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The CIPUV Residential Land Use Regulatory Index: A Measure of the Local Regulatory Environment for Land and Housing Markets in Argentina's Municipalities

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Abstract

A rich set of unique data on Land Use Regulation and Practices, from the municipalities in Argentina, is used to create a summary measure of the stringency of the local regulatory environment—the CIPUV Land Policy Index (CILP). This aggregate measure, comprised of diverse sub-indexes, summarizes information on the different aspects of the regulatory environment, including the existence of provincial and local land use laws and plans, process of projects approval, their costs and delays, and other sets of rules on local residential land use regulation, like community involvement, the presence of building restrictions (such as floor-to-area-ratio (FAR), open space dedications or minimum lot size requirements), affordable housing requirements, and requirements to pay for infrastructure. The CILP documents how regulation of residential building varies across space and provides evidence on what a 'typical' degree of local regulation entails, and how this stringency varies across municipalities. Coastal markets from metropolitan jurisdictions, such as Buenos Aires, La Plata and Bahia Blanca are the most highly regulated. Municipalities in the Northern regions—Northeast and Northwest—are the most lightly regulated. Municipalities over 50,000 inhabitants, in the path of Metropolitan Area development, may have the strongest incentives to practice restrictive zoning. In such jurisdictions, growth of any kind may be perceived as adverse, imposing substantial economic or social costs for residents. Importantly, within metro areas (BUAs), municipalities with an average regulatory environment are 27 percent of a standard deviation below the sample average in terms of approval costs and delays, but are 18% above in terms of local plans, and 17 percent of a standard deviation below for the development of gated urbanizations. The biggest differences between what happens in highly regulated environments and low regulated jurisdictions are found in terms of local plans, the amounts of bureaucratic levels needed for project approval (ZRPI) and in terms of approving costs and delays. In all this cases, the indexes range on average more than 1 full standard deviation, showing the maximum range for the Local Plan Index.

Keywords: Land use regulations, land use regulations indicators, stringency/flexibility of urban regulation, zoning, developing countries cities, municipal government, Argentina

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Introduction

General objectives of the research project

In the last decades, it has become clear that land use regulation of residential housing constitutes a relevant element that has economic effects which extend into many areas of economic life. For example, the interaction of land markets and their regulation should determine access to a wide range of publicly provided goods, the consumption of environmental goods, the patterns of urban extension and the costs of infrastructure provision, and even informal land development and the patterns of residential segregation.
Furthermore, the regulatory environment might constrain the quantity of housing built or affect prices in the market, as indicated by the literature.[1] Yet, perhaps because a large part of these costs are indirect, and the underlying political-economic processes are difficult to observe empirically, this area of research remains relatively unexplored (Hilber and Robert-Nicoud 2013). Additionally, empirical studies that can shed light on many of those issues are usually constrained by the lack of comparable data on land use regulation across jurisdictions. Therefore, the few theories that have been advanced about the determinants and effects of the local regulatory environment have not been carefully tested in Latin American housing and land markets.[2] Even the specialized international research community has still only scratched the surface with respect to the extent and complexity of the determinants of land use regulation and its main effects.

In Argentina, as in most other countries, local regulation can affect building in myriad ways. Although the most obvious way is to prohibit a project, regulation may also affect costs through approval delays, design restriction through building parameters requested in each zoned area, or requirements imposed on developers, all without formally banning construction (Gyourko, Saiz and Summers 2008). Added to that, the proliferation of difficulties or hurdles to development has made it difficult to describe—or map completely—the complexity of the local land use regulatory environment. We are aware that the enormity of that effort might have prevented researchers from conducting a detailed analysis of local zoning codes that would permit more precise calculations of potential effects.[3] Hence, our efforts in recent years were primarily focused on the deliberate development of better data that will contribute to improve and expand research on land use in Latin American countries. As far as we know, the data that we have already generated (see Goytia and Pasquini 2010, 2012a, 2012b) is the most comprehensive effort yet towards assembling a complete database on land use covering a large number of

1 Links between the stringency of the local regulatory environment and house prices or new construction are conceptually outlined by Fischel (1985) and Quigley (20 07). Those ideas are tested in empirical studies as well. Among others, these include Pollakowski and Wachter (2000), Malpezzi (1996), Mayer and Somerville (2000), Glaeser and Gyourko (2003), Quigley and Raphael (2004a, b or 2005 instead of 2004b), Glaeser, Gyourko and Saks (2005a, b), Quigley and Rosenthal (2005), Glaeser, Schuetz and Ward (2006), Saks (2006), and Ihlanfeldt (2007).

2 Biderman (2008 and Henderson and Feler (2008) are two valuable studies that use land use regulation data from Brazil.

3 See Glaeser, Schuetz, and Ward, 2006 for a valuable precedent studying Boston metropolitan area.

municipalities (those that form part of the large metropolitan areas and others outside them) in a Latin American country.[4] This database in based on the Regulation and Practices Survey to Planning Directors, combined with quantitative metrics about the coverage (area) and the parameters (content) of land use regulation for all urban zoned areas, as well as land cover metrics based on satellite images from jurisdictions in years circa 1990, 2000 and 2010. We expect that, as better data become available, the academic community will contribute to the development of methods leading to more reliable tests of hypotheses about the links between land use regulation, land and housing development and policies, and general welfare issues in developing countries.

This paper presents a new measure capable of synthesizing the differences in the local land use regulatory environment across municipal jurisdictions nationwide, based on the results of our 2011 survey. We developed the CIPUV Land Policy Index (CILP) which measures the degree of overall stringency of land use parameters and enforcement for the municipalities of Argentina. This aggregate measure comprises several sub-indexes (or indicators) with information on the different aspects of the regulatory environment, such as infrastructure provision and finance, value capture and access-to-land, among others. In so doing, it provides a standardized summary measure of the land use regulatory environment of a given jurisdiction. The CILP facilitates the comparison of land use regulation at the municipal level while also allows for aggregation at the metropolitan and state levels.

Virtually every municipal government in Argentina has some form of regulation. The results of our previous descriptive analysis show how the restrictiveness of land use regulation varies strongly across jurisdictions in Argentina (Goytia and Pasquini, 2010, 2012a). The CILP Index analyzed in this paper extends such evidence. Preliminary results indicate that the regulatory environment in Buenos Aires Metropolitan Area (BAMA) is tighter than the average for the nation, and the main costal metro areas are the most regulated markets. Municipalities of over 50,000 inhabitants, many of them in the path of metropolitan area development, may have the strongest incentives to practice restrictive zoning. In these jurisdictions, growth of any kind may be perceived as adverse, imposing substantial economic or social costs for residents.

To further our understanding of the economics of land use regulation we use the CILP and our extensive database to analyze the determinants of residential land use regulation, its spatial variation in terms of stringency and its effects on prices, on informal land and housing development, or on sprawl, among other aspects.[5] In sum, our research has two main goals: (a) the empirical study on the determinants of residential land use regulation, and (b) the analysis its

[4] The database is publicly available for public sector use and academics at a UTDT — CIPUV web page as well as the Ministry of Federal Planning (Dirección de8 Ordenamiento Territorial) and is currently being used in several research and policy studies. For example, by the World Bank and the Initiative for the Integration of Regional Infrastructures in South America — SAP Project — coordinated by Harvard University.

[5] Land use regulation and transport planning is another dimension of the CIPUV research agenda 2013-2014 (with the World Bank) to identify particular trends, including: areas of high accessibility that are not being developed to their full potential or how new development is tending towards areas of relatively low accessibility.

effects, in particular its effects on informal land development and on the patterns of urban expansion of cities in Argentina. This analysis is reported in a separate paper.[6]

The present paper is organized as follows: section 2 describes the sampling process and the survey instrument; section 3 describes in detail the process of generating the indicators (or sub-indexes) that comprise the CILP; section 4 focuses on the CILP Index and presents summary statistics for the index and its components for the full sample and various subsets of jurisdictions; section 5 reports on how regulatory strictness varies spatially across municipalities and metropolitan areas (defined as BUA in Argentina); and section 6 consists of a brief summary and statement of general conclusions.

The Survey on Residential Land Use Regulation

This section briefly presents the methodology of the nationwide survey on residential land use regulation and preliminary descriptive results.[7] The survey aims at compiling part of the comparative regulation information covering a large number of municipal jurisdictions in Argentina. Other sources of data include geographically identified land zoning information and land cover metrics derived from satellite imagery at the local government jurisdictional level. We expect the resulting database will open several research possibilities to improve our understanding of urban land policy. As far as we know, there are no data of this kind for a developing country such as Argentina. We build on similar initiatives in developed countries, such as The Wharton Residential Land Use Regulation Index for the USA, and the information on Local Housing Regulation in Easter Massachusetts produced by the Pioneer Institute and Rappaport Institute.[8]

But in addition, it should be pointed out, there several issues relevant for land markets in developing countries that we address. For example, informal markets are significant, while annual building caps, while particularly important to understand the land use development in US markets, are not important for most municipalities in Argentina. Other issues are also specific to developing countries and are examined in this research, for example the process of infrastructure expansion, the presence of redistributive and access-to-land provisions in the regulation, and the pattern of regulation enforcement.[9]

The 2011 survey was targeted to a total of 269 jurisdictions divided into three which were sequentially targeted. The first group is a sample of all the jurisdictions that are part of the big urban agglomerates (BUA) of Argentina, a total of 119 municipalities. The definition of big urban agglomerate is given by the National Institute of Statistics and Census (INDEC) of

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[6] See Goytia, C. G. Dorna, J. Cohen and R. Pasquini. 2015. An empirical analysis of land use regulation determinants. Working Paper (forthcoming). Cambridge, MA: Lincoln Institute of Land Policy.

[7] The survey follows a prior survey that we carried out in 2009 (detailed in Goytia and Pasquini, 2010, and Secretaría de Asuntos Municipales del Ministerio del Interior de la Nación 2011).

[8] See Dain (2006), and Schuetz (2006) [is this the same as in Glaeser, Schetz and Ward 2006?].

[9] The survey covers some of the main issues related to land regulation for residential purposes. The selection of issues has been made by the researchers and benefited by the comments of several experts.

Argentina. The BUAs are the main geographic entities used by all public statistical agencies in collecting, tabulating, and publishing federal and provincial periodic statistics, and is the equivalent to a metropolitan area definition. Each province has one or two BUAs formed by several municipalities. A BUA includes the jurisdictions that form the core urban area as well as adjacent jurisdictions that have a high degree of social and economic connectivity with the urban core. The Great Buenos Aires BUA is the biggest urban area of the country, comprising 30 municipalities—the entire area of 14 jurisdictions and part of the area of 16 others (INDEC 1998). Other BUAs include one or two municipalities only.

The two other samples surveyed cover municipalities outside the big urban agglomerates: one sample of municipalities with more than 50,000 inhabitants (39 jurisdictions), and another of smaller jurisdictions with 20,000 to 50,000 inhabitants (111 municipalities). Thus, the 2011 survey has a much larger coverage compared the 2009 one, as it covers almost the entire universe of municipalities with a significant level of urban land use planning. According to the 2001 Census, the three samples account for nearly 80 percent of the total population in Argentina (approximately 60 percent in BUA sample and an additional 40 percent in the other two samples).

Fifty specific questions were asked in the survey. The complete survey instrument, summary statistics, and a descriptive analysis of responses are reported in Goytia, Hageldorn and Pasquini (2012). In carrying out the survey, we worked in close collaboration with the Secretaría de Asuntos Municipales (Municipal Affairs Secretariat — SAM) at the Ministerio del Interior de la Nación Argentina. The Secretariat helped us generate and update a local contacts database that includes information on the key people involved with land regulation in each municipality who were our potential respondents. We contacted the Planning Directors in each municipality inviting them to respond to the survey. Where none existed, we contacted a planning officer specially designated by the Mayor in each jurisdiction to answer the survey. To minimize non-response, we followed the respondents by telephone after the initial contact. We also built a Webpage to facilitate the task for respondents. In many cases the survey questionnaire was sent to the municipality via regular mail due to technical limitations in the jurisdictions. The survey was carried out from May to September of 2011. During field work we also collected zoning maps covering all zoned areas of the municipalities; that was done according to the technological capabilities of each jurisdiction.

We registered a 71 percent final response rate, corresponding to a total of 190 respondents. To address concerns related to the sampling procedures and possible sample selection bias in the responses, we carried out an analysis of the response rate by city size and regional location (see table 1 in Appendix A). Results from this analysis suggest that there are no significant response biases in the sample.[10] The highest response rate was obtained for municipalities outside BUAs with more than 50,000 inhabitants (85 percent), followed by municipalities in BUAs (75 percent)

[10] In order to check for sources of biases in the response rate we also estimated response models using the available Census data including characteristics of the population (e.g., proportion of population with less than 14 years or more than 65 years, proportion of immigrants), education and socioeconomic status (e.g. using unmet basic needs indicators) and available infrastructure (e.g., sewerage system, water network, natural gas network, electricity). We did not find any significant correlation between these variables and the response rate.

and 61 percent for the smaller jurisdictions. For these jurisdictions outside the BUAs, the lower response rate is due in part to the shorter time given to them for answering the survey and fewer follow up efforts by our survey team. In the case of jurisdictions in the NOA and NEA regions, a 61 percent combined response rate might suggest some degree of response bias since municipalities in these regions have lower average GDP per capita.

Preliminary descriptive analysis of the survey data yields several suggestive findings. For example, with respect to infrastructure extension, municipalities with relatively more vacant land (as a percentage of the total area of the jurisdiction) as well as those with relatively less total urbanized area, report lower infrastructure extension financed by the public sector as a percentage of total financing. Regulation of gated communities frequently include requirements for infrastructure provision by developers (less frequently for open urbanizations) and these requirements are higher in jurisdictions in process of urbanization, suggesting why there are more incentives for zoning gated communities in these jurisdictions.

Norm v. practice issues

The 2011 survey has two important upgrades compared to the earlier 2009 survey (Goytia et al. 2010). The new survey was designed to capture possible differences between what the norm states and what is actually enforced. Enforcement is specifically addresses in relation Access to Land Regulation Indicator (ALRI) and that is the only component of the CILP which has both a normative and a practice part. The ALRI captures the presence of the redistributive and access-to-land elements and was built adding four regulatory elements: (i) percentage of lots that must be given for public facilities, (ii) percentage of lots that must be given for social housing, (iii) value added tax, and, (iv) access to land instruments such as obligatory use of vacant urban land. Based on the survey answers for each of these regulatory elements, we were able to build a Normative and Practice ALRI measure that allows us to verify whether the normative and the enforcement aspects of regulation are consistent.

Figure 1 in Appendix A scatters the Normative and Practice ALRI, with a 45º degree line indicating equality between them. When a municipality is above this line that indicates that local government enforcement practices exceed what is prescribed in the norm. Conversely, in municipalities falling below the red line enforcement is less stringent than what the norm would require. The totals in this figure indicate that most local governments, in practice, are less stringent that the norm. This finding is important especially considering that this group of jurisdictions represents 55 percent of the full sample (see table 2 in Appendix A).

The municipalities outside the BUAs are more consistent in enforcing the regulatory norms that those that are part of BUAs. The BUA jurisdictions tend to have more stringent regulations than what actually happens in practice. The difference in regulatory enforcement behavior decreases with the population size of the BUA: 32 percent of the BUAs with more than 50,000 inhabitants have more restrictive enforcement practices than what is required by the regulation, while BUAs with less than 20,000 inhabitations have less restrictive norms (47.6 percent) but more stringent enforcement (52.4 percent). Consistency between normative requirements and enforcement practices is observed among municipalities outside the BUAs, where the norms, more often than not, match what is actually enforced.

Consistency between enforcement practice and the norm is also registered for the NEA, NOA and Cuyo regions. However, in Patagonia and Pampeana regions, the normative requirements tend to exceed what happens in the practice, i.e. the letter of the law is often not enforced.

Further, the balance between the norm and the practice is affected by level of regulation in a given municipality, whether it is light, average or highly regulated. Municipalities with light and average regulatory environment show more consistency between enforcement and the norm. Yet, this balance is broken where the regulatory environment is more stringent (above the 75º percentile). These jurisdictions tend to impose higher regulatory standards than what actually occurs in practice (see table 2 in Appendix A).

Frequency weights

The earlier Land Use Regulatory Survey focused on whether the regulatory authority or instrument was available or not in the jurisdiction while the expanded 2011 survey captures how frequently the regulatory tools are used. This new feature is an important advancement for the analysis of the local regulatory environment. When appropriate, questions on a given tool specify three possible frequencies of use: (i) never, (ii) sometimes, and (iii) always. Although the answers to these questions are somehow subjective, they bring us one step closer to understanding what happens in practice and determine how important certain regulations are in relation to others.

One of the main CILP components affected by this improvement is the Zoning and Residential Projects Indicator (ZRPI). As this indicator captures which regulatory bodies are needed to approve certain projects it is crucial to determine how often it is used.

For instance, in 22 municipalities the ZRPI value would be the same except that, when taking into account the frequency of use, we find 12 different value figures, i.e. adding frequency of use reveals greater variability in the index. In this case the range between the minimum and maximum values was more than one full standard deviation. Although this is an extreme example, it is useful to show the advantages of this survey enhancement.

Generation of Regulation Indicators

This section focuses on the development of indicators of regulation and practices to measure the stringency of regulation and its enforcement with the aim of developing a standardized regulatory index that facilitates the comparison of the regulatory environment at municipal level while also allowing for aggregation to the metropolitan and state levels.

In our preliminary research on land use regulation (Goytia and Pasquini 2010) the construction of indicators followed the literature for developed markets (such as Gyourko, Saiz and Summers 2008). However, we found the approach of these authors less than fully adequate to the reality of land use in developing countries such as Argentina. Thus, we adapted and constructed new indicators designed to address relevant issues that are specific of developing countries, such as

the existence of informal markets and the level of regulation enforcement.[11] Several variables related to these issues were added to the survey, including those on the process of infrastructure expansion, on the presence of redistributive and access-to-land elements in the regulation, and on fiscal policies.

The new indicators capture two important aspects of the local regulatory environment. First, the degree of application or enforcement of a specific regulatory mechanism is now incorporated in the indicators. The Planning Directors who answered our survey clearly see the difference between the regulatory norm and the degree of enforcement in actual practice. Second, we enhanced the information on land use and building parameters by specifying these parameters by zoning use category. We developed GIS-based metrics of zoning uses that allows us to weight these parameters by zoning area, thus providing an accurate picture of the overall degree of stringency of the parameters for the entire (zoned) jurisdiction.

The following section describes the construction of the indicators. It provides information on the data used, and explains how we used regression and principal component techniques to construct the indicators and describes the resulting ranking of jurisdictions. In future analyses we shall provide a set of geo-referenced illustrations of this process.

Description of indicators and sub-components

Here we describe how we created the eight components of the CILP. These components are classified according to the topics they address as follows:

1. Land Plan Indicator (LPI)
2. Zoning and Residential Projects Approval Processes Indicator (ZRPI)
3. Local Assembly Indicator (LAI)
4. Building Restrictions Indicator (BRI)
5. Infrastructure Provision Indicator (IPI)
6. Access to Land Regulation Indicator (ALRI)
7. Projects Approval Cost Indicator (ACI)
8. Gated Urbanizations Restrictions (GUR)
9.

Table 1A in Appendix A provides a brief description composition of the indicators and their abbreviations.

<u>Land Plan Indicator (LPI)</u>

One of the main tools that local governments have to shape and control urban growth is by developing and enacting an urban plan and a zoning code. The Land Plan Indicator (LPI) captures the capacity of local governments to make use of these regulatory instruments. Although local governments can promote their own urban plan and code, under the Argentina's federal government system, the provinces have the power to enact and impose on the

[11] See Goytia and Pasquini (2013) for more on these issues.

municipalities a specific, higher level, provincial planning law or decree. This indicator is designed to capture the extent to which a land use plan exists, and whether it has been formally established in the legal and regulatory framework of the jurisdiction. The indicator consists of two components, namely the provincial and municipal levels. The LPI reflects the existence of a land use plan, indicating whether it has been promulgated as law or decree at the provincial level or as regulations at the municipal level. Municipal level instruments comprise *ordenanzas* and urban planning codes, for example. For both the municipal and the provincial components we assigned a value of one if the land use plan exists and is incorporated in the respective legal or regulatory framework; one-half in the case the regulatory plan exists but it is not promulgated, and zero otherwise. The LPI is the standardized[12] sum of the provincial and municipal components; it has zero mean and a standard deviation of one. More formally:

$$LPI = STD(provincial + municipal)\ where,$$

$$provincial, municipal = \begin{cases} 0 & if\ there\ is\ no\ regulation\ at\ the\ provincial\ level \\ 0.5 & if\ a\ planning\ instrument\ exists\ but\ is\ not\ a\ law\ or\ decree \\ 1 & if\ a\ legal(law\ or\ decree)\ planning\ instrument\ exists\ at\ the\ provincial\ level \end{cases}$$

Results indicated that 51.1 percent of the municipalities that answered the survey have both municipal and provincial land use regulations. About 20 percent declared to have just a municipal plan law and the rest just a provincial one. Interestingly, these proportions do not depend on the specific sample, i.e. on whether the municipality is part of a BUA, or is not a BUA but has more than 50,000 inhabitants, or between 20,000 and 50,000 inhabitants.

Since there is no strong prior evidence to support the fact that provincial land use regulations are more restrictive than municipal ones, we give equal weight to both components.

Zoning and Residential Project Approval Process Indicator (ZRPI)

This indicator is designed to capture the involvement of different governmental authorities in the approval of residential projects. Following Gyourko, Saiz and Summers (2006), the indicator distinguishes the approval of projects that require zoning changes from those regular projects that do not require a zoning change. The architecture of this indicator differs from that presented in Goytia and Pasquini (2011) mainly because the present version incorporates a direct democracy provision. The indicator has two separate components. More formally, the ZRPI is defined by the following formula:

$$ZRPI = Std(ZRPI\_zai + ZRPI\_rpai)$$

Zoning Approval Indicator (ZRPI_zai)

The first component of the ZRPI measures the degree of difficulty for the approval of a project requiring a zoning change. Our survey asked which and how frequently authorities are involved

[12] Standardized variable X=(X – Mean of X) / Std. Dev of X.

in zoning change approvals. The intuition behind this indicator reflects the idea that as more institutions are involved in the zoning change approval process, there are more potential veto points for a project; thus the regulation is more stringent.

Regulatory bodies listed in question 14 are classified according to their institutional nature into local, provincial or technical authorities. Among the local authorities involved in Zoning Change Approval (zai_local) we included (i) the executive power at the municipal or communal level and (ii) the Local Municipal Council. For the provincial authorities involved in Zoning Change Approval (zai_prov) only officials of the provincial level of government are included. As to the technical authorities involved in Zoning Change Approval (zai_tech) we include (i) the Zoning Board Commission and (ii) the Environmental Evaluation Committee. Each regulatory body takes different values depending on how frequently it is used. When the participation of an institution is always required it takes the value of one, one-half when it is occasionally required, and zero otherwise. In all cases where other answers were registered, they were studied and catalogued accordingly.

Finally, the ZAI was calculated as the standardized sum of zai_local, zai_pov and zai_tech: formally:

$$ZRPI\_zai = Std(z\text{ai\_local} + z\text{ai\_prov} + z\text{ai\_tech}), where$$

$$\begin{aligned} z\text{ai\_local} = Std\{&\text{Executive power at the municipal or communal level} * \text{Freq} \\ &+ \text{Local Municipal Councilthe Local Municipal Council} * \text{Freq} \\ &+ \text{Other Authorities} * \text{Freq}\} \end{aligned}$$

$$z\text{ai\_prov} = Std\{\text{Provincial Level of governmental officials} * \text{Freq}\}$$

$$\begin{aligned} z\text{ai\_tech} = Std\{&ZoningBoardCommission * Freq + \\ &EnviromentalEvaluationCommitee * Freq\} \end{aligned}$$

Where,

$$Freq = \begin{cases} 0 & \text{if the } i \text{ relevant actor is never consulted} \\ 0.5 & \text{if the } i \text{ relevant actor is occacionally consulted} \\ 1 & \text{if the } i \text{ relevant actor is always consulted} \end{cases}$$

Regular Project Approval Indicator (ZRPI_rpai)

As the ZAI, the RPAI measures the number of, and frequency with which regulatory bodies are involved in the project approval process. This component only takes into account projects that do not need zoning changes (regular projects). Following the methodology above, this component is calculated as the standardized sum of how often regulatory bodies are used. As before, each institution is assigned a value of one if its participation is always required, one-half if sometimes,

and zero if never. In this case four institutions were considered: (i) Technical Offices, (ii) Local / Municipal Planning Commission, (iii) Environmental Impact Study, and (iv) other relevant officials.

More formally:

$$RPAI = STD\{TechnicalOffices + LocalPlanningCommission + \text{Enviromental Impact Studies} + \text{Other Relevant officials}\}$$

Local Assembly Indicator (LAI)

In the last decades the use of direct democracy mechanisms has been growing. To the extent that citizen participation can be a determinant in the project approval process, it must be measured. In our previous work (Goytia and Pasquini 2010 and 2013), this regulatory tool was included in the Approval to Land Regulation Indicator (ALRI). However, recently Gyourko et al. (2008) developed a separate component, and indicated that they had to do a second smaller survey to capture this aspect of the regulation, because it was not initially taken into account. Taking advantage of their work, our survey included a set of questions addressing how citizen's participation is instrumented. The resulting indicator captures how direct democracy is instrumented in each municipality. The component not only describes whether this mechanism is part or not of the norm, but also if it has binding power. The indicator can be summarized by the following table of values.

Values assigned to the LAI, before considering frequency of use:

		Existence of civil participation			
		No		Yes	
		Not in the norm	Included in the norm	Not in the norm	Included in the norm
Decisions are	Not binding	0		1	2
	Binding			2	3

Building Restriction Indicator (BRI)

This indicator captures the relation that exists between three concepts related to restrictions in the supply of residential buildings. Maximum Total Building Potential in floor to area ratio (FAR), Maximum Land Occupancy Factor (LOF, or known as FOS—*Factor de Ocupación* in Spanish—which indicates the share of the plot that can be built on), and lot size restrictions (minimum lot size) are summarized in the following components: (1) Land Fertility Indicator (LFI), (2) Potential Amenities Indicator (PAI), and, (3) Demand Restriction Indicator (DRI).

In constructing this indicator, besides the survey answers, we incorporated information on zoning maps for each jurisdiction by developing a series of metrics used to weight our regulation data.[13] Residential zoning is divided between low, medium, and high density and within each of these categories, constructability restrictions are different. Each BRI sub-component is calculated using the parameters for each zoned area in the jurisdiction and weighted according to the total area of that zoning category.

BRI is calculated as the standardized sum of its three sub-components as follows:

$$BRI = STD\ \{-LFI + PAI + DRI\}$$

Land Fertility Indicator (LFI)

The Land Fertility Indicator (LFI) captures the maximum square meters that can be built out of the total square meters of residential land in the municipality. Different municipalities have different ways of regulating the level of constructability in each zoned area. Most of the municipalities use Floor to Area Ratio (FAR), while few others set caps on density or restrict the height and the Maximum Land Occupancy Factor (LOF). LOF is a ratio that ranges between 0 and 1, which sets the share of the plot that can be occupied and implicitly sets the area that needs to be left as open space. Different residential zoning categories allow for different levels of constructability, therefore, we weight constructability restrictions according to the area that each residential category occupies. Thus, the LFI indicator is calculated as the weighted average value of the total square meters that could be built per meter of residential land.

$$LFI = STD\left\{\begin{array}{l} FAR_{Low} * \dfrac{\text{Residential Low area}}{\text{Residential Total area}} + \\ FAR_{Med} * \dfrac{\text{Residential Medium area}}{\text{Residential Total area}} + \\ FAR_{High} * \dfrac{\text{Residential High area}}{\text{Residential Total area}} \end{array}\right\}$$

In order to indicate greater stringency in the overall Building Restriction Indicator (BRI), the LFI indicator is added with the opposite sign since higher values in LFI mean less building restriction.

Potential Amenities Indicator (PAI)

The Potential Amenities Indicator (PAI) takes the information provided by Maximum Land Occupancy Factor (LOF), where a lower factor indicates *less* buildable area in a given plot, which provides *greater* amenities in the form of more available open space (either public or private) per unit of plot. Such enhanced amenities in the form of open space may be capitalized

[13] The collection of images was done by contacting the local authorities, and through the Ministry of Government in the Province of Buenos Aires. Once the base map of each municipality were obtained together with the corresponding zoning map images (bitmap – BMP), we proceed to geographically reference the zones using GIS (Arc Map software 9.3).

in housing prices (also as an externality affecting surrounding constructions). Then, this indicator is constructed by the estimate of the ratio of open space required per square meter in each of the different residential areas zoned. We weight the different restrictions that apply to differing residential zoning categories by the share of land used for each residential classification.

$$PAI = -STD\left\{\begin{array}{l} LOF_{Low} * \dfrac{\text{Residential Low area}}{\text{Residential Total area}} + \\ LOF_{Med} * \dfrac{\text{Residential Medium area}}{\text{Residential Total area}} + \\ LOF_{High} * \dfrac{\text{Residential High area}}{\text{Residential Total area}} \end{array}\right\}$$

Demand Restriction Indicator (DRI)

The Demand Restriction Indicator (DRI) uses the information on minimum lot sizes. Like the building restrictions previously described, lot sizes are not uniform within the jurisdiction where there are generally several different planning sub-areas. We include all sub-areas where it is possible to build single-family housing. The indicator is constructed based on Glaeser and Ward (2009), calculating the weighted average of the minimum lot size for residential areas that allow for single-family housing construction. These residential zoning categories are low-density areas and areas that allow for gated urbanizations. Formally,

$$DRI = STD\left\{\begin{array}{l} \text{Minimum Lot Size}_{Low} * \dfrac{\text{Residential Low area}}{\text{Residential Low area + Gated Urb. area}} + \\ \text{Minimum Lot Size}_{Gated\,Urb.} * \dfrac{\text{Gated Urb. area}}{\text{Residential Low area + Gated Urb. area}} \end{array}\right\}$$

The effect of minimum lot size should be particularly striking on undeveloped land. In jurisdictions that are mostly built up, the impact of lot sizes should work primarily by reducing the ability to subdivide existing properties.

There is a great deal of variation in this indicator across our 190 jurisdictions. Minimum lot size ranges from 250 to 1,500 square meters in low-density residential areas, while the share of the municipality zoned for that use extends from 2 to 100 percent.

This indicator captures the relation that exists between three concepts associated to restrictions in the supply of residential buildings. These are: lot size restrictions, maximum land use and maximum total buildings which are summarized in the following components: Land Fertility Indicator (LFI), Potential Amenities Indicator (PAI), and Demand Restriction Indicator (DRI).

To construct DRI, besides the survey answers, we used zoning maps of each jurisdiction and developed a series of metrics that allow weighting of our regulation data.[14] Residential zoning is divided into low, medium, and high density, and within each of these, the constructability restrictions are different. Each BRI sub-component is calculated, using the parameters for each area zoned in the jurisdiction and weighted by the total area that is zoned.

To do this, we have amassed very detailed geographical data on each specific type of zoning category and the physical use of land for each municipality. We then match these data with (GIS) geo-referenced zoning ordinances. Finally, for each zoned area, level data on land use intensity is used to construct the maximum potential development that could take place under current regulatory laws in each zoning area that is determined by the municipal regulatory framework. The exercise is based on the idea of assessing potential development, where the amount of build-out permitted under existing land use regulations is computed.[15]

Infrastructure Provision Indicator (IPI)

This indicator captures the level of stringency arising from infrastructure requirements and is built to address two major issues. First, it measures which services are required as normative when a project involves the shift from rural into urban land. Secondly, the IPI measures the portion of infrastructure provided, in practice, by the public sector at any level of government. Here it is important to highlight the fact that as more kinds of infrastructure are required, the municipality, in theory, is more stringent. Nevertheless, the second part of the indicator behaves in the opposite way: as more services are provided by the public sector, the regulatory environment of the municipality is less restrictive.

The aggregate indicator is the standardized sum of both sub-components. Formally:

$$IPI = STD\{ipi\_request - ipi\_public\}$$

The ipi_request is the standardized sum of the different infrastructure items requested by the norm. We take into account: (i) electricity, (ii) street public lighting, (iii) paved roads access, (iv) paved internal roads and sidewalks, (v) water connection, (vi) sewer system, and (vii) rain water drainage. Each of these items equals one if the service is required and zero otherwise. Formally:

$$ipi\_request = STD\{Electricity + Streetlighting + pavement + Sidewalks + DesaguePluvial + Water + Sewerage\}$$

[14] The collection of images was done by contacting the local authorities, and through the Ministry of Government of the Provincia de Buenos Aires. Having obtained the base map of each municipality and corresponding zoning map images (bitmap - BMP), we proceed to geographically reference the zones using GIS (Arc Map software 9.3).

[15] We follow Evenson and Wheaton (2003), who provide a data set of remarkable detail about land uses, the rules governing them, and permissible future development in Massachusetts, and Glaeser and Ward (2009) who used the Pioneers' Institute data for Massachusetts on minimum plot size to construct their minimum plot indicator.

The second part of the IPI, ipi_public, counts the percentage of infrastructure that is provided by the public sector. Among these services we consider: (i) electricity, (ii) gas, (iii) water, (iv) sewer, (v) treatment plant, (vi) sidewalks, (vii) public lighting, and, (viii) paved roads.

$$ipi\_public = STD\{Electricity + Gas + Streetlighting + pavement + TreatmentPlant + Sidewalks + Water + Sewerage\}$$

Access to Land Regulation Indicator (ALRI)

This indicator measures the presence of the redistributive and other access to land-related elements incorporated in the regulation of land use. Although, this measure is based on previous research by Goytia and Pasquini (2010), the 2011 survey allows us to explore not only the normative prescription, but also what happens in practice. Consequently, the first part of the indicator deals with what the normative framework states and the second one reflects what actually happens in practice. Both parts draw from similar questions of the survey and the aggregate index is calculated as follows:

$$ALRI = STd\{\text{ALRI normative} + ALRI \text{ in Practice}\}$$

Whether in practice or as normative, both sub-components take into account:

alri_Public Equipment: The percentage of lot that developers must give for public equipment.

alri_Social Housing: The percentage of lot that it must be given for social housing.

alri: The regulatory instruments that regulate the access to land.

alri_Added Value recovery: The existence of added value recovery tax.

Formally:

$$ALRI_i = \text{Std}\{\text{alri\_Public Equipment}_i + \text{alri\_PublicHousing}_i + alri_i + \text{alri\_Added Value Recovery}_i\},$$

$$\text{Where i} = \text{in Normative or in Practice}$$

In the case of Public Equipment, the survey asks if a developer was forced to give a percentage of land for (i) green spaces, (ii) squares, (iii) schools, (iv) kindergartens, (v) health centers, (vi) sporting equipment, (vii) cultural equipment, or, (viii) roads. In the case of Social Housing only this category was taken into account. In each case, the answers were assigned the following values:

Percentage of plot given up =
- 0 if there were no requirements
- 1 if the request is between 0% and 1%
- 2 if the request is between 1% and 5 %
- 3 if the request is between 6% and 10%

4 if the request is between 11% and 20%
5 if the request is between 21% and 30%
6 if the request is between 31% and 40%
7 if the requests imply more than 41%

Therefore for each item, we added the value assigned to the values above.

Formally:

$$\begin{aligned} alri\_PublicEquipment_{i} = \text{Std}\{&\text{LandDonationParks}_{i} + \text{LandDonationSquares}_{i} + \text{LandDonationSchools}_{i} \\ &+ \text{LandDonation Kindergartens}_{i} + \text{LandDonation HealthCenter}_{i} \\ &+ \text{LandDonation SportEquipment}_{i} + \text{LandDonation CulturalEquipment}_{i} \\ &+ \text{LandDonation Streets}_{i}\}, \end{aligned}$$

And,

$$alri\_PublicHousing_{i} = \text{Std}\{\text{LandDonation for Public Housing}_{i}\},$$

Where i = in Normative or in Practice

The next component of ALRI deals with the Access to Land Regulation Instruments. Again, one part of this component measures what the normative states and the other what occurs in practice. In both cases the index adds one for each of the following elements incorporated in the regulation or used: (i) obligatory use of the urban land, (ii) regularization of occupied land, (iii) building permits reserved for social projects, and, (iv) the possibility for the municipality to acquire land for social purposes.

Formally:

$$\begin{aligned} alri_{i} = Std\{&\text{Obligatory use of the urban land}_{i} + \text{RegularizationOccupiedLand}_{i} \\ &+ Social\ \text{Pr}ojectreserve_{i} + LandMunicipality_{i}\}, \end{aligned}$$

Where i = in Normative or in Practice

Finally, ALRI also captures whether there are instruments set to recover value added value to land generated through zoning changes or other municipal efforts. This is the only part of the component that records differences regarding the normative framework and in practice. When dealing with the normative issues, this component equals one if the instrument is present in the normative and zero otherwise.

$$alri\_AddedValue\ \text{Recovery}\_n = STd\ \{ValueAdded\ \text{Recovery}Tax\_Normative\}$$

Based on the survey data, the value added to land as a result of public sector intervention can be captured by five different instruments. Each respondent was asked how frequently these instruments were used. If the instrument was used always, equals one; sometimes it has a value of half-one, and zero in other cases. The following regulatory instruments were considered: (a) property tax or charges, meaning contributions made effective for zoning changes from rural to urban use or for increases in density (higher FAR allowed), (b) value capture in terms of land or monetary contributions imposed on large area developments (over 5000 square meters); or (c) contributions to improve infrastructure.

Approval Cost Indicator (ACI)

This indicator captures the costs related to the project registration process. The ACI is composed of the standardized sum of the delay measured in days to get a non-regular project approved and the amount of time needed to register a regular project and the time to get it approved.

$$ACI = STD\{(aci\_NR + aci\_R)\}$$

Non-Regular Project Approval Delay Indicator (ACI_nr)

This indicator measures the number of days needed to have a non-regular project approved. This type of project may require that the density of certain area be increased or that the zoning be changed from rural to urban area. The ADI is the average of the delay in days needed for the first and second requirement. More formally,

$$aci\_nr = STD\{Days \text{ to approve an increase in density} + \text{Days to approve a change in zoning} / 2\}$$

Regulat Project Approval Delay and Cost Indicator (ACI_R)

Following the same methodology as above, the ACI not only takes into account the delay in days to approve a regular project, but also the cost to start the approval process. The approval time is a measure of the average time for the review of a project between presentation and approval. When respondents do not have a precise estimate of the average delay, this becomes a subjective indicator. The survey asked about single and multifamily residential projects. The approval time is then defined as the average delay in days between presentation and approval of these projects.

Formally:

$$aci\_r\_t = STD\{(DelayFor\text{SingleFamily} + \text{DelayforMultiFamily}) / 2\}$$

The survey also included a question about the monetary value charged for property registration. As above, the survey distinguished a multifamily and a single-family housing project.

$$aci\_r\_c = STD\{(COSTFor\text{SingleFamily} + \text{COSTforMultiFamily}) / 2\}$$

Gated Urbanization Regulation (GUR)

In recent decades some municipalities have started to approve the development of gated urbanizations (GU). The development of this type of project implies the use of a large extension of vacant land and some local governments have seen them as a way to expand infrastructure provision. Yet, there is no clear evidence of this and more research is needed to better understand the drawbacks of approving gated urbanizations. In order to generate some insight into this issue we developed the Gated Urbanization Regulation Indicator (GUR) which intends to capture how reluctant municipalities are toward the development of gated urbanizations. This indicator is composed of two parts. The first part reflects whether municipal or provincial offices are required to approve a gated urbanization project. Supposing that municipal level is more flexible than the provincial one, the indicator takes a value of two if gated urbanizations are not allowed, one if the province must approve the project, and zero (being the less restrictive) if the municipality is responsible for the approval of GUs projects. The second part of this indicator measures the amount of infrastructure that the government requires the developer of the GU project to provide. As part of the arrangement for the approval of a project, authorities may request the developer to provide: (i) electricity, (ii) public lighting, (iii) access, (iv) sewer, (v) roads, (vi) water, and (vii) rain water drainage. If the norm requests all these items, this part of the indicator equals 7 and if no provision is asked it equals 0. These values are standardized and added to the first part of the indicator.

Formally, this indicator is calculated using the following formula:

$$\text{GUR} = \text{STD}\{\text{GURa} + \text{GURb}\}, \text{ where}$$

$$GURa = \begin{cases} 2 \text{ if Gated Urbanizations are not allowed} \\ 1 \text{ if Gated Urbanizartions must be appoved by the Provincial body} \\ 0 \text{ if Gated Urbanizations must be apporved by the Municipal body} \end{cases}$$

$$GURb = STD\{\sum Of \text{ infrastructrue requested }\}$$

Heterogeneity Zoning Index (HEZI)

The Heterogeneity Zoning Index captures the variety in zoning land use. As part of the survey, local governments officials were asked to attach in their answers the zoning map of their jurisdiction. Thanks to their willingness to cooperate with this project, we were able to use this resource and thus identify 11 types of different land uses. This index is calculated by adding the different types of land use. Each land use was assigned a value of one if it was greater than 0.5 and zero otherwise. At this stage the index values were between 0 and 11, if the municipality has available all the uses. As this index increased, it meant that the local government was more heterogeneous, thus less stringent.

Finally, as we wanted this index to increase as the governments are more stringent we inverted the results of the standardized sum. As HEZI increases, the municipality has a more homogeneous zoning and, thus more stringent.

More formally:

$$\text{HEZI} = -\text{STD}\{\sum ZONING\,USE\,TYPE_I\}$$

Dealing with missing data

As indicated by Gyourko et al. (2008), it is not uncommon for a municipality to have complete data for most survey questions, but missing data for one or two variables. In cases where there is missing information for one of the nearly 80 variables used to create the different indicators, we had to decide whether to drop that jurisdiction from the sample or try to impute the missing data point. 190 local governments answered the survey, but as a result of (at least) one missing value in any variable within the dataset, 86 observations have all the information completed. The BRI Indicator (Building Restrictions Indicator) was the most affected, since it is composed of a large number of variables from each and every building parameter (i.e, in FAR, density, minimum plot size, factor of occupation of the plot, and many other parameters) for each zoning category in a particular jurisdiction (i.e., low, medium, and high density residential areas, mixed zoning areas and gated urbanizations). In this instance, only half of the observations were complete. For the other indicator, there were 2 to 20 missing values, meaning that if no imputation was done, we would have lost less than 10 percent of the municipalities.

Our strategy to deal with the missing data was as follows. First we reviewed the municipal land use ordinances and normative regulations using that to complete the missing values. This information was obtained either via the internet or, most often, was provided by jurisdictions upon our follow-up request. In this way we succeed in completing many cells in the database. Secondly, we decided to complete the rest of the missing values by using predictions with maximum likelihood techniques. More precisely, we used the multiple imputation package (ICE in STATA) developed by Royston (2005). Another possible solution considered, which has been used by other researchers, was to impute missing values with the average values, or to use other packages such as the 'hotdeck' in STATA. Whatever the case, the database includes a flag for every imputation made. Consequently, any other researcher interested in working with the CILP data can use any other imputation method. Once the imputation was done we conducted a detailed verification to see whether the procedure was successful in producing valid data and concluded that, indeed, through the imputation we managed to produce a complete dataset.

Yet, it is extremely important to check how good the imputations were. A good heuristic check on the quality of the imputations is to compare the correlations between the indicators in the case of imputed observations with the correlations in the case of the observations that did not require imputations. The results from that exercise are shown in Table 3 on Appendix A, complemented by histograms of imputed and non-imputed values and, in table 4 the correlation matrix for the imputed and non-imputed values. Overall, the distribution is not much affected. Therefore, since the imputed values behave similar to the original data, the benefits of this procedure clearly outweigh its costs.

Correlation among indicators

The simple correlation among the eight CILP indicators is reported in table 4 of Appendix A. Seventy-five percent of the cross-correlations are positive, which indicates that municipalities that are restrictive in one aspect of the regulatory process tend not to be lightly regulated in others. This observation constitutes an important stylized fact about the nature of the local regulatory environment that will be examined in more detail in subsequent analysis. Practically, this implies that, if the jurisdiction is rated as highly regulated on one of the dimensions by which we measure regulatory stringency, it is very likely to be highly regulated in the other dimensions as well. Only in a few cases the municipal evidence is contradictory, as for example, in relation to adoption and implementation of direct democracy instruments.

Based on these correlations, we can report some interesting points. The highest positive correlations among the CILP indicators are found between the Land Plan Index (LPI) and the Zoning Residential Process Approval Index (ZRPI) (0.43). The second, Access to Land Restriction Index (ALRI) and the Local Assembly Index (LAI) (0.27). These suggest that in municipalities where more authorities are required in the project approval process, it is more usual to find direct participation mechanisms which are binding on public decisions. Finally, another interesting insight derived from the correlation matrix is to notice the indicators that are not related to each other. It seems that some indicators are not correlated at all, such as the ALRI and LPI that show lack of association between the implementation of access to land-related instruments and the existence of local and provincial plans. Similarly, ALRI and BRI are not correlated showing lack of association of such access-to-land instruments that capture land for equipment and housing, and the building restrictions indicator. Finally, the existence of direct democracy mechanisms is not correlated to a higher presence of local and provincial land use plans enacted in the normative framework, indicated by LAI and LPI.

CIPUV Index of Land Policy (CILP): Construction and Analysis

Factor Analysis

We employ factor analysis of the Indicators to create the CIPUV Index of Land Policy (CILP) and we select the first factor as the CILP. In this way, we wish to capture a single dimension of the data and rank localities according to whether they have a more or less restrictive regulatory environment regarding housing and urban land development. Moreover, there seems little need to create additional factors given that the indicators already condense the survey information into a limited number of regulatory dimensions. Additionally, we can use the different indicators to analyze each dimension effect on regulatory environment.

The result obtained by applying a factor analysis methodology is similar to what we can obtain by adding the normalized indicators. The high correlation between the CILP and the sum of the CILP indicators (0.834) suggests that the results obtained from the factor analysis are not sensitive to the weighting produced. This fact is summarized in figure 4 (Appendix A), where the sum of the CILP components is plotted against the final index. After the principal component analysis was performed, the resulting index was standardized therefore the index has a mean of

zero and a standard deviation of one. After looking at the kernel density plot graphs and testing for normal distribution, we cannot reject the null hypothesis of normality (see figure 5 in Appendix A).

The correlations of the CILP with the component indicators are presented in table 6 (Appendix A). In the same table we included the factor loading for each standardized component used to create the CILP. The factor loadings are the weights used when multiplying by each of the standardized component indicators to obtain the CILP as a linear combination of the indicators. As we can see, the aggregate index loads positively on all the components.

The CILP is loading heavily in the indicators related to provincial and local political involvement in planning and land use policy and plans as well as average delay in the project approval process. The CILP loads more heavily on the LPI (Land Plans Indicator) and the ZRPI (Zoning Approval Process Indicator); the factor loadings of these components are both around 0.48. The second group of components in terms of weighting importance in the CILP is the Approval Cost Indicator (ACI) and the Building Restriction Indicator (BRI).[16]

CILP by Municipalities and Regions

The following sections report some of the main findings from our preliminary descriptive statistics analysis. Table 7 (Appendix A) presents summary statistics on the distribution of the CILP for different samples. The analysis of the CILP is performed for the whole sample (column 1), and allows to compare them with the average values for the municipalities within the metro area sample (BUA, in column 2), outside BUA with more than 50,000 inhabitants (column 3), or municipalities with population between 20,000 and 50,000 (column 4). Recall that BUA is a metropolitan area geographical unit, set by the national statistics office (INDEC 1998) that defines each one of the 28 most important urban areas of Argentina formed by one or several municipal jurisdictions. Since metropolitan administrative jurisdictions and authorities are not allowed by art.31 of the National Constitution, BUAs are the urban areas closest in definition to an MSA in the USA or a metro area. The BUA group represents 47 percent of the total sample (89 jurisdictions), while the other two sub-samples of municipalities outside the BUAs comprise 17 and 38 percent respectively. Table 7 also reports the average values of CILP for capital cities and the rest of the municipalities in the full sample. By construction, the CILP presents a mean value of 0, standard deviation of 1 and the middle value is 0.01 for the full sample.

The CILP index follows a normal distribution only for those municipalities that are not part of a BUA and have more than 50,000 inhabitants. Although for the other two sub-samples we reject the null hypothesis of normality, it seems that the CILP mean value for those municipalities within BUA (0.03) tends to be quite close to the overall mean. Importantly, the mean is higher (0.24) for jurisdictions over 50,000 inhabitants outside BUA, while lower for smaller municipalities (-0.16). Only 50 percent of jurisdictions in the BUA sample are over the mean compared with 75 percent of those with over 50,000 inhabitants. This is an interesting finding

[16] Except for BRI, which is not part of the WRLURI (Gyourko et al. 2008), that follows Glaeser and Ward 2009 in their minimum lot size index (our minimum land consumption indicator (DRI)).

since CILP seems to be more stringent in the larger jurisdictions outside metro areas than in jurisdictions located within BUAs. Interestingly, the CILP mean in capital cities is 0.02, very closed to average for the sample, while it is -0.23 for municipalities that are not capitals.

The bottom panel of table 7 shows the characteristics of the municipalities related to each sub-sample. For instance, jurisdictions that do not belong to BUAs and with population above 50,000 inhabitants have, on average, 14 percent of the population with Unsatisfied Basic Needs (UBN).[17] That is the lowest incidence of at least one unmet basic need compared to the other two sub-samples. In terms of land use regulation this group of municipalities has a CILP mean value that is above the sample mean. Capital cities are better off than the rest of the jurisdictions and the CILP mean suggests a more stringent regulatory environment than for those that are not, but less than the average for municipalities in BUAs and for those with more than 50,000 inhabitants outside BUAs. In forthcoming papers we shall focus on estimating causality about these variables.

Table 8 (Appendix A) describes the distribution of the CILP index by geographic regions. It shows the Pampeana region, where Buenos Aires is located, as the only one where the mean value of CILP is above the mean, suggesting it to have a more restrictive regulatory environment (with a mean value of 0.38). The mean values are positive (up to 1.44 standard deviation over the mean) over the 50th percentile. The other regions present negative CILP values, indicating that on average they have a less stringent land use regulatory environment. The least stringent region seems to be the Northwestern region (NOA) with -0.84, followed by the Northeastern (NEA) region with a CILP mean value of -0.67.

At the 50th percentile, the Patagonia region is still the most stringent, with a CILP value of 0.45, half of a standard deviation over the mean and NOA is still the less heavily regulated region followed by NEA. At the 75th percentile the NEA regulatory environment becomes the least stringent (see figure 7 in Appendix A).

The most stringent regulatory environments are found in those municipalities that do not belong to a BUA and have a population of more than 50,000 inhabitants. Their regulatory environment has local plans, the province might also be involved, and their regulations for gated urbanization development fall are around the average restriction level; they allow gated urbanizations requiring developers to provide some level of infrastructure. Their high level of stringency is due to high levels of ZRPI (authorities involved in the approval process for regular or special residential projects), LAI (local democracy), ALRI (requirements to contribute with land for equipment provision, social housing and value capture), and ACI (project approval costs). In other words, these municipalities require more entities to approve a project requiring a zoning change (be they a zoning commission, city council or environmental review board); but also more authorities are involved in the approval process for regular projects, i.e. those that do not involve a zoning change. Further, these municipalities have some form of direct democracy, which is practiced rigorously, in which land use issues and projects must be put to popular consideration and the resulting decisions are binding. There are probably more forms of

[17] This index measures the percentage of population with at least one unmet basic need, according to the unmet basic needs indicator (i.e., *Índice de Necesidades Básicas Insatisfechas*) which includes (a) access to infrastructure services in the dwelling, (b) quality of the dwelling; (c), housing overcrowding; and (d) the dependency ratio for a lower-educated household head.

contributions required for public equipment and social housing. Furthermore, these jurisdictions have on average higher costs and delays for approving a project, while the cost of approvals and delays are also high, probably because of the large number of authorities and actors involved in their project process and presence of direct citizen's participation mechanisms that seem to be more developed here than for the rest of the sample. Importantly, this group of jurisdictions has been the one affected by population pressure and growth during the last decade, due to several macroeconomic conditions related to two main specific issues. First, huge growth of agricultural exports located in rural areas nearby such centers, or manufacturing firms deciding to locate outside BUAs but within corridors which now have greater accessibility to relevant markets and ports (FIEL 2008; Sanguinetti 2009).[18]

For the most part, the municipalities within BUAs behave like the full sample except regarding participatory instruments and their application where they rank below the average (see table 10 and figure 8 in Appendix A). Smaller municipalities outside BUAs behave in an unusual way. They cluster around the average in terms of the existence of plans at local and provincial level (LPI), participatory instruments and their application (LAI), and gated urbanization regulations (GUR). Also, they present a low level of requirements in terms of private infrastructure financing and show a lower percent provision for water, gas and electricity, but at the same time, their percentage of sewer connection is above that of BUA municipalities but lower than municipalities with more than 50,000 inhabitants outside BUAs. Moreover, their zoning regulations display greater homogeneity, showing few zoning categories (HEIZE).

Finally, table 10.B in Appendix A, presents the CILP and its component indicators categorizing the jurisdictions by their population quintiles, the existence of vacant land, the ownership of vacant land, and region. These data show that CILP increases monotonically with population and the share of vacant land, and Pampeana region, the most important in the country in terms of population and GDP per capita, is the most stringently regulated region.

What does it mean to be average in terms of the local regulatory environment?

This section examines the regulatory environment characteristics of CILP average value for jurisdictions in the full sample. We focus on those municipalities with a CILP value within 1/10th of a standard deviation. These values range from -0.06 and 0.12 and are observed in 15 municipalities. Table 11 and figure 9 in Appendix A present the results of this exercise. CILP values below the average are observed in 89 jurisdictions where also all the CILP component indicators are negative. This finding is consistent with the fact that when governments impose stringent (flexible) regulations in one aspect they are also stringent (relaxed) in other aspects. On average, municipalities that are below the average on CILP values present lower values of LPI, indicating that the jurisdiction lacks an urban plan enacted in their regulatory framework, either by local or provincial initiative. Not having an urban plan might be associated with the fact these same municipalities present the least variation in zoning types (high values of HEIZE) displaying less complexity in land uses, and low density.

[18] Some promoted by national and provincial industrial tax exemptions.

A municipality with the typical (average) land use regulatory environment in our sample exhibits low values for the project approval cost indicator (0.34 standard deviation below the sample mean), and are somehow less stringent regarding gated urbanizations. That is, they include this type of zoning but impose fewer infrastructure provision requirements on developers, compared to other municipalities. These same municipalities are around half a standard deviation over the sample mean in terms the number of authorities involved in the project approval process (ZRPI) and have the more developed direct democracy mechanisms which rank more than half standard deviation over the sample mean.

Municipalities with CILP value above the mean have more than half standard deviation above the overall mean in the number of land use plans, enacted provincially and locally (LPI), number of authorities involved in project approval (ZRPI), project approval costs, and in delays for the approval of zoning changes (ACI). In these aspects, their overall regulatory environment for land use and housing development is more strict and complex than in other municipalities. In contrast, direct democracy mechanisms rank lower than in the average jurisdiction; they still exist, but with less binding power on zoning decisions.

Table 12 in Appendix A presents similar results to those discussed above. The main difference is that in this case, the classification of municipalities as average and non-average jurisdictions is based on the value of the percentiles. Here, we divide the sample into three groups: those that are lightly, modestly and heavily regulated. Lightly regulated municipalities are the ones below the 25th percentile; the average ones are between the 25th and the 75th percentile; and the highly regulated ones are above the 75th percentile. Importantly, there seems to be a standard deviation difference of almost two between the highly and lightly regulated jurisdictions regarding the existence of local plans (either provincial or local) and the degree of involvement by various entities in the project approval process. A difference of one and a half standard deviation is found for project approval costs and delays as well as building restrictions, such as minimum plot size or FAR. Finally, highly regulated places are one standard deviation above the lightly regulated ones in infrastructure provision requirements, for both open and gated urbanizations.

Municipalities in Big Urban Agglomerates (BUA)

In this section we focus exclusively on the analysis of municipalities that are part of Argentina's metropolitan areas (BUAs). This sub-sample represents demographically more than 80 percent of the Argentinean population; thus the importance of characterizing the regulatory environment in these jurisdictions.[19]

Table 13 in Appendix A allows us to highlight differences across the sample of BUA municipalities. As above, in this case we divided the BUA sample into three categories depending on their CILP values. Lightly regulated municipalities are those with a CILP value below the bottom quartile (below -0.74), the average regulated are those spanning in the inter-quartile range of the data; and highly regulated jurisdictions are defined as those with CILP values above the upper quartile (above 0.83).

[19] Our forthcoming paper presents econometric analyses that build upon these data (Goytia et al. 2015).

The differences between the lightly and highly regulated BUA municipalities are around one full standard deviation in most cases, except for the low variation regarding the existence and implementation of direct democracy instruments LAI (0.07), and instrument promoting access to land in the form of contributions required from developers for social housing and equipment, both normative and in practice (ALRI components, 0.12). The lack or small gap between these values suggests that no matter what the values of the CILP are, BUA municipalities typically tend to be restrictive regarding direct participation mechanisms and access to land instruments. One of the biggest differences among these values is recorded for the Approval Cost Indicator (~ 1.8), shown, in the fifth row of the table 13 (1.17 and -0.63, respectively); this means that the costs and approval delays are almost two standard deviation above in highly regulated jurisdictions than in more lightly regulated ones. The difference for this indicator between the higher regulated and the average municipality is also high—around one full standard deviation.

The bottom panel of table 13 presents differences in CILP values across the local traits of the BUA municipalities. Although no causality can be inferred from these data, it is valuable to highlight some aspects. One important stylized fact is that municipality's wealth—measured by the average years of education of the adult population is strongly positively correlated with the degree of stringency of the local regulatory environment. The higher the proportion of adults with college degrees, the greater is the municipality's CILP value. On average, higher density and more populated places are also more stringently regulated. It is clear that as we move from left to right (from less restrictive to more) the municipalities tend to increase in population and density. Another set of variables that move in the same direction are those related to infrastructure. Although this table is far from suggesting causality in any direction (from regulation to better infrastructure coverage, or from coverage and local finance share), stringently regulated municipalities perform better in terms of the coverage of water, gas and electricity networks.

Table 14 shows the CILP values and its component-indicators for BUA municipalities.

Table 15 ranks average CILP values by stringency, from lightly regulated to highly regulated environments. Buenos Aires, Bahía Blanca, La Plata and Gran Mendoza, are the most stringently regulated jurisdictions, all of them are part of the six more important metro areas in Argentina, and two are capitals of the most prosperous states, while another includes the federal capital of the country. Furthermore, coastal markets tend to be more highly regulated. Six out of the ten more highly regulated metropolitan areas are costal ones.

Summary and Conclusions

We developed a new measure, the CIPUV Land Use Regulation Index (CILP), following previous work by Gyourko et al. (2008), who have developed the Wharton Residential Land Use Regulatory Index. The CILP allows measuring the local land use regulatory environment across municipalities in Argentina, based on the results of a 2011 survey in which both norms and implementation of land use regulation contribute to bringing better quality information of the

study of regulatory environment.[20] One of the main gains of requesting this type of information was to know that some regions impose higher standards than what happens in practice, in particular in terms of implementing value capture instruments and requiring developers to make contributions for public equipment. The 63 percent of the highly regulated jurisdictions (CILP value above the mean) are more stringent in terms of normative regulations than what they actually enforce.

The CILP is based on a single factor extracted from eight indicators (or sub-indexes) that measure various facets of the local regulatory environment. Our focus in this paper is on that single factor, while other work (see Goytia el al. 2011 and Goytia et al. 2012a) looked in more detail into the subcomponents of the index.

Here we show evidence that jurisdictions with highly stringent regulation in one component of the index tend to be also stringent in other regulatory aspects and that the broader picture is one of spatial heterogeneity, with substantial variation across metropolitan areas (BUAs) and within BUAs municipalities, and greater variability across jurisdictions within and outside metropolitan areas. Municipalities in the Pampeana region and in big metro areas such as Buenos Aires, La Plata, and Bahia Blanca are the most heavily regulated according to our measure.

Adding to that, metro areas in the North East (NEA), Northwest (NOA) and Cuyo regions seem to have different dynamics compared to other of regions. Municipalities in these regions are, on average, below the mean values of the CILP (in some cases the range between the minimum and maximum values is more than two full standard deviations). Those regions present below average indicators in other socio-demographic and territorial dimensions. This means that, in terms of infrastructure coverage, they perform worse than the jurisdictions in other regions. For instance, the provision of sewer infrastructure correlates 0.17 with the CILP in the Pampeana region, and 0.23 in Patagonia, but in NOA the correlation is of -0.47, in NEA -0.24 and in Cuyo -0.02—most likely reflecting the fact that sewer systems are infrastructure services that require a strong financial effort from local government budgets.

Heavily regulated jurisdictions (CILP values in the upper quartile) are those where costs and delay for project approval are higher, the requirements to developers to contribute for infrastructure are stronger and the public sector participates less in financing infrastructure. These heavily regulated jurisdictions have two tiers of normative regulation enacted at both local and provincial level (particularly zoning plans and land use laws), and on average involve more authorities in the approval of regular projects and zoning changes.

Municipalities with an average CILP value, also have average regulation in terms of the authorities that are required to approve a project, the development of direct citizens' participation mechanisms, access to land regulation instruments, and building restriction. Nevertheless, they are 27 percent of a standard deviation below the average in terms of project approval costs and delays, 18 percent above in terms of local plans and 17 percent of a standard deviation below for the development of gated urbanizations. Furthermore, an average regulated jurisdiction seems to

[20] Recent work by Goytia et al. (2012a) shows the analysis of the survey data in greater detail.

have, on average, lower costs and delays for approving projects but they seem to be above the average (even above highly regulated entities) in terms of direct democracy. In these places, the practice of direct democracy in the form of town meetings that require land use issues to be put to popular vote appears to be more important than in highly regulated jurisdictions.

The biggest differences between what happens in highly regulated environments and lightly regulated places are found in terms of project approval costs and delays, two tiers of enacted normative regulation (provincial and local plans) which also adds to the bureaucratic process, and authorities required for approving a project (ZRPI). In all these aspects, the CILP indicators range on average more than one full standard deviation, showing the maximum range for the Local Plan Indicator.

On average, municipalities that do not belong to BUAs (not located within metropolitan areas but in the path to them) and have more than 50,000 inhabitants present the most stringent regulatory environment. With the exception of the Building Restriction Indicator (BRI), and the Gated Urbanization Regulation, they are the most stringent places with respect to all other components that comprise the CILP. These places have the highest percentage of sewer provision (59.9 percent) and the lower percentage of informal tenure (18.5 percent). In some sense, the wealth of a municipality is positively correlated with the degree of local land use regulation. While causality cannot be inferred from this correlation, more telling about the likely motivation for stricter land use controls is the weak, slightly negative, correlation of CILP with density in such jurisdictions. Municipalities over 50,000 inhabitants in the path of a metropolitan area may have the strongest incentives to practice restrictive zoning. In such places, growth of any kind may be perceived as adverse, imposing substantial economic or social costs on residents.

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Appendix A. Tables and Figures

Table 1: Survey Response Rate

	Number of jurisdictions in sample	Number of respondents	Response rate (in %)
Survey Samples			
Belongs to a big urban agglomerate	119	89	75.0
Not in a big U. A. and more than 50k inhabs.	39	33	85.0
Not in a big U. A. and between 20k-50k inhabs.	111	68	61.0
Population			
Less than 23,700 inhabitants.	53	42	79.0
between 23,800 and 33,800 inhabitants.	53	33	62.0
between 33,800 and 54,700 inhabitants.	53	35	66.0
between 54,700 y 115,800 inhabitants.	53	40	75.0
More than 115,800 inhabitants.	58	41	71.0
Region			
Cuyo	30	19	63.0
NEA	51	31	61.0
NOA	30	18	60.0
Pampeana	134	105	78.0
Patagonia	24	17	71.0
Total	269	190	71.0

Table 1.A: Index Names and Abbreviations

Index Abbreviation	Index Name
CILP	CIPUV INDEX OF LAND POLICY
LPI	LAND USE PLAN INDICATOR
lpi_prov	LPI Provincial
lpi_muni	LPI Municipal
ZRPI	REGULAR PROJECT APPROVAL INDICATOR
ZRPI_zai	Zoning Authorities Index
zai_local	Local Authorities involved in Zoning Change Approval Indicator
zai_prov	Provincial Authorities involved in Zoning Change Approval Indicator
zai_tech	Technical Authorities involved in Zoning Change Approval Indicator
ZRPI_rpi	Regular Project Index
LAI	Local Assembly Index
ALRI	ACCESS TO LAND REGULATION INDICATOR
alri_n	ALRI Normative
alri_npe	Normative for Public Equipment
alri_nph	Normative for Public Housing
alri_van	Normative for Recovered Value Added
alri_nalr	Normative for Access to Land Regulation
alri_p	ALRI Practice
alri_ppe	Practice for Public Equipment
alri_pph	Practice for Public Housing
alri_vap	Practice for Recovered Value Added
alri_palr	Practice for Access to Land Regulation
ACI	APPROVAL COST INDICATOR
aci_nr	ACI NonRegular TimeDelay
aci_r_t	ACI Regular TimeDelay
aci_r_c	ACI Regular Cost
aci_r	ACI Regular
IPI	PUBLIC SERVICE PROVISION INDICATOR
ipi_n	Normative for Public Service Provision
ipi_p	Practice for Public Service Provision
GUR	Gated Urbanizations Index
gur_a	Regulation allows for Gated Urbanizations
gur_b	Gated Urbanization Infrastructure
BRI	BUILDING RESTRICTION INDEX
LFI	Land Fertility Index
PAI	Potential Amenity Index
DRI	Demand Fertility Index
HEIZE	HETEROGENETY ZONING INDEX

Table 2: ALRI Normative and ALRI in Practice

Samples	Norm<Prac	Norm>Prac
Full Sample	44.8%	55.3%
BUA	40.5%	59.6%
More than 50k pop	32.0%	68.0%
Between 50k and 20k pop	55.6%	44.4%
Less than 20k pop	47.6%	52.4%
CILP Lightly regulated	31.8%	68.2%
CILP Average regulated	45.2%	54.8%
CILP Highly regulated	40.0%	60.0%
Not in BUA; >50K	48.5%	51.5%
Not in BUA; <50K >20k	48.5%	51.5%
Regions		
Cuyo	50.0%	50.0%
NEA	50.0%	50.0%
NOA	45.5%	54.6%
Pampeana	37.3%	62.8%
Patagonia	33.3%	66.7%
CILP		
Lightly regulated	46.8%	53.2%
Average regulated	47.9%	52.1%
Highly regulated	36.2%	63.8%

Figure 1: ALRI differences between Normative and Enforcement

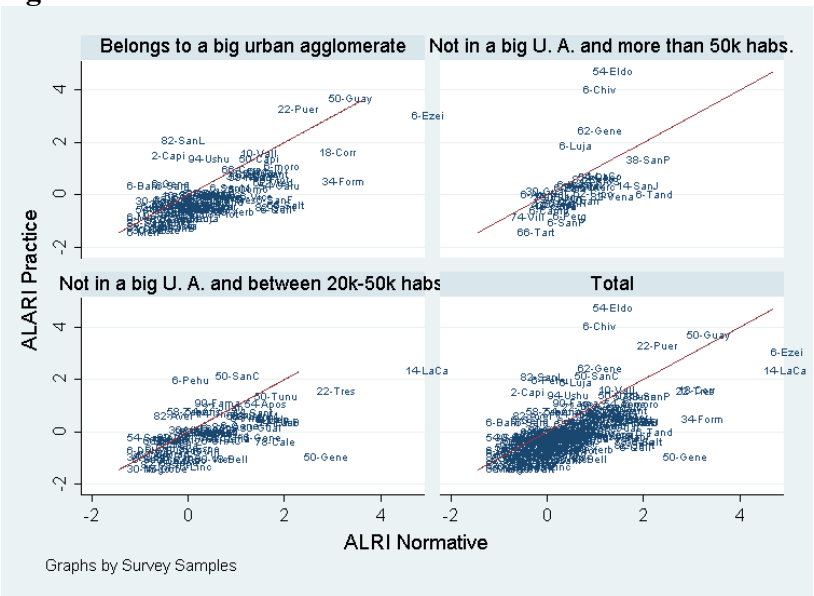

Table 3: Correlations — Imputed and Non-imputed Index Values

	LPI imputed	ZRPI imputed	ALRI imputed	ACI imputed	IPI imputed	BRI imputed	GUR imputed
LPI	1	0.34	0.04	0.20	0.11	0.10	0.09
	0	*0*	*0.64*	*0.01*	*0.13*	*0.50*	*0.20*
ZRPI	0.05	1.00	0.31	0.17	0.09	-0.10	0.00
	0.59	*0*	*0*	*0.02*	*0.21*	*0.49*	*0.99*
ALRI	-0.25	0.30	1	-0.05	-0.03	0.03	-0.05
	0.01	0	0	0.50	0.68	0.82	0.52
ACI	0.14	0.16	-0.02	1	-0.14	-0.29	0.12
	0.18	0.03	0.80	0	0.06	0.04	0.10
IPI	0.14	0.09	0.01	-0.12	0.99	0.18	-0.23
	0.16	*0.23*	*0.94*	*0.12*	*0*	*0.23*	*0.00*
BRI	0.08	0.01	0.13	-0.08	0.03	0.43	-0.03
	0.44	*0.94*	*0.08*	*0.27*	*0.67*	*0.00*	*0.70*
GUR	-0.09	0.01	-0.05	0.12	-0.23	-0.26	1
	0.36	*0.94*	*0.49*	*0.10*	*0.00*	*0.07*	*0*

Notes: Significance levels in *italics*

Figure 3: Histograms of Imputed and Non-imputed Components

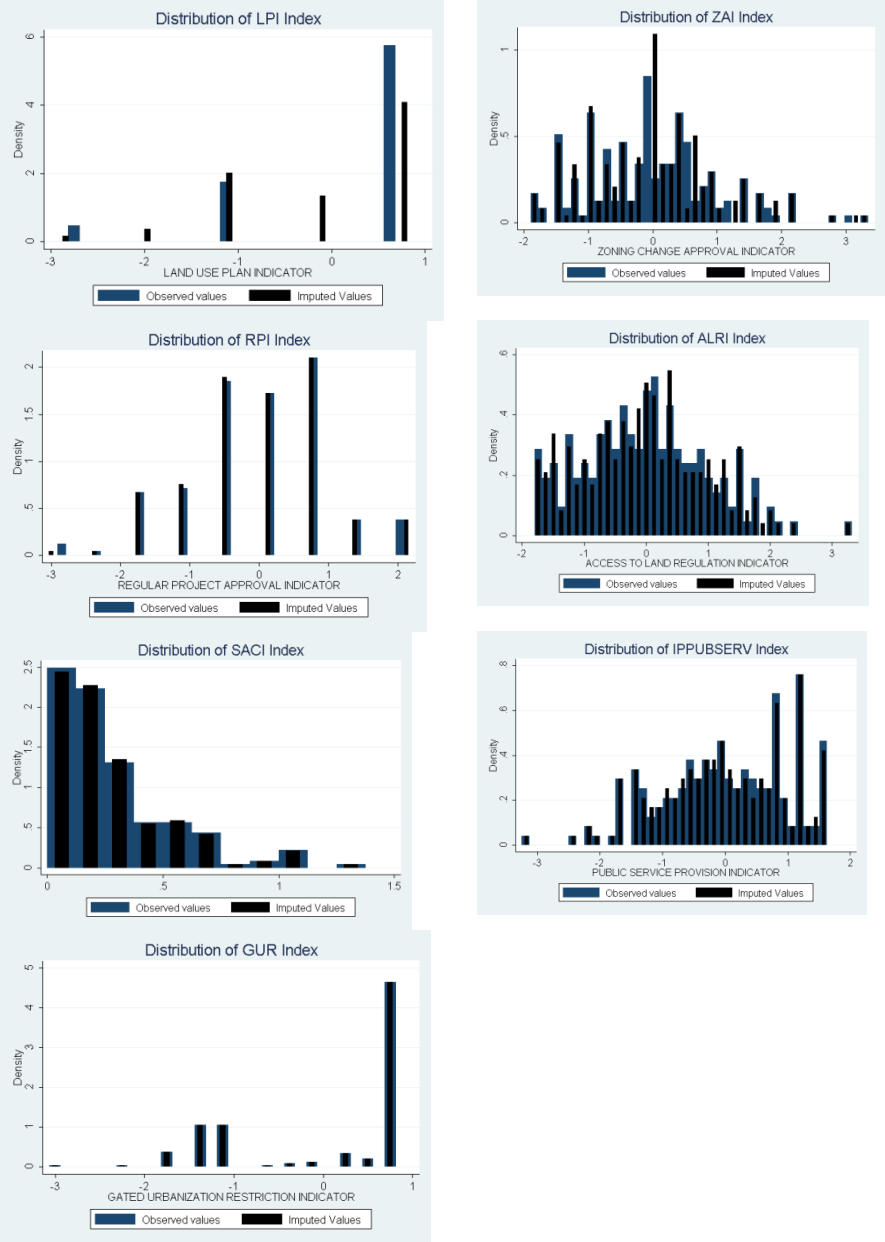

Table 4: Sub-index Correlation Matrix

	LPI	ZRPI	LAI	ALRI	ACI	IPI	BRI	HEZI	GUR
LPI	1								
ZRPI	0.43 *0.00*	1							
LAI	-0.06 *0.38*	0.10 *0.17*	1						
ALRI	0.01 *0.93*	0.20 *0.01*	0.27 *0.00*	1					
ACI	0.25 *0.00*	0.21 *0.00*	0.02 *0.83*	-0.03 *0.72*	1				
IPI	0.13 *0.07*	0.20 *0.01*	0.00 *0.98*	0.04 *0.55*	-0.03 *0.66*	1			
BRI	0.22 *0.00*	0.21 *0.00*	0.07 *0.34*	0.00 *0.96*	0.18 *0.01*	0.24 *0.00*	1		
GUR	0.15 *0.04*	0.09 *0.19*	-0.07 *0.32*	-0.01 *0.89*	0.25 *0.00*	-0.01 *0.87*	0.15 *0.04*	-0.11 *0.13*	1

Note: p-values in italics

Figure 4: Factor Analysis and Sum of Component Indexes

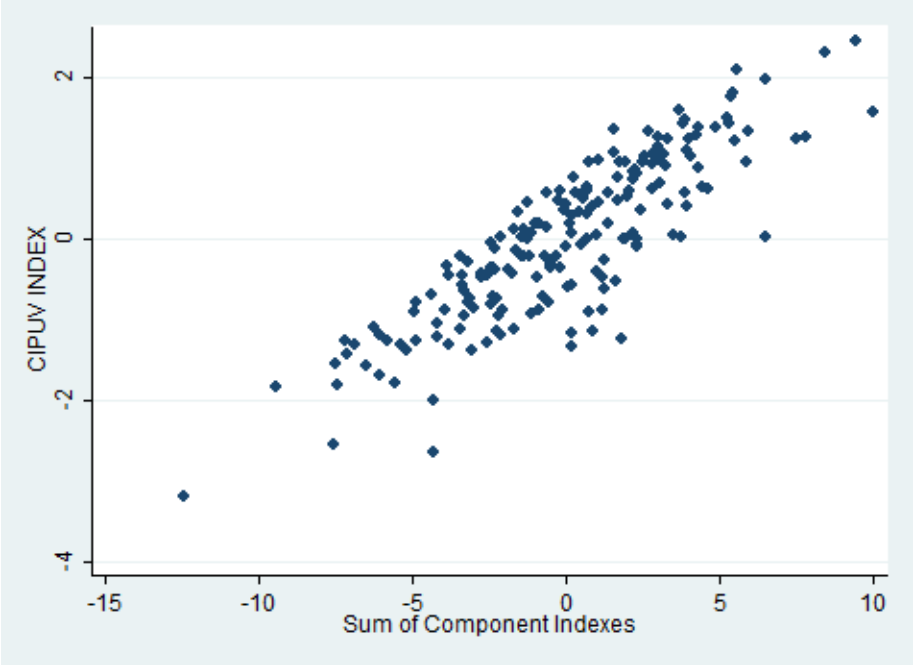

Table 5: The CILLP and its Components

	Factor Loadings	Correlation with CILP
LPI	0.487	0.700
ZRPI	0.488	0.701
LAI	0.100	0.143
ALRI	0.166	0.239
ACI	0.354	0.509
IPI	0.268	0.385
BRI	0.357	0.514
GUR	0.265	0.381

Figure 5: Distribution of Sample Weights (Kernel Density)

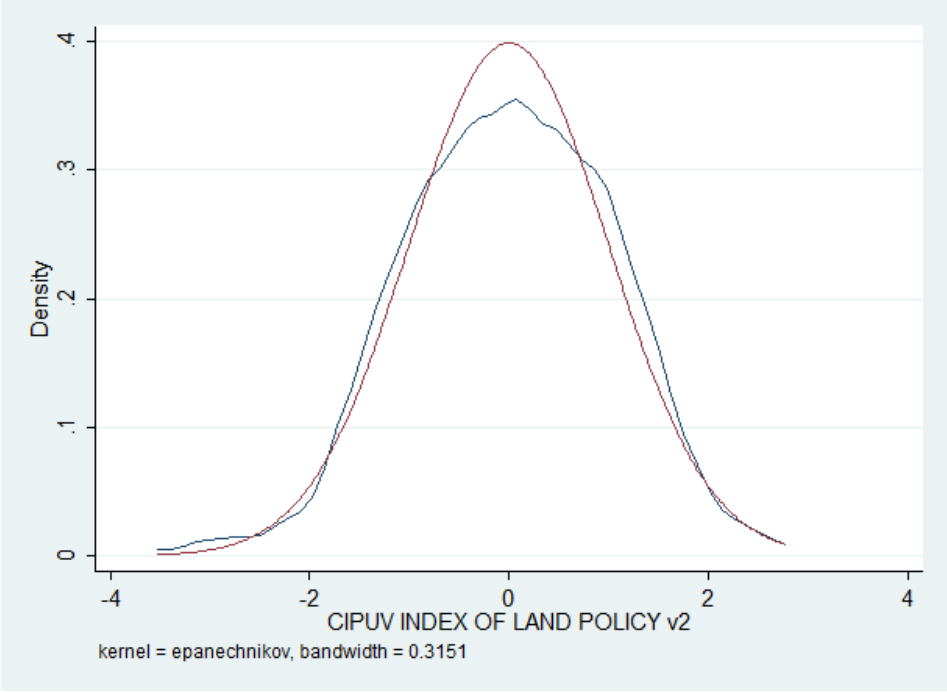

Table 6: Descriptive Statistics of CILP Components

Index Name	Obs	Mean	Std	Min	Max
CIPUV INDEX OF LAND POLICY (CILP)	190	0.00	1.00	-3.20	2.47
LAND USE PLAN INDICATOR (LPI)	190	0.00	1.00	-2.91	0.84
LPI Provincial (lpi_prov)	190	0.68	0.44	0.00	1.00
LPI Municipal (lpi_muni)	190	0.87	0.26	0.00	1.00
	190	0.00	1.00	-3.18	2.37
REGULAR PROJECT APPROVAL INDICATOR (ZRPI)	190	0.00	1.00	-3.18	2.37
Zoning Authorities Index (ZRPI_zai)	190	0.00	1.00	-2.45	2.50
Local Authorities involved in Zoning Change Approval Indicator (zai_local)	190	0.00	1.00	-4.56	2.74
Provincial Authorities involved in Zoning Change Approval Indicator	190	0.00	1.00	-1.06	3.25
Technical Authorities involved in Zoning Change Approval Indicator (zai_tech)	190	0.00	1.00	-1.43	2.47
Regular Project Index (ZRPI_rpi)	190	0.00	1.00	-3.06	2.07
LOCAL ASSEMBLY INDEX (LAI)	190	0.00	1.00	-0.64	3.50
ACCESS TO LAND REGULATION INDICATOR (ALRI)	190	0.00	1.00	-1.61	4.27
ALRI Normative (alri_n)	190	0.00	1.00	-1.41	4.51
Normative for Public Equipment (alri_npe)	190	0.00	1.00	-1.34	4.54
Normative for Public Housing (alri_nph)	190	0.00	1.00	-0.34	4.98
Normative for Recovered Value Added (alri_van)	190	0.00	1.00	-0.52	1.90
Normative for Access to Land Regulation (alri_nalr)	190	0.00	1.00	-1.32	1.95
ALRI Practice (alri_p)	190	0.00	1.00	-1.56	4.01
Practice for Public Equipment (alri_ppe)	190	0.00	1.00	-1.34	4.54
Practice for Public Housing (alri_pph)	190	0.00	1.00	-0.38	4.34
Practice for Recovered Value Added (alri_palr)	190	0.00	1.00	-1.44	2.15
Practice for Access to Land Regulation (alri_p)	190	0.00	1.00	-1.56	4.01
APPROVAL COST INDICATOR (ACI)	190	0.00	1.00	-1.24	3.83
ACI NonRegular TimeDelay (aci_nr)	190	0.00	1.00	-0.87	3.11
ACI Regular (aci_r)	190	0.00	1.00	-1.11	5.07
ACI Regular TimeDelay (aci_r_t)	190	0.00	1.00	-0.61	7.98
ACI Regular Cost (aci_r_c)	190	0.00	1.00	-0.95	3.57
PUBLIC SERVICE PROVISION INDICATOR (IPI)	190	0.00	1.00	-3.38	1.61
Normative for Public Service Provision (ipi_n)	190	0.00	1.00	-3.09	1.23
Practice for Public Service Provision (ipi_p)	190	0.00	1.00	-1.98	1.19
Gated Urbanizations Index (GUR)	190	0.00	1.00	-4.59	2.13
Regulation allows for Gated Urbanizations (gur_a)	190	0.00	1.00	-1.36	0.95
Gated Urbanization Infrastruture (gur_b)	190	0.00	1.00	-0.96	1.28
BUILDING RESTRICTION INDEX (BRI)	190	0.00	1.00	-3.42	4.01
Land Fertility Index (LFI)	190	0.00	1.00	-4.57	1.36
Potential Amenity Index (PAI)	190	0.00	1.00	-2.55	3.22
Demand Index (DRI)	190	0.00	1.00	-0.76	8.33

Table 7: Summary Statistics for CILP for Different Samples

	Full Sample	BUA	Not BUA, >50K Hab	Not BUA, >20k Hab; <50K Hab	Capital Cities	Not Capital Cities
Mean	0.00	0.03	0.24	-0.16	0.02	-0.23
Standard Deviation	1.00	0.94	1.20	0.96	1.01	0.85
Min	-3.20	-1.85	-2.55	-3.20	-3.20	-1.83
Max	2.47	2.11	2.47	2.32	2.47	1.50
10th percentile	-1.26	-1.24	-1.69	-1.28	-1.26	-1.27
25th percentile	-0.74	-0.74	-0.60	-0.77	-0.74	-1.11
50th percentile	0.01	-0.05	0.48	-0.17	0.02	-0.05
75th percentile	0.73	0.83	1.04	0.47	0.81	0.33
90th percentile	1.26	1.34	1.45	1.06	1.26	0.57
N of Obs	190	89	33	68	15	175

Local Trails	Full Sample	BUA	Not BUA , >50K Hab	Not BUA, >20k Hab; <50K Hab	Capital Cities	Not Capital Cities
Density	1619.30	1619.30			1894.06	1560.04
Population	99075.59	168583.10	62519.15	25843.12	360545.10	76663.93
Average years of education	7.00	7.16	7.10	6.73	7.54	6.95
At least w/ one NBI	0.15	0.16	0.14	0.16	0.17	0.15
Infrastructure: Sewage	47.54	41.27	59.87	49.50	68.24	45.74
Infrastructure: Water Network	91.42	92.56	90.12	90.62	96.70	90.96
Infrastructure: Gas Connection	55.13	61.07	56.54	46.93	68.24	53.98
Infrastructure: Electricity	94.36	94.54	94.70	93.97	97.32	94.10
Tenure: Formal Owner (%)	70.44	70.95	70.48	69.76	69.07	70.56
Tenure: Informal Owner (%)	20.35	20.40	18.47	21.19	18.80	20.48
Dwelling Type A %	2.93	2.57	3.00	3.37	1.92	3.02

Figure 6: Distribution of CILP by Sample

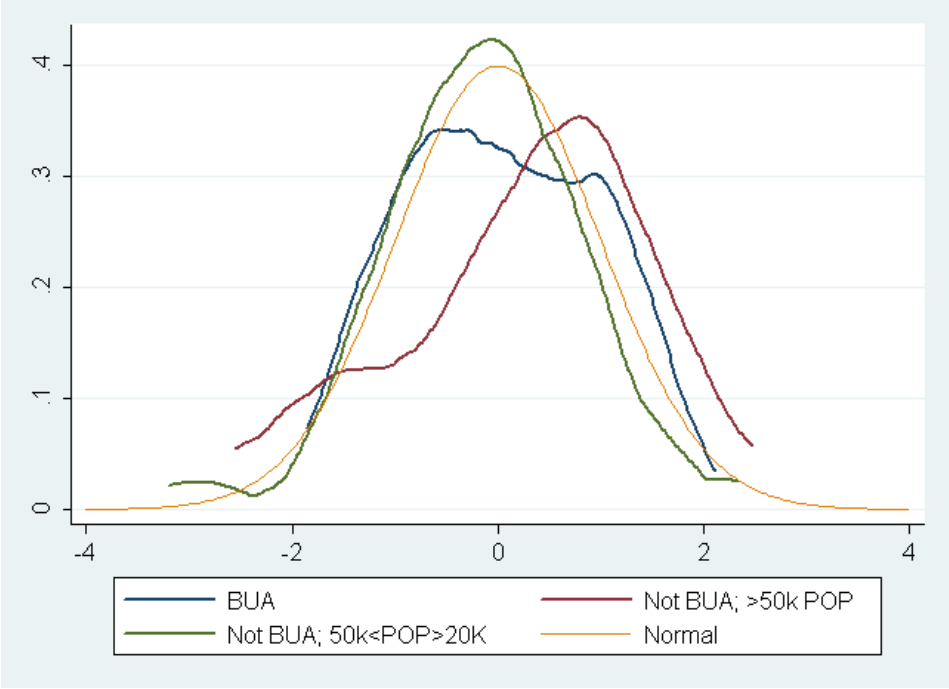

Table 8: Summary Statistics for CILP by Geographic Region

	Cuyo	NEA	NOA	Pampeana	Patagonia
Mean	-0.06	-0.67	-0.84	0.38	-0.15
Standard Deviation	0.72	0.88	1.19	0.90	0.66
Min	-1.80	-2.66	-3.20	-1.28	-1.39
Max	1.34	1.23	1.48	2.47	0.89
10th percentile	-1.33	-1.55	-2.55	-0.94	-1.19
25th percentile	-0.27	-1.24	-1.58	-0.31	-0.72
50th percentile	-0.11	-0.71	-1.08	0.45	0.01
75th percentile	0.46	-0.36	-0.05	1.02	0.19
90th percentile	0.63	0.60	0.83	1.44	0.73
N of Obs	19	31	18	105	17
Local Trails	Cuyo	NEA	NOA	Pampeana	Patagonia
Density	274.9	233.9	885.0	2377.8	69.4
Population	70112.6	53308.1	93575.4	126810.1	49426.6
Average years of education	6.6	6.3	6.8	7.3	7.2
At least w/ one NBI	0.2	0.2	0.2	0.1	0.1
Infrastructure: Sewage	38.6	42.9	49.6	46.6	69.9
Infrastructure: Water Network	91.3	83.4	96.6	92.2	96.3
Infrastructure: Gas Connection	55.2	14.7	50.6	61.9	92.1
Infrastructure: Electricity	95.2	91.5	94.5	94.6	97.2
Tenure: Formal Owner (%)	65.7	68.4	66.4	73.1	67.7
Tenure: Informal Owner (%)	25.8	23.8	27.6	17.4	18.2
Dwelling Type A %	2.6	1.8	1.7	3.6	2.5

Figure 7: Distribution of CILP by Region

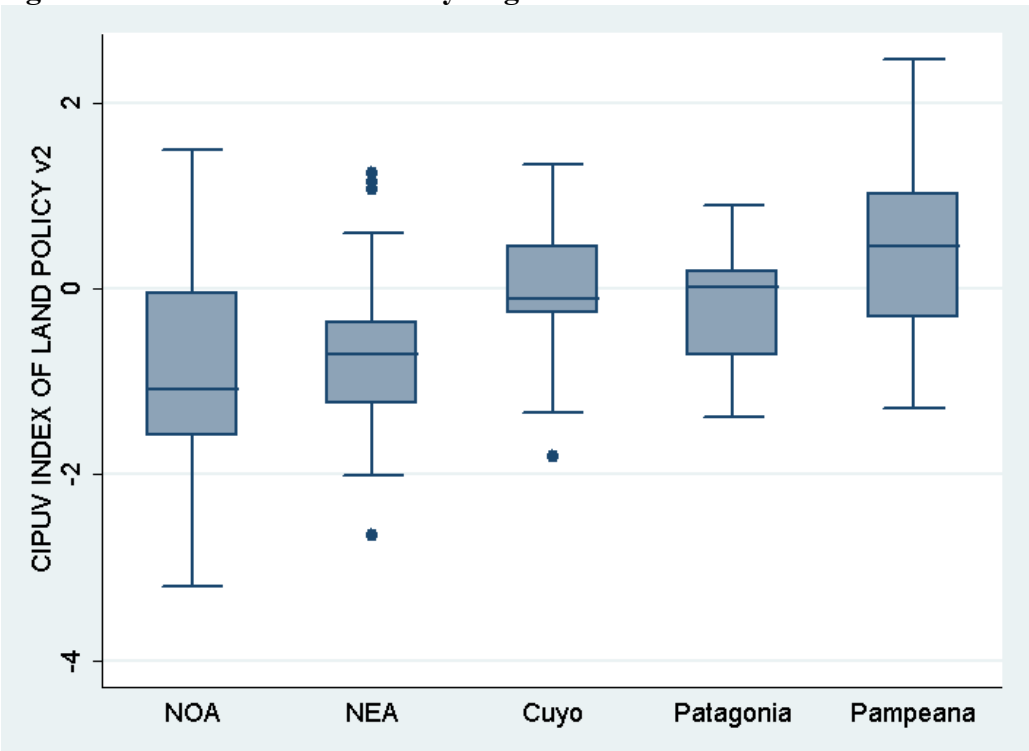

Table 9: Correlation of Local Trails and CILP

	Correlations with CILP								
	Full Sample	BUA	Not BUA; >50K	Not BUA; Between 20k & 50k	Cuyo	NEA	NOA	Central	Patagonia
Population	0.20	0.29	0.30	-0.05	0.38	0.06	0.05	0.20	0.13
Average years of education	0.28	0.22	0.59	0.20	-0.36	-0.18	0.21	0.30	0.08
At least w/ one NBI	-0.27	-0.08	-0.57	-0.30	0.38	0.22	-0.15	-0.13	-0.03
Infrastructure: Sewage	-0.01	0.06	0.03	-0.16	-0.02	-0.24	-0.47	0.17	0.23
Infrastructure: Water Network	0.13	0.18	0.18	0.01	-0.02	-0.18	0.14	0.26	-0.06
Infrastructure: Gas Connection	0.27	0.33	0.38	0.08	-0.14	-0.25	-0.19	0.32	-0.05
Infrastructure: Electricity	0.16	0.18	0.33	0.01	0.16	-0.08	0.21	0.23	-0.30
Tenure: Formal Owner (%)	0.10	0.19	0.24	-0.14	-0.40	-0.29	0.02	-0.01	-0.22
Tenure: Informal Owner (%)	-0.20	-0.18	-0.39	-0.06	0.38	0.20	-0.02	-0.15	-0.04
Type A house: Census 2001	0.13	-0.04	0.40	0.22	-0.17	-0.36	0.35	-0.11	-0.36
N	190	86	33	68	19	31	17	103	17

Table 10: CILP Components by Survey Sample

	Means		
Sub-component	BUA	Not BUA; >50K	Not BUA; < 50K & >20K
Local Plan Index (LPI)	-0.03	0.05	0.02
Zoning Change Regular Project Index (ZRPI)	-0.01	0.30	-0.14
Local Assembly Index (LAI)	-0.14	0.33	0.03
Access to Land Regulation Index (ALRI)	-0.04	0.26	-0.08
Approval Cost Index (ACI)	0.05	0.19	-0.16
Infrastructure Provision Index (IPI)	0.12	0.12	-0.21
Building Restriction Index (BRI)	0.03	-0.18	0.05
Gated Urbanization Restrictions (GUR)	0.03	-0.06	-0.01
N	89	33	68

Local Trails	BUA	Not BUA; >50K	Not BUA; < 50K & >20K
Density	1619.3		
Population	168583.1	62519.2	25843.1
Average years of education	7.2	7.1	6.7
At least w/ one NBI	0.2	0.1	0.2
Infrastructure: Sewage	41.3	59.9	49.5
Infrastructure: Water Network	92.6	90.1	90.6
Infrastructure: Gas Connection	61.1	56.5	46.9
Infrastructure: Electricity	94.5	94.7	94.0
Tenure: Formal Owner (%)	70.9	70.5	69.8
Tenure: Informal Owner (%)	20.4	18.5	21.2
Dwelling Type A %	2.6	3.0	3.4

Figure 8: Regulatory Differences between Survey Samples

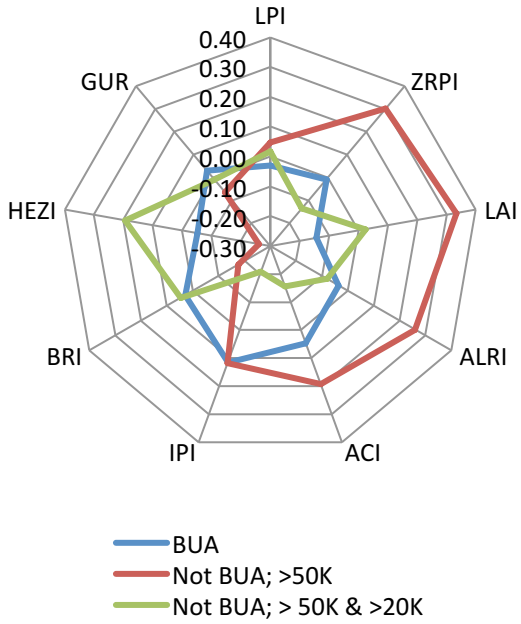

Table 10.B: General Descriptive Statistics of CILP INDEX and its Components

Population	N	CILP	LPI	ZRPI	LAI	ALRI	ACI	IPI	GUR	LFI	DRI	BRI
less than 19425.5 inhabitants	38	-0.3	-0.3	-0.3	-0.1	-0.2	-0.2	0.2	-0.2	0.2	0.2	0.4
between 19425.5 and 28555 inhabitants	38	-0.4	-0.1	-0.3	0	-0.2	-0.4	-0.3	0.1	0.2	-0.2	0
between 28555 and 46641.5 inhabitants	38	0	0	0.2	0.1	0	0	-0.1	0	0	-0.2	-0.1
between 46641.5 and 127073 inhabitants	38	0.3	0.1	0.3	0	0.1	0.3	0.1	0.1	-0.4	0.2	-0.2
more than 127073 inhabitants	38	0.4	0.4	0.1	0	0.2	0.4	0.1	0.1	0	0	0
Total	190	0	0	0	0	0	0	0	0	0	0	0

Vacant Land	N	CILP	LPI	ZRPI	LAI	ALRI	ACI	IPI	GUR	LFI	DRI	BRI
Lowest % (up to percentile 50)	81	0	-0.1	0	0	0	0.1	-0.1	0.1	0	0	0
Medium % (between percentiles 50 and	93	0.1	0.1	0.1	0	0	0	0	0	-0.1	0	-0.1
Highest % (above percentile 75)	15	-0.3	-0.2	-0.3	-0.1	-0.2	-0.3	0.4	-0.4	0.3	0.1	0.3
Total	189	0	0	0	0	0	0	0	0	0	0	0

Table 11: What Does it Mean to be Average?

Sub-component	Means Below Mean	12 Municipalities with -0.06<CILP<0.12	Above Mean
Local Plan Index (LPI)	-0.60	-0.04	0.63
Zoning Change Regular Project Index (ZRPI)	-0.63	0.30	0.61
Local Assembly Index (LAI)	-0.22	0.68	0.10
Access to Land Regulation Index (ALRI)	-0.19	0.01	0.20
Approval Cost Index (ACI)	-0.44	-0.34	0.52
Infrastructure Provision Index (IPI)	-0.31	0.05	0.32
Building Restriction Index (BRI)	-0.43	0.17	0.42
Gated Urbanization Restrictions (GUR)	-0.26	-0.18	0.31
N	89	16	85

Local Trails	Below Mean	12 Municipalities with -0.06<CILP<0.12	Above Mean
Density	1083.7	2304.5	2223.2
Population	64999.7	62261.3	141652.6
Average years of education	6.8	6.9	7.3
At least w/ one NBI	0.2	0.2	0.1
Infrastructure: Sewage	43.8	52.7	50.5
Infrastructure: Water Network	89.2	93.1	93.4
Infrastructure: Gas Connection	45.1	60.7	64.4
Infrastructure: Electricity	93.0	96.1	95.5
Tenure: Formal Owner (%)	69.5	69.4	71.6
Tenure: Informal Owner (%)	22.2	20.4	18.4
Dwelling Type A %	2.8	2.7	3.1

Figure 9: Regulatory Differences between CILP Values

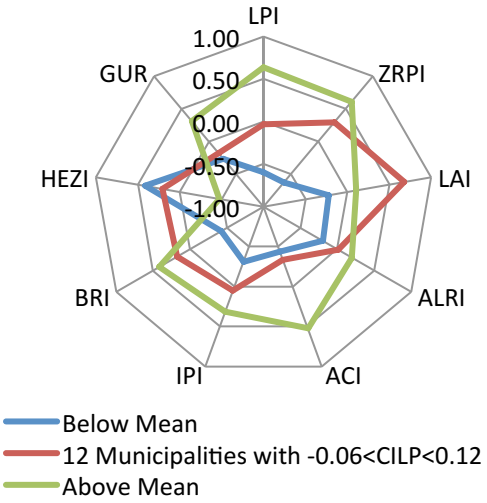

Table 12: Comparing Municipalities in the Full Sample with Different Degrees of Local Land Use Regulation

Sub-component	Mean Full Sample	Lightly-Regulated Bottom Quartile of CILP Distribution CILP<-0.74	Average-Regulated Bottom Quartile of CILP Distribution - 0.74<CILP<0.73	Highly-Regulated Bottom Quartile of CILP Distribution CILP<0.73
Local Plan Index (LPI)	0.0	-1.11	0.18	0.71
Zoning Change Regular Project Index	0.0	-0.94	0.01	0.89
Local Assembly Index (LAI)	0.0	-0.18	0.04	0.10
Access to Land Regulation Index (ALRI)	0.0	-0.29	0.05	0.18
Approval Cost Index (ACI)	0.0	-0.45	-0.27	0.96
Infrastructure Provision Index (IPI)	0.0	-0.51	0.08	0.33
Building Restriction Index (BRI)	0.0	-0.72	0.03	0.63
Gated Urbanization Restrictions (GUR)	0.0	-0.32	-0.17	0.64
N	190	46	96	46

Local Trails	Full Sample	Lightly-Regulated Bottom Quartile of CILP Distribution CILP<-0.74	Average-Regulated Bottom Quartile of CILP Distribution - 0.74<CILP<0.73	Highly-Regulated Bottom Quartile of CILP Distribution CILP<0.73
Density	1619.3	521.3	1765.3	2370.1
Population	99075.6	53363.3	83626.0	176344.5
Average years of education	7.0	6.8	6.9	7.4
At least w/ one NBI	0.2	0.2	0.2	0.1
Infrastructure: Sewage	47.5	50.3	45.7	48.5
Infrastructure: Water Network	91.4	90.4	90.3	94.7
Infrastructure: Gas Connection	55.1	45.4	54.7	65.5
Infrastructure: Electricity	94.4	92.9	94.5	95.6
Formal Owner (%)	70.4	70.6	69.3	72.7
Informal Owner (%)	20.3	21.3	21.3	17.4
Dwelling Type A %	2.9	2.7	3.1	2.9

Table 13: Comparing BUAs Municipalities with Different Degrees of Local Land Use Regulation

Sub-component	Mean BUA Sample	Lightly-Regulated Bottom Quartile of CILP Distribution CILP<-0.74	Average-Regulated Bottom Quartile of CILP Distribution - 0.74<CILP<0.83	Highly-Regulated Bottom Quartile of CILP Distribution CILP<0.83
Local Plan Index (LPI)	-0.03	-1.07	0.11	0.72
Zoning Change Regular Project Index	-0.01	-0.83	-0.02	0.84
Local Assembly Index (LAI)	-0.14	-0.18	-0.14	-0.11
Access to Land Regulation Index (ALRI)	-0.04	-0.14	0.01	-0.02
Approval Cost Index (ACI)	0.05	-0.63	-0.17	1.17
Infrastructure Provision Index (IPI)	0.12	-0.43	0.28	0.34
Building Restriction Index (BRI)	0.03	-0.40	0.03	0.45
Gated Urbanization Restrictions (GUR)	0.03	-0.35	-0.27	1.02
N	89	22	45	22

Local Trails	BUA Sample	Lightly-Regulated Bottom Quartile of CILP Distribution CILP<-0.74	Average-Regulated Bottom Quartile of CILP Distribution	Highly-Regulated Bottom Quartile of CILP Distribution CILP<0.83
Density	1619.3	521.3	1765.3	2370.1
Population	99075.6	53363.3	84461.7	180786.0
Average years of education	7.0	6.8	6.9	7.4
At least w/ one NBI	0.2	0.2	0.2	0.1
Infrastructure: Sewage	47.5	50.3	45.4	49.4
Infrastructure: Water Network	91.4	90.4	90.4	94.9
Infrastructure: Gas Connection	55.1	45.4	54.7	66.1
Infrastructure: Electricity	94.4	92.9	94.4	95.9
Formal Owner (%)	70.4	70.6	69.4	72.8
Informal Owner (%)	20.3	21.3	21.3	17.2
Dwelling Type A %	2.9	2.7	3.1	2.9

Table 14: CILP in the Big Urban Agglomerates

Sub-index values	Belongs to a BUA Full Sample	>50k pop	pop >20k & <50k	<20k pop
CILP	0.03	0.31	0.03	-0.63
LPI	-0.03	0.22	0.01	-0.67
ZRPI	-0.01	0.09	0.17	-0.38
LAI	-0.14	-0.03	-0.18	-0.38
ALRI	-0.04	0.19	-0.37	-0.30
ACI	0.05	0.27	0.19	-0.59
IPI	0.12	0.14	0.07	0.09
GUR	0.03	0.14	0.13	-0.32
LFI	-0.02	-0.21	0.02	0.39
DRI	-0.04	0.02	-0.21	-0.02
BRI	0.03	-0.08	-0.10	0.39
N	89	50	18	21

Local Trails	Belongs to a BUA Full Sample BUA	>50k pop	pop >20k & <50k	<20k pop
Density	1619.3	2654.7	230.7	140.6
Population	168583.1	283792.7	34458.5	9238.6
Average years of education	7.2	7.4	7.2	6.6
At least w/ one NBI	0.2	0.2	0.1	0.2
Infrastructure: Sewage	41.3	49.0	47.3	17.2
Infrastructure: Water Network	92.6	95.9	95.1	82.1
Infrastructure: Gas Connection	61.1	70.8	72.1	27.8
Infrastructure: Electricity	94.5	96.9	96.5	87.2
Formal Owner (%)	70.9	71.2	72.1	69.3
Informal Owner (%)	20.4	19.3	19.4	23.9
Dwelling Type A %	27391.2	44712.3	7771.6	2967.2

Table 15: Average CILP Values by Metropolitan Area

Rnk	BUA	CILP	Obs
1	Stgo. del Estero	-1.83	1
2	Rio Gallegos	-1.19	1
3	Gran Paraná	-1.15	3
4	Posadas	-1.14	2
5	Gran Resistencia	-0.97	2
6	Rawson - Trelew	-0.94	1
7	Rio Cuarto	-0.78	1
8	San Luis – El Cho	-0.78	2
9	Concordia	-0.71	1
10	Gran Rosario	-0.71	10
11	Neuquén – Plottier	-0.60	2
12	Gran Tucumán – Tafi Viejo	-0.54	5
13	Corrientes	-0.48	1
14	Gran Córdoba	-0.44	3
15	Gran Santa Fe	-0.41	4
16	Gran San Juan	-0.36	2
17	Ushuaia – Río Grande	-0.19	2
18	Salta	-0.16	2
19	Jujuy – Palpalá	-0.05	1
20	Formosa	0.01	1
21	Comodoro Rivadavia	0.01	1
22	Santa Rosa – Toay	0.06	1
23	Gran Catamarca	0.24	2
24	Mar del Plata	0.45	1
25	San Nicolás	0.50	2
26	Viedma – Carmen	0.53	2
27	Gran Mendoza	0.66	4
28	Gran La Plata	0.85	2
29	Gran Buenos Aires	0.93	26
30	Bahía Blanca – Cerri	1.61	1

Appendix B. Index Construction Details

Local Plan Indicator (LPI)						
LPI	**lpi_provincial**	-	Provincial level of planning instrument	The degree of involvement of the Province in the planning of land use at Municipal level	0 = There is no provincial regulation 0.5 = There is a planning instrument, but there is no Law or Decree 1 = The planning instrument is in a Law or Decree	Line item 3 of the survey question 1 Line item 2 of the survey question 1 Line item 1 of the survey question 1
LPI	**lpi_municipal**	-	Municipal level of planning instrument	Type of Municipal Land Use Regulation	0 = There is no regulation at municipal level 0.5 = There is a planning instrument, but there is no Law or Decree 0.5 = There is a planning instrument, but there is no Law or Decree 1 = Decrees, Law or Legislation that sets an Urban Code or similar instrument	Line item 4 of the survey question 4 Line item 3 of the survey question 4 Line item 2 of the survey question 4 Line item 1 of the survey question 4
	LPI = STD {provincial + municipal}					
Zoning and Residential Projects Approval Processes Indicator (ZRPI_zai)						
ZRPI_zai	**Local Authorities involved in Zoning Change Approval (zai_local)**					
	zai_local	Executive power at the municipal or communal level	Executive Involved in Zoning Approval	The requirement that a local executive review and approve a new project that entails re-zoning	0 = is never consulted 0.5 = requirement is consulted occasionally 1 = is consulted always	Line item 1 of question 14
	zai_local	Local Municipal Council	Council Involved in Zoning Approval	The requirement that a local deliberative council review and approve a new project that entails re-zoning	0 = is never consulted 0.5 = requirement is consulted occasionally 1 = is consulted always	Line item 4 of question 14
	zai_local	Other Authorities	Other local authorities involved in Zoning Approval	The requirement that other local institutions review and approve a new project that entails re-zoning	0 = is never consulted 0.5 = requirement is consulted occasionally 1 = is consulted always	Line item 7 of question 14
Zai_local = STD {Executive power at the municipal or communal level *Freq+Local Municipla Council *Freq+Other Authorities+Freq}						

ZRPI_zai						
	Provincial Authorities involved in Zoning Change Aproval (zai_prov)					
	zai_prov	Provincial Level of Governmental Officials	Executive involved in Zoning Approval	The requirement that a provincial review and approve a new project that entails re-zoning	0 = is never consulted 0.5 = requirement is consulted occasionally 1 = is consulted always	Line item 6 of question 14
	zai_prov = STD {Provincial Level of Governmental Officials* Freq}					
ZRPI_zai						
	Technical Authorities Involved in Zoning Change Aproval (zai_tech)					
	zai_tech	Zoning Board Commission	Zoning Board Commission involved in Zoning Approval		0 = is never consulted 0.5 = requirement is consulted occasionally 1 = is consulted always	Line item 3 of question 14
	zai_tech	Environmental Evaluation Committee	Environmental Evaluation Committee involved in Zoning Approval	The requirement that an environmental evaluation committee review and approve a new project that entails re-zoning	0 = is never consulted 0.5 = requirement is consulted occasionally 1 = is consulted always	Line item 5 of question 14
	zai_tech = STD {Zoning Board Commission * Freq+ Environmental Evaluation Committee* Freq}					
	ZRPI_zai= STD (zai_local+ zai_prov+ zai_tech)					

Local Assembly Involved in Zoning Change Approval Index (LAI)						
LAI	lai_type		Local Assembly Type	Type of local Assembly tool when a project entails re-zoning	0 = There is no Local Assembly participation or decisions are made public 1 = Local assembly is consulted and decisions are made public. The process of planning is shared with community	Line item 1 and 4 of question 16 Line item 2 and 3 of question 16
LAI	lai_binding		Local Assembly is binding	Identifies if the Local Assembly decisions are binding or not	0 = if the decisions are not binding 1 = if the decisions are binding	Line item 2 question 17 Line item 1 question 17
LAI	lai_normative		Local Assembly in normative	Local Assembly participation tools are incorporated in normative	0 = if Local Assembly instrument is not regulated 1 = if Local Assembly instrument is normative	Line 4 question 18 Line 1,2,3 question 18
	LAI = NORM {lai_type + lai_binding + lai_normative}					
Regular Project Approval indicator (RPAI)						
RPAI	**Technical Office**	-	Technical office involved in approval of regular projects	The requirement that a technical office approves a regular project	0 = doesn't exist 0.5 = requirement is needed occasionally 1 = is required always	Line item 1 question 20
RPAI	**Local Planning Commissions**	-	Municipal Planning Commission involved in approval of regular projects	The requirement of Municipal Planning Commission offices is required to approve a regular project	0 = doesn't exist 0.5 = requirement is needed occasionally 1 = is required always	Line item 2 question 20
RPAI	**Environmental Impact Studies**	-	Environmental impact evaluation involved in approval of regular projects	The requirement that an environmental impact evaluation is needed to approve a regular project	0 = doesn't exist 0.5 = requirement is needed occasionally 1 = is required always	Line item 3 question 20
RPAI	**Other relevant Officials**	-	Other relevant institutions involved in approval of regular projects	The requirement that other relevant institutions are required to approve a regular project	0 = doesn't exist 0.5 = requirement is needed occasionally 1 = is required always	Line item 4 question 20
RPAI = STD {Technical Offices + Local Planning Commissions + Environmental Impact Studies+ Other elevant Officials)						

Access to Land Regulation index (ALRI)						
ALRI						
	Normative for Public Equipment					
ALRI	**alri_npe**	p28_norm_parq	-	By normative, what percentage must be given for parks	0 = No requirements	Line 1 column 1 question 28
ALRI	**alri_npe**	p28_norm_plaz	Environmental Evaluation Committee in Zoning Approval	By normative, what percentage must be given for parks The requirement that an environmental evaluation committee review and approve a new project that entails re-zoning	1 = Requires that 0%-1% of the lot must be given	Line 2 column 1 question 28
ALRI	**alri_npe**	p28_norm_escu	-	By normative, what percentage must be given for schools	2 = Requires that 1%-5% of the lot must be given	Line 3 column 1 question 28
ALRI	**alri_npe**	p28_norm_jard	-	By normative, what percentage must be given for kindergartens	3 = Requires that 6%-10% of the lot must be given	Line 4 column 1 question 28
ALRI	**alri_npe**	p28_norm_cent	-	By normative, what percentage must be given for health center	4 = Requires that 11%-20% of the lot must be given	Line 5 column 1 question 28
ALRI	**alri_npe**	p28_norm_eqdep	-	By normative, what percentage must be given for sport equipment	5 = Requires that 21%-30% of the lot must be given	Line 6 column 1 question 28
ALRI	**alri_npe**	p28_norm_eqcul	-	By normative, what percentage must be given for cultural equipment	6 = Requires that 31%-40% of the lot must be given	Line 7 column 1 question 28
ALRI	**alri_npe**	p28_norm_call	-	By normative, what percentage must be given for streets	7 = Requires that more than 40% of the lot must be given	Line 9 column 1 question 28
	alri_npe = STD {p28_norm_parq + p28_norm_plaz + p28_norm_escu + p28_norm_jard + p28_norm_cent + p28_norm_eqdep + p28_norm_eqcul + p28_norm_call}					

	Practice for Public Equipment					
ALRI	**alri_ppe**	p28_pract_parq		In practice, what percentage must be given for parks	0 = No requirements	Line 1 column 2 question 28

ALRI	**alri_ppe**	p28_pract_plaz		In practice, what percentage must be given for parks The requirement that an environmental evaluation committee review and approve a new project that entails re-zoning	1 = Requires that 0%-1% of the lot must be given	Line 2 column 2 question 28
ALRI	**alri_ppe**	p28_pract_escu		In practice, what percentage must be given for schools	2 = Requires that 1%-5% of the lot must be given	Line 3 column 2 question 28
ALRI	**alri_ppe**	p28_pract_jard		In practice, what percentage must be given for kindergartens The requirement that an environmental evaluation committee review and approve a new project that entails re-zoning	3 = Requires that 6%-10% of the lot must be given	Line 4 column 2 question 28
ALRI	**alri_ppe**	p28_pract_cent		In practice, what percentage must be given for health center	4 = Requires that 11%-20% of the lot must be given	Line 5 column 2 question 28
ALRI	**alri_ppe**	p28_pract_eqdep		In practice, what percentage must be given for sport equipment The requirement that an environmental evaluation committee review and approve a new project that entails re-zoning	5 = Requires that 21%-30% of the lot must be given	Line 6 Column 2 Question 28
ALRI	**alri_ppe**	p28_pract_eqcul		In practice, what percentage must be given for cultural equipment	6 = Requires that 31%-40% of the lot must be given	Line 7 column 2 question 28
ALRI	**alri_ppe**	p28_pract_call		In practice, what percentage must be given for streets The requirement that an environmental evaluation committee review and approve a new project that entails re-zoning	7 = Requires that more than 40% of the lot must be given	Line 9 column 2 question 28

	alri_ppe = STD {p28_pract_parq + p28_pract_plaz + p28_pract_escu + p28_pract_jard + p28_pract_cent + p28_pract_eqdep + p28_pract_eqcul + p28_pract_call}					
	Normative for Public Housing (alri_nph)					
ALRI	**alri_nph**	p28_norm_vivi		By normative, what percentage must be given for social housing	0 = No requirements 1 = Requires that 0%-1% of the lot must be given 2 = Requires that 1%-5% of the lot must be given 3 = Requires that 6%-10% of the lot must be given 4 = Requires that 11%-20% of the lot must be given 5 = Requires that 21%-30% of the lot must be given 6 = Requires that 31%-40% of the lot must be given 7 = Requires that more than 40% of the lot must be given	Line 8 column 1 question 28
	alri_nph = STD {p28_norm_vivi}					
	Practice for Public Housing					
ALRI	**alri_pph**	p28_pract_vivi		In practice, what percentage must be given for public housing	0 = No requirements 1 = Requires that 0%-1% of the lot must be given 2 = Requires that 1%-5% of the lot must be given	Line 8 column 2 question 28

					3 = Requires that 6%-10% of the lot must be given 4 = Requires that 11%-20% of the lot must be given 5 = Requires that 21%-30% of the lot must be given 6 = Requires that 31%-40% of the lot must be given 7 = Requires that more than 40% of the lot must be given	
	alri_pph = STD {p28_pract_vivi}					
	Added Value Recovery in Normative (VAN)					
ALRI	**alri_van**	VAN		Existence of Value Added tax in Normative	0 = Regulation does not include Value Added Tax 1 = Regulation includes Value Added Tax	Question 29
	Added Value Recovery in Practice (VAP)					
ALRI	**alri_vap**	VAP1		In practice, tax is collected as a property tax	0 = Never implemented 0.5 = Occasionally implemented 1 = Always implemented	Question 30b_1
ALRI	**alri_vap**	VAP2		In practice, tax is collected as a contribution at the moment of normative change	0 = Never implemented 0.5 = Occasionally implemented 1 = Always implemented	Question 30b_2
ALRI	**alri_vap**	VAP3		In practice, tax is collected as a contribution when construction permit is given	0 = Never implemented 0.5 = Occasionally implemented 1 = Always implemented	Question 30b_3
ALRI	**alri_vap**	VAP4		In practice, tax is collected as a contribution on purchase-	0 = Never implemented 0.5 = Occasionally implemented	Question 30b_4

				sale of the lot after the regulation changes	1 = Always implemented	
ALRI	**alri_vap**	VAP5		In practice, tax is collected as a contribution after upgrade is done	0 = Never implemented 0.5 = Occasionally implemented 1 = Always implemented	Question 30b_5
	VAP = STD {VAP1 + VAP2 + VAP3 + VAP4 + VAP5}					
	Access to Land Regulation Instruments					
ALRI	**alri_nalr**	Obligatory use of Urban Land in the Normative	p33_1	Compulsory use of urban areas	0 = This tool is not incorporated in the normative 1 = This tool is incorporated in the normative	Line 1 question 33
ALRI	**alri_nalr**	Regularization of Occupied Land in the Normative	p33_2	Regularize occupied lots	0 = This tool is not incorporated in the normative 1 = This tool is incorporated in the normative	Line 2 question 33
ALRI	**alri_nalr**	Social Project Reserve in the Normative	p33_3	Building reserve is established for social housing	0 = This tool is not incorporated in the normative 1 = This tool is incorporated in the normative	Line 3 question 33
ALRI	**alri_nalr**	Land Municipality	p33_4	Possibility of municipality to purchase land for social reasons	0 = This tool is not incorporated in the normative 1 = This tool is incorporated in the normative	Line 4 question 33
	alri = STD {nalr1 + nalr2 + nalr 3 + nalr4}					

	Practice for Access to Land Regulation (PALR)					
ALRI	**alri_palr**	p34_1		Differential rates to incentive the use of urban areas	0 = This tool is not used in practice 1 = This tool is used in practice	Line 1 question 34
ALRI	**alri_palr**	p34_2		Regularize occupied lots	0 = This tool is not used in practice 1 = This tool is used in practice	Line 2 question 34
ALRI	**alri_palr**	p34_3		Building reserve is established for social housing	0 = This tool is not used in practice 1 = This tool is used in practice	Line 3 question 34
ALRI	**alri_palr**	p34_5		Preserve rural land from urbanization	0 = This tool is not used in practice 1 = This tool is used in practice	Line 5 question 34
	PALR = STD {palr1 + palr2 + palr 3 + palr4}					

ALRI = STD {NPE + PPE + NPH + PPH + VAN + VAP + NALR + PALR}						
Approval Cost Indicator (ACI)						
ACI	**Non Regular Approval Delay Index (ACI_nonR)**					
	ACI_nr	aci_nr_t_zone	Days to approve a change in zoning project	Amount of days needed to approve a project that needs a change from rural to urban zone		Line item 1 question 15
ACI	**ACI_nr**	aci_nr_t_dens	Days to approve an increase in density	Amount of days needed to approve a project that needs an increase in density, but not the conversion from rural to urban		Line item 2 question 15
	ACI_nonR = STD {qday_rural_to_urban + qday_rural_to_urban}					
	Approval Cost indicator for non-regular projects ACI_R					
ACI	**aci_r_c**	p21_1	Cost of processing a request for a one-family project	Estimated cost of processing a request to approve a single family project		Line item 1 question 21
ACI	**aci_r_c**	p21_2	Cost of processing a request for a multifamily project	Estimated cost of processing a request to approve a multifamily project		Line item 2 question 21
ACI	**aci_r_t**	p22_1	Days to approve a one-family regular project	Estimated time of processing a request to approve a single family project		Line item 1 question 22
ACI	**aci_r_t**	p22_2	Days to approve a request for a multifamily project	Estimated time of processing a request to approve a single family project		Line item 2 question 22
	ACI_R = STD [STD {(p21_1 + p21_2)/2} + STD {(p22_1+ p22_2)/2}]					
ACI = STD {ACI_nonR + ACI_R}						
Gated Urbanization Regulation (GUR)						
GUR	**Gated Urbanization Regulation - part A**					
	GURa	gur_exist		Existence of gated urbanizations in the municipality	0 = if Gated Urbanizations are allowed in the jurisdiction 2 = if Gated Urbanizations are not allowed in the jurisdiction	Line 1 question 11 Line 2 question 11

GUR	**GURa**	gur_auth		The development of gated urbanizations requires provincial or municipal authorization	0 = only requires municipal approval 1 = requires provincial approval	Line 2 question 12 Line 1 question 12
	GURa = gur_exist + gur_auth					
	Gated Urbanization Regulation - part B					
GUR	**GURb**	bc_electric		Electric energy is required by normative when a project entails re-zoning	0 = service not required 1 = service required	Column 1 question 26_bc
GUR	**GURb**	bc_publigh		Public lights are required by normative when a project entails re-zoning	0 = service not required 1 = service required	Column 2 question 26_bc
GUR	**GURb**	bc_accssroads		Road access is required by normative when a project entails re-zoning	0 = service not required 1 = service required	Column 3 question 26_bc
GUR	**GURb**	bc_pavement		Internal roads is required by normative when a project entails re-zoning	0 = service not required 1 = service required	Column 4 question 26_bc
GUR	**GURb**	bc_drain		Drain system is required by normative when a project entails re-zoning	0 = service not required 1 = service required	Column 5 question 26_bc
GUR	**GURb**	bc_water		Water system is required by normative when a project entails re-zoning	0 = service not required 1 = service required	Column 6 question 26_bc
GUR	**GURb**	bc_sewage		Sewage system is required by normative when a project entails re-zoning	0 = service not required 1 = service required	Column 7 question 26_bc
	GURb = STD {bc_electric + bc_publigh + bc_accssroads + bc_pavement + bc_drain + bc_water + bc_sewage}					
GUR = STD {GURa + GURb}						
Infrastructure Provision Index (IPI)						
IPPUBSERV	**Infrastructure Required by Normative (IPPUBSERV_N)**					
IPPUBSERV	**IPPUBSERV_N**	p26_ua_elect		Electric energy is required by normative when a project entails re-zoning	0 = service notrequired 1 = service required	Column 1 question 26_ua
IPPUBSERV	**IPPUBSERV_N**	p26_ua_alum		Public lights are required by normative when a project entails re-zoning	0 = service not required 1 = service required	Column 2 question 26_ua

IPPUBSERV	**IPPUBSERV_N**	p26_ua_acceso		Road access is required by normative when a project entails re-zoning	0 = service not required 1 = service required	Column 3 question 26_ua
IPPUBSERV	**IPPUBSERV_N**	p26_ua_pavim		Internal roads is required by normative when a project entails re-zoning	0 = service not required 1 = service required	Column 4 question 26_ua
IPPUBSERV	**IPPUBSERV_N**	p26_ua_desag		Drain system is required by normative when a project entails re-zoning	0 = service not required 1 = service required	Column 5 question 26_ua
IPPUBSERV	**IPPUBSERV_N**	p26_ua_agua		Water system is required by normative when a project entails re-zoning	0 = service not required 1 = service required	Column 6 question 26_ua
IPPUBSERV	**IPPUBSERV_N**	p26_ua_cloac		Sewage system is required by normative when a project entails re-zoning	0 = service not required 1 = service required	Column 7 question 26_ua
	IPPUBSERV = NORM {p26_ua_elect + p26_ua_alum + p26_ua_acceso + p26_ua_pavim + p26_ua_desag + p26_ua_agua + p26_ua_cloac}					

	Infrastructure Provided by the Government (IPPUBSERV_P)					
IPPUBSERV	**IPPUBSERV_P**	p27_ppub_elect		In practice electricity or light is provided by public spending	0 = service not required 1 = service required	Line 1 question 27
IPPUBSERV	**IPPUBSERV_P**	p27_ppub_gas		In practice gas network is provided by public spending	0 = service not required 1 = service required	Line 2 question 27
IPPUBSERV	**IPPUBSERV_P**	p27_ppub_agua		In practice water provision is provided by public spending	0 = service not required 1 = service required	Line 3 question 27
IPPUBSERV	**IPPUBSERV_P**	p27_ppub_cloac		In practice sewage is provided by public spending	0 = service not required 1 = service required	Line 4 question 27
IPPUBSERV	**IPPUBSERV_P**	p27_ppub_plantatrat		In practice treatment plant is provided by public spending	0 = service not required 1 = service required	Line 5 question 27
IPPUBSERV	**IPPUBSERV_P**	p27_ppub_veredas		In practice sidewalk network is provided by public spending	0 = service not required 1 = service required	Line 6 question 27
IPPUBSERV	**IPPUBSERV_P**	p27_ppub_alum		In practice public light is provided by public spending	0 = service not required 1 = service required	Line 7 question 27
IPPUBSERV	**IPPUBSERV_P**	p27_ppub_pavim		In practice roads are provided by public spending	0 = service not required 1 = service required	Line 8 question 27
	IPPUBSERV_P = STD {p27_ppub_elect + p27_ppub_gas + p27_ppub_agua + p27_ppub_cloac + p27_ppub_plantatrat + p27_ppub_veredas + p27_ppub_alum + p27_ppub_pavim}					

IPPUBSERV = STD{IPPUBSERV + IPPUBSERV_P}						
Building Restrictions Index (BRI)						
BRI	**Land Fertility Indicator (LFI)**					
	LFI	p23_alta_fot		Maximum Floor to Area Ratio (FAR) allowed in the High Density Residential District	x > 1	Line 16 question 23
BRI	**LFI**	SHARE_ALTA		Share of the High Density Residential District	0 < x < 1	Municipalities' Geo-referenced Zoning Maps
BRI	**LFI**	p23_media_fot		Maximum Floor to Area Ratio (FAR) allowed in the Medium Density Residential District	x > 1	Line 10 question 23
BRI	**LFI**	SHARE_MEDIA		Share of the Medium Density Residential District	0 < x < 1	Municipalities' Geo-referenced Zoning Maps
BRI	**LFI**	p23_baja_fot		Maximum Floor to Area Ratio (FAR) allowed in the Low Density Residential District	x > 1	Line 2 question 23
BRI	**LFI**	SHARE_BAJA		Share of the Low Density Residential District	0 < x < 1	Municipalities' Geo-referenced Zoning Maps
	LFI= STD (p23_alta_fot* SHARE_ALTA+ p23_media_fot* SHARE_MEDIA+ p23_baja_fot* SHARE_BAJA)					
	Demand Restrictions Index (DRI)					
BRI	**DRI**	p23_baja_suplote		Minimum Lot Size in Low Density Residential District	LOTE_MIN_baja/2 if p23_baja_prophoriz=1	Line 6 question 23
BRI	**DRI**	p23_baja_prophoriz		Horizontal property allowed in the Low Density Residential District	LOTE_MIN_baja/1.5 if p23_baja_prophoriz=2 LOTE_MIN_baja/1.25 if p23_baja_prophoriz=3	Line 7 question 23
BRI	**DRI**	SHARE_BAJA		Share of the Low Density Residential District	0 < x < 1	Municipalities' Geo-referenced Zoning Maps
	DRI= STD ((LOTE_MIN_baja * (SHARE_BAJA/ (SHARE_BAJA+ SHARE_BC)) + (LOTE_MIN_bc * (SHARE_BC/(SHARE_BAJA+SHARE_BC))					
	Potential Amenities Indicator (PAI)					

BRI	**PAI**	p23_baja_fos		Maximum Occupancy Land Factor in Low Density Residential District	0 < x < 1	Line 1 question 23
BRI	**PAI**	p23_media_fos		Maximum Occupancy Land Factor in Medium Density Residential District	0 < x < 1	Line 9 question 23
BRI	**PAI**	p23_alta_fos		Maximum Occupancy Land Factor in High Density Residential District	0 < x < 1	Line 15 question 23
BRI	**PAI**	SHARE_BAJA		Share of the Low Density Residential District	0 < x < 1	Municipalities' Geo-referenced Zoning Maps
BRI	**PAI**	SHARE_MEDIA		Share of the Medium Density Residential District	0 < x < 1	Municipalities' Geo-referenced Zoning Maps
BRI	**PAI**	SHARE_ALTA		Share of the High Density Residential District	0 < x < 1	Municipalities' Geo-referenced Zoning Maps
BRI	**PAI= p23_baja_fos * (SHARE_BAJA/ (SHARE_BAJA+ SHARE_MEDIA+SHARE_ALTA))+ p23_media_fos * (SHARE_MEDIA/ (SHARE_BAJA+ SHARE_MEDIA+ SHARE_ALTA))+ p23_alta_fos * (SHARE_ALTA/ (SHARE_BAJA+ SHARE_MEDIA+SHARE_ALTA))**					
BRI= STD (LFI+ DRI+ PAI)						
Heterogenity Zoning Indicator (HEZI)						
	HEZI	USO_1		Gated Urbanizations District	0= it does not exist in the zoning area 1= it exists in the zoning area	Municipalities' Georreferenced Zoning Maps
	HEZI	USO_2		High Density Residential District	0= it does not exist in the zoning area 1= it exists in the zoning area	Municipalities' Georreferenced Zoning Maps
	HEZI	USO_3		Medium Density Residential District	0= it does not exist in the zoning area 1= it exists in the zoning area	Municipalities' Georreferenced Zoning Maps
	HEZI	USO_4		Mix & Medium Density Residential District	0= it does not exist in the zoning area 1= it exists in the zoning area	Municipalities' Georreferenced Zoning Maps

HEZI	USO_5		Mix Residential District	0= it does not exist in the zoning area 1= it exists in the zoning area	Municipalities' Georreferenced Zoning Maps
HEZI	USO_6		Low Density Residential District	0= it does not exist in the zoning area 1= it exists in the zoning area	Municipalities' Georreferenced Zoning Maps
HEZI	USO_7		Equipment District	0= it does not exist in the zoning area 1= it exists in the zoning area	Municipalities' Georreferenced Zoning Maps
HEZI	USO_8		Green Spaces District	0= it does not exist in the zoning area 1= it exists in the zoning area	Municipalities' Georreferenced Zoning Maps
HEZI	USO_9		Industrial District	0= it does not exist in the zoning area 1= it exists in the zoning area	Municipalities' Georreferenced Zoning Maps
HEZI	USO_10		Others	0= it does not exist in the zoning area 1= it exists in the zoning area	Municipalities' Georreferenced Zoning Maps
HEZI	USO_11		No Data	0= it does not exist in the zoning area 1= it exists in the zoning area	Municipalities' Georreferenced Zoning Maps
HEZI = - std {USO_1 + USO_2 + USO_3 + USO_4 + USO_5 + USO_6 + USO_7 + USO_8 + USO_9 + USO_10 + USO_11 }					