

A territorial approach to assess children's opportunities in Latin American Countries

Un enfoque territorial para evaluar las oportunidades de los niños en los países de América Latina

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Abstract

This paper documented the overall improvement in living conditions and equality of opportunity in several LAC countries. However, huge disparities within as well as across countries remain. The Human Opportunity Index (HOI) for the analyzed advantages ranges from almost universal coverage for school attendance and electricity in Chile and Mexico to very low HOI levels for sewerage and housing conditions in Nicaragua. For all advantages and countries, more recent levels of HOI showed significant improvements in comparison to previous censuses' levels.

This paper opens the territorial "black box" by assessing the importance of territorial variables *vis á vis* personal and households' circumstances in determining the inequality of distribution of each advantage. In almost every case, in explaining access to advantages, territorial circumstances appeared to be more important than the individuals' ones (sex and ethnic origin of the child).

Territorial variables were the most important determinant for supply-driven advantages (i.e. public services), whereas their importance is slightly lower for advantages that are more closely linked to the demand-side (quality of housing material) or to both sides (schooling). Among territorial characteristics,

in almost all cases the most influential ones were those linked to the geography (density and rural/urban condition), followed by those linked to human capital (illiteracy rate and the migratory capital of territories). Institutional proxies (ethnic fragmentation, political participation) and variables linked to the economic structure (employment concentration, main activities) appeared to have a lower impact.

All things considered, the paper points to the still long road ahead to provide equality of opportunity for the youth within each country. In this scenario, the territory imposes important access restrictions for all the advantages studied, in some cases representing more than 50% of the total inequality. As a general result, the importance of the territory calls for place-based policies as a tool for achieving equity in access.

Keywords: Human Opportunity Index; living conditions; functional territories

JEL: I14, I24, I32

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Resumen

En este artículo se documentó la mejora general de las condiciones de vida y la igualdad de oportunidades en varios países de América Latina y el Caribe. Sin embargo, siguen existiendo enormes disparidades tanto dentro de los países como entre ellos. El Índice de Oportunidades Humanas (IHO) para las ventajas analizadas va desde la cobertura casi universal para la asistencia escolar y la electricidad en Chile y México hasta niveles muy bajos de IHO para el alcantarillado y las condiciones de vivienda en Nicaragua. Para todas las ventajas y países, los niveles más recientes de HOI mostraron mejoras significativas en comparación con los niveles de los censos anteriores.

En este trabajo se abre la “caja negra” territorial al evaluar la importancia de las variables territoriales frente a las circunstancias personales y de los hogares en la determinación de la desigualdad de la distribución de cada ventaja. En casi todos los casos, al explicar el acceso a las ventajas, las circunstancias territoriales parecieron ser más importantes que las de los individuos (sexo y origen étnico del niño).

Las variables territoriales fueron el determinante más importante para las ventajas basadas en la oferta (es decir, los servicios públicos), mientras que su importancia es ligeramente menor para

las ventajas que están más estrechamente vinculadas al lado de la demanda (calidad del material de la vivienda) o a ambos lados (escolaridad). Entre las características territoriales, en casi todos los casos, las más influyentes fueron las vinculadas a la geografía (densidad y condición rural/urbana), seguidas de las vinculadas al capital humano (tasa de analfabetismo y capital migratorio de los territorios). Las aproximaciones institucionales (fragmentación étnica, participación política) y las variables vinculadas a la estructura económica (concentración del empleo, actividades principales) parecieron tener un impacto menor.

En general, el documento señala el camino todavía largo que queda por recorrer para lograr la igualdad de oportunidades de los jóvenes en cada país. En este escenario, el territorio impone importantes restricciones de acceso para todas las ventajas estudiadas, representando en algunos casos más del 50% de la desigualdad total. Como resultado general, la importancia del territorio exige políticas basadas en el lugar como herramienta para lograr la equidad en el acceso.

Palabras clave: Índice de Oportunidades Humanas; condiciones de vida; territorios funcionales

1. Introduction

Several studies point to Latin America as the most unequal region in the world (Robles, et al., 2013; ECLAC, 2015; Milanović, 2016; Alvaredo et al., 2017). This inequality is expressed in a significant gap in income but also in the opportunities that are accessible to people. Many of these inequalities are rooted in the territory: where one was born or lives is not irrelevant when defining the levels of welfare that an individual can achieve (Rimisp, 2011, 2013 and 2018; Bebbington et al., 2016).

However, little is known about the determinants of these spatial inequalities. Why are opportunities distributed unevenly across different territories? Is it that people with characteristics that make them less likely to access an opportunity tend to be concentrated in certain territories, or is the territory itself that presents a barrier to access? We want to know how important the territory is when defining the access to opportunities and which territorial characteristics are the most binding.

Following these queries, three research questions lead this study:

- 1) How are opportunities distributed across territories and how have they changed over time?
- 2) How much does the territory account for, compared to personal circumstances, when explaining the unequal distribution of opportunities?
- 3) What factors explain the importance of the territory?

To answer these questions, we explore the distribution of opportunities for children and youth under sixteen years old in seven Latin American Countries: Brazil, Chile, Ecuador, El Salvador, Mexico, Nicaragua, and Peru. This variety of countries allows us to investigate the distribution of opportunities in many different contexts. Our sample goes from low-income countries (Nicaragua) to the highest income country of the region (Chile). We also include the largest and the most populated country (Brazil), middle size countries (Peru), and a small and less populated one (El Salvador).

When defining the territory, this paper goes beyond sub national political and administrative divisions. We understand the territory as a social construction, built from the daily interactions of people and enterprises. In that sense, our spatial unit of analysis corresponds to Functional Territories which group,

under a single spatial unit, municipalities with high levels of social and economic interactions¹.

This paper offers two main contributions to the literature: 1) Estimating the territorial distribution of opportunities at the smallest territorial level allowed by the available data, which in turn allows us to assess the unequal distribution of opportunities with levels of geographic accuracy that can't be found elsewhere; 2) Opening the "black box" of what a territory is, shedding at the same time some light to which territorial characteristics are the most binding when defining the access to opportunities.

Understanding the factors behind the spatial distribution of opportunities is useful for the development of a better public policy as it gives insights about the most effective ways to close the gaps. Furthermore, the design of public policy might differ if the observed opportunity distribution is driven by personal circumstances or if it is rather driven by the characteristics of the territory where each individual lives, studies or works. In this sense, the document becomes an empirical contribution to the debate between place-based policies and people-based policies (Barca et al., 2012; Barca, 2009; CAF, 2010; World Bank, 2009).

The paper is structured as follows: Section 2 presents some evidence of the role of territory on inequality in Latin America. Section 3 describes the methodology and Section 4 presents the data sources used. Section 5 presents the main results of our investigation, while Section 6 concludes.

2. Territory and opportunities: what we know

Unequal distributions of income, assets or consumption are characteristics of a market economy. Different values of the marginal productivity of labor, derived from different capabilities or skills, are associated with different levels of income. However, sometimes these differences in income levels are not a result of the skills, abilities or effort of the individuals, but respond rather to restrictions to the operation of competitive markets, evidenced, among other things, by entry barriers to labor markets, unequal access to productive resources or an uneven distribution of opportunities. Many of these restrictions are rooted in the territory (Anderson & Ponfret, 2004).

The territorial dimension of inequality has been widely studied. Goerlich & Mas (2001); Jesuit et al. (2002); Osberg (2000); Stewart (2002); Green (2009)

among others have revealed significant disparities in development patterns at the sub national level in developed countries. These inequities have also been studied in the developing world. For example, Kriaa et al. (2011); Grab & Grimm (2008); Mazumdar & Sarkar (2008); Milanovic (2005); Wei & Wu (2001); and Kanbur & Zhang (2004) find that national aggregates hide significant and systematic distributional effects that keep certain social groups and regions lagging. Christiaensen et al. (2003) found the territory as one of the determinants of the persistence of poverty.

Territorial inequalities are also a documented fact in Latin America. National averages mask significant gaps, as evidenced in the high-income inequality of the region (UNDP, 2010; Deininger and Squire, 1996). As well as for income, inequality is also found in significant spatial gaps in indicators of territorial competitiveness (CAF, 2010); and other synthetic welfare indicators (ECLAC, 2010; World Bank, 2008; Rimisp, 2011 and 2013). In that line, Modrego & Berdegué (2015) identify a heterogeneous spatial growth in the region for the 1990 to 2000 period when one in three territories experienced economic and social stagnation in a context of national growth and poverty reduction.

In the field of human opportunities, Barros et al. (2009); Molinas et al. (2010); Hoyos & Narayan (2011); Contreras et al. (2012), among others, found an inequitable distribution of access to basic goods and services in different human groups, many of them defined by their place of residence. For example, Molinas et al. (2010) found a wide dispersion of the Human Opportunity Index among sub national regions, both between countries and within countries. They also found that all capital cities rank higher than the rest of the territories within a country.

These differences in the spatial patterns of development are linked to agro-ecological features of the environment, to the availability of infrastructure and to the access to services (Christiaensen et al., 2003), as well as to distance and access to urban areas (Krugman, 1991; Glaeser & Kohlhase, 2004; Partridge & Rickman, 2008). Indeed, several studies suggest that the territory generates welfare differences beyond individual or household differences (De Ferranti et al., 2004; Barca et al., 2012). The empirical literature on opportunities shows the territory as a substantial source of inequality of opportunity, in addition to other individual circumstances as gender or parental education (Ferreira & Gignoux, 2011; Bourguignon et al., 2007).

Although there is an extensive literature documenting territorial inequalities, little is known about the drivers of this inequality. In particular, it is not clear if people with characteristics tend to be concentrated in certain territories, or rather whether the territory itself presents a barrier to higher levels of welfare. Efforts to answer this question in Latin America are still scarce. An exception is the work by Ramirez et al. (2009), who estimated that inequality between municipalities represented 27% of total inequality in Chile in 2002. In the same line, Elbers et al. (2004), estimate that territorial inequality could account for up to 40% of total consumption inequality in Ecuador. Moreover, Modrego & Berdegúe (2015) show that fast-growing Latin American countries present a significant spatial polarization process, as in the case of Peru, with an increase of between-provinces component of inequality from 12 to 24% between 1993 and 2007 (Modrego & Cazzuffi, 2015).

With respect to human opportunities, Barros et al. (2009) found that the unequal distribution of educational opportunities of children is explained best by the level of education of the parents and by the sex of the child. In contrast, the area of residence is the circumstance that imposes the most important restrictions to opportunities of access to public services. Molinas et al. (2010) found similar results for a sample of 19 Latin American countries: on average, the circumstances related to the parent's education will be the most binding for the equitable distribution of educational opportunities while at the level of access to basic services the place of residence (area plus province/region) represents the most important constraint. Finally, Hoyos & Narayan (2011) in a sample of 47 countries, including 4 Latin American ones, identify households' wealth as the most relevant circumstance for educational and health opportunities.

In this paper we provide further evidence on the drivers of inequality in Latin America, with a special emphasis on the territory. In this way, we extend previous analysis found in the literature to by using functional territories to capture the actual economic and social interactions that occur in space covering a total of 4,388 functional territories, 221 municipalities and 195 provinces in the seven countries studied.

3. Methodology

To evaluate the distribution of opportunities, this study follows the Human Opportunity Index HOI-based in Roemer's approach to evaluate inequality of opportunity (Roemer, 1998) and developed by the World Bank (World Bank, 2006). Taking youth and children as units of analysis, the HOI assesses the average availability of a good or service penalized by its uneven distribution within the population. The index is not a direct measure of inequality of opportunity, but an indicator of how the access to basic goods and services is allocated based on the principle of equality of opportunity (World Bank, 2010; Barros et. al., 2009). The equal opportunity principle implies that a child's access to basic goods and services should not be related to circumstances over which he/she has no control (Hoyos & Narayan, 2011).

By analyzing outcomes for youth and children, the observed results are isolated from personal effort. At that age, virtually all environmental variables can be considered as circumstances beyond their decision. Hence, all differences across outcomes can be attributed to inequality of opportunity (Roemer, 1998).

Mathematically, the HOI is defined by the average coverage (C) of a good or service (called advantage in this literature), punished by its unequal distribution among circumstance groups.

Circumstance groups gather under a single synthetic unit youth and children defined by their circumstances (e.g. schooling level and sex of household head, household composition, rural/urban, ethnicity, etc.)². The dissimilarity index (D) measures the inequality in access rates to a given advantage for each circumstance group, compared with the average access rate of the population (Barros et al., 2009):

$$D = \frac{1}{2C} \sum_{k=1}^m |c_k - C| \beta_k \quad (1)$$

Where c_k is the average access of each k group to the advantage; β_k is the share of the population of each of the k groups; C is the average level of coverage of the advantage and; m the number of groups defined by the circumstances. D ranges from 0 to 1, 0 being the case of no inequality in the distribution (all k groups have the same access rate), and 1 the case of total inequality where one group takes it all. Using the dissimilarity index, the HOI is estimated as follows:

$$HOI(\textit{advantage } j) = C_j(1 - D_j) \quad (2)$$

As such, the resulting HOI will depend positively on the average coverage C_j and negatively of its unequal distribution D_j . If $(1-D)$ is equal to 1, that is if the access to the advantage is independent of the circumstances, the HOI will be equal to the average coverage rate (C_j).

The contribution of the circumstances to the inequality of opportunities

One of the advantages of the D Index is that it is decomposable. Following the studies of Soloaga & Chavez (2010) and Hoyos & Narayan (2011), its inequality component can be subject to a Shorrocks - Shapley (1999) decomposition which can identify the relative contribution of each circumstance to the total inequality.

This decomposition identifies the extent to which the inequality index changes when a new circumstance is incorporated. However, as can be elucidated from formula (1), since the circumstances are related to each other, the effects of incorporating a new circumstance will be closely related to the circumstances previously included. So, to isolate each effect, the Shapley decomposition averages the contribution of each variable to all the possible subsets of pre-existing conditions. The effect of each circumstance will be the average of all these changes. Mathematically this is expressed as follows:

$$D_A = \sum_{S \subseteq \{A\}} \frac{|S|!(n-|S|-1)!}{n!} [D(S \cup \{A\}) - D(S)] \quad (3)$$

Where n is the set of all the circumstances, S is a subset of circumstances which excludes the circumstance A . $D(S)$ is the dissimilarity index estimated with the set of circumstances S and $D(S \cup \{A\})$ is the estimated dissimilarity index with the set of circumstances S plus the circumstance A . It is worth mentioning that A can represent an individual circumstance or a group of circumstances.

So, the contribution of a circumstance (or group of circumstances) to the dissimilarity index can be defined as:

$$M_A = \frac{D_A}{D(n)}; \text{ where } \sum_{i \in n} M_i = 1 \quad (4)$$

The sum of the contributions of all circumstances to the dissimilarity index adds up to 100%. Furthermore, one of the characteristics of the Shapley decomposition is its symmetry, that is: the contribution of each circumstance is not affected by the order in which it is included in the estimation (Shorrocks, 1999).

To answer the three research questions, the empirical strategy follows two steps. In the first one, the HOI is estimated at the lowest sub national level allowed for each country by data availability. This step permits to evaluate the spatial dispersion of opportunities since the HOI is estimated for each one of the territories. In the second step the HOI is estimated only once and at the national level. The differential impact of each one of the circumstances is then evaluated with the Shapley decomposition performed on the dissimilarity index --that part of HOI that adjusts average coverage of a given advantage by the inequality of its distribution--. This decomposition helps us to evaluate the incidence of territorial variables *vis-à-vis* personal circumstances in the distribution of opportunities. This second step is done in two parts. In the first one a comparison of the evolution across time of the opportunities within a country is performed, while in the second, considering only the last available census, a comparison across countries is done.

4. Data and variables

The analysis considers the spatial heterogeneity observed in Latin America (Mordrego & Berdegú, 2015; Rimisp, 2011; CAF, 2010). We seek to evaluate the distribution of opportunities at the lowest sub national level possible. In doing so, the sources of information for Chile, El Salvador, Mexico, Nicaragua and Peru were the last two available micro data from censuses of population and housing, whereas, due to data availability, for Brazil and Ecuador the study was limited to the last census period (see Table 1).

As described by Cotter (2002), when examining spatial patterns of development, the first problem to be solved is the level of aggregation: “what constitutes ‘place’?” (p. 540). Following Schejtman and Berdegú (2004), we understand the territory as a social and dynamic construction. Administrative and political divisions which are often static are not always a good reflection of the social and economic interactions that occur between people.

Thus, this paper has chosen to use territorial divisions built from the social interactions that occur within the territories. In doing so, the HOI is estimated at a Functional Territory level in Brazil, Chile, El Salvador and Nicaragua. Functional Territories evoke the idea of labor markets (Tolbert and Killian, 1987). Previous works for Brazil (Favareto et al., 2014), Chile (Berdegué et al., 2011), El Salvador (Amaya & Cabrera, 2012), and Nicaragua (Rodríguez et al., 2013) identified Functional Territories by analyzing commuting patterns between municipalities. Thus, Functional Territories group under a single territorial unit one or several municipalities with high levels of economic and social interactions (Berdegué et al. 2011). For the cases of Ecuador, Mexico and Peru, census micro-data did not allow the construction of Functional Territories. Therefore, the index is estimated at the municipal level for Ecuador and at the state or provincial level for Mexico and Peru. For the case of Mexico, data allowed a further disaggregation into four levels within each state according to their population size.

Advantages and circumstances

Following Molinas et al. (2010), indicators of opportunities were calculated for children and people younger than 16 years old, under the assumption that below this age threshold children are not responsible for, and cannot influence with their own effort, their access to education, available income and other household's characteristics. As such, they are not responsible for their access to advantages either, and uneven access can be attributed to differences in opportunities.

This study defines seven advantages, five of them related to a healthy environment in which a child can grow and the remaining two related to human capital formation. Every advantage has been specified as a binary variable taking the value of one when the child has access to it and of zero otherwise. Advantages that proxy a healthy environment to growth (numbers 1 to 5 in the text below) and human capital formation (numbers 6 to 7) are:

1. Access to clean water (if the house is connected to the public network or has treated water)
2. Access to sewerage (toilets connected to public network or septic tank)
3. Availability of electricity (from any source: public network, community, or own generator)

4. Quality of House Materials (according to floor, walls and ceilings quality standards defined officially by each country)
5. The house is not-crowded (as defined UNDP, that is less than 2.5 persons per room)
6. School attendance (if the child is attending school)
7. Schooling on time (schooling progress consistent with children's age)

To ease the analysis, following Barros et al. (2009), a synthetic opportunity index is also included. This synthetic index corresponds to the simple average of the seven advantages.

As mentioned, circumstances are factors that define the belonging of a child to each k group of the society, but that in a scenario of perfect equality should not affect access to the advantages. Following the specialized literature (Barros et al., 2009; Molinas et al., 2010; Dill & Gonçalves, 2012) they contain personal, household and environment characteristics. The circumstance variables used in this study are:

- Personal circumstances that capture the effects of direct discrimination
 - Gender
 - Ethnic origin (a dummy variable that takes 1 when the household head or its partner declared their belonging to indigenous or Afro-American cultures)
- Household circumstances that capture the effects of family background
 - Gender of household head
 - Education of household head (three dummy variables according to the educational level: primary, secondary, and tertiary)
 - Single – parent household dummy
 - Household dependency rate (ratio of household members that work over total household members)
 - Employment sector of household's head (three dummy variables according to the employment sector: primary, secondary or services)

In addition to personal and household circumstances, a set of territorial circumstances is included. These circumstances were obtained from the census and from administrative data, as described in Table 1 below. By using multiple territorial variables, we seek to identify an order of importance for their impact on inequality of opportunities.

The selection of territorial variables seeks to cover those driving factors behind national and sub national development inequalities that have been identified in the literature. As such, proxy variables that consider aspects of human capital formation (Roemer, 1986; Lucas, 1988); institutions (Rodrik et al., 2004; Barca et al., 2012); local production structures (Cotter, 2002) and geographic characteristics (Rodríguez-Pose, 2011) were selected.

The list of territorial variables used to compare the decomposition across countries (circa 2007) is³:

- Human Capital
 - Illiteracy rate (share of people over 15 years who don't read or write)
 - Migratory capital (percentage of recent immigrants (last 5 years) over the total population).
- Institutional proxies
 - Ethnic fragmentation (Herfindahl-Hirschman index of ethnic and racial cultures)⁴
 - Political participation (voter turnout in the last elections)
- Economic
 - Employment concentration (Herfindahl-Hirschman index of employment categories)⁵

³ The evolution over time of the decomposition within a country is analyzed using a specific set of circumstances according to available information. Country specific circumstances will be presented in the results section.

⁴ Calculated as the sum of the squares of the shares of each ethnic/racial culture within the territory.

⁵ Calculated as the sum of the squares of the shares of each economic activity within the territory.

- Main activity (dummy variable if agriculture is the main activity of the territory)
- Geographic
 - Population density
 - Rurality level: a gradient that goes from Metropolitan to isolated rural as defined in the works of Favareto et al. (2014) for Brazil, Berdegué et al. (2011) for Chile, Amaya & Cabrera (2012) for El Salvador, Soloaga & Yunez (2013) for Mexico, and Rodríguez et al. (2013) for Nicaragua.

Although the above is not a definitive list of territorial circumstances, they represent a first effort to open the “black box” of what the territory is and to shed some light on which the most binding characteristics are when defining access to basic goods and services.

Table 1. Data Sources

Country	Sub-national level	Survey	Year
Brazil	Functional territories	Population and Housing Census Sample	2010
		Election results - Supreme Electoral Tribunal	2008
Chile	Functional territories	Population and Housing Census	1992, 2002
		Election results - Electoral service	1992, 2000
Ecuador	Municipalities	Population and Housing Census	2010
		Election results - National Electoral Council	2009
El Salvador	Functional territories	Population and Housing Census	1992, 2007
Mexico	Degree of rurality within each state	Population and Housing Census	2000
		Population and Housing Census Sample	2010
Nicaragua	Functional territories	Population and Housing Census	1995, 2005
		Election results - Supreme Electoral Council	2008
Peru	Provinces	Population and Housing Census	1993, 2007
		Election results - National Jury of Elections	2006

5. Main Findings

5.1 Human Opportunities: levels and changes over time

This section presents the results to the first research question: How are opportunities distributed across territories and how have they changed over time? In doing so, the HOI was estimated for each functional territory, province, or municipality.

Table 2 summarizes the main results of the territorial HOI. It presents the simple average of the HOI estimations, the standard deviation, and its maximum and minimum values in each country. Furthermore, an inequality index is presented which compares the HOI values of the top 10% of the territories against the bottom 10%.

Table 2. Human Opportunity Index. Estimates for the whole set of countries. Main statistics

	Year 1					Year 2				
	Mean	Std. deviation	Max	Min	P90/P10	Mean	Std. deviation	Max	Min	P90/P10
Brasil (2010) *										
Water						75.8	21.1	99.9	0.0	2.2
Sewerage						33.5	28.7	99.9	0.0	45.4
Electricity						94.5	9.8	100.0	17.9	1.2
Not Overcrowded						68.3	13.2	95.8	4.9	1.6
School Attendance						93.7	4.3	99.8	33.0	1.1
School on time						75.2	6.9	92.0	47.7	1.3
Average HOI						73.4	10.0	93.7	27.4	1.4
Chile (1992, 2002)										
Water	43.3	22.4	95.2	7.4	4.8	71.3	18.4	99.7	20.2	2.1
Sewerage	33.4	24.4	95.2	3.8	9.6	69.9	18.7	99.7	18.8	2.1
Electricity	62.7	26.6	100.0	8.2	4.0	90.3	10.0	100.0	48.5	1.3
House Material	66.4	23.3	99.2	6.2	2.9	70.1	18.6	97.8	13.5	2.2
Not Overcrowded	39.1	8.6	65.6	15.7	1.6	58.6	6.1	77.5	33.4	1.2
School Attendance	96.8	1.6	99.0	91.4	1.0	99.1	0.5	100.0	97.1	1.0
School on time	63.1	10.0	81.5	38.2	1.5	78.1	4.3	87.2	67.1	1.1
Average HOI	57.5	12.9	88.5	32.4	1.8	76.9	7.7	93.7	57.5	1.3
Ecuador (2010) *										
Water						45.8	21.5	92.9	4.8	4.5
Sewerage						50.6	19.9	96.5	1.7	3.1

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Electricity						87.7	12.0	99.8	19.8	1.3
House Material						55.2	14.9	93.5	14.5	2.1
Not Overcrowded						61.0	11.9	88.5	22.2	1.6
School Attendance						90.2	3.2	97.6	77.1	1.1
School on time						70.6	6.3	85.0	51.0	1.3
Average HOI						65.8	10.3	90.2	31.7	1.5

El Salvador (1992, 2007)

Water	14.5	14.1	78.5	0.2	14.3	67.1	18.5	98.0	4.0	2.2
Sewerage	8.5	11.4	66.8	0.1	18.6	13.8	14.5	81.5	0.3	13.5
Electricity	38.7	22.5	94.7	0.3	6.4	75.6	16.2	97.7	20.6	1.8
House Material	28.8	15.4	81.7	3.8	4.6	53.5	16.6	90.6	9.8	2.5
Not Overcrowded	5.0	4.4	29.0	0.6	5.7	16.3	7.7	48.4	1.4	3.2
School Attendance	68.5	8.6	90.6	41.1	1.4	85.2	4.3	94.1	68.9	1.1
School on time	58.7	6.8	78.0	44.8	1.4	72.4	5.1	83.8	58.0	1.2
Average HOI	32.0	10.0	73.5	15.6	2.1	54.7	8.6	83.7	32.5	1.5

Mexico (2000, 2010)

Water	81.1	14.6	98.7	33.7	1.6	85.1	13.7	99.3	11.4	1.5
Sewerage	65.2	26.5	98.8	7.7	3.7	83.4	17.4	99.4	26.8	1.6
Electricity	93.4	7.7	99.8	53.1	1.2	96.2	6.3	100.0	49.8	1.1
House Material	54.7	17.1	81.7	11.3	2.5	67.6	15.0	90.1	23.2	1.9
Not Overcrowded	62.4	13.7	83.5	23.9	1.8	71.9	12.6	90.8	32.2	1.7
School Attendance	87.3	4.0	94.2	73.7	1.1	91.9	2.6	96.0	82.8	1.1
School on time	68.9	6.0	79.2	50.5	1.3	72.8	5.5	80.3	53.5	1.2
Average HOI	73.3	11.4	89.6	41.2	1.5	81.3	9.0	92.4	50.6	1.3

Nicaragua (1995, 2005)

Water	18.7	15.3	69.6	1.8	8.2	28.6	17.9	76.0	1.6	6.9
Sewerage	3.2	4.5	20.9	0.2	24.5	5.0	6.8	28.5	0.2	46.7
Electricity	25.3	19.6	77.0	0.8	11.0	36.4	25.0	89.1	1.5	10.7
House Material	8.1	8.4	34.8	0.1	13.1	14.7	12.0	46.9	1.6	9.3
Not Overcrowded	6.2	3.0	15.6	2.5	3.4	12.7	6.0	29.0	4.5	4.1
School Attendance	54.4	17.0	79.4	23.2	2.6	68.4	12.7	84.7	42.0	1.7
School on time	11.7	7.9	27.9	1.5	11.4	24.6	12.1	46.0	7.7	5.2
Average HOI	18.2	9.5	45.7	6.3	3.9	27.2	11.8	55.9	10.7	3.3

Peru (1993, 2007)

Water	14.9	17.9	73.4	0.0	69.0	35.8	21.1	89.1	0.1	7.8
Sewerage	31.9	22.4	84.3	0.5	18.3	58.8	19.0	93.2	11.5	2.6
Electricity	22.4	23.0	82.1	0.3	34.2	46.3	23.6	94.7	2.0	5.5
House Material	9.4	13.4	71.9	0.2	38.4	13.6	16.7	76.7	0.5	34.6
Not Overcrowded	42.2	14.3	77.8	8.3	2.7	52.1	14.3	83.5	12.3	2.1
School Attendance	75.6	7.8	90.0	47.6	1.3	87.6	5.7	95.6	62.0	1.2
School on time	54.7	9.1	79.1	37.6	1.5	64.5	9.8	84.1	44.9	1.5
Average HOI	35.9	13.0	73.8	18.8	2.4	51.3	11.9	85.8	22.1	1.9

*Data not available for the first period.

Source: Elaborated by the authors with census data.

With respect to how opportunities are distributed across functional territories and how they change over time, two main patterns are found:

- i. There are huge disparities within as well as across countries in the estimated HOI. The HOI for the advantages analyzed ranges from almost universal coverage for School attendance and Electricity in Chile and Mexico to very low HOI levels for sewerage and housing conditions in Nicaragua.

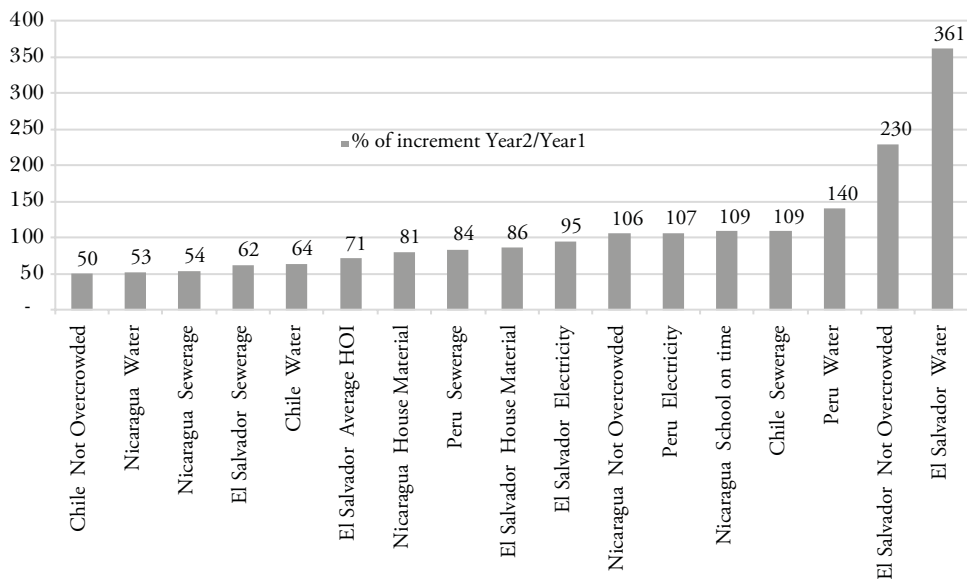
A wide territorial disparity within countries is also seen in almost every advantage when comparing HOI levels for the 10% of territories at the top of the HOI distribution against the bottom 10%. The range goes from a ratio close to 1, implying an equal distribution of Opportunities across territories (school attendance in Chile, Mexico and El Salvador, and Electricity in Mexico) to more than 10 (Electricity in Nicaragua, Sewerage in El Salvador and Nicaragua, and House Materials in Peru), implying strong differences in access to advantages that are related to the territory where the child lives.

- ii. For all advantages and countries, more recent levels of HOI showed significant improvements in comparison to previous censuses' levels. Average levels of HOI over all advantages increased by 19 percentage points in the case of Chile, 23 for El Salvador, 8 for Mexico, 9 for Nicaragua and 15 for Peru (see Table 2). Considering individual advantages, the most important increments were concentrated in the access to water and in the provision of sewerage (Nicaragua, Chile, Peru and El Salvador). Figure 1 shows those cases for which increments between the two years were higher than 50%.

Main developments in HOI for both years are synthesized by density plots of the Kernel distribution of the average HOI indexes for each country. The continuous line shows the distribution in year 1 and the dotted line shows the distribution for year 2. The complete set of density plots is presented in the appendix, where it can be clearly seen the size of HOI's improvements for many advantages, and the high levels of spatial heterogeneity.

Some selected examples of territorial distribution of opportunities are presented below. In Brazil for the advantage of access to clean water, while some functional territories show HOI values near 100% there are other whose value lies below 5%. In this country, the synthetic opportunity index, which is the simple average of all the advantages, presents also an important territorial dispersion: HOI values go from 27.4 to 93.7, with a national average of 73.4. Taking into consideration HOI estimates for the bottom 10% of the distribution of functional

Figure 1. Increments in the Human Opportunity Index superior to 50%. Year 2 against Year 1, in percentages.

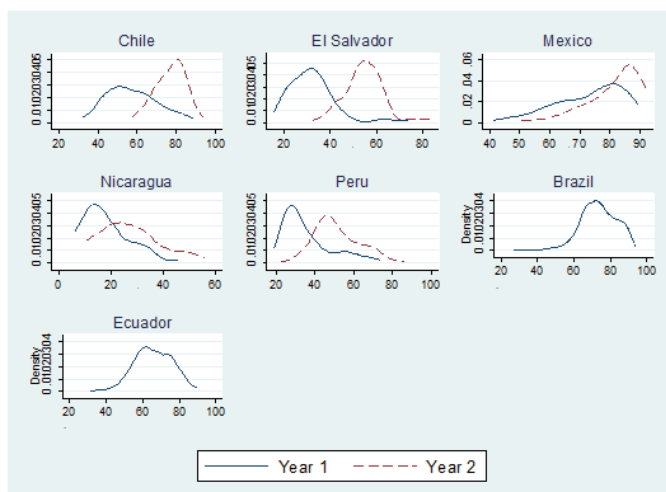


Source: Elaborated by the authors with census data.

territories and comparing them with that of the rest of the country, some stylized facts can be mentioned: lagging territories tend to be small in terms of their population; all of them account for less than 4% of the total population of Brazil. None of the lagging territories can be described as metropolitan or urban; as a matter of fact, of the 382 lagging territories, 264 are deeply rural, 115 rural and only 3 smalls urban.

To give another example of the territorial heterogeneity, in Chile for the 2002 sample, all the advantages related to public services (clean water, sewerage and electricity) showed at least one functional territory with almost universal coverage (HOI value above 99%). At the same time other territories showed much lower values of HOI: 20% for access to Clean Water, 19% for Sewerage and 49% for Electricity. The synthetic index also shows an important territorial dispersion, with 2002 HOI values ranging from 57.5 to 93.7 and a simple national average of 76.9. Like the case of Brazil, lagging territories in Chile (bottom 10%) tend

Figure 2. Density plots for average HOI.



Note: The horizontal axis shows the level of HOI (from 0 to 100) whereas the vertical axis shows the density for each HOI value.

Source: Elaborated by the authors with census data.

to be small in terms of their population and isolated: all of them account for less than 1% of the total population, none of them are metropolitan or urban; of the 10 territories 8 can be categorized as deeply rural and 2 as rural.

The advantage of access to electricity in Ecuador and El Salvador is another good example of territorial heterogeneity. In Ecuador, 84% of the municipalities show high HOI levels, ranging from 80% up to universal coverage but 2% of municipalities lag behind with values lower than 50%. In the synthetic index the HOI values range from 31.7 to 90.2 with a simple national average of 65.8. The bottom lagging 10% territories are characterized by their small population, as all of them account for less than 4% of the total population of Ecuador. They are mostly rural, with an average urbanization rate of only 18%.

In El Salvador, between 1992 and 2007 there has been an important advance in access to electricity. While in 1992 the HOI average was 39%, this grew to 76% in 2007. However, in 2007, while some functional territories present HOI values above 97%, there is still a group of territories with values below 25%. The synthetic

index also shows this territorial heterogeneity, with 2007 HOI values ranging from 32.5 to 83.7 and a simple national average of 54.7. The lagging territories (bottom 10% of the synthetic index) tend to be small in terms of their population as they account for less than 4% of the total population. They also tend to be isolated; in all the cases the lagged functional territory is formed by only one mostly rural municipality.

In the case of Mexico, the advantage of access to clean water presents another good example of territorial disparities. The advantage shows some movement in the upper part of the distribution; most sub-state level territories improve their HOI values, with some attaining universal coverage. Nevertheless, there also are some territories whose HOI values fell during this period. The synthetic index again presents an important territorial dispersion. In this case, HOI values vary from 50.6 to 92.4, whereas the national average was 81.3. The lagging territories in Mexico (bottom 10% of the synthetic index) were mostly rural.

In Nicaragua, the advantage of School on Time provides another good example. In this case the advantage shows an improvement from 1995 to 2005, but Nicaragua's HOI values still lie below the ones of the rest of the Latin American countries studied in this paper. In 2005 the highest HOI level achieved by a functional territory is 46% while the lowest is 8%, that is, 6 times less. The synthetic index also shows territorial heterogeneity, with HOI values ranging from 10.7 to 55.9 and a simple national average of 27.2. The lagging territories (bottom 10% of the synthetic index) also tend to be small in terms of their population, accounting for 6% of the total population. No metropolitan or urban territories appear to be lagged; in fact, in all cases the lagged functional territory is categorized as rural.

Finally, in Peru, both advantages related to human capital formation show positive shifts away from the lower part of the opportunity distribution. However, by 2007 territories with near universal access coexist with territories with HOI values around 60% (School Attendance) and 45% (School on time). The synthetic index shows how, even in a context of generalized growth, some territories lag behind with apparent stagnation. For the 2007 measure, HOI values range from 22.1 to 85.8 with a simple national average of 51.3. In this case the lagging territories (bottom 10%) tend to be small in terms of their population accounting for 4% of the total population of Peru. They are also more rural, with an urbanization rate of 28% compared with the 54.6% of the rest of the country.

The figures of this section showed within as well as across country differences in the access to advantages and documented the important advances in average

coverage in most of them when comparing the most recent census with figures from the previous one. Importantly, this section also documented the unevenness of the spatial development in Latin America, where some territories are being left behind. Lagging territories are characterized by being small in terms of their population and by being mostly rural. In the next section we explore this issue further by means of quantifying the relative importance of individual and household's related circumstances to those coming from the territory.

5.2 Quantifying the importance of the territories

The previous section showed how the spatial distribution of HOI of children and youth has changed over time. To answer questions 2 and 3 posited at the introduction (finding the relative importance of the territory vis-à-vis personal circumstances and identifying factors behind territorial's impacts) we proceed by doing the following. First, we estimate the HOI for each country, using as before individual and household characteristics, and adding variables to capture key territorial features, that is: human capital, institutional, economic and geographic characteristics, that vary across territories. Second, we assess the importance of each set of variables (those related to the individual and households on one hand and to the territories on the other) by using the Shapley decomposition. This section focuses then on the relative importance of each of these two sets of variables.

Table 3 presents the HOI estimation and the relative participation of the territorial component in the dissimilarity index for the two years of analysis for countries with information for both years. Although the country-level estimates for HOI are different from the un-weighted averages of territorial-levels presented as summary measurements in the previous section, they show the same upward trend in all the advantages and for all countries, which is an implied consequence of higher coverage of the advantages in Year 2.

Table 3. HOI for Year 1 and Year 2. Coverage, Dissimilarity and Shapley decomposition

	Year 1					Year 2				
	Human Opportunity Index (HOI)	Coverage (C)	Dissimilarity (D)	Shapley Decomposition, % due to each group of variables		Human Opportunity Index (HOI)	Coverage (C)	Dissimilarity (D)	Shapley Decomposition, % due to each group of variables	
				Personal and Household circumstances	Territorial Circumstances				Personal and Household circumstances	Territorial Circumstances
Chile (1992, 2002)										
Water	64.3	73.0	11.9	55.7	44.3	87.0	91.3	4.8	50.5	49.5
Sewerage	57.1	67.5	15.4	51.0	49.0	86.0	90.6	5.1	51.8	48.2
Electricity	84.4	90.0	6.2	41.7	58.3	96.5	97.6	1.2	51.6	48.4
House Material	68.1	72.7	6.3	53.2	46.8	74.0	78.1	5.2	49.1	50.9
Not-crowded	42.1	48.8	13.6	94.6	5.4	60.2	65.6	8.2	97.3	2.7
School Attendance	97.9	98.3	0.4	68.2	31.8	99.4	99.5	0.1	84.9	15.1
School on time	71.7	76.2	5.9	74.4	25.6	80.2	82.4	2.7	94.7	5.3
El Salvador (1992, 2007)										
Water	24.2	36.9	34.4	46.5	53.5	73.6	79.4	7.3	43.9	56.1
Sewerage	17.8	30.3	41.3	46.2	53.8	28.8	40.8	29.4	31.3	68.7

A Territorial Approach to Assess Children´s Opportunities in Latin American Countries

Electricity	50.0	62.0	19.3	49.2	50.8	82.4	86.8	5.1	50.0	50.0
House Material	39.2	50.7	22.6	52.5	47.5	63.4	70.2	9.7	47.1	52.9
Not-crowded	8.9	15.1	41.3	60.1	39.9	23.2	30.5	24.1	55.5	44.6
School Attendance	72.4	77.1	6.0	62.0	38.0	87.1	88.8	1.9	64.1	35.9
School on time	63.1	68.0	7.2	69.9	30.1	76.3	79.1	3.6	69.0	31.0
Mexico (2000, 2010)										
Water	74.6	81.3	8.3	27.3	72.7	81.9	86.8	5.6	23.4	76.6
Sewerage	54.9	68.3	19.5	26.8	73.2	79.3	86.2	8.0	27.3	72.7
Electricity	90.9	94.0	3.3	29.9	70.1	96.6	97.8	1.2	30.0	70.0
House Material	69.3	77.5	10.6	48.6	51.4	66.8	73.9	9.5	52.1	47.9
Not-crowded	59.6	67.5	11.7	43.5	56.5	72.1	78.0	7.5	47.3	52.7
School Attendance	86.7	89.3	2.9	58.0	42.0	91.7	93.4	1.8	74.7	25.3
School on time	67.8	71.6	5.4	50.4	49.6	72.3	75.3	3.9	54.2	45.8
Nicaragua (1995, 2005)										
Water	32.2	49.3	34.7	63.1	36.9	38.7	54.5	29.0	57.8	42.2
Sewerage	7.4	15.3	51.8	67.3	32.7	9.3	19.5	52.3	64.9	35.1

Electricity	38.7	55.3	30.1	59.3	40.7	45.7	62.1	26.4	48.0	52.0
House Material									100.0	
Not-crowded	7.4	11.1	33.0	86.5	13.5	14.3	19.8	27.7	80.1	19.9
School Attendance	60.9	69.8	12.8	53.9	46.1	71.2	77.2	7.9	53.7	46.3
School on time	16.4	24.2	32.4	70.0	30.0	29.5	38.7	23.9	65.7	34.3

Peru (1993, 2007)

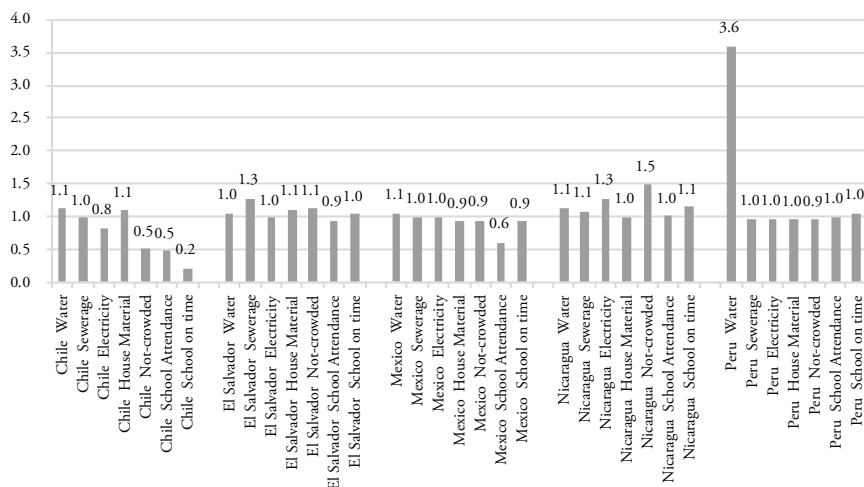
Water	25.2	40.3	37.5	80.0	20.0	44.4	54.3	18.2	28.1	71.9
Sewerage	44.0	56.5	22.2	27.4	72.6	68.6	74.1	7.4	29.6	70.4
Electricity	33.1	49.6	33.2	23.4	76.6	56.2	69.1	18.7	26.3	73.7
House Material	14.6	25.5	42.7	25.5	74.5	26.6	40.7	34.6	28.4	71.6
Not-crowded	47.7	54.9	13.2	56.0	44.0	56.4	62.5	9.8	58.2	41.8
School Attendance	78.2	81.9	4.5	44.2	55.8	89.3	91.3	2.2	44.5	55.5
School on time	59.5	65.4	9.0	50.3	49.7	69.1	73.9	6.6	47.8	52.2

Source: Elaborated by the authors.

For most of the cases, the influence of territorial variables is higher for basic services (water, sewerage, and electricity) than for schooling and housing quality. A plausible explanation is that, while the provision of basic services mostly depends on the supply side (i.e., public investment), housing quality mostly depends on the demand side (i.e., household’s income). Following this line of reasoning, basic schooling should be somewhat in between, affected by both supply and demand.

In general, there is a strong inertia in the importance of territorial variables for explaining overall inequality of advantages. This is illustrated in figure 3, which shows the ratio of the share of Territorial Circumstances for Year 2, divided by that of Year 1. For 27 out of the 35 country-advantage combinations considered, the importance of territorial variables remained similar across these two years (the ratio of the values for both years is within 1 plus/minus 20%). Notably for the case of Chile, the relative importance of territorial variables for not-crowded housing and schooling variables registered a sharp drop, whereas for some advantages in El Salvador (sewerage), Nicaragua (electricity, not-crowded housing) and Peru (access to clean water) the opposite was the case.

Figure 3. Relative importance of territorial variables on equity across country-time. Ratio of % due to territorial variables, Year 2/ Year1



Source: Table 3. Column 11 divided by column 6.

Chile shows overall low levels of dissimilarity, since coverage is high in most of its advantages. The territory appears as a binding restriction for universal access in the advantages of Sewerage, Electricity, Clean Water and House Materials: circumstances related to the territory explain together around 50% of the total inequality by Year 2 (2002). On the other hand, territorial circumstances play a minor role when explaining the inequality in the advantages of Not-crowded housing, School Attendance and School on time.

El Salvador⁶ shows medium to high levels of dissimilarity, apart from the two advantages related to human capital formation in which the dissimilarity values tend to be low. As seen for the case of Chile, the territorial component appears to be the most binding restriction for universal access in the advantages Sewerage, Electricity, Clean Water and House Materials; in all four explaining more than 50% of the inequality. The territorial component still explains a significant part of the inequality of access to the other advantages as well, with values ranging from 31% to 49%.

Mexico shows relatively low levels of dissimilarity. The decomposition of factors shows that for public services (water, sewerage and electricity) the territorial component is by far the most binding restriction, with values over 70% in 2010. For all the other cases, save for school attendance in 2010, territorial variables are less important, but still explaining more than 42% of the overall levels of dissimilarity.

Nicaragua shows the highest levels of inequality measured by the dissimilarity index. In this case, the territorial component shows increasing levels of participation in the decomposition and is the most binding component in the advantage of Electricity, while for Clean Water, Sewerage and School Attendance, its weight surpasses 40%. The lowest participation of the territorial component is found in the opportunity of living in a Not-crowded home, where it weighs 20% although with an increasing participation over time.

For Peru⁷, the dissimilarity estimation shows reductions in the unequal distribution in all the advantages. In general, Peru shows medium to low levels of dis-

⁶ El Salvador's HOI national estimation and Shapley decomposition used the following territorial variables: Illiteracy rate, regional capital dummy, direct access to the ocean dummy, population density and Rurality level.

⁷ The circumstances considered where: Illiteracy rate, Migratory capital, Ethnic fractionalization, Employment concentration, Principal activity, Voting turnout, Population density and Rurality level.

similarity, being the exception of high dissimilarity the case of Quality of House Materials (35). When analyzing the Shapley decomposition, the territorial participation remains almost the same across time, the exception being the advantage of Access to Clean Water where the territorial component shows an important increase on its participation. In general, the territory appears to be a binding component. In most cases it explains more than 50% of the estimated dissimilarity.

5.1 Identifying the factors behind territorial variables.

In this section we provide estimates to answer the third question of the paper: what the key factors behind the importance of the territory in are explaining inequity in access to the advantages considered above. We were able to add two additional countries (Brazil and Ecuador), since just a cross section of countries is required, but we omit Chile since the last available census year (2002) is a bit too long ago.

As indicated in the data section, after controlling for personal and household characteristics, territorial variables are grouped and identified as belonging to the following sets of variables: i) human capital, ii) institutional, iii) economics and iv) geographic. Importantly, as can be seen from tables 4 to 6, in all cases except for Not-crowded Housing in Brazil and School Attendance in Mexico, the territorial component represents a higher barrier to access than the personal characteristics of the child (sex and ethnicity).

To facilitate the exposition, the analysis is done by grouping the advantages in three categories: 1) Basic Services; 2) Housing and 3) Human Capital Formation. Since a comparison between territorial and non-territorial effects was already done in the previous section, we stress here results coming from the relative importance of key variables within the territorial factors.

5.3.1 Basic Services

In this category we analyze the Shapley decomposition of the dissimilarity index for the advantages of Access to Clean Water, Sewerage and Electricity, which, as indicated above, are most probably driven by public investments. Results for this category show no apparent correlation between the level of development of a country and its dissimilarity index (see Table 4). For example, for the case of Access to Clean Water and Electricity, both Brazil (a medium high-income country) and El Salvador (a low-income country) show low levels of inequality, compared to the rest of the countries in the sample. Similarly, Access to Sewerage in Mexico (a medium high-income country) presents low levels of inequality,

while Brazil, a country with similar levels of development, presents high levels of inequality in this respect. However, it is worth mentioning that Nicaragua (the less developed country of the analysis) always presents the highest levels of inequality.

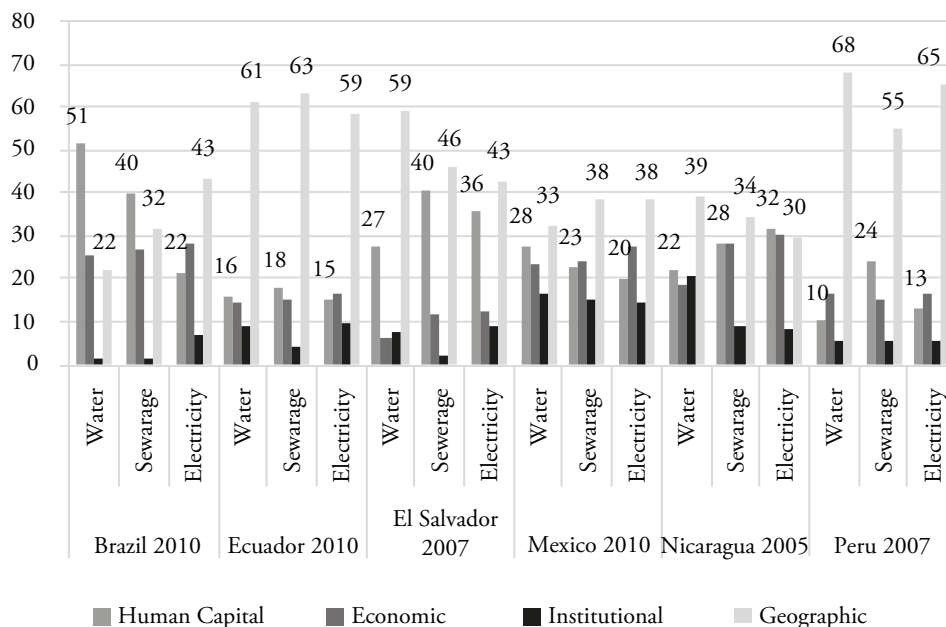
When analyzing the participation of each group of circumstances in the dissimilarity index some stylized facts can be mentioned. Almost for all cases, geographic variables (population density and rural/urban condition) are by far the most important determinants of inequities within the set of territorial variables. This is illustrated in Figure 4: the geographic component is larger than 40% in 10 out of the 18 cases analyzed.

Table 4. Shapley Decomposition Basic Services, International Comparison

Variable	Country	Human Opportunity Index (HOI)	Coverage (C)	Dissimilarity (D)	Shapley decomposition					
					Personal circumstances	Household circumstances	Human Capital	Circumstances linked to territories		
							Economic	Institutional	Geographic	
Access to Clean Water	Brazil 2010	81.7	86.9	6	3.9	32.7	32	16	1	14
	Ecuador 2010	56.1	66.8	16	0.8	31.6	11	10	6	41
	El Salvador 2007	73.7	79.4	7.2	0	44.6	15	3	4	33
	Mexico 2010	85.1	87	2.5	11.6	11.7	21	18	13	25
	Nicaragua 2005	38.7	54.5	28.9	2.3	55.5	9	8	9	17
	Peru 2007	44.3	54.3	18.3	1.9	25.4	7	12	4	49
	Brazil 2010	42.9	53.2	19.3	6.6	18.7	30	20	1	24
Sewerage	Ecuador 2010	62.3	72.6	14.3	4.7	34	11	9	3	39
	El Salvador 2007	28.9	40.8	29.3	0	30.8	28	8	2	32
	Mexico 2010	83.4	86	3.7	12	15.3	17	18	11	28
	Nicaragua 2005	9.3	19.5	52.3	0.7	64.2	10	10	3	12
	Peru 2007	68.6	74.1	7.5	3.4	26	17	11	4	39
	Brazil 2010	95.8	97.3	1.5	7.7	39.5	11	15	4	23
	Ecuador 2010	91.4	93.8	2.6	12.1	34.5	8	9	5	31
Electricity	El Salvador 2007	82.3	86.8	5.2	0	47.3	19	7	5	23
	Mexico 2010	96.2	97	1	13.3	16.8	14	19	10	27
	Nicaragua 2005	45.7	62.1	26.4	0.7	47.3	17	16	4	16
	Peru 2007	56.2	69.1	18.7	1.5	24.2	10	12	4	49

Source: Elaborated by the authors.

Figure 4. Basic services: relative importance of components of the territorial variable.
As a % of total impact due to territorial variables



Source: Elaborated by the authors, based on Table 4.

Note: to facilitate reading, data labels correspond only to Human Capital and Geographic group of variables.

5.3.2 Housing

This category groups the advantages of Quality of House Materials and Not-crowded housing. No apparent correlation between the level of development of a country and its dissimilarity index is found for the advantage of Acceptable House Materials. In contrast, for the advantage of Not-crowded housing the two less developed countries of the sample share the highest levels of inequality.

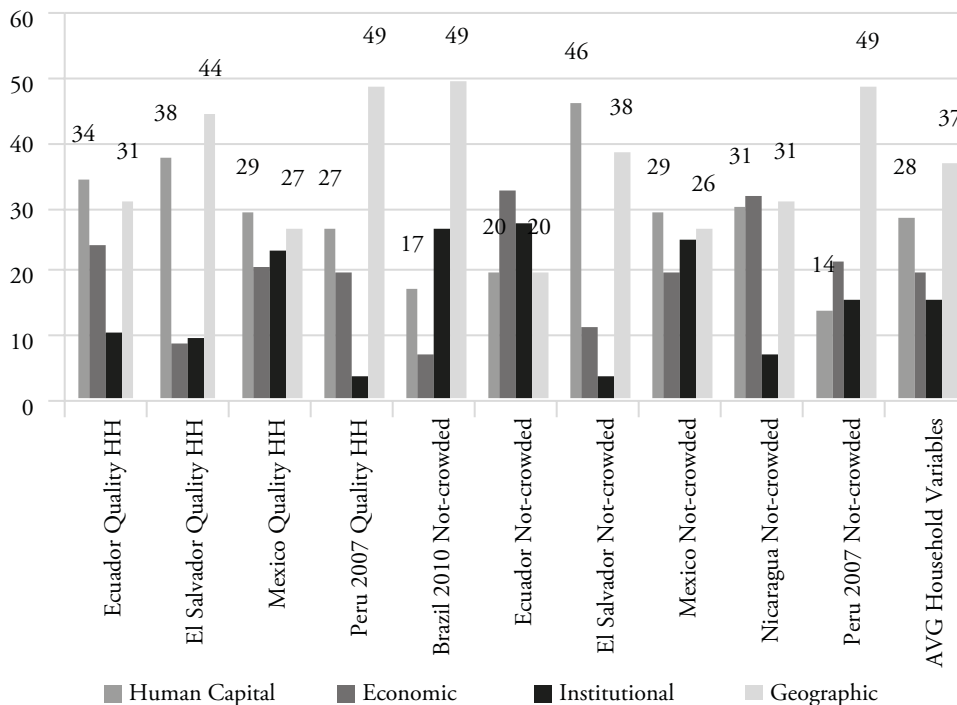
Within the territorial circumstances Geography and the territorial Human Capital appear to be the most important characteristics explaining the inequality. In fact, Geography appears to be the most important characteristic when explaining the inequality in Brazil and Peru, while in Mexico the territorial Human Capital is the most important one. In the rest of the countries a mix is found: Human Capital and Geography in El Salvador; or Human Capital and Economic characteristics in Ecuador. Figure 5 shows the relative importance of each one.

Table 5. Shapley Decomposition Housing, International Comparison

Variable	Country	Human Opportunity Index (HOI)	Coverage (C)	Dissimilarity (D)	Shapley decomposition					
					Personal circumstances	Household circumstances	Human Capital	Economic	Institutional	Geographic
Quality of walls, roof and floor	Ecuador 2010	61.3	68.4	10.4	3.8	56.3	13.7	9.6	4.2	12.5
	El Salvador 2007	63.2	70.2	10	0	44.8	20.7	4.8	5.2	24.5
	Mexico 2010	67.6	72.6	7.6	27.6	19.7	15.3	10.8	12.3	14.2
	Peru 2007	26.6	40.7	34.6	3.4	24.7	19.5	14.2	3	35.2
	Brazil 2010	65.3	71.1	8.2	17.7	64.9	3	1.2	4.6	8.6
Absence of over-crowding	Ecuador 2010	64.7	70.3	8	12.2	71.6	3.2	5.3	4.5	3.2
	El Salvador 2007	23.2	30.5	24.2	0	54.5	21.1	5.2	1.7	17.5
	Mexico 2010	71.9	76.5	6.4	30.1	22	13.9	9.5	11.9	12.6
	Nicaragua 2005	14.3	19.8	27.7	0.5	79.6	6.1	6.3	1.4	6.2
	Peru 2007	56.3	62.5	9.9	2.9	53	6.1	9.5	7	21.5

Note: data on Quality of housing materials were not available for Brazil and Nicaragua.
Source: Elaborated by the authors.

Figure 5. Housing: Relative importance of components of the territorial variable.
As a % of total impact due to territorial variables



Source: Elaborated by the authors, based on Table 5.

Note: Data labels correspond to Human Capital and Geographic groups of variables.

5.3 Human Capital Formation

The last category includes the advantages of School Attendance and School on Time. All the countries, except Nicaragua, show relatively low levels of inequality, measured by their dissimilarity index, because of high levels of coverage of both variables. As expected, the inequality in the advantage of School on Time is a bit higher.

Within the territorial set of circumstances, again Geography and Human Capital appear to be the most important. The first one explains up to 33% of the inequality in School Attendance in Peru and the second up to 17% of the School Attendance in Nicaragua and El Salvador. The group of Economic characteristics accounts on average for 7% of the inequality while Institutional proxies play a minor role in all but Mexico's School on Time, where they account for 10% of the estimated inequality. Figure 6 shows these results.

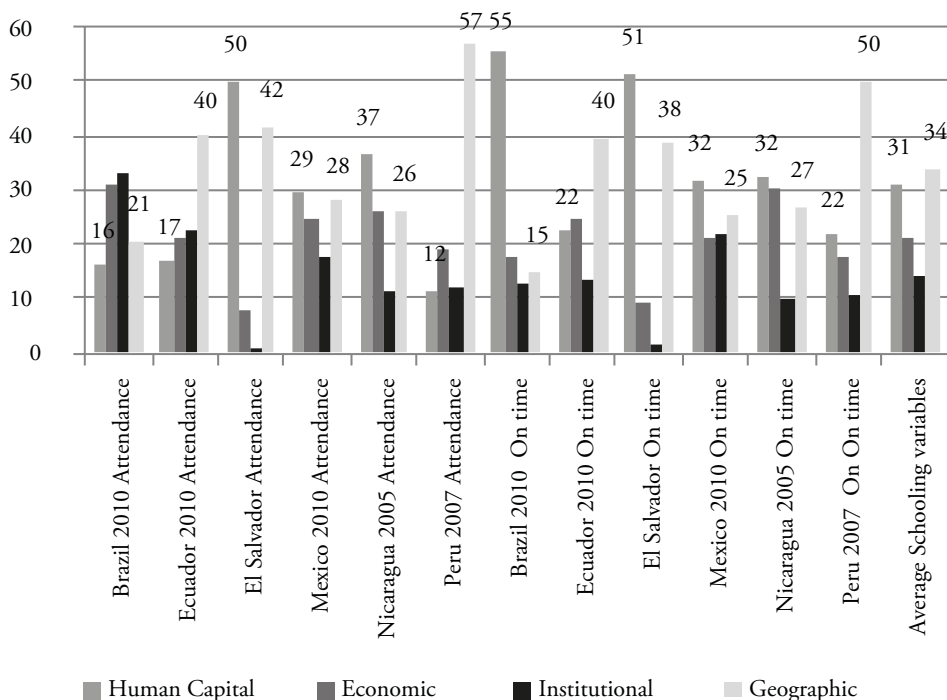
Table 6. Shapley Decomposition Human Capital, International Comparison

Variable	Country	Human Opportunity Index (HOI)	Coverage (C)	Dissimilarity (D)	Shapley decomposition					
					Personal circumstances	Household circumstances	Human Capital	Economic	Institutional	Geographic
School attendance	Brazil 2010	94.3	95.3	1	3.1	81.4	2.5	4.8	5.1	3.2
	Ecuador 2010	91.6	93.2	1.7	1.8	77.7	3.4	4.3	4.6	8.2
	El Salvador 2007	87.1	88.8	1.9	0.1	65.8	17	2.7	0.2	14.2
	Mexico 2010	91.9	93.5	1.7	33.8	40.9	7.4	6.3	4.5	7.1
	Nicaragua 2005	71.2	77.2	7.9	1.7	52	17	12	5.2	12.1
	Peru 2007	89.3	91.3	2.2	1.1	41.9	6.6	11	6.9	32.6
	Brazil 2010	77.1	79.4	2.9	20.3	55.4	13.4	4.2	3.1	3.6
Proper schooling for age	Ecuador 2010	74	77.5	4.6	7.7	60.3	7.2	7.9	4.3	12.7
	El Salvador 2007	76.3	79.1	3.6	3.1	66.1	15.8	2.8	0.4	11.8
	Mexico 2010	72.8	75.1	3.1	39.3	14.9	14.5	9.6	10.1	11.6
	Nicaragua 2005	29.5	38.7	23.9	4.1	61.6	11.1	10.5	3.5	9.3
	Peru 2007	69	73.9	6.6	2.2	44.4	11.5	9.4	5.7	26.8

Source: Elaborated by the authors , based on Table 6.

Note: Data labels correspond to Human Capital and Geographic group of variables.

Figure 6. Schooling: Relative importance of components of the territorial variable. As a % of total impact due to territorial variables



Source: Elaborated by the authors , based on Table 6.
 Note: Data labels correspond to Human Capital and Geographic group of variables.

6. Discussion

This paper documented the overall improvement in living conditions and equality of opportunity in several LAC countries. However, huge disparities within as well as across countries remain. The HOI for the analyzed advantages ranges from almost universal coverage for School attendance and Electricity in Chile and Mexico to very low HOI levels for sewerage and housing conditions in Nicaragua. For all advantages and countries, more recent levels of HOI showed significant improvements in comparison to previous censuses’ levels.

This paper opens the territorial “black box”, which is done by assessing the importance of territorial characteristics *vis á vis* personal and households’

circumstances in determining the inequality of distribution of each advantage. In almost every case, in explaining access to advantages, territorial circumstances appeared to be more important than the individuals' ones (sex and ethnic origin of the child).

Territorial variables were the most important determinant for supply-driven advantages (i.e. public services), whereas their importance is slightly lower for advantages that are more closely linked to the demand-side (quality of housing material) or to both sides (schooling). Among territorial characteristics, in almost all cases the most influential ones were density and rural/urban condition (Geography group), followed by the illiteracy rate and the migratory capital of territories (Human Capital group). Institutional proxies (ethnic fragmentation, political participation) and Economic variables (employment concentration, main activities) appeared to have a lower impact. The importance of geographical variables can be explained by the relative remoteness and lower connectivity of non-metropolitan territories, which raise the marginal cost of providing a service. Moreover, these territories are typically characterized by lower income levels, which impacts access to opportunities also from the demand side.

All things considered, the paper points to the still long road ahead to provide equality of opportunity for the youth within each country. In this scenario, the territory imposes important access restrictions for all the advantages studied, in some cases representing more than 50% of the total inequality. As a general result, the importance of the territory calls for place-based policies as a tool for achieving equity in access.

The data shows that policies aimed to universal coverage of the opportunities related to public services should have a territorial approach. Although our definition of these opportunities allowed for self-provisioning of the service (e.g. connection to septic tank or self-generating electricity), the territory always appeared as the most binding circumstance. One way to overcome this restriction could be through improving connectivity among territories, which has been found elsewhere to have an equalizing effect under certain circumstances (Partridge et.al, 2008 and 2010, Berdegué & Soloaga, 2018).

For the case of housing and education related opportunities, people-based policies appear to be the most effective, those related to improving the households' economic livelihoods. However, the data also show that people-based policies by themselves may not be enough because they do not address some of the binding restrictions surrounding each individual. Again, a combination of people based, and territory-based policies is what is needed.

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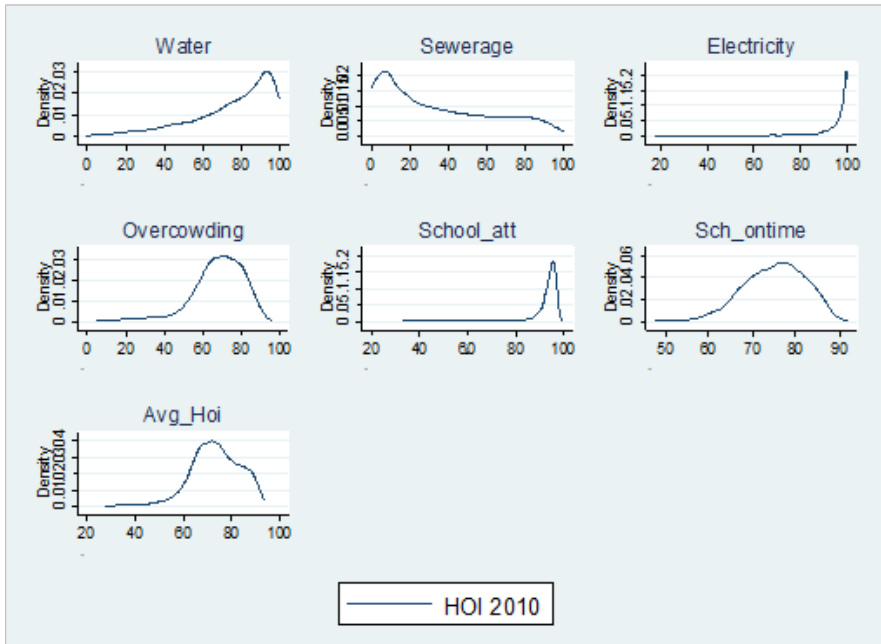
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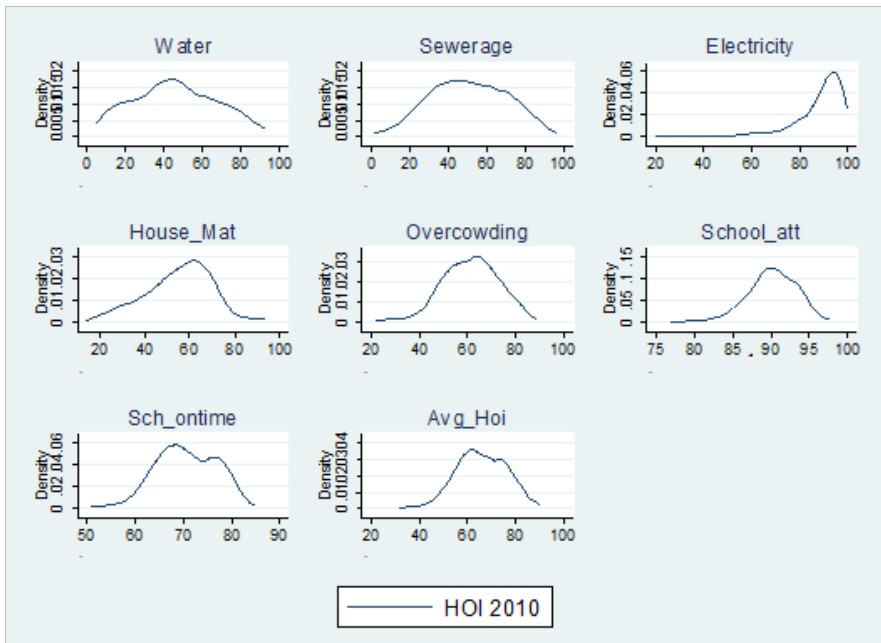
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Appendix 1 Density Plots

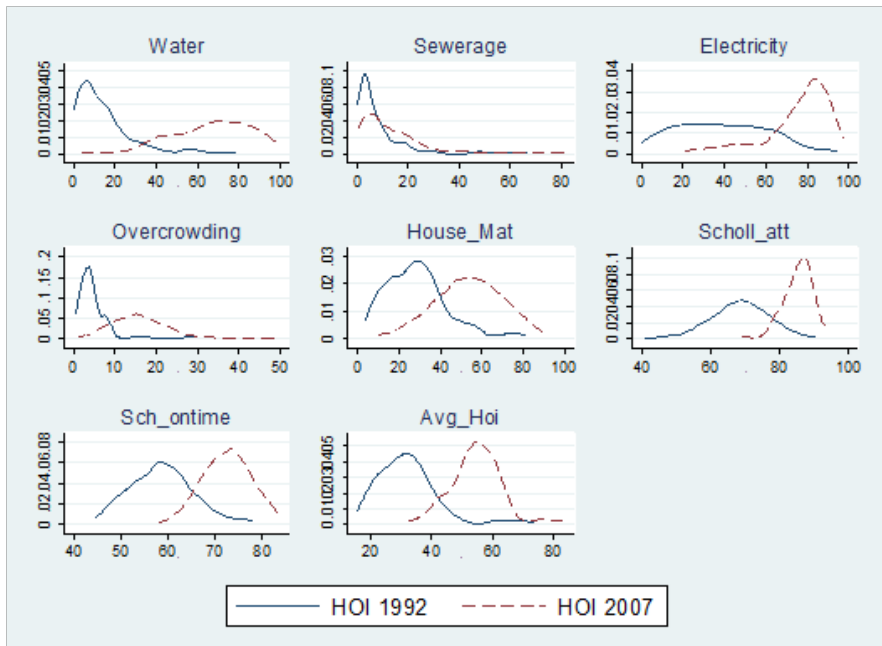
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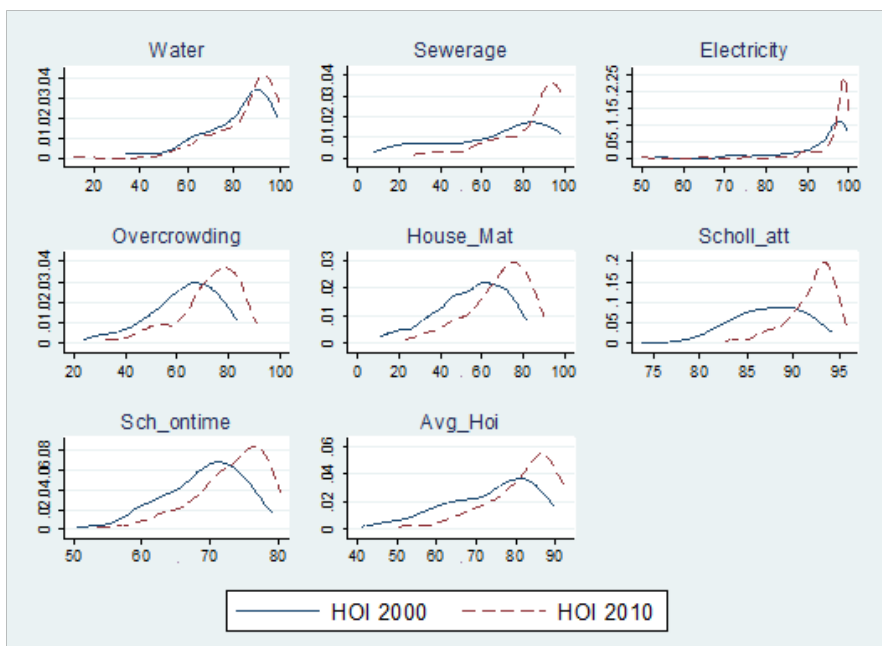
Ecuador



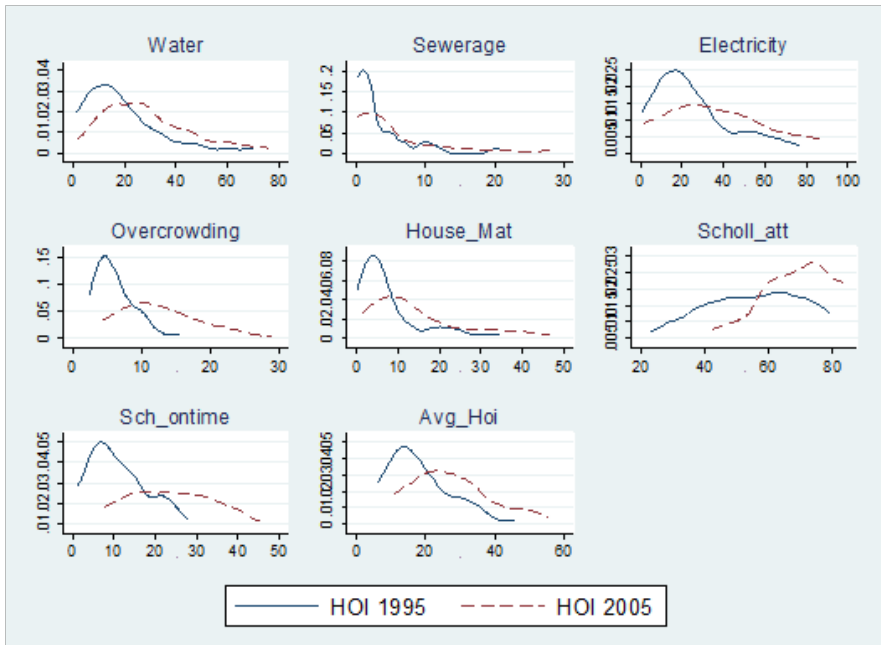
El Salvador



Mexico



Nicaragua



Perú

