

# The long memory of poverty: the Historical Unsatisfied Basic Needs and the geographic patterns of standards of living in Argentina (and Spain) in the last 100 years<sup>\*</sup>

**VERY PRELIMINARY DRAFT – Please do not quote.**

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## **Abstract**

Regional inequality in living standards is a major social problem in the very top of most of the political agendas worldwide. However, their origins and ultimate causes are far from clear. In this paper we propose a new strategy to measure living standards in the long run based on the Unsatisfied Basic Needs approach (the Historical UBN – HUBN). Using data on education and housing from census and Statistical Yearbooks from the end of the 19<sup>th</sup> and beginning of the 20<sup>th</sup> century we present a description of population's standards of living in Argentina and Spain (with some notes to Uruguay) with an unprecedented high level of spatial disaggregation.

The first finding of this paper is that the correlation among the different dimension of our HUBN and between the HUBN and other contemporaneous variables linked with standards of living (like average incomes or inequality) are usually the expected ones suggesting that the HUBN is capturing relatively well some dimension of poverty levels. The second finding of the paper is that the geographic distribution of the standards of living one hundred years ago is remarkably similar to the one dominant nowadays. This very high levels of persistence suggests that regional inequality of standards of living is extremely resilient to policy interventions and reinforces the hypotheses related with geographic determinants and/or strong levels of path dependence.

**JEL Classification Numbers:** I31, I32, R12

**Keywords:** Regional development, Standards of living, Poverty, Argentina, Spain.

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## 1. Introduction

The choice of the right variable to analyze human well being is related with at least three dimensions: normative, empirical and spatial. From a normative point of view it is important to make an appropriate distinction between measures related with income, consumption or outcomes. A very standard approach is the one related with the so called income poverty based on the comparison between a household income or consumption and the poverty line defined as the cost of a basket of goods deemed necessary to satisfy some physical or social requirements (Ravallion 1992, Ravallion, Datt and De Walle 1991).<sup>1</sup> Given that this approach is based on income and prices, it assumes implicitly or explicitly that most of the human needs are satisfied through the participation on markets and this assumption is not always appealing for some traditional societies in contemporaneous developing countries or in some historical contexts.

Other approaches tend to focus on outcome variables more directly related to some predefined dimensions of welfare like education or housing. For instance, the Unsatisfied Basic Needs approach, introduced in the 80s by CEPAL, based on census data in characterization of poverty. Relying on a direct approach, this method determines that a household is poor or not according if it does not satisfy a list of basic needs that allow the people to have a dignified life (Feres and Mancero 2001). The information of the UBN method is complementary to the income-poverty measures, because it opens the possibility to identify the structural causes of poverty (Minujin et al. 1992) but in many occasions poverty measures obtained from the UBN approach correlate quite well with the ones obtained with the absolute poverty approach (Hentschel et al. 1998). When analyzing living standards in the long run, the UBN approach can be particularly interesting because in some traditional economies with low levels of participation in commercial networks, the monetary income is probably no capturing all the dimensions of living standards.

Normative concerns in the context of international comparisons have also induced some researchers to combine average income with some outcome variables. The most famous change in that direction is the introduction of the Human Development Index (HDI) in the 1990s to have a measure more consistent with a definition of human development “a process of enlarging people’s choices” (UNDP 1990, p. 10). The HDI is a combination of average national income, life expectancy at birth and an average of two measures of education levels (literacy and enrolment). Prados de la Escosura (2013) presents a long run view of the human development with the proposal of the HIHD (Historical Index of Human Development). He says that, namely, enjoying a healthy life, acquiring knowledge and achieving a decent standard of living.

The available measures of livings standards in the long run are have different properties in relation to the spatial dimension. The most usual variable used as a proxy for average livings standards in a given economy is GDP per capita and in recent years, a growing body of

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<sup>1</sup> The analysis of absolute poverty using household consumption (Chen and Ravallion 2010) does not take into account what kind of goods are being consumed but the value of total household consumption; in this sense it is not a measure of the suitability of a specific consumption choice but rather a comparison between the value of the actual consumption choice and the value of an “adequate” basket of goods.

research has provided estimation of sub-national GDPs in several regions of the world.<sup>2</sup> Of course, given that is an average it does not take into account the income distribution<sup>3</sup> and it is virtually impossible to calculate this measure for geographic units smaller than a province or a region.

The average wage is also used for comparing living standards across space or across time. Regarding the spatial dimension, this variable is linked to the concept of labour market and it is usually unrelated with the place of residence of the wage earners. So, using wages as a proxy for living standards for very small geographic units can be misleading. Additionally, the link between wages and households' welfare depends on labour participation (both male and female), hours worked per year and household composition.<sup>4</sup>

A detailed characterization of the geographic pattern of living standards is very important; in a more applied or policy oriented framework it allows a better design and targeting of development policies (Coady, Grosh and Hoddinott 2004). From a more theoretical point of view, that characterization can improve our possibility to identify causality and ultimate determinants of the changes in welfare levels. For instance, if most of the regional variability in welfare levels is generated within very small geographic units, the explanations of that variability based on national trajectories become less plausible.<sup>5</sup>

The analysis of the evolution of the regional distribution of standards of living in the 20<sup>th</sup> century in Latin America is particularly interesting because most of the countries experienced dramatic changes in economic trajectories moving from intense integration into the world markets of goods, services and productive factors (Williamson 2002) to inward looking policies with large state intervention between the 1930s to the 1970s (Gerchunoff and Lach 1998) and again liberalization in the 1980s and 1990s (Bertola and Ocampo 2012). The 20<sup>th</sup> century in Latin America has also witnessed tremendous changes in the social role of the public sector which moved from a liberal view with some minor concerns about the social issues before the WWI to a very high level of social activism in the central decades of the century. In the 1980s a new wave of deregulation of the labour market and reduction of the social spending in line with the Washington consensus dominates most of the Latin American countries.

In this paper we propose to use a modified version of the UBN (the HUBN, Historical Unsatisfied Basic Needs) to analyse the geographic distribution of standards of living. Unlike other measures of living standards, the HUBN are based on statistical information quite usually provided by the public offices in the end of the 19<sup>th</sup> century through census or statistical yearbooks: education levels and housing characteristics.<sup>6</sup> We claim that the

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<sup>2</sup> See for instance Crafts (2005) for Britain, Rosés et al (2010) for Spain, and Aguilar Retureta (2015) for Mexico and Aráoz and Nicolini (2015) for Argentina.

<sup>3</sup> For a discussion of the difference between average household incomes and average income from national accounts for contemporary economies, see Sala-i-Martin (2002), Chen and Ravallion (2004) and Deaton (2005).

<sup>4</sup> See for instance Voth (1998), Humphries and Weisdorf (2014).

<sup>5</sup> The debate about persistence or reversal crucially depends on the geographic "size" of the unit of analysis. See for instance Acemoglu, Johnson and Robinson (2002) and Maloney and Caicedo (2016).

<sup>6</sup> Sometimes, data on health is also available, for instance the Statistical Yearbook of Spain 1912 provides information on cause-specific mortality at provincial level. A complementary analysis of the relationship of this indicator with education and housing indicators is left for further research.

correlation among the different dimensions of the HUBN and between them and other proxies for standards of living strongly suggest that attained levels of housing and education are good proxies for households living standards at the beginning of the 20<sup>th</sup> century. Additionally, we provide strong evidence that the most of the geographic pattern of living standards today has already been defined one hundred years ago.

The rest of the paper is developed as follows. In Section 2 we introduces the historical sources and the way in which the data set has been elaborated. In Section 3 we describe the methodological choices related with the HUBN. In section 4 we present our main results and in Section 5 our conclusions. The sections at the end provides the bibliographical references and some ancillary information in the form of Appendices.

## **2. Sources and data**

### **A. Argentina**

At the end of the 19th century Argentina was composed by 14 provinces (Buenos Aires, Catamarca, Córdoba, Corrientes, Entre Ríos, Jujuy, La Rioja, Mendoza, San Juan, San Luis, Salta, Santa Fe, Santiago del Estero and Tucumán), one autonomous city (Capital Federal) and 9 Territorios Nacionales (Chaco, Chubut, Formosa, La Pampa, Misiones, Neuquén, Río Negro, Santa Cruz and Tierra del Fuego). The geographic characteristics of the *Territorios Nacionales* are very much the same than the ones of the correspondent provinces.

Nowadays Argentina is divided in 23 provinces and one autonomous city (Capital Federal). Additionally, it is possible to distinguish 5 different geographical regions in its territory. Region “NOA” includes the provinces of the north west of Argentina: Jujuy, Salta, Tucumán, Santiago del Estero, Catamarca and La Rioja. Region “NEA” includes the provinces of the north east of the country: Formosa, Chaco, Misiones, Corrientes and Entre Ríos. Region “Cuyo” includes the provinces located in the mountainous area on the west center of the country: Mendoza, San Juan and San Luis. Region “Pampeana” includes the provinces and an autonomous city of the east center of Argentina: Capital Federal, Buenos Aires, Córdoba, Santa Fe and La Pampa. And region “Patagonia” includes provinces of the south of Argentina: Neuquén, Río Negro, Chubut, Santa Cruz and Tierra del Fuego.

Additionally, each province is divided in departments, which is a smaller unit and will be our observation unit. Currently, Argentina has 512<sup>7</sup> departments in all his territory. It is necessary to clarify that in the province of Buenos Aires, departments are called “partidos” and that Capital Federal is divided in different sections called “distritos”.

Given that many departments in the country changed names and some of them their geographical distribution, it is necessary to make a matching of departments across different benchmarks. In Annex A, we present a map of the political division of Argentina in 1895 and in Annex B we describe the process of matching departments across the 20th century.

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<sup>7</sup> Instituto Geográfico Nacional, República Argentina. Web page at 18-8-2016: <http://www.ign.gob.ar/>

The subnational units considered for Argentina are the provinces (the largest one below the province) and the departments (the next one). There are 24 provinces and 421 departments.

Given that the census of 1895 provides information about literacy and school attendance and about the quality of housing, we generate three types of HUBN variables: HUBN-housing, HUBN-education and HUBN-combination. These variables are constructed with data from the Segundo Censo de la República Argentina, collected on May 1895. The census contains information for 424 departments of the country, which are located in provinces or Territorios Nacionales mentioned previously.

The data on housing is obtained from the Cuadro I of the *Censo Complementario de Edificación* of the *Tomo III* and the data on school attendance is obtained from the *Cuadro XIV* of the *Tomo II* in the census. HUBN-housing is constructed from data contained in the first table of the *Censo de Edificación*. This table distinguishes 11 types of houses, which are described in a quality order: brick houses with flat roof of three or more bodies, of two bodies and of one body, brick houses with tile roof of two bodies and of one body, brick houses with tin roof of two bodies and of one body, wood houses of two bodies and of one body and one-body houses of tin and of adobe. HUBN-housing is constructed as a ratio between the one-body houses built with adobe and the total houses in each department.

In the period of the end of the 20<sup>th</sup> century and beginning of the 21<sup>st</sup> century, the main source of information is the official data of the Instituto de Estadísticas y Censos (INDEC) in Argentina. Specifically, we use data of UBN index in years which census was held in Argentina: 1980, 1991, 2001 and 2010. We have data of UBN index for census of 1980, 1991, 2001 and 2010 at provincial level and data of UBN index in 2001 at departmental level.

The UBN index in Argentina is defined in five dimensions: school attendance, quality of household, overcrowding, sanitary conditions and subsistence capacity, estimated by the education level reached by the household head and the ratio between employed adults and household size. A household is considered poor by UBN if this has at least one privation's dimension (INDEC).

In the following table, we present the Descriptive Statistics of the HUBN variables in Argentina. The first part of the table shows the variables at provincial level and the second part at departmental level.

TABLE 1: Descriptive Statistics of the HUBN variables for Argentina.

Provincial level	Descriptive statistics				
Variable	Obs.	Mean	Std. Dev.	Min	Max
HUBN_housing	24	0.6000	0.3000	0.0000	0.9500
HUBN_education	24	0.6472	0.1555	0.2028	0.8675
HUBN_combination	24	0.6237	0.2065	0.1026	0.9087

  

Departmental level	Descriptive statistics				
Variable	Obs.	Mean	Std. Dev.	Min	Max

HUBN_housing	422	0.6012	0.3370	0.0000	1.0000
HUBN_education	423	0.6383	0.2187	0.0000	1.0000
HUBN_combination	424	0.6193	0.2538	0.0000	1.0000

Source: Authors' elaboration.

In addition to the variables used to construct the HUBN index, we use estimations of GDP per capita (at provincial level) and measures of inequality (at departmental and provincial level) for the last decade of 19<sup>th</sup> century and the first half of 20<sup>th</sup> century. The data about GDP per capita is from Aráoz and Nicolini (2015, 2016) and is constructed with a methodology to decompose aggregate national GDPs into its provincial counterparts.

Inequality is proxied by the variable “PropShare” defined as the proportion of owners of some form of real estate in the total population adult in 1895. This variable is available at provincial and departmental level.

## B. Spain

Our analysis of the Spanish case is focused on the 49 provinces. Information of housing characteristics comes from the Yearbook of 1912 with information about 1900.<sup>8</sup> The table provides information at the provincial level on the number of buildings of one, two or three floors and the number of *Albergues*, defined as edification of transitory nature with flimsy structure. Calculating the share of *Albergues* and the share of buildings of one floor in the total of buildings we can get two alternatives for HUBN related with housing for Spain. However, the correlation between the two is basically zero (see next section) suggesting that one of them is probably not related with standards of living.

Information about Education comes from the Censo de 1900.<sup>9</sup> It provides information on the individuals (male and female) who know to read, to read and write and who do not know to read. The alternatives for the HUBN is the percentage of male and the percentage of female that do not know to read and write. These are called HUBN-E-M and HUBN-E-F respectively.

TABLE 2: Descriptive Statistics of the HUBN variables for Spain.

Variable	Descriptive statistics				
	Obs.	Mean	Std. Dev.	Min	Max
HUBN-albergue	49	0.1018	0.0697	0.0155	0.3037
HUBN-H	49	0.3660	0.1694	0.0666	0.8355
HUBN-E-F	49	0.7007	0.1286	0.3970	0.8514
HUBN-E-M	49	0.5374641	0.1491686	0.2894156	0.755575

Source: Authors' elaboration.

<sup>8</sup> See Anuario Estadístico de España (1912), page 60. Table: “Número y clases de edificios y albergues. Año 1900”. Downloaded from <http://www.ine.es/inebaseweb/pdfDispacher.do?td=29347&ext=.pdf>, March 13<sup>th</sup> 2017.

<sup>9</sup> Censo de 1900. Tomo II: Clasificación de la población de hecho por sexo, estado civil e instrucción elemental.

The plausible relationship between the economic situation of the families and the average level of education in a particular district is reinforced by the description of Barquín et al. (2016): “...until 1902, the Spanish municipalities pay out only a part of the cost of schooling children because they lacked resources. ...Therefore, supposedly compulsory education only became so to the extent in which the municipal boards had enough resources to establish it. Therefore, it would widen the gap between the “rich and literate” Spain and the “poor and illiterate” one.”

Real wages are from Rosés and Sanchez Alonso (2004). They present series on real average daily wage rates for the most important male occupations—unskilled workers in agriculture, urban unskilled workers, and urban industrial (semi-skilled) workers—from approximately 1850 to 1930 for 48 Spanish provinces (the Canary Islands excluded). Given that the series are not continuous we selected from each series the closest benchmark to 1900: they are 1910 for agricultural wages, 1914 for urban unskilled and 1896 for industry urban workers. The information on provincial GDP and population comes from Tirado et al. (2015)<sup>10</sup>.

Given that information for current UBN in Spain is not available, we have used data on educational attainment in 2001 as a proxy for an education UBN. We use two measures of education for 2001<sup>11</sup>: “Bachiller” which is the percentage of population who completed High School (included in the Second Grade category) and “Bachelor” which is the percentage of population with a Bachelor Degree (included in Third Grade).

### C. Uruguay

The subnational unit considered in Uruguay is the “*Departamento*” (department). In Uruguay there were 19 departments at the end of 19<sup>th</sup> century and remain the same nowadays.

The main source of current UBN index in Uruguay is the official data contained in the “Atlas Sociodemográfico y de la Desigualdad del Uruguay” of the Instituto Nacional Estadístico (INE). Currently, the UBN index in Uruguay is defined in six dimensions: housing, access to electric service, access to clean water, basic comfort artefacts, sanitary services and school attendance. Housing is measured by three characteristics (habitable space, materials of construction and kitchen area) and the dimension of basic comfort artefacts includes heating, food preservation and water heating. A household is considered poor by UBN if this has at least one privation’s dimension.

Data to construct the Historical UBN in Uruguay comes from the 1908 census. The census provides a lot of information about housing characteristics (Table *Censo de Vivienda* in pages 1215 and ss.) giving quantities of houses with different construction materials (bricks, wood, adobe), different kinds of roof (rooftop, roof tiles, zinc, straw) and availability of latrine. These three dimensions show a reasonable degree of variability across departments. There are other dimensions like availability of electricity or gas or running water which are very close to zero in most of the departments being Montevideo the only one with significant levels of coverage.

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<sup>10</sup> We thank the generosity of the authors of the paper for facilitating the original data set on provincial GDPs.

<sup>11</sup> Pastor Monsálvez, and Serrano Martínez (2005).

The quality of the variables available in the historical censuses to capture some underlying dimension of standards of living is not beyond dispute and this is particularly true in relation to quality of housing. Three possibilities for quantifying the quality of housing are the wall materials, the kind of roof and the availability of latrine. A simple analysis of correlations suggests that they describe housing quality in a robust way with correlations above 0.85.<sup>12</sup>

TABLE 3: Correlations among the dimensions of HUBN-housing for Uruguay

Variable	Correlations		
	Adobe	Straw	Availability of latrine
Adobe	1.0000		
Straw	0.9024	1.0000	
Availability of latrine	-0.9197	-0.8503	1.0000
Obs.:29			

Source: Authors' elaboration.

The education dimension is measured as the ratio between the illiterate individuals between 5 and 15 years and the total population in that age range (Information is presented in the Table "Instrucción" in pages 896 and ss.).

For this reason, in Uruguay we present four different HUBN variables. First, HUBN-housing is the ratio between houses made with adobe as construction material. In this sense, HUBN-housing in Uruguay is like HUBN-housing in Argentina. Second, HUBN-education is the ratio between illiterate population and total population in escolar ages (between 5 and 15 years). Third, HUBN-latrine is the percentage of households which have latrine in each department and lastly, HUBN-combination is the simple average of the three variables above.<sup>13</sup> In the following table we present the Descriptive Statistics of the HUBN variables in Uruguay.

TABLE 4: Descriptive Statistics of the HUBN variables for Uruguay.

Variable	Descriptive statistics				
	Obs.	Mean	Std. Dev.	Min	Max
HUBN_housing	19	0.4450	0.1750	0.0136	0.6442
HUBN_education	19	0.1820	0.0439	0.0685	0.2468
HUBN_latrine	18	0.7918	0.1584	0.2908	0.9589
HUBN_combination	19	0.4667	0.1176	0.1243	0.60763

Source: Authors' elaboration.

<sup>12</sup> The Census also provides information on the number of floors of each building. Given that for some other countries the only available variable for the quality of housing is the quantity of floors the correlation of this variable with the other variables linked to housing quality is relevant. The correlation between the percentage of one-floor houses and the three possible HUBN-housing is quite high and between 0.57 and 0.82, suggesting that the percentage of one-floor housing can be a good estimation of the quality of housing when other variables are not available.

<sup>13</sup> HUBN-latrine is available for 18 departments in Uruguay.



It is important to note that although means and ranges of each HUBN variables are quite different, the three one-dimension variables have strong relationships, with coefficients of correlation above 84%<sup>14</sup>.

In addition to the variables used to construct the HUBN index, we use estimations of GDP per capita at departmental level from Castro and Willebald (2016) whose estimation is based on the decomposition of aggregate national GDPs into its departmental counterparts using the Geary-Stark methodology (Geary and Stark 2002 and 2015).

### 3. Methodology

Our main methodological assumption is that the information provided by the census about the average level of education and average quality of housing of a given geographic unit provides valuable information about the welfare levels of the population living in that unit. For the different geographic units used in this research (provinces and departments in Argentina, provinces in Spain and departments in Uruguay) we calculate an average measure of welfare shortage in the education and housing dimensions and we call them the Historical UBNS: HUBN-housing and HUBN-education; the HUBN-combination is a simple average of both variables. Given that the HUBN are defined in the interval between 0 and 1, for every HUBN variable we have applied a logit transformation like:

$$HUBN_{logit} = \log\left(\frac{HUBN}{1 - HUBN}\right)$$

It is important emphasize that HUBN variables are not completely equivalent to the current measure of UBN index for various reasons. First, the dimensions incorporated in each index are different and they depend on the availability of data for each period and country. In the case of Argentina, for instance, our HUBN variables take into account two of five dimensions that UBN index considered in Argentina. Additionally, the unit of observation is also different: while the UBN index is expressed in percentage of households in each geographic unit, our HUBN is expressed in percentage of houses<sup>15</sup> (HUBN-housing) or percentage of children or individuals (HUBN-education) by department.

Given that the goal of this study is to analyze the evolution living standards in the long run, it is necessary to discuss about the changes in what is considered a Basic Need over time. The UBN method relies in normative assumptions about what is currently considered a need and takes into account certain privation's dimensions, as school attendance, house quality, overcrowding, sanitary conditions and purchase power. It is not obvious that the social normative criteria today is the same than one hundred years ago and it is debatable what can be considered a Basic Need at the end of 19th century.

The idea that our variables are relevant for households' welfare even from a one hundred years old normative point of view is based on two facts. First, in the construction of HUBN-housing

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<sup>14</sup> Correlation between HUBN-housing and HUBN-latrine is 92%, between HUBN-housing and HUBN-education is 85% and between HUBN-education and HUBN-latrine is 84%.

<sup>15</sup> House and household are different concepts. In the analysis of contemporaneous household surveys, the notion of household is related with the individuals sharing a cooking facility (Ravallion 1992).

we have used the lowest level of classification made by the census' authors to construct a ratio which originates the variable. The information's disposition in the census has a clear normative ordering that we incorporate when defining our variable. Regarding education, the question is whether the clear positive value that we currently attach to basic education, can be extrapolated to the values of the society at the end of the 19th century. The fact that primary education was deemed free and compulsory in most Latin America countries at the end of the 19<sup>th</sup> or beginning of the 20<sup>th</sup> century strongly suggests that primary education was already regarded a crucial desirable element for all the segments of the society.<sup>16</sup>

Secondly, as we will show in the next sections, our HUBN variables are highly correlated with each other and with other measures of living standards in contemporary time (like GDP per capita) and with the UBN variables nowadays. In this sense, we believe that our HUBN variables are reasonable proxies for living standards.

## 4. Results

### A. How the different dimensions of the HUBN behave in relation to each other?

Although the different variables of the UBN or the HUBN are capturing different dimensions of the standards of living, a sensible hypothesis is that all these dimensions are associated to a common underlying level of welfare and therefore, a natural question is about the correlations among these variables.

In **Argentina** the correlation between the two dimensions of the HUBN is high (0.6866) but lower (0.3968) if we use the departments. If we use the variables without the logit transformation correlation increases at departmental level (0.6373) but they do not change at provincial (0.6132).<sup>17</sup>

A regression analysis opens the possibility of analysing the linear relationship between the two variables after conditioning on other variables like a set of regional dummies. This is important because the quality and type of houses can be influenced by climatic conditions which in a country like Argentina vary a lot across regions. If we use an econometric approach defining the education HUBN as the "endogenous" variable, the housing HUBN is statistically significant and the inclusion of regional dummies increase the t-statistic. If we use departments, housing HUBN is highly significant.

The correlations between the four alternative dimensions of the HUBN in **Spain** are not very high (See Table 5). In fact, the HUBN defined as the share of Albergues has a negative correlation with all the other alternatives for HUBN. Without more information from the Anaurio about how the Albergues are defined, it seems reasonable to use as our preferred version of the HUBN-H the percentage of one-floor buildings.

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<sup>16</sup> In Argentina the Law of Common Education defining basic education as free and compulsory was passed in 1884. In Uruguay, the Decree-Law of Public Education number 1350 in 1877 and in Spain, the Law regulating Education of 1857 (known as Ley Moyano) do the same for primary school.

<sup>17</sup> Hypothesis... when variables are close to the upper or lower limit, the logit transformation makes that small deviations from the diagonal became larger...

TABLE 5: Correlations among the dimensions of HUBN in Spain.

Variable	Correlations			
	HUBN-albergue	HUBN-H	HUBN-E-F	HUBN-E-M
HUBN-albergue	1.0000			
HUBN-H	-0.056	1.0000		
HUBN-E-F	-0.1636	0.2777	1.0000	
HUBN-E-M	-0.2896	0.1891	0.8426	1.0000
Obs.:49				

Source: Authors' elaboration.

The correlations between this HUBN-H and the two HUBN related with education are positive but small, being the correlation with the female education clearly larger.

In **Uruguay** the correlation between the two dimensions is very high (0.8901).

### B. Relationship with contemporaneous variables (mean income, wages and inequality).

Another way to analyse whether the HUBN produce a reasonable picture of standards of living is to explore the association between them and other available variables commonly used as proxies for households quality of life.

In Argentina, we can explore, at both the provincial and departmental level, the association between the HUBNs and per capita GDP and inequality. Correlation between the HUBNs and GDP per capita have the right sign and they are relatively large although the one for housing is larger than the one for education (-0.2943 for education and -0.5065 for housing).<sup>18</sup> The results of OLS estimation of equations in which the HUBN are the “endogenous” variables are shown in Table 6: per capita GDP is statistically significant even though regional dummies are included and that our proxy for inequality is not statistically significant.

TABLE 6: OLS estimations for Argentina.

Argentina at the end of 19 <sup>th</sup> century – Provincial Level				
Regression	D.V.: HUBN-H		D.V.: HUBN-E	
	Model 1	Model 2	Model 3	Model 4
GDP-1895	-2.891*** (0.767)	-2.732*** (0.919)	-1.050*** (0.297)	-0.851** (0.391)
PropShare	0.426 (0.418)	-0.127 (0.558)	-0.238 (0.162)	-0.248 (0.237)
NOA		0.986		0.388

<sup>18</sup> If the HUBNs are not log-transformed the correlations are even larger (-0.4705 and -0.5761).

		(1.203)		(0.511)
NEA		0.643		0.324
		(1.011)		(0.430)
Cuyo		2.729**		0.0389
		(1.284)		(0.545)
Patagonia		0.290		0.107
		(1.022)		(0.434)
Constant	18.59***	15.84**	6.563***	5.152*
	(4.478)	(5.967)	(1.732)	(2.535)
Observations	24	24	24	24
R-squared	0.477	0.591	0.377	0.413
Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1				

Source: Authors' elaboration.

In Spain we can analyse the correlation between the three variables linked to HUBN: HUBN-H (housing), HUBN-ME (male education) and HUBN-FE (female education) and the traditional variables of standards of living: the three versions of wages and GDP per capita (Table 7).

TABLE 7: Correlations among HUBN variables and income variables for Spain.

Variable	Correlations						
	W-rural	W-ind.	W-unskill	GDPpc	HUBN-H	HUBN-E-F	HUBN-E-M
W-rural	1.0000						
W-ind.	0.2505	1.0000					
W-unskill	0.2662	0.0382	1.0000				
GDPpc-1900	0.0145	0.1612	0.1662	1.0000			
HUBN-H	-0.1134	-0.0003	-0.0239	-0.4606	1.0000		
HUBN-E-F	-0.1327	-0.1738	0.1181	-0.6128	0.2652	1.0000	
HUBN-E-M	-0.2459	-0.1747	0.2031	-0.2722	0.1164	0.8460	1.0000
Obs.:49							

Source: Authors' elaboration.

The correlations between the three alternative measures of wages and per capita GDP are very low. This is rather discomfoting give that both GDP and real wages are quite usually assumed to capture standards of living. Additionally, all the chosen dimension of HUBN display a negative correlation with wages and GDP and the correlation between our male-education UBN and male real wages is quite similar to the correlation between HUBN-ME and GDP per capita and both are relatively small in absolute terms. However, the correlation between GDP per capita and HUBN-FE is quite high (again in absolute terms) and the correlation between the latter and real wages is very small.

In Uruguay the correlation between per capita GDP and both dimensions of HUBN is very high and slightly higher with education than with housing (Table 8).

TABLE 8: Correlations among HUBN variables and income variables for Uruguay.

Variable	Correlations		
	HUBN-H	HUBN-E	GDPpc
HUBN-H	1.0000		
HUBN-E	0.8901	1.0000	
GDPpc	-0.8928	-0.7982	1.0000
Obs.: 19			

Source: Authors' elaboration.

### C. Persistence of standards of living

In **Argentina**, at provincial level of analysis the HUBN are not statistically significant for today's NBIs and the regional dummies are very powerful in "explaining" the present-day regional distribution of welfare levels (Table 9).

However, at departmental level the standards of living in 2001 are significantly associated to both HUBN and the provincial GDP per capita in 1895 after controlling for regional dummies and for the provincial GDP per capita in 2001.<sup>19</sup>

TABLE 9: OLS estimations for Argentina.

Regression	Argentina across the 20th century	
	D.V.: UBN-2001	
	Provincial Level	Departmental Level
HUBN-E	-0.0496 (0.139)	0.0778*** (0.0156)
HUBN-H	0.0633 (0.0609)	0.0550*** (0.00962)
GDP-1895	0.00177 (0.197)	-0.243** (0.0966)
GDP-2001		-0.535*** (0.0925)
NOA	0.789*** (0.201)	0.393*** (0.110)
NEA	0.901*** (0.179)	0.626*** (0.0864)
Cuyo	0.0964	0.164*

<sup>19</sup> When analysing the determination of contemporaneous NBIs, the significance of HUBN education is quite robust to reducing the sample to some provinces and/or regions, as long as the number of observations is large enough.

	(0.269)	(0.0879)
Patagonia	0.326*	0.479***
	(0.169)	(0.118)
Constant	-2.089	4.248***
	(1.227)	(1.120)
Observations	391	
R-squared	0.623	
Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1		

Source: Authors' elaboration.

In **Spain** we can explore the relationship between educational levels today and the HUBN. Given that basic education is basically universal in contemporaneous Spain we have preferred to focus on high-level education and use as our indicator of educational levels, the share of individuals with a completed university degree (“Licenciatura”).

Table 10 shows that the three HUBN are statistically significant for the educational levels today. After controlling for regional GDP in 1900 the HUBN-H ceases to be significant but and both HUBN-E-F and HUBN-E-M. If we control for regional GDP in 2015 and regional GDP in 1900 the education remains significant.

TABLE 10: OLS estimations for Spain.

Spain across the 20 <sup>th</sup> century – Provincial Level									
Regression	Dependent Variable: Percentage of Third Grade Education (2001)								
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
HUBN-H	-0.646** (0.241)	-0.0630 (0.246)	0.101 (0.225)						
HUBN-E-M				-1.310*** (0.276)	-0.982*** (0.238)	-0.753*** (0.249)			
HUBN-E-F							-1.655*** (0.247)	-1.221*** (0.274)	-0.970*** (0.284)
GDPpc-1900		2.353*** (0.546)	1.394** (0.561)		1.945*** (0.407)	1.324*** (0.476)		1.325*** (0.455)	0.836* (0.485)
GDPpc-2015			4.114*** (1.172)			2.606** (1.145)			2.539** (1.110)
Constant	4.130*** (0.246)	22.53*** (4.278)	-25.86* (14.31)	4.742*** (0.178)	19.60*** (3.114)	-11.26 (13.88)	6.049*** (0.272)	15.81*** (3.358)	-13.56 (13.24)
Observations	49	49	49	49	49	49	49	49	49
R-squared	0.133	0.382	0.515	0.325	0.549	0.595	0.489	0.568	0.613
Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1									

Source: Authors' elaboration.

In **Uruguay**, the HUBN related with education is significant but the HUBN related with housing is not. This is robust to the inclusion of per capita GDP in 1908 and per capita GDP in 2003. A surprising result is that conditional on the HUBN-E, the relationship between GDP in 1908 and today's GDP is positive (Table 11).

TABLE 11: OLS estimation for Uruguay.

Uruguay across 20th century - Departments						
Regression	D. V.: UBN-2011					
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
HUBN-combination	0.103 (0.0892)					
HUBN-housing		0.0545 (0.0433)				
HUBN-education			0.285** (0.128)	0.251 (0.164)	0.848** (0.293)	
Log GDP - 2003				-0.0225 (0.0657)	0.00663 (0.0594)	-0.0826 (0.0547)
Log GDP - 1908					0.824** (0.352)	
Constant	0.666*** (0.0500)	0.670*** (0.0502)	1.088*** (0.202)	1.319* (0.704)	-1.750 (1.450)	1.686** (0.687)
Observations	19	19	19	19	19	19
R-squared	0.072	0.085	0.225	0.231	0.437	0.119

Standard errors in parentheses, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Source: Authors' elaboration.

## 5. Conclusions

Most of the variables that are commonly used to assess or approximate living standards in the long run (income per capita, real wages, heights) are in general not suitable for refined regional analysis. Expanding the spatial disaggregation of our understanding is potentially important for testing the relative merit of some of the relevant hypothesis about the evolution of living standards. For instance, assessing the importance of geography, or the impact of some policies like the building of railway facilities is quite difficult without enough variability of observation of outcomes.

We claim that average attained levels of education and housing (in many cases available from public statistics) can be elaborated into very good proxies –the HUBN- for analysing the geographic pattern of living standards at the end of the 19<sup>th</sup> century and the beginning of the 20<sup>th</sup> century. The estimated correlations among different dimensions of the HUBN in three Latin American countries and Spain strongly suggest that most of them capture the underlying standards of living most of the time. Of course the precision of these proxy variables can be

low in some cases; in particular, the information about housing for some countries (as Spain) is very imperfect and this generates lower correlations with the other measures. The correlation between the HUBN and other variables linked to living standards (average income real wages and inequality) have the expected sign and, in some cases, are considerably large.

Another contribution of this research is to improve our understanding of the historical origin of present day regional inequalities which are very acute in many countries; although their reduction is usually a top priority in the political agenda, their origins and causes have not been clearly established so far. We documented a remarkable geographical persistence in some dimensions of material deprivation in all the countries at all the possible levels of disaggregation during the 20<sup>th</sup> century. The levels of average housing and, in particular, education, in a certain geographic unit at circa 1900 are a very good predictor of living standards today even after controlling for past and even present day levels of income per capita. In general, education is a better predictor for today's UBN than housing which is probably explained by dynamic implications of human capital in the process of economic growth. In relation to this, in some situations the role of female educations is significantly different than the one of male education suggesting a gender dimension of the analysis that is left for further research.

Our finding of a remarkable persistence in the measures of standards of living for such a long and changing period like the 20<sup>th</sup> century suggests a reconsideration of the plausible hypothesis about the determination of the patterns of regional inequality. For instance, given that it is quite reasonable to assume that the different geographic areas within a province share the same institutional and characteristics and given that a large part of the inequality in living standards is defined at very small geographic units, the space left for institutional quality and its influence in productivity and average incomes (Acemoglu, Johnson and Robinson 2002) should be rather small.

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## 8. Appendices

### A. Appendix 1: Matching of departments.

The change in the geographical distribution of departments between 1895 and 2001 in each province or *Territorio Nacional* is described below.

#### Provinces

The next table contains the departments of provinces in 1895 and the departments in 2001 that were used to make the matching across the time when this match is not direct. In the provinces, there are departments that do not match any department in the past or they did not belong to Argentina, which they were not used. At the same time, actually there are departments that correspond with two or more departments in 1895; therefore they are used in the matching more than once time.

Province	Department in 1895	Department in 2001	Province	Department in 1895	Department in 2001	
Buenos Aires	Barracas al sud	Lanús	Mendoza	Belgrano	Malargüe	
		Avellaneda		Luján	Luján de Cuyo	
	Bahía Blanca	Tornquist		Mendoza (capital)	Godoy Cruz	
		Bahía Blanca			Capital	
		Coronel de Marina Leonardo Rosales		San Rafael	San Rafael	
	Juarez	Adolfo Gonzales Chaves			General Alvear	
	Chacabuco	Benito Juárez		Salta	Campo Santo	General Güemes
		Alberti			Rivadavia	General José de San Martín
	Dorrego	Chacabuco	Rivadavia		Rivadavia	
		Monte Hermoso	San Juan		Angaco Norte	Angaco
	Tuyú	Coronel Dorrego		Angaco Sud	San Martín	
		Villa Gesell		Calingasta	Calingasta	
		General Juan Madariaga		Gualilán	Capital	
	General Lavalle	Pinamar		San Juan (capital)		
		La Costa		Concepción	Desamparados	
	General Lavalle	General Lavalle		Trinidad		Rawson
	General Pintos	Florentino Ameghino		Guanacache	Sarmiento	
		General Pinto		Cochagual	Valle Fértil	
	San Martín	Tres de Febrero		Valle Fértil		
		General Villegas		General San Martín	Huerta	
	Guaminí			Rivadavia	Marquesado	Ullum
		General Villegas		Rivadavia		
		Daireaoux		Zonda		
		Tres Lomas				

		Salliqueló	Santa Fe	Vera	9 de Julio
		Guaminí			Vera
	La Plata	Berisso	Santiago del Estero	28 de Marzo	Aguirre
		Ensenada			Belgrano
		La Plata			Taboada
	Lincoln	Leandro N. Alem			Avellaneda
		Lincoln			Rivadavia
	Necochea	San Cayetano		Copo Primero	Copo
		Necochea		Jimenez Primero	Jiménez
	Pehuajó	Hipólito Yrigoyen		Jiménez Segundo	
		Carlos Casares		Matará	Sarmiento
		Pehuajó			Juan F. Ibarra
	Salto	Roque Pérez		Salavina	Salavina
		Salto			Mitre
	San Isidro	Vicente López		Copo Segundo	Pellegrini
San Isidro		Silípica Segundo		San Martín	
Las Conchas	Tigre	Silípica Primero		Silípica	
Trenque-Launquen	Carlos Tejedor	Tucumán	Burruyaco I	Burruyacú	
	Trenque Lauquen		Burruyaco II		
Catamarca	Piedra Blanca		Fray Mamerto Esquiú	Cruz Alta I	Cruz Alta
				Cruz Alta II	
Córdoba	Tercero Abajo		General San Martín	Chicligasta I	Chicligasta
	San Antonio de Itatí		Berón de Astrada	Chicligasta II	Simoca
Corrientes	Caa-cati		General Paz	Famaillá I	Famaillá
	Lomas			Famaillá II	Lules
	La Cruz		San Martín	Graneros I	Graneros
			General Alvear	Graneros II	La Cocha
Entre Ríos	Gualedaychú		Islas del Ibicuy	Leales I	Leales
			Gualedaychú	Leales II	
	La Paz		La Paz	Monteros I	Monteros
	Federal		Monteros II		
	San José de Feliciano		Feliciano	Río Chico I	Juan B. Alberdi
	Rosario del Tala	Tala	Río Chico II	Río Chico	
	Concepción del Uruguay	Uruguay	Tafí I	Tafí del Valle	
Villaguay		Villaguay	Tafí II	Tafí Viejo	
Jujuy	Jujuy (capital)	Dr. Manuel Belgrano	Trancas I	Trancas	
	Perico del Carmen	El Carmen	Trancas II		
	Perico de San Antonio	San Antonio	Tucumán (capital)	Yerba Buena	
La Rioja	Lavalle (Gral)	Coronel Felipe Varela		Capital	
	Rivadavia	General Juan F.			

		Quiroga
	Roca (Gral)	Rosario Vera Peñaloza
	Vélez Sarfield	General Angel V. Peñaloza
	Sarmiento (Gral)	Vinchina

### Territorio Nacional

The next table contains the departments of Territorios Nacionales in 1895 and the departments in 2001 that were used to make the matching across the time when this match isn't direct. The data about Territorios Nacionales in 1895 is more reduced than the data about provinces; therefore, the matching of departments was more difficult in this case. As in the provinces, currently there are departments that correspond with two or more departments in 1895; therefore, they are used in the matching more than once.

Territorio Nacional	Department in 1895	Department in 2001	Territorio Nacional	Department in 1895	Department in 2001
Chaco	Martínez de Hoz	Libertador General San Martín	Misiones	Apóstoles	Apóstoles
		Bermejo		San Carlos	
	Caaguazú	12 de Octubre		San José	
	Guaycurá	Libertad		Posadas	Capital
		General Donovan Presidencia de la Plaza		Frontera	Eldorado General Manuel Belgrano
	San Bernardo	O'Higgins			Iguazú
	Solalindo	Sargento Cabral		Cerro Corá	Leandro N. Alem
		25 de Mayo		Campo Grande	Libertador General San Martín Cainguás
		General Donovan		San Ignacio y Corpus	San Ignacio
	Resistencia	San Fernando		Santa Ana	Oberá
Florencia al Norte	Tapenagá	San Pedro	San Pedro Montecarlo		
Chubut	Rawson (capital)	Biedma	Monteagudo	Guaraní	25 de Mayo
		Rawson		25 de Mayo	
	16 de Octubre	Cushamen	Neuquén	III	Pehuenches Añelo
		Languiño		Chos Malal (capital)	Minas Chos Malal
		Paso de Indios			V
		Tehuelches		Aluminé	
		Gastre			
		Río Senguer			
		Sarmiento			
Futaleufú					

		Escalante			Lácar		
	Gaiman	Florentino Ameghino		I	Ñorquín		
		Gaiman			Loncopué		
		Mártires			Picún Leufú		
		Telsen			Collón Curá		
					Confluencia		
Formosa	I y IV	Laishi		IV	Catán Lil		
		Pirané			Picunches		
		Patíño			Zapala		
	II y III	Patíño			Viedma (capital)	Adolfo Alsina	
		Pilagás				Conesa	
		Pilcomayo			Nahuel Huapi-Bariloche	Pilcaniyeu	
	V	Matacos				Ñorquincó	
		Bermejo				Bariloche	
		Ramón Lista			Pringles (Coronel)	Pichi Mahuida	
La Pampa	XIII	Chalileo	Río Negro	25 de Mayo (y 9 de Julio)	San Antonio		
	XIV	Chical Co			9 de Julio		
	V	Caleu Caleu			El Cuy		
	X	Curacó				Valcheta	
		Lihuel Calel				25 de Mayo	
	XI	Curacó				Gallegos (capital)	Güer Aike
		III			Atreucó		Puerto Deseado
		Guatraché					Lago Buenos Aires
	IV	Caleu Caleu				Santa Cruz y San Julián	Corpen Aike
		Hucal					Lago Argentino
	IX	Lihuel Calel		Magallanes			
	XII	Limay Mahuida		Río Chico			
	Victorica	Loventué		San Sebastián	Río Grande		
	I	Chapaleufú		Tierra del Fuego	Bahía Thetis	Ushuaia	
		Maracó			Isla de los Estados		
		Trenel			Ushuaia (capital)		
		Realicó					
	XV	Puelén					
	II	Conhelo					
		Capital					
Catrilo							
Quemú Quemú							
VI	Rancul						
Gral Acha (capital)	Toay						

**Capital Federal**

Capital Federal is taken as a single observation because the name of the Distritos in each census take the form as “Distrito n°1” and the numbers of Distritos in the census of 1895 is different that the number of Distritos in the census of 2001. It is not a big problem, because the characteristics and variables are very similar between Distritos.