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How social housing policies affect housing quality and affordability? The European case

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Abstract

This dissertation analyses the impact of the share of social housing stock on indicators of housing affordability and housing quality. The model covers a panel of 24 European countries between 2009 and 2019. The results suggest that although there is no statistically significant relation between the share of social rental dwellings and severe housing deprivation rate, there is a positive effect of social housing on housing affordability. An increase of one percent in the share of social housing leads to an increase of 0.94% on households without financial burden due to housing costs. The countries with the highest levels of households without financial burden due to housing costs are also among those with the highest levels of social housing, and the countries with the lowest levels of this indicator are among the countries with the lowest levels of social housing. The main contributions of this research are the time considered throughout the analysis and its population. Despite the difficulty in finding the impact of social housing on households' wellbeing, this analysis portraits many European countries, as well as takes into consideration recent data on social housing, never considered.

Keywords: Social Housing, Housing; Affordability; Housing Quality; Panel Data

JEL classification: O18; C23

Resumo

Esta dissertação analisa o impacto que a percentagem de habitação social tem nos indicadores de acessibilidade e qualidade da habitação. O modelo abrange um painel de 24 países europeus entre 2009 e 2019. Os resultados sugerem que, embora não haja umarelação estatisticamente significativa entre a percentagem de habitação social e a taxa deprivação de habitação grave, existe um efeito positivo da habitação social na acessibilidade da habitação. Um aumento de 1% na percentagem de habitação social levaa um aumento de 0,94% nos agregados familiares sem fardo financeiro devido aos custosda habitação. Os países com os níveis mais elevados de agregados familiares sem encargos financeiros, devido aos custos da habitação, estão também entre os países com os níveis mais elevados de habitação social e os países com os níveis mais baixos deste indicador estão entre os países com os níveis mais baixos de habitação social. Os principais contributos desta investigação são o tempo considerado ao longo da análisee a sua população. Apesar da dificuldade em encontrar o impacto da habitação social no bem-estar das famílias, esta análise retrata muitos países europeus, tendo também em consideração dados recentes sobre habitação social, nunca considerados.

Palavras-chave: Habitação Social; Acessibilidade de habitação; Qualidade de habitação; Dados de painel
Classificação JEL: O18; C23

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List of Abbreviations:

OECD	Organization for Economic Cooperation and Development
EU	European Union
UK	United Kingdom
B-P LM	Breusch-Pagan Lagrange multiplier test
OLS	Ordinary least squares

1| Introduction

Housing is a fundamental element in the life of any citizen, representing a shelter and when owned a form of wealth. However, access to housing is still very difficult to a significant share of the population and as such housing policies are one of the most important areas of public policy. The main goal of housing policies is to promote access to affordable, quality housing, one of the principal tools to achieve it being social housing. Despite these policies, not everyone has access to affordable and quality housing.

How do social housing policies affect housing quality and affordability? This paper seeks to answer this question by measuring the impact that the share of social housing has on households' financial burden due to housing costs and on severe housing deprivation.

Although the topic of social housing is covered in the literature (Andrews et al., 2011; Block, 1987; Braga & Palvarini, 2013; Dewilde ,2017; Hansson & Lundgren, 2018; Harloe, 1995; Salvi Del Pero et al., 2016; Scanlon, Arrigoitia, Whitehead, 2015; Scanlon, Whitehead, Arrigoitia, 2014), its impact on housing affordability and quality is slightly addressed and there is a lack of data regarding the percentage of social housing dwellings in total housing by country. This dissertation contributes to the literature by doing for the first time a broad analysis across 24 European countries of the impact of the share of social housing on indicators of housing affordability and quality that cover the total population of each country, it is therefore innovative.

Increasing the knowledge on the impact of social housing on housing affordability and quality can be useful in the definition of housing policies regarding investment in social housing and the criteria for its allocation. In this sense, this paper can contribute to the definition of more effective housing policies.

The paper uses panel data to analyze the impact of the social housing variable, with observations ranging from 2009 to 2019. The homeownership rate is also analyzed and compared with the impact of social housing. When analyzing the impact of social housing on the severe housing deprivation rate, GDP per capita and the employment rate are used as control variables as the Total Outstanding Residential Loans and the Share of national equivalised disposable income for fifth income quintile.

The results indicate that there is a positive correlation between the share of social

housing stock and the percentage of households without financial burden due to housing costs, however there is no statistically significant correlation between the share of the social housing stock and the severe housing deprivation rate.

The dissertation is structured as follows. Section two presents the literature review, which consists in explaining what social housing is and its different models, it also discusses housing affordability and quality indicators. Section three presents an overview of social housing policies in Europe and the relevance they have gained because of COVID-19. Section four describes the data and methodology used to measure the impact of social housing on housing affordability and quality. Section five presents the main findings. And finally, section six presents a summary of the dissertation.

2| Literature Review

2.1| Social housing: definitions and classifications

Social housing can be defined as “residential rental accommodation, provided at sub- market prices, that is targeted and allocated according to specific rules, such as identified need or waiting lists" (OECD, 2020). This is the definition used by OECD however the definition of social housing differs between countries (Hansson & Lundgren, 2018).

In the European Union (EU) Member States, the definition of social housing has three common elements: the mission of general interest, the objective of increasing the supply of affordable housing, and specific targets defined in terms of socio-economic status or the presence of vulnerabilities (Braga & Palvarini, 2013).

Besides different definitions of social housing, there are different classifications of social housing systems. According to Braga & Palvarini (2013), there are 2 classifications of social housing systems based on the allocation criteria: the universalistic and the targeted. The approach of the universalistic is to provide the whole population with decent quality housing at an affordable price, this being the responsibility of the state. Within this model, there are countries where dwellings are delivered through municipal housing companies (like Sweden) and others through non-profit organizations (like Netherlands or Denmark). The targeted approach aims to provide decent quality housing at an affordable price to those who cannot access it through the market, with the remaining houses being allocated to the rest of the population according to market mechanisms. Within this model there are two sub-models: the generalist and the residual. In the generalist, dwellings are allocated to households with an income below a preidentified ceiling, while in the residual they are directly allocated to the most vulnerable groups.

With the financial crisis of 2007–2008, the demand for social housing has increased (Scanlon, Whitehead, Arrigoitia, 2014) besides that there was a limitation of access to social housing for lower-income households in many countries (OECD, 2020), yet the percentage of households eligible for social housing far exceeds the proportion of social housing stock in most countries, for example in Austria in 2012 the percentage of social housing dwellings was 24% while 80-90% of the population was eligible for it and in Hungary the percentage of social housing was 3% while 15-45% of the population was eligible (Scanlon, Arrigoitia, Whitehead, 2015).

In addition to the trend of income targeting, there has also been in the last decade a trend of reduction of the share of social housing. According to OECD (2020) there was a decrease in many OECD member countries with Poland, Finland, and Germany being the countries experiencing the most significant reduction, falling by at least 20%, the only countries with a recorded growth were Austria, France, Netherlands (increase by between 0.5 and 2 percentage points), Iceland and Korea (increase by 2.5 percentage points).

However, before these recent trends and throughout its history, social housing went through several phases. According to Block (1987) the provision of social housing and other social arrangements are related to the different phases of capitalism expansion. Based on this approach, Harloe (1995) divides the history of social housing into different phases, assuming that there are two models of social housing that can be distinguished by allocation criteria: the residual model in which only the poorest have access, serving those who do not have access to quality homes through the market, and the mass model whose access is not limited to the lower classes but also includes the middle class. The first phase lasted until 1914, when social housing began in some European countries mainly as a philanthropic activity to help the less fortunate. After World War I the mass model dominated for a brief period. In the third phase, from the later 1920s to 1939, there was a reassertion of the residual model. Then, during the period after the World War II to mid- 1970s the mass model dominated again, this time for much longer. Finally, the last phase started in the mid-1970s where the residualism were back. This sequence of events led Harloe to conclude that the mass model only gains relevance in periods of abundance and that the normal form of social housing is the residual model.

Despite the loss of relevance of social housing with the trends of income targeting and reduction of social housing that have occurred in different countries of the world, including European countries, the European Semester 2019 called on different EU Member States to increase investment in social housing in order to reduce the problem of scarcity of adequate and affordable housing, recognizing the importance of social housing (Housing Europe, 2019).

2.2| Housing Affordability

The concept of housing affordability, like the concept of social housing, has several definitions. One of the most quoted definitions is “Affordability is concerned with securing some given standard of housing (or different standards) at a price or rent which does not

impose, in the eyes of some third party (usually the government), an unreasonable burden on household incomes" (Maclennan and Williams 1990, p. 9).

According to Sunega & Lux (2015) the burden on household incomes can be measured by objective indicators or subjective perception. The objective indicator used by Eurostat to define housing cost overburden rate is "the percentage of the population living in households where the total housing costs (net of housing allowances) represent more than 40% of disposable income (net of housing allowances)". To analyze the subjective perception of European citizens about housing affordability the European Union Statistics on Income and Living Conditions (EU-SILC) survey respondents are questioned annually "Please think about your total housing costs including mortgage repayment (instalment and interest) or rent, insurance and service charges (sewage removal, refuse removal, regular maintenance, repairs and other charges). To what extent are these costs a financial burden to you?" with the possible answers being: (a) a heavy burden, (b) a slight burden, and (c) no burden at all.

Properly measuring housing affordability is very important to identify the size of housing cost overburden and its negative consequences for the well-being of the population.

According to Maqbool, Viveiros, & Ault (2015) housing has an impact on physical and mental health and well-being, with the lack of housing affordability being the reason for many problems. One of the problems is that the excessive amount of income spent on housing often makes families have no money for other essential needs like food, medical insurance, and health care, which can risk their health. Another relevant issue is that residential instability that can be aggravated by a lack of affordable housing can cause behavioral and mental problems. Lastly Clough & Draughon (2014) indicate that, in times that the availability of affordable housing is reduced, there is an increase in the rate of women that suffered domestic violence returning to their abusers.

According to Dewilde (2017), more government intervention like involvement in housing provision (e.g., social housing) results in low housing cost burdens across tenure-age groups, particularly for renters. In addition, Housing Europe (2019) tells us that the low-burden countries (Sweden, Denmark, Norway, France, and the Netherlands), the countries wherein 2007 more people said in the EU-SILC survey that they had no financial burden due to the housing costs, have a relatively high average share of Public / Social Housing in Housing Stock (21%) and also a high employment rate (74.1%) while the high-burden

countries (Italy, Poland, Spain, Greece, and Croatia) have a significantly lower share of Public / Social Housing in Housing Stock (3%) and a significantly lower employment rate (60.8%). Here we note a positive correlation between housing affordability and social housing as well as between housing affordability and employment rate.

According to OECD (2021) and, despite the importance of housing affordability, it has become a reality for fewer and fewer OECD households. On average, more than half of the OECD population reports that they are not satisfied with the availability of good, affordable housing where they live (OECD, 2020). The rising of housing costs in most OECD countries over the past two decades have contributed to the increasing in the share that households spend on housing, something that has increasingly affected the middle class (OECD, 2019), difficulties that low-income and vulnerable households have long faced. Consequently, homelessness has been a growing problem in OECD countries, even before the COVID-19 pandemic, the rates of homelessness of one-third of these countries were increasing.

In the EU, with the financial crisis of 2007–2008, there was a relevant increase in household answers to the EU-SILC survey claiming to have heavy financial burdens due to housing costs. It went from 31.7% in 2007 to 38% in 2013. After that, there was a decrease until 2019 with 28.2% (Table 1).

Despite the relevant increase of the answer "a heavy burden" there was not a relevant change in the answer "no burden at all" after the final crisis, it went from 20.4% in 2007 to 19.4% in 2013. However, after that, there was a relevant increase until 2019 to 25.2% (Table 1).

	Time												
Affordability	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Households with heavy financial burden (%)	31.7	34.0	32.7	34.0	35.2	36.7	38	36.7	34.0	32.1	30.9	29.3	28.2
Household swithout financial burden (%)	20.4	19	20.7	21.1	20.3	19.7	19.2	20.5	22.5	23.2	23.3	24.8	25.2

Table 1: *Households with heavy and without financial burden due to the housing costs in EU*

Source: EU – SILC [ilc_mded04]

In conclusion, the financial crisis of 2007–2008 has worsened the values of housing affordability in the EU. However, in the following years, there was a recovery and improvement in this indicator, getting better than before the crisis. While there is no definitive answer as to why this happened, one fact that may help explain this improvement was that economic conditions in the EU were better in 2019 compared to 2007, according to Eurostat data there was a higher real GDP per capita (28610 vs. 26220) and a higher employment rate (73.9% vs. 69.8%).

2.3| Housing quality

There are several ways to measure housing quality. According to OECD (2021), two measures that are usually used are the overcrowding rate and the housing deprivation rates.

Eurostat (2014) defines overcrowding rate by the sufficiency of dwelling rooms for the households, considering different factors of household composition.

Housing deprivation rates measure maintenance deficiencies (like a leaking roof, damp walls, floors or foundation, or rot in window frames and floor) and the lack of other essentials, like sanitary facilities (OECD, 2021). There is also the severe housing deprivation rate which is used by Eurostat that combines overcrowding with housing deprivation features.

Like housing affordability and, according to Winston, Kennedy, & Carlow (2019), housing quality has a great impact on the well-being of society. It affects physical and mental health, especially among the households whose accommodation is damp and/or moldy (Bentley et al, 2011; Clark and Kearns, 2012; Marmot, 2015; Mendell, 2015; Reeves et al, 2016; Rollins et al, 2012; Webb et al, 2013) and it is also common that households that live in poor housing also suffer from energy poverty, which usually brings health challenges (Healy 2003; 2016; Liddel and Morris, 2010). Besides that, housing quality also has social effects, affecting access to jobs, schools, amenities, and social networks (Mulder, 2007; Acolin and Wachter, 2017).

Dewilde (2017), in addition to considering that more government involvement in housing provision (e.g., social housing) results in low housing costs burdens also considers that it results in better housing conditions (“the average number of problems out of five indicators: leaking roof, damp walls, floors, foundation, rot in window frames and floors; no bath or shower; no indoor flushing toilet; dwelling too dark, not enough light; and

crowding") for the different age and tenure groups but particularly for renters. Despite the financial crisis, the countries of the EU have been able to reduce the average severe housing deprivation rate. This figure has dropped from 6.5% in 2008 to 3.8% in 2019 (Table 2).

	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Severe housing deprivation (%)	7.2	6.5	5.9	5.7	5.4	5.0	5.1	5.0	4.9	4.8	4.0	4.0	3.8

Table 2: Severe housing deprivation rate in EU

Source: EU – SILC [ilc_mdho06a]

Among the 28 member states of the EU, between 2007 and 2019, only 8 countries had an increase in the several housing deprivation rates: Belgium, Denmark, Germany, Cyprus, Malta, Netherlands, Finland, and Sweden, all of which had in 2007 a rate below 2% (Table 3). The countries that showed a greater reduction in the severe housing deprivation rate were countries that according to Eurostat data in 2007 had a higher rate than the EU average and that between 2007 and 2019 also had a higher growth in real GDP per capita, which may help explain the greater reduction.

Country / Time	2007	2019
Belgium	1.2	2.6
Bulgaria	18.2	8.9
Czechia	8.1	1.9
Denmark	1.7	2.8
Germany (until 1990 former territory of the FRG)	1.8	2.1
Estonia	14.6	2.7
Ireland	1.7	1.1
Greece	8.5	6.0

Spain	2.6	1.7
France	3.3	2.3
Croatia	:	5.9
Italy	7.5	5.0
Cyprus	0.8	1.3
Latvia	25.2	12.7
Lithuania	21.9	7.8
Luxembourg	2.1	2.0
Hungary	14.4	7.8
Malta	0.9	1.3
Netherlands	0.8	1.5
Austria	3.8	3.0
Poland	25.9	7.9
Portugal	7.6	4.1
Romania	32.0	14.2
Slovenia	12.3	3.9
Slovakia	4.5	3.6
Finland	0.7	0.9
Sweden	1.2	2.6
United Kingdom	2.2	:

Table 3: Severe housing deprivation rate in EU countries

Source: EU – SILC [ilc_mdho06a]

3| Housing policies across Europe: the role of Social Housing

Housing is a fundamental element in the life of any human being, having a quality home is an essential condition to have a dignified life. As such, housing policies are one of the most important areas of public policy.

To guarantee access to affordable and quality housing, there are several policies, such as fiscal measures (like subsidies and taxes), direct provision of social housing and regulations aimed at influencing rental markets, as well as the quantity, quality and allocation of dwellings, they also involve public resources being directed to redistribute income by supporting housing consumption like housing allowances (Andrews et al., 2011).

3.1| Social housing policies in Europe

Social housing varies in different countries according to the size, the allocation criteria, the tenure, and the provider of the service. In Europe, in terms of size, there are countries whose social rental stock is very small at 2% or less of the total housing stock, like the countries of the Iberian Peninsula, the Baltic countries, and also the Slovak Republic, Luxembourg, and the Czech Republic. There are also countries whose social rental share is small, corresponding to between 2% and 6%, such as Malta, Slovenia, Norway, Italy, Belgium, Germany, and Hungary. Countries with a large social rental share of between 10% and 20% such as the United Kingdom (UK), France, Ireland, Iceland, and Finland. And then there are countries whose social rental share is very large, accounting for 20% or more such as the Netherlands, Denmark, and Austria (Table 4).

Social rental stock size	Countries
Very small (<= 2%)	Portugal, Spain, Estonia, Latvia, Lithuania, Slovak Republic, Luxembourg, Czech Republic
Small (2-6%)	Malta, Slovenia, Norway, Italy, Belgium, Germany, Hungary
Large (10-20%)	UK, France, Ireland, Iceland, Finland
Very large (>=20%)	Netherlands, Denmark, Austria

Table 4: Social rental stock size of EU countries

Source: OECD Affordable Housing Database

Regarding the allocation criteria social housing models can be classified as universalistic and targeted, within the targeted there are two sub-models, the generalist,

and the residual, as explained earlier in this paper. Braga and Palvarin (2013) consider considers as universalistic the social housing models of the Netherlands, Denmark and Sweden, as targeted generalist the models of Austria, Czech Republic, France, Finland, Poland, Belgium, Germany, Italy, Slovenia, Luxemburg, and Greece and as targeted residual the models of UK France, Belgium, Estonia, Germany, Ireland, Malta Bulgaria, Cyprus, Hungary, Latvia, Lithuania, Spain, and Portugal (Table 5).

Allocation Criteria	**Countries**
Universalistic	Netherlands, Denmark, Sweden
Targeted	
Generalist	Austria, Czech Republic, France, Finland, Poland, Belgium, Germany, Italy, Slovenia, Luxemburg, Greece
Residual	UK France, Belgium, Estonia, Germany, Ireland, Malta Bulgaria, Cyprus, Hungary, Latvia, Lithuania, Spain, Portugal

Table 5: Social housing allocation criteria in EU countries

Source: Braga and Palvarin (2013)

In terms of the tenure, social housing is provided for rent in most EU countries but is also possible in many the sale of dwellings. However, in some countries, like the UK, there is a shared ownership solution where tenants buy part of the dwelling and payrent for the remainder. In other countries, including some Mediterranean ones (like Cyprus, Greece, and Spain), have provided social housing as low-cost housing for sale (Braga and Palvarin, 2013).

Also, according to Braga and Palvarin (2013) and regarding the provision, currently social housing involves many different stakeholders such as local authorities, public companies, non-profit or limited-profit associations and companies, cooperatives, and in some cases even private for-profit developers and investors. The most recent trend in the sector indicates an increasing involvement of many stakeholders, but with the private and public sectors having well-defined roles: local authorities manage the existing social housing stock while the private sector is responsible for the development of new social housing. In some countries, namely Austria, Belgium, Estonia, Germany, Hungary,

Italy, Poland, Portugal, Spain and Sweden, cooperatives also play a crucial role. In Denmark and the Netherlands, the provision of social housing is the prerogative of the private non-profit sector. In Central and Eastern Europe the situation is different, since 1990 there has been a trend of massive privatization of housing where the public authorities have been left with a very low percentage of the housing stock that is used as social housing, with the exception of Poland and Slovenia where there has been a small growth in the non-profit housing sector.

3.2 | The resurgence of social housing

Despite the loss of relevance of social housing in the last decade already mentioned earlier in this paper, this housing policy is now presented by the OECD (2021) as a key element of economic recovery from the consequences of the COVID-19 crisis.

In its report *Brick by Brick: Building Better Housing Policies*, several recent initiatives from different countries to invest in social housing are highlighted, such as the announcement of large investments in affordable housing from countries like Australia, Canada, and France, including AUS 6 billion (about EUR 3,81 billion) for the Australian state of Victoria's "Big Housing Build"; CAD 1 billion (about EUR 0,68 billion) for Canada's "Rapid Housing Initiative"; and just under EUR 3 billion towards housing investments in France's France Relance economic recovery plan. Also given is the example of the Dutch building sector, which in February 2021 signed an agreement to build 1 million homes by 2030. The report also highlights that in addition to contributing to the economic recovery these investments bring other benefits such as helping to support jobs and SMEs in the building sector; underpinning residential mobility and supporting efforts to prevent and reduce homelessness, particularly through 'Housing First' and integrated service delivery approaches. Furthermore, it states that one of the core elements of the European Green deal, which is large-scale investment in social housing renovation, not only stimulates economic recovery, but also supports environmental sustainability goals and boosts well-being in population.

The report also warns about the importance of building socially mixed neighborhoods to avoid social and economic segregation, so social housing should be brought into neighborhoods that traditionally have not had this type of housing and there should also be investment in existing neighborhoods to improve infrastructure and

opportunities related to education, public transport, parks, culture and leisure. In cases where the stock of social housing is scarce one must be careful about targeting policies to the neediest as this can create spatial concentration of vulnerable groups.

4| Data and Methodology

4.1| Data

Two models will be estimated one to test the impact of social housing on housing affordability and another to test the impact of social housing on housing quality. They will also estimate the impact of homeownership rate, and some control variables. Thus, two models with different dependent variables are presented.

The first model assumes as dependent variable the percentage of *households without financial burden due to housing costs*. This variable corresponds to the percentage of people that answered, "no burden at all" to the question of EU-SILC survey"To what extent are these costs a financial burden to you?" referring to total housing costs. According to Eurostat (2021), the EU-SILC is an initiative which aims to periodically collect comparable cross-sectional and longitudinal multidimensional microdata on income, poverty, social exclusion and living conditions, it covers all EU countries, Iceland, Norway, Switzerland and some other countries that participate on thevoluntary basis. The data was taken from Eurostat (2021). *Households without financial burden due to housing costs* was chosen to measure housing affordability because it is a subjective indicator that, unlike objective indicators, allows to see whether people have difficulty paying their housing costs.

As main explanatory variables there were included the *share of social rental dwellings as a percentage of total dwellings* and the *home ownership rate*. The former variable measures the impact of social housing on housing affordability and quality. The data is taken from the OECD Affordable Housing Database and in this case "social rental housing" refers to the stock of residential rental accommodation provided at sub-market prices and allocated according to specific rules rather than market mechanisms (Salvi Del Pero et al., 2016). The *home ownership rate* will be used to make a comparison of the impact of the share of social rental dwellings as a percentage of total dwellings with the share of people who own the dwelling where they live on housing affordability and quality. The data was taken from Eurostat (2021).

As control variables, the fist model considers the *GDP per capita in Purchasing Power Standards* and the *employment rate of the population aged 20 to 64* to ensure that the level of resources and employment do not constrain the results of the impact of the dependent variables.

To control for the level of resources, the variable used will be the *GDP per capita in Purchasing Power Standards* which is, according to Eurostat (2021), intended for cross-country comparisons rather than for temporal comparisons. Also, according to Eurostat (2021) GDP per capita when expressed in PPS eliminates the differences in price levels between countries allowing meaningful volume comparisons of GDP between countries. Expressed in relation to the EU (EU27 = 100), a country with an index that is higher than 100 mean that this country's level of GDP per head is higher than the EU average. The data was taken from Eurostat (2021). To control for the level of employment, the variable used will be the *employment rate of the population aged 20 to 64*. The data was taken from Eurostat (2021).

The second model besides considering *GDP per capita in Purchasing Power Standards* and the *employment rate of the population aged 20 to 64* as control variables also considers *Total Outstanding Residential Loans to GDP Ratio* and *Share of national equivalised disposable income for fifth income quintile*.

To control for the level of residential debt, the variable used will be *Total Outstanding Residential Loans to GDP Ratio*. According to European Mortgage Federation (2020), "the definition of residential loans can vary somewhat across EU27 countries, depending on the collateral system and the purpose of the loans. Some countries only integrate secured residential loans, while some others include both secured and non-secured loans. In some countries, this collateral is generally the property, whilst some others favour a system of personal guarantees. Regarding the purpose, a few countries exclude residential loans whose purpose is above all commercial (such as purchasing a building to let). In addition, there are some methodological differences across EU27 countries regarding the statistical treatment of loans made for renovations of existing dwellings: under some assumptions, some of these loans can be considered as consumption loans.". In this variable, the GDP used is at current prices. The data was taken from European Mortgage Federation (2020).

To control for the level of resources of the poorest quintile, the variable used will be the Share of national equivalised disposable income for fifth income quintile. The data was taken from Eurostat (2021).

The correlation between households without financial burden due to housing costs and severe housing deprivation rate was tested and the result was -0.2439. Given the low

and negative correlation, each of the variables was not included in each other's explnatory varibles or control variables.

The data used is from 24 European countries, where each will have one or two observations, from 2009 to 2019, in total there will be 37 observations. All this data is presented in Appendix.

4.2 | Methodology

To determine the impact of social housing on housing affordability and housing quality, two panel data linear regressions will be run.

In the first regression the dependent variable will be households without financial burden due to housing costs.

$$HNFB_{it} = \beta_0 + \beta_1 SH_{it} + \beta_2 HO_{it} + . \beta_3 ER_{it} + \beta_4 GDP_{it} + \varepsilon i, t$$

In the second regression the dependent variable will be the severe housing deprivation rate.

$$SHD_{it} = \beta_0 + \beta_1 SH_{it} + \beta_2 HO_{it} + . \beta_3 ER_{it} + \beta_4 GDP_{it} + \beta_5 TORL_{it} + \beta_6 SFQ_{it} + + \varepsilon i, t$$

Before presenting the results of the panel data regressions, the four countries with the lowest and the four with the highest levels of financial burden due to housing costs and severe housing deprivation will be selected between the countries studied. Then the values of each of the independent and control variables will be taken for the last year available. A correspondence of these countries with their social housing classification (universalistic or targeted) will also be made in order to associate the different social housing policies with the countries with the highest and lowest levels of financial burden due to housing costs and severe housing deprivation.

4.3 | Fixed effects vs. Random effects

Firstly, it was used the Breusch-Pagan Lagrange multiplier (B-P LM) test in both models, under the null hypothesis to run OLS estimation, to decide between random effects and a simple OLS regression. The results indicate that the null hypothesis is rejected, and so random effects regression is the most appropriate for both models. It was also used the F test and the results indicate that the null hypothesis (H0: Pooled

OLS) is rejected for both models, so the conclusion was that fixed effects are preferred over OLS regression.

To find out whether effects, fixed or random, should be used, the Hausman test was performed whose null hypothesis is random effects (Hausman, 1978). The results (0.1830 in the first model and 0.1223 in the second model) indicate that the null hypothesis is rejected for both models, suggesting that the random effects model should be used.

5| Results and discussion

5.1| Countries with highest and lowest levels of Housing Affordability and Quality

Analyzing data for countries with the highest and lowest levels of Households without financial burden due to housing costs*, we can identify some common characteristics.

Countries	Households without financial burden due to housing costs	Social Housing (%)	Homeownership rate	GDP p.c.	Employment rate	Classification of social housing
Denmark	64.9	21.2	60.8	130	78.3	Universalistic
France	54	14	65.1	150	71.3	Targeted (Residual)
Netherlands	51.3	37.7	69.4	129	78	Universalistic
United Kingdom	42.7	17.4	65.2	106	78.7	Targeted (Residual)

*Excluding countries with missing data

Table 6: Countries with the highest levels of Households without financial burden due to housing costs, 2018 or latest year available

Source: Euostat; OECD Affordable Housing Database; Housing Europe; Braga and Palvarin (2013)

Among the four countries with the highest levels of *households without financial burden due to housing costs* all of them have more than 10% of social housing dwellings and have less than 70% of homeownership rate. All of them have an index of *GDP p.c.* higher than 100 and an employment rate of 70%. Finally, according to the Braga and Palvarini (2013) classification, there are two of them which the classification of social housing is Universalistic and two which is Targeted (both residual).

Countries	Households without financial burden due to housing costs	Social Housing (%)	Homeownership rate	GDP p.c.	Employment rate	Classification of social housing
Italy	1.6	4.2	72.6	106	61	Targeted (Generalist)

Spain	3.8	1.1	76.2	91	68	Targeted (Residual)
Poland	4	7.6	83.4	69	69.3	Targeted (Generalist)
Czech Republic	8.3	0.4	80.1	84	70.9	Targeted (Generalist)

* Excluding countries with missing data

Table 7: Countries with the lowest levels of Households without financial burden due to housing costs, 2018 or latest year available

Source: Euostat; OECD Affordable Housing Database; Housing Europe; Braga and Palvarin (2013)

Among the four countries with the lowest levels of households without financial burden due to housing costs all of them have less than 10% of social housing dwellings and more than 70% of homeownership. Three of them have an index of *GDP p.c.* lower than 100, only Italy has a higher figure (106), in relation to employment rate only Czech Republic has more than 70%, having 70,9%. Finally, all of them have a targeted social housing classification (three generalist and one targeted).

These tables show a positive correlation between higher levels of social housing as we can also see in Figure 1, *GDP p.c.* and employment rate and higher levels of *Households without financial burden due to housing costs* which demonstrates the importance of investing in social housing and the promotion of higher levels of GDP and employment to increase housing affordability. In addition, they show a correlation between lower levels of homeownership rate and higher levels of *Households without financial burden due to housing costs* and that between the countries with higher levels of housing affordability two of them have a universalistic social housing classification which can indicate that the best strategy to increase housing affordability is to invest in a large universalistic social housing model.

As in the previous case, analyzing the four countries with the lowest and the four countries with the highest levels of *severe housing deprivation rate* we also find some common characteristics.

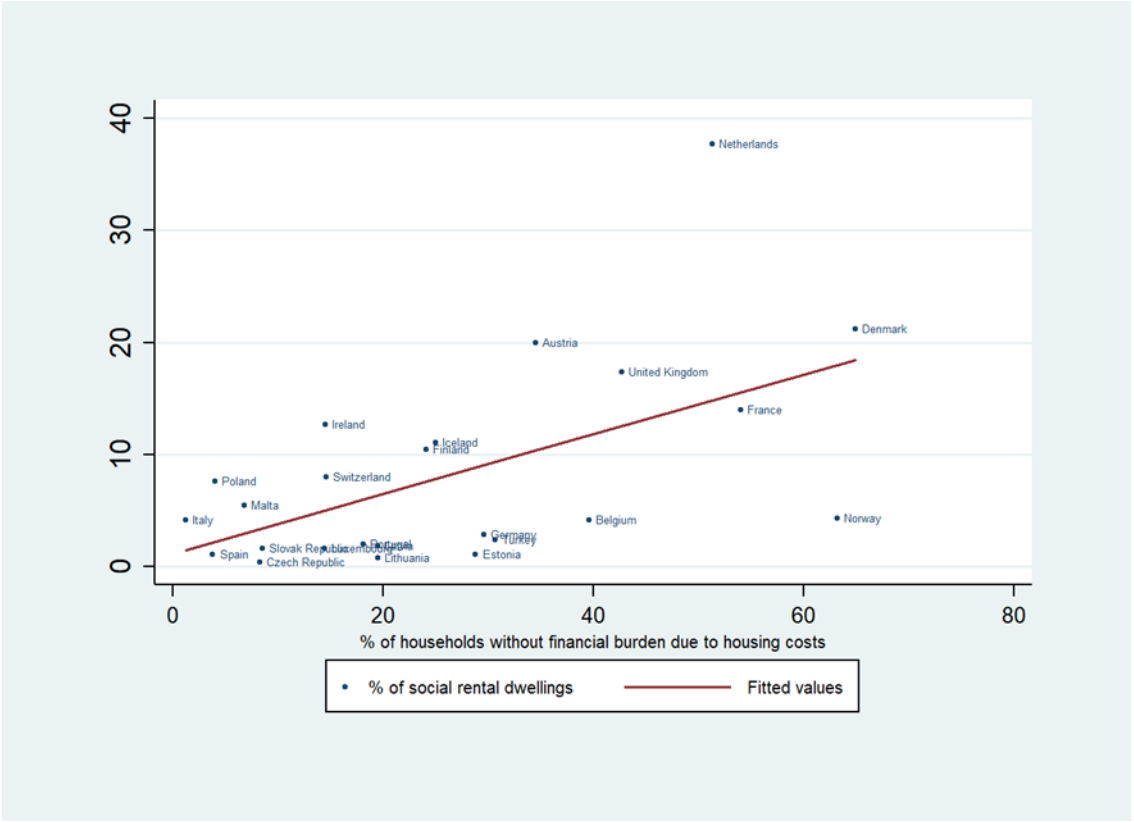

Figure 1: *Percentage of social rental dwellings and percentage of households without financial burden due to housing costs*

Source: OECD Affordable Housing Database and Eurostat

Countries	Severe housing deprivation rate	Social Housing (%)	Homeownership rate	-GDP p.c.
Ireland	0.8	12.7	69.5	177
Finland	0.9	10.5	71.4	111
Malta	1.2	5.5	80.2	84
Netherlands	1.3	37.7	69.4	129

Countries	Employment rate	Resiential debt	Share of national equivalised disposable income for fifth income quintile	Classification of social housing
Ireland	71.4	31.7	38	Targeted (Residual)

Finland	74.2	42.6	35.3	Targeted (Generalist)
Malta	61.2	42.3	36.1	Targeted (Residual)
Netherlands	78	95.5	36.2	Universalistic

* Excluding countries with missing data

Table 8: Countries with lower levels of Severe housing deprivation rate, 2018 or latest year available

Source: Euostat; OECD Affordable Housing Database; Housing Europe; Braga and Palvarin (2013)

Between the four countries with the lower levels of *severe housing deprivation rate** all of them have more than 5% of social housing dwellings. Regarding the homeownership rate, the values are varied, three of them are close to 70% (Ireland, Finland, and Netherlands) and one of them are close to 80% (Malta). The only country with an index of *GDP p.c.* lower than 100 is Malta (84) and it also the only country with less than 70% of employment rate (61.2%). Three of them have more than 40% of *Outstanding Residential Loans to GDP Ratio*, the only with a lower figure is Ireland (31.7%). The *Share of national equivalised disposable income for fifth income quintile* is less than 40% in all of them. Finally, according to the Braga and Palvarini (2013) classification, the classification of social housing is the targeted in three of them (two residual and one generalist) and one is universalistic (Table 8).

Countries	**Severe housing deprivation rate**	**Social Housing (%)**	**Homeownership rate**	**GDP p.c.**
Latvia	14.6	1.9	80.9	66
Poland	9.4	7.6	83.4	69
Lithuania	6.9	0.8	89.9	82
Italy	7	4.2	72.6	106

Countries	Employment rate	Resiential debt	Share of national equivalised disposable income for fifth income quintile	Classification of social housing
Latvia	73.2	17.6	41.2	Targeted (Residual)
Poland	69.3	21.6	36	Targeted (Generalist)
Lithuania	77.8	17.1	43.3	Targeted (Residual)
Italy	61	32.8	39	Targeted (Generalist)

*Information not available

Table 9: Countries with higher levels of Severe housing deprivation rate, 2018 or latest year available

Source: Euostat; OECD Affordable Housing Database; Housing Europe; Braga and Palvarin(2013)

Among the four countries with the higher levels of severe housing deprivation rate three of them have less than 5% of social housing dwellings, the exception is Poland (7.6%). With respect to the homeownership rate, the values are varied, three of them havemore than 80% (Latvia, Poland, and Lithuania) and Italy have 72.6%. The only country with an index of *GDP p.c.* higher than 100 is Italy (106). Just two countries have more than 70% of employment rate, Poland has 69.3% and Italy have the lowest values with 61%. All of them have less than 40% of Outstanding Residential Loans to GDP Ratio. The Share of national equivalised disposable income for fifth income quintile is more than 40% in two of them and the countries with less than 40% are Italy (39%) and Poland(36%). Finally, the classification of social housing is the targeted in four of them (two residual and two generalists) (Table 9).

Analyzing these tables, we can conclude that in the countries with lowest levels of severe housing deprivation the figures of GDP, employment and residential debt are higher than the figures of these variables in the countries with higher levels of severe housing deprivation and the share of national equivalised disposable income for fifth income quintile is lower. This shows that increasing GDP, employment and reduce income inequalities can contribute to reduce severe housing deprivation.

Regarding the share of social housing, we cannot conclude that it has a proportional relationship to severe housing deprivation as we can also see in Figure 2.

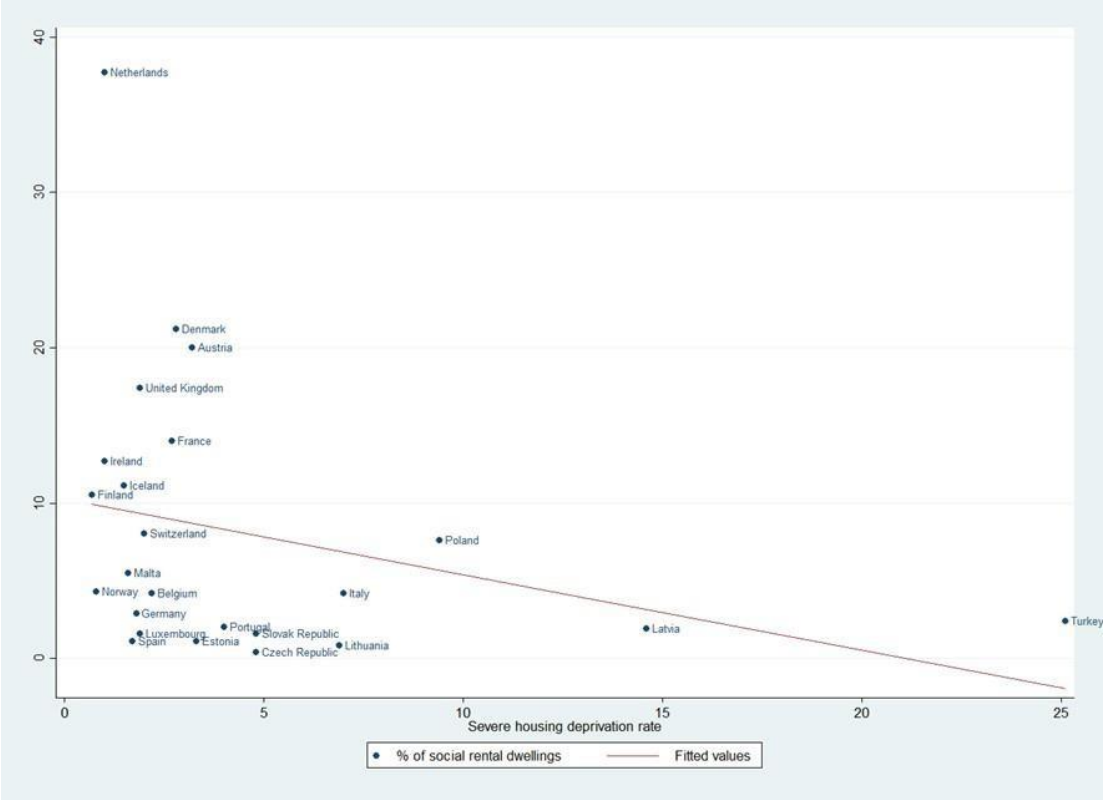

Figure 2: Percentage of social rental dwellings and Severe housing deprivation rate

Source: OECD Affordable Housing Database and Eurostat

5.2 | Panel data regression results

The results obtained from the panel data regressions show that most variables have significant influence on both dependent variables as can be confirmed in Tables 10 and 11. Although the social housing variable has a significant positive impact on households without financial burden due to housing costs it does not have a significant impact on the severe housing deprivation rate as shown in tables 10 and 11. Furthermore, the homeownership rate variable is the only one that does not seem to have an statistically significant impact on households without financial burden due to housing costs and the GDP per capita (GDP p.c) variable is the only one that does not seem to have a statistically significant impact on severe housing deprivation rate.

Variables	
% of Social Housing	0.9411**
	(0.3789)
Homeownership rate	-0.3065
	(0.2158)
GDP p.c.	-0.1068*
	(0.0628)
Employment rate	1.0619***
	(0.3136)
Constant	-24.8903
	(26.9261)
Observations	37
Number of groups	24
Within R-squared	0.6450
*, **, and *** represent p<0.1, p<0.05, p<0.01	

Table 10: Estimations results for Households without financial burden due to housing costs

Social housing has a positive influence on *households without financial burden due to housing costs.* One percent increase in the *share of social rental dwellings as a percentage of total dwellings* would yield a 0.94% increase on *households without financial burden due to housing costs*, corroborating Dewilde (2017) which affirms that more government intervention like involvement in housing provision (e.g., social housing) results in low housing cost burdens across tenure-age groups.

GDP p.c. has a negative influence on *Households without financial burden due to housing costs.* An increase of one percentage point in *GDP p.c.* would decrease *Households without financial burden due to housing costs* by 0,11% which shows that an increase in economy does not necessarily translate into an increase in the levels of housing affordability.

Employment has a positive impact on *households without financial burden due to housing costs*. An increase of one percent in the *employment rate* leads to an increase of 1,06% on that variable, this finding complies with Housing Europe (2019) which tell us that there is a positive correlation between housing affordability and the employment rate.

Variables	
% of Social Housing	0.0279

	(0.0954)
Homeownership rate	-0.1085*
	(0.0614)
GDP p.c.	-0.007
	(0. 0165)
Employment rate	-0.1969**
	(0. 0808)
Total Outstanding Residential Loans to GDP Ratio	-0.0643***
	(0. 0198)
Share of national equivalised disposable income for fifth income quintile	0.5394**
	(0. 2333)
Constant	9.6667
	(17.0608)
Observations	37
Number of groups	24
Within R-squared	0.7299
*, **, and *** represent p<0.1, p<0.05, p<0.01	

Table 11: Estimations results for Severe housing deprivation rate

The Homeownership rate has a negative impact on *severe housing deprivation rate.* An increase of one percent in that variable would lead to a decrease of 0,11% on *Severe housing deprivation* which may indicate that when people own the house they live in, they have a greater tendency to guarantee its maintenance than when they live in a house they do not own.

The GDP has a negative impact, an increase of one percentage point of GDP p.c. leads to a decrease of 0,007% on Severe housing deprivation rate indicating that economic growth can contribute to a decrease in the severe housing deprivation rate.

The employment rate also has a negative impact, an increase of one percent of *Employment rate* would decrease 0,2% the *Severe housing deprivation rate* which makes sense considering that when people are employed they have more income to guarantee

the maintenance of their home.

The residential debt also impacts *Severe housing deprivation rate* negatively, an increase of one percent of *Total Outstanding Residential Loans to GDP Ratio* would decrease 0,06% the *Severe housing deprivation rate* which can mean that households in countries with better economic conditions and consequently lower levels of severe housing deprivation are more able to take on housing-related debts.

Finally, the *Share of national equivalised disposable income for fifth income quintile* has a positive impact, an increase of one percent leads to a decrease of 0,54% the *Severe housing deprivation rate* which shows that the less income the lower classes have, the more difficult it is to guarantee the maintenance of their homes.

6| Conclusion

Housing policies are essential to promote housing quality and affordability. Despite the disinvestment we have seen in social housing in Europe over the last decade, it remains one of the main housing policy tools, and is even seen by the OECD as one of the ways to ensure economic recovery after the economic downturn caused by COVID-19.

There are different models of social housing that vary from country to country whose main differences are in size and allocation criteria. In Europe, there is a greater tendency for the Southern and Baltic countries to have a small stock of social housing and the allocation criterion to be targeted and for the Nordic countries to have a larger stock and the allocation criterion to be universalistic or targeted generalist. Also noteworthy are the Netherlands and Austria whose share of social rental dwellings was 37.7% and 20% in 2017 and 2018 respectively.

There are also different ways to measure housing affordability and quality. In this dissertation, to measure housing affordability it was used the percentage of households without financial burden due to housing costs, a subjective indicator that is based on the perception of the difficulties that people have paying housing-related expenses. To measure housing quality, the severe housing deprivation rate was used, which is an indicator defined as "the percentage of population living in an overcrowded dwelling, while also exhibiting at least one of the housing deprivation measures", where the deprivation measures are "a leaking roof, no bath/shower and no indoor toilet, or a dwelling considered too dark" (Eurostat, 2021).

This dissertation studied the relation between social housing and households without financial burden due to housing costs and between social housing and the severe housing deprivation rate for a sample of 24 European countries, from 2009 to 2019. For that, two panel data linear regressions were run. The results show that despite not existing a statistically significant correlation between social housing and severe housing deprivation there is a positive correlation between social housing and housing affordability. The results imply that an increase of one percent in the share of social rental dwellings as a percentage of total dwellings leads to an increase of 0.94% on households without financial burden due to housing costs which supports the theory that a higher stock of social housing leads to lower housing costs burden. It was also made an analysis of the countries with the highest and lowest levels of households without financial burden due to housing costs and severe housing deprivation rate and it was concluded that the countries with the highest levels of

households without financial burden due to housing costs are also among the countries with the highest levels of social housing and those with the lowest levels are among the countries with the lowest levels of social housing.

It is thus concluded that social housing promotes housing affordability and that countries with lower housing affordability would benefit from investing in social housing, considering the economic downturn caused by COVID-19 this is a policy that in addition to promoting housing affordability can also promote economic growth.

It is therefore recommended that European countries develop plans for investment in social housing, for which they can use funds from the EU recovery package that is intended to help member states recover from the negative economic impact caused by COVID-19. Countries should also take great care in defining the criteria for allocating social housing and its location in order to avoid social and spatial segregation. It is also important that emphasis be placed on the EU's housing objectives concerning housing affordability and quality.

The major limitation of this study was the lack of data regarding the share of social rental dwellings as a percentage of total dwellings. If there was more data it might have been possible to find a significant correlation between the share of social housing and the severe housing deprivation rate, which would have further enriched the dissertation as it would have also given us an idea of the impact of social housing on housing quality.

For future research, it is recommended to use new data that emerges regarding the share of social housing thus increasing the sample in order to obtain more meaningful results, particularly with regard to the impact of social housing on severe housing deprivation rates. Having a larger sample would also allow for dividing it into subgroups in order to test the robustness of the results to see if the impact of social housing on affordability and quality housing is in any way related to other factors not mentioned in this dissertation.

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8| Appendix

Country	Year	Nofinancial	Severe housing deprivation rate	Social Housing %	Homeown	GDP p.c. in PPS	Employment Rate	Debt to GDP	Fifthquintille
Netherlan	2012	43.3	0.9	36	67.5	136	76.6	105.4	35.3
Netherlan	2017	51.3	1	37.7	69.4	129	78	95.5	36.2
Denmark	2010	69.2	1.3	21.8	66.6	131	74.9	92.1	34.7
Denmark	2019	64.9	2.8	21.2	60.8	130	78.3	83.2	36.5
Austria	2010	28.8	4	19.4	57.4	128	73.9	27	37.1
Austria	2018	34.5	3.2	20	55.4	128	76.2	29.2	35.9
United Kin	2010	30.2	2.8	18.1	70	111	73.5	74.6	40.6
United Kin	2018	42.7*	1.9	17.4	65.2	106	78.7	65	40.9
France	2012	48.5	2.6	13.5	63.7	108	68.9**	41.7	39.5
France	2018	54	2.7	14	65.1	104	71.3	42.8	37.7
Ireland	2010	15.3	0.5	12.7	73.3	132	65.5	61.4	39.1
Ireland	2016	14.5	1	12.7	69.5	177	71.4	31.7	38
Iceland	2010	15.3	1.6	8.6	81.3	120	80.4	86.9	36
Iceland	2016	25	1.5	11.1	78.7	131	87.8	63.6	34.6
Finland	2010	25.4	0.9	13.2	74.3	118	73	40.8	35.2
Finland	2017	24.1	0.7	10.5	71.4	111	74.2	42.6	35.3
Poland	2009	11.5	15.2	10.1	68.7	60	64.9	16.6	39.5
Poland	2016	4	9.4	7.6	83.4	69	69.3	21.6	36
Norway	2011	57.6	1.3	4.6	84	180	79.6	63.4	33.2
Norway	2017	63.2	0.8	4.3	81.5	150	78.3	76.5	35.4
Italy	2010	1.2	7	4.2	72.6	106	61	32.8	39
Belgium	2010	37.8	1.9	4.3	71.6	121	67.6	44.5	35.5
Belgium	2018	39.6	2.2	4.2	72.3	118	69.7	53.6	34.6
Germany	2011	21.5	2.1	3.7	53.4	124	76.5***	43.2	37.4
Germany	2017	29.6	1.8	2.9	51.4	124	79.2	42.5	37.5
Portugal	2011	18.1	4	2	75	78	68.8***	64.7	42.2
Estonia	2013	15.1	5.8	1.1	81.1	77	73.3	31	40.3
Estonia	2017	28.8	3.3	1.1	81.8	80	78.7	29.9	38.6
Spain	2019	3.8	1.7	1.1	76.2	91	68	39.2	39.6
Slovak Rep	2011	8.5	4.8	1.6	90.2	76	65***	17.3	35.1
Latvia	2016	19.5	14.6	1.9	80.9	66	73.2	17.6	41.2
Malta	2011	6.8	1.6	5.5	80.2	84	61.2	42.3	36.1
Czech Rep	2011	8.3	4.8	0.4	80.1	84	70.9***	15.6	35.6
Lithuania	2018	19.5	6.9	0.8	89.9	82	77.8	17.1	43.3
Luxembou	2011	14.4	1.9	1.6	68.2	267	70.1	46.9	36.2
Turkey	2017	30.7	25.1	2.4	59.1	66	55.3	35.1	49.4
Switzerlan	2013	14.6	2	8	44	173	80.8	135.1	37.5

*Low reliability

**Estimated

***Break in time series

Table A1 - *Data availability by country and year – Dependent, Independent and Control Variables*

Source: Euostat; OECD Affordable Housing Database and Housing Europe