
DOES INCOME INEQUALITY AFFECT HOUSING
AFFORDABILITY? AN EXPLORATORY ANALYSIS FOR PORTUGAL

Diogo Henrique de Meneses Pinto

Dissertation
Master in Economics

Supervised by
Anabela Carneiro

2025

Acknowledgements

I am grateful to my supervisor, Anabela Carneiro, for her guidance and insight throughout this dissertation. Without her support, this accomplishment would not have been possible.

I also thank the Instituto Nacional de Estatística for providing access to the Inquérito aos Orçamentos Familiares database, which made this research possible.

My gratitude extends to the School of Economics and Management of Porto, where I spent five unforgettable years.

To my friends, who were always by my side, bringing colour to my academic journey.

Finally, to my mother, for her limitless care and support throughout my journey.

Abstract: Economic theory posits a negative relationship between income inequality and housing affordability. Given the numerous factors influencing housing prices, examining this relationship helps policymakers address social concerns in housing crisis. The literature identifies three key drivers of housing prices: i) income inequality, ii) housing financialization and iii) land-use regulation. This dissertation aims to determine whether rising household income inequality in Portugal reduces access to housing and to what extent this effect is driven by tenure status. This constitutes a gap in the national academic debate, since it is mainly focused on the solutions and not the causes and social implications. Thus, this work follows a methodology employed by the leading literature on this topic through a set of variables, at the household level, available in the INE's Households' Budget Survey (IOF) for 53,011 households across five years (2000, 2005, 2010, 2015 and 2022). Using an econometric approach, this study aims to understand the impact of income inequality reported by the Gini coefficient on four affordability indicators: housing expenses to income ratio and residual income to access financial burden, housing expenses per room as a crude indicator of quality and persons per room to measure crowding in the dwelling. Point estimates are in line with the literature, unless for persons per room, which presents an opposite signal and requires further explanation. Overall, one standard deviation increase in the Gini coefficient increases the housing expenses to income ratio between 2% and 4% and is more impactful for renters than homeowners. Curiously, households in the first quintile are more insulated from changes in the housing expenses to income ratio than the second quintile.

JEL codes: O18, R21, R31, R38

Keywords: Housing affordability, Income Inequality, Housing Policy

Resumo: A teoria económica postula uma relação negativa entre a desigualdade de rendimentos e a acessibilidade da habitação. Dados os inúmeros fatores que influenciam os preços da habitação, examinar esta relação ajuda os decisores políticos a abordar as preocupações sociais na crise da habitação. A literatura identifica três fatores-chave que influenciam os preços da habitação: i) desigualdade de rendimentos, ii) financeirização da habitação e iii) regulamentação do uso do solo. Esta dissertação procura determinar se o aumento da desigualdade de rendimentos das famílias em Portugal reduz o acesso à habitação e se surgem diferenças ao analisar as famílias em cada situação de posse e quintis da distribuição de rendimentos. Isto constitui uma lacuna no debate académico nacional, uma vez que este se centra principalmente nas soluções e não nas causas e implicações sociais. Assim, este trabalho segue uma metodologia empregada pela literatura líder neste tema através de um conjunto de variáveis, ao nível das famílias, disponíveis no Inquérito ao Orçamento das Famílias (IOF) do INE para 53,011 famílias ao longo de cinco anos (2000, 2005, 2010, 2015 e 2022). Através de estimativas OLS agrupadas e efeitos fixos, procuramos compreender o impacto da desigualdade de rendimentos medida pelo coeficiente de Gini em quatro indicadores de acessibilidade: rácio entre despesas com habitação e rendimentos e rendimento residual para aceder a encargos financeiros, despesas com habitação por quarto como indicador bruto de qualidade e pessoas por quarto para medir a sobrelocação na habitação. As estimativas pontuais estão em linha com a literatura, exceto no que diz respeito às pessoas por quarto, que apresentam um sinal oposto e requerem uma explicação adicional. No geral, um aumento de um desvio padrão no coeficiente de Gini aumenta a relação entre as despesas com habitação e o rendimento entre 2% e 4% e tem um impacto maior para os inquilinos do que para os proprietários. Curiosamente, as famílias no primeiro quintil estão mais protegidas das mudanças na relação entre as despesas com habitação e o rendimento do que as do segundo quintil.

Contents

1. Introduction	1
2. Portuguese Housing Market: Brief Overview	3
2.1. Historical and Structural Overview	3
2.2. Housing Market Performance and Key Indicators	8
3. Theoretical Framework	15
3.1. Drivers of Housing Prices	15
4. Data	20
4.1. Data Description	20
4.2. Measurements of Housing Affordability	24
4.3. Sample Analysis	26
5. Empirical Model	31
5.1. Model Specifications	31
5.2. Empirical Results	33
5.3. Robustness checks	40
6. Conclusions	43
7. Annexes	46
8. References	51

List of Figures

Figure 1: Evolution of government expenditure per category as a share of GDP (1972-2012)

Figure 2: New dwellings constructed, and dwellings completed in rehabilitation interventions in Portugal, 1995–2022

Figure 3: Housing Prices and Income Indexes in Portugal, 2003–2022 (nominal)

Figure 4: Median bank appraisal value, 2003–2024 (nominal)

Figure 5: Housing cost overburden rate, by income distribution quintile (2004 – 2024)

Figure 6: Mean housing expenses to income ratio by NUTS II regions (%), 2000 – 2022

Figure 7: Mean housing expenses per room, 2000 – 2022 (€, Base = 2015)

Figure 8: Number of rooms per accommodation by income quintiles (2000 – 2022). Total income distribution and bottom 40% in the income distribution, respectively

Figure 9: Gini coefficient by NUTS II regions (2000 – 2022)

Figure 10: Type of household as a percentage of total households (2000 – 2022)

List of Tables

Table 1a: Descriptive statistics for continuous variables

Table 1b: Descriptive statistics for dummy variables

Table 2: OLS results for the 1st and 2nd quintile households. Time dummies and region dummies: yes.

Table 3: OLS results for housing expenses per room and persons per room for the bottom 40% households in the income distribution. Time dummies and region dummies: yes.

Table 4: OLS results for the 1st and 2nd quintile households, by tenure status. Time dummies and region dummies: yes.

1. Introduction

Access to adequate housing is a fundamental necessity for citizens in every nation. However, households are increasingly subjected to a systemic crisis in the real estate market, characterized by a marked acceleration in housing prices growth in recent years (Januário et al., 2023; Tarne & Bezemer, 2025; Wetzstein, 2017). This is a complex phenomenon that is generating debate among both academics and policy makers. In addition to affecting most Western economies, including Portugal, it is driven by multiple factors - some controversial - as evidenced by Novo et al. (2024), namely the pressure of tourist activity and the attractiveness of short-term rentals.

However, these factors are not the fundamental drivers, as existing literature suggests a higher importance of factors like the financialization of housing (Fields & Uffer, 2016; Marques et al., 2020; Wetzstein, 2017) – and, consequently, policies endorsing homeownership instead of renting (Cardoso, 2019) – the presence of private and institutional investors (Tarne & Bezemer, 2025), land-use regulations (Glaeser & Gyourko, 2018) and increasing inequality in metropolitan areas (Matlack & Vigdor, 2008; Wetzstein, 2017; Zhang et al., 2016). In addition, Januário et al. (2023) note that countries in southern Europe that have returned to economic growth in the aftermath of the sovereign debt crisis, now face an additional challenge balancing income inequality with rapidly rising housing prices. The Portuguese case needs therefore to be analysed in depth, as it is a heterogeneous territory made up of various regional social disparities, but, essentially, because it is a small economy with low wages (ninth lowest full time average wage per employee in the European Union in 2023¹) that is facing a particularly harsh housing crisis.

In Portugal, between 2011 and 2022, the number of dwellings increased by 2,12%², while the population decreased by 0,40%³. While this increase in housing supply would theoretically exert downward pressure on housing prices, the median bank appraisal value instead rose by 66,25%⁴ during the same period. This statistic alone may be insufficient to establish a meaningful causal relationship between these variables, as it merely reflects relative changes in physical supply and population trends (Tarne & Bezemer, 2025), with the latter

¹ Eurostat. [Average full time adjusted salary per employee](#). Accessed on January 12th, 2025.

² INE. [Conventional dwellings \(Housing stock - No.\) by Geographic location \(NUTS - 2024\)](#). Accessed on January 13th, 2025.

³ INE. [Resident population \(No.\) by Sex, Age and Birthplace](#). Accessed on January 13th, 2025.

⁴ INE. [Median value of bank evaluation \(€/ m²\) by Geographic localization \(Municipality - 2024\) and Type of construction](#). Accessed on January 13th, 2025.

serving as a weak proxy for potential housing market demand. An increase in the supply of new housing does not necessarily result in a reduction in prices, as there is often a misalignment between newly constructed units and the actual needs of the population (Januário et al., 2023). Between 2011 and 2022, housing expenses in Portugal grew faster than nominal wages, reducing affordability and reflecting households' reduced ability to meet housing costs (Januário et al., 2023). Indeed, much of the existing literature emphasizes the critical role of housing-related household expenses and wage dynamics in shaping affordability (Matlack & Vigdor, 2008; Tarne & Bezemer, 2025; Wetzstein, 2017; Zhang et al., 2016).

This dissertation aims to examine the mechanisms through which household income inequality influences housing affordability for families in Portugal. Specifically, it seeks to assess the extent to which different distributions of income impact housing market prices and to identify sociodemographic patterns on how this process exacerbates difficulties for financially disadvantaged households in accessing adequate housing. Thus, this work inserts in the field of housing and development economics. The literature predominantly focuses on broader mechanisms of price determination, often not emphasizing the relevance of differences in income distribution and not revealing the profile of the most disadvantageous in access to housing, specifically in Portugal where the academic debate centralizes mostly in the solutions. Examining household characteristics and the impact of income inequality on their ability to obtain affordable housing is essential for effective policymaking.

Therefore, research in this topic is important to study this dynamics and policy consequences within a socio-economically and geographically diverse territory like the Portuguese, that has experienced a rapid increase in housing prices since the global financial crisis. The current body of literature in housing and development economics has not sufficiently addressed this subject within the context of the Portuguese housing market. This gap in national research hinders the development of effective policy measures to improve housing accessibility and affordability.

This report is structured as follows: chapter 2 depicts a brief overview of the Portuguese housing market; chapter 3 presents the literature review on drivers of housing prices and the mechanisms of the relation between income inequality and housing affordability; chapter 4 exposes a summary of the data and indicators used; chapter 5 explains methodologies, model specifications and empirical results; and chapter 6 concludes.

2. Portuguese Housing Market: Brief Overview

Similarly to any other economic activity, the housing market is shaped by a complex interplay of economic, social, cultural, and institutional factors. These affect both supply and demand of new dwellings for housing purposes and, particularly, the availability of affordable housing in a specific region. Thus, when analysing housing affordability, one must have consideration for spatial patterns resulting from these factors and pre-established frameworks, while identifying regional disparities for effective policy making. Portugal belongs to a group of southern European countries that undergone major changes in the housing market (Barlow et al., 2004), while having significant and chronic issues on addressing this sector of the Welfare State (Mendes, 2022). Consequently, examining the evolution of its housing market is essential before engaging in a focused examination of specific issues.

2.1. Historical and Structural Overview

The housing issue is not new in the Portuguese context. Since the beginning of the twentieth century, Portugal had faced multiple challenges in following European standards of living, with political friction and economic volatility among the primary impediments to progress in this issue. Nonetheless, the late industrialization of the 1960s intensified the housing problem that Portugal faced, when the rural exodus to the cities of Lisbon and Porto put pressure on both housing availability and quality. Illegal construction, severe housing poverty and overcrowding were among the most important issues the low-income families faced when entering the housing market. In a country with around two million households, there was a shortage of 600 thousand dwellings (Ferreira, 1987).

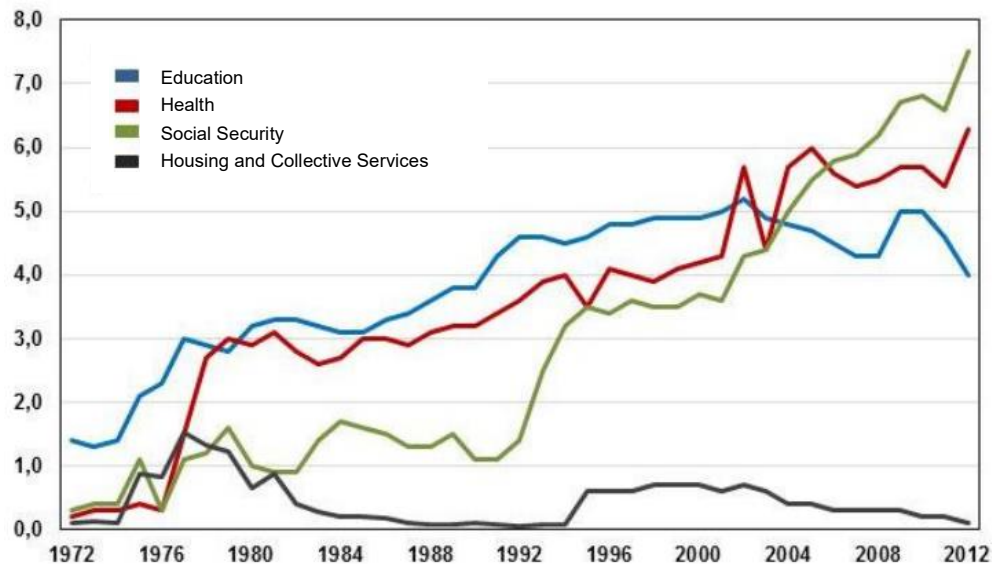
Portugal entered the democratic era in the 1970s amid a profound housing crisis, marked not only by acute shortages but also by widespread inadequacy. In 1970, 52.3% of households lacked running water and 35.8% had no electricity (BdP, 2025). The chronic lack of adequate housing was particularly visible in major urban centres, where informal settlements proliferated. This situation was further aggravated by the mass return of *retornados* (returnees) from former Portuguese colonies.

The 1970s marked a turning point in Portugal's housing policy, as the post-revolutionary transition to democracy brought a stronger role for the State in addressing severe housing shortages. In the year of 1974, over 43,000 new dwellings were built, with around 3% classified as social housing (INE, 1974). Programs like the Special Rehousing Program

led to the construction of 50,000 homes, primarily in Lisbon and Porto (Lorga et al, 2022). Despite these efforts, housing remained underfunded compared to other social sectors. Many low-income households continued to rely on informal or self-built housing well into the 1980s, reflecting the late and limited development of the Portuguese welfare state in housing provision (Lorga et al., 2022). Regardless of these circumstances, there is widespread consensus that inadequate housing quality and limited supply of housing undermines economic and social stability (Meen & Whitehead, 2020).

The traditional Keynesian approach of direct state intervention in building housing for low-income households underwent significant changes. The new prominent economic ideology fostered neoliberal economic ideas that gained influence globally. Thus, policymakers began to emphasize market-driven solutions over large-scale public housing projects. Indeed, the weakness of the newly created Portuguese Welfare State proceeded for a mix of housing policies that followed characteristics both from typical less advanced southern European peers and advanced European capitalist countries. Figure 1 plots the evolution of components of public expenditure as a percentage of GDP.

Figure 1: Evolution of government expenditure by category as a share of GDP (1972-2012)⁵



Throughout the decades of 1980 and 1990, the Portuguese economy had a period of rapid growth and social development. The GDP per capita increased an average annual rate 3,1% and 2,6% during the 1980s and the 1990s, respectively. Accompanying this growth, the

⁵Adapted from Santos, A., Teles, N., Serra, N. (2014). *Finança e Habitação em Portugal*. Cadernos do Observatório. Observatório sobre Crises e Alternativas/CES. Accessed on March 13th, 2025, from <https://hdl.handle.net/10316/41129>

liberalization of fiscal constraints and the global diffusion of market-oriented policies contributed to the housing market liberalization. The negligible social housing development was primarily targeted at clearing informal housing and squatter settlements in the two main cities (Barlow et al, 2004). This involved a progressive withdrawal of the state from direct housing provision, prioritizing private homeownership.

Housing problems were dealt with state incentives to homeownership by both financial and fiscal mechanisms, like credit subsidies and tax benefits (Azevedo, 2020). As a result, 70% of Portuguese households owned their homes in 2021⁶. Moreover, the rental market has a residual importance in the national housing market, as it is characterized by its low dimension and targeted to low-income families with no financial capabilities of borrowing enough funds to buy a house. In fact, it is common for southern European countries to have a disproportionally bigger homeownership rate, largely driven by access to credit markets. Portugal is the one from this group of countries with higher rental rates (Mendes, 2022), especially in the northern and inland regions, Lisbon, Porto and Algarve (Azevedo, 2020).

The promotion of homeownership persisted until the financial crisis of 2008. According to Alves & Guimarães (2024), between 1987 and 2011, nearly three-quarters of Portugal's housing budget was spent on subsidies for mortgages and loans, only 8.7% on rent subsidies, and 17.9% on direct provision of housing. Between 2001 and 2011, Portugal saw a modest decline in homeownership from 54% to 50%, and a slight rise in rental housing, reversing decades of pro-ownership policy (Xeres et al., 2018). During this period, mortgage debt soared from €5 billion in 1990 to €104 billion in 2008, despite only a 10% population increase.

Since then, the scarcity of affordable housing has extended beyond low-income households, affecting individuals across the entire wealth spectrum. The risk of default stemmed by the financial crisis and the financialization of housing brought with increasing social risks for a broader set of households, specifically middle-income families. Policies like the *Regime de Crédito Bonificado* (Subsidized Credit Scheme) did not achieve its expected effects. This program was discontinued in 2002 after nearly three decades of implementation, as neither low-income nor younger households really benefited from these special credit lines, thus not effectively enhancing affordability. Xeres et al. (2018) argue that subsidies like the

⁶ INE. [*Conventional dwellings of usual residence \(No.\) by Locality \(Census\) and Tenure status*](#). Accessed on March 16th, 2025.

RCB do not exhibit a statistically significant impact on the promotion of homeownership, rather benefiting those whose activities are associated with the housing sales market, namely real estate agencies and construction firms.

Rendering the stabilization of the housing sector was a primary concern for public authorities, given its central role in the unfolding of the crisis. This priority was not only aimed at mitigating the crisis and the financial hardships of households, but also to avoid further constraints within the sector. Since the early 2000s, Portugal's housing policy has undergone a strategic shift. From public expenditure heavily oriented toward homeownership and credit subsidies (Azevedo, 2020) to market deregulation intended to reduce public debt, urban rehabilitation (particularly in historic centres) and attraction of foreign investment. State intervention increasingly focused on stimulating the rental market and real estate development, while promoting social housing and urban regeneration as key policy pillars (Xeres et al., 2018). In fact, increasing rental housing demand stems from labour market and sociodemographic transformations in southern European countries, including Portugal.

As Barlow et al. (2004) highlight, a growth in temporary employment contracts has led to greater labour mobility, which in turn fosters more frequent residential relocation. Low-income households are more exposed to more frequent changes of home as they often get employed with this type of contracts and are subjected to more labour market uncertainties. Hence, a rigid rental market constrains labour mobility and housing access for these households, with new contracts often commanding higher rents. Demographic shifts, including changing family structures and increased immigration, have further intensified demand for rental housing. As an increasing proportion of households are composed by smaller families, divorced parents and families with no children, a strategic convergence toward Northern European policy standards becomes essential to foster greater housing mobility, independence and affordability.

The integration of Portugal's rental market into international standards, coupled with urban rehabilitation, became a central focus of housing policy. This shift materialised through key initiatives such as the 2006 New Regime of Urban Renting (NRAU), a landmark reform aimed at modernising rental legislation. The NRAU sought to revitalise the rental market by updating frozen rents, promoting a more equitable balance of rights between landlords and tenants, and introducing protections for vulnerable groups. Accompanying this, the *Porta 65 Jovem* programme provided targeted rental subsidies to support the residential independence

of individuals under 35. A broader set of policies included urban rehabilitation programmes, “build-to-rent” projects, financial subsidies mechanisms and the expansion of inclusive social housing under a more progressive concept of “accessible housing”.

However, the outcomes of the dual promotion of rental housing combined with the easing of urban rehabilitation under the new regulatory framework are involved in controversy. The restructuring of the urban rental sector through the implementation of the NRAU stimulated a gradual phasing out of long-term rental contracts and a substantial increase in rents in a regime more favourable to short-term leases and market-driven prices (Lorga et al., 2022). This reduced housing affordability had initiated a process of gentrification, displacing lower-income renters from city centres. Combined, these processes reshaped inner-city neighbourhoods with areas increasingly oriented to higher-income families, tourism-related activities, and speculative investment (Xeres et al., 2018).

In addition, the creation of tax regimes oriented to attract foreign investment (most notably the Golden Visa) intensified housing unaffordability in urban centres, producing spillover effects that have extended to suburban areas of the metropolitan areas and to other regions. Nonetheless, the dynamization of the real estate market was successful, as Portugal's relatively low cost of living, combined with favourable fiscal incentives attracted wealthy European retirees, nomadic workers and tourists (Lorga et al., 2022). Indeed, the inflow of capital alongside the NRAU framework significantly amplified the demand to renovate the real estate stock, thereby accelerating rehabilitation efforts and the modernization of the housing stock (Mendes, 2022).

One major concern about housing prices determination should be highlighted. As policies aimed at encouraging foreign ownership of real estate and projects of urban rehabilitation are implemented, demand from international investors rises, thereby exerting upward pressure on housing prices. The housing market may detach from the national labour market and depend on foreign incomes rather than domestic purchasing power (Gordon, 2020), creating a problem of displaced demand. During the 4th quarter of 2021, “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)” (INE, 2022). As later discussed, marginal buyer theory posits that inelastic supply and rising demand from high-income groups drive up prices, reducing housing affordability. Local and low-income households are often displaced to dwellings

with lower conditions, that would otherwise be vacant, or forced into overcrowded living conditions.

Despite policy efforts to reform the rental sector, by 2014 homeownership in Portugal had returned to pre-2008 levels. Exceptionally low interest rates from 2016 to 2022 reinforced the preference for ownership, while surging housing prices further distorted the rental market. Shifting family structures and increased labour mobility generated more diverse housing needs, underscoring the urgency of a structural change in housing provision. The Portuguese housing market reveals a deep difficulty in adjusting the existing housing stock to the needs, exposing a structural inertia to flexibility and adaptation. Yet, to fully understand these changes and how does Portuguese households cope with them, one must undertake an analysis of key indicators that delineate the contours of the national housing landscape and compare the national scenario with the international context.

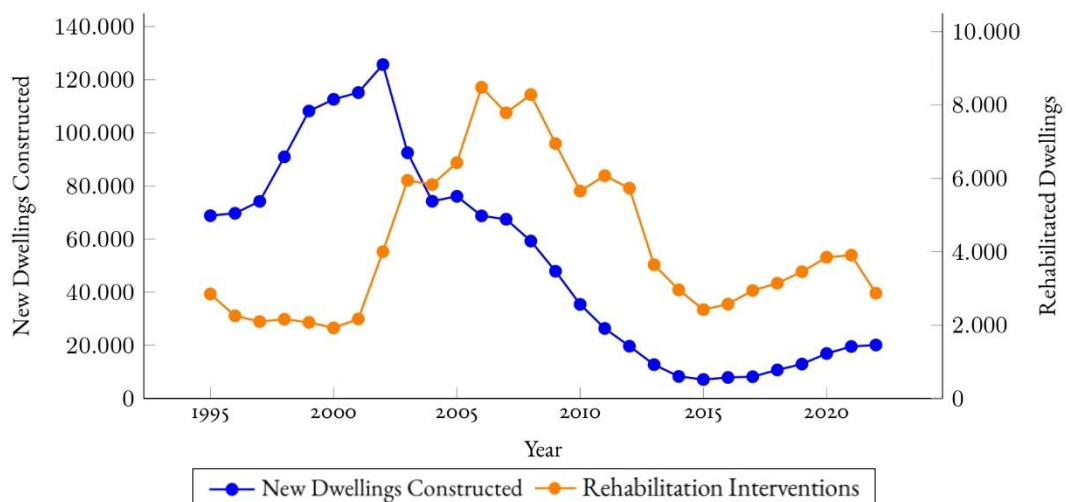
2.2. Housing Market Performance and Key Indicators

Portugal underwent a major turning point in the housing market at the 2008 financial crisis. Alongside a significant decrease of finished dwellings per year, both the institutional framework and the political attention shifted towards new priorities, away from the incentives to homeownership. Direct construction of social housing, promotion of rehabilitation instead of construction and, above all, incentive to renting were the new focus of policy makers during the 2000s, as discussed in the previous section.

Figure 2 plots the evolution of the yearly constructed new dwellings and completed dwellings in rehabilitation interventions for family housing between 1995 and 2022. An unprecedented boom in the housing market took part in the late 1990s, fuelled by Portugal's accession to the European Economic Community and the liberalization of the banking sector. More than 760.000 new dwellings were built during the period 1995-2002, yet only 2,5% corresponded to rehabilitated properties. From 2002 onwards, however, housing production began a sustained contraction—not merely a cyclical slowdown but a structural realignment in policy. Between 2002 and 2008, more than 8% of new dwellings on the market were rehabilitated. The pronounced decline in housing construction after 2002, as discussed above, is not merely a reflection of cyclical slowdown, but marks a structural shift in Portugal's housing system. A reorientation of housing policy towards rehabilitation and rental

promotion contributed to a persistent contraction in new housing supply. The financial crisis did not contribute to invert the decreasing tendency of housing production, until construction activities reached a minimum in 2015.

Figure 2: New dwellings constructed, and dwellings completed in rehabilitation interventions in Portugal, 1995–2022



Source: INE

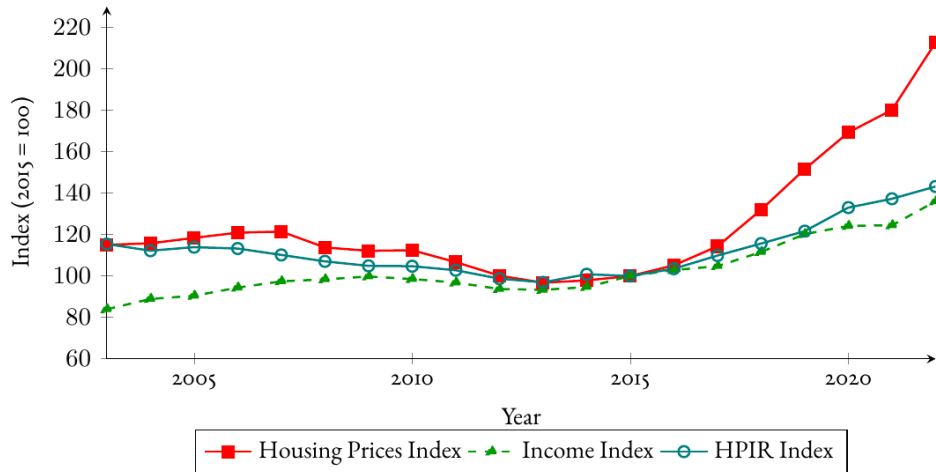
In principle, the expansion of the housing stock (combined with a more flexible institutional framework) should have contributed to a more responsive and less inelastic housing market. However, the rental market has a residual importance in the national housing market, as it is characterized being of low dimension and targeted to low-income families with no financial capabilities of borrowing enough funds to buy a house. In 2024, only 26.6% of all households were renters, compared to 39.6% among households earning below 60% of median equivalised income⁷. This discrepancy reveals not enhanced affordability in rental units, but a significant barrier in wealth accumulation for low-income households.

From 2015 onwards, housing prices began to increase at a faster pace than household income (Figure 3), reflecting not only a constrained supply environment but also the growing commodification of housing, as emphasized in the literature (Fields & Uffer, 2016; Wetzstein, 2017). While household income increased by 36% over the last decade, housing prices more than doubled. Consequently, the house price-to-income ratio (HPIR) rose nearly 48%, absorbing a growing share of household budgets. Although expanding housing supply

⁷ Eurostat. [Distribution of population by tenure status, type of household and income group](#). Accessed on June 28th, 2025.

post-2015 could, in theory, ease affordability pressures, Portugal's post-crisis recovery was accompanied by a strong revaluation of real estate, a time in which the country gained prominence as an increasingly popular tourism destination.

Figure 3: Housing Prices and Income Indexes in Portugal, 2003–2022 (nominal)



Source: INE, ECB and author's calculations

Owing to a limited supply of housing specifically designated for tourism in major urban centres (Lorga et al., 2022), the post-crisis institutional framework promoted neoliberal practices by facilitating a rapid and expansive growth of short-term renting for tourists and foreign visitors. As a result, rehabilitation projects increased significantly post-2015, especially in the metropolitan areas (53,4% of total rehabilitations completions). However, Algarve stands out when considering the proportion of rehab projects in total construction in each region.

As a result, historic city centres were transformed into hubs for short-term rental yields, often displacing long-term tenants or diverting capital from other real estate investments. Concurrently, metropolitan areas such as Lisbon and Porto experienced notable demographic growth between 2011 and 2021, now collectively accounting for nearly half of all Portuguese households. A spillover effect from prices in urban areas to suburbs or rural areas can be observed, as plotted by the evolution of the median price per square meter since 2015 (Figure 4). If a house of 100 m² could be bought by €75,342 in 2014, the same unit reached a market value of €164,325 ten years later, a 120% increase.

Figure 4: Median bank appraisal value, 2003–2024 (nominal)



Source: INE

This more than twofold increase occurred in a context where income growth was modest, revealing a deepening affordability crisis. Although the post-crisis period saw renewed focus on urban rehabilitation and policy efforts to revitalize city centres, these initiatives did not translate into more accessible housing for lower-income groups (Xeres et al., 2018). The renewed housing stock remained financially inaccessible to lower-income groups. Hence, the affordability of housing for the poorest households is not a simple matter of availability, but must also consider the functional allocation of dwellings, specifically, whether units are directed towards short-term rentals, long-term residential use, ownership, or investment purposes.

This misallocation is particularly important in metropolitan areas. Despite over 30% of the national housing stock being either vacant or used as secondary residences in 2021⁸, access to housing in Lisbon and Porto remains constrained. Population growth and economic activity remain concentrated in these cities, but much of unoccupied units are in depopulating inland regions. This imbalance undermines the expected equilibrium effects of supply-demand mechanics and fuels continued price escalation. It reinforces not only exclusionary dynamics in urban housing markets but also translates into a tangible financial burden for a growing share of households.

An important shift in sociodemographic characteristics occurred during this period and cannot be undervalued. Smaller and more heterogeneous households, alongside urban concentration, has further increased the need for additional housing units (especially in urban

⁸ INE. (2021). [The housing stock - analysis and evolution: 2011-2021](#). Accessed on July 13th, 2025.

geographies), even amidst a stagnant national population. Therefore, recent dynamics in the housing market cannot be explained by the evolution of the population. Between 2001 and 2021, Portugal's resident population grew by a modest 0.2%, yet the number of private households increased by 13.6%⁹. This divergence is especially evident in the metropolitan areas of Lisbon and Porto. While the population of the Lisbon metropolitan area grew by 1.7% and declined by 1.3% in Porto (Rodrigues et al., 2023), the number of households increased significantly in both regions, by 16.5% and 16.8%, respectively.

Focusing our analysis period between 2011 and 2024, a significant driver of this dynamic is the sharp rise of 47,3% in single-person households. Most of this increase occurred after 2021, indicating an acceleration in individual living arrangements during recent years. This trend is likely the result of multiple overlapping factors, including aging, decreasing fertility and higher rates of separation¹⁰. As more individuals choose or are compelled to live alone, the demand for housing units rises disproportionately, further restricting access to affordable housing for lower-income households, especially in urban areas.

Overall metrics of housing affordability such as housing-price-to-income ratios or rent-to-income ratios often hide social inequality resulting from market conditions. The housing cost overburden rate by income quintile (Figure 5¹¹) is used to examine the uneven impact felt across different income quintiles. It measures the proportion of households spending more than 40% of their disposable income on housing expenses and identifies which segments of the population are most vulnerable to housing unaffordability. If the average overburden rate across all income quintiles is around 6,9% in 2024, this value rises 3,5 times when only considering the impact on the lowest quintile. Therefore, around a fourth of the poorest households do not respect the maximum effort rate allowed by the banking sector to access housing credit, further restricting wealth accumulation, and increasing inequality, as mentioned previously. Figure 5 clearly reveals a markedly regressive pattern that disproportionately affects lower-income households.

Interestingly, the proportion of households struggling to support housing expenses is decreasing and even lower than the values reported in the early 2000s, where the house-

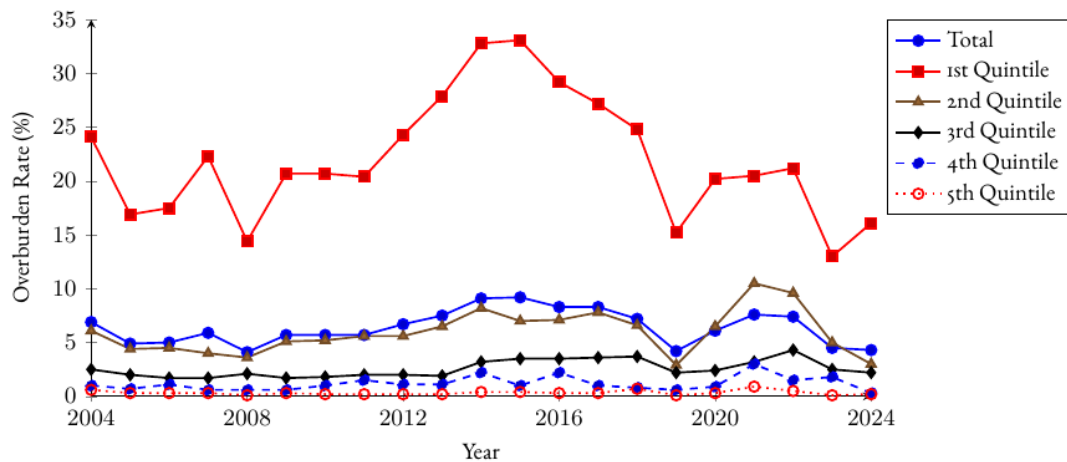
⁹ INE. *Private households/ families (No.) by Place of residence at the Census moment (Series 1890 - 2021) and Size class of private household/ family*. Accessed on June 29th, 2025.

¹⁰ Eurostat. *Household composition statistics*. Accessed on July 15th, 2025.

¹¹ Eurostat. *Housing cost overburden rate by income quintile*; INE. *Housing cost overburden rate (%) by Place of residence (NUTS - 2013) and Urban areas typology*. Accessed on July 16th, 2025.

price-to-income ratio was the lowest. While the HPIR measures market access for those aspiring to own a home, the HCOR captures actual housing expenditure as a share of income for those already housed, reflecting realized affordability. Thus, when many households are owners with no or low mortgage burdens in Portugal, price increases may not affect their immediate housing costs. Yet they signal exclusion for new buyers or renters.

Figure 5: Housing cost overburden rate, by income distribution quintile (2004 – 2024)



Source: INE and Eurostat

The HCOR undervalues differences in living conditions, particularly by overlooking the structural effects of larger household compositions (adult children residing with parents) and overcrowded dwellings. Indeed, since 2017, Portugal has experienced a steady rise in its national overcrowding rate, increasing from 9.3% to 11.2%¹². This difference is more nuanced in tourism-intensive regions like Algarve and Madeira, totalling 14,4% and 19,4%, respectively, contrast with the relative stability observed in the Lisbon Metropolitan Area, where the rate slightly declined from 12.9% to 12.5%. When disaggregating HCOR by tenure status, a notable divergence emerges: homeowners are generally more insulated to fluctuations in market conditions, with their overburden rate declining consistently from 8.5% in 2011 to just 1.6% in 2023¹³. However, tenants remain highly vulnerable to adverse macroeconomic conditions, as reflected in the elevated HCOR for rental households, which reached 30.3% in 2024.

Taken together, the data presented in this section suggest a misalignment between housing needs and available supply. Persistently low levels of housing production and

¹² INE. [Dwelling overcrowding rate \(%\) by Location of residency \(NUTS – 2013\) and Tipau](#). Accessed on July 6th, 2025.

¹³ Eurostat. [Housing cost overburden rate by tenure status](#). Accessed on July 6th, 2025.

rehabilitation, compounded by sociodemographic and institutional transformations, have intensified the demand for housing units, especially for poor households in urban rental markets. Not addressing the needs for this deprived group risks deepening living conditions and create social unrest. A flexible housing market not only accelerates economic growth and development by allowing labour mobility but also democratizes access to wealth accumulation. The next section reviews the literature on the effects of inequality on access to housing by exploring the fundamentals behind housing prices formation, transmission mechanisms and the roots of the current housing crisis.

3. Theoretical Framework

Classical economic models frame housing as a normal good, but the evolving dynamics of the housing market (particularly in urban and high-demand regions) have increasingly reflected asset-based logics driven by wealth accumulation and investment flows. Detaching the housing market from the traditional supply and demand dynamics of residential use has amplified the price-setting power of private investors and high-income households. Hence, an increase in income inequality is expected to decrease overall housing affordability. Although the literature on this effect is scarce, especially for developed countries, this section reviews the drivers behind housing prices fluctuations, while emphasizing the importance of inequality. Then, empirical studies on this topic are analysed, in order to shape our exploratory analysis in subsequent sections.

3.1. Drivers of Housing Prices

Glaeser and Gyourko (2018) review the basic economics of housing supply and the operation of the housing market in the US over the 1985-2013 period. To analyse price determination in this sector, the authors examine the causal relationship between the minimum profitable production cost and actual housing prices. They argue that when housing prices exceed this cost, the resulting disparity reflects a regulatory tax that should only internalize the negative externalities associated with constructing new dwellings. However, this gap indicates the influence of regulation and not the physical scarcity of housing. The study concludes that rising housing prices are primarily driven by increased land costs resulting from binding land-use restrictions, rather than by the costs of physical construction, which vary mainly with the geographic characteristics of the building site. In fact, this conclusion aligns with Marques et al. (2020) that acknowledges a significant impact of regulation costs in housing supply. Petach (2022) goes further and points out an “home voter effect”, from which land-based interests influence planning decisions to limit new housing construction to protect and increase property values of homeowners.

In fact, the economic neoliberal vision from the 1980s promoted policies encouraging homeownership, with only 8,7% and 17,9% of the Portuguese housing budget subsidising rent and direct housing provision from 1987 until 2011, respectively, as pointed out by Alves & Guimarães (2024). This trend is not unique to the Portuguese case, therefore revealing a generalized shift from social housing provision in the supply-side to subsidies for homeowners in the demand-side since the 1970s (Fields & Uffer, 2016), especially in the USA.

Thus, most of Portuguese households are now homeowners, 76,0% in 2023 (Eurostat, n.d.), respecting the trend observed in western economies (Moore & Skaburskis, 2004; Wetzstein, 2017). Nonetheless, low-income or younger families struggle to save for a down payment and are driven towards less affordable housing options or remain in the rental market (Moore & Skaburskis, 2004). Hence, the ability of a household to afford a down payment for a mortgage serves as an indicator of purchase affordability.

In light of affordability indicators, Gan and Hill (2009) refine the usual concept by inquiring between purchase, repayment and income affordability, with the latter being one of the most notorious instruments of measure as it does not respond to changes in interest rates. Thus, income affordability in some sense provides a long-term vision of variations in affordability within a given economy. The housing-price-to-income ratio (HPIR) is widely used in the literature (Gan & Hill, 2009; Zhang et al., 2016) and provides a easily computable and comparable measure of housing affordability (Bogdon & Can, 1997). However, the purchase and repayment indicators emphasize the role of increasing financialization of housing since the 1980s deregulation. A household's ability to secure sufficient funds for home purchase and the financial burden of mortgage repayments on monthly income provide a good understanding into the impact of housing credit developments. As deregulation of the mortgage market increases average mortgage lengths, a consequential reduction in the average downpayment ratios is expected, *ceteris paribus*, increasing the housing affordability for lower income households.

Nonetheless, the literature suggests that this deregulation and the processing of housing as an asset with commodity characteristics is another root of the current housing crisis (Fields & Uffer, 2016; Wetzstein, 2017). The rising of financial services associated with the expansion with real estate industry and the redevelopment of city centres in the 1980s began making real estate activities amenable to capital inflows driven by the prospect of profitable returns, as pointed out by Fields and Uffer (2016). This study highlights how these factors reshaped the political economy of housing, driven by the sharp decline in interest rates following the 2000 stock market crash, which increased market liquidity and inflated asset prices and profitability.

The commodification of housing as a liquid and tradable asset redefined the financial sector's role, shifting mortgage markets from solely facilitating borrower credit access to functioning as a mechanism for global investment (Aalbers, 2008). Similarly, Alves &

Guimarães (2024) argue that the agenda stimulating the financialization of housing increased the risk of default for low-income households, but also for upper-middle-income families with unexpected expenses. The authors go further and point out that the increase in demand from foreign investors and immigrants that can afford more expensive real estate declined housing affordability, especially in areas with high demand. Thus, speculative global finance elevated land and housing to a central role in capital flows, increasing the influence of institutional and private investors on housing prices (Aalbers, 2008; Wetzstein, 2017).

Private investors compete with buyers in the real estate market to acquire housing units for rental or resale profit. Rather than contributing for the supply of new dwellings, investors speculate on housing prices; affordability problems have already risen even after selling the dwelling to occupiers. Therefore, considering house as a normal good, the demand for housing should increase with income and an inflow of capital to invest in the housing market should also increase (Moore & Skaburskis, 2004), as housing is a desirable asset for investment purposes. This results that “the income elasticity of demand for investment purposes is higher than the elasticity for residential purposes and decreases very slowly as income goes up” (Zhang et al., 2016). It allows high-income individuals to channel their wealth into property acquisition at a greater scale. The income increase of wealthy households drives up the equilibrium housing price since the price is determined by the marginal buyers (Matlack & Vigdor, 2008), aggravating the burden of housing expenses for lower-income households.

Matlack and Vigdor (2008) conduct a formal analysis to examine whether increases in the income of affluent households contribute to housing affordability challenges for lower-income households. Using a partial equilibrium model, they find that in tight housing markets with low vacancy rates, increases in ninth decile incomes relative to the median lead to increased rents and overcrowding for low-income households in the first decile. While there is demand for housing by high-income households, there will be demand for (more expensive) new houses and housing prices tend to increase. When rising housing prices are driven by income growth among wealthy households, it is unlikely that income inequality would negatively affect housing affordability for this high-income group (Zhang et al., 2016).

The same finding is supported by Dewilde and Lancee (2013). The authors explicit three mechanisms linking income inequality to housing affordability: i) housing market dynamics and other two mechanisms, although not significant: ii) absolute level of resources and iii) rising aspirations. While the absolute level of resources corresponds to the income

of the households available to spend in housing expenses, rising aspirations is related to the status competition between high- and low-income households that trigger “emulative consumption” with the less favourable buying houses more expensive than necessary.

Another hypothesis that can influence the relationship between income inequality and housing prices is housing market segmentation (Dewilde & Lancee, 2013; Matlack & Vigdor, 2008). Specifically, if distinct income groups participate in separate housing segments, income inequality may reduce demand within “inferior” housing markets, leading to a corresponding decline in prices. Nonetheless, the hypothesis of housing market segmentation suggests that an increase in inequality, understood as a decline in income among poorer households, results in higher inferior housing demand and, consequently, in their prices, reducing affordability. A spillover effect from rising prices in high-end housing to inferior housing is also evident, as builders often speculate on renovating older properties within the latter segment (Beitel, 2007). As a result, the impact on housing prices for low-income households may be mixed and depends on the rise in income inequality source.

However, the significant role of private landlords (investors) in “supplying” housing within these segments can exacerbate the financial burden on lower-income households. Higher housing prices incentivize property owners and investors to capitalize on selling their assets rather than renting them out, thereby reducing the availability of affordable rental options. This trend is particularly pronounced in lower-priced and tight markets, where selling often generates greater profits than renting (Matlack & Vigdor, 2008). This impact reveals that homeowners, to some extent, are hedged against rising housing prices, whereas renters experience a decline in real terms, effectively making them poorer (Glaeser & Gyourko, 2018). Thus, as renters are mainly low-income households due to high burdens in accessing a downpayment, housing markets can serve as a barrier to wealth accumulation, functioning as a transmission mechanism that links rising income inequality to increasing wealth inequality (Petach, 2022).

Lastly, Tarne and Bezemer (2025), from a neoclassical perspective, argue that financialization does not drive housing inflation and only enables demand to be expressed and facilitates supply. Periodic monetary and financial drivers, however, lead to unsustainable booms and crises. As housing is increasingly regarded as a viable investment asset, newly created capital is funnelled into this sector in pursuit of supranormal profits. This inflates asset prices while depleting liquidity, ultimately exacerbating affordability crises.

Consequently, rising income inequality enables wealthier households to further invest in the market, accelerating housing prices growth for all agents participating in the market, even when accounting for potential market segmentation theories previously discussed.

4. Data

4.1. Data Description

The estimations relating to the model are conducted utilizing the Household's Budget Survey (IOF). The IOF is collected by INE, which reports detailed confidential microdata from 1980 to 2022 on households' characteristics. It is a quinquennial survey that contains information on three categories: i) characterization of dwellings and existent equipment, ii) socio-economic description of the households' members, including their annual monetary income and iii) daily, recurrent or periodic expenses incurred by the households per category, such as the ones carried out for housing.

The IOF constitutes a foundational instrument for revising the structure of the Consumer Price Index. Thus, its statistical importance is designed to capture household expenditure patterns, contextualized within the broader distribution of income and access to material comforts. Through a regionally representative sample, the IOF enables a characterization of poverty and inequality with sufficient detail to identify differences and tendencies between geographies.

This analysis is conducted at the Portugal's NUTS II regions level, using INE provided data on the years 2000, 2005, 2010, 2015, and 2022. This temporal framework includes a sufficiently extended period to capture significant economic shocks highly impactful in the housing market, such as the financial crisis, and political and housing policy-orientation shifts. The selected timeframe captures both cyclical market fluctuations and evolving institutional frameworks affecting affordability dynamics.

For this study, were selected two relevant sets of information. The first relates to household and dwelling characteristics, for example the urbanization degree, tenure status, number of rooms, floor area, construction year, number of residents, expenses per category, annual monetary income for each member, and equipment in the dwellings used to characterize living conditions. These data is used to identify housing outcomes by income quintile across the time span of this series. The second reports socio-demographic characteristics for the households' members, namely their civil status, sex, age, education level and labour condition. However, this analysis will only consider the characteristics for the households' head, as they are the providing member of reference for the household. The households' head is defined as the member with the higher income. Their characteristics determine the financial

stability of the household, and, therefore, its position along the income distribution. Annexes IIa and IIb describe and explain the purpose of each variable included in the model.

In order to avoid errors in modelling, a usual data cleaning process was conducted. Firstly, missing values not resulting from plausible economic justification were dropped. The year of 2005 had twenty missing values in the variables corresponding to the professional situation and labour conditions, which were also dropped¹⁴. The remaining were the result of different terminology and categorization of the components of each variable, which were dealt with and harmonized. The content of each harmonized variable is described further in this section. The filtered sample is composed by 53,011 households across the entire income distribution.

There are many caveats regarding the harmonization of variables, such as geographical detail and discontinuation across the different waves. Discontinued variables, such as equipment in the dwellings, existence of secondary homes, and nationality are not considered in the final dataset. Different terminology and categories within variables across years are a major time-consuming obstacle in the processing of the data. Using a case-by-case approach, they are easily harmonized for the purpose of this investigation. Missing values are removed from the final dataset, as they do not reveal hidden information.

Following the methodology adopted by similar investigations, the sample is restricted to low-income households in the second quintile (40%) of the income distribution. Not limiting the sample to poorer households dilutes the effect of increasing income inequality. Since an increase in the Gini coefficient is associated with an increase in the share of income held by wealthier households, contradictory effects on housing affordability arise if these households are included in the model. A total of 21,047 households in the bottom 40% of the income distribution are presented by the survey. As a sensitivity check, the bottom quintile (20%) of the income distribution is also considered as low-income households. Modelling for these two groups allows for a better understanding of how housing affordability differs between poorer households. The bottom quintile is composed by 8,312 households after filtering data. This analysis is primarily interested in low-income households, even though accessibility of wealthier households may be of interest for future research to better understand housing production mechanisms and speculative behaviour.

¹⁴ Results from these households not selecting the correct labour status, even though they appear as currently employed.

Additionally, different tenure status condition housing outcomes and the impact of increases in income inequality. While the survey identifies multiple categories of tenure status, for the purpose of this study only homeowners (with or without mortgage) and renters at “market rate” (not in social housing) are considered. Even though the majority of households living in social housing are among the bottom 20%, they are not considered. They are protected from market adversities, since their housing problems are already dealt with by the government. The filter for households in the rental market is suggested by Matlack and Vigdor (2008). It is incorporated in this model because this group is more prone to be affected by short-term fluctuations in market prices and inequality dynamics than those in the homeownership regime. Even low-income homeowners are generally insulated from spot market prices. Effects for each tenure status are estimated. Descriptive statistics of the data used for each filter are available in Table 1a (continuous variables) and Table 1b (dummy variables).

The explanatory variable of income inequality requires additional attention. The literature suggests the use of the Gini coefficient, due to its straight forwardness and easiness of computation and understanding (Dong, 2018; Liu et al., 2020; Matlack & Vigdor, 2008; Zhang, 2015; Zhang et al., 2016). The Gini coefficient is the primary measure of income inequality in each NUTS II region and year. It quantifies the extent to which income distribution deviates from perfect equality across all households. A Gini value of 0 denotes complete income uniformity within the population, whereas a value of 1 reflects maximal inequality. This measure is constructed from the annual monetary income reported by each IOF household.

The calculation of this metric requires a satisfactory level of variation between the observations. Without this, the independent variable might lead to imprecise estimates and statistically weak results. Considering the data's high level of aggregation, a total of 35 region*year observations is achieved. This low level of variation in the explanatory variable introduces econometric challenges, particularly related to the identification and precision of the estimated effects. Since the Gini coefficient varies only at the region-year level, while the regression is estimated at the household level, the effective number of independent variation points for inequality is limited.

Table 1a: Descriptive statistics for continuous variables

	All Households (<i>N</i> = 53011)		Bottom 40% (<i>N</i> = 21047)		Bottom 20% (<i>N</i> = 10525)	
	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.
Gini coefficient	0.357	0.028	0.356	0.028	0.356	0.028
Housing exp. to income ratio	0.285	0.158	0.349	0.181	0.371	0.199
Log (Residual income)	9.295	0.895	8.535	0.691	8.195	0.698
Log (Housing exp. per room)	7.183	1.137	6.954	1.202	6.813	1.238
Persons per room	1.118	1.092	1.050	1.016	0.976	0.914
No. occupants	2.589	1.424	1.918	1.156	1.619	1.003
Real income (in euros)	21,144.490	18,325.480	9641.949	4902.262	7174.776	3492.545
Real total expenditure (in euros)	16,865.750	13,473.590	9391.010	6199.804	7388.159	4962.447
Real housing expenditure (in euros)	5493.710	4748.373	3482.832	2524.405	2805.683	2085.059
Real GDP (in euros)	16,092.870	6483.652	15,949.970	6182.049	15,930.710	6046.413
Population density	273.849	321.307	256.045	306.907	253.982	305.007
Housing stock	552,893.500	439,179.100	549,482.000	442,239.800	543,160.600	441,207.700
IPC	90.242	22.846	90.051	22.558	90.023	22.459

Source: IOF and author's calculations

Table 1b: Descriptive statistics for dummy variables

Variable	Category	All Households		Bottom 40%		Bottom 20%	
		N	Freq	N	Freq	N	Freq
Tipau	Rural area	24168	45.93%	9177	43.60%	4570	43.42%
	Semi-urban area	10511	19.98%	4869	23.13%	2481	23.57%
	Urban area	17936	34.09%	7001	33.26%	3474	33.01%
Tenure Status	Ownership	39180	74.47%	13219	62.81%	5960	56.63%
	Renting at "market rate"	7382	14.03%	4145	19.69%	2352	22.35%
	Council housing	2470	4.69%	1777	8.44%	1220	11.59%
	Free housing	3579	6.80%	1905	9.05%	993	9.43%
	Other	4	0.01%	1	0.00%	0	0%
Dwelling age	Less than 15 years	3749	7.13%	1178	5.60%	559	5.31%
	15–30 years	13278	25.24%	3360	15.96%	1413	13.43%
	More than 30 years	35487	67.45%	16440	78.11%	8515	80.90%
No. of rooms	Up to 3 rooms	17418	33.10%	9485	45.07%	5406	51.36%
	4 rooms	17907	34.03%	6810	32.36%	3079	29.25%
	5 or more rooms	17290	32.86%	4752	22.58%	2040	19.38%
Household type	1 adult	10461	19.88%	8048	38.24%	5733	54.47%
	Single parent	1408	2.68%	766	3.64%	382	3.63%
	2+ adults without dependents	22637	43.02%	8938	42.47%	3467	32.94%
	2+ adults with dependents	15415	29.30%	2990	14.21%	895	8.50%
	Other	2694	5.12%	305	1.45%	48	0.46%
Education	None or basic education	39860	75.19%	19230	91.37%	9900	94.06%
	High school	6087	11.48%	1288	6.12%	456	4.33%
	College	7064	13.33%	529	2.51%	169	1.61%
Sex	Male	34008	64.15%	11544	54.85%	4775	45.37%
Age	Up to 29 years old	2127	4.01%	655	3.11%	248	2.36%
	30 - 64	32126	60.60%	9030	42.90%	3822	36.31%
	65 or more years old	18758	35.39%	11362	53.98%	6455	61.33%
Labour condition	Employed	28360	53.50%	6742	32.03%	2312	21.97%
	Unemployed	2191	4.13%	1226	5.83%	721	6.85%
	Other	22460	42.37%	13079	62.14%	7492	71.18%
Observations		53011		21047		10525	

Source: IOF and author's calculations

4.2. Measurements of Housing Affordability

The selection of appropriate housing affordability indicators remains a topic of debate. Bogdon and Can (1997) emphasize the importance of ease of computation and comparability across jurisdictions. With this in mind, Matlack and Vigdor (2008) focuses on affordability in the rental market and proposes three key indicators that this investigation intends to follow: i) the rent-to-income ratio, ii) residual income and iii) rent per room. The first two assess financial burden on households' budget and, the latter a raw indicator of housing quality. Since the indicators used in our investigation are mainly derived from these three and other relevant literature, we begin by briefly outlining each before detailing the specific measures adopted in the present analysis.

The methodology of this investigation uses four indicators that measure affordability, by creating a set encompassing three dimensions: i) cost burden, ii) quality and iii) quantity adequacy. In the cost burden dimension, we introduce the housing expenses to income ratio and the logarithm values of residual income. For the quality dimension, housing expenses per room are evaluated using their logarithmic transformation. Lastly, the quantity dimension is captured through the persons per room indicator, that is an adapted crowding metric. All indicators are derived from calculations using IOF data.

The rent-to-income ratio is the most used metric of rental market affordability within the housing economics literature. Its widespread adoption is largely attributable to the relative accessibility of data, the ease of computation and its methodological transparency. It identifies households experiencing affordability problems and facilitates the comparison across regions and time periods by measuring relative changes between the periodic cost of living in the dwelling and the household income. However, it hides meaningful information about living conditions of the household. A higher ratio is not positively correlated with the quantity of housing consumed by the members. During a housing crisis, increases in housing expenses may not be linked with quality increases.

In this case, we use the housing expenses to income ratio, derived from the rent to income ratio measured by dividing annualized housing-related expenses (rent or repayment duties and utilities, such as electricity, water and gas) by the total annual monetary income declared by each household in the survey. Altogether render a robust indicator of financial burden borne by households. Thus, the analysis uses an adapted ratio similar to an effort rate like described by Matlack and Vigdor (2008). The ratio measurement presents limitations

regarding lifestyle choices. High-income families may choose to spend larger proportions of their income on housing expenses. However, this approach remains pertinent, as housing is deemed affordable if the household can support the expenses associated with the right of living in the accommodation.

A household may attribute a high share of their income to housing expenses and still have sufficient money to address other needs. Solely analysing ratios hides this information, especially when examining the impact of sociodemographic characteristics on affordability. Our purpose is not to conduct a normative judgment on the management of the domestic finances, but only on their capacity of living in an affordable dwelling. In addition, our focus is on low-income households, not at the top of the income distribution.

Hence, another cost burden indicator is the residual income indicator. It is measured by subtracting the annual monetary income by annualized housing-related expenses for each household. An increase in residual income is associated with a similar increase in what a household can actually afford accounting for inflation. It follows Hancock (1993) definition of housing affordability as the “households’ ability to meet housing expenses without excessively limiting non-housing consumption”. It is also related with the concept of “shelter poverty” developed by Stone (1993), which adjusts affordability standards according to household size and composition, incorporating preferences and necessities often overlooked by ratio-based measures. Nonetheless, the residual income measure may be insufficient to address differences in housing size and quality between households. Analysing housing affordability without accounting for uniform dwelling size and quality requires a specific measure of quality.

The housing quality indicator is measured by total housing expenses per room, similar to the rent per room indicator of Matlack and Vigdor (2008). The housing expenses per room indicator is defined as the ratio of the annualized monthly housing expenses to the number of rooms within a dwelling. It is a superior indicator of housing size and quality, since it simultaneously captures elements of housing size and potential quality, with the number of rooms reflecting spatial dimensions and the rental value approximating perceived or market-assessed quality. While, as with other affordability indicators, higher rent does not unambiguously signal superior quality (due to price distortions, market segmentation, or location effects), the rent per room ratio contributes meaningfully to a multidimensional assessment of housing affordability.

It offers a proxy for the cost-efficiency and potential quality of a dwelling. Higher figures can indicate housing of better quality, but also inefficient or over-priced housing, particularly for low-income households. Yet, considering the analysis across all four indicators, we improve the robustness of the affordability framework, while differentiating the financial burden dimension and qualitative conditions. The ratio enables cross-household comparisons of the intensity of housing costs, and it serves to reveal affordability and quality gaps along the income distribution. Further research on this metric is essential to tailor it to model specifications.

Measuring housing availability is derived from the methodology adopted by Dewilde and Lancee (2013). The authors proxied it by the level of crowding, that is the number of individuals residing within a dwelling per room. This proxy serves as an indicator of spatial adequacy and the overall capacity of the housing market to furnish a sufficient supply of dwellings that align with the living requirements of households. Accordingly, a dwelling may be considered spatially adequate if it affords its occupants a reasonable degree of privacy and personal space, thus fulfilling a fundamental dimension of housing adequacy. Additionally, the percentage of public housing per capita in a given geographic area could serve as an indicator of a potential "escape valve" during housing crisis, providing another measure of housing availability (Januário et al., 2023). However, such data is not publicly and regularly available.

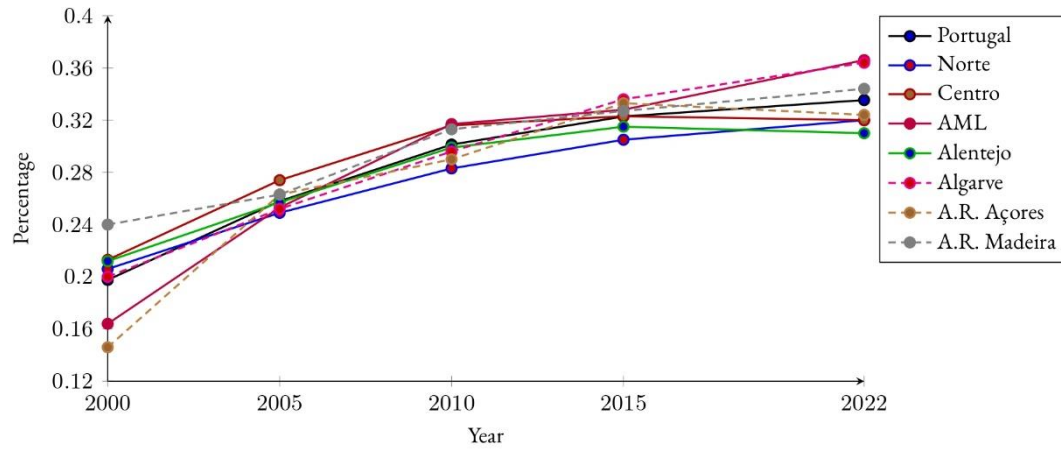
4.3. Sample Analysis

To ensure the results of this investigation are well interpreted, it is essential to analyse social and economic characteristics of the regions and households captured by the survey, as well spatial relationships between the variables. This includes examining demographic profiles, income distributions across regions and regional disparities that may influence affordability outcomes. Indicators used to measure housing outcomes and built for the purposes of modelling are also discussed and analysed.

To contextualise the problem of decreasing housing affordability in Portugal, we evaluate the incidence of the phenomenon across the period between 2000 and 2022, using the housing expenses to income ratio as the main affordability indicator (Figure 6) and the housing expenses per room (Figure 7). We quantify the evolution of the Gini coefficient as well in each region (Figure 8). Addressing this issue enables us to visualise heterogeneous

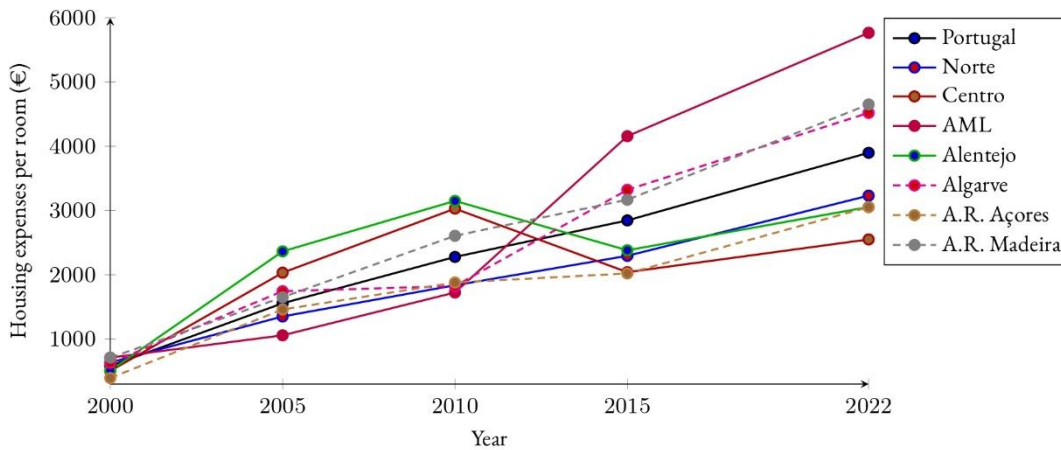
inequality levels and evolution between regions.

Figure 6: Mean housing expenses to income ratio by NUTS II regions (%), 2000 – 2022



Source: IOF and author's calculations

Figure 7: Mean housing expenses per room, 2000 – 2022 (€, Base = 2015)



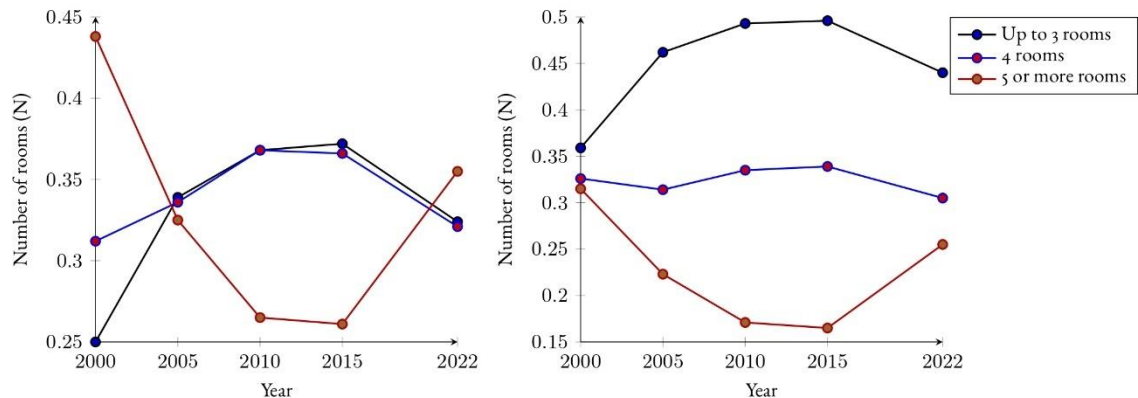
Source: IOF and author's calculations

From the analysis of the affordability indicators evolution, we conclude that the housing market of Portugal exhibited a marked and sustained increasing pressure on household in accessing adequate housing. The evolution of the housing expenses to income ratio shows a consistent upward trajectory across all regions, with particularly pronounced increases in the Metropolitan Area of Lisbon (AML), the Algarve and Autonomous Region of the Azores.

Concurrently, the housing expenses per room indicator more than sextupled over the two-decade span, underscoring structural regional imbalances within the housing market. In fact, the housing market in Lisbon experienced the most pronounced rise in this metric. This surge is closely tied to a declining average number of rooms per dwelling (Figure 8), a

development that coincides with sociodemographic shifts, including a reduction in household size and the number of occupants per dwelling. Thus, the rise in housing expenses per room reflects both increasing costs and shifting residential patterns.

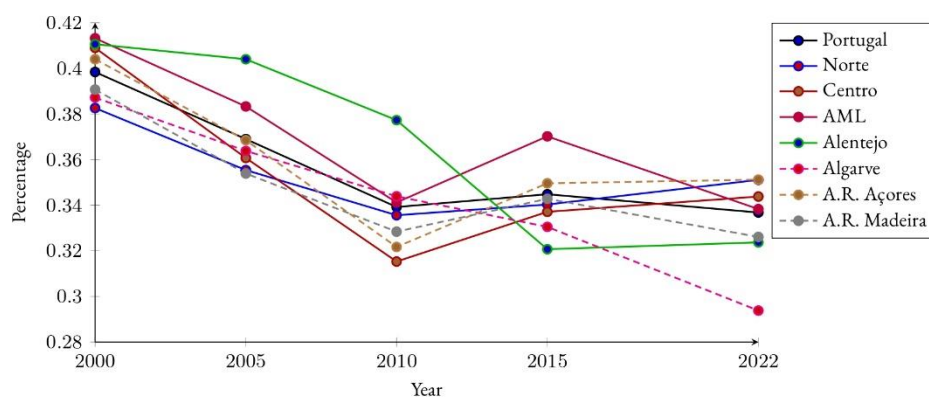
Figure 8: Number of rooms per accommodation by income quintiles (2000 – 2022). Total income distribution and bottom 40% in the income distribution, respectively



Source: IOF and authors' calculations

Considering the evolution of the number of rooms per dwelling, a significant contrast is observed between households in the bottom 40% of the income distribution (right) and the overall sample (left). In 2022, approximately 45% of lower-income households resided in dwellings with no more than three rooms, compared to 31% in the broader sample. However, it is worth mentioning a significant decline in the average number of rooms until 2015, reflecting the housing market constraints and economic pressures from the financial crisis.

Figure 9: Gini coefficient by NUTS II regions (2000 – 2022)



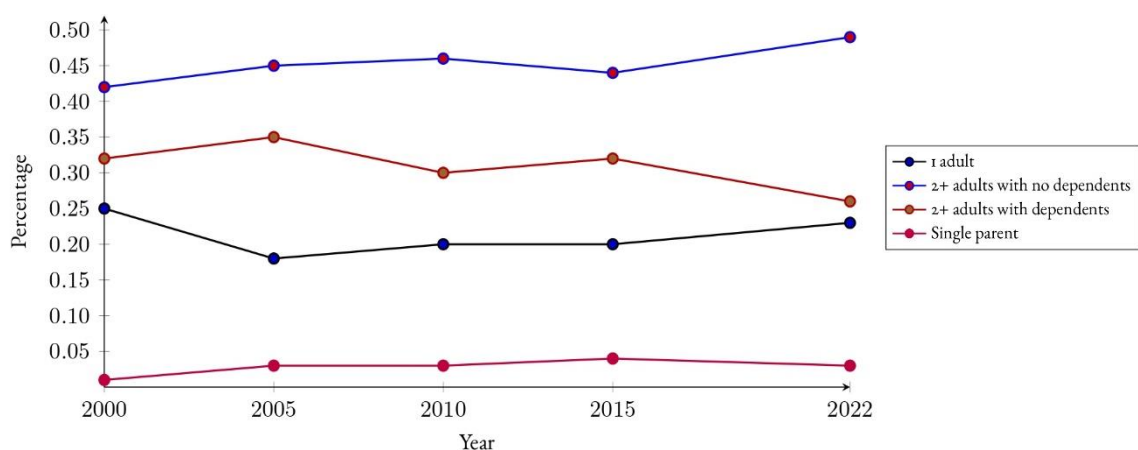
Source: IOF and author's calculations

Regarding the Gini coefficient, a downward evolution until 2010 is analysed, reflecting the positive impact of redistributive social policies and targeted welfare interventions implemented during that period. These policies included the expansion of minimum income

schemes (such as the *Rendimento Social de Inserção*), increased investment in education and healthcare, and gradual increases in the minimum wage. This is followed by a sustained increase until 2015. This increase coincides with the implementation of austerity measures under the terms of the international bailout agreement signed in 2011. Although Figure 9 does not capture the evolution of the Gini coefficient between 2015 and 2022, an analysis of data provided by the World Bank reveals that the upward trend observed up to 2015 was followed by a gradual decline extending through to 2019. Since then, the socioeconomic pressures induced by the pandemic contributed to a reversal of prior gains, pushing the coefficient back to levels comparable to those observed in 2010 by the year 2022.

Some regions stand out with consistently higher disparities or peculiar paths in the wealth distribution. As expected, the Metropolitan Area of Lisbon (MAL) consistently presents higher values of this coefficient. While urban centres typically offer greater access to services, infrastructure, and employment opportunities, they also face intensified housing market pressures. These pressures come from high demand and the concentration of low-income households, which together contribute to greater inequality. Algarve shows a steady decline in inequality despite a rising housing expense-to-income ratio. This suggests that housing pressures there are less tied to local income disparities and more influenced by external demand from tourists and foreign investors, highlighting the need to distinguish between different drivers of affordability challenges across regions. This illustrates how the housing market can become increasingly detached from national labour market dynamics.

Figure 10: Type of household as a percentage of total households (2000 – 2022)



Source: IOF and author's calculations

The number of occupants proxied by the type of household reflects

sociodemographic changes that conducted to an increase in the number of one individual households and dwellings with less occupants. Figure 10 suggests that, while the proportion of dwellings occupied by a single adult declined slightly between 2000 and 2005, this trend reversed in subsequent years, showing a steady and sustained increase thereafter. This evolution reflects broader demographic transformations, including delayed marriage, increased life expectancy, and a growing preference for independent living. This trend aligns with declining fertility rates and changing family structures in Portugal, which mirror broader patterns observed across Southern Europe. The decreasing prevalence of larger family units has implications not only for social policy but also for housing demand, contributing to a greater need for smaller, more affordable housing typologies.

5. Empirical Model

The analysis proceeds by estimating a pooled OLS model inspired by the prominent literature on measuring the effects of income inequality on housing prices and the determinants of affordability. In section 5.1. we present the empirical model motivated by the literature and describe the model framework of this investigation, followed by its results in section 5.2.

5.1. Model Specifications

To correctly estimate the respective effects of income inequality on housing expenses to income ratio, residual income housing expenses per room and persons per room, one must focus the analysis on low-income households, as they are the group with more financial instability and difficulty to live in a house adequate to their needs. Not restricting the analysis to these households may originate conclusions with less noticeable inequality impacts.

Similar models focus on renters and not homeowners. Choosing to filter the estimations by tenure status understands that low-income households are more prompted to rent than to own housing, thus not being insulated from housing market volatility. In this way, income inequality may be more impactful than when dealing with more heterogenous income distributions and renters. However, the southern European housing market is strongly based on households buying the house and the land they live in.

Therefore, it is necessary to conduct a series of models intended to capture differences rising from tenure status and households in different income quintiles for the entire household sample, even though ownership and rental markets are interconnected and jointly influence housing decisions. For instance, low-income households may aspire to homeownership but are often diverted into the rental market due to credit constraints or mortgage repayment burdens that exceed sustainable effort rates, mainly due to rigidities in the rental supply. An inverse situation may occur for those facing frequent residential mobility demands. High rental prices may incentivize homeownership when feasible, notwithstanding the long-term financial commitments involved.

Correctly defining low-income households is essential. Matlack and Vigdor (2008) define low-income households as those with an individual of reference that does not hold a high school diploma. However, Portugal has seen significant evolution in education since 2000, so that financially disadvantageous households may not be accurately represented by this measurement. In the other hand, Zhang (2015) defines low-income households as those

in the bottom 20% in each Chinese city. Since Portugal is being particularly targeted by a substantial housing crisis, we opt by this measurement, although with an increase to 40% in each region. To check for sensitivity, this analysis also models for the lower three quintiles of the income distribution.

Two methodologies are visible in the literature, although every time data is extracted from similar databases to the IOF. This means that resorting to IOF data may be the most tangible and direct way of picturing the relationship. In one hand, Dewilde and Lancee (2013) analyse the causal effect while turning to aggregated sociodemographic characteristics that describe each geography (and not each individual or household). This dissertation follows a second approach formally developed by Matlack and Vigdor (2008) and used as well in Zhang (2015), in which variables are described at the household level with microdata. The first analyses the impact of the explanatory variable in the quantity of financially burdened households in each territory. The latter estimates how inequality explains individual outcomes, given their sociodemographic characteristics, allowing for within-region heterogeneity.

A pooled cross-sectional data analysis is then conducted using a conventional ordinary least squares (OLS) linear regression with time and region dummies to account for fixed effects. The econometric model is specified as follows:

$$H_{it} = \alpha + \beta GINI_{rt} + \gamma X_{it} + \delta Z_{it} + \theta_r + \lambda_t + \mu_{it}$$

where H_{it} denotes an affordability indicator as defined in section 4.2. involving the i) housing expenses to income ratio, logarithm values of ii) residual income and iii) housing expenses per room, and iv) persons per room of the i th household in the t th year. $GINI_{rt}$ is the r th region's income inequality Gini coefficient in the t th year. X_{it} is a vector of control variables at the household and individuals' level such as the urbanization degree (TIPAU), region (NUTS II), tenure status, number of rooms, floor area, construction year, number of residents, head's civil status, sex, age, education level and labour condition. Z_{it} is a set of control variables regarding regional characteristics for each year, such as real GDP (Base=2015), population density, housing stock, and consumer price index household.

θ_r is a region fixed effect, λ_t is the year fixed effect and μ_{it} an i.i.d. random disturbance. This composite error term addresses the concern that both regions and years may have uncontrollable factors that affect housing outcomes of low-income households. Structural

socioeconomic heterogeneity between NUTS II has implications on economic development, employment and education, as well long-standing housing market conditions and urban zoning laws that do not change often. Similarly, temporal shocks or trends might wrongly attribute their effects to changes in inequality. These fixed effects are captured by a set of dummy variables and are expected to improve robustness. Clustered robust standard errors are used to account for within-cluster correlation between residuals and avoid bias in inference.

To capture variation across tenure status and income quintiles, the model is estimated 16 times, as detailed in the following section. The first four regressions examine the impact of income inequality on the housing expenses-to-income ratio and residual income for households for the bottom 40% and 20% households, irrespective of tenure status. In order to analyse if time-varying unobserved heterogeneity specific to each region is significant, two regressions in the annex do not account for fixed effects. Then, we evaluate the influence of inequality on housing expenses per room and persons per room among second-quintile households, again irrespective of tenure. Finally, the last eight estimations further disaggregate the analysis by filtering for both tenure status (homeowners vs. market-rate renters) and income quintiles.

5.2. Empirical Results

Table 2 presents the coefficient estimates of a regression specification examining the impact of income inequality on the housing cost burden measured by the housing expenses to income ratio and the residual income. For both purposes, the pooled OLS accounts for households in the bottom 20% and 40% of the income distribution. The first two columns respect to households in the first quintile, while the third and fourth columns present the point estimates for the second quintile. This table do not account for differences for the cases of homeownership and renting. These regressions control to region and year fixed effects.

As a sensitivity check, results with no region and time dummies are presented in Annex III. Not accounting for unobserved heterogeneity produces a biased estimation of the main parameters of interest. While statistically significant, some coefficient signs contradict theoretical expectations. The Gini coefficient shows a negative effect, despite the

literature suggesting a positive link. This may reflect the role of social protection or the relocation of low-income households to more affordable areas.

In fact, an endogeneity problem between income inequality and housing affordability is not novel and it stems from omitted variable bias (treated by estimating with region and time dummies) or reverse causality (Hailemariam et al., 2021). Controlling with region and year time dummies, expected signals from economic theory are achieved. Regional fixed effects control for time-invariant differences across regions, such as stable disparities in housing markets, income distribution, and institutional contexts. Year fixed effects capture shocks and temporal trends that affect all regions simultaneously.

The estimates for the first and second quintiles from Table 2 reveal a significant relationship between income inequality, as measured by the Gini coefficient, and both the housing expenses to income ratio and residual income. As expected, inequality impacts positively on the proportion of housing expenses in relation to total income and negatively on the annual residual income. Since variations in the Gini coefficient are generally small, the effects are expressed as the product of its standard deviation and the corresponding point estimates. An increase of one standard deviation in the Gini index increases by 2.4% the housing expenses to income ratio and decreases residual income by 5.5% for households in the bottom 40% of the income distribution.

Similar results were obtained by Matlack and Vigdor (2008) when analysing inequality dynamics in the USA. Intuitively, households in the bottom 20% experience further financial constraints in result of an increase in inequality. However, this difference is only notable when considering variations in the residual income. While housing expenses to income ratio presents similar estimations, the same increase in inequality reduces the income after housing expenses by 7.6%.

The household characteristics incorporated as control variables in each specification are as well significant predictors of changes in the financial burden of housing. Households headed by unemployed, single parents and females are especially exposed to higher housing expenses to income ratio resulting from increases in inequality. This pattern reflects the greater income volatility and financial uncertainty typically associated with the unemployed and single parents, as well as less stable access to favourable mortgage conditions or social protections to female-headed households.

Table 2: OLS results for the 1st and 2nd quintile households. Time dummies and region dummies: yes.

	Bottom 40%		Bottom 20%	
	HEIR	Log(RI)	HEIR	Log(RI)
Gini index	0.843*** (0.096)	-1.960*** (0.324)	0.849*** (0.150)	-2.720*** (0.489)
GDP (Real, 2015 EUR)	0.000*** (0.000)	-0.000*** (0.000)	0.000*** (0.000)	-0.000*** (0.000)
Population density	-0.001*** (0.000)	0.002*** (0.000)	-0.001*** (0.000)	0.002** (0.001)
Housing stock	-0.000*** (0.000)	0.000* (0.000)	-0.000*** (0.000)	0.000 (0.000)
Consumer price index	0.003*** (0.001)	-0.007*** (0.002)	0.003*** (0.001)	-0.011*** (0.003)
<i>Omitted variables: Rural and Semi-urban areas</i> Dwelling in urban area	-0.006* (0.002)	0.001 (0.008)	-0.010** (0.004)	0.004 (0.012)
<i>Omitted variables: Renting, Free housing and Other Homeownership</i>	0.042*** (0.003)	0.062*** (0.009)	0.042*** (0.004)	0.021 (0.013)
Council housing	-0.136*** (0.004)	0.089*** (0.017)	-0.151*** (0.006)	0.162*** (0.021)
<i>Omitted variables: 15-30 years and More than 30 years</i> Dwelling age less than 15 years	0.041*** (0.006)	-0.081*** (0.023)	0.046*** (0.009)	-0.112** (0.036)
Dwelling age 15 - 30 years	0.027*** (0.003)	-0.025* (0.011)	0.033*** (0.005)	-0.062** (0.019)
<i>Omitted variable: 2+ adults without dependents</i> 1 adult	0.034*** (0.003)	-0.318*** (0.010)	0.013*** (0.004)	-0.177*** (0.014)
Single parent	0.042*** (0.007)	-0.188*** (0.026)	0.028* (0.011)	-0.106** (0.040)
2+ adults with dependents	0.015*** (0.004)	0.002 (0.013)	0.040*** (0.007)	-0.081** (0.026)
Other household type	-0.020* (0.009)	0.215*** (0.029)	0.049 (0.029)	-0.120 (0.112)
<i>Omitted variable: None or basic education</i> High school	0.022*** (0.005)	0.044* (0.020)	0.049*** (0.010)	-0.078* (0.039)
College	0.055*** (0.008)	-0.022 (0.036)	0.102*** (0.016)	-0.324*** (0.077)
Male	-0.022*** (0.003)	0.092*** (0.009)	-0.036*** (0.004)	0.118*** (0.013)
<i>Omitted variable: 30 - 64</i> Householder aged up to 29	-0.008 (0.007)	0.021 (0.027)	-0.002 (0.013)	0.003 (0.053)
Householder aged 65 or more	-0.041*** (0.004)	0.128*** (0.014)	-0.061*** (0.005)	0.212*** (0.019)
<i>Omitted variables: Employed</i> Unemployed	0.053*** (0.005)	-0.315*** (0.022)	0.041*** (0.008)	-0.263*** (0.031)
Other employment status	0.036*** (0.004)	-0.236*** (0.015)	0.026*** (0.006)	-0.194*** (0.023)
Constant	-0.142 (0.076)	9.751*** (0.272)	-0.077 (0.120)	10.418*** (0.417)
Observations	21047	21047	10525	10525
R-squared	0.239	0.367	0.282	0.316

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Interestingly, households headed by individuals with a college diploma allocate a larger share of income to housing and possess less residual income, relatively to those with none or basic education. This pattern reflects the dual nature of housing affordability metrics. It reflects both the spatial distribution of skilled employment, often concentrated in high-cost urban centres, and preferences for quality and location. Despite higher housing expenditures, their greater earnings leave a larger absolute amount of income available after housing costs. In fact, Stone (2006) signals that more affluent households are capable of spending a bigger share of their income in housing expenses while having enough residual income to support their lifestyle.

Gender-based disparities in housing outcomes remain a salient feature of the Portuguese housing market. Residing in a household headed by a male individual is associated with a decrease in the housing expenses to income ratio and an increase in annual residual income. These findings parallel the observed effect of single parenthood, which corresponds to an increase in the housing expenses to income ratio compared to the remaining types of households. Given that most single-parent households are headed by women, this result underscores the additional economic hardship disproportionately borne by female-headed households. The situation is more adverse for households in the first quintile.

Economic characteristics of each region throughout the years reveal that both regional GDP per capita and the evolution of consumer price index possess a positive and statistically significant impact on the housing expenses to income ratio and a negative impact on households' residual income, even though a negligent impact of GDP on the ratio. In contrast, population density and the expansion of the housing stock are both associated with statistically significant reductions in the housing-expense-to-income ratio.

Analysing the impact of tenure status on housing affordability is essential to identify situations where households are forced to choose between renting or homeownership due to problems associated with market undersupply of housing or access to credit. Estimations reveal a negative impact of owning a home on housing expenses to income ratio and a positive reaction on residual income. This reflects that homeowners are more prompt to spend a larger share of their income, while being insulated from exogenous shocks that affect their financial stability. As a robustness check, the sample is filtered further in this analysis for each tenure status to analyse the correct impact of income inequality on households' financial burden by tenure status.

Following the housing affordability literature, considering a home as adequate is not solely the result of respecting the requirements of financial burden indicators. A house may be financially affordable but lack conditions for the needs of the household. It can be overcrowded or lack quality. Thus, this investigation conducts two final regressions that try to capture the impact of income inequality on quantity of housing consumed per person (crowding indicator) and overall quality, respectively the persons per room and housing expenses per room indicators. Estimations for each indicator are presented in Table 3.

The Gini coefficient is a statistically significant predictor of housing expenses per room. Estimations indicate that on average an increase of one standard deviation in this inequality indicator raises annual housing expenses by 3.3% per room. This “crude quality-adjusted cost variable” (Matlack and Vigdor, 2008) indicates that as the upper end of the income distribution increases their share of total wealth, prices tend to increase and/or poorer households are forced to move into smaller units. This effect is supported by the marginal buyer theory, which suggests that as long as there are wealthier households capable of buying new homes, prices tend to increase even for smaller units, and the size of new dwellings accompanies the quality standards required by these wealthier households. This raw positive effect on quality cannot be captured by the residual income, as it doesn’t reflect the impact of demand spillovers from higher-income households across housing conditions. The residual income may be the same after an increase in inequality, but the number of rooms (and quality of housing) is lower. Both Glaeser and Gyourko (2018) and Matlack and Vigdor (2008) support these findings, as they suggest that wealthier households exert demand pressure on housing markets, raising costs across all market segments.

Population density exerts a positive and statistically significant effect on housing expenses per room. This result is consistent with the structural characteristics of denser regions, where housing supply constraints and elevated demand typically coincide with smaller dwelling sizes and higher unit prices. Accordingly, living in an urbanized region decreases housing expenses per room. Although these findings may appear contradictory at first glance, they reflect distinct dimensions of the housing market. Urbanized classifications in Portugal include not only dense metropolitan centres but also district capitals and peripheral cities with lower population densities and less competitive housing markets. This distinction underscores the importance of differentiating between urbanization as a policy or statistical label and the actual market dynamics associated with population agglomeration.

Table 3: OLS results for housing expenses per room and persons per room for the bottom 40% households in the income distribution. Time dummies and region dummies: yes.

	Log(HEPR)	PPR
Gini index	1.179* (0.537)	-0.586 (0.496)
GDP (Real, 2015 EUR)	0.000*** (0.000)	0.000 (0.000)
Population density	-0.002*** (0.001)	0.001 (0.001)
Housing stock	-0.000*** (0.000)	-0.000 (0.000)
Consumer price index	0.011*** (0.003)	0.002 (0.003)
<i>Omitted variables: Rural and Semi-urban areas</i> Dwelling in urban area	-0.045** (0.014)	-0.025 (0.013)
<i>Omitted variables: Renting, Free housing and Other</i> Homeownership	-0.038** (0.015)	-0.378*** (0.015)
Council housing	-0.652*** (0.026)	-0.021 (0.028)
<i>Omitted variables: 15-30 years and More than 30 years</i> Dwelling age less than 15 years	0.228*** (0.027)	0.041 (0.034)
Dwelling age 15-30 years	0.151*** (0.017)	0.001 (0.020)
<i>Omitted variable: 2+ adults without dependents</i> 1 adult	0.017 (0.015)	-0.431*** (0.012)
Single parent	0.103** (0.034)	0.286*** (0.042)
2+ adults with dependents	0.035 (0.020)	0.959*** (0.031)
Other household type	-0.137** (0.052)	0.394*** (0.072)
<i>Omitted variable: None or basic education</i> High school	0.111*** (0.026)	-0.044 (0.031)
College	0.226*** (0.038)	-0.032 (0.044)
Male	-0.001 (0.014)	-0.007 (0.014)
<i>Omitted variable: 30 - 64</i> Householder aged up to 29	0.059 (0.037)	0.124* (0.050)
Householder aged 65 or more	-0.074*** (0.020)	0.008 (0.017)
<i>Omitted variables: Employed</i> Unemployed	-0.032 (0.027)	0.060 (0.034)
Other employment status	-0.048* (0.021)	-0.023 (0.020)
Constant	6.151*** (0.435)	0.884* (0.430)
Observations	21029	21047
R-squared	0.471	0.272

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The estimations further suggest that the most vulnerable groups in terms of housing affordability are also renters at “market rate”, single parents, householders with college education, female-headed households living in newer dwellings. These findings are consistent with the broader literature, which identifies renters as the most exposed to housing market volatility. Single-parent and female-headed households face higher housing stress due to lower earnings and caregiving constraints. While college education is generally associated with higher income, it often leads to higher housing costs through increased demand for quality and location, particularly in urban areas.

Regarding our crowding measure of persons per room, the Gini coefficient effect is not statistically significant. Multiplying the Gini coefficient’s standard deviation by the point estimate in the persons per room regression yields the curious result that a one standard deviation increase in income inequality is associated with a reduction of at least one household occupant. This result contrasts with the findings of Matlack and Vigdor (2008), who report a significant increase of 0.10 persons per room under similar conditions. Theoretically, rising inequality is expected to intensify household crowding as families consolidate living arrangements to cope with higher housing costs. For example, Portugal has seen a significant delay in residential emancipation among younger adults, driven by stagnant wages, rising rents, and a competitive housing market. However, the negative sign in the current estimates may reflect specific demographic dynamics, such as declining household size (more single adults with no dependents, with less children, etc...) or migration patterns, rather than affordability pressures alone.

The estimations reveal that market-rate renters, single-parent households, and employees are significantly more likely to live in crowded housing conditions. These groups are systematically exposed to multiple dimensions of housing stress: not only do they face higher housing costs relative to income and elevated per-room expenses, but they are also more susceptible to overcrowding. Moreover, the analysis suggests that higher population density is associated with increased levels of overcrowding, although this point estimate is not statistically distinguishable from zero. Nonetheless, in high-demand regions, lower-income and marginalized households are often pushed into overcrowded living situations as a coping strategy.

5.3. Robustness checks

We now conduct a robustness check on the model's sensitivity to households in different tenure status. A homeowner in the bottom 40% of the income distribution is not so exposed to housing hardships as those living in renting units. We immediately notice the difference in our inequality indicator coefficient values after filtering the sample for low-income renters at "market rate".

Table 4 reveals a statistically significant difference in the impact of income inequality on housing affordability, both on the first and second quintiles. A one standard deviation increase in the Gini coefficient increases housing expenses to income ratio for second quintile renters by 4% and 3.7% for first quintile households in similar conditions. This means the 20% poorer households are more insulated to economic shocks than the 40%. Renters in the first quintile are also more capable of saving more income after paying for housing costs than those in the second quintile.

Although a curious estimation, Leishman and Rowley (2012) suggest that, in fact, housing affordability problems mainly affect households in the lower 40% of the income distribution, as the poorer often live in social housing or older dwellings whose contracts are protected against steep increases. Overall, these estimations verify that renters have more financial instability, thus having a higher impact of increases of income inequality on their capacity to afford a decent home.

Nonetheless, homeowners that belong to the first quintile are not so well insulated from the adverse effects of rising inequality as renters are. The estimates indicate that, for households in the bottom 20% of the income distribution who own their homes, a one standard deviation increase in the Gini coefficient is associated with an increase in the housing expenses-to-income ratio of approximately 2.4% and a decrease of 5.7% in the residual income. These values contrast to the 3.1% impact on residual income for the 40% poorer households.

Table 4: OLS results for the 1st and 2nd quintile households, by tenure status. Time dummies and region dummies: yes.

	BOTTOM 40%				BOTTOM 20%			
	Homeownership		Renting		Homeownership		Renting	
	HEIR	Log(RI)	HEIR	Log(RI)	HEIR	Log(RI)	HEIR	Log(RI)
Gini index	0.827*** (0.126)	-1.181** (0.392)	1.271*** (0.229)	-3.649*** (0.845)	0.904*** (0.225)	-2.190** (0.681)	1.145*** (0.333)	-4.024*** (1.176)
GDP Real (2015 EUR)	0.000*** (0.000)	-0.000*** (0.000)	0.000*** (0.000)	-0.000*** (0.000)	0.000*** (0.000)	-0.000** (0.000)	0.000*** (0.000)	-0.000*** (0.000)
Population density	-0.001*** (0.000)	0.003*** (0.001)	-0.001** (0.000)	0.002 (0.001)	-0.001*** (0.000)	0.002** (0.001)	-0.000 (0.000)	0.001 (0.001)
Housing stock	-0.000*** (0.000)	0.000* (0.000)	-0.000 (0.000)	0.000 (0.000)	-0.000*** (0.000)	0.000* (0.000)	-0.000 (0.000)	-0.000 (0.000)
Consumer price index	0.003*** (0.001)	-0.006** (0.002)	0.002 (0.002)	-0.005 (0.006)	0.005*** (0.001)	-0.016*** (0.004)	0.001 (0.002)	-0.009 (0.008)
<i>Omitted variables: Rural and Semi-urban areas</i>								
Dwelling in urban area	-0.009** (0.003)	-0.001 (0.010)	0.012 (0.007)	0.036 (0.023)	-0.012* (0.005)	0.003 (0.016)	0.018* (0.009)	-0.000 (0.030)
<i>Omitted variables: 15-30 years and More than 30 years</i>								
Dwelling age less than 15 years	0.013 (0.008)	-0.018 (0.031)	0.105*** (0.012)	-0.197*** (0.052)	0.007 (0.014)	-0.071 (0.060)	0.135*** (0.017)	-0.313*** (0.070)
Dwelling age 15 30 years	0.025*** (0.004)	-0.006 (0.013)	0.051*** (0.010)	-0.082* (0.037)	0.035*** (0.007)	-0.056* (0.025)	0.073*** (0.014)	-0.160** (0.049)
<i>Omitted variable: 2+ adults without dependents</i>								
1 adult	0.036*** (0.003)	-0.305*** (0.012)	0.030*** (0.007)	-0.361*** (0.024)	0.017** (0.005)	-0.172*** (0.018)	0.008 (0.009)	-0.176*** (0.031)
Single parent	0.023* (0.009)	-0.089** (0.031)	0.066*** (0.014)	-0.326*** (0.056)	0.019 (0.019)	-0.062 (0.062)	0.030 (0.018)	-0.113 (0.072)
2+ adults with dependents	0.008 (0.005)	0.020 (0.016)	0.040*** (0.008)	-0.079* (0.032)	0.019 (0.011)	-0.025 (0.037)	0.066*** (0.013)	-0.155** (0.052)
Other household type	-0.037** (0.013)	0.216*** (0.046)	-0.007 (0.013)	0.195*** (0.038)	0.053 (0.047)	-0.218 (0.216)	0.029 (0.036)	-0.004 (0.103)
<i>Omitted variable: None or basic education</i>								
High school	0.020** (0.007)	0.044 (0.025)	0.030** (0.010)	0.004 (0.040)	0.058*** (0.016)	-0.093 (0.060)	0.040** (0.015)	-0.068 (0.060)
College	0.075*** (0.012)	-0.087 (0.050)	0.040** (0.014)	0.036 (0.063)	0.115*** (0.030)	-0.411** (0.156)	0.096*** (0.021)	-0.293** (0.097)
Male	-0.020*** (0.003)	0.091*** (0.011)	-0.027*** (0.006)	0.111*** (0.022)	-0.037*** (0.005)	0.127*** (0.018)	-0.030*** (0.008)	0.112*** (0.029)
<i>Omitted variable: 30 - 64</i>								
Householder aged up to 29	-0.032** (0.011)	0.059 (0.043)	-0.009 (0.011)	0.038 (0.042)	-0.045 (0.027)	0.078 (0.124)	-0.013 (0.018)	0.059 (0.071)
Householder aged 65 or more	-0.043*** (0.005)	0.107*** (0.017)	-0.061*** (0.009)	0.209*** (0.036)	-0.069*** (0.007)	0.200*** (0.026)	-0.082*** (0.012)	0.317*** (0.048)
<i>Omitted variables: Employed</i>								
Unemployed	0.058*** (0.007)	-0.282*** (0.029)	0.045*** (0.012)	-0.322*** (0.047)	0.056*** (0.012)	-0.260*** (0.047)	0.026 (0.016)	-0.232*** (0.057)
Other employment status	0.045*** (0.005)	-0.217*** (0.018)	0.013 (0.010)	-0.280*** (0.038)	0.040*** (0.009)	-0.185*** (0.030)	0.003 (0.013)	-0.254*** (0.055)
Constant	-0.109 (0.098)	9.148*** (0.334)	-0.359* (0.176)	10.449*** (0.675)	-0.021 (0.175)	10.194*** (0.601)	-0.427 (0.245)	11.305*** (0.903)
Observations	13219	13219	4145	4145	5960	5960	2352	2352
R-squared	0.177	0.373	0.290	0.377	0.216	0.307	0.391	0.338

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The marginal difference between the two estimations is of limited economic significance, even though it suggests that the widespread low-income homeownership (Dewilde & Lancee, 2013) is accompanied by a higher financial burden. The data indicate that the impact of income inequality on the housing expenses to income ratio diminishes as household income rises, and critically, this effect is less pronounced for homeowners compared to renters. In situations characterized by widespread promotion of homeownership, especially during periods of neoliberal housing policy orientation, banks and financial institutions often relaxed credit standards to expand mortgage access among lower-income households, making them assume risky long-term debt obligations, as mentioned in previous sections.

Urbanization appears to intensify affordability pressures for second-quintile households renting at market rates, though the effect is not statistically significant. Point estimates are consistent with the theory that in major urban cores, institutional investor activity and financialization have been shown to amplify rental costs, as it was discussed previously.

For single-parent households, results echo Matlack and Vigdor (2008) and Zhang (2015), showing that inequality reduces affordability. The impact is weaker for the lowest quintile, likely reflecting greater access to social protections. This pattern reinforces the notion that households in the second quintile face greater exposure to affordability risks than those in the bottom quintile, as the latter are more likely to benefit from targeted social protections and safety nets during periods of economic stress.

6. Conclusions

Portugal is in an ongoing housing crisis, which has attracted economists' attention on exploring possible solutions to deal with it. Nonetheless, the national literature has mainly focused on finding solutions and not correctly analysing the causes and social implications arising from them. The main aim of this dissertation has been to analyse to which point problems of housing affordability for low-income households can be explained by inequality dynamics in the income distribution. Indeed, an underexplored topic within the national literature despite its growing policy relevance.

The literature suggests that housing affordability is primarily driven by a combination of structural supply constraints, financialization of housing markets, and rising income inequality. Although empirical investigation on income inequality driven housing outcomes remains limited in scope, the existing evidence is both suggestive and compelling. Investigations on different countries reflect that the institutional background, economic structures and the integration of the financial market differ the significance of inequality movements on the households' capacity of affording a decent home.

The works of Matlack and Vigdor (2008) for the United States, Zhang (2015) for China, and Dewilde (2018) for Europe have demonstrated that, independently of the location of the sample, rising inequality tends to increase housing cost burdens, reduce residual income and intensify crowding for low-income households. Additionally, they find out that households that own the house in which they live in are more insulated to market shocks and income inequality than renters at "market rate". In fact, the first two articles focus their analysis only on the latter group.

Income inequality transmits its effects to housing affordability through several interconnected mechanisms rooted in market dynamics and structural asymmetries. The marginal buyer hypothesis posits that as high-income households increase their demand for premium housing, they effectively set higher equilibrium prices, pushing overall market values upward (Matlack & Vigdor, 2008). As long as there are households capable of paying for higher prices, low-income households are forced to go down to low-quality and cheaper housing. Moreover, in a context of financialized housing markets, property owners and investors are incentivized to sell rather than rent their assets, further constraining rental supply and exacerbating affordability pressures for non-owners.

At the same time, housing market segmentation may suggest that growing inequality reduces demand in lower-tier segments, potentially lowering prices. However, these segments often face a spillover effect, as developers and investors target older, lower-quality housing for speculative upgrading (Beitel, 2007). This process, coupled with an increasing number of poorer households competing for stagnant or shrinking affordable stock, intensifies overall price pressures. Thus, income inequality drives affordability deterioration both at the top end and at the bottom.

Using cross-sectional microdata from Portugal's Household Budget Survey (IOF) for 2000–2022, this study conducts a pooled OLS model to quantify the impact of changes in income inequality on housing affordability for each NUTS II and year combination. The analysis focuses on low-income households, primarily the bottom 40% of the income distribution, based on the rationale that these groups are most exposed to housing market fluctuations and credit constraints. Stratification by tenure status is also conducted in order to quantify differences in affordability arising from renting. Additionally, modelling on the bottom 20% of income distribution is also done as a robustness check and to ensure that, as expected by the literature, the second quintile is the most exposed to hardships.

Empirical results show that rising income inequality undermines housing affordability across various dimensions, with additional stress for low-income renters. For the ratio of housing expense to income, one standard-deviation rise in the Gini coefficient raises the overall ratio by 2.4%, regardless of the income quintile. However, the impact is most severe when examining residual income: 5.5% for the second quintile and 7.6% for the first. Homeowners demonstrate relative insulation from shocks, since these households also have a 2.4% increase in the housing expenses to income ratio, while renters experience increases between 3.7% and 4%. Regarding residual income, inequality affects deeply and in a backward manner. An increase in the Gini coefficient of one standard deviation reduces annual post-housing expenses income by 7.6% and 5.5%, for first- and second-income quintiles.

For housing room prices, inequality increases year-on-year prices by 3.3% per room, both through quality gains and price pressures from responding to demand from wealthier households. This result is predicted by marginal buyer theory, whereby demand from high-income households increases the size and quality of housing, spilling over into general market condition. Finally, the effect of inequality on people per room is statistically minor but has an unexpected negative sign, perhaps driven by demographic and not affordability trends

and not inequality, namely declining family size. Nevertheless, renters, single parents, and employees are all more likely to experience overcrowding.

A limitation of this study is the low number of observations for the Gini coefficient for NUTS II and year combinations. With only 35 region-year observations, the explanatory power of the inequality measure is constrained, increasing the risk of imprecise estimates and limiting regional and year analysis. Future research should aim to construct more granular inequality measures at the municipal or district level to increase variation. Additionally, employing quasi-experimental methods or instrumental variables could help address endogeneity concerns. Incorporating housing finance indicators, such as loan-to-value ratios and household credit conditions, and analysing the impact of increasing local tourism accommodations and construction costs would further improve the analysis of how inequality affects housing affordability across tenure types and income groups.

7. Annexes

Annex Ia: Extended descriptive statistics by quintile and tenure status (continuous variables)

	BOTTOM 40%				BOTTOM 20%			
	Homeownership		Renting		Homeownership		Renting	
	(N = 13219)		(N = 4145)		(N = 5960)		(N = 2352)	
	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.
Gini coefficient	0.354	0.026	0.366	0.031	0.354	0.026	0.365	0.032
Housing exp. to income ratio	0.376	0.169	0.316	0.198	0.400	0.186	0.352	0.219
Log (Residual income)	8.580	0.655	8.345	0.774	8.225	0.673	8.011	0.746
Log (Housing exp. per room)	7.037	1.132	6.745	1.431	6.883	1.161	6.655	1.481
Persons per room	0.887	0.871	1.334	1.184	0.805	0.741	1.215	1.069
No. occupants	1.831	1.045	2.077	1.255	1.507	0.827	1.783	1.144
Real income	10,268.830	4846.307	8095.847	4982.748	7591.245	3441.632	6203.918	3623.846
Real total expenditure	9825.361	6183.053	8540.541	6483.050	7531.514	4744.971	7215.295	5842.215
Real housing expenditure	3961.029	2563.166	2680.859	2251.847	3164.775	2084.720	2410.853	2107.664
Real GDP	16,181.780	5837.436	14,885.780	7150.617	16,014.460	5521.207	15,122.970	7190.098
Population density	256.493	305.496	267.910	323.807	251.947	300.600	272.042	325.891
Housing stock	543,676.800	444,408.000	566,447.800	432,959.500	535,450.600	444,668.400	561,165.600	431,398.300
IPC	91.046	21.721	85.193	25.313	90.451	21.421	85.983	25.441

Annex Ib: Extended descriptive statistics by quintile and tenure status (dummy variables)

Variable	Category	BOTTOM 40%				BOTTOM 20%			
		Homeownership		Renting		Homeownership		Renting	
		N	Freq	N	Freq	N	Freq	N	Freq
Tipau	Rural area	5167	39.09%	1998	48.20%	2160	36.24%	1174	49.91%
	Semi-urban area	3517	26.61%	705	17.01%	1723	28.91%	390	16.58%
	Urban area	4535	34.31%	1442	34.79%	2077	34.85%	788	33.50%
Dwelling age	Less than 15 years	465	3.52%	440	10.62%	162	2.72%	234	9.95%
	15–30 years	2194	16.60%	449	10.83%	736	12.35%	246	10.46%
	More than 30 years	10521	79.59%	3239	78.14%	5041	84.58%	1862	79.17%
No. of rooms	Up to 3 rooms	4980	37.67%	2365	57.06%	2579	43.27%	1448	61.56%
	4 rooms	4676	35.37%	1109	26.76%	1961	32.90%	555	23.60%
	5 or more rooms	3563	26.95%	671	16.19%	1420	23.83%	349	14.84%
Household type	1 adult	5031	38.06%	1487	35.87%	3359	56.36%	1174	49.91%
	Single parent	338	2.56%	249	6.01%	101	1.69%	178	7.57%
	2+ adults, no dep.	6187	46.80%	1502	36.24%	2153	36.12%	676	28.74%
	2+ adults, with dep.	1507	11.40%	780	18.82%	325	5.45%	301	12.80%
	Other	156	1.18%	127	3.06%	22	0.37%	23	0.98%
Education	None/basic	12357	93.48%	3534	85.26%	5755	96.56%	2067	87.88%
	High school	624	4.72%	404	9.75%	155	2.60%	197	8.38%
	College	238	1.80%	207	4.99%	50	0.84%	88	3.74%
Sex	Male	7517	56.87%	2127	51.31%	2766	46.41%	989	42.05%
Age	Up to 29 years	191	1.44%	286	6.90%	49	0.82%	122	5.19%
	30–64 years	4984	37.70%	2136	51.53%	1712	28.72%	1096	46.60%
	65+ years	8044	60.85%	1723	41.57%	4199	70.45%	1134	48.21%
Labour condition	Employed	3591	27.17%	1836	44.29%	939	15.76%	819	34.82%
	Unemployed	585	4.43%	272	6.56%	284	4.77%	185	7.87%
	Other	9043	68.41%	2037	49.14%	4737	79.48%	1348	57.31%
Observations		13219		4145		5960		2352	

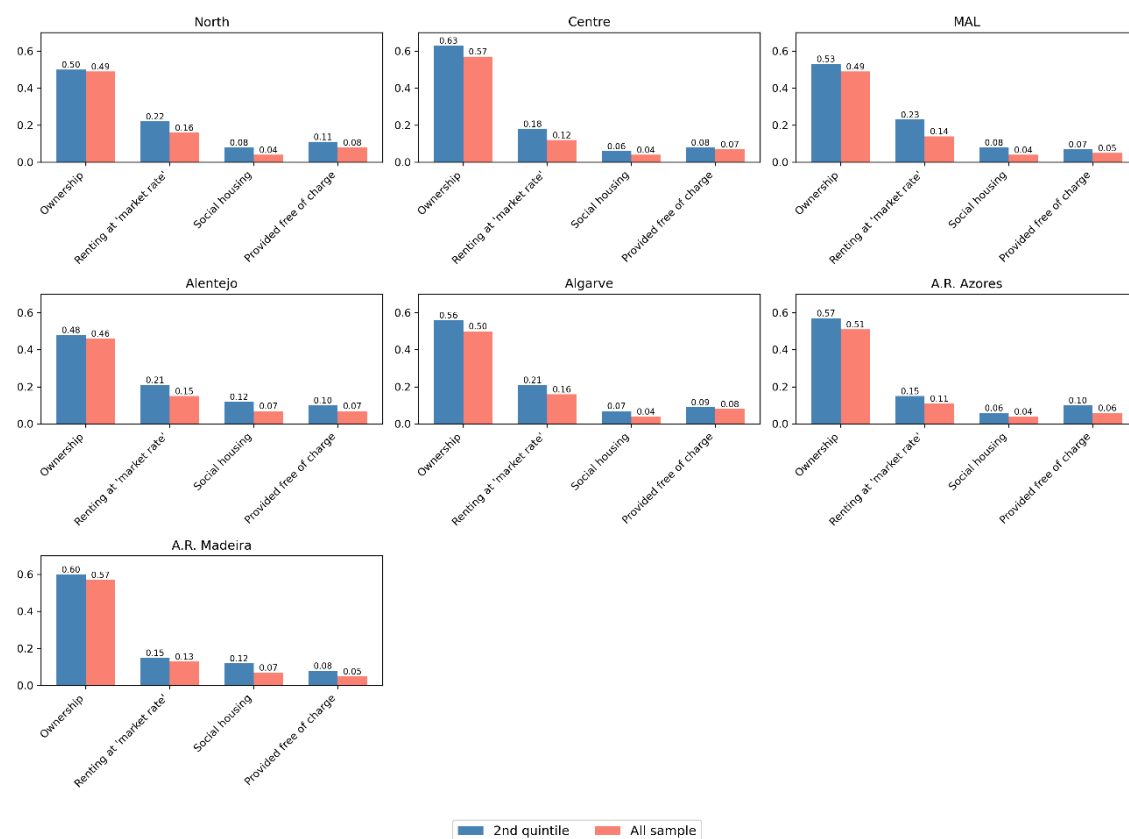
Annex IIa: Variables description

Variable	Category	Description	Detail Level	Obs.
Gini coefficient		Measure of income inequality, where 0 represents perfect equality and 1 represents perfect inequality.	NUTS II	[0;1]; Source: IOF
Real GDP		Region's real GDP	NUTS II	(2015 EUR); Source: INE
Population density		Region's population density	NUTS II	(No./km ²); Source: INE
Housing stock		Number of completed dwellings currently occupied or physically ready to be occupied	NUTS II	Source: INE
Consumer price index		Region's average change over time in the prices paid by consumers for a basket of goods and services	NUTS II	Source: INE
Housing expenses to income ratio		Percentage of householder's gross annual income that goes toward annualized housing expenses. Includes rent or repayment duties and utilities, such as electricity, water and gas.	Household	[0;1]; Source: IOF
Log(Residual Income)		Logarithmic of annual available income after housing expenses.	Household	Source: IOF
Log(Housing expenses per room)		Logarithmic of the annual housing expenses to number of rooms in the dwelling ratio.	Household	Source: IOF
Persons per room		Number of individuals living in the same dwelling divided by the number of rooms.	Household	Source: IOF
Number of occupants		Number of individuals living in the same dwelling.	Household	Source: IOF
Real income		Annual income declared by the householder.	Household	(2015 EUR); Source: IOF
Real total expenditure		Annualized household's total expenses.	Household	(2015 EUR); Source: IOF
Real housing expenditure		Annualized household's housing expenses, utilities included.	Household	(2015 EUR); Source: IOF

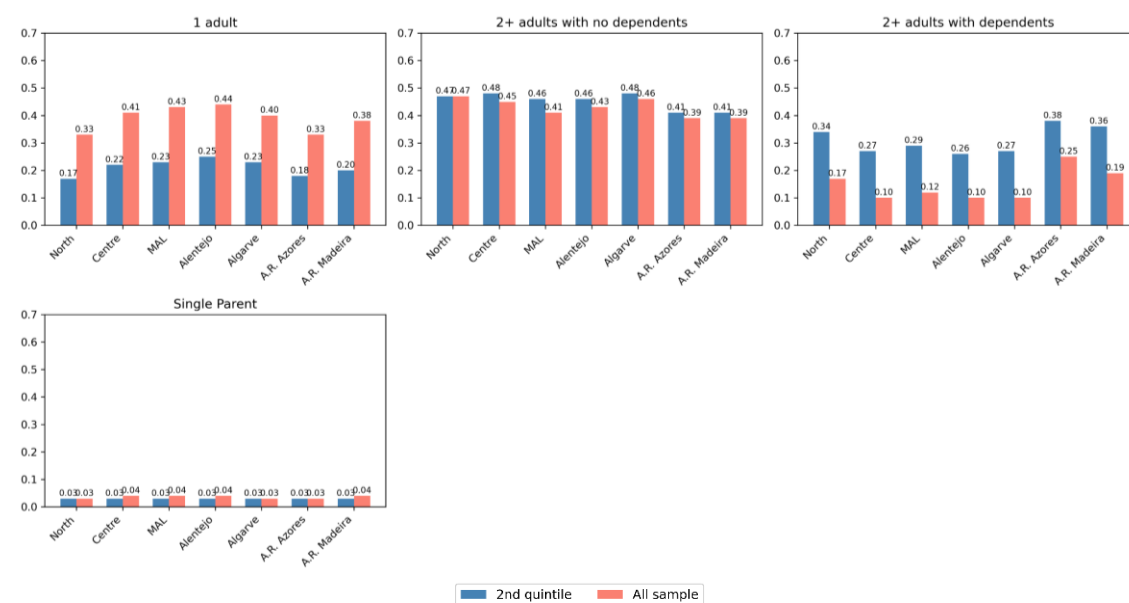
Annex IIb: Dummy variables description

Variable	Category	Description	Detail Level	Obs.
Tipau	Rural area	Dummy (1 if dwelling located in a rural area; 0 if not)	Household	Source: IOF
	Semi-urban area	Dummy (1 if dwelling located in a semi-urban area; 0 if not)	Household	
	Urban area	Dummy (1 if dwelling located in a urban area; 0 if not)	Household	
Tenure Status	Ownership	Dummy (1 if the household owns the dwelling in which they live in; 0 if not)	Household	Source: IOF
	Renting	Dummy (1 if the household is renting at "market rate" the dwelling in which they live in; 0 if not)	Household	
	Council housing	Dummy (1 if the household benefits from a dwelling under social protection program; 0 if not)	Household	
	Free housing	Dummy (1 if the household benefits from free housing, often as salary; 0 if not)	Household	
	Other	Dummy (1 if the household's housing is in other format ; 0 if not)	Household	
Dwelling age	Less than 15 years	Dummy (1 if the dwelling was constructed less than 15 years ago; 0 if not)	Household	Source: IOF
	15 - 30 years	Dummy (1 if the dwelling was constructed between 15 and 30 years ago; 0 if not)	Household	
	More than 30	Dummy (1 if the dwelling was constructed more than 30 years ago; 0 if not)	Household	
No. of rooms	Up to 3 rooms	Dummy (1 if the dwelling has no more than 3 rooms available for the residents; 0 if not)	Household	Source: IOF
	4 rooms	Dummy (1 if the dwelling has 4 rooms available for the residents; 0 if not)	Household	
	5 or more rooms	Dummy (1 if the dwelling has 5 or more rooms available for the residents; 0 if not)	Household	
Household type	1 adult	Dummy (1 if the household is composed by one adult; 0 if not)	Household	Source: IOF
	Single parent	Dummy (1 if the household is composed by a single parent with dependents; 0 if not)	Household	
	2+ adults without dependents	Dummy (1 if the household is composed by 2 or more adults without dependents; 0 if not)	Household	
	2+ adults with dependents	Dummy (1 if the household is composed by 2 or more adults with dependents; 0 if not)	Household	
	Other	Dummy (1 if the household is composed by another format; 0 if not)	Household	
Education	None or basic education	Dummy (1 if the householder has not formal education or has basic education; 0 if not)	Household	Source: IOF
	High school	Dummy (1 if the householder has a high school diploma; 0 if not)	Household	
	College	Dummy (1 if the householder has a college diploma; 0 if not)	Household	
Sex	Male	Dummy (1 if the householder is male; 0 if not)	Household	Source: IOF
Age	Up to 29 years old	Dummy (1 if the householder's age is up to 29 years old; 0 if not)	Household	Source: IOF
	30 - 64	Dummy (1 if the householder's age is between 30 and 64 years old; 0 if not)	Household	
	65 or more years old	Dummy (1 if the householder's age is 65 or more years old; 0 if not)	Household	
Labour condition	Employed	Dummy (1 if the householder is currently formally employed, either by someone else or on their own initiative; 0 if not)	Household	Source: IOF
	Unemployed	Dummy (1 if the householder is currently unemployed; 0 if not)	Household	
	Other	Dummy (1 if the householder has another labour condition, is a student, a retiree or disabled to work; 0 if not)	Household	

Annex III: Tenure status by NUTS II and income quintile (2000 – 2022)



Annex IV: Type of household by income quintile and NUTS II (2000 – 2022)



Annex V: OLS results without filtering for poorer households (time dummies and region dummies: yes)

	HEIR	Log(RI)
Gini	-0.766*** (0.059)	-3.308*** (0.198)
GDP (2015 EUR)	0.000 (0.000)	0.000*** (0.000)
Population density	0.000*** (0.000)	-0.000*** (0.000)
Housing stock	-0.000** (0.000)	0.000*** (0.000)
Consumer Price Index	0.001*** (0.000)	0.005*** (0.001)
<i>Omitted variables: Rural and Semi-urban areas</i>		
Dwelling in urban area	-0.016*** (0.002)	-0.028** (0.008)
<i>Omitted variables: Renting, Free housing and Other Homeownership</i>		
Homeownership	0.049*** (0.003)	0.096*** (0.009)
Council Housing	-0.117*** (0.004)	0.156*** (0.016)
<i>Omitted variables: 15-30 years and More than 30 years</i>		
Dwelling age less than 15 years	0.048*** (0.006)	-0.111*** (0.022)
Dwelling age 15-30 years	0.029*** (0.003)	-0.031** (0.012)
<i>Omitted variable: 2+ adults without dependents</i>		
1 adult	0.034*** (0.003)	-0.320*** (0.010)
Single parent	0.047*** (0.007)	-0.177*** (0.026)
2+ adults with dependents	0.015*** (0.004)	0.005 (0.013)
Other household type	-0.044*** (0.009)	0.096** (0.030)
<i>Omitted variable: None or basic education</i>		
High school	0.023*** (0.005)	0.032 (0.020)
College	0.056*** (0.008)	-0.039 (0.036)
Male	-0.024*** (0.003)	0.092*** (0.009)
<i>Omitted variable: 30 - 64</i>		
Householder age up to 29	-0.006 (0.007)	0.041 (0.027)
Householder aged 65 or more	-0.042*** (0.004)	0.113*** (0.014)
<i>Omitted variables: Employed</i>		
Unemployed	0.057*** (0.005)	-0.309*** (0.022)
Other employment status	0.036*** (0.004)	-0.233*** (0.015)
Constant	0.461*** (0.026)	8.888*** (0.089)
Observations	21047	21047
R-squared	0.218	0.345
Adj. R-squared	0.217	0.344

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

8. References

- Aalbers, M. B. (2008). The Financialization of Home and the Mortgage Market Crisis. *Competition & Change*, 12(2), 148-166. <https://doi.org/10.1179/102452908X289802>
- Alves, S.; Guimarães, P. (2024), Housing and Inequality: the case of Portugal. In: M. Lundahl, D.I Rauhut & N. Hatti (Eds.), *Inequality: Economic and Social Issues* (chapter 9). Routledge
- Azevedo, A. B. (2020). como vivem os portugueses – população e famílias alojamentos e habitação. Fundação Francisco Manuel dos Santos.
- Banco de Portugal. (2025). Portugal em Construção. Como éramos e como mudámos. <https://www.bportugal.pt/page/como-eramos-e-como-mudamos>
- Barlow, J., Allen, J., Leal, J., Maloutas, T., & Padovani, L. (2004). *Housing and Welfare in Southern Europe*. <https://doi.org/10.1002/9780470757536>
- Beitel, K. (2007). Did Overzealous Activists Destroy Housing Affordability in San Francisco? *Urban Affairs Review*, 42, 741 - 756.
- Bogdon, A. S., & Can, A. (1997). Indicators of local housing affordability: Comparative and spatial approaches [Article]. *Real Estate Economics*, 25(1), 43-80. <https://doi.org/10.1111/1540-6229.00707>
- Dewilde, C., & Lancee, B. (2013). Income inequality and access to housing in Europe [Article]. *European Sociological Review*, 29(6), 1189-1200. <https://doi.org/10.1093/esr/jct009>
- Dong, H. (2018). The impact of income inequality on rental affordability: An empirical study in large American metropolitan areas [Article]. *Urban Studies*, 55(10), 2106-2122. <https://doi.org/10.1177/0042098017710380>
- Fields, D., & Uffer, S. (2016). The financialisation of rental housing: A comparative analysis of New York City and Berlin. *Urban Studies*, 53(7), 1486-1502. <https://doi.org/10.1177/0042098014543704>
- Ferreira, A. F. (1987). Política(s) de habitação em Portugal. *Povos E Culturas*, 2, 261-284. <https://doi.org/10.34632/povoseculturas.1987.15739>
- Fields, D., & Uffer, S. (2016). The financialisation of rental housing: A comparative analysis of New York City and Berlin. *Urban Studies*, 53(7), 1486-1502. <https://doi.org/10.1177/0042098014543704>
- Fragoso, J., Oliveira, C., Varum, H., & Faria e Sousa, V. (2023). Is housing becoming less affordable? A study of affordability in the Portuguese housing market

- [Article]. *Property Management*, 41(5), 698-728. <https://doi.org/10.1108/PM-08-2022-0059>
- Gan, Q., & Hill, R. J. (2009). Measuring housing affordability: Looking beyond the median. *Journal of Housing Economics*, 18(2), 115-125. <https://doi.org/https://doi.org/10.1016/j.jhe.2009.04.003>
- Glaeser, E., & Gyourko, J. (2018). The Economic Implications of Housing Supply. *Journal of Economic Perspectives*, 32(1), 3-30. <https://doi.org/10.1257/jep.32.1.3>
- Gordon, J. C. (2020). Reconnecting the Housing Market to the Labour Market: Foreign Ownership and Housing Affordability in Urban Canada. *Canadian Public Policy*, 46(1), 1-22. <https://doi.org/10.3138/cpp.2019-009>
- Instituto Nacional de Estatística. (1970). 1º Recenseamento da Habitação – Continente e Ilhas Adjacentes.
- Instituto Nacional de Estatística. (1974). Estatísticas da Construção e Habitação – Continente e Ilhas Adjacentes.
- Instituto Nacional de Estatística. (2022). Statistics on house prices at local level, 4th quarter of 2021. Destaque. https://www.ine.pt/xportal/xmain?xpid=INE&xpgid=ine_destaques&DESTAQUE_Sdest_boui=472940326&DESTAQUESmodo=2
- Liu, R., Li, T., & Greene, R. (2020). Migration and inequality in rental housing: Affordability stress in the Chinese cities [Article]. *Applied Geography*, 115, Article 102138. <https://doi.org/10.1016/j.apgeog.2019.102138>
- Lorga, M., Januário, J. F., & Cruz, C. O. (2022). Housing Affordability, Public Policy and Economic Dynamics: An Analysis of the City of Lisbon. *Journal of Risk and Financial Management*, 15(12), 560. <https://doi.org/10.3390/jrfm15120560>
- Marques, J., Batista, P., Borges, M., & Gonçalves, C. (2020). Spatial patterns of affordable housing needs in Portugal.
- Matlack, J. L., & Vigdor, J. L. (2008). Do rising tides lift all prices? Income inequality and housing affordability [Article]. *Journal of Housing Economics*, 17(3), 212-224. <https://doi.org/10.1016/j.jhe.2008.06.004>
- Mendes, L. (2022). The Dysfunctional Rental Market in Portugal: A Policy Review. *Land*, 11(4).
- Moore, E., & Skaburskis, A. (2004). Canada's increasing housing affordability burdens [Article]. *Housing Studies*, 19(3), 395-413.

<https://doi.org/10.1080/0267303042000204296>

- Petach, L. (2022). Income stagnation and housing affordability in the United States. *Review of Social Economy*, 80(3), 359-386. <https://doi.org/10.1080/00346764.2020.1762914>
- Stone, M. E. (2006). What is housing affordability? The case for the residual income approach. *Housing Policy Debate*, 17(1), 151-184. <https://doi.org/10.1080/10511482.2006.9521564>
- Tarne, R., & Bezemer, D. (2025). Roof or real estate? An agent-based model of housing affordability in The Netherlands. *Structural Change and Economic Dynamics*, 72, 163-178. <https://doi.org/https://doi.org/10.1016/j.strueco.2024.11.014>
- Wetzstein, S. (2017). The global urban housing affordability crisis. *Urban Studies*, 54(14), 3159-3177. <https://doi.org/10.1177/0042098017711649>
- World Bank. GDP per capita growth (annual %) – Portugal. World Development Indicators. <https://data.worldbank.org/indicator/NY.GDP.PCAP.KD.ZG?locations=PT>
- Xeres, R., Rodrigues, P. G., Cardoso, F. D. (2018). A política de habitação em Portugal de 2002 a 2017 – Programas, políticas públicas implementadas e instituições envolvidas. *Habitação, Cem Anos De Políticas Públicas Em Portugal, 1918-2018*.
- Zhang, C. (2015). Income inequality and access to housing: Evidence from China [Article]. *China Economic Review*, 36, 261-271. <https://doi.org/10.1016/j.chieco.2015.10.003>
- Zhang, C., Jia, S., & Yang, R. (2016). Housing affordability and housing vacancy in China: The role of income inequality [Article]. *Journal of Housing Economics*, 33, 4-14. <https://doi.org/10.1016/j.jhe.2016.05.005>