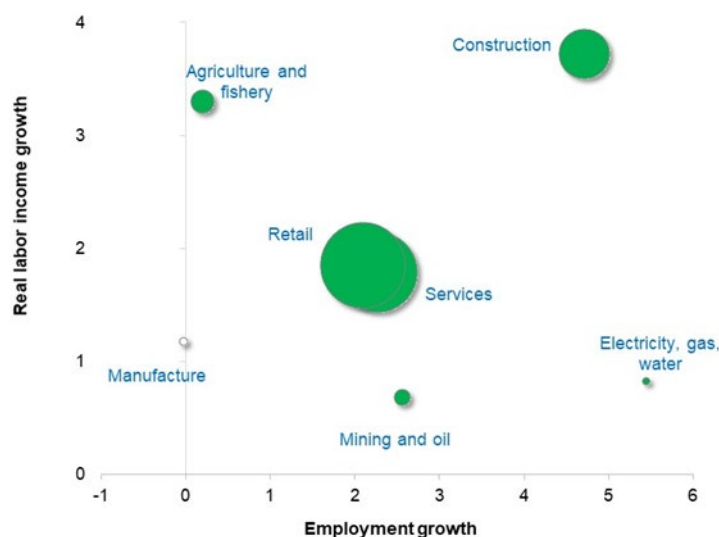
External favorable conditions during the commodity boom period were added to structural reforms and prudent management of public policies. Behind this boom, rapid growth of emerging economies like China markedly increased the demand of raw materials, and consequently their price in international markets. During this period, as a response to the global financial crisis of 2008-2009, central banks of industrialized countries adopted expansive monetary policies and reduced interest rates at never-before-seen levels to reactivate their economies. These measures brought favorable external financial conditions in international markets, where Peru and other economies of the region were important receivers of capital flow.

In this context, mining sector played a crucial role as growth engine during the boom period. Between 2000 and 2013, the production of this sector grew 87%, at an average annual rate of 4.7%, and the value of mining exports, in particular copper and gold, grew six times, representing more than half of the total exports of the country. The balance of trade improved from a deficit of 0.8% of GDP in 2000 to a surplus of 5.4% in 2011. Flows of direct foreign investments (DFI), mainly associated with mining sector recorded an average level of 4.5% of GDP during that period. External conditions combined with the policies detailed above allowed the Peruvian economy to flourish, and at the same time to avoid major imbalances or sustainability problems.

¹¹ Among the milestones of structural reforms: i) adoption of a fiscal rule, within the framework of the Fiscal Transparency and Prudence Law (Ley de Prudencia y Transparencia Fiscal) of 1999, to reduce pro-cyclical bias and public expenditure volatility and contribute to sustainability of external debt; ii) adoption of a control of inflation regime in 2001 to promote stability of prices, together with more autonomy and credibility of the Central Bank; iii) unification and flexibility of the exchange rate to buffer external shocks; iv) financial and commercial openness; v) creation of a legal framework to promote investment and a major share of the private sector in the economy; and vi) a decentralization framework to provide regional entities with autonomy.

This positive supply shock had an impact on household through different channels, mainly via the labor market and public finances. High demand for labor generated employment and income growth coming from economic activity. Between 2004 and 2017, both employment and income increased at an annual average rate of 2%, with relative heterogeneity among productive sectors¹² (see graph 4).

Graph 4. Employment growth and labor income by productive sector, 2004-2017 (average annual Var. in %)



Note: EGW = Energy, Gas and Water. Commerce including restaurants and hotels. The bubble's area represents the absolute change in job creation during the period. Source: Own elaboration with data from IADB Sociómetro.

With an analytical exercise using micro data from the National Household Survey in Peru (ENAHO, in Spanish), the change in the total income per capita is decomposed by source of income. In particular, the decomposition model according to Shapley-Shorrocks was applied, following the method of Azevedo et al. (2012)¹³, which allows to differentiate household income per capita by components of interest (labor and non-labor, for instance) to analyze the change in the interest indicators within two years, in this case the percentage of population belonging to the middle class. This method gathers per capita income distribution in the initial year to build counterfactual distributions using variations in each component of interest, in this way making possible to estimate the marginal effects of each of them in the observed change in the middle class percentage of population¹⁴.

Additional to applying a decomposition by labor and non-labor income, income is decomposed by employment sector. The analysis shows that income coming from the services sector had the

¹² The statistics considers habitual resident of 14 years old or older. Labor income corresponds to the definition of IADB Sociómetro, and deflated with average annual PCI (2009 as a basis).

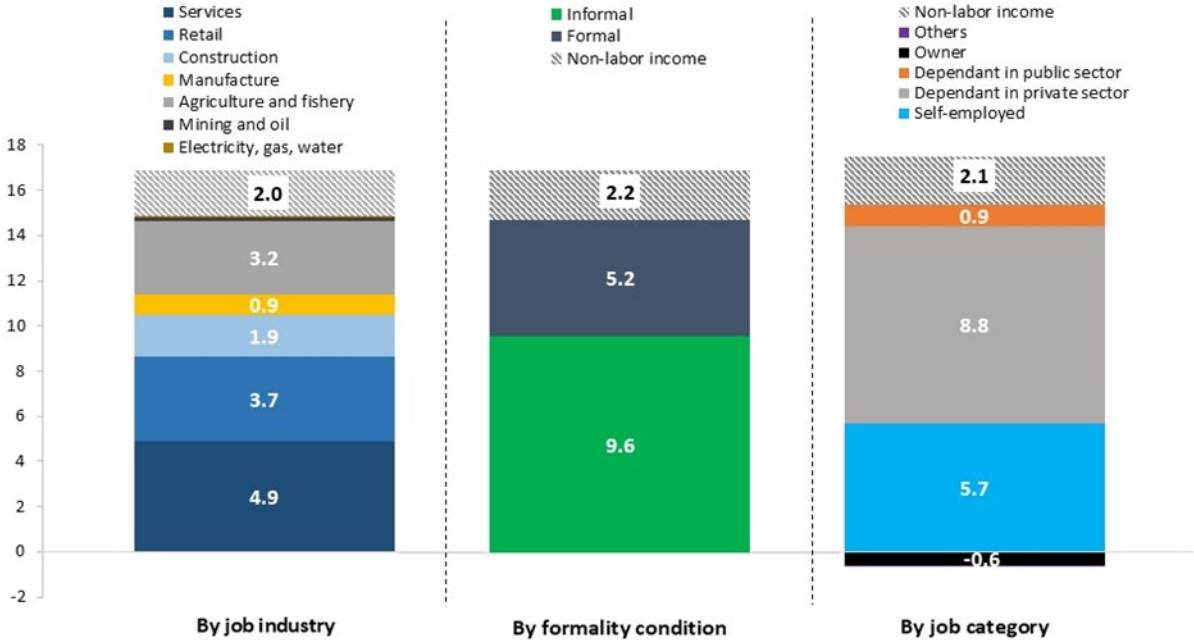
¹³ Azevedo, J., V. Sanfelice and M. Nguyen (2012).

¹⁴ This method stands out because it corrects the dependence on the trajectory. Given the importance of the order according to which components of construction and counterfactual distribution are taken, this method recalculates such estimate adding different orders and showing average effect.

highest impact on the middle-class expansion. In effect, between 2007 and 2017, middle class grew 17 percentage points (p.p.). The increase in individuals' income contributed the most to such expansion, explaining 15 p.p. of the total. With a more limited impact, non-labor income, including revenues, transfers and remittances among others, explained 2 p.p. of the total.

When disaggregating income by employment sector, it can be observed that the increase in labor income from tertiary sectors explains 11 p.p. of the total (services 5 p.p., commerce 4 p.p., and construction 2 p.p.). Following them, the increase in labor income from agriculture and fishery explains 3.2 p.p. of the expansion of the total middle class (see graph 5)¹⁵.

Graph 5. Decomposition of median class absolute change in Peru by income source, 2007-2017 (percentage points)



Note: EGW = Energy, Gas and Water. Commerce including restaurants and hotels. Source: Own elaboration with data from IADB Sociómetro.

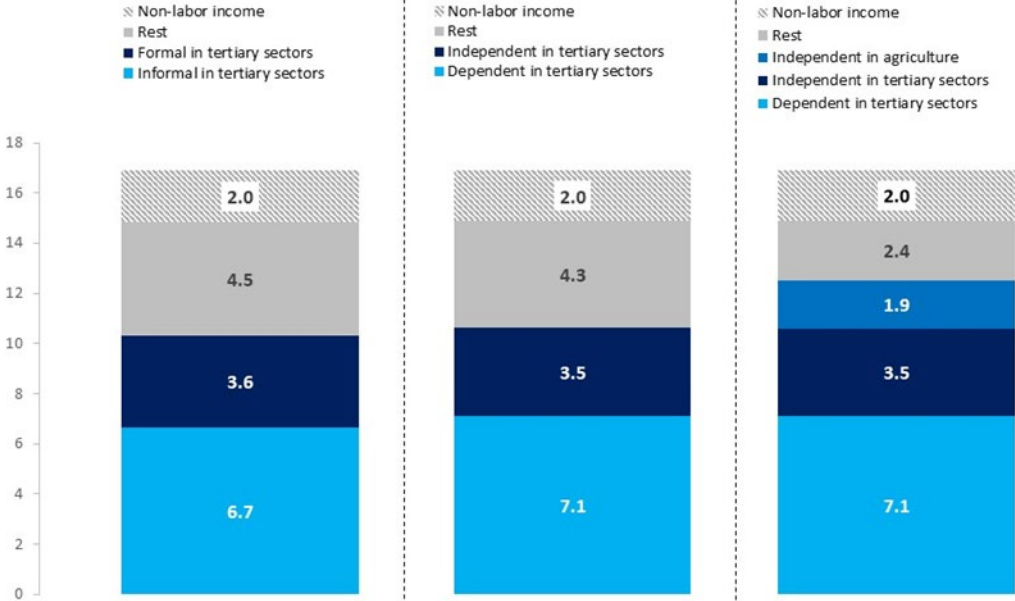
In decomposing by occupational category, it is observed that income growth of paid employment in the private sector explains 9 p.p. of the total, followed by self-employment (6 p.p.). In turn, by informality employment condition, informal employment income growth explains 10 p.p. of the total, while formal employment income only explains half of it (5 p.p.) (see graph 5).

A more detailed decomposition approach in the tertiary sector shows that labor income coming from informal employment explains 6.7 p.p. of the 17 p.p. expansion in the middle class during

¹⁵ Non-labor income only includes monetary income, according to the construction of variables of IADB Sociómetro. All incomes are deflated with annual average IPC by department (2009 as a basis). Main source of employment is considered, and it is defined as formal labor if it pays social security contributions. National poverty lines were considered, and middle class was defined as population whose income per capita is above such line, but not exceeding it over ten times its value.

the period 2007-2017, in comparison with a more limited contribution of formal employment in the services sector explaining only half of it (3.6 p.p.). Income coming from labor in services sector explains 7.1 p.p. in comparison with a more limited contribution of income coming from self-employment, which represents 3.5 p.p. (see graph 6).

Graph 6. Decomposition of median class absolute change in Peru in the tertiary sector by income source, 2007-2017 (percentage points)



Note: The tertiary sector includes construction, commerce, and services. All other categories in the tertiary sector and other sectors are gathered under the rest. Source: Own elaboration using data from IADB Sociómetro.

In short, expansion of the middle class is mainly explained by an increase in income coming from informal employment in the services sector. When considering the changes in the income distribution by occupational category, it becomes evident that the increase in income coming from employment in the private sector followed by self-employment is responsible for the expansion of the middle class, while employment in public sector played a limited role.

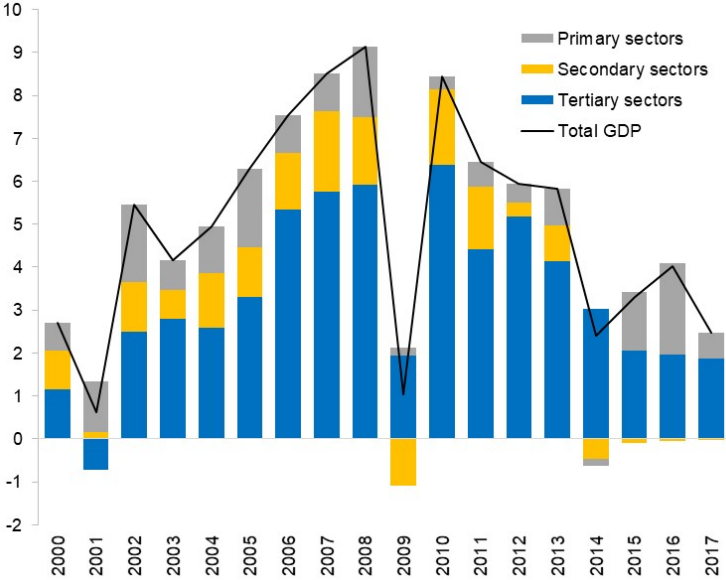
4. Growth pattern behind the expansion of middle class: evidence at a macroeconomic level

The relevance of the income sources mentioned in the expansion of the middle class is related to the proportion of jobs accounted by the tertiary sectors during the period of analysis. These sectors accounted for 59% of jobs in 2007 and 64% in 2017. Employment in the private sector and self-employment accounted for 36% and 35% in 2007 respectively and 40% and 37% in 2017. Meanwhile, informal employment accounted for 85% in 2007 and 79% in 2017.

The structure and sectoral composition of the economy have an impact on poverty levels and the middle class, where the most important factors are initial conditions and sectors contributing to economic expansion. Interestingly, economic growth impact on the middle class is not the same for every country¹⁶. Therefore, it is highly relevant to analyze the sectoral structure of GDP growth with a territorial approach inside each country, in order to suggest specific policies that foster middle class expansion.

In the specific case of Peruvian economy, services sector has a strong impact in terms of growth and employment (see graph 7). Tertiary sector includes besides productive services such as commerce and construction, all other services (e.g. tourism, finances, among others). To this date, this sector represents 65% of total GDP, in comparison with 20% which represents primary sector and 15% of the manufacturing sector, and 64% of the total EAP, in comparison with 27% in the case of primary sector and 10% in manufacturing sector.

Graph 7. Sector contribution to GDP growth, 2000-2017
(%)



Note: Tertiary GDP includes import right and other taxes. Source: BCRP

Likewise, production from services sector is the one leading in most of the departments of the country. During the period 2007-2017, the services sector had the highest share in manufacturing in 18 out of 24 departments that Peru is divided into^{17,18}. In three departments, primary and tertiary

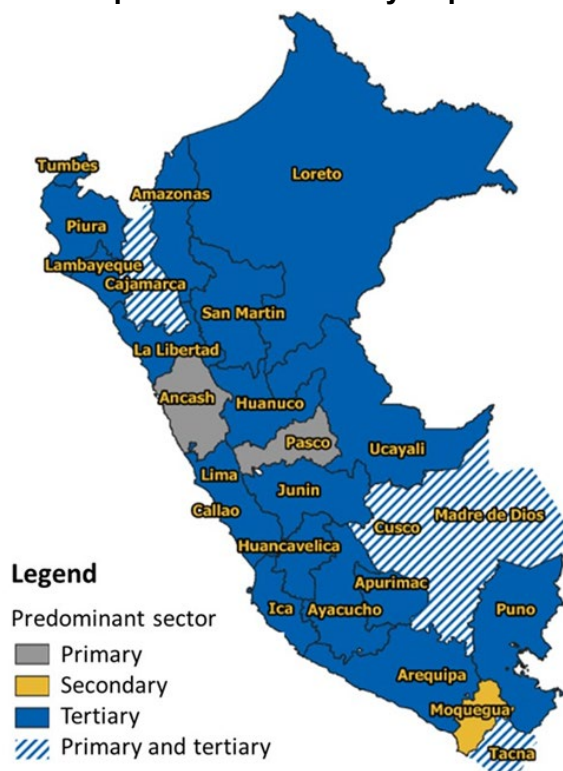
¹⁶ Canavire et al (2017) and Ferreira et al. (2010) find that growth of manufacturing and services sectors mostly affects middle class, but in a heterogeneous way in regions of Peru and Brazil respectively.

¹⁷ Constitutional province of Callao is included in the department of Lima.

¹⁸ The composition of GDP at a departmental level during the period analyzed is considered and defined as the predominant sector if it had a major role in the total GDP. Sectoral GDP data at a departmental level are only available since 2007, and for this reason the period after such year is analyzed. ¹⁹ Canavire et al. (2017) analysis includes the period 1997-2010.

sectors had a similar share, and only in one of them (Moquegua), the manufacturing sector had a relatively higher share in the economy (see graph 8).

Graph 8. Dominant productive sector by Department, 2007-2017



Note: In Cajamarca, Cusco, Madre de Dios and Tacna, the difference between the tertiary sector share and the primary sector share was lower than 10 percentage points. Source: INEI.

4.1. Empirical specification and description of variables

To examine the impact of growth dynamics, sectoral and territorial, on middle class in Peru, the model of Ferreira et al. (2010) for the case of Brazil, and the model of Canavire et al. (2017) for the case of Peru were adopted¹⁹. This model enables to capture the impact of growth dynamics by productive sector and at territorial level (by departments in the case of Peru) on the expansion of middle class. Furthermore, the model analyzes the impact of the fiscal channel, considering public expenditure by function, as well as the monetary channel, meaning the price index, to observe if these variables of economic policy were also responsible for the expansion of the middle class.

The econometric analysis estimates correlations, and not causality, considering the dynamics and the sectoral and territorial composition of growth, based on macro data at a departmental level for the period 2007-2017²⁰. The estimate comes from a model of differences and allows to control

¹⁹ Canavire et al. (2017) analysis includes the period 1997-2010.

²⁰ In Peru, a change in the base year in the national accounts was carried out, therefore, there is only information of GDP by economic sector at a departmental level since 2007.

heterogeneity of the initial conditions in each department, reducing potential problems of endogeneity (Wooldridge, 2010). The econometric specification is as follows:

$$\Delta \ln CM_{i,t} = \beta_i^{Pri} s_{i,t-1}^{Pri} \Delta \ln Y_{i,t}^{Pri} + \beta_i^{Sec} s_{i,t-1}^{Sec} \Delta \ln Y_{i,t}^{Sec} + \beta_i^{Ter} s_{i,t-1}^{Ter} \Delta \ln Y_{i,t}^{Ter} + \delta \Delta \ln G_{i,t-1} + \vartheta \Delta \ln CPI_{i,t} + \pi_i + u_{i,t} \quad (1)$$

Where i corresponds to each of the 24 departments of Peru (Lima includes the Constitutional Province of Callao) and t corresponds to each of the year of the period of the analysis. While CM is the proportion of population that belongs to the middle class; Y is real GDP per capita in primary sectors (Pri), secondary (Sec) and tertiary (Ter); s is the share of the respective sector in total GDP; CPI is the consumer price index (CPI); G is public expenditure divided into three categories: social expenditure, infrastructure expenditure, and expenditure in productive sectors. π denotes the time trend for each department. Following this specification, coefficient of each sector is averaged by its participation in the total GDP, so each $\beta_i^j s_{i,t-1}^j$ corresponds to the sectoral growth elasticity of the middle class.

The socioeconomic segment belonging to the middle class is defined as population with expenditure per capita above the poverty line in a determined geographical area, ten times below the value of it, according to the multiples established by Robles y Robles (2016)²¹. Official poverty lines were considered, which represent the cost of goods needed to sustain a person in different areas of the country in a more precise way. In the case of Peru, there are 82 poverty lines. The source of this information is the Harmonized Household Survey of IADB Sociómetro²².

Information at a departmental level by sectoral GDP comes from the National Institute of Statistics and Informatics (INEI, Instituto Nacional de Estadística e Informática), at constant prices of 2007 and transformed in per capita terms taking population projections of INEI. Specifically, primary GDP is composed of agriculture, livestock, hunting and forestry, fisheries and aquaculture, and oil, gas and mineral extraction and related services; secondary GDP is composed of manufacturing and electricity, gas, and water sectors; and tertiary GDP is composed of construction, commerce, maintaining and repair of automobiles and related services (transport, accommodation and restaurants, telecommunications, among others).

Regarding public expenditure variables by function, the data source is Integrated Financial and Budgetary Management System (SIAF, Portal de Sistema Integrado de Administración Financiera) of the Ministry of Economy and Finance (MEF). Public Expenditure includes the functions of education, health, housing, protection, and social welfare. Meanwhile, infrastructure expenditure includes the functions of energy, mining, and transport. Finally, expenditure in productive sectors includes the functions of agriculture, fisheries, industry and labor. Data of Consumer Price Index (CPI) includes 2009 as the year basis and comes from INEI statistics.

²¹ Poverty line at monetary value of each product and service consumed in a house divided by the number of people that live in it. This is the most precise measurement of material well-being and considering that Peru is one of the few countries of the region whose official estimate of poverty includes household consumption, for this analysis this concept of well-being is considered.

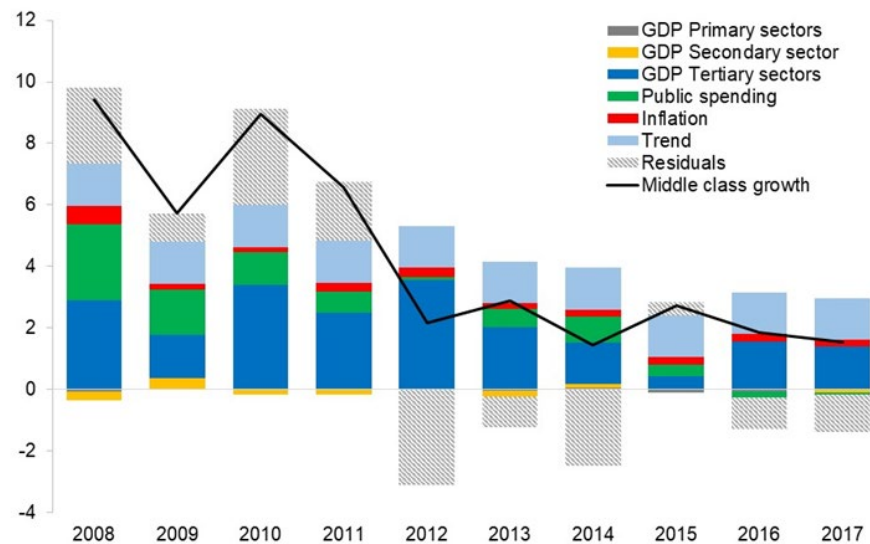
²² In the case of Peru, the National Household Survey, (ENAHO) is used, having a representative annual version at a departmental level.

4.2. Results

Results obtained from this model estimation reaffirmed the relevance of the tertiary sector in the expansion of the middle class. In effect, after estimating different specifications, on average, the growth of tertiary sector GDP was significantly and positively associated with the middle-class growth, unlike primary and secondary sectors ²³ (see table A.1 in annex). On average, during the period 2007-2017, for each 1% increase of GDP per capita in the tertiary sector, the middle class was expanded in 0.4% ²⁴ (see graph 9).

Meanwhile, the results show that fiscal policy in those years, through public expenditure increase in social sectors as well as in infrastructure, also had a positive and statistically significant impact on the expansion of the middle class, but to a lesser extent when compared to the impact of the tertiary GDP. Therefore, for each 1% increase in actual infrastructure expenditure and social sectors, the middle class expanded, on average, 0.02% and 0.06% in each case (see table A.1 in the annex).

Graph 9. Decomposition of middle-class average expansion according to growth pattern model, 2007-2017 (percentages points)



Source: Own estimations based on Ferreira et al. (2010) and IADB Sociómetro, INEI and MEF.

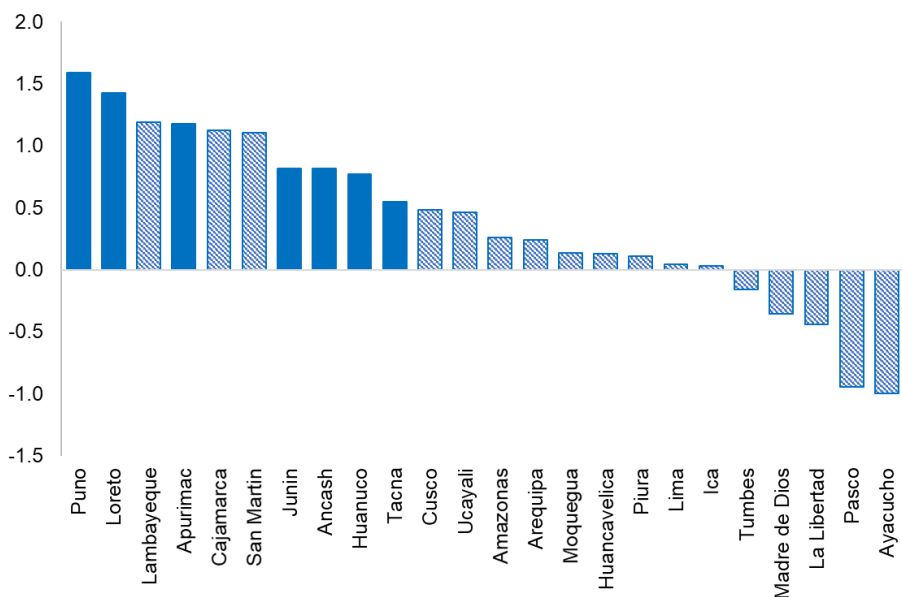
²³ It is possible to determine the best specification of the model based on likelihood tests, whether calculating aggregated coefficients for each sector or disaggregating them at a departmental level. Based on these tests, it was determined that the best estimate corresponds to disaggregating on the tertiary sector coefficient by department.

²⁴ It corresponds to simple average of the elasticity of the 24 departments, without considering the weight of each one in national tertiary GDP.

At a territorial level, results show that in most of the departments, services sector supported the expansion of the middle class. In effect, in 18 out of 24 departments, the dynamics of the tertiary sector growth had a positive impact on the expansion of the middle class. Among these, there are seven departments with an estimated coefficient which is statistically significant and robust following different specifications of the econometric model: Puno (1.6%), Loreto (1.4%), Apurímac (1.2%), Junín (0.8%), Áncash (0.8%), Huánuco (0.8%) and Tacna (0.5%) (see graph 10).

These departments did not present characteristics in common that could be related to a higher impact of the tertiary sector on the expansion of the middle class. In fact, these departments present a certain degree of heterogeneity with respect to the share of tertiary sector in total GDP and EAP.

Graph 10. Middle-class tertiary GDP average elasticity, according to growth pattern model, 2007-2017 (percentage points)



Note: Those departments where the coefficient is statistically significant to 5% are shown in dark blue. Lima and Callao are together. Source: Own estimations based on Ferreira et al. (2010) and IADB Sociómetro, INEI and MEF.

5. Territorial convergence and Pattern of growth.

5.1. Empirical specification and description of variables

Within the framework of the analysis of the growth pattern in Peru and its impact on the middle class, it is analyzed whether the estimated contribution of the expansion of the tertiary sector in upward social mobility is dependent on certain initial conditions at a territorial level. In other words, if certain characteristics of the departments, in terms of economic development and quality of life, before the commodity boom, magnified the positive impact of the expansion of this sector on the middle-class growth. If the services sector has contributed more to the expansion of the middle class in those departments with less favorable initial conditions, it would suggest a convergence dynamic at a territorial level.

With this purpose, the following adjustment to basic econometric specification is performed, mentioned in equation (1), adding an intersection term between tertiary GDP and initial conditions indicators and characteristics at a departmental level. The adjustment is represented in equation (2). At the same time, this expanded specification also allows to verify if the robustness of the significant and positive impact of the social public expenditure and expenditure in infrastructure is maintained.

$$\beta_i^{Ter} = \beta^{Ter} + \sum_k \beta_k^{Ter} \ln X_k^{inicial} \quad (2)$$

Vector X is composed of economic development indicators which belonged to a year way back before to avoid endogeneity issues. For this study, actual GDP per capita in 1997 and inequality of expenditure, measured by coefficient of Gini, for the year 2004 were considered. As far as quality of life indicators were concerned, Human Development Index (HDI) of 1993 and the percentage of the population having basic needs satisfaction (BNS) of 1993²⁵ were used. All variables are incorporated in logarithms. In all cases, the source comes from INEI, except for HDI, which comes from United Nations Development Program estimations (UNDP, 2009).

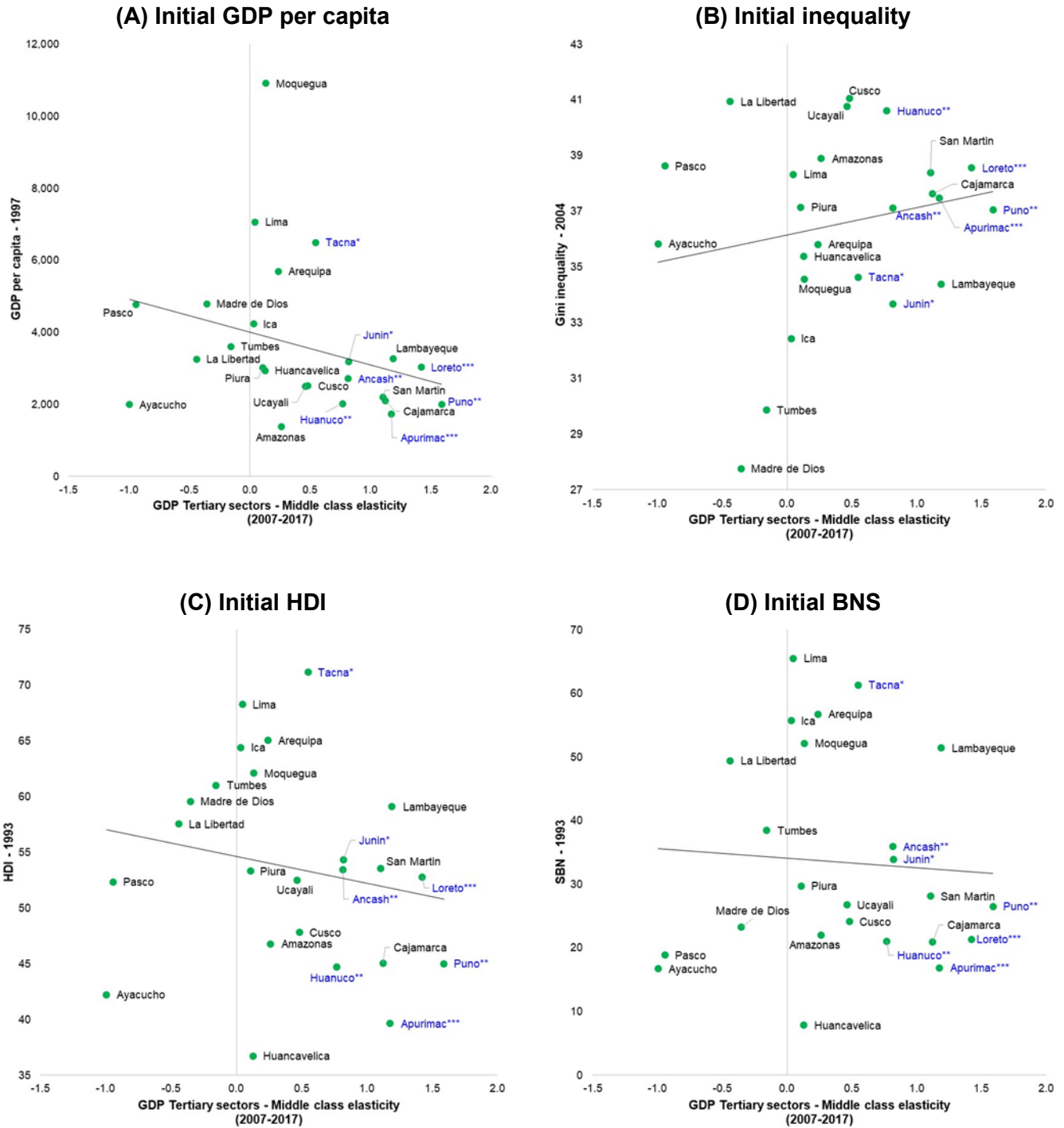
5.2. Results

The results show a negative and significant coefficient in the case of initial GDP per capita, which implies that departments with setbacks in terms of income benefited more from growth of the tertiary sector (see graph 11, a). In the same way, a significant and positive coefficient is obtained in the case of the inequality index, measured through coefficient of Gini, which implies that departments with higher levels of inequality benefited more from growth of tertiary GDP (see graph 11, b). Besides, the positive and significant coefficients of public expenditure in

²⁵ Household units with Basic Needs not covered are characterized by: high economic dependence (if the householder has initial or primary education incomplete or if there are more than 3 persons depending on only one person with employment, or if none has a job); school non-attendance (if there are children aged 6-12 years not attending to schools); inadequate housing (houses with walls made of mud, *quincha*, or straw matting or similar, dirt floors or improvised shelters); inadequate services (lack of hygienic service like pipe network or cesspit); and critical crowding conditions (if there are more than 3-4 persons per room).

infrastructure and social expenditure remain robust in each of the specifications (see table A.2 in the annex).

Graph 11. Relation between middle-class tertiary GDP elasticity and initial conditions



Note: Those departments in blue are the ones with statistically significant coefficients for the tertiary GDP sector. ***1% significance, ** 5% significance, * 10% significance. Source: Own estimations based on Ferreira et al. (2010) y BID, INEI and MEF.

Finally, as to the indicators of quality of life, negative and significant coefficients are obtained in Human Development Index (HDI) and the percentage of population with Basic Needs Satisfaction (BNS) covered, which implies that departments with major setbacks in terms of quality of life benefited more from growth of tertiary GDP (see graph 11, c and d). In the same way, positive and significant coefficient of public expenditure in infrastructure and social expenditure remain robust in each of the specifications (see table A.3 in the annex).

Therefore, the results obtained under the addition of initial conditions in the econometric estimates, like GDP per capita, inequality and access to basic services, suggest that impact of tertiary GDP was higher on the expansion of the middle class in those departments with major setbacks. That confirms that the growth pattern in Peru presented a convergence dynamic among the departments.

6. Labor market and Pattern of growth

6.1. Empirical specification and description of variables

During the period of the analysis, it is observed in Peru that departmental average rate of informal labor decreased from 87.9% in 2007 to 83.9% in 2017. Meanwhile, departmental average rate of employment in small enterprises marginally increased from 71.6% in 2007 to 72.2% in 2017. The dynamics that both indicators followed was heterogeneous among departments and over time.

In this context, with the purpose of analyzing the relation between dynamics of services sector and dynamics of the structure of labor market over the period of the analysis, the adjustment mentioned in equation (2) is taken as reference, which is applied to the main specification, and added to a crossed term of the tertiary GDP with indicators of labor market. Unlike the model which incorporates initial conditions where the variables of labor market are fixed over time, in this model variables correspond to a change in variables of labor market throughout the period of analysis (2007-2017). The adjustment is represented in the equation (3).

$$\beta_i^{Ter} = \beta^{Ter} + \sum \beta_i^{Ter} \Delta \ln Z_{i,t-1} \quad (3)$$

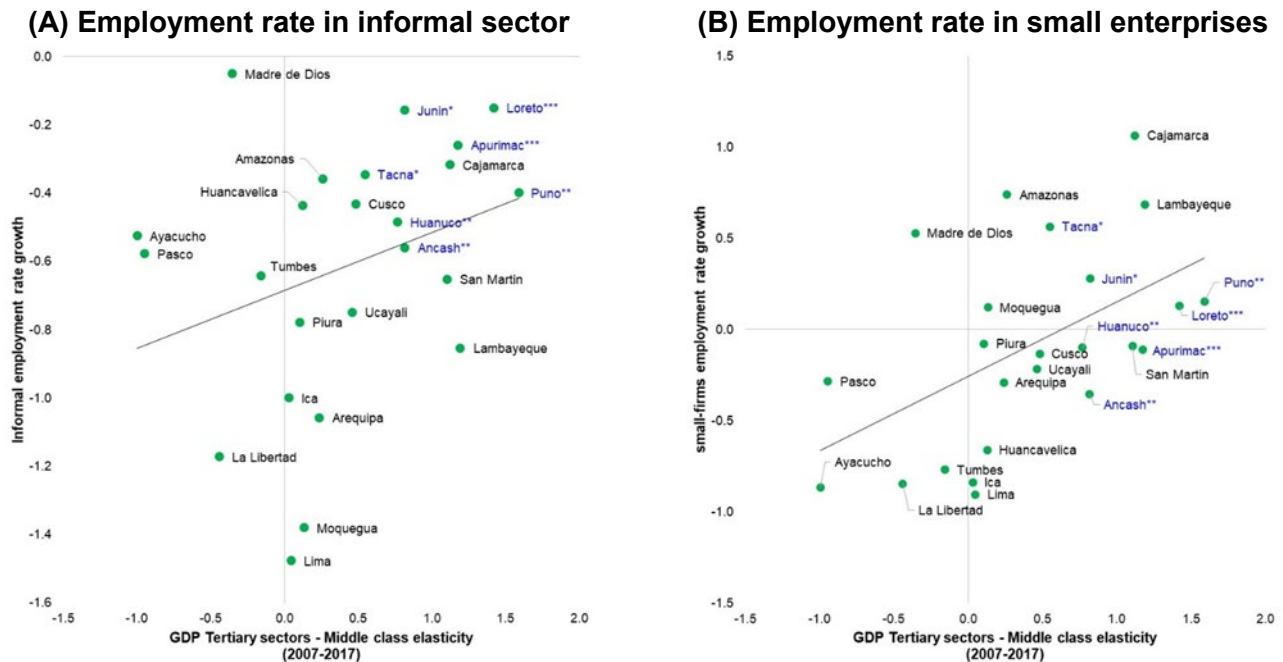
Vector Z is composed of indicators of the structure of labor market. For this study, the rate of informal labor was considered, defined as the percentage of workers who contribute to social security, and employment rate in small enterprises defined as the percentage of workers who work in enterprises with less than 5 employees. Both variables are incorporated in differences and in logarithms. Both indicators are estimated according to the Harmonized Household Surveys of IADB Sociómetro.

6.2. Results

The results obtained from this specification to examine the way the middle class expansion associated to growth of tertiary sector was linked to the dynamics of the structure of the labor market show a positive and significant coefficient in both indicators. Thus, departments with high rates of informal labor or employment in small enterprises registered a higher impact of the tertiary GDP on the expansion of middle class (see graph 12, a and b). In this case, only the positive and significant coefficient of social public expenditure remains strong in each of the specifications (see table A.4 in the annex)

The results at a territorial level are in line with what has been observed in the statistic exercise of decomposition of the expansion of the middle class mentioned in section 2, which shows that income coming from informal employment in tertiary sectors mostly explains the expansion of the middle class during the period 2007-2017.

Graph 12. Relation between middle-class tertiary GDP elasticity and labor market dynamics



Note: Those departments in blue are the ones with statistically significant coefficients for the tertiary GDP sector. ***1% significance, ** 5% significant, * 10% significant. Source : Own estimations base don Ferreira et al. (2010) y BID, INEI and MEF.

7. Conclusions

For the last fifteen years, a significant decrease in poverty in Peru was observed, together with upward social mobility, which enlarged the socioeconomic segment of the population belonging to the middle class. In particular, the commodity boom during the period 2000-2013 resulted in an unprecedented expansion of the middle class in primary goods exporting countries. This was the case of Peru, through exports of metallic mining including copper, one of its main export products.

The results show that the growth pattern in Peru, which favored the expansion of the middle class in recent years, is characterized by the dynamics of the services sector. The expansion of the middle class was also supported by public expenditure in infrastructure and social public expenditure, which had a positive distributive effect resulting in upward social mobility. Notwithstanding, it has been proved that the expansion of middle class is mostly explained by an increase in labor income coming from the services sector with informal labor and the private sector, as well as an increase in self-employment. In contrast, income coming from formal employment and the public sector had a limited role.

At a territorial level, the results show that in most of the departments of the country, the services sector supported the expansion of the middle class. There is no evidence of characteristics in common that could be associated with a higher impact of the tertiary sector. In fact, these departments present a certain degree of heterogeneity with respect to structural characteristics such as participation of tertiary sector in total GDP and in total EAP.

On the other hand, a convergence dynamic in the pattern of growth in Peru is evidenced. The impact of the tertiary GDP growth on the expansion of the middle class was higher in those departments with major setbacks in terms of initial conditions of development, inequality, access to basic services, among others. Likewise, the departments which kept high rates of informal labor or employment in small enterprises registered a higher impact of the tertiary GDP growth on the middle classes expansion.

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ANNEX

Table A.1. Basic model results: Panel data regressions at departmental level

Period: 2007-2017	Middle class					
	coeff.	SE	coeff.	SE	coeff.	SE
GDP Primary sectors	-0.076	(0.047)	-0.082	(0.051)	-0.0554	(0.048)
GDP Secondary sectors	-0.186	(0.173)	-0.3626**	(0.171)	-0.3176*	(0.174)
GDP Tertiary sectors	0.5760***	(0.172)	0.4645***	(0.172)	Ti	
CPI			0.164	(0.168)	0.0739	(0.160)
Public spending in production sectors			-0.001	(0.007)	0.0017	(0.007)
Public spending in infrastructure sectors			0.0132**	(0.007)	0.0181***	(0.007)
Public spending in social sectors			0.0695**	(0.030)	0.0577**	(0.029)
Department FE	Yes		Yes		Yes	
GDP Tertiary sectors Amazonas					0.4666	(1.281)
Ancash					2.4073**	(1.104)
Apurimac					1.8301***	(0.684)
Arequipa					0.4964	(0.855)
Ayacucho					-1.8359	(1.479)
Cajamarca					2.2903	(1.880)
Cusco					1.1422	(1.617)
Huancavelica					0.3161	(2.944)
Huanuco					1.2141**	(0.471)
Ica					0.0678	(0.348)
Junin					1.4850*	(0.893)
La Libertad					-0.8359	(0.642)
Lambayeque					1.5425	(1.162)
Lima					0.0628	(0.391)
Loreto					2.6097***	(0.989)
Madre de Dios					-0.8535	(1.273)
Moquegua					0.7274	(2.371)
Pasco					-3.8642	(3.347)
Piura					0.1917	(1.460)
Puno					2.5334**	(1.006)
San Martin					1.8087	(1.629)
Tacna					1.1217*	(0.583)
Tumbes					-0.2568	(0.342)
Ucayali					0.7496	(1.887)
Constant	0.033	(0.021)	0.022	(0.021)	0.0191	-0.0517
# observations		240		240		240
# groups		24		24		24
# periods		10		10		10

Note. ***1% significance, ** 5% significance, * 10% significance. Either fixed effects neither the constant are reported.

Table A.2. Expanded model results: Panel data regressions at departmental level incorporating both initial conditions for GDP and inequality

Period: 2007-2017	Middle class					
	coeff.	SE	coeff.	SE	coeff.	SE
GDP Primary sectors	-0.080	(0.051)	-0.075	(0.049)	-0.078	(0.049)
GDP Secondary sectors	-0.3038*	(0.172)	-0.3830**	(0.170)	-0.3319*	(0.171)
GDP Tertiary sectors	T		T		T	
CPI	0.143	(0.167)	0.183	(0.164)	0.162	(0.165)
Public spending in production sectors	-0.001	(0.007)	-0.001	(0.007)	-0.001	(0.007)
Public spending in infrastructure sectors	0.0138**	(0.007)	0.0158**	(0.007)	0.0173***	(0.007)
Public spending in social sectors	0.0738**	(0.030)	0.0618**	(0.029)	0.0614**	(0.029)
Department FE	Yes		Yes		Yes	
T	7.8943***	(2.883)	-12.7793***	(4.893)	-4.1627	(6.238)
T x Initial GDP per capita (1997)	-0.9005**	(0.351)			-0.7464**	(0.354)
T x Initial gini (2004)			3.7319***	-1.3782	3.0254**	(1.395)
Constant	0.013	(0.021)	0.007	(0.022)	0.004	(0.022)
# observations		240		240		240
# groups		24		24		24
# periods		10		10		10

Note. ***1% significance, ** 5% significance, * 10% significance. Either fixed effects neither the constant are reported.

Table A.3. Expanded model results: Panel data regressions at departmental level incorporating initial conditions for quality of life

Period: 2007-2017	Middle class			
	coeff.	SE	coeff.	SE
GDP Primary sectors	-0.0858*	(0.051)	-0.0894*	(0.052)
GDP Secondary sectors	-0.2919*	(0.169)	-0.2861*	(0.171)
GDP Tertiary sectors	T		T	
CPI	0.120	(0.166)	0.093	(0.167)
Public spending in production sectors	0.000	(0.007)	0.000	(0.007)
Public spending in infrastructure sectors	0.0160**	(0.007)	0.0157**	(0.007)
Public spending in social sectors	0.0686**	(0.029)	0.0696**	(0.029)
Department FE	Yes		Yes	
T	12.1545***	(3.724)	3.9898***	(1.286)
T x Initial HDI (1993)	-2.8794***	(0.918)		
T x Initial SBN (1993)			-0.9494***	-0.3466
Constant	0.017	(0.021)	0.015	(0.021)
# observations		240		240
# groups		24		24
# periods		10		10

Note. ***1% significance, ** 5% significance, * 10% significance. Either fixed effects neither the constant are reported.

Table A.4. Expanded model results: Panel data regressions at departmental level incorporating labor market structure dynamics

Period: 2007-2017	Middle class			
	coeff.	SE	coeff.	SE
GDP Primary sectors	-0.070	(0.047)	-0.074	(0.051)
GDP Secondary sectors	-0.3134*	(0.167)	-0.3458**	(0.169)
GDP Tertiary sectors	T		T	
CPI	0.189	(0.162)	0.205	(0.166)
Public spending in production sectors	0.003	(0.007)	0.001	(0.007)
Public spending in infrastructure sectors	0.008	(0.007)	0.0146**	(0.007)
Public spending in social sectors	0.0767***	(0.029)	0.0678**	(0.029)
Department FE	Yes		Yes	
T	0.8026***	(0.189)		
% informal employment	-0.207	(0.189)		
T x % informal employment	23.4004***	(8.036)		
T			0.5224***	(0.170)
% small-firms employment			-0.1301	(0.137)
T x % small-firms employment			9.7050*	(4.952)
Constant	0.018	(0.021)	0.020	(0.021)
# observations		240		240
# groups		24		24
# periods		10		10

Note. ***1% significance, ** 5% significance, * 10% significance. Either fixed effects neither the constant are reported.