



**Comparative**

and **Descriptive Analysis**

of the **EFFECTS** of the

**EXTRACTIVE INDUSTRY**

**BOOM**

on **Social Indicators**

**ANDEAN COUNTRIES**

August, 2016



with the support of:



**FORD  
FOUNDATION**





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NATURAL RESOURCE GOVERNANCE INSTITUTE

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**Comparative and Descriptive Analysis  
of the Effects of the Extractive Industry  
Boom on Social Indicators in the  
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# I. INTRODUCTION

Recently, Bolivia, Chile, Colombia, Ecuador and Peru have experienced sustained growth, at annual average rates of 4.9% in 2011 – 2014.<sup>1</sup> Peru averaged an annual 6% rate, above the others that experienced rates of 4.5% approximately. Growth was led mainly by mining and hydrocarbons, i.e. metals, gas and oil exports (see Figure 1). Figure 2 shows mining, hydrocarbon and forestry’s shares in the economy of Andean countries (GDP) during the commodity cycle.

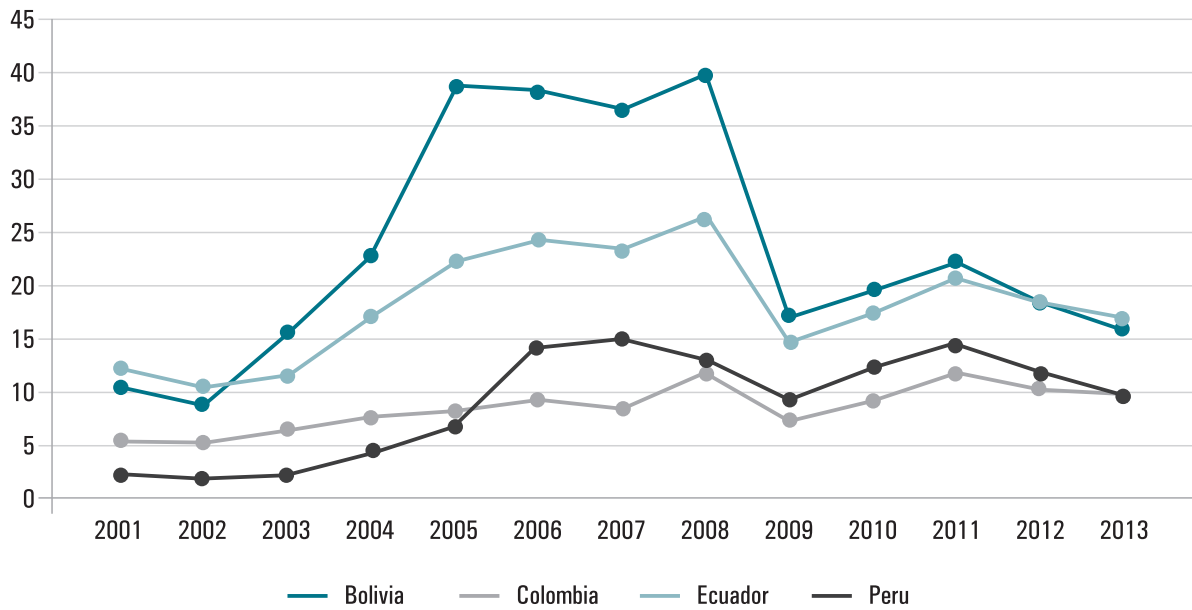
Figure 1. Mineral and hydrocarbon exports. Percentage of total exports



Source: World Development Indicators (2015)

1 The annual average rate of growth in Latin America has been 3.5%.

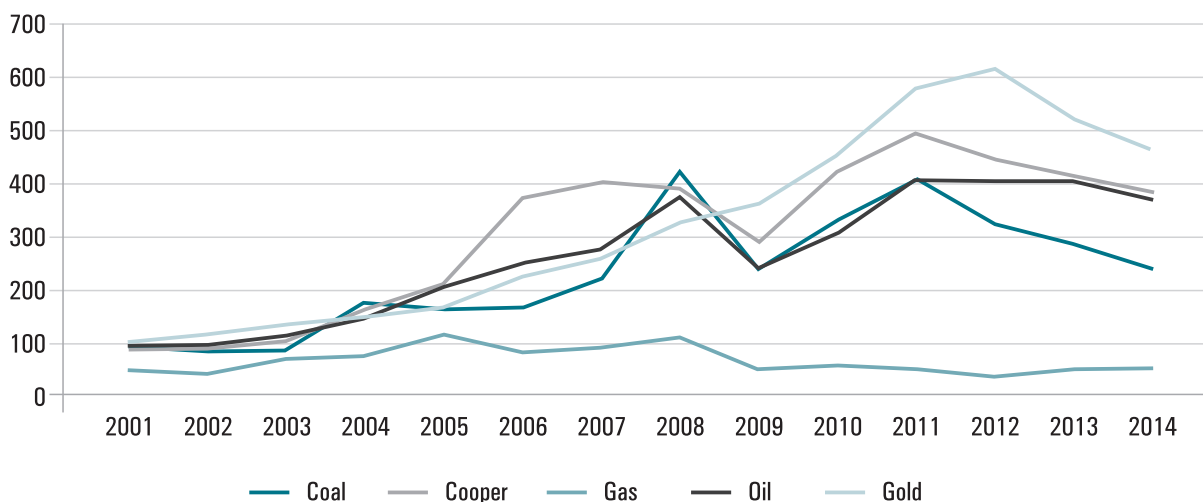
Figure 2. Extractive sector. Percent of GDP



Source: World Development Indicators - World Bank / Aggregate production of mining, hydrocarbon and forest sectors.

Each sector's growth in Andean countries has depended on external (international prices) and internal (private investment incentives) conditions. Figure 2 shows the price boom of the most important commodities in each country: gas in Bolivia, coal and oil in Colombia, oil in Ecuador, and copper and gold in Peru, with 2013 clearly as the starting year of the price boom for the most important commodities.

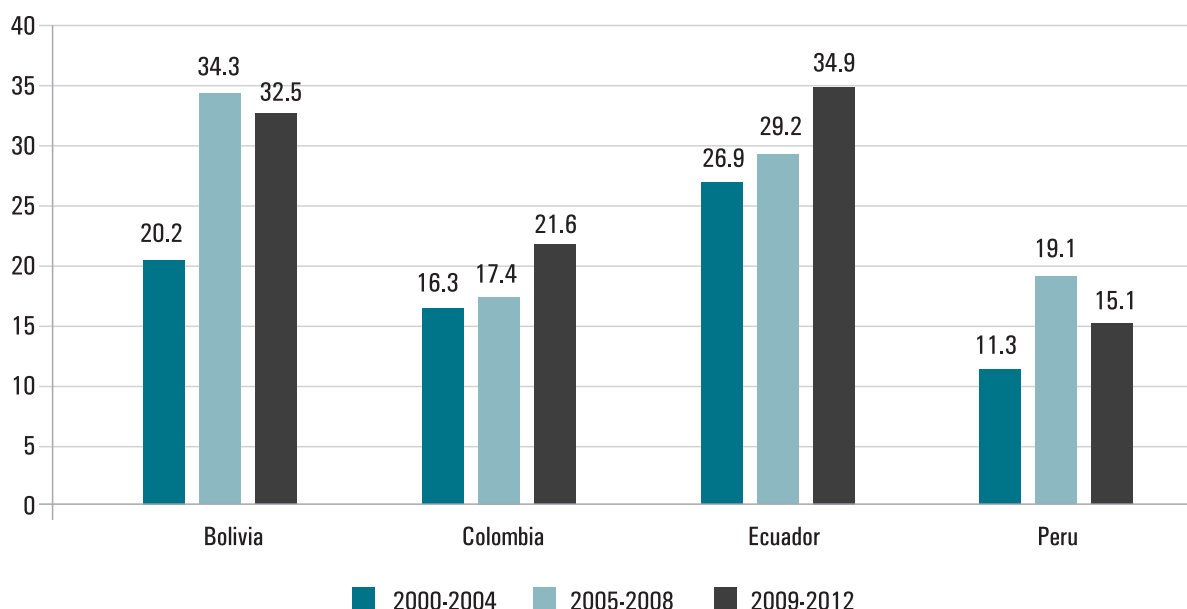
Figure 3. International price index for main commodities  
(January 2001 = 100)



Source: International Monetary Fund

The extractive industries have also been the main source of investments in the Andean, resulting in income and tax revenues. Table 4 (in the Annexes) shows the evolution of each country's own fiscal rules for the mining and hydrocarbon sectors. These different rules make it difficult to compare estimates of fiscal collection from the extractive resources in each country. ECLAC has estimated that between 2000 - 2004 and 2005 - 2008, tax revenues from the extractive sectors grew as a share of total collection in all countries under review (Figure 4).

Figure 4. Income shares of non-renewable natural resources in total income (%)



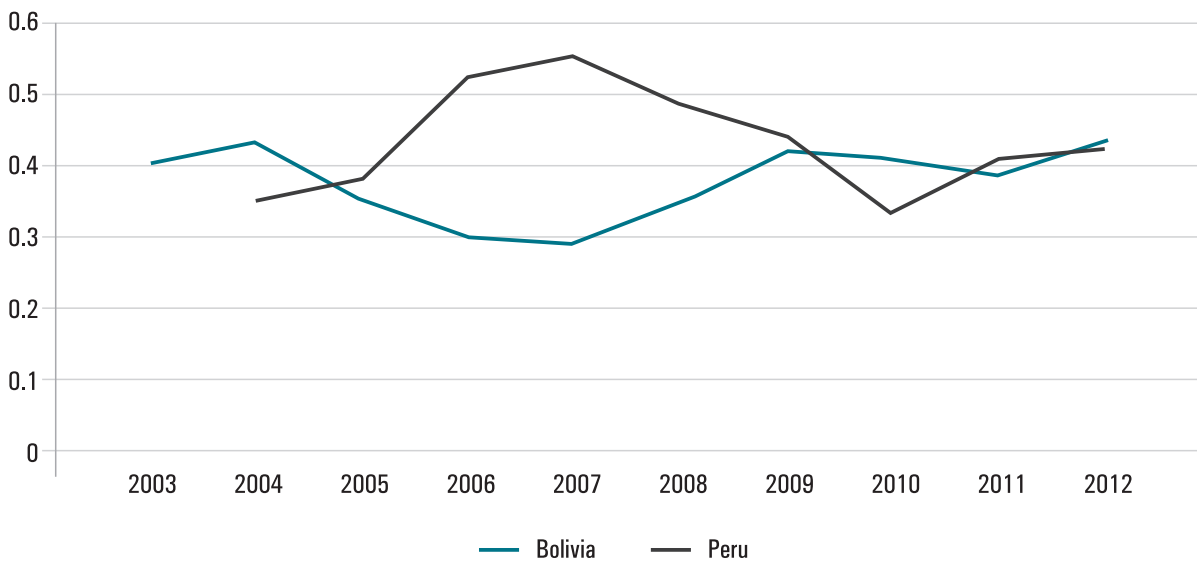
Source: ECLAC

Another key aspect during the boom was the consolidation of the rules for fiscal transfers to sub-national governments of a portion of tax revenues from the extractive sectors. These rules establish that revenues from extractive activities have to be shared between central governments and producing regions. Table 5 (in the Annex) summarizes the rules for sub-national transfers, which are important to understand public investments in those areas, including their social components.

Resource allocation by region has varied significantly from country to country. For example, Figure 5 shows Peru and Bolivia differ clearly in the reallocation of sub-national extractive revenues in this period. The figure draws the Gini

Coefficient of interregional inequality of government transfers to regions in both countries. Under the rules in each country, the interregional inequality of transfers grew in Peru, but fell in Bolivia during the resource boom.

Figure 5. Gini Coefficient for transfers to regional governments (2003-2012)



Source: 1. Bolivia: Royalties and Transfers to Departmental Governments. Statistical Yearbook 2012 // 2. Peru: Transfers to Regional Governments. Economic Transparency, Ministry of Economy and Finance 2015

This research has been designed with a comparative research agenda to explore the evolution of social inequalities between groups in the Andean region during the recent extractive boom. Its general objective is to compare the evolution of social indicators and gaps amongst relevant social groups during the 2001-2013 period. We examine the inequalities among the following groups of people: indigenous and non-indigenous, men and women, and rural and urban populations. Since in most cases, the fiscal rules have mainly aimed at benefitting the regions affected by the resource boom, we will examine the inequalities among affected and non-affected regions.



The specific objectives of this research are the following:

- i. Search existing data bases in the four countries for the 2001 – 2013 period.
- ii. Design comparative social indicators, including ethnicity, gender and territory indicators.
- iii. Prepare descriptive statistical tables of social indicators for each country.
- iv. Comparatively analyze social indicators for each country and calculate gaps among groups (indigenous / non-indigenous, men / women, rural / urban and producing / non - producing)
- v. Present results of each country to NRGÍ's counterpart organizations and prepare a comparative chapter on social effects of the extractive boom.

The following final report is organized in seven sections. After the introduction, the second section is a summary literature review. The third one describes the methodology and the fourth compares the gaps in horizontal inequalities. The fifth compares the gaps in horizontal inequalities between extractive and non-extractive areas and the sixth section describes the changes in extractive and non-extractive areas in the Andean region. Conclusions appear in the seventh and last section. Together with the final report, annexes, methodological details, prior reports, the matrix of averages by countries, and databases may be downloaded from a Google Drive folder.



*Esta investigación ha sido pensada con una agenda de investigación que explora de manera comparativa la evolución de las desigualdades sociales en la región andina entre grupos durante el reciente ciclo del boom extractivo*



## II. LITERATURE REVIEW

---

The macroeconomic impact of the metals and hydrocarbons' price boom in the Andean countries is unquestionable. However, greater doubts remain regarding the distribution of the microeconomic and social impact of this growth at a subnational level. The subnational analysis of resource boom impacts has been less studied in the literature, which focuses mainly on the national level. Nonetheless, there is a new and growing interest among economic development studies to build a micro (subnational) perspective on the effects of growth driven by non-renewable natural resource extraction. For example, Larsen (2005) and Hajkowicz et. al. (2011). Regarding Peru, Zegarra et. al. (2007), Herrera & Millones (2011), Aragón and Rud (2013), Ticci & Escobal (2012) and Loayza et. al. (2013) are some of the existing cases of economic research on the local version of this growth model. However, results are not yet conclusive, and dialogue between the evidence found and theory is still weak.

Moreover, social dimensions and inequality tend to be ignored in the empirical analysis of development driven by natural resources. Particularly, an analysis is missing of how social gaps "between groups" evolved in this growth cycle based on natural resources in the Andean region. The inequality concept "between groups" or "horizontal" has been introduced by Frances Stewart to differentiate inequalities between groups (with individuals sharing specific and important characteristics, e.g. gender, ethnicity, class, region) from inequalities between individuals, which are regularly analyzed (Stewart 2010). Stewart defines horizontal inequalities as those existing between culturally defined groups and not among individuals (Stewart 2000: 2). The need to introduce the notion of horizontal inequalities (HI) in the literature is due to insufficient explanations of the term "vertical inequality" (inequalities among individuals) to explain persisting poverty and emergence of conflict in countries with high indices of economic inequality (Vanneman and Dubey 2010; Stewart, Brown and Cobham 2009; Charles 2003).

The fundamental assumption of this concept is that individuals live in groups and because they belong to them, with their self-adscribed or imposed characteristics, they may find themselves more or less trapped in a vicious cycle of exclusion (Paredes and Thorp 2015). On the one hand, group members may face obstacles to access opportunities, resources, capabilities or assets. On the



*existe un nuevo y creciente interés en los estudios del desarrollo económico por construir una perspectiva micro, sub-nacional, sobre los efectos de un crecimiento basado en recursos naturales no-renovables*

other hand, they may have less access to key capabilities or capital because they are members of that specific group and therefore carry the burden of past or historical discrimination. The fact that a man and a woman with the same education earn different wages is an example of the first situation. This is what we know as labor discrimination. An example of the second case is that of indigenous communities who have been denied education in their mother tongue for years and lacked access to higher education for entire generations. Historically, those communities have accumulated disadvantages in human capital formation that prevent them from taking advantage, for instance, of opportunities such as scholarships for university education today.



*la dinámica de una economía basada en las industrias extractivas suele generar enclaves regionales donde hay mega proyectos mineros o petroleros que no generan encadenamientos eslabonados en las regiones en donde se encuentran operando*

In countries where governments depend significantly on revenues from exports of natural resources (minerals, oil, gas, etc.) deposits are typically distributed unequally, thus leading to diverse regional economic dynamics (normally enclaves). If this distribution concurs with strong historical inequalities (ethnic, regional or religious), economic inequalities may be exacerbated and enhance the likelihood of conflict (Lujala and Ass Rustad 2012: 251). In general, the dynamics of an economy based on extractive industries usually creates regional enclaves where large scale mining or oil projects fail to create chain linkages in the regions where they operate (Thorp et al 2012; Ross, Lujala and Ass Rustad 2012, Ross 2007; Gamu, Le Billon and Spiegel 2014).

When adding the institutional weakness factor and historical inequalities between groups to the regional inequality caused by this enclave economy (characteristic of economies based on extractive industries), a scenario arises tending to exacerbate, or at least maintain, income inequalities and poverty rate (Ross 2007, Stewart and Brown 2007). Among the Andean-region countries analyzed in this consultancy, there is a strong territorial superposition of areas where extractive deposits are located and areas of historically discriminated peoples (indigenous territories, rural areas, etc.). The literature does not clearly mention if there are changes in the gaps between groups after the last extractive boom in the region (2004-2014). The persisting inequality gaps between urban and rural areas, indigenous and non-indigenous populations, as well as among women and men, are not yet apparently been closed. Despite strong economic results for all analyzed countries, income, health, education and sanitation indicators do not seem to have had the same impact inside these groups.

In summary, the literature says very little about the extent to which Andean countries have been able to close the gaps between groups with different initial advantages. Little is still known about how many of those groups have been able to take advantage or not of the micro and social “trickle-down” effect of the extractive resource boom. To deal with this deficiency, our research was designed with a comparative research agenda exploring the evolution of social indicators and gaps among relevant social groups during the 2004

– 2014 period. The groups between which inequalities will be analyzed are the following: indigenous and non-indigenous, men and women, and urban and rural populations. In addition, since in most cases fiscal game rules have sought to preferably benefit regions affected by the resource boom, we also analyze the inequalities between affected and non-affected regions.



## III. METHODOLOGY

### 3.1 GROUP DEFINITION

Analyzing inequality requires, on the one hand, defining the groups and, on the other hand, a definition of indicators to be used in inequality analysis. Table 2 presents definitions of the first three groups to be analyzed, i.e. indigenous / non-indigenous; urban / rural; and men / women. See Table 1.

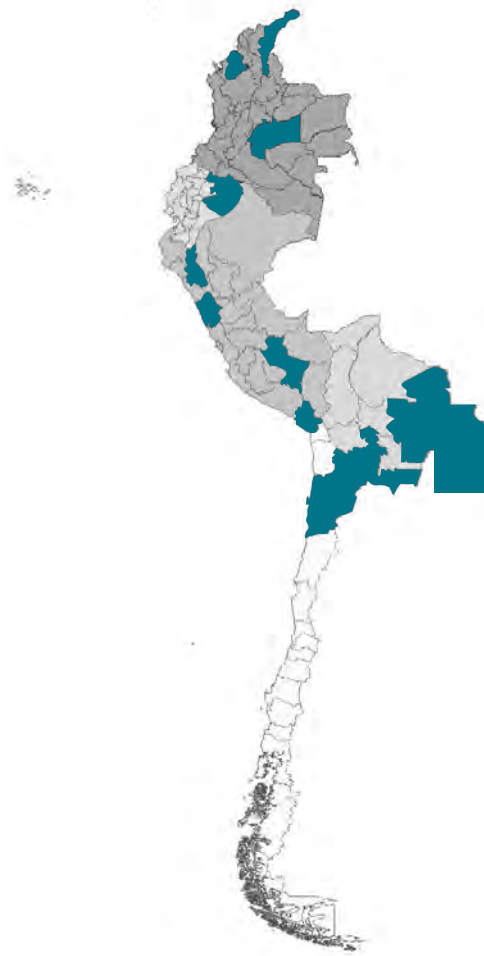
Table 1: Proposed definitions of groups affected by extractive industries

Group	Definitions
Indigenous / non-indigenous	Mother tongue (Peru, Ecuador and Bolivia)
Urban / rural population	National definitions
Gender	Sex

Source: Prepared by the authors

Likewise, such gaps will be analyzed in extractive and non-extractive regions. The objective of this analysis is to descriptively inform how these gaps have been transformed during the resource boom in both types of regions: extractive and non-extractive. It is worthwhile taking into account that this analysis does not pretend to explain the impact of such industries in gap changes. The analysis is still a descriptive report of changes in social gaps and not an explanation of factors explaining these changes. In Map 1, all sub regions are shown in five countries studied, highlighting extractive regions in red, while the remaining sub-regions' colors vary by country. Extractive regions were selected together with NGRI's national counterparts, as requested. As the map shows, the regions under scrutiny were Antofagasta in Chile; Potosí, Santa Cruz and Tarija in Bolivia; Córdoba, Cesar, La Guajira and Meta in Colombia; Orellana, Pastaza and Sucumbios in Ecuador; and, finally, Ancash, Cajamarca, Cusco, Moquegua and Tacna in Peru.

Map 1. Extractive regions in Andean countries (Bolivia, Colombia, Chile, Ecuador and Peru)



Source: Prepared by the author

### 3.2 MEASUREMENT OF INEQUALITY INDICATORS

Inequality indicators are used to capture in the largest possible way, the total variability and general inequality between groups. We aim at overcoming the fact that averages in quantitative indicators most times hide huge disparities. In addition, these indicators do not allow an understanding of the importance of belonging to a group or exclusion from a group to explain such indicator.

In broad terms, there are two types of inequality indices: one capturing inequality in continuous variables and another in binary variables. The first one is the best known because it is used to calculate income inequality. The second one requires transforming the original variable and is useful since many indicators of interest are binary, e.g. having access or not to public



services, or completing or not secondary education. Likewise, a suitable characteristic of these indicators is their ability to be broken down by groups. Therefore, we propose using the *Theil Entropy Indices* and a *Dissimilarity Index* as inequality indicators for those previously mentioned groups of variables. Nonetheless, those two indicators are not widely used by the literature or are not easily understood by the average reader, therefore we will use two additional inequality indicators for the continuous variables. The first one is the well-known Gini index and the second one is the gap analysis that consists in dividing high percentiles (for examples, decile or superior quintile). Regarding dichotomic indicators, we will use the gap between the averages, by percentiles of different incomes.

Hereinafter, we present the functional form of those indicators and, if relevant, the necessary calculations to explain why they are important.

For continuous variables

### **Percentile gap**

Calculating this indicator is relatively simple. It is easily understandable. For example, if we establish that the gap that we want to know is the one between the highest and the lowest percentiles, the indicator is the ratio between the averages of these percentiles. In such case, the index is simply presented as follows:

$$B_{p^{99}/p^1} = \frac{X_{p^{99}}}{X_{p^1}}$$

Its interpretation is simply how many times the lowest percentile indicator (e.g. for income), is contained in the highest percentile. Thus, if a society allows the highest percentile group to earn income that is more than 100 or 1000 times higher than the lowest percentile, this would be a highly unequal society. However, despite its simplicity and easy understanding, it does not tell us much about inequality between the highest and the lowest quintile, for example. That is, it does not give us a universal measure of inequality, and only focuses on the relative measure between two groups.

### **Gini Index**

The Gini index is a widely used indicator because, unlike the one relative to gaps, it allows capturing total inequality as a continuous indicator. Its widespread use in the literature also makes it easier to understand than other indicators. An explanation appears in the annexes. Interpreting the index is essentially



*El índice Gini es un indicador muy usado pues a diferencia del de brechas permite capturar el total de la desigualdad en un indicador continuo*

as follows: if the “percentage” of absolute inequality is possible, then we can assume that when the ratio approaches 1, we are approaching the worst possible inequality scenario; whereas if it approaches 0, we are approaching the lowest possible inequality scenario. In algebraic terms, this index can be expressed as:

$$G = 1 - 2 \int_0^1 L(p) dp$$



*lo que nos diría este indicador (brecha de percentiles) sería cuantas veces más es mayor (o menor) el porcentaje de individuos con algún atributo de interés, por ejemplo culminación de educación secundaria*

Where  $L(p)$  is the Lorenz curve, 0 is the lowest distribution point of  $p$  (the continuous variable), i.e., regarding income, it represents the country’s poorest individual. On the other hand, 1 represents the richest one in the formula.

Actually, although the explanation of this index is somehow extensive, it is quite intuitive. However, one of its disadvantages is that it does not allow making a simple break down that accounts for the the groups’ relative importance in the distribution of inequality. For this study, such index would be provide an incomplete picture.

For binary variables

#### **Percentile gap**

As with the continuous variable, the gap index is the ratio between the high average percentile in the distribution of a continuous variable (e.g., income). But unlike the previous case, in this one, a variable different from this continuous variable will be used to calculate the average, specifically, a binary variable. Thus, this indicator would show how many more times the percentage of individuals with some attribute of interest (such as completed secondary education, etc.) is higher or lower in the high income percentile, compared to the low income percentile. So, a society which is 10 or 20 times more likely to complete secondary education among percentiles chosen for comparison would be a very unequal one.

Once again, the big problem with this type of indicators is the little information given with respect to the rest of the income distribution and, additionally, that it is based on or requires the help of a continuous indicator (such as income) to be estimated. Moreover, it is not possible to have distinctions by groups with this indicator.

#### **Dismilarity Index**

The dissimilarity index is similar to above mentioned since additional indicators are needed to be estimated; however, it is more flexible as it allows to use

“groups” with which comparisons can be established. So, instead of comparing the quintiles, many indicators can be used simultaneously and the relative importance of these groups can be analyzed in explaining inequality.

The corresponding formula is as follows:

$$D = \frac{1}{2\mu} \sum_{g=1}^G |\mu_g - \mu| f_g$$

Where  $G$  is the total of groups built. It can be the combinatorial analysis of different variables such as gender, ethnicity, rurality, etc. On the other hand,  $\mu$  represents the variable average, in general, and  $\mu_g$  represents the variable average for the group  $g$ . Finally,  $f_g$  represents the frequency of group  $g$  in the analyzed population.

Once again, the problem of this index is not having a maximum or minimum level to be reached and its intuition is not simple either. Another problem is that its variability is neither exogenous nor endogenous as the obtained with continuous variables, rather it is essential to create groups that provide their variability. Thus, in practice, this indicator will change provided that we change the number of groups. Despite these limitations, this index is useful to estimate the importance of social groups to explain the variable variability.

### c. Comparative Analysis

To make the comparison between the different tendencies in social gaps for 5 Andean countries (Bolivia, Chile, Colombia, Ecuador, and Peru), the Differences in Differences (DD) method was used. With this method, a descriptive analysis is performed, helping to understand how much the gaps among social groups (by gender, ethnicity and rurality) changed in the “extractive boom” period.

This model is used since it allows us to include some basic control of variables in the descriptive analysis of trends, affecting social wellbeing, such as geographic and / or political conditions, and more precise estimate changes and differences in social wellbeing in Andean countries between relevant social groups (by gender, ethnicity and rurality).

To implement the DD model, it was assumed that the origin of the boom cycle is relatively exogenous. Then, we analyzed whether the change is differentiated by some relevant features. It is worthwhile noting that this assumption is strong and simplifies the analysis to provide a statistically reliable answer that is also easy to interpret. This model does not allow us to analyze the effects or impacts of extractive industries per se, nor is this the study’s objective. As a matter of fact, an effect or causality assessment, in addition to defining pre



*Para realizar la comparación entre las diferentes tendencias en brechas sociales para 5 países de la región andina se usó el método de Diferencias en Diferencias (DD)*

and post boom periods, requires an extra effort to establish a valid comparison group; i.e. those regions similar to regions with extractive industries and that only differ in this regard. This is not done in this study.

Equation 1 summarizes the DD model.

$$\text{Equation 1: } y_{it} = \beta_1 * Dim_i * Boom_t + \alpha_1 * Dim_i + \alpha_2 * Boom_t + X_t' \gamma + \varepsilon_{it}$$



Where  $y_{it}$  represents the dependent variable “y” for the individual “i” in the period “t”. The variable  $Dim_i$  refers to the dimension on which the gap tendency will be analyzed. For simplicity purposes in this comparison, this variable takes the value of 1 when the individual “i” belongs to the favored group. For example, the gender variable would take 1 if it is man and 0 if it is a woman.

The *Boom* variable refers to the point in time where individual “i” is located. Thus, it takes the value of 1 for the “post-boom” period, and 0 for the “pre-boom” period.

Matrix X includes a set of control variables (to be detailed in the following sub-sections) for all individuals. Thus,  $\varepsilon_{it}$  represents the estimation error term. Estimated parameters are  $\beta_1$ ,  $\alpha_1$ ,  $\alpha_2$  and contents in the vector  $\gamma$ . In general, the interest estimator is  $\beta_1$ , because it indicates the difference between those two groups. For example, regarding the “income” indicator, if such estimator is positive, it would indicate that the gap has been increasing. In other words, after the boom, the difference between those groups in the average income increased even more than before the boom arrival.

In addition to this analysis, differences in changes of the analyzed social gap would be compared depending on whether the individual “i” is in an extractive region or not. This is shown in equation 2:

$$\begin{aligned} \text{Ecuación 2: } y_{it} = & \beta_2 * Dim_i * Ext_i * Boom_t + \alpha_1 * Ext_i + \alpha_2 * Boom_t + \alpha_3 * Dim_i + \dots \\ & \dots + \delta_1 * Dim_i * Boom_t + \delta_2 * Ext_i * Boom_t + \delta_3 * Dim_i * Ext_i + X_t' \gamma + \varepsilon_t \end{aligned}$$

Thus, the variable *Ext* is included and takes the value of 1 when the household is in an extractive region. This variable interacts with others to estimate the differentiated boom effect when the individual “i” is in an extractive region. The interest variable is  $\beta_2$ , which will be added to  $\delta_1$  to find the boom differentiated impact when it is in an extractive region.

*Este modelo no nos permite analizar efectos o impacto de las industrias extractivas en sí*

**Dependent Variables**

Table 1 shows result indicators used for analysis. Generally, they are grouped into four broad categories, including monetary wellbeing (per capita income, poverty and extreme poverty), education, employment and housing.

**“Extractive boom” cycle variable**

Given the heterogeneity of the beginning of the boom, for the purpose of this study, we will assume that there are two marked periods, pre-boom and post-boom, defining 2007 as the beginning of the boom. It is an imperfect assumption, since there is some heterogeneity across the different metals produced by region, but we believe that the price of the majority of metals increased since that year. Therefore, it allows us to simplify the study’s interpretation. Figure 3.1. shows the standardized average price of the main natural resources exported in the countries studied (gold, silver, copper, gas, ferronickel, coal and oil). Thus, only as of 2007, the average price exceeds 300 on average, i.e., on average, those natural resources are three times more expensive compared to 2001. Even though this increase started in 2005, the year 2007 was considered more suitable since, although higher in 2005 and 2006, prices had an impact on the country’s fiscal resources just one or two years later, i.e., in 2007.

Figure 3.1. Evolution of natural resource prices

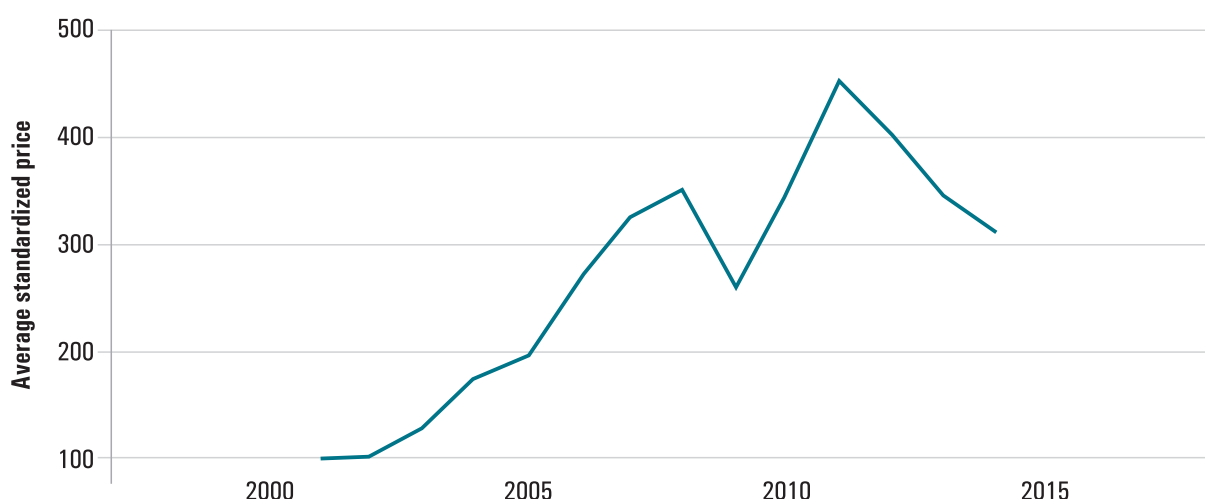


Table 3.1 Outcome Variables

	Bolivia	Chile	Colombia	Ecuador	Peru
	Total household income divided by number of household members				
Household per capita income in USD					
% of people in a situation of poverty					
Monetary Wellbeing	<p>The definition of poverty is from the survey itself. Expenditure was used as a reference for 2001, 2002 and 2005; and income for the remaining years.</p>		<p>Total household income divided by the number of family members is used as a reference (including wages, secondary activity, rental income, pensions, financial aids and others). The poverty line is taken from the methodological note of DANE (Colombia's National Administrative Department of Statistics) (a differentiated line between urban and rural households).</p>	<p>Total household income divided by the number of family members is used as a reference (including wages, secondary activity, rental income, pensions, financial aids and others). The poverty line is taken from the methodological note of INEC (National Institute of Statistics and Census).</p>	<p>Total household expenses divided by the number of family members is used as a reference (calculated by INEI -National Institute of Statistics and Informatics-, included in the survey's summary).</p>
Education	<p>Years of schooling (only formal schooling system, as well as technical and university). In Bolivia, the three systems are included.</p>	<p>Years of schooling (only formal schooling system, as well as technical and university). In Chile, the two systems are included.</p>	<p>Years of schooling (only formal schooling system, as well as technical and university). In Colombia, the two systems are included.</p>	<p>Years of schooling (only formal schooling system, as well as technical and university). In Ecuador, the two types of systems are included.</p>	<p>Years of schooling (only formal schooling system, as well as technical and university).</p>
% of illiteracy	People who can read and write (for people older than 15 years)				

	Bolivia	Chile	Colombia	Ecuador	Perú
	% of children enrolled in school between 6 and 18 years				
	% of children with extra schooling years (between 6 and 18)				
	% of Economically Active Population older than 18 years that had a (salaried or unsalaried) job in the last week prior to the survey				
Employment	% of employed and salaried EAP				
	Households with access to the power grid				
Housing	Households with access to public sewerage system				
	Households with access to drinking water from water supply network or public water tap				

### *Control Variables*

As previously mentioned, the DD method allows us to include control variables in the analysis. This enables a more precise measurement of changes suffered by the variables of interest during the extractive boom. Control variables used are shown in Table 3.2.

Table 3.2 Control Variables

Variable name	Variable Description
area	1 for rural area, 0 other
IP_gender1	1 for woman, 0 for man
capital city	1 for nation's capital, 0 other
size	Region size in km <sup>2</sup>
elections	1 if national elections happened, 0 other
population	Population in region
density	Persons per square kilometer
country	Dummy for country
age	Person's age in years
region	Dummy for region
year	Dummy for year

### *Sample characteristics*

Household surveys were used for the five countries for 2001, 2003, 2006, 2009, 2011 and 2013, so the 5 countries can be compared over the same number of years (since Chile's household surveys are only available for those years).



Table 3.3 Sample distribution

Country	Observations	%
Bolivia	13,776,565	9.0%
Chile	9,658,785	6.3%
Colombia	69,679,546	45.7%
Ecuador	19,157,575	12.6%
Peru	40,233,250	26.4%
Total	152,505,721	100%

Table 3.4 Structure of analysis sample by characteristics

By area		By gender		By mother tongue		Extractive regions	
Urban	Rural	Men	Women	Non-indigenous	Indigenous	Non-extractive	Extractive
65.3%	34.7%	48.8%	51.2%	69.6%	30.4%	60.5%	39.5%
87.3%	12.7%	48.1%	51.9%	34.9%	65.1%	96.7%	3.3%
78.7%	21.3%	49.4%	50.6%	-	-	92.5%	7.5%
65.6%	34.4%	49.4%	50.6%	93.2%	6.8%	97.5%	2.5%
74.3%	25.7%	49.2%	50.8%	82.5%	17.5%	84.6%	15.4%



## IV. GENERAL GAP CHANGES IN THREE TYPES OF GROUPS DURING THE RESOURCE BOOM CYCLE IN THE ANDEAN REGION

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Interpreting the gaps is simple as proposed here. A positive value (higher than zero) always represents a widening gap between social groups and negative values point to a narrower gap.

Results are presented in 4 groups: i) Monetary wellbeing, ii) Education, iii) Employment, and iv) Access to public services. The results are always presented organized in these four categories for easier interpretation.

### *Monetary Wellbeing*

In the five countries, per capita income and the poverty gap between urban and rural individuals have expanded significantly. Income-wise, urban households now earn almost 100USD more per capita. Meanwhile, rural households are 10 percentage points poorer, and even more in Colombia.

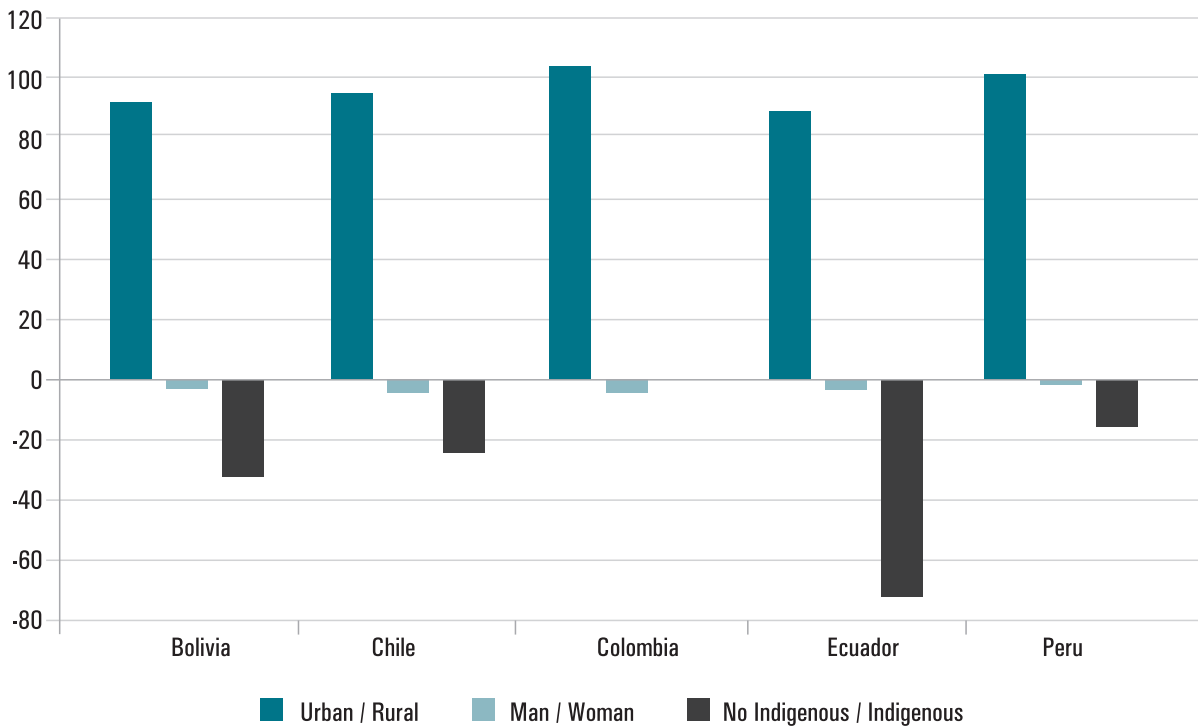
Income gaps and the poverty gaps between individuals of indigenous and non-indigenous groups had a reduction in the five countries. Ecuador shows the largest fall. It is interesting to note that the extreme poverty gap has been reduced between urban and rural individuals as well as between indigenous and non-indigenous groups, mainly in Ecuador.

This would indicate that during the resource-based growth cycle, inequality increased among at the top of the wellbeing scale, but narrowed for the bottom groups, i.e., people in extreme poverty. This could have also happened because before the boom almost all extreme poverty concentrated in rural areas. The analysis model does not allow us to determine the reasons for these changes.



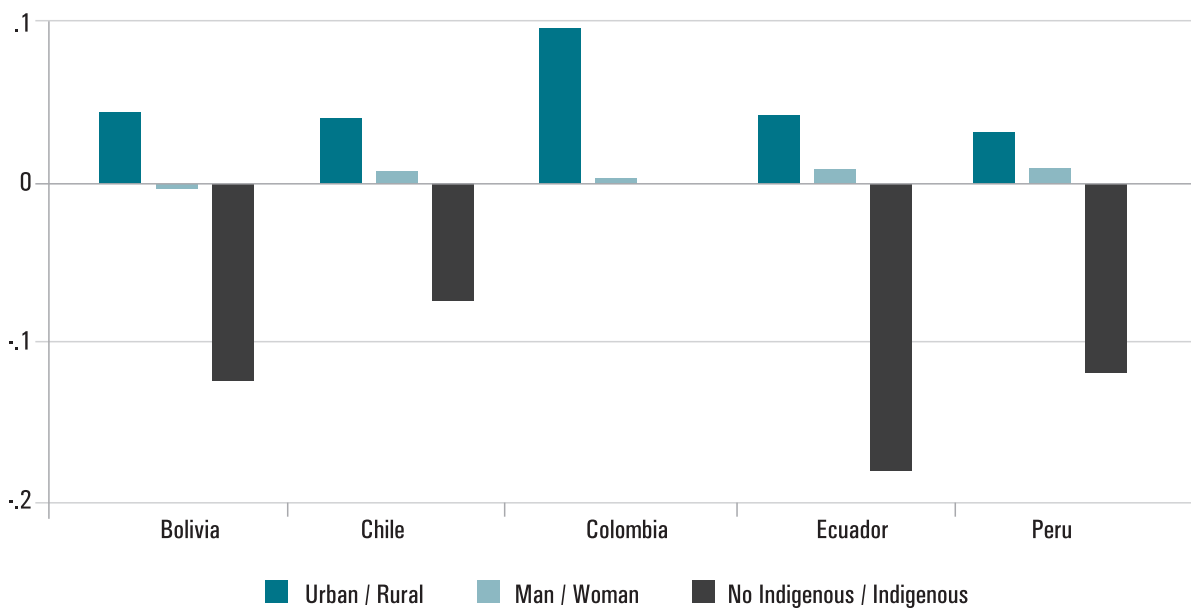
*Se observa que en los 5 países la brecha de ingresos per cápita y de pobreza entre individuos urbanos y rurales se ha incrementado de manera importante*

Figure 4.1 Changes in per capita monthly income gap (USD) between three types of social groups (by rurality, gender and ethnicity) during the extractive resource boom cycle in five countries



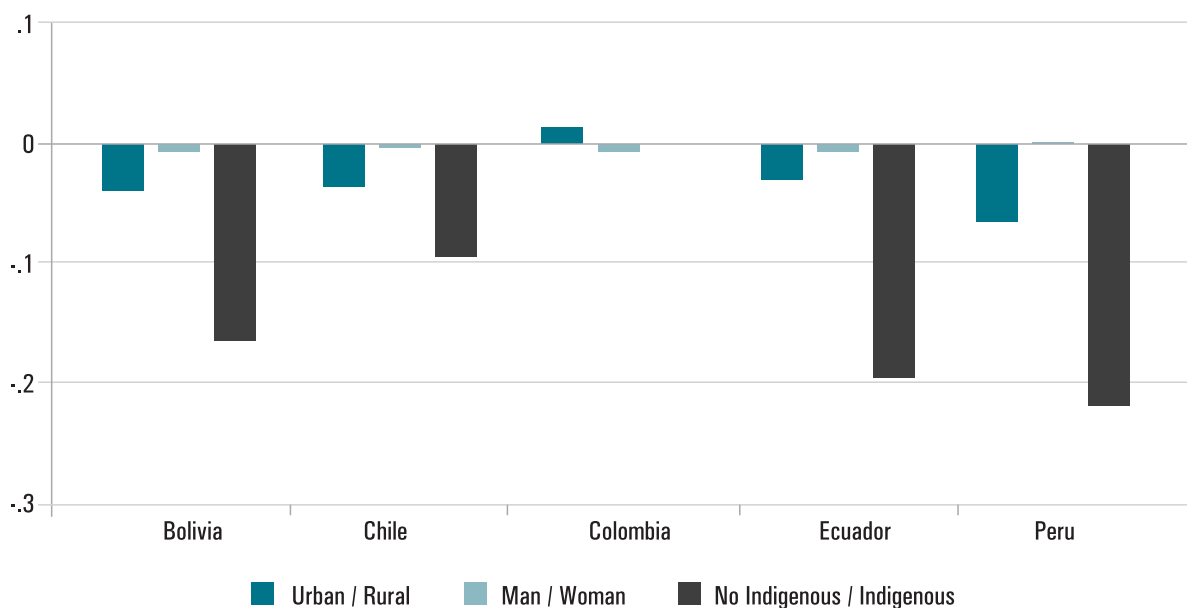
Source: Household surveys in Peru, Ecuador, Colombia, Chile and Bolivia. Prepared by the author.

Figure 4.2 Changes in the poverty gap between three types of social groups (by rurality, gender and ethnicity) during the extractive resource boom cycle in five countries (growth rate in %)



Source: Household surveys in Peru, Ecuador, Colombia, Chile and Bolivia. Prepared by the author.

Figure 4.3 Changes in extreme poverty gap between three types of social groups (by rurality, gender and ethnicity) during the extractive resource boom cycle in five countries (growth rate in %)



Source: Household surveys in Peru, Ecuador, Colombia, Chile and Bolivia. Prepared by the author.

### Education

As with monetary wellbeing, results highlight that the gap in the average number of schooling years increases between individuals of indigenous and non-indigenous groups during the cycle. So, the difference in average schooling years between both groups increases on average by almost a half-year (0.5). Ecuador shows the largest gap increase between those groups. This is interesting because Ecuador showed the largest reduction in extreme poverty between both groups.

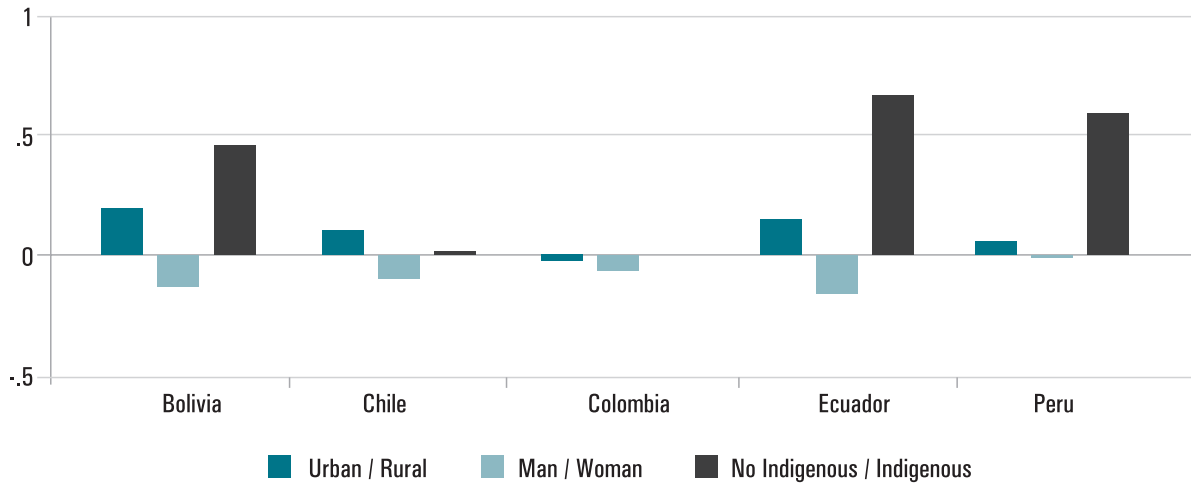
The fall in the illiteracy gap between individuals in urban and rural areas is another remarkable outcome. As with extreme poverty, this could have happened because, before the boom, almost all illiteracy was found in rural areas. Remarkably, the school enrolment gap increases significantly between individuals of indigenous and non-indigenous groups, mainly in Chile, where it reaches almost 10 percentage points.

All countries narrowed the gap regarding schooling delays, except Chile and, to a smaller extent, Bolivia. Remarkably, the delayed schooling gap fell more between urban and rural individuals and reached almost 5% in Colombia.



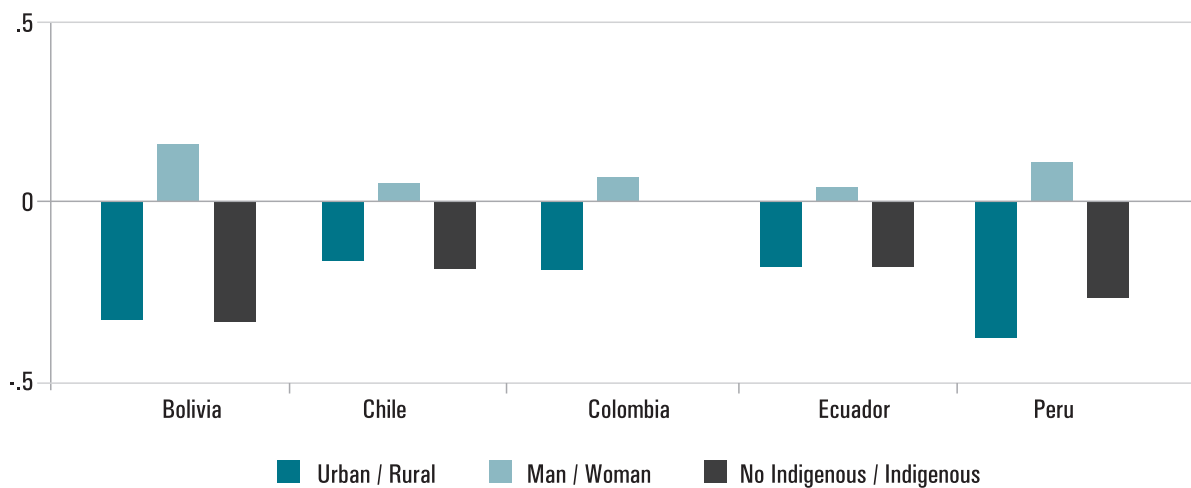
*la brecha de  
analfabetismo  
se reduce entre  
individuos de las  
zonas urbanas y  
rurales*

**Figure 4.4.** Changes in the gap of years of average education among three types of social groups (rural, Gender and ethnicity) during the extractive boom cycle in five countries (Change in the gap in years of average education)



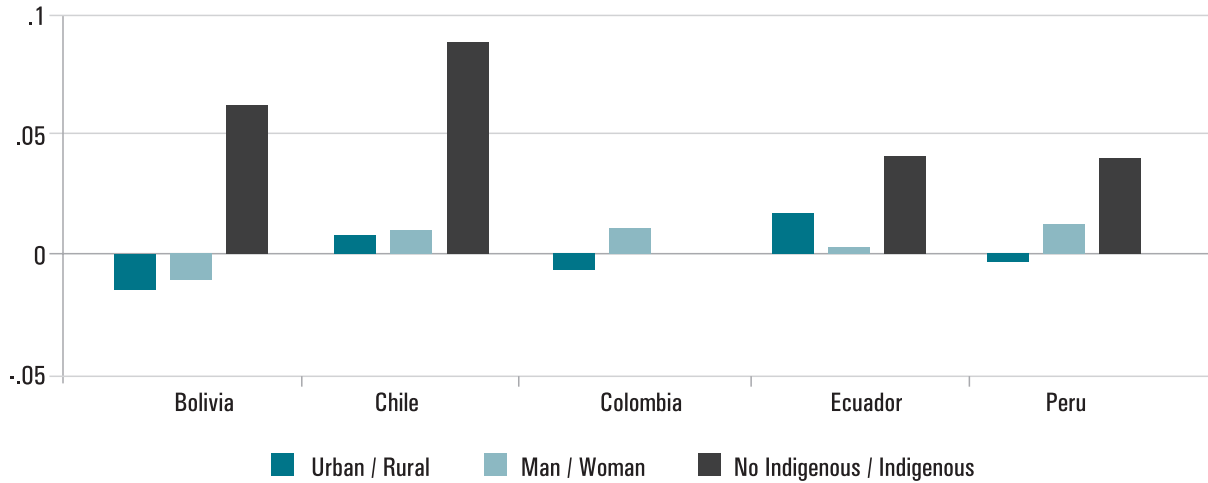
Source: Household surveys in Peru, Ecuador, Colombia, Chile and Bolivia. Prepared by the author.

**Figure 4.5** Changes in the gap of average schooling years between three types of social groups (by rurality, gender and ethnicity) during the extractive resource boom cycle in five countries (growth rate in %)



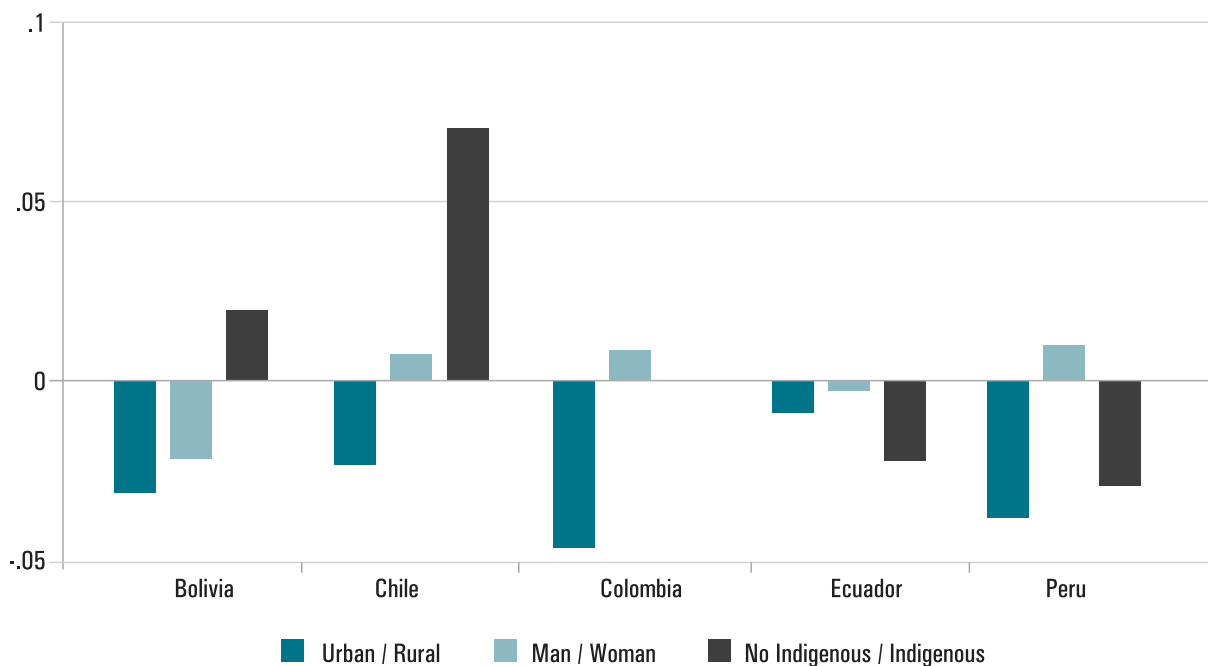
Source: Household surveys in Peru, Ecuador, Colombia, Chile and Bolivia. Prepared by the author.

Figure 4.6 Changes in illiteracy gap between three types of social groups (by rurality, gender and ethnicity) during the extractive resource boom cycle in five countries (growth rate in %)



Source: Household surveys in Peru, Ecuador, Colombia, Chile and Bolivia. Prepared by the author.

Figure 4.7 Changes in school enrolment gap between three types of social groups (by rurality, gender and ethnicity) during the extractive resource boom cycle in five countries (growth rate in %)

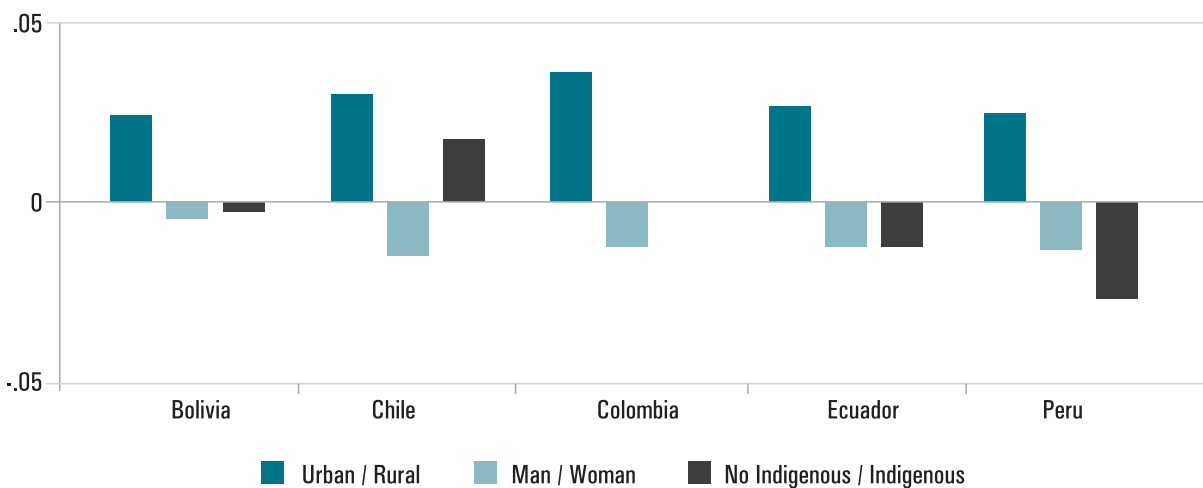


Source: Household surveys in Peru, Ecuador, Colombia, Chile and Bolivia. Prepared by the author.

### Employment

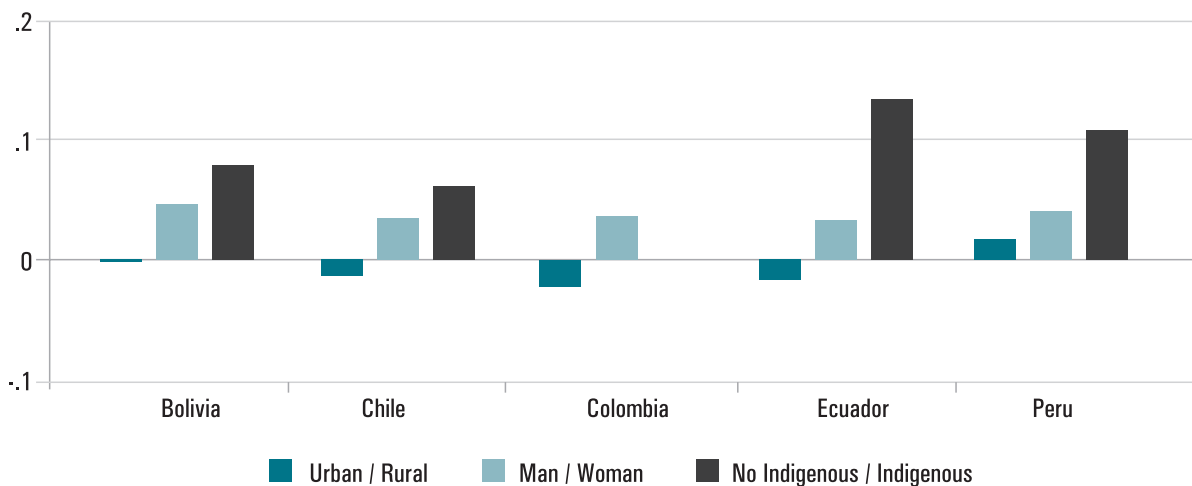
Generally speaking, during the resource boom cycle, the gaps in employment have expanded only slightly. However, the gaps in salaried employment did show an important increase. In Ecuador and Peru, the gap in salaried employment between individuals of indigenous and non-indigenous groups grew the most. The gap in salaried employment between those groups grew more than 10 percentage points in both countries.

Figure 4.8 Changes in the gap in schooling delays between three types of social groups (by rurality, gender and ethnicity) during the cycle of extractive resource boom in five countries (growth rate in %)



Source: Household surveys in Peru, Ecuador, Colombia, Chile and Bolivia. Prepared by the author.

Figure 4.9 Changes in the employment gap between three types of social groups (by rurality, gender and ethnicity) during the extractive resource boom cycle in five countries (growth rate in %)



Source: Household surveys in Peru, Ecuador, Colombia, Chile and Bolivia. Prepared by the author.

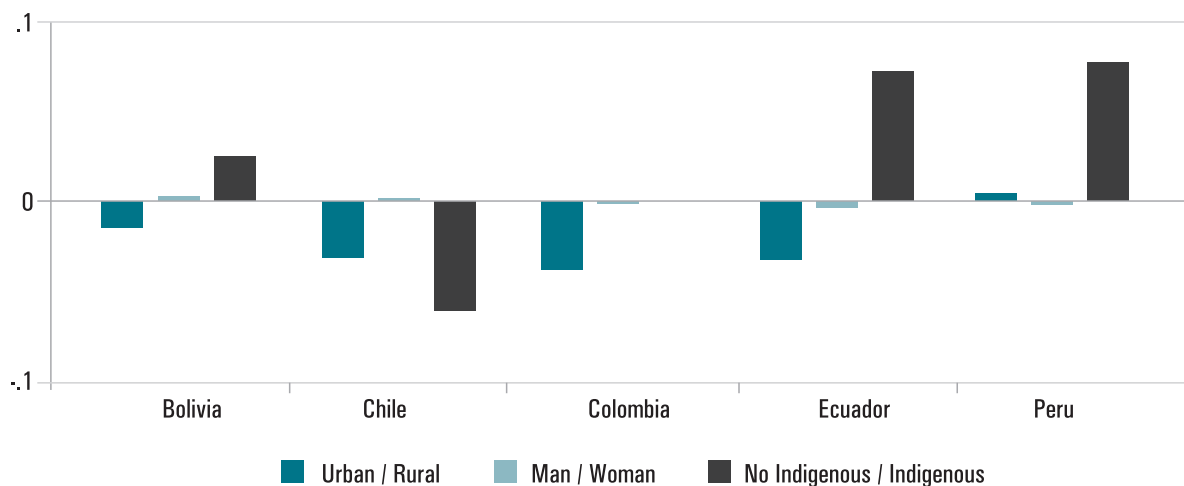


Access to services

Results highlight that gaps in access to drinking water and sanitation from public grids have almost not changed between urban and rural households. Except that, on the one hand, gaps in both indicators increased significantly in Peru and Ecuador between households of indigenous and non-indigenous groups. The gap in access to drinking water between households of the same groups fell in Chile.

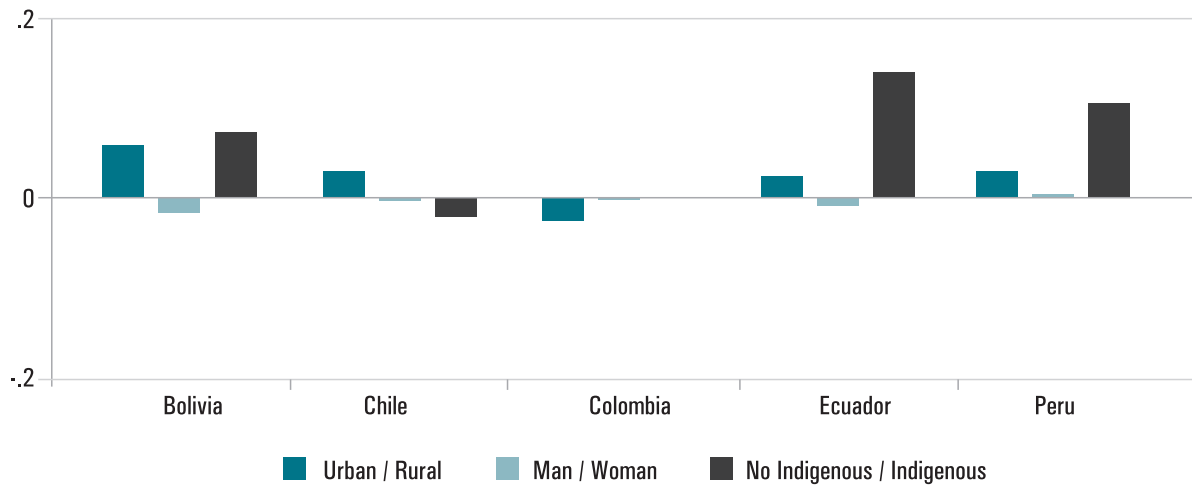
Notably, we observed a large reduction of the gap in access to *electricity* service between urban and rural households in all countries. The reduction in this gap is the clearest shown in this analysis. The gap in access to electricity fell 20 percentage points in most countries. Peru shows a small reduction in the gap between households of indigenous and non-indigenous groups while Chile shows a small increase in the gap. However, in general terms, no major changes occurred.

Figure 4.10 Changes in salaried employment gap between three types of social groups (by rurality, gender and ethnicity) during the extractive resource boom cycle in five countries (growth rate in %)



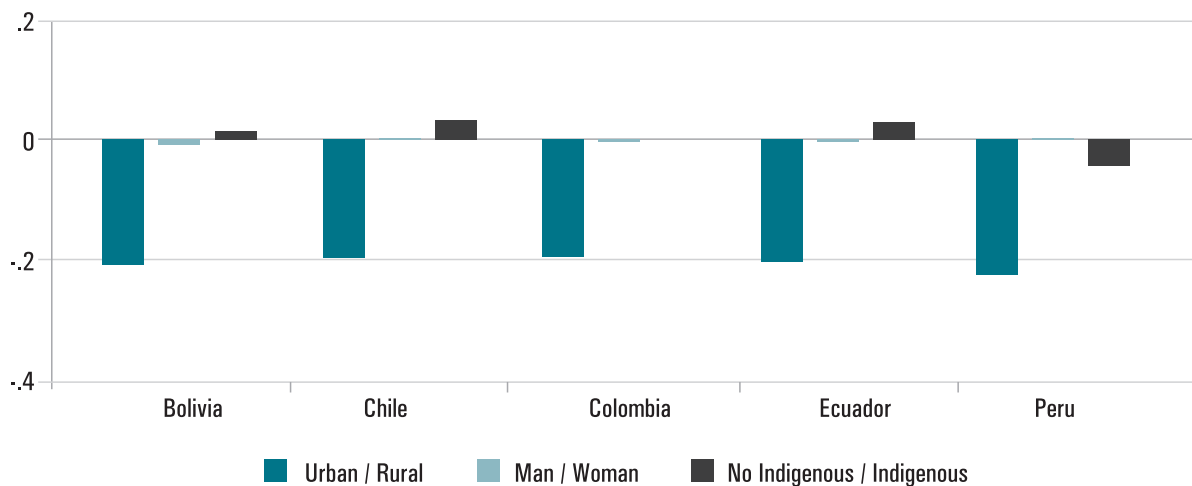
Source: Household surveys in Peru, Ecuador, Colombia, Chile and Bolivia. Prepared by the author.

Figure 4.11 Changes in the gap of access to drinking water between three types of social groups (by rurality, gender and ethnicity) during the extractive resource boom cycle in five countries (growth rate in %)



Source: Household surveys in Peru, Ecuador, Colombia, Chile and Bolivia. Prepared by the author.

Figure 4.12 Changes in the gap of access to sewage between three types of social groups (by rurality, gender and ethnicity) during the extractive resource boom cycle in five countries (growth rate in %)



Source: Household surveys in Peru, Ecuador, Colombia, Chile and Bolivia. Prepared by the author.

## V. GAP CHANGES IN THREE TYPES OF GROUPS DURING THE EXTRACTIVE BOOM CYCLE IN EXTRACTIVE AND NON-EXTRACTIVE AREAS

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This section describes an analysis similar to that in previous section. However, changes in extractive and non-extractive areas were observed. This analysis is still descriptive and shows what happened in those two areas. It does not examine impacts or casualities. The factors that resulted in changes in gaps may have occurred for multiple structural causes peculiar to the area or because of government policies.

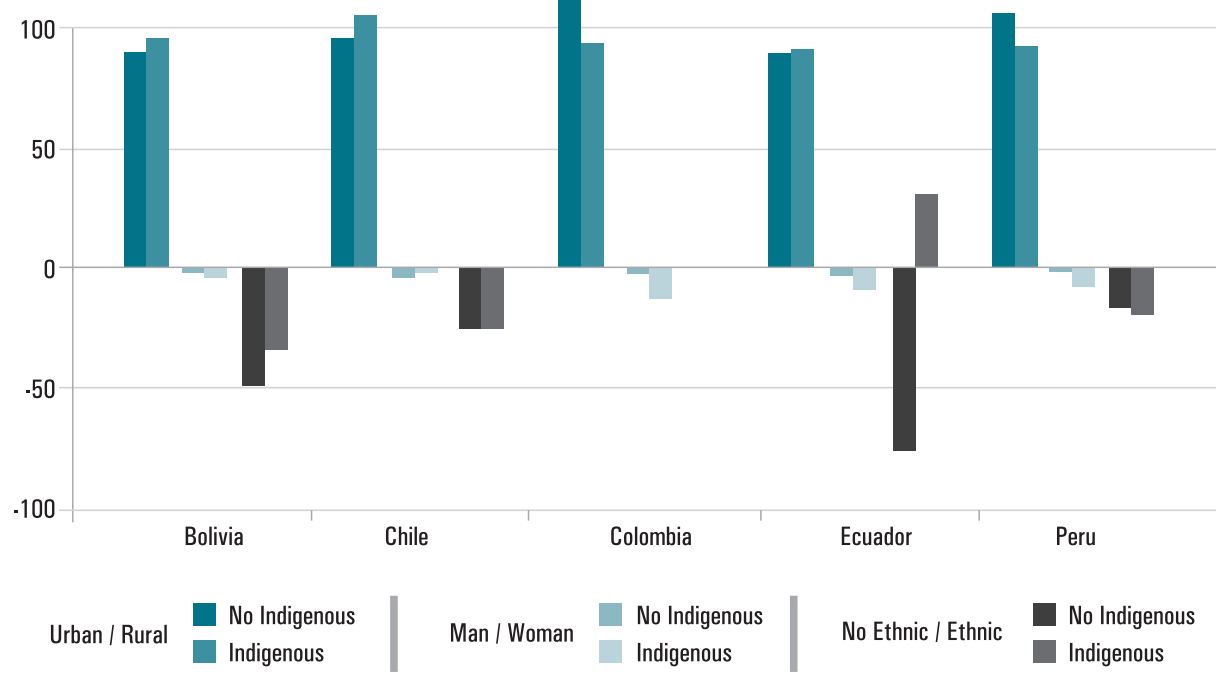
### *Monetary wellbeing*

In general, there have not been differences in the changes in gaps regarding monetary wellbeing in both types of regions between different groups in the five countries. However, Ecuador's case is exceptional. The income gap between indigenous and non-indigenous households narrowed in non-extractive regions but widened for the same groups of households in extractive regions. Furthermore, those same results are observed for poverty and extreme poverty gaps between indigenous and non-indigenous groups in Ecuador. A significant narrowing is observed in both gaps between households of those groups in non-extractive areas, but moderate reductions are found in extractive areas, i.e., oil producing areas.



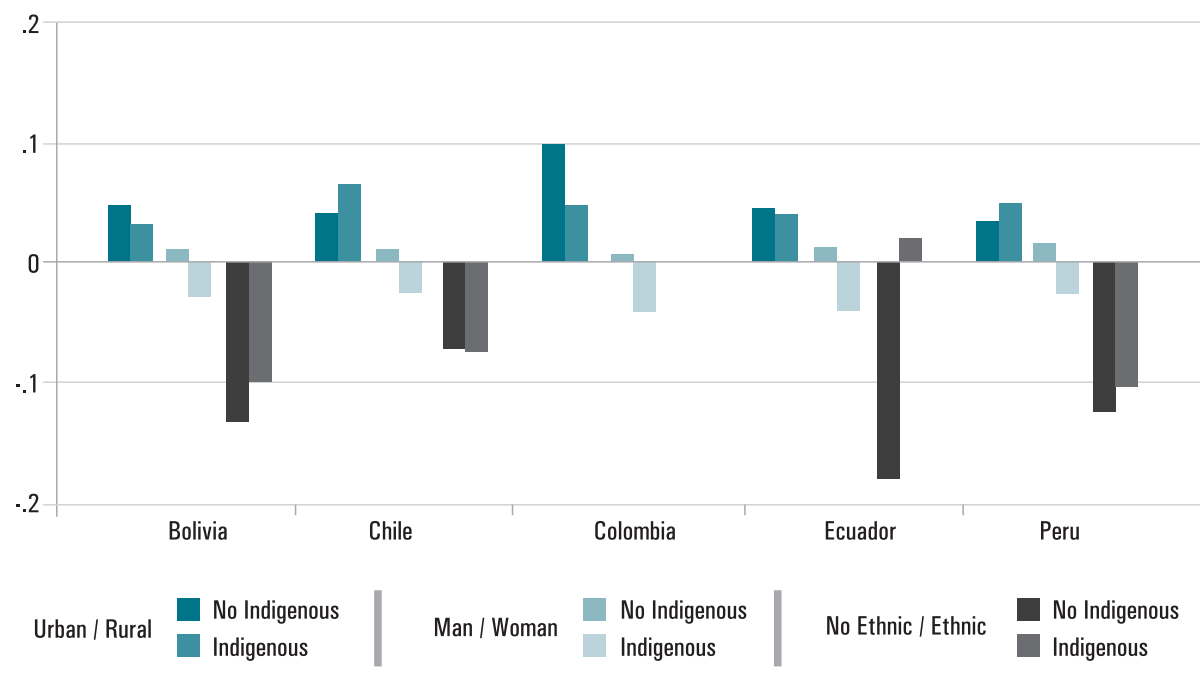
*En general, no ha habido diferencia en las variaciones de las brechas monetarias en ambas regiones entre los diferentes grupos en los cinco países*

Figure 5.1 Changes in per capita monthly income gap (USD) between three types of social groups (by rurality, gender and ethnicity) during the extractive resource boom cycle in five countries in extractive and non-extractive regions



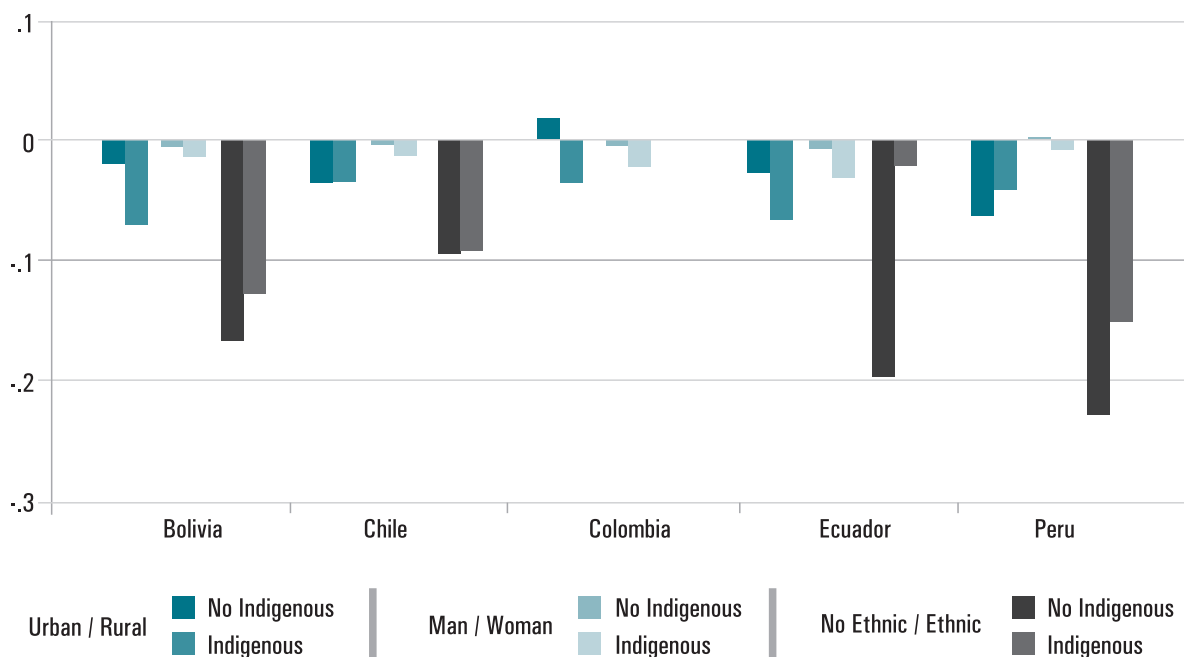
Source: Household surveys in Peru, Ecuador, Colombia, Chile and Bolivia. Prepared by the author.

Figure 5.2 Changes in the poverty gap between three types of social groups (by rurality, gender and ethnicity) during the extractive boom cycle in five countries in extractive and non-extractive regions (growth rate in %)



Source: Household surveys in Peru, Ecuador, Colombia, Chile and Bolivia. Prepared by the author.

Figure 5.3 Changes in the extreme poverty gap between three types of social groups (by rurality, gender and ethnicity) during the extractive boom cycle in five countries in extractive and non-extractive regions (growth rate in %)



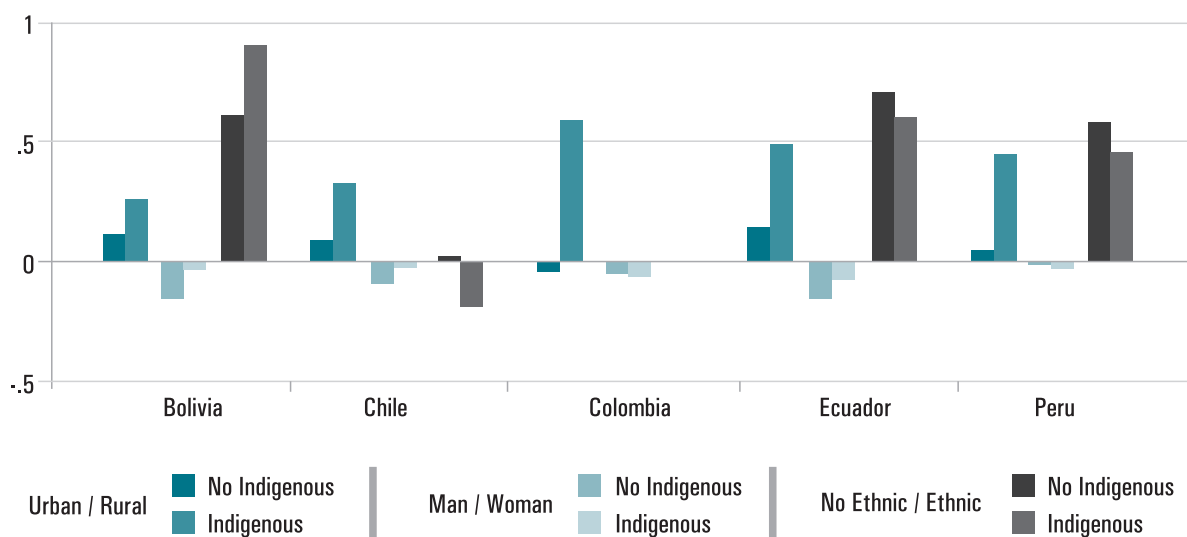
Source: Household surveys in Peru, Ecuador, Colombia, Chile and Bolivia. Prepared by the author.

### Education

Small changes in the gap of schooling years are observed in groups analyzed both in extractive and non-extractive areas. Nonetheless, some results in Colombia and Bolivia are worthwhile underscoring. In Colombia, an increase in the gap of schooling years is observed between individuals of urban and rural areas, mainly in the extractive regions. In non-extractive areas, we did not identify changes in gaps between individuals of those groups. Likewise, in Bolivia, the gap in schooling years between individuals of indigenous and non-indigenous groups has widened more in extractive areas than in non-extractive regions.

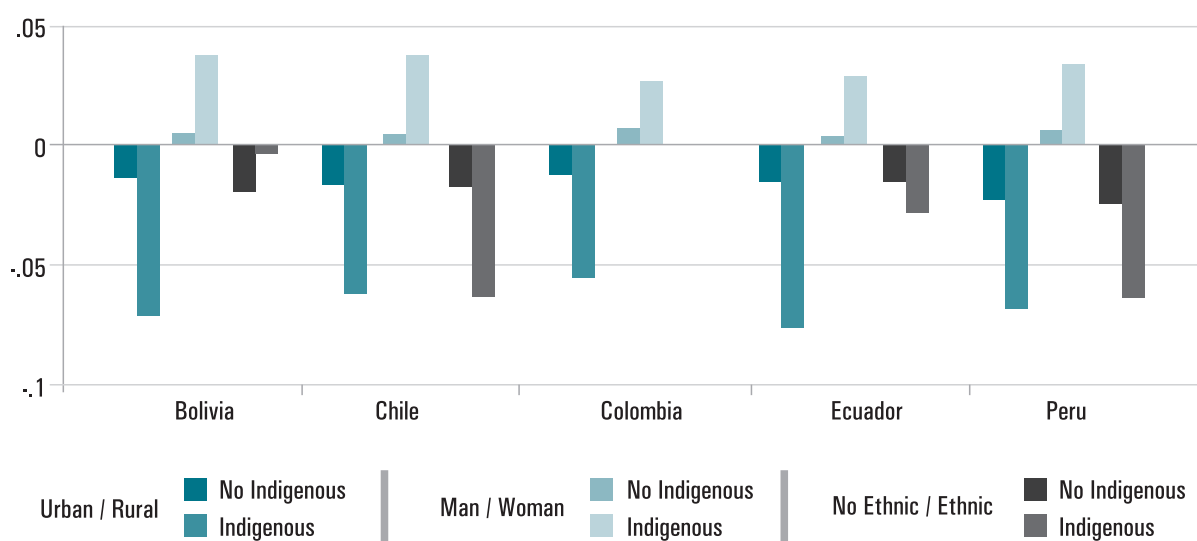
On the contrary, the narrowing of the enrolment gap and school delay gap between different types of social groups analyzed in five countries is more significant in extractive areas than in non-extractive ones, except Colombia, where no differences are observed between those types of areas.

Figure 5.4 Changes in the average schooling years gap between three types of social groups (by rurality, gender and ethnicity) during the extractive boom cycle in five countries in extractive and non-extractive areas (growth rate in %)



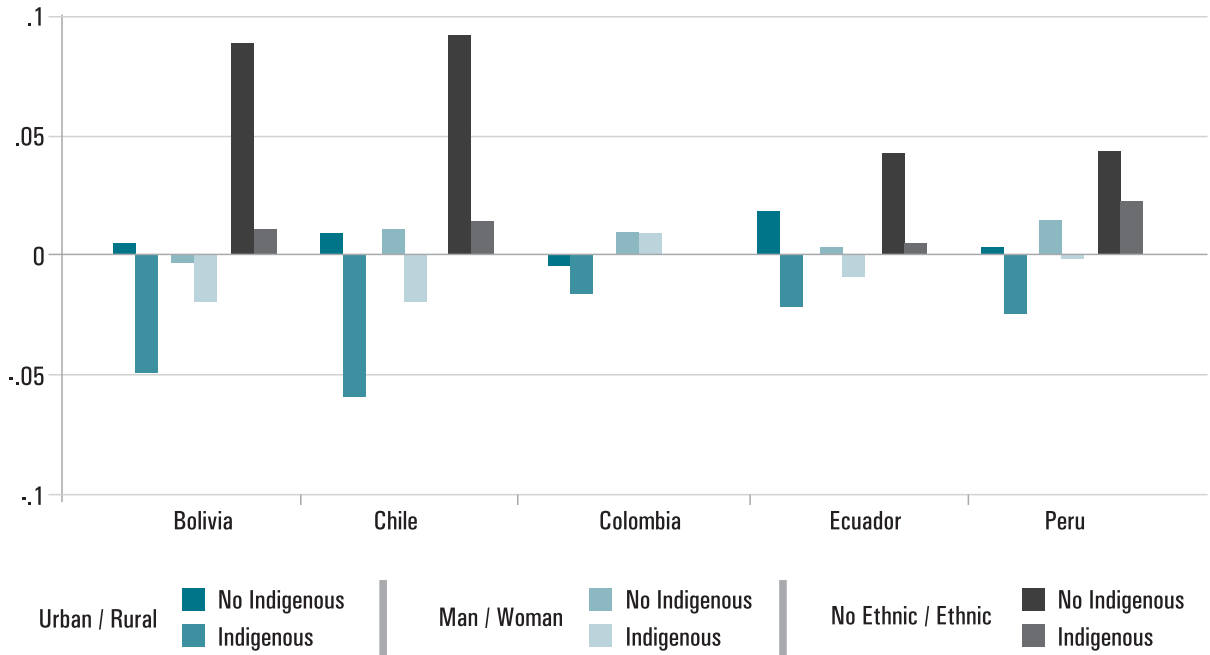
Source: Household surveys in Peru, Ecuador, Colombia, Chile and Bolivia. Prepared by the author.

Figure 5.5. Changes in the illiteracy gap between three types of social groups (by rurality, gender and ethnicity) during the extractive boom cycle in five countries in extractive and non-extractive areas (growth rate in %)



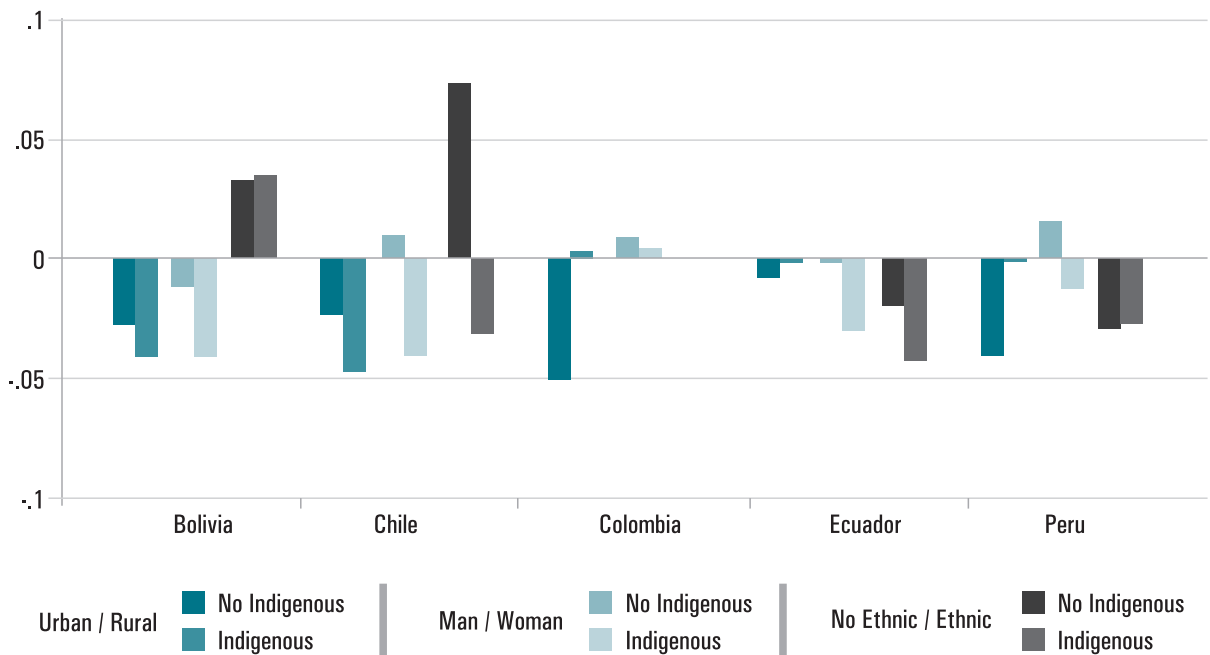
Source: Household surveys in Peru, Ecuador, Colombia, Chile and Bolivia. Prepared by the author.

Figure 5.6. Changes in the school enrolment gap between three types of social groups (by rurality, gender and ethnicity) during the extractive boom cycle in five countries in extractive and non-extractive areas (growth rate in %)



Source: Household surveys in Peru, Ecuador, Colombia, Chile and Bolivia. Prepared by the author.

Figure 5.7. Changes in the gap in schooling delays between three types of social groups (by rurality, gender and ethnicity) during the extractive boom cycle in five countries in extractive and non-extractive areas (growth rate in %)



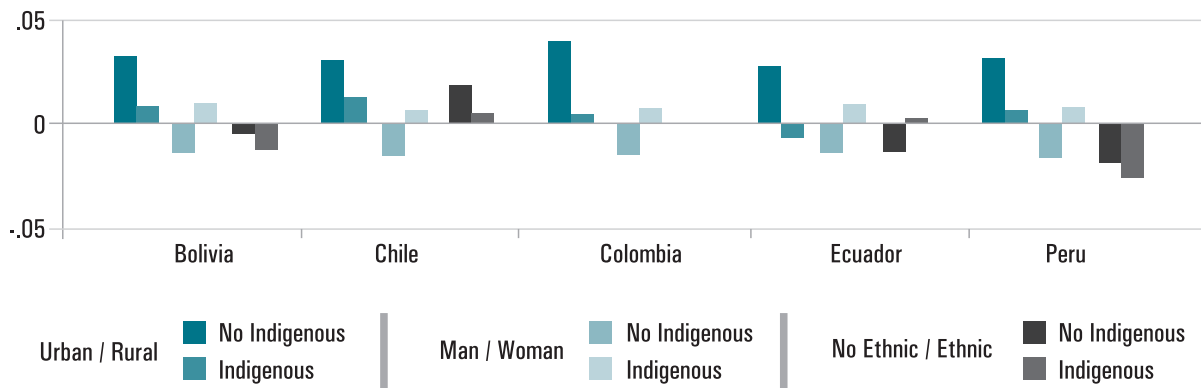
Source: Household surveys in Peru, Ecuador, Colombia, Chile and Bolivia. Prepared by the author.

### Employment

In general, employment indicators have been guided mainly by changes in non-extractive regions, because the gap in extractive regions was practically steady. This is positive since, out of extractive regions, gaps increased.

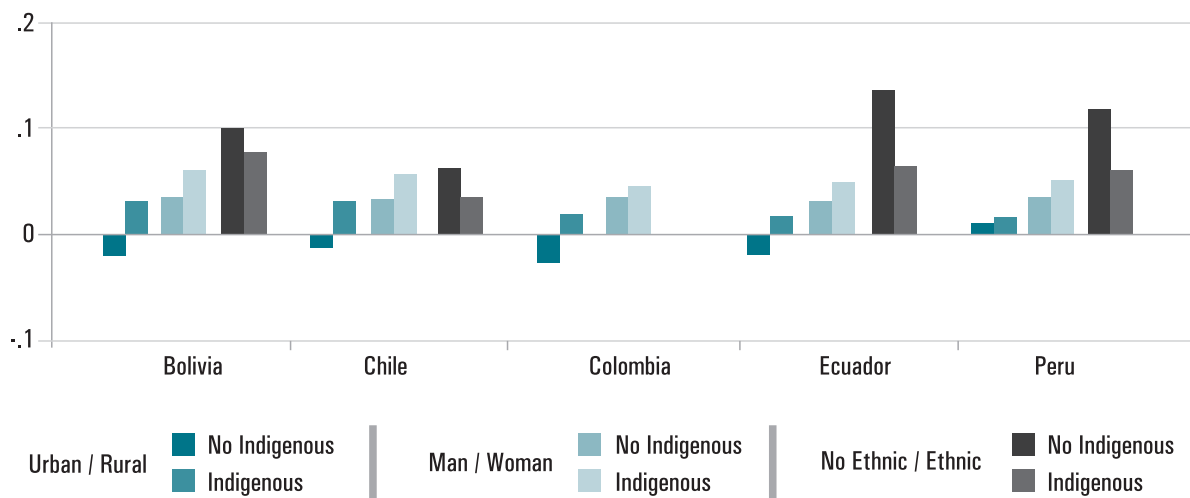
The same happens in the salaried employment gap. In that case, the largest changes are guided by non-extractive regions, while gaps in extractive regions increased. However, such increase is smaller than the one observed in the remaining regions.

Figure 5.8. Changes in the employment gap between three types of social groups (by rurality, gender and ethnicity) during the extractive boom cycle in five countries in extractive and non-extractive areas (growth rate in %)



Source: Household surveys in Peru, Ecuador, Colombia, Chile and Bolivia. Prepared by the author.

Figure 5.9. Changes in the salaried employment gap between three types of social groups (by rurality, gender and ethnicity) during the extractive boom cycle in five countries in extractive and non-extractive areas (growth rate in %)



Source: Household surveys in Peru, Ecuador, Colombia, Chile and Bolivia. Prepared by the author.

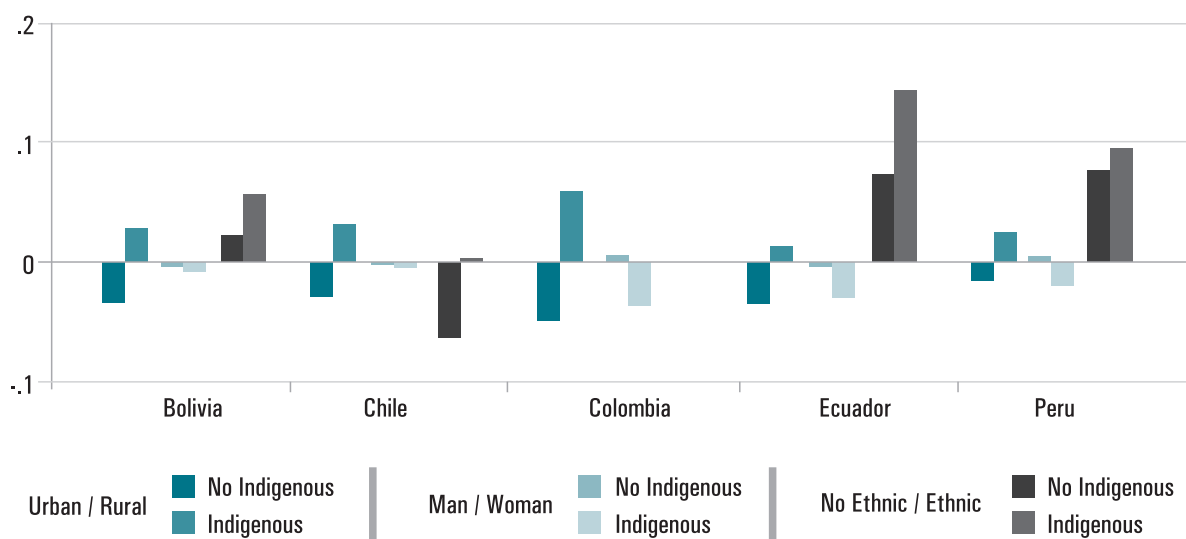


Access to services

Clearly, the increase in gaps in access to drinking water and sanitation previously observed is much stronger in extractive regions. In other words, horizontal inequality in this respect has increased in extractive regions.

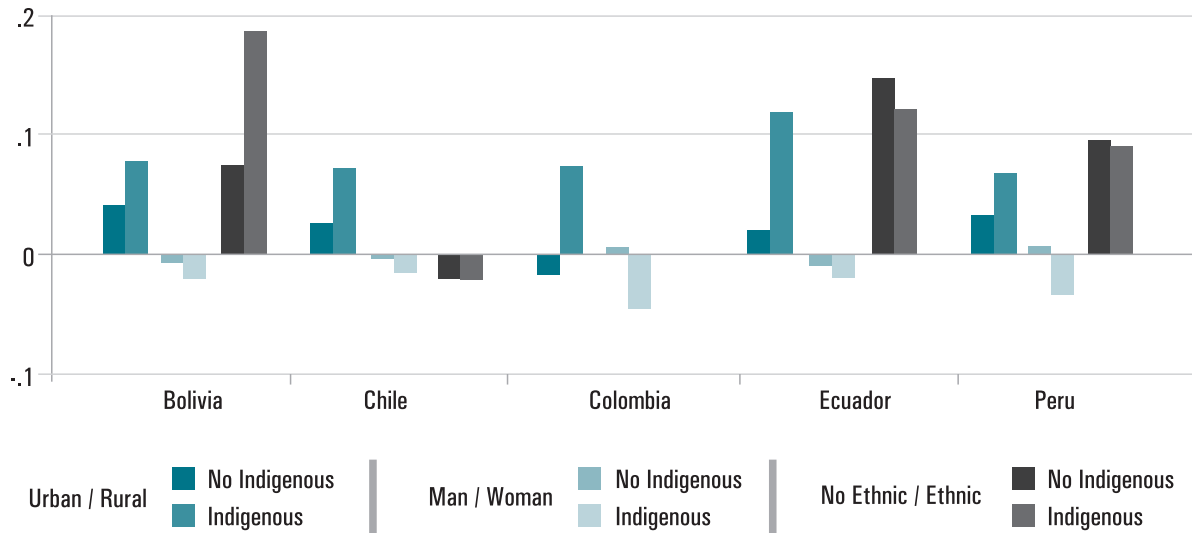
Remarkably, regarding electricity service, where the largest gap reduction had been observed (mainly in urban and rural areas), a similar outcome was identified since the gap between indigenous and non-indigenous groups increased in Ecuador, Bolivia and Peru. On the other hand, the urban-rural gap reduction was slightly larger in extractive areas (although the difference is not very large).

Figure 5.10. Changes in the gap in access to drinking water access between three types of social groups (by rurality, gender and ethnicity) during the extractive boom cycle in five countries in extractive and non-extractive areas (growth rate in %)



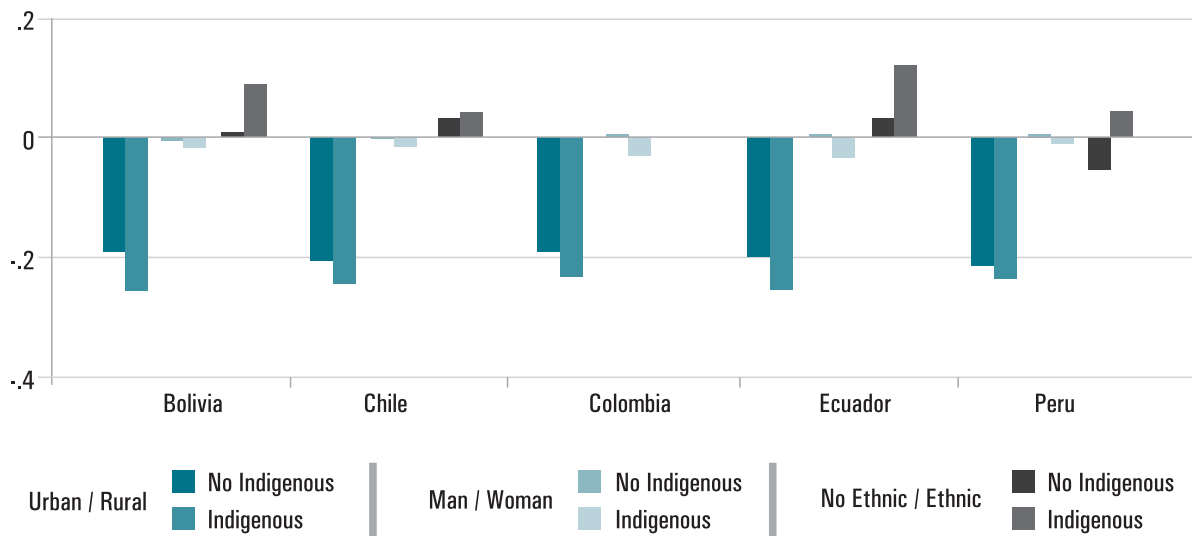
Source: Household surveys in Peru, Ecuador, Colombia, Chile and Bolivia. Prepared by the author.

Figure 5.11. Changes in the gap in access to sanitation between three types of social groups (by rurality, gender and ethnicity) during the extractive boom cycle in five countries in extractive and non-extractive areas (growth rate in %)



Source: Household surveys in Peru, Ecuador, Colombia, Chile and Bolivia. Prepared by the autor

Figure 5.12. Changes in the electricity service access gap for three types of social groups (by rurality, gender and ethnicity) during the extractive boom cycle in five countries in extractive and non-extractive areas



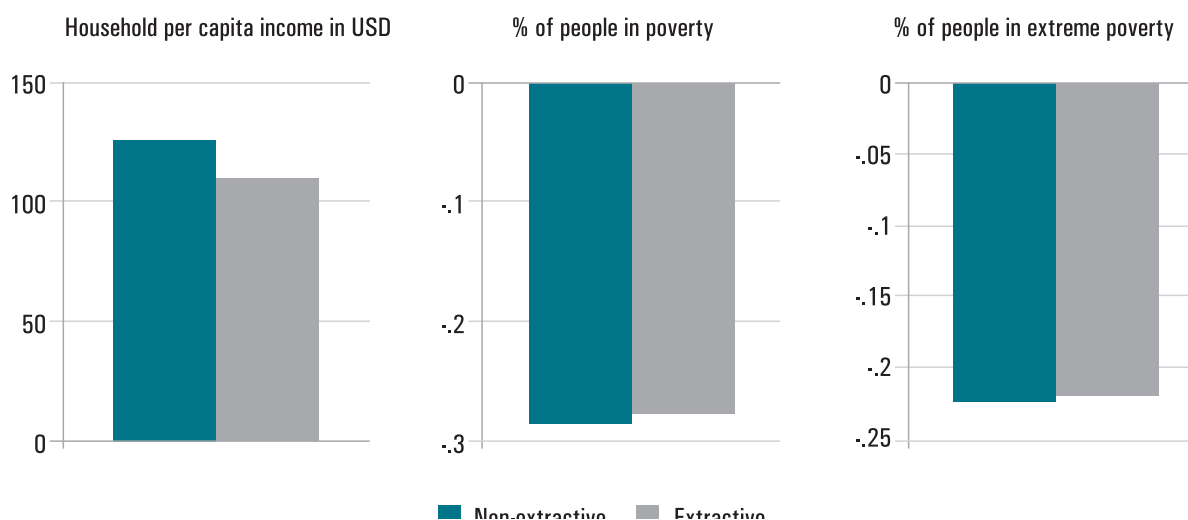
Source: Household surveys in Peru, Ecuador, Colombia, Chile and Bolivia. Prepared by the author.

## VI. AVERAGE CHANGES IN SOCIAL INDICATORS IN EXTRACTIVE AND NON-EXTRACTIVE REGIONS

This last section presents a descriptive estimate of changes in social indicators in the extractive and non-extractive areas of the Andean region. These indicators are classified in the same four groups used in previous sections. This analysis now focuses on the changes in the social averages of indicators for each type of region (extractive and non-extractive). It does not look at the changes in gaps anymore as in the previous section.

Figure 6.1 shows that per capita income grew less in extractive regions, and poverty and extreme poverty also fell less there. However, the differences are very small.

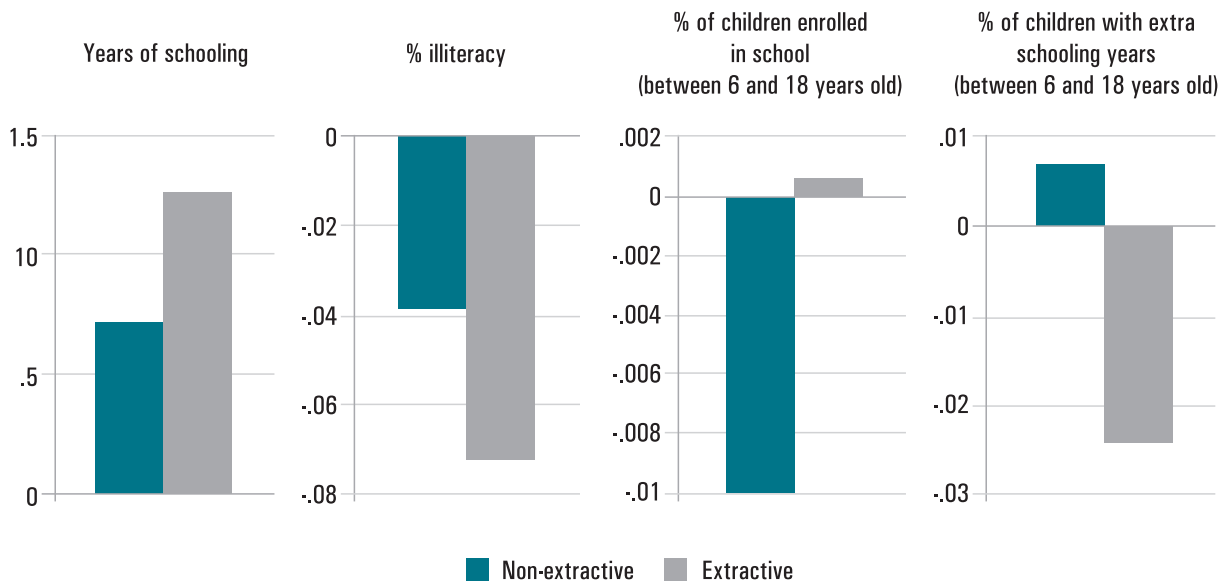
Figure 6.1 Average change in monetary indicators (income, poverty and extreme poverty) during the extractive boom cycle in extractive and non-extractive areas of the Andean region.



Source: Household surveys in Peru, Ecuador, Colombia, Chile and Bolivia. Prepared by the author.

Figure 6.2 shows a larger increase in schooling years in extractive regions. The fall in illiteracy is also larger in those regions. Practically, there are no changes in the other two indicators.

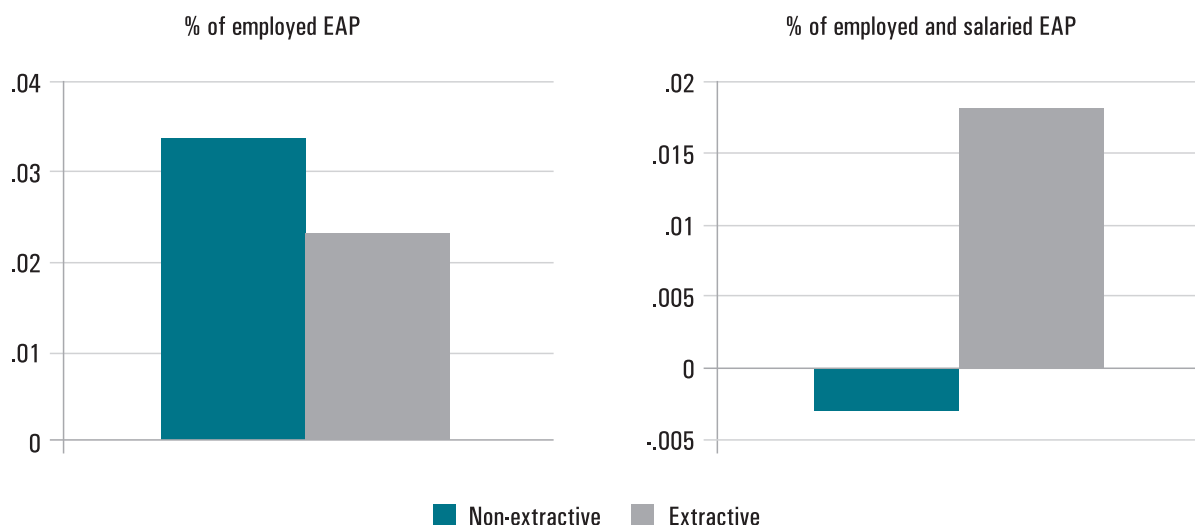
Figure 6.2 Average change in educational indicators during the extractive boom cycle in extractive and non-extractive areas of the Andean region



Source: Household surveys in Peru, Ecuador, Colombia, Chile and Bolivia. Prepared by the author.

Employment in extractive regions grew little, though more than salaried jobs. In other words, on average, extractive regions show more growth of salaried employment.

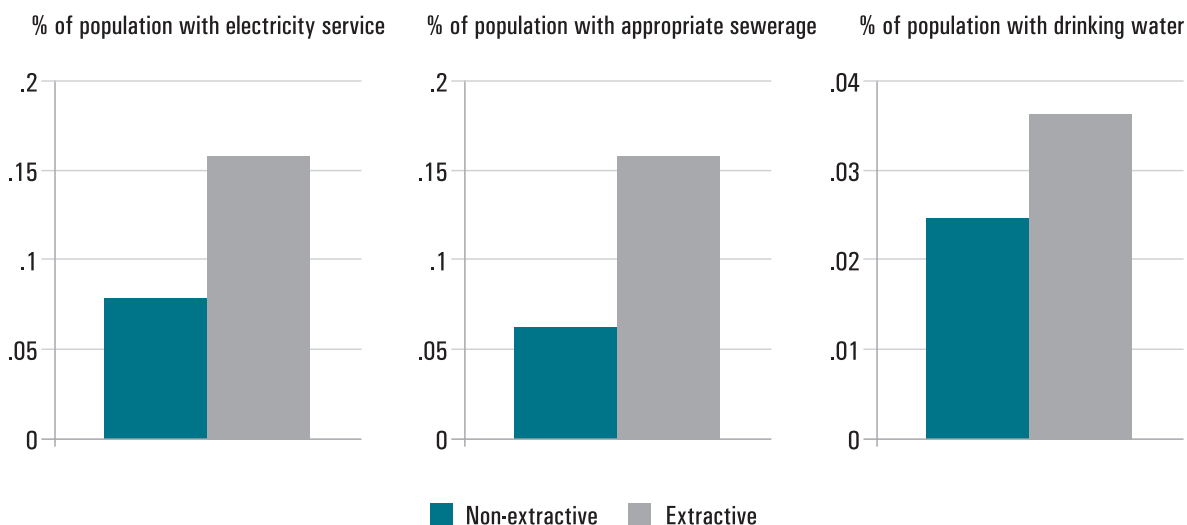
Figure 6.3. Average change in employment indicators during the extractive boom cycle in extractive and non-extractive areas in the Andean region



Source: Household surveys in Peru, Ecuador, Colombia, Chile and Bolivia. Prepared by the author.

Finally, Figure 6.4 shows that growth in access to services in extractive regions is significantly larger than in the non-extractive ones. For example, regarding access to electricity, access in extractive regions grew on average almost 15 percentage points, i.e., twice as much as in non-extractive regions.

Figure 6.4. Average change in basic services indicators during the extractive boom cycle in extractive and non-extractive areas of the Andean region



Source: Household surveys in Peru, Ecuador, Colombia, Chile and Bolivia. Prepared by the author.

## VII. CONCLUSIONS

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The gap regression analysis points to results that are very different by type of indicator. Clearly, gaps in money-related components have narrowed more, such as in income or access to electricity. On the other hand, gaps in access to education and basic services remained almost unchanged. Those gaps were not always narrowed more in extractive regions than in the non-extractive ones. In most cases, the boom seems to have consisted in a flow of resources favoring some groups (urban, men, and non-indigenous), whether in an extractive region or not. However, specific studies focusing on a country or a group of indicators are required to analyze who benefited most from the extractive boom.



*Claramente las brechas que más se han cerrado se relacionan en mayor medida a indicadores monetarios como ingresos o electricidad*

The general objective of this study was to compare the evolution of social indicators and gaps among social groups (indigenous and non-indigenous, men and women, and urban and rural) during the 2001 and 2013 period. Performing a causality analysis or evaluating the impact of the extractive industry boom on horizontal inequalities was not the objective of this study. This descriptive research focused on showing the comparative evolution of inequality indicators among groups in the Andean region during the recent cycle of natural resources boom in five countries.

Clearly, changes in extractive and non-extractive regions depend on each country's fiscal rules and types of reallocation in these areas. Several Andean governments, but not all, have sought to favor regions affected by the resource boom. This makes a big difference.



