

## Spatial Patterns of Affordable Housing Needs in Portugal

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### Abstract

Ensuring the provision of affordable housing is an important and challenging role of planning practice, both at macro and micro level. The adequacy of housing supply to the population's (present and future) needs, preferences and income is particularly relevant and complex in territories where standard housing market mechanisms typically fail. In places, shaped by socio-economic vulnerabilities (such as high proportions of population with low income levels) and by severe demographic decline processes (associated with high levels of vacancy houses), the mismatch between the market drivers (e.g. demand and supply) and the efficient market conditions to produce affordable and good solutions for all population is a crucial issue in the context of public policy.

Thus, a spatial composite indicator of housing accessibility, considered in this article as a combination of need and affordability, is developed. More specifically, the former is assessed by the balance between housing stock (supply) and number of households (demand), while the latter is captured by the equilibrium between housing price (supply) and household's income conditions (demand).

*Keywords: housing needs, housing affordability, spatial econometric analysis, demography, income*

### 1. Introduction

The concepts of need and affordability applied in the context of housing are widely discussed in the literature (C. M. E. Whitehead, 1991, C. Whitehead & Yates, 2009, Fingleton, 2008), from which emerges a clear distinction between both. In general terms, housing need is the quantity and type of housing that a country, a region or a place requires to provide accommodation for a given standard pattern, within a society (price is not considered), while housing affordability is an indication of whether house prices / expenditure are affordable in relation to the incomes of the households or a certain group of people (e.g. first-time home buyer, young people, specific type of workers). The former, is therefore related with social demand, the latter considers only housing expenditure and income without any definition of housing standards.

A relative interdependence between the right to adequate housing (need) and the right to a minimum threshold of living conditions (affordability) can be assumed (United Nations, 2016). The inclusion of access to housing within the scope of human rights results from the fact that it is recognized that the dignity of human life stems from the satisfaction of basic needs such as having a house that provides privacy and security, peace and dignity (Leckie, 1989). The

concepts of right to housing and housing justice are at the basis of the design of instruments able to provide adequate housing to families whose socioeconomic conditions block their access to this essential condition for dignity. The right to housing, as a human right, binds States to the need to support citizens in their pursuit when they are unable to access this essential asset on which the dignity of their existence depends (Kothari & Chaudhry, 2001). The inability to pay for adequate housing is an unjust and humiliating unacceptable condition that requires corrective public policy intervention.

The widespread recognition of the importance of access to housing by national and international institutions (Kothari, Karmali, & Chaudhry, 2006; Commissioner for Human Rights, 2009; United Nations, 2016; Cuidades Y Gobiernos Locales Unidos, 2018), has not been sufficient for solving this violation of human rights.

This paper presents an exploratory approach to measure housing need and housing affordability across the 276 Portuguese municipalities (inland territory), using descriptive spatial econometrics methods to capture spatial patterns associated with these concepts. The section 2 provides a general overview about how these two concepts are discussed, measured and contextualized in the national and international public policy agenda. In section 3 the territorial patterns of need and affordability are presented and then discussed in line with the conceptual framework of housing vulnerabilities presented in the literature. Moreover, regional disparities in terms of demography and housing demand and supply are shown as a result of a multidimensional notion of housing accessibility. Finally, in section 4, general conclusions and further research directions are summarized.

## **2. Housing need and affordability**

### ***2.1 International Background***

The right of access to housing combines seven dimensions: legal security of tenure, including legal protection against forced evictions; availability of services, materials, facilities, and infrastructure; affordability; habitability; accessibility for vulnerable groups; location and, cultural adequacy (Miloon Kothari & Chaudhry, 2001) (Tate, Meyer, & Yuan, 2016). Access to housing results from a combination of dimensions that are constantly being framed. Evidence on the aggregation of dimensions goes back to the early 1980s when housing need placed the focus on the inability to pay rents, loans or purchase values by low-income populations. International institutions such as the OECD are starting to pay attention to the process of replacing social housing provision policies (supported by the public sector) with market-oriented assistance solutions (Misztal, 2013).

Public concern with social groups and territories, where the inability to afford housing costs occurs, is growing as it represents families' most significant expenditure. This situation makes them vulnerable to variations in the rental and acquisition market, changes in financing conditions and the tensions shaping housing provision. Low-income families and other social groups positioned on the edge of the housing market, due to this condition of vulnerability are always at risk of being homeless or being unable to access housing that fulfils the seven abovementioned dimensions (Quigley & Raphael, 2004). The weight of housing costs for

families in situations of poverty, for example in the USA, captures about half of the family income while the average of this cost for all families is about a quarter of the income.

In the most common approach, the ability to afford housing costs results in a ratio between household income and the amount corresponding to that weekly, monthly or annual expenditure. This ratio creates a dynamic geography of families, social groups and territories that enter and leave this border of exclusion. Consequently, when calculating the threshold that excludes social groups and territories from access to housing, the most and least efficient policies to reduce this vulnerability are considered (Stone, 2006).

Urbanization is a structural condition with a global expression that is associated with better working conditions, access to a range of amenities and better incomes causes a constant need for housing production and increases this cost for families. When market mechanisms are fully functioning, there is an increase in supply that works as a device that blocks price inflation. However, in many regions, the zoning rules, the control of the available land for this urban function and the financing of this type of asset keeps the price of housing at a level that causes difficulties for families with low and medium-income that. In many cases, it means the inability to purchase or rent a house. Public provision policies or other support instruments targeting specific families or agents in the housing market and urban planning strategies can minimize the problem of the inability to access adequate housing (Agyemang & Morrison, 2018).

Briefly, there are two approaches to determine the inability to pay for housing costs. The ratio could be turned into an effort rate that weighs the proportion of the cost of housing in the family's income. Housing is affordable if the share of household income is low or moderate. Hamidi, Ewing, & Renne (2016), using the price affordability ratio, the U.S. Department of Housing and Urban Development states that if the total housing cost is at or below 30% of gross annual income, then the house is affordable. According to the World Bank criterion, housing price to income ratio between 3 and 6 is considered acceptable (Lau & Li, 2006). However, as presented in the 13<sup>th</sup> Annual Demographia International Housing Affordability Survey by Cox, Pavletich, and Hartwich, median housing prices which are multiples of 3.0 and below of median income are considered affordable; 3.1 to 4.0 of median income are moderately unaffordable; 4.1 to 5.0 are seriously unaffordable, and 5.1 and over are severely unaffordable (Cox & Pavletich, 2016).

The residual income approach through which the impact of housing is weighed against the other monthly household expenses. That is, "this measure expresses the challenges that each household faces in balancing the cost of housing with non-housing expenditure, subject to a budget constraint" (Borrowman, Kazakevitch, & Frost, 2017, p. 871).

Families that are vulnerable at the risk of not being able to pay the cost of housing are in the situation that Borrowman et al., (2017) calls "housing affordability stress". The authors consider that a family suffers from housing affordability stress "if income after housing costs are met, is below a budget standard. Budget standards are a set of budget lines based on pricing a basket of goods and services that a household needs to achieve a specific standard of living, which will vary according to the differences in the quality, quantity, and scope of household consumption" (Borrowman et al., 2017, p. 871).

Focusing on the situation in Portugal, the indicators show that the rate of overhead on housing expenses, which corresponds to the proportion of people living in households, in which the ratio between annual housing expenses and disposable income (less social transfers related to housing) is over 40%, was 6.7% in 2017, 0.8 pp less than in 2016 (National Statistical Institute of Portugal, 2018).

## ***2.2 The demand perspective of needs and affordability: demography and social conditions***

The increase in life expectancy and the decrease of the number of births are unquestionable phenomena in developed countries, leading to a progressive aging of the population. Most of the European countries are currently facing two related demographic challenges: population ageing and population decline – resulting from a combination of low fertility and the life expectancy increase. Despite being a generalized phenomenon, this process is affecting central and peripheral regions differently and is shaping new spatial patterns of inequality. Portugal is a peripheral territory, in the European context, where these demographic decline and aging processes are much more intense. Within the country, a significant part of the Portuguese territory is in sharp population decrease. The data analysis in the last decades clearly shows that the current trend is leading to human desertification in the inland of Portugal (Castro et al, 2017). One of the main issues addressed by Portuguese demographic studies is the concentration of population in the coastal zone arising from a continuous process of urban and industrial agglomeration. Such process is centred on the growth of the metropolitan areas of Lisbon and Oporto and is spreading to the coastal area between and around both cities. To a lesser extent, urban sprawl also occurs in the coast of Algarve. The counterpart of such process is the persistent though territorially heterogeneous demographic and economic decline of the rest of the country. Current demographic indicators show that this trend persists and is combined with other demographic phenomena, such as the decrease of the average size of households and a strong aging tendency (Castro, 2016).

These regional economic and demographic disparities motivated several public programs in depressed areas which, so far, did not reverse the situation. In what concerns population policies, it is clear that any measure aiming to increase birth rates will no longer produce significant impacts in the inland, given the population age structure (Gomes et al, 2016). Young people must be attracted from other regions, and thus, any effective demographic policy must promote opportunities to enhance the quality of life for all that are living or will be live in those territories. The provision of good jobs, infrastructures and services and affordable houses are critical conditions to reverse the present demographic trends. In the absence of adequate policies there is a risk that a population decrease will create less demand, leading to a negative vicious circle. If employment fall greater than population decrease, negative population dynamics will be enhanced by out migration movements. Given the unbalance on the population age structure, there is a serious risk of generating a demographic downward spiral decrease, with direct impact in the housing needs. Thus, the demographic evolution, over time, and population distribution, across the territory, is having an effective impact in housing demand and supply; the former, because the total population is dramatically decreasing and the available housing is more than enough for the people that are leaving in those territories, the later, in the sense that the

economic dynamic and the job opportunities do not justify any private residential housing investment, both in new buildings or requalification existing buildings.

The successive changes in demographic structure and population distribution across the territory contribute significantly to the variation in housing markets over time. Understanding the nature of such temporal dynamic is important when effective public policies are required.

### ***2.3 The supply perspective of needs and affordability: Housing and income***

In the UN-Habitat Millennium Development Goals Report (Indicator 11.1.1), United Nations estimates that one in eight people in the world lives in slums or experiences slum-like conditions around their housing environments. Over the next 15 years, it is estimated that more than three billion people will need adequate housing. The estimative for 2025 concludes that just in Europe will be 41.8 million of people living in slums. That means that these households have a lack of access to the better-quality water source, sanitation facilities, enough living area, housing durability and, the security of tenure (UN-Habitat, 2018).

The Report of the Special Rapporteur on adequate housing (Mission to Portugal) concluded that in 2015, 33.5 percent of poor households lived in unaffordable situations and were at risk of falling into arrears or mortgage foreclosure, a 3 percent increase in just two years (United Nations, 2017). According to the National Statistical Institute of Portugal, 11 percent of people living in poverty live in severe housing deprivation, and almost 10.3 percent (21 percent of whom are poor) live in overcrowded households. Through a survey of Housing Replacement Needs, concluded in 2018, the Portuguese authorities identified 25,762 families as being in an unsatisfactory housing situation. In 2018 the share of the population in the bottom quintile of the income distribution spending more than 40% of disposable income to pay for a mortgage in Portugal was 26,8 percent and to pay for rent at market price on the private rental market was 33,5 percent (OECD 2.2 Social Policy Division, 2017).

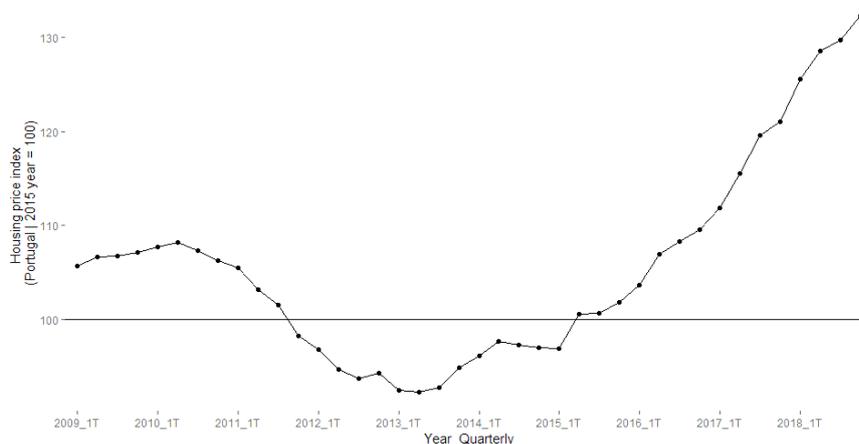
Housing is considered an important single asset owned by most individuals and represented a very large proportion of household wealth. The share of income spent on housing represents a considerable percentage of total expenditure and a permanent source of direct expenses (rent, interest rate and amortisation, repair and renovation, etc.) and indirect costs (energy, water, telecommunications, furniture and other domestic goods, etc.). For this reason, for households, the cost and quality of their houses greatly influence their quality of life. The Portuguese National Bank estimates that average housing expenditure in Portugal currently represents 30% to 40% percent of monthly income. Beyond its impact at the household level, major and persistent expenditures on housing lead, at the macroeconomic level, to high levels of external indebtedness affecting countries as diverse as Portugal and the United States.

The rise in the importance of the housing sector is due to the abovementioned multiplier effect and corresponding policies essential for maintaining high levels of economic growth and employment supply. The flip side of the coin corresponds to the negative effects from oversupply of housing that is recorded for most developed countries (ESDP, 1999; ECB, 2002), and which in turn, is partially explained by the expansion of the number of second dwellings. In the case of Portugal, the number of houses increased from 2.6 million, in 1970, to more than 5.9 million in 2019 (but 12.5%, about 750 thousand, are empty - OECD, 2019), representing a

growth rate significantly higher than the number of households. A recent OECD Report (2019) reveals that Portugal is the developed country of the Organization for Economic Cooperation and Development (OECD) with more houses per thousand inhabitants. This study also shows that 11.3% of Portuguese with a rented house in the private market spend more than desirable, by spending more than 40% of their disposable income on housing. In many countries as Portugal, housing costs are especially demanding for the poorest families (OECD, 2019).

After a somewhat minimal evolution in the 1990s and early 2000s, housing prices in Portugal have been increasing in the recent past (see for instance Rodrigues, 2017, in which the authors analyse the determinants of housing prices in Portugal, with particular emphasis on the periods of crisis and post-crisis.). Leading the strong rising of housing prices is Lisbon, where buying a house costs 4,532 euros per square meter (INE, 2019). According to recent data of the Statistic Institute, in more than two and a half years, buying a house in Lisbon has increased 1,002 euros per m<sup>2</sup>: from 1,875 euros per m<sup>2</sup> to 2,877 euros per m<sup>2</sup>. The scenario is not different for Oporto (the second major urban area of Portugal), where the increase corresponded to 437 euros per m<sup>2</sup> - increased from 1,088 euros per m<sup>2</sup> to 1,525 euros per m<sup>2</sup>. The increase of prices in urban areas with strong tourist pressure (which is the case of these two metropolitan areas of Portugal) has as direct consequence the accentuating of the gentrification process and an increase in housing demand in more peripheral areas. The disposable income of the majority of Portuguese households is not sufficient to buy a dwelling nearby the workplaces, and the interest rates to apply for a bank loan are not as attractive as they were in the past. The figure 1 shows how the housing price evolved in the last 10 years.

**Fig. 1.** Housing price index for Portugal (Base – 2015 year)



Source: INE / <https://bit.ly/2RZDjyl>

### 3. Data and Methodology

As mentioned in the introduction, this paper presents an exploratory analysis of the general accessibility to housing provision mechanisms in Portugal. This analysis was applied in the context of the 276 Portuguese municipalities for the period between 2011 and 2018 and uses a set of key indicators collected and compiled from the National Statistical Institute (INE) public database. The territorial disparities of housing need and housing affordability are analysed

through spatial analysis techniques – spatial descriptive statistics and spatial autocorrelation measures.

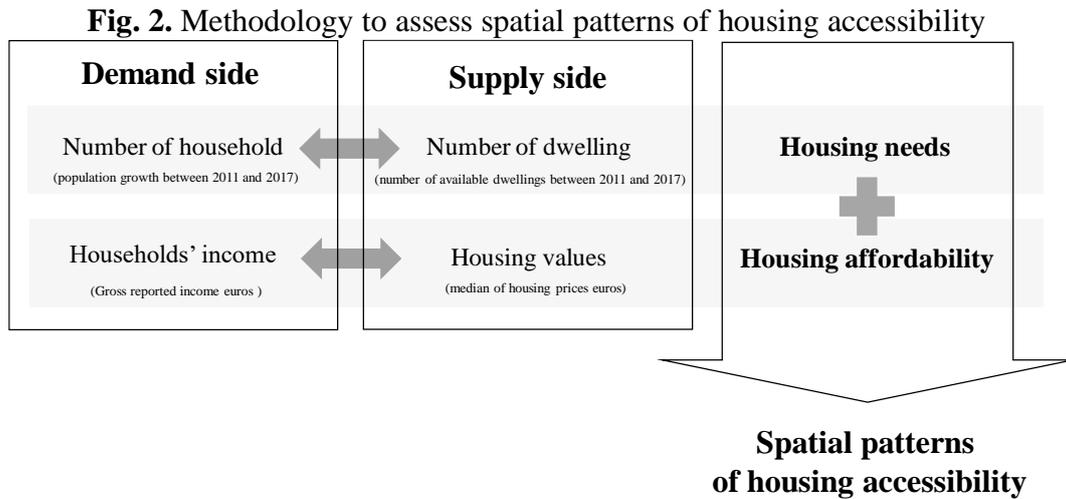
As shown in table 1 and figure 2, for this propose it was considered: i) the population growth between 2011 and 2018 (to assess the demand side of the need); ii) the number of available dwellings between 2011 and 2018 (to assess the supply side of the need); iii) the households' median income in 2018 (to assess affordability for demand side); and iv) the median of housing prices (to assess affordability for supply side).

The exploratory assessment of territorial patterns of housing accessibility is obtained through a spatial clustering processes, in which the spatial autocorrelation analysis allowed to capture where housing need and housing affordability are critical, that is, where the ratio between the population growth and the available number of dwellings between 2011 and 2018 is higher; and where the ratio between the (yearly) maximum disposable income of household in housing expenses (2017) and the market value of houses (2017), measured in yearly costs, is lower. Finally, a joint analysis of these two concepts are presented in order to identify major territorial patterns (clusters) of housing accessibility.

**Table 1.** Primary data and indicators derived for the exploratory spatial analysis (Stage 1)

	PRIMARY VARIABLE	SOURCE OF PRIMARY DATA	FINAL HOUSING INDICATOR	DESCRIPTION
DEMAND SIDE	Resident Population (No.) (census – 2011)	INE ( <a href="https://tinyurl.com/vse436o">https://tinyurl.com/vse436o</a> )	Population growth	Demographic dynamic between 2011 and 2018 in the Portuguese municipalities. (Note that to analyse housing need in 2018 was considered the resident population estimates for 2018 – as the final indicator)
	Estimated resident population (annually population estimations - 2018)	INE ( <a href="https://tinyurl.com/srg eewb">https://tinyurl.com/srg eewb</a> )		
	Gross reported income (€) of taxable persons (2017)	INE ( <a href="https://bit.ly/37YAaEv">https://bit.ly/37YAaEv</a> )	Maximum income available for housing expenses by households (€ - median - yearly)	Median spent on housing expenses; it is considered the value based on the maximum effort rate of 40% of disposable income
SUPPLY SIDE	Conventional dwellings (No.) by Occupancy status ...crossed with... Buildings (No.) by Preservation state; (Census - 2011)	INE ( <a href="https://bit.ly/39ajVEf">https://bit.ly/39ajVEf</a> and <a href="https://bit.ly/3b9EsuF">https://bit.ly/3b9EsuF</a> )	Available houses (number)	The final indicator considers the (total) vacant conventional dwellings for sale and for rent which are integrated in buildings classified with the following preservation state: repair not needed, small need repair or medium need repair. In addition, it was considered the number of completed dwellings in new constructions for family housing between 2011 and 2017
	Completed dwellings (No.) in new constructions for family housing (2011 to 2017)	INE ( <a href="https://bit.ly/2GUyzDO">https://bit.ly/2GUyzDO</a> )		
	Median value (€) per m <sup>2</sup> of dwellings sales (2018)	INE ( <a href="https://bit.ly/36Y64Qa">https://bit.ly/36Y64Qa</a> )	Median housing value (€ - median - year equivalent)	The median market price is multiplied by the average housing size in the municipality. Average size of houses are obtained as a weighted average of the central value of each class of useful area, using the number of dwellings in each class. To define the yearly equivalent of housing value it is assumed a mortgage contract with a 2% (average) interest rate and a 30 years credit contract.
	Conventional dwellings of usual residence (No.) by Size class of useful area (m <sup>2</sup> )	INE ( <a href="https://bit.ly/31qnHa7">https://bit.ly/31qnHa7</a> )		
JOINT ANALYSIS OF SUPPLY AND DEMAND FOR BOTH NEED AND AFFORDABILITY				

[Ratio of] Number of available houses by number of individuals – measuring housing need
[Ratio of] Median housing market value by median household's income – measuring housing affordability

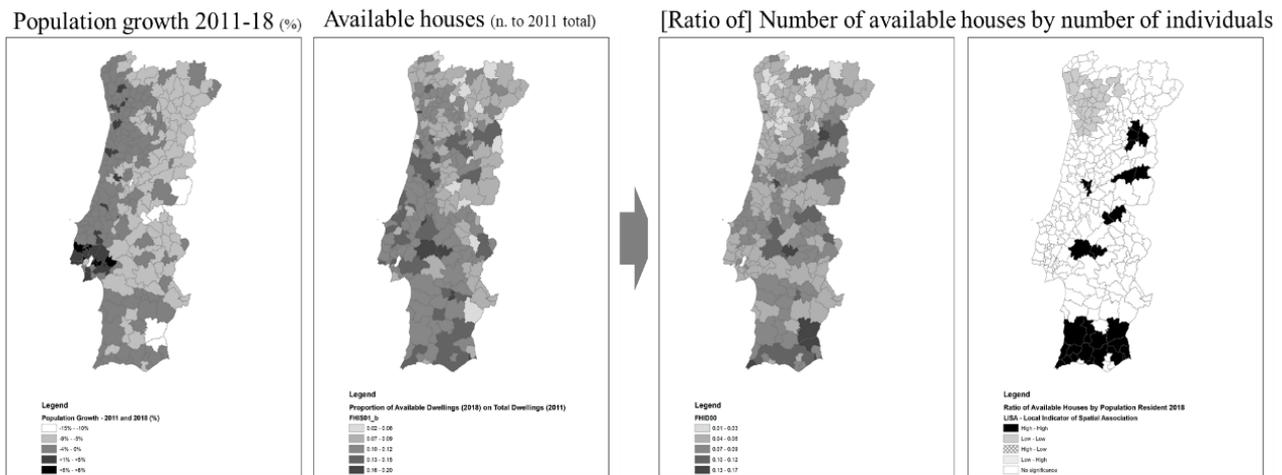


## 4. Results

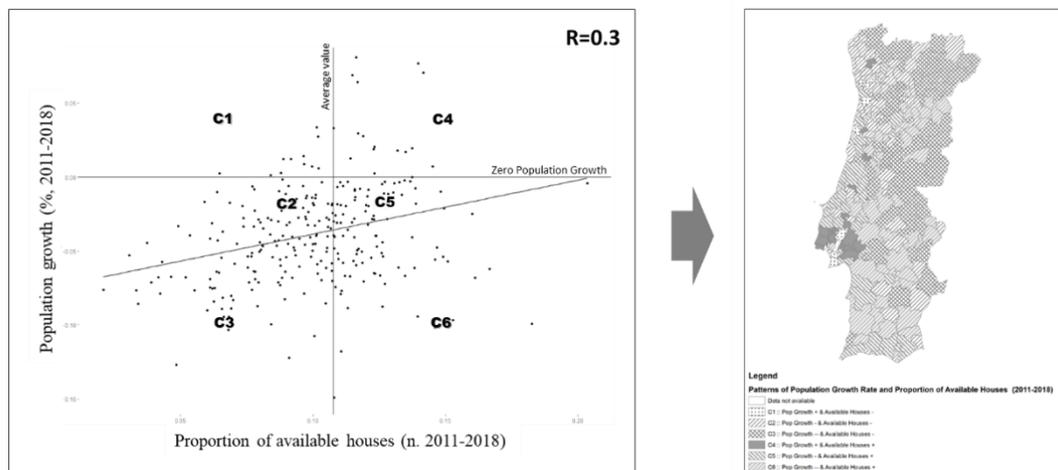
### 4.1 Housing Needs

The results described below represent the spatial structure of housing need. It is possible to identify very different and clear territorial patterns regarding the demand for housing and its availability. As mentioned in the theoretical framework, the demographic evolution in Portugal is resulting in a strong and deep contrast between the inland and the coastal territory of the country, but the number of available houses does not follow this pattern, as demonstrated by the dispersion graph in figure 4, and corroborated by the coefficient correlation (0.3). Analysing the LISA indicator (local indicator for spatial autocorrelation), which measures the univariate spatial autocorrelation for the indicator used to measure the concept of housing need – the ratio between the number of available houses and the number of individuals shows significant differences. In the north-west, the housing need is critical, while in the south it is not a major issue. A more detailed analysis of the dispersion graph in figure 4, allowed to build 6 territorial clusters, taking into account the position of each municipality in relation to different housing need sub-dimensions, considering 3 thresholds: i) the municipalities with values above and below the regression line (distinguishing the municipalities that have the population growth value above or below to what would be expected for the percentage of available housing); ii) considering the null level of the population growth, and finally, iii) the average value of the percentage of available housing to the total housing stock, in Portugal municipalities'. The combination of these three conditions resulted on the territorial clusters represented on the map of the figure 3. Clusters 1, 2, 4 and 5 are those where the - need for housing is greater, since the demand indicator suggests to be much higher than the supply response. In this group, it is also possible to highlight the territories of clusters 1 and 4 where population growth is positive, while clusters 2 and 5, despite being territories where housing need indicator point to a comparatively alarming situation despite these territories have negative population growth.

**Fig. 3.** Spatial patterns of housing need



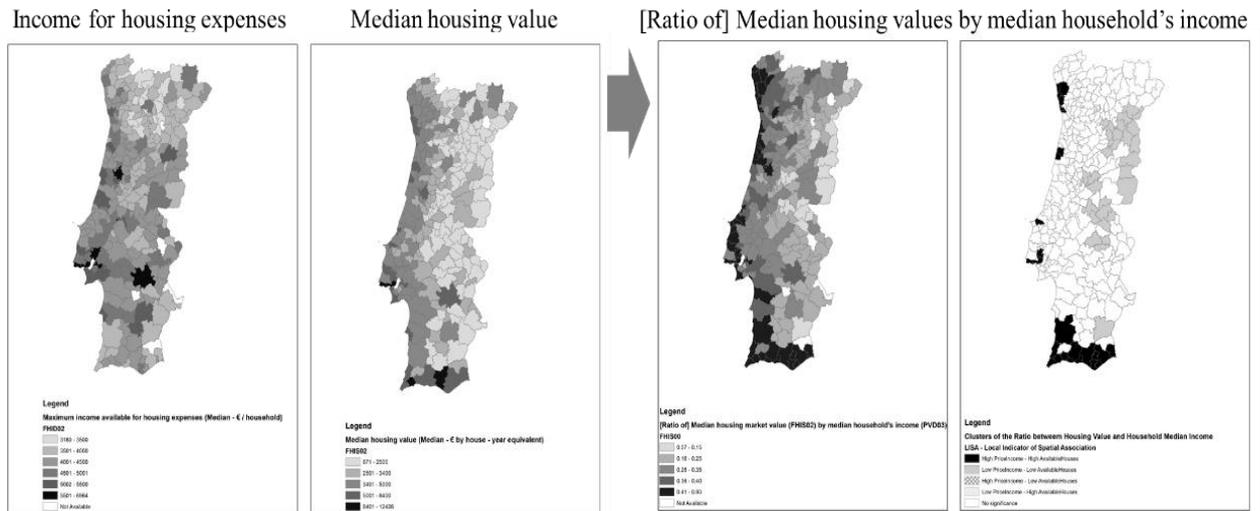
**Fig. 4.** Spatial patterns of the demand and supply of housing need



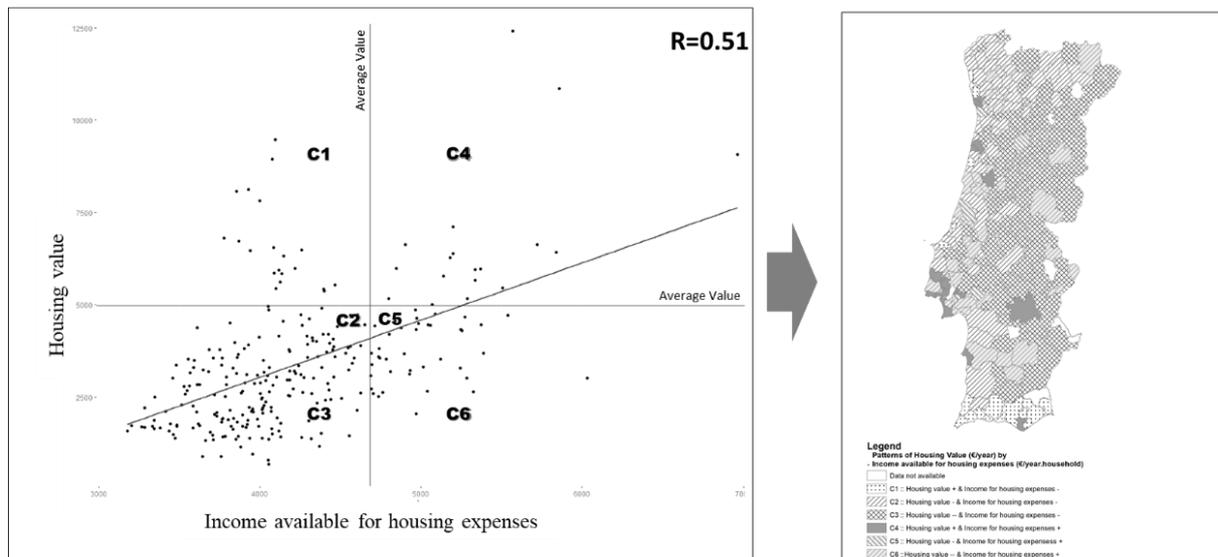
#### 4.2 Housing Affordability

The information described below follows the same rational as that followed in the previous point. The results are presented for the concept of housing affordability measured by the relationship between the level of household's income and the value of housing (third and fourth maps in figure 5). In this case, as expected, it is possible to find a close association between the value of housing and the income of the population - as can be seen from the territorial patterns of income and housing prices (first and second map in figure 5) – and to validate by the measure of the correlation coefficient of the scatter plot, shown in figure 6. Using the same approach of the previous indicator (housing need), three axes were defined, allowing to stratify the territory into 6 different groups. The clusters 1, 2 4 and 5 are the critical ones, because it includes the municipalities that have the value of housing above to what would be expected given the income of the families who live there. Still, it is worth mentioning clusters 1 and 4, which have a value of house prices above the average.

**Fig. 5. Spatial patterns of housing affordability**



**Fig. 6. Spatial patterns of the demand and supply of housing affordability**

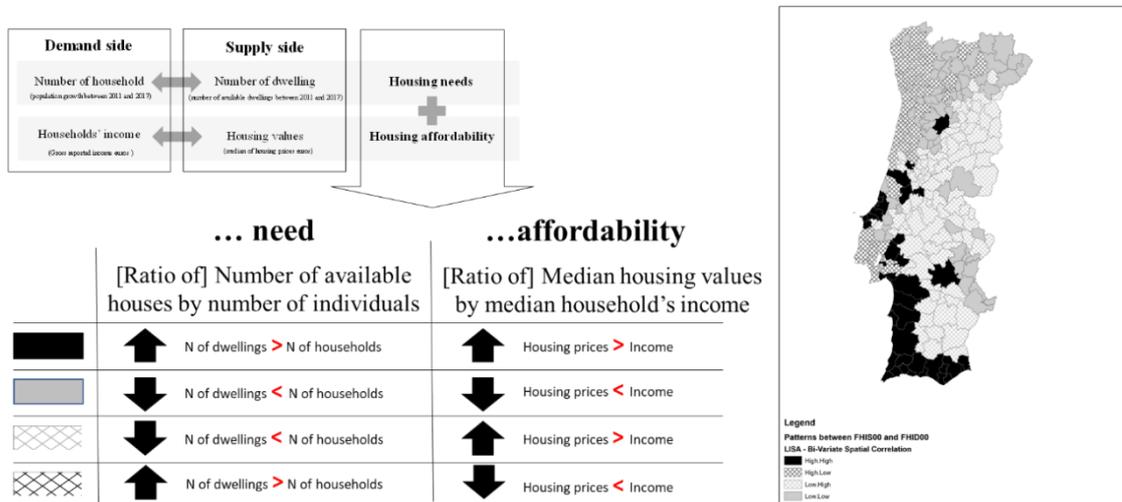


**4.3 Territorial patterns of accessibility housing**

This last point aims to present the territorial patterns of housing accessibility, assessed by the aggregation of the concept of housing need and housing affordability, presented in the previous two sections. From this aggregation, it was possible to establish 4 territorial clusters of housing accessibility, which result from a combination of high and low values of the two implicit dimensions of this composite indicator. Thus, there is a clear division of the country into 4 distinct quadrants: i) the northern coastal area (between the two metropolitan areas of Lisbon and Oporto) with bad housing accessibility (few and expensive houses); ii) the southern coastal area (corresponding to Algarve region and the coastal part of Alentejo region) in which the level of housing accessibility is not critical if the housing need is considered, but the level of affordability is critical, that is, there are many houses available but there are expensive compared to the income level of households that are living in those territories; iii) the northern

interior of Portugal aggregates the municipalities with bad performance of the housing need (the number of dwelling are greater than the number of households) but a good level of affordability, there are few houses but they are cheap); finally the iv) the southern interior of Portugal (which is suffering a trend of human desertification) considers the municipalities with the highest level of accessibility, there are many and cheap houses. Of course, that these results must be analysed carefully, since the questions of having good conditions of housing accessibility just means that those municipalities are not so effective to attract and fix population, explaining the oversupply of housing stock and as a consequence the lower prices of the housing market.

**Fig. 7.** Spatial patterns of the demand and supply of housing affordability



### 5. Conclusions

The purpose of this paper was to discuss and measure the concepts of housing need and housing affordability, and consequently, to present an exploratory approach to apply an innovative methodology to build a spatial composite indicator of housing accessibility. This work adds value to the indicators available on statistic authorities' datasets to produce reliable measures of each one of the two concepts referred above.

This study was applied in the context of Portugal, using data from 2011 and 2018. Since, the last census was in 2011, some estimations and assumption were adapted to assess the level of spatial pattens of housing accessibility. Spatial autocorrelation statistics were used to capture the main dimensions implicitly involved in this multidimensional indicator. The results show a substantial spatial heterogeneity across the municipalities in terms of housing need and housing affordability and strong evidences of spatial dependence, resulting in clear patterns of spatial housing accessibility. Four different clusters were defined with a clear and distinguish spatial structure: in one side, the coastal part of the country, in which the values of the houses are predominantly higher than the income of the households, and the inland part of the country, with an opposite situation; these major clusters are possible to be subdivided into two differentiate parts, if the sub-dimension of housing need is considered.

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