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Article

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Article

Housing Affordability, Public Policy and Economic Dynamics: An Analysis of the City of Lisbon

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Abstract: The increasing growth of population living in cities, associated with the commoditization of investment in real estate, has impacted real estate prices and created obstacles for average income families to meet their housing needs. This problem is generalized to virtually all cities, but it has assumed larger proportions in cities where economic activities (tourism, financial services, high-tech industry) have flourished after the financial crisis. Lisbon is one of those cases. The growth of short-term rentals led to an increase in the property prices well above the average income growth, eroding housing affordability. This paper will focus on analyzing Lisbon's affordability and understanding its main determinants. The analysis is carried out from the compilation and processing of data from 2004 to 2019, in the context of the municipality of Lisbon, using statistical instruments of linear regression in an exploratory and predictive approach. The results suggest a great influence of factors such as tourism, the foreign population with resident status, the propagation of short-term rentals and public policies on the worsening of housing affordability. In view of these conclusions, the preponderance of the type of public policies implemented and their relationship with the most prominent factors on housing affordability is debated.

Keywords: affordability; housing; real estate; Lisbon



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1. Introduction

The growing disparity between housing prices and the financial capacity of families has highlighted the topic of housing affordability. After the global crisis of 2007/2008, the problem of affordability spread to most countries in the world and has registered an accelerated growth. The impacts that unaffordable housing have on families generate social concern, influencing quality of life, health, birth rates and the balance of society (OECD 2021). A family suffers from housing affordability when the share of income spent to obtain housing is excessive and the remaining income is not sufficient to cover the remaining household expenses (Hancock 1993; McLennan and Williams, cited by Heylen and Haffner 2013).

Portugal also suffered the consequences of the financial crisis, leading to the implementation of austerity measures in 2011 that led to the reduction of incomes. In the following years, public policies were instated with the objective of stimulating the real estate market, which resulted in an exponential increase in the price of housing, mainly in the city of Lisbon. This set of measures led to the growth of the problem of affordability for the middle class, and transformed the urban space of the historic district of the city of Lisbon, which has made it difficult for residents to guarantee adequate housing, causing the displacement of households with medium and low incomes to peripheral areas of the municipality of Lisbon.

In an attempt to counter the growing difficulty for families to acquire adequate housing without compromising their basic needs, the Lisbon City Council (CML) has developed programs focused on helping families who suffer from affordability problems. Given the

lack of context and scientific evidence regarding the problem of housing affordability, this study seeks to determine the factors that have the greatest influence on housing affordability in the municipality of Lisbon, with the aim of guiding the design of future public policies and affordability programs.

This paper discusses from a theoretical and practical perspective the problem of housing affordability, discussing and identifying its main determinants, using Lisbon (Portugal) as a case study.

This paper is organized as follows: after this introduction, Section 2 presents the literature review; Section 3 provides some context on the housing affordability panorama in Portugal and, in particular, in Lisbon; Section 4 presents the methodology; Section 5 contains the data analysis, followed by presentation of results in Section 6; Section 7 concludes.

2. Literature Review

2.1. Affordable Housing

In recent years the terms “affordable housing” and “accessibility to housing” have become common terms to refer to the nature of housing difficulties in many countries (Hulchanski 1995). In recent decades, there has been a growing disparity between house prices/rents and the financial capacity of families, particularly in metropolitan areas of western countries. This upward trend in housing prices is due, among other reasons, to: scarcity of available land; stricter planning and construction regulations and higher material costs; private market focus on the construction of housing for the upper class (seeking to maximize its gains); permutation of social policies in austerity policies by national governments; foreign investment and market financialization. At the same time, the low growth in household income has not been able to keep up with the rapid increase in prices in the housing sector (Anacker 2019).

The use of the term accessibility originated in countries with neoliberal political models of housing provision, that is, more dependent on the market and non-governmental organizations and less weight on the State in the provision of public housing (Gabriel et al. 2005). These pioneer countries in the accessibility problem fit, according to Esping-Andersen (1990), as cited by Arts and Gelissen (2002), in the liberal regime of the Welfare State, that is, they are characterized by low levels of decommodification and high levels of social stratification. In the US, the term affordability was initially used in the 1960s in the country’s housing policy, in response to the difficulties of the middle and lower classes in finding accommodation in the private market. In the late 1980s, the term affordability emerged in Canada, the United Kingdom and other European countries in the transition from an administrative social housing system to a multifaceted system, with a focus on policies aimed at greater involvement of the private market (Gabriel et al. 2005).

The concept of accessibility has, over the years, lacked a clear and unanimous definition by governments and academics. One of the main problems is the ambiguity of the term accessibility, which Quigley and Raphael (2004) reinforce in their article:

“Affordability” brings together in a single term a series of disparate issues: the distribution of housing prices, the distribution of housing quality, the distribution of income, the ability of families to borrow, public policies that affect real estate markets, conditions that affect the supply of new or remodeled housing, and the choices people make about how much housing to consume relative to other goods. This mix of issues raises difficulties in interpreting even basic facts about housing affordability. (Quigley and Raphael 2004, pp. 191–92)

Although the themes of “affordable housing” and “accessibility to housing” will be explored by several academics in different fields of study, currently, these terms are extensively used by society, so divergences remain as to their meaning. To this day, most governments establish that a family has accessibility problems if they spend more than a certain percentage of their income on obtaining adequate and appropriate housing (Hulchanski 1995).

Another perspective on the topic of accessibility is given by [Stone \(2006\)](#), who states that accessibility is the relationship between housing and people, arguing that, for certain families, any housing is accessible regardless of its cost, while, for other families, no housing is accessible if it has some kind of cost. [Stone \(2006\)](#) criticizes the way in which the terminology “affordable housing” has been used widely to describe not only social housing, but also financially assisted housing for middle-income families who are struggling to find housing on the private market. In his article, he suggests using the term “below market price” to describe the situation mentioned above, avoiding making assumptions about accessibility. Finally, [Stone \(2006\)](#) states that for the term affordable housing to make sense, it is necessary to answer three questions:

- Accessible to whom?
- By what measure of accessibility?
- For how long?

A universal definition of the terms “affordable housing” and “accessibility to housing” is needed to help address an ever-deepening problem. The way in which accessibility to housing is evaluated has repercussions in terms of the interpretation of the problem and its dimensions, but also in terms of the people covered by public policies. Establishing the concept of accessibility based on the three questions posed by [Stone \(2006\)](#) will result in a better and greater perception of the problem that many families face and, consequently, of ways to mitigate it.

2.2. Evaluating Affordability

In recent years, two measurement approaches have established themselves as the most used (the ratio and the residual income), despite several criticisms about the limitations of both models.

The best-known, applied and oldest indicator in the evaluation of housing affordability is the ratio approach, also called effort rate. The ratio measures the amount of the household’s monthly income that is spent on housing costs ([Heylen and Haffner 2013](#)). Proponents of this approach point out that it is difficult for a household to meet all its needs if it spends more than a certain percentage of its income on housing ([Stone 2006](#)). A percentage is usually specified, which has taken values between 20 and 50% over the years and in different regions of the globe. When a household exceeds the established threshold, it is assumed that housing is not affordable.

The residual income approach, adapted from poverty studies, comes up in an attempt to create a more adequate indicator for measuring affordability problems. Unlike the ratio approach, residual income assesses a household’s ability to meet all its needs with the income remaining after the monthly housing expenditure ([Gabriel et al. 2005](#)). This indicator argues that housing represents the largest and least flexible portion of a family’s monthly costs. In this way, a household’s ability to meet its needs excluding housing is limited by the amount left over after paying for housing ([Stone 2006](#)). By residual income, a household has affordability problems if its residual income is too low for consumption of other necessities and services after spending the portion of income related to housing ([Heylen and Haffner 2013](#)). Table 1 shows the benefits and limitations of each approach.

Table 1. Benefits and limitations of the Ratio and Residual Income affordability measures.

Ratio		Residual Income	
Benefits	Limitations	Benefits	Limitations
It just depends on two variables	Lack of a theoretical or empirical basis for choosing the reference ratio	Relationship between housing and other expenses	Depends on subjective assumptions about a household's expenses
Information on which it is based is usually available	Does not consider non-housing related expenses	Fits different types and sizes of households	Complex and expensive (resources and time)
Reliable when used in description, analysis and administrative matters	Evaluates only one dimension of the problem (does not consider the constitution of the household, location and form of occupation)	Does not attribute affordability problems to high-income families where a large portion of their income is on housing	Difficulty in translating a qualitative standard of living into monetary amounts dependent on the constitution of the household
Its use and understanding is easy and intuitive.	Inability to identify families that live overcrowded or in bad conditions	Reliable when used in description, analysis and administrative matters	Data for creating a reference budget is limited
		Ability to identify households with the biggest problems	Different methodologies make it difficult to compare budgets from different countries

3. Housing Affordability in Portugal

Housing affordability problems were always present in Portugal. However, until the end of the first decade of the 21st century, these problems mainly affected low-income families. Since Salazar's time, State policies have focused on encouraging homeownership. After the end of the dictatorship, the housing scenario in the country did not have significant improvements. Until the 1980s, it was common for the population with lower incomes to build their own houses or resort to the illegal market, which led to the spread of "slums", which were illegal, overcrowded and without minimum conditions of habitability. To solve this problem, the State created some public programs, of which the PER—Special Rehousing Program—stands out. The PER allowed for the large-scale construction, in a short period of time, of 50 thousand houses, generally located in suburban areas of Lisbon and Porto (Alves and Andersen 2015). With the entry into the European Economic Community (EEC) in 1986, came the liberalization of the Portuguese banking sector, which led to increased demand for home purchases and the growth of the housing stock in the country. Support for the purchase of own housing, through credit subsidies and tax benefits, represented a large share of the State's public expenditure, leading to around 75% of the Portuguese population living in their own home (Azevedo 2020).

Until the crisis that hit the world in 2007/2008, the problem of acquiring affordable housing affected the poorest more significantly and, for that reason, the policies created by the State were aimed at this group. The global financial crisis has transformed society. The impacts were felt both in the private and public sectors, and housing played a central role in the crisis in Portugal, due to its weight in public expenditure. Nowadays, the problem of housing affordability has spread and is also felt by middle class families, who cannot afford a house at prices compatible with their budget. According to the latest financial stability report by the Bank of Portugal (BdP 2022), the real estate market shows signs of being overheating, which is especially concerning given an increase in home loans and the fact that 90% of mortgages have a variable interest rate.

With the intention of overcoming the crisis and returning to economic growth in the country, the Portuguese State introduced new public housing policies. In order to reduce the public debt, the national government weakened the territorial planning regulations (Law 31/2014 and DL 80/2015), which facilitated the process of carrying out real estate operations. They also reorganized the urban lease law (Law 31/2012), which simplified the termination of lease contracts, and established an extraordinary regime for rehabilitation operations

(DL 53/2014), which made it possible to circumvent some building regulations. In addition, they created tax regimes beneficial to real estate speculation, such as the approval of the Golden Visa scheme (Law 29/2012) and the tax regime program for non-habitual residents (DL 249/2009), which opened doors to foreign investment in the housing market through tax incentives (Allegra and Tulumello 2019; Cocola-Gant and Gago 2021; Tulumello and Allegretti 2021; BdP 2022). The transformation of public policies with the purpose of boosting the real estate market was successful; however, along with the investment, social inequalities worsened, which led to the dissemination of housing affordability problems, especially in Lisbon.

As a result of the measures taken in the five years after the beginning of the crisis, Portugal, and especially Lisbon, underwent an immediate and rapid transformation in the housing sector. Portuguese culture, low cost of living, climate and tax incentives attracted European pensioners, nomadic workers, students and visitors to the Portuguese capital (Tulumello and Allegretti 2021). Most of the tourist housing supply was located outside the historic area of the capital and was largely offered by hotels (Mendes 2020). The high number of visits to the city of Lisbon combined with neoliberal measures, which encouraged foreign investment, and the lack of tourist housing in the historic center of the city led to the abrupt growth of short-term rentals.

In 2016, short-term rentals already represented 25% of the housing stock in the Alfama neighborhood. Between 2015 and 2017, 150 apartments were transacted in the Alfama area and only one was purchased by a new resident. The vast majority were purchased for use as short-term rentals and the rest were left empty. No long-term rental apartments were found during this period. During the 2 years of study, 27 dwellings were identified from which 36 tenants were forced out (Cocola-Gant and Gago 2021). The remaining neighborhoods in the historic city center of Lisbon followed similar transformation processes as the Alfama neighborhood. This shows the effects of the “commoditization” of real estate, which is often seen not as a shelter for households but as a commodity to be traded. The traditional features and location of such properties are highly valued not only by buy-and-hold investors, but especially by those aiming to turn to the short-term rental business. It gives their guests the feeling of being part of the city while creating an outward pressure for traditional households to move out, and forces a gentrification process to occur. Investors and property owners look at short-term rentals as a safe investment that allows for a faster and more efficient reproduction of real estate capital than long-term housing leases which, according to the Association of Professionals and Real Estate Mediation Companies of Portugal (APEMIP), have suffered a reduction of 75% between 2015 and 2020 in the city of Lisbon (Mendes 2020).

The lack of State intervention and political decisions that prevent and control the excessive growth of the concentration of short-term rentals in the city of Lisbon, led to a general increase in real estate prices (Mendes 2020). The median value of sales per square meter of family dwellings in the city of Lisbon increased by around 76% between the first quarter of 2016 (1875 €/m²) and the first quarter of 2021 (3296 €/m²) (INE 2022b).

The purchasing power of foreign investors completely outweighs the purchasing power of ordinary Portuguese citizens. According to INE (2022a), “in the Lisbon metropolitan area, the median price of housing purchased by buyers with tax domicile abroad (4283 €/m²) was more than twice the price of that purchased by buyers with domicile in the national territory (1858 €/m²)—4th Quarter 2021”. This difference in the purchasing power of housing between domestic and foreign buyers leads to the decoupling of the real estate market in relation to national incomes, generating affordability problems for local buyers. Prices begin to reflect what wealthier foreign buyers are willing to spend rather than national incomes, which leads to the problem of displaced demand; this consists of the displacement of households with a lower level of income to areas with more affordable prices due to the increase in prices in their area (Gordon 2020). Changes in the dynamics of the real estate market in Lisbon (rising prices, an increase in the number of short-term rentals, neoliberal measures)

have led to the exclusion of the population from the more central areas and made living in the center of Lisbon an unattainable desire for many Portuguese families (Mendes 2020).

To react to the housing crisis that affects the resident population, the Lisbon City Council (CML) promotes housing programs, which are governed by the Municipal Regulation of the Right to Housing of Lisbon. The two principal programs are the Affordable Income Program (PRA) and Municipal Subsidy for Affordable Lease Program (SMAA) and are exclusively aimed at middle-income families who cannot access the private rental market in Lisbon. Any citizen with a lease and proof of residence can apply for the programs, provided that the aggregate income of the household respects the minimum and maximum values established. The PRA distributes housing with lower rents to families with an average income that cannot compete in the private market, and the housing is allocated by draw to households according to their size, constitution and overall income. The program has carried out 12 tenders so far and its award rate does not reach 2%. The SMAA grants a subsidy to those selected corresponding to one third of the house rent, and they only assign a subsidy to about half of the candidates (Habitar Lisboa 2021).

One should note that young people, renters and first-time buyers are the most affected by the rising prices and declining housing affordability as long-time homeowners may even benefit from the decline in housing affordability, whether by simple housing value appreciation or by equity effects (Gordon 2020) in the case of property sale.

4. Methodology

This research's main objective is to understand which factors contribute with the greatest impact on housing affordability in Lisbon. It is important to note that the data refers to Lisbon's municipality and not to Lisbon's Metropolitan Area (LMA). Additionally, we should note that, due to Law n.º 56/2012, Lisbon parishes were subject to changes in their administrative limits, leading to the creation of Parque das Nações parish, which included a small portion of the Loures municipality to be transferred to Lisbon's administration. However, this increase in area did not change their population significantly¹.

The first step was creating a database with annual statistics referring to the municipality of Lisbon that appear to have a relationship with housing affordability levels. Limited to the information shared by the national statistics institute (INE), it was not possible to collect data referring to the idealized reference period, ending up developing the analysis focusing on 20 indicators and 16 years, between 2004 and 2019. The database created was formed by indicators that belong to five themes considered important by the literature in the evolution of the problem of housing affordability: population, income, housing, construction and tourism. In Appendix A you will find a summary table containing the statistical description of every variable, as well as their unit and source.

To quantify the impact of each selected factor on housing affordability, it was necessary to consider the ratio between housing expenditures and income as a measure of housing affordability, named in this study as RDHR (Housing Expenditure to Income Ratio) and based on the work of Li et al. (2020).

The RDHR is defined by Formula (1):

$$RDHR = VMAB \times AREA \times (1 - pe) \times \frac{j}{12} \times \left(1 + \frac{j}{12}\right)^{12 \times anos} / \left[\left(1 + \frac{j}{12}\right)^{12 \times anos} - 1\right] / GMM \quad (1)$$

where:

VMAB refers to the median value of bank valuation;

AREA is the median area of households sold (2017), which is 95 square meters; GMM represents the average gross monthly earnings of workers in the municipality of Lisbon; and

j , pe and $years$ are the annual interest rate, down payment and housing loan duration, respectively.

Following the conventional loan made in Portugal, it was assumed to have a duration of 30 years and a minimum down payment of 10%, while the annual interest rate for 30 years corresponds to 2.1%.

Finally, multiple linear regressions were performed considering two different models, the standard model and stepwise model. The standard model selected the best variables considering a correlation between the RDHR variable and the explanatory variables. The stepwise model used the forward stepwise selection technique, which is an iterative method that starts with a null model and adds variables, one by one, until the stopping criterion is reached, choosing the variable to be added to improve the robustness of the model. Due to the short reference period, the regressions were limited to a maximum of five independent variables in order not to affect the results. The linear regressions were performed in Excel using the ordinary least square method. All data in our models was previously standardized, in order to prevent scaling-induced bias.

Table 2 shows the variables selected for each model.

Table 2. Indicators selected by the standard method and the stepwise method.

Standard Model	Stepwise Model
Apartments completed in new constructions for family housing	Average monthly earnings
Resident population	Resident population
Foreign population that applied for resident status	Foreign population that applied for resident status
Registrations made of new short-term rentals	Overnights in hotel establishments
	NRAU—Changes in Public Policies

5. Data Analysis

First, the authors developed an exploratory analysis of the indicators selected for both models. The dependent variable RDHR registered a decrease in the first decade analyzed. The decrease in the effort rate of families started with the crisis that hit the country in 2007/2008 and that affected the real estate market, leading to a generalized fall in the value of housing. After the decline observed in the first decade of research, which hit the minimum ratio of 30% in 2014, there was an accelerated growth until the last year of the research. In five years, the RDHR ratio rose from 30 to 57%, an average annual growth of 5.4%, in the effort rate of families residing in the municipality of Lisbon (see Table 3).

Table 3. RDHR for Lisbon during 2004–2019. Source: authors' calculations.

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
RDHR (%)	41	40	41	41	39	39	38	35	31	30	30	32	37	45	54	57

The ratios show that the present levels of housing affordability do not reflect a return to normalcy on the rebound of the financial crisis, but rather a peak value in recent years.

Regarding the explanatory variables, the average monthly gain and the median value of bank valuation have a direct impact on the variation of the RDHR ratio. The average monthly gain grew approximately 26% in the reference period, registering a linear growth, except for the decline observed between 2012 and 2015. The higher the average monthly income in a region, the greater its attractiveness and, therefore, the higher the cost of housing. After the decrease in the value of real estate during the crisis period (2010 to 2014), there was an exponential growth in the value attributed by banks to real estate. The municipality of Lisbon saw its properties' value close to 1500 €/m² in just five years, reaching a median value of approximately 3000 €/m².

Regarding the resident population in each municipality, its evolution during the period studied was generalized: the decrease in the resident population. In 16 years, the municipality of Lisbon saw its population decrease by almost 10%, a difference of 50 thousand inhabitants.

Three indicators that stood out for their exponential rise were the foreign population that applied for resident status, overnight stays in hotel establishments and registration of new short-term rentals. The difference between the beginning and end of the investigation period is massive, with Lisbon registering a 1604% increase in the requests for resident status by foreigners, from 1391 requests in 2004 to 23,707 requests in 2019. Overnight stays in hotel establishments nearly tripled in the municipality of Lisbon, from around 5 million in 2004 to 14 million in 2019. Finally, short-term rentals multiplied in the municipality at an abnormal speed. While in 2013 Lisbon had 395 short-term rentals in the RNAL², in 2019 it already had a little more than 18 thousand establishments of this type. The great outbreak of this concept took place in 2014, when, in that year alone, more local accommodations were registered than in all previous years. The restriction of new short-term rentals in the most historic parishes of the capital in November 2018 led to the first drop in the growth of this type of tourist establishment since the beginning of this business model, with a drop in registrations from 2018 to 2019 (6724 in 2018 to 2103 in 2019).

Lastly, regarding the number of dwellings completed in new constructions for family housing, the municipality presents a disinvestment in new housing buildings over the years. The phase from 2004 to 2010 was when more houses were completed, followed by a decrease until 2013, where the number of completed dwellings stabilized below 150 per year.

6. Results

As previously stated, two multiple linear regressions were performed, resulting from two different selection techniques.

Both regressions return high adjusted R square values, which means that the models explain most of the variance of the dependent variable. This implies that the factors chosen as independent variables are, with high evidence, linked to the evolution of housing affordability in the years studied. Nevertheless, it is necessary to pay attention to the veracity of these values, as very high values can be synonymous of multicollinearity issues among variables. With very low Significance F values, it is possible to state that the regression models are statistically relevant.

As for the parameters of each explanatory variable, it is important to analyze the *p*-value and the coefficient. The variables included in this model reject the null hypothesis that the coefficient is zero, except for the variable dwellings completed in new constructions for family housing and the variable NRAU, which obtained a *p*-value of 0.21 and 0.079, respectively. For this reason, the relationship between the dependent variable and those mentioned is not assured. All other variables are statistically significant in relation to the RDHR variable.

The variables resident population and foreign population that applied for resident status obtained significant positive coefficients in both models, which means that the growth of the resident population in the municipality of Lisbon and the increase in demand for resident status by foreign citizens is accompanied by a worsening of housing affordability for resident families.

Table 4 presents the most relevant results of these models.

Table 4. Main results of the regressions of the RDHR model for Lisbon, standard model vs. stepwise model.

Standard Model: Lisbon		Stepwise Model: Lisbon	
Most Statistically Significant Explanation Variables (X) ^(a)	Coefficient ^(b)	Most Statistically Significant Explanation Variables (X)	Coefficient
Resident population	0.98	Resident population	1.66
Foreign population that applied for resident status	1.01	Overnight stays in hotel establishments	1.43
Registrations made of new short-term rentals	0.42	Average monthly earnings	−0.29
Apartments completed in new constructions for family housing ^(c)	−0.17	Foreign population that applied for resident status	0.56
Global explanatory power of the model (Adjusted R2): 83.6%		NRAU ^(d)	0.33
		Global explanatory power of the model (Adjusted R2): 96.7%	

Note: ^(a) significance based on $\alpha < 0.05$. ^(b) It can be interpreted as elasticity: for each unit increase in the variable X, the variable Y RDHR increases the value of the coefficient of the variable X. ^(c) p -value = 0.21, above α . ^(d) p -value = 0.079, above α .

The standard model assigns a coefficient of 0.42 to the registration of new short-term rentals. Although the mathematical relationship between this variable and the RDHR is not so high as the previous variables, it is still quite substantial. The growth in the number of these establishments is directly related to the tourism sector. The higher the tourist attraction of a location, the greater the number of short-term rentals found, if there are no laws that restrict this type of business.

Overnight stays in hotel establishments registered a coefficient of 1.43. This coefficient only reinforces the idea already reflected in the results of the previous regression that the foreign population has a significant influence in the effort rate of families. The successive annual growth of tourism, manifested in overnight stays in hotel establishments, especially since 2012, is one of the main factors that affect housing affordability.

The coefficient of the variable average monthly earnings has a coefficient with a negative sign. Despite having a small effect on the dependent variable, 0.29, the negative mark expresses that the rise in workers' monthly remuneration leads to a decrease in the family's affordability to pay for housing. In 16 years, the average monthly gain has increased by 26%, while the median value of the bank valuation of properties has increased by 90%, which may explain the low coefficient between the two variables.

The New Urban Lease Regime (NRAU) variable, despite not having a p -value below the required value, had a positive impact of 0.33 on the RDHR ratio. The changes in legislation that began in 2012 had a negative impact on housing affordability. The attempt to boost the real estate market and attract investors resulted in a greater influx of people interested in acquiring properties in Lisbon, raising their prices and lowering the competitiveness of the local population.

Although the variable concerning the apartments completed as new construction for family housing shows a p -value of over 5% in the standard model regression, it is essential to clarify this result in light of Lisbon's reality. One would expect a positive relationship between the increase in housing supply and the increase in affordability, as a larger supply would, theoretically, meet demand at a lower price point. However, the issue in Lisbon is related not only to the number of newly built dwellings, but also to the type of properties being developed. Although there are no actual published numbers on the split of properties sold by type (low class/middle class/upper class targeted construction), it is clear on the ground that developers have been favoring the upper class. According to real estate developers, the Portuguese middle class cannot keep up with the increasing

valuations in the capital city, leaving middle-class developments to the city's neighboring municipalities. During the last 12 months, median prices in Lisbon reached 3704 €/m² (as of the second quarter of 2022³), far off the average middle class home buyer. Drilling down by purchaser's tax residence, we see that the median price for national buyers is 3574 €/m², while for foreign buyers it reaches 5230 €/m², reflecting this divergence between national and foreign home buyers. Hence, this "decoupling" between new construction and local average incomes leads to a negative association between the number of apartments completed as new construction for family housing and the RDHR. This shows that an increase in the number of new developments does not necessarily translate into an effective increase in offers for local populations, especially those in the middle and lower classes. Despite land use in Lisbon being determined by the City Council, most development is led by private initiative which, in recent years, has been aiming for developments for the upper and upper-middle class, as well as foreigners, as their primary target. This happens in an attempt to maximize profits, surpassing the high costs in taxes and the limitations imposed by building height restrictions. Real estate developments by the public sector have been negligible, and do not meet the population's needs. In recent years, the City Council has been trying to address the housing affordability issues, but we have yet to see concrete and definitive results on increasing affordability.

7. Conclusions

The results of the two models carried out point to the foreign population as the central source of the problem of housing affordability. The growth in the number of both foreigners who immigrate to Lisbon and those who visit the city on their holidays created a chain of actions that led, directly and indirectly, to an increase in real estate prices that took place in a very short period. The decrease in the number of inhabitants of the municipality of Lisbon was one of the consequences of the globalization of the Portuguese capital, as well as the evolution of the short-term rental business model. Not enough evidence was found to support the possible impact of the homes completed annually, which may be related to the disparity between the number of dwellings completed annually and the number of dwellings that needed to be completed in order to bring supply and demand closer together. The implementation of the NRAU only exacerbated a problem that was already rapidly developing, creating in Lisbon profitable business opportunities for new investors, who previously had difficulty accessing the Portuguese market.

The results of the programs created by the Lisbon City Council indicate that something more needs to be done and that, given the seriousness of the current situation and the forecast for the future, new public policies must begin to have a regulatory character instead of attributing incentives. The authors conclude that it is essential to create regulatory policies in the foreign population sector, in the construction sector and in the real estate sector. In terms of tourism, the reformulation of the municipal tourist overnight tax could be positive. In the construction sector, a mechanism used in other countries is the Land Value Capture, which would allow the requisition and use of a part of any increase in the value of land for public benefit, if related to a public policy and/or investment. With this mechanism, CML would receive an agreed share of that valuation and could use it to provide capital for its programs that promote affordable housing (Nzau and Trillo 2020). Another mechanism used is inclusionary housing zoning. Through inclusionary housing zoning, the government encourages or mandates developers to include housing units intended for affordable housing in any new construction. This mechanism would have the advantage of providing affordable housing without the need for public funding, with developers being the part that bears the costs of affordable housing (Lerman 2006).

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Appendix A

Table A1. Summary table of original variables.

Variable	Mean	Std	Min	1Q	Median (2Q)	3Q	Max	Unit	Source
Housing Expenditure to Income Ratio (RDHR)	0.39	0.07	0.30	0.33	0.39	0.41	0.57	—	authors calculations
Total number of dwellings for family housing	323,321.81	4479.92	312,780.00	322,464.00	323,424.00	323,783.25	332,538.00	Nº	INE
Apartments licensed in new construction for family housing	362.25	369.36	0.00	91.25	254.00	453.25	1210.00	Nº	INE
Apartments completed in new constructions for family housing	291.88	292.58	37.00	68.75	137.00	546.75	1054.00	Nº	INE
Number of purchase and sale contracts	12,381.50	3252.97	6381.00	10,121.50	12,610.50	14,974.75	17,404.00	Nº	DGPJ
Resident population	531,189.63	21,206.47	504,471.00	507,743.00	535,898.50	551,822.00	558,019.00	Nº	INE
Population density	5855.17	689.73	5042.00	5074.88	6247.45	6512.15	6582.90	N.º/km ²	INE
Foreign population that applied for resident status	8684.06	6183.16	1387.00	4332.25	7180.00	10,330.75	23,707.00	Nº	INE
Average monthly earnings	1522.80	93.39	1323.30	1451.15	1556.25	1578.50	1669.40	€/month	INE
Total value of purchase and sale contracts	3,563,343.31	1,445,367.06	1,429,627.00	2,449,458.75	3,384,354.00	4,577,717.75	6,617,222.00	€ (thousand)	INE
Mean value of home purchases	282,669.44	77,819.54	200,244.00	222,391.00	256,357.00	312,580.50	462,062.00	€/Nº	INE
Median banking valuations	1869.93	412.37	1474.00	1563.53	1797.29	1853.01	2963.00	€/m ²	INE
Overnights in hotel establishments	8,144,468.50	2,962,493.64	4,973,439.00	5,810,474.50	6,604,211.00	1,079,9560.25	1,398,5262.00	Nº	INE
Guests in tourism establishments	3,531,770.31	1,156,671.57	2,282,664.00	2,694,513.50	2,903,076.50	4,467,494.00	5,980,014.00	Nº	PORDATA
Registrations made of new short-term rentals	1149.69	1858.17	0.00	1.25	73.00	2050.75	6724.00	Nº	RNAL
Foreign Direct Investimnt (FDI) (% of GDP)	3.98	2.27	0.60	2.35	3.65	5.20	9.90	%	BdP
Foreign Direct Investimnt (FDI)	99,457.04	25,869.01	61,128.43	82,460.86	91,211.35	123,762.65	143,030.40	€ (millions)	BdP
6-month Euribor rates	1.25	1.55	−0.32	−0.18	0.69	2.54	4.71	%	BdP
NRAU—Changes in Public Policies	0.50	0.50	0.00	0.00	0.50	1.00	1.00	dummy	—
Restrictions in new short-term rentals (November 2018)	0.06	0.24	0.00	0.00	0.00	0.00	1.00	dummy	—

Notes

- ¹ According to the census, the population in the area of Parque das Nações was 10,405 in 2011 and 10,823 in 2021, which is a 4% growth when accounting for the overall parish population or a 0.07% increase when accounting for the entire municipality.
- ² *National Register of Local Accommodation Establishments (in portuguese, Registo Nacional de Estabelecimentos de Alojamento Loca—RNAL).*
- ³ Source: National Statistics Institute (INE).

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