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Housing regimes and residualization of the subsidized rental sector in Europe 2005-2016

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ABSTRACT

Residualization refers to the process whereby publicly subsidized rental housing moves towards a position in which it provides only a safety net for low-income households. In this paper we quantify residualization based on the income profile of households in the below market rates (BMR) rental sector. Various residualization indicators for 12 European countries from EU-SILC data are calculated. First, we explore the effect of the size of the BMR sector and the cost of alternative tenure types on residualization. Second, we investigate if there are similar trends of residualization from 2005 to 2016. We find that decreases in the share of the BMR sector are associated with significant increases in residualization. Increases in rent differences between the BMR and market rate rental sector are related to larger degrees of residualization. We further observe a rising level of residualization for most countries. However, countries with allocation systems that aim at broader income groups still display the lowest degree of residualization.

1. Introduction

Defining which groups in society should have access to government-subsidized social housing is a crucial policy question. On the one hand, stricter means-testing ensures that those with the lowest incomes can access affordable accommodation. On the other hand, such a system can pave the way for segregation, produce negative economic externalities (Atkinson, 2008; Galster & Friedrichs, 2015) and raise transaction costs (e.g. eligibility checks, cost of moving).

A key term in this context is residualization, which refers to '*the process whereby public housing [and other social housing] moves towards a position in which it provides only a 'safety net' for those who for reasons of poverty, age or infirmity cannot obtain suitable accommodation in the private sector*' (Malpass & Murie 1982, p. 174).

Empirically, residualization is investigated at two levels (Scanlon et al., 2014; Pearce & Vine, 2014): a) eligibility rules and b) tenant characteristics (e.g. income).

Concerning a) eligibility rules, various scholars have argued that a general trend towards refocusing social housing on the most economically vulnerable populations can be observed over the last decades (Gibb, 2002; Van der Heijden, 2002; Scanlon et al., 2014). This work can be related to the more general *convergence* perspective on housing markets and housing policy in Europe (Harloe, 1995; Malpass, 2014). According to this perspective, the residual model that stresses the safety-net role became the normal form of social housing provision in the long run, whereas access for broad socio-economic groups (mass model) was only dominant for a short period after the first and second world wars.

Much of the existing literature discusses residualization in the context of policy changes and tighter eligibility rules. However, eligibility rules are only one aspect of residualization. The extent to which eligible (low-income) households actually end up (and remain) in the subsidized rental sector also depends on a range of other non-administrative influences, including personal preferences (Clarke & Monk, 2011), social networks (Boterman, 2012), discrimination (e.g. nationality), financialization of housing (Pearce & Vine, 2014) and the size and growth of the social housing sector (Borg, 2019).

In this paper, rather than focusing on eligibility rules we quantify residualization by using several indicators that relate the household income of tenants paying a subsidized reduced rate below the market rent (BMR) to other tenure groups' incomes. In doing so, we address two research questions. First, we quantitatively explore the effect of major explanatory factors on residualization. Second, we complement the literature on policy rules and check how the trends in narrowing eligibility are reflected in changes of the BMR income structure. In other words, we investigate how residualized (in terms of income) the BMR sector currently is across housing systems in Europe and if countries have become more similar in that respect from 2005 to 2016.

We contribute to the small cross-country empirical literature on residualization of subsidized-rental housing in Europe based on tenant characteristics (Hoekstra, 2009) and focus on a broader range of countries and a more recent period. The bulk of the existing literature are single-country studies, among them the majority for the UK (Burrows, 1999; Borg, 2019; Forrest & Murie, 1983; Pearce & Vine, 2014). Many of these studies find an increasing degree of residualization of the public rental sector over the last decades. However, the more recent situation for Europe after the great financial and economic crisis of 2007/08 is much less researched.

The EU Survey on Income and Living Conditions (SILC) User Database will be used to address our research questions. This data is set up to allow for comparisons across European countries. Variables capturing the housing tenure status, household income and various sociodemographic characteristics are available for multiple countries over time.

The structure of the paper is as follows. First, we will discuss explanatory factors for residualization. In Section 3, we continue with a summary of the relevant literature that deals with eligibility systems and residualization in a cross-country comparative perspective. Methods and results are discussed in Sections 4 and 5. We conclude and discuss limitations and avenues for future research in Section 6.

2. Residualization within countries: explanatory factors

Allocation/eligibility polices are an obvious candidate for explaining residualization in the BMR sector. For EU member states, there is an additional aspect: to comply with EU competition rulings[1], pressure rises for countries with more universalist approaches to social housing provision (weaker link of social housing with disadvantaged groups) to move to a more targeted system (Czischke, 2014).

Given a specific institutional context, however it is ex-ante not always clear how much residualization based on tenants' characteristics (here: income) we ultimately observe in the social rental sector. In what follows, we illustrate this by summarizing other explanatory factors discussed in the literature (Pearce & Vine, 2014)

First, due to reduced (public) investment and right-to-buy schemes (e.g. as in the UK) a declining or stagnating share of the social housing stock can be observed in many countries (Scanlon et al., 2014; OECD, 2019). Budgetary problems, e.g. caused by macroeconomic shocks, of public institutions responsible for housing construction can in principle have a negative effect on construction activities. When the publicly subsidized rental sector is shrinking, it is likely that relatively more well-off households move to either home-ownership or to the market rate rental sector (e.g. to avoid long waiting lists) and thus the less well-off tenants who need it the most are left in the below market rate rental sector. Borg (2019) finds that regions in Sweden with declining public rental sectors are associated with higher levels of residualization in the public rental sector (as defined by tenants' income). We thus expect a negative correlation between the size of the social housing sector and residualization (Hypothesis 1).

Second, cheaper and easier access to mortgages due to the liberalization of mortgage finance since the 1980s – one particular dimension of housing market financialization (Aalbers, 2008; Fernandez & Aalbers, 2016) – was often argued to have allowed more low-income households to become home-owners (Andrews et al., 2011; OECD, 2011; Scanlon et al., 2008; Schwartz, 2009). In principle, a negative/positive correlation between mortgage cost/mortgage-to-GDP ratio (a proxy for access to mortgages) and residualization can thus be expected: relatively more well-off households move to home-ownership and thus the less well-off tenants are left in the BMR rental sector (Hypothesis 2). However, as was shown by Kohl (2018) for 17 European countries covering the years 1920 to 2012, the effect of increasing (access to) mortgage debt on ownership rates is not universally positive. Moreover, as Andrews et al. (2011) show, in European countries the supply responsiveness in the housing market is comparatively low. The degree of supply responsiveness determines the extent to which increases in demand for housing (e.g. due to lower mortgage costs) result in higher prices (vs. in more housing investment). In short, this means that a better access to mortgages could also be translated in higher house prices. Several authors indeed find a positive relation between mortgage costs and house prices (Andrews et al. 2011, Andrews 2010, Geng 2018). Moreover, legal costs for buyers or increased demand for securitization (down-payments) from banks could also interfere with a potentially negative effect of mortgage costs on household outflows from BMR renting to ownership. In the regression model, the effect of such costs and housing price increases could thus also suppress the presumably negative effect of mortgage costs on residualization.

Third, many countries face an increasing demand from less well-off households (among them new immigrants) who find it more difficult to obtain affordable homes in the private (rental) sector (Scanlon et al., 2014). Excess demand and high rent prices in the private rental sector can make this a less attractive option for low-income households. We are interested if the BMR sector serves as the next best renting opportunity for low-income MR renters (resulting in higher BMR residualization). Thus, we use the relative difference of median rents (MR/BMR) in the regression model as a summary measure for price differences between these sectors. The higher this difference the more incentives for low-income MR tenants to move to the BMR sector (with its lower rents) and increase residualization there (Hypothesis 3). Similarly, among BMR renters it becomes less attractive for low-income households who consider moving to switch to the MR sector if the rent difference increases. As Wiesel and Pawson (2015) argue, a major disincentive to leave the BMR sector relates to affordability of tenure in private rental rather than "push" factors inherent in the BMR sector itself.

Fourth, as Scanlon (2014) argues, the great financial crisis of 2007/2008 (GFC) has increased the number of poor households and of households defaulting on their mortgages who may look for cheap tenure alternatives in the social rental sector. On the one hand, we thus expect an increase in residualization of the BMR sector due to this inflow. On the other hand, fewer relatively better-off social renters who would otherwise have moved to owner occupation may, in times of economic crisis, decide to remain in social housing to benefit from low housing costs and unlimited contracts (Scanlon, 2014). This could have reduced the number of available social housing units for low-income households who enter the market and in turn could also have led to more residualization of the *private* rental sector as this is their remaining option. Ex ante, the effect macroeconomic shocks like the GFC on residualization of the BMR rental sector is thus ambiguous.

To sum up, besides eligibility rules, residualization (as measured by tenants' characteristics) is mainly related the supply of social housing and the cost of alternative tenure types. In our paper, we provide a quantitative exploration of the association of residualization with these explanatory factors. Moreover, we investigate the degree of convergence and common trends vs. sustained heterogeneity in residualization across several Western European countries. With our data, we can also have a closer look at developments after the GFC of 2007/2008.

3. Residualization and eligibility regimes: a cross-country perspective

Residualization of the social housing/BMR sector is also of main interest for the discussion of country differences in Europe. Traditionally, there are two main perspectives (Kemeny & Lowe, 1998; Malpass, 2014): convergence and divergence. Jim Kemeny is an influential proponent of the divergence perspective (Kemeny, 1995; Kemeny, 2006) and differentiates two systems: in the dualistic system, the social sector is seen as a residual safety net reserved for low-income households. Governments support home-ownership and a wide range of income groups owns their home, with only the poorest, being excluded from market, living in social housing. According to

Kemeny (1995, 2006), such systems typically exist in Anglo/liberal nations (e.g. Australia, New Zealand, England, Ireland, USA). The other type is referred to as unitary[2] rental market. Kemeny (1995, chapter 8, 2006) discussed Sweden, Switzerland, Germany, the Netherlands and Denmark as typical examples. Here, state-subsidized social housing competes with the private housing sector and is open to broad classes of the population. According to Kemeny (1995), dual rental countries will depart further from unitary rental countries as time progresses.

According to Malpass (2014: p. 206) convergence in social housing systems would mean that there is '[…] *a tendency in the present period for social housing systems in broadly similar a◻uent democracies with market-based economies to move towards a residual, safety-net role, underpinning the dominant owner-occupier market.*' Michael Harloe (1985; 1995) laid out a comprehensive contribution to the convergence school. In Harloe (1995), he distinguishes between the mass model of social housing provision on the one hand that aims at a broad range of income groups and the residual model on the other hand, limited to the least well-off who cannot find affordable housing on the private market. Examining the US and four Western European countries, he concluded that the residual model became the normal form of social housing provision in the long run, whereas the mass model was only dominant for a short period after the two world wars.

We can also add Scanlon et al. (2014) to the convergence perspective. In their collection of 12 country case studies, they concentrate on policy rules and conclude that there is a general trend across Europe towards refocusing social housing on socio-economically disadvantaged groups. Similarly, Malpass &Victory (2010), Pittini & Laino (2012) and Poggio & Whitehead (2017) argue that residualization of social housing is highly relevant almost everywhere in Europe.

The number of cross-country comparative studies on residualization of the reduced rent/social rent sector based on tenant characteristics is scant. Hoekstra (2009) represents an early attempt. In support of Kemeny's expectations, Hoekstra's analysis of 2001 income data from the European Community Household Panel for six Western European countries reveals that most countries presumed to be dualist rental systems (e.g. UK, Belgium) indeed have the highest share of the lowest income third residing in the social rent sector. His study, however, does not look on the change of residualization over time in more detail. We are not aware of any similar (cross-country comparative) and more recent study.

Following the work of Kemeny (1995), several updates have been made on classifying countries based on eligibility systems. Table 1 contains additional cross-country studies (published during the observation period of our data) that characterize the nature of allocation systems for the BMR rental sector. Most of them are based on expert interviews and document analysis and differentiate between two or three types. Of course, these typologies do not pay attention to detailed specifics within countries but should be seen as heuristic devices to summarize the set of eligibility rules.

When comparing Table 1 with an application to the countries under study (Table 2), we observe consistent labels across authors (last column) for the UK, Portugal, Ireland, Austria, Iceland and Switzerland. In what follows, we briefly discuss allocation systems for the remaining countries.

Table 1. Allocation & rental regimes in the literature.

Author (Year)	Description	Method/data
Kemeny (1995)	*Dualist*, *Unitary* (section 3)	Document analysis (e.g. reports on outstanding debt, number of dwellings, average debt per dwelling, statements of accounts in cost rental housing companies)
Harloe (1995)	*Mass model*, *Residual model* (section 3)	Document analysis (reports on legal reforms, housing stock and construction statistics)
Czischke (2009)/ Ghékière, (2007)	*Universalistic*: housing as public responsibility, delivered either through municipal housing organisations or NPOs, social housing has a market-regulating role (e.g. through rent control), aims to provide the whole population with housing of decent quality at an affordable price *Targeted (generalist)*: small private rental sector, also middle-income groups *Targeted (residual)*: stronger presence of the private rental sector vis-̀a-vis the social rental sector, vulnerable households (e.g. unemployed, disabled, single-parents)	Typology based on Ghékière (2007); • survey of 42 social housing organisations across Europe
Czischke & Pittini (2007), Andrews, et al. (2011)	*broad-based system (universalistic)*: no income limit, waiting list *targeted system w. income thresholds (generalist)*: housing is allocated to eligible tenants (based on income thresholds) *via* some queuing system with consideration given to the priority rating of tenants *targeted system (needs based) (residual)*: greater emphasis on the needs of the most vulnerable households.	Typology based on Ghékière (2007); • *Czischke*: survey of experts drawn from 27 CECODHAS member organisations, • *Andrews*: OECD Housing Market questionnaire to experts from 33 member states.
UNECE (2015)	*Universal*: open to the whole population (waiting list) *Generalist*: open to vulnerable households, households below defined income thresholds *Residual*: open to very vulnerable households (e.g. refugees, asylum seekers, disabled, mentally challenged, substance abusers, etc.)	• adopts and modifies Czischke2007/Ghekière, model to the needs of the UNECE region • expert interviews (N = 31); representatives from governments, the public and private sectors • statistical information from the UNECE Survey and partner organizations, notably CECODHAS (Housing Europe), • review of over 200 international publications

Social housing in Belgium used to be highly targeted but is in a process of change. De Decker et al. (2017) write that particularly after the GFC, the Flemish government in Belgium has been aiming to reduce long waiting lists and the marginalization of the social rental sector. Since the end of the 2000s, a commitment to invest in social rental housing and to increase the social mix can be observed. In Finland, the BMR

Table 2. Allocation regimes in Europe.

	Type (Source[1])
Austria	Integrated (Kemeny, 2006), Generalist (Andrews, Czischke, 2007, Czischke, 2009, UNECE)
Belgium	Dualist (Kemeny, 2006), Generalist & Residual (Czischke, 2009, Czischke, 2007, UNECE), Generalist (Andrews)
Finland	Dualist (Kemeny, 2006), Generalist (Czischke, 2007, Czischke, 2009), Residual (Andrews), Generalist & Residual (UNECE)
France	Hybrid (Kemeny, 2006), Generalist & Residual (Czischke, 2007, Czischke, 2009, UNECE), Residual (Andrews)
Germany	Unitary (Kemeny, 1995), Generalist & Residual w. trend to Residual (UNECE), Generalist & Residual (Czischke, 2007, Czischke, 2009), Residual (Andrews)
Iceland	Dualist (Kemeny, 2001)[2]
Ireland	Dualist (Kemeny 2006), Residual (Czischke 2007, Czischke 2009), Generalist (Andrews), Residual (UNECE)
Italy	Generalist (Czischke 2007, Czischke 2009), dualist (Kemeny 2006), Residual (Andrews), Generalist w. trend to Residual (UNECE)
Portugal	Residual (Czischke, 2007, Czischke, 2009), Dualist (Balchin, 1996, Alves, 2017), Residual (Andrews), Residual (UNECE)
Spain	Residual (Czischke, 2007, Czischke, 2009), Residual (Pareja-Eastaway, 2014), generalist (Andrews), Generalist w. trend to Residual (UNECE)
Switzerland	Unitary (Kemeny, 1995), generalist (Andrews)
UK	Residual (Czischke, 2007, Czischke, 2009), dualist (Kemeny 1995), Residual (Andrews), Residual (UNECE)

Notes: own illustration.
[1]see Table 1 for definition of regimes.
[2]see also Reykjavik Department of Welfare https://reykjavik.is/en/welfare (accessed on August 26, 2020).

rental sector is relatively large and according to Pittini et al. (2015) is characterized by a high level of social mix. If we look at the literature for France in more detail (Lévy-Vroelant et al., 2014), the results of the survey by Andrews et al. (2011) seems to be an outlier. We conclude that the French system aims to accommodate a mix of low-income and middle-income tenants. In Germany, a majority of the social housing stock belongs to private landlords (Kofner, 2017). Kofner (2017), on the one hand, thus labels the German system as more unitary than dualistic but on the other hand also observes an increased focus on fragile populations in the recent years.

The Mediterranean countries Italy, Portugal and Spain, all have a very small BMR rental sector (Table 3). Since ownership is the dominant tenure form, the relationship between BMR and market renting is not the key dynamic of these markets. Still, all of these countries have a social housing system operating. There is agreement in the literature (Table 2), that Portugal has a small but dualist rental system, where private and social rental markets are strictly separated. The social housing sector is residual and reserved for low-income families. However, given the small size of the BMR rental sector a considerable share of poor households who cannot find accommodation in the social housing sector also live in the least attractive parts of the private rental sector and the owner-occupancy market. In Spain, the traditional model of public housing provision is basically a form of low-cost access to home ownership (Vivienda de Proteccion Oficial), whereas social rental housing accounts for only a very small percentage of the total stock (Alberdi, 2014). Allocation rules generally vary a lot across autonomous communities (Pareja-Eastaway & Sánchez-Martínez, 2017). In sum, it does not appear to be meaningful to classify Spain to any particular system based on access rules for social rental housing. In Italy, eligibility for social housing is

Table 3. Housing tenure split, % of all households are …..

	Renting at reduced rate		Renting at market rate		Owners		Accomm. Provided for free	
	2016	Δ16-05	2016	Δ16-05	2016	Δ16-05	2016	Δ16-05
UK	18	4	18	2	63	−6	1	0
Finland	18	−1	16	3	65	−1	1	0
France	14	−1	21	−1	61	3	3	−1
Ireland	14	2	11	3	72	−6	3	2
Iceland	12	4	12	4	74	−9	2	1
Austria	10	1	33	0	48	−3	9	1
Belgium	8	0	24	1	67	0	1	−1
Germany	7	0	46	2	44	−1	3	−1
Switzerland	6	2	55	−1	38	−1	2	1
Portugal	4	−3	14	2	74	1	9	0
Spain	3	−1	14	7	77	−6	7	0
Italy	3	−3	17	5	71	−1	9	−1

Notes: Source is Eurostat EU-SILC UDB version 2019-03. Weighted frequencies. Unit of observation = household. Countries sorted by % of households paying a reduced rent. Differences are due to rounding.

defined similarly throughout Italian Regions. Priority in subsidized rental housing owned by the public sector (*Edilizia sovvenzionata*) is given to lower incomes (Caruso 2017). Furthermore, Caruso (2017) and Poggio & Boreiko (2017) observe an increase in targeting towards lower incomes since the GFC: Poggio & Boreiko (2017: p. 117) write that '[…] *annual means tests and rent adjustments have also become quite a standard in the sector*'.

The aim of our paper is to contrast these country profiles from the literature review with what we find when quantifying the degree of residualization in the BMR sector based on household income. In doing so, we can also reveal whether residualization of the reduced-rent sector is a general trend across countries and housing regimes.

4. Data and methods

We use pooled cross-sectional survey data for the period 2005 to 2016 from Eurostat's EU-SILC User Database. EU-SILC is an annual multi-country household survey in Europe designed for comparative research. Samples are representative for the national populations, excluding the homeless and those residing outside private households. Our unit of analysis is the household.

The housing tenure variable in SILC contains four main categories (European Commission, 2019)[3]: owner (outright or paying mortgage), tenant or subtenant paying rent at prevailing or market rate, accommodation rented at a reduced rate (lower price than the market price), accommodation provided rent free (e.g., if the accommodation comes with the job). National data producers have to include appropriate and understandable answer categories reflecting the specifics of the tenure system in their national questionnaires[4]. SILC variables are later output-harmonized for the Eurostat SILC User Database (Eurostat, 2017).

Although harmonization of variables and various quality checks (Eurostat, 2017; European Commission, 2019) ensure that the SILC is currently the most comprehensive tool for comparative research on housing in Europe, it does not come without caveats. SILC does not distinguish between social/public renting and private renting

but between "renting at market rate" and "renting at reduced rate". Beyond those renting social housing, the latter also include households renting at a reduced rate from an employer, and those in accommodation where the actual rent is fixed by law. One the one hand, this goes beyond the type of provider. On the other hand, it more consistently summarizes subsidized renters into one group and provides a more complete picture on inequality of access to cheap rental housing.[5] Consequently, we will speak of the 'below market rate rental sector' (BMR) vs. the market rate rental sector (MR) henceforth. Finally, we have to stress that housing policies can also subsidize ownership, as for instance in the recurring right-to-buy schemes implemented in the UK and Ireland (Elsinga et al., 2014; Norris, 2016). With our data, we cannot differentiate between owners that benefited from such subsidies and owners that acquired their property on other terms.

Our paper focuses on Western and Southern European countries. Among those, we drop countries if there are less than 50 observations[6] for the BMR group in any of the years 2005 to 2016. Where there is no clear distinction between a 'market rent' sector and a 'reduced-rent sector' (i.e. Denmark, Netherlands, Sweden), the SILC guidelines for data producers demand to classify all renters in the former category. Consequently, these countries cannot be used for our analysis. Our final sample covers 12 countries. (Table 3).

Income is used for all measures of residualization. It refers to the household's total disposable income after tax including social transfers and old-age pensions (henceforth "income") and is adjusted for household size (using the modified OECD scale).

To quantify residualization of the BMR rental sector, we use several indicators. Taken together this should provide us with a comprehensive picture of BMR residualization.

First, we look at the share of households from the bottom income tertile who reside in BMR rental housing. Second, we compare median incomes between tenants with BMR rents and other tenure groups. The advantage of these two measures lies in their straightforward scale and interpretation. However, they do not consider the full distribution of income.

To overcome this limitation[7] we replicate the index of residualization developed in Pearce & Vine (2014). This index compares the incomes of those living in a particular tenure (BMR renting in our case) with the incomes of the population as a whole. If the BMR rental sector houses disproportionately more households with lower incomes, this indicates residualization. The calculation of the index demands dividing the population incomes into bands. We proceed as Pearce & Vine (2014) and split household income into population deciles[8]. The index of residualization is calculated as[9]

$$R_S = \frac{L_S}{K} - 1 \qquad (1)$$

with $K = 0.5$ [10] and

$$L_S \approx \sum_{i=1}^{10} \frac{1}{2} \left[F_S(p_i) + F_S(p_{i-1}) \right] (p_i - p_{i-1}) \qquad (2)$$

where p_i is the proportion of households in the total population at or below point p_i and $F_S(p_i)$ is the proportion of households in the subpopulation (BMR renters) at or below point p_i. It has a value of zero if the income distribution of BMR renters is identical to the total income distribution. Values above zero indicate that there is an overrepresentation of low-income households in this tenure, while values below zero tell us there is an overrepresentation of higher income households in this tenure. The higher this index greater 1, the higher the level of residualization.

One feature of the Pearce/Vine residualization index is that its value for any given tenure is limited by the size of that tenure. Imagine an example of two countries, each with a split only between owner occupation and BMR renting. The sizes of the BMR rental sector are different − 10% in country A and 30% in country B. Further, assume that in both countries, BMR renting only houses the poorest members of society. In country A, all households (100%) of the 1st income decile live in the BMR rental sector and in country B all households of the 1st, 2nd and 3rd income decile live in the BMR rental sector. Households from all other deciles are owners. In both cases, the BMR rental sector is 'the most residualized it can be' given its proportion of the overall housing stock. Yet, in country B it will have an index of residualization lower than in country A. A similar argument applies, when we compare shares of the bottom income third that reside in the BMR rental sector. We do not, however, regard this as a problem in our paper. We are also interested in the income structure irrespective of the size of the tenure and in our example, the BMR rental sector in country B is housing a broader range of the population. Moreover, one can also argue that for policymaking the actual social mix in the BMR sector independent of its size is of major interest when it comes to tackling problems of social segregation.

Nevertheless, following Stephens et al. (2003) we calculate a fourth indicator that takes account of the fact that the relative size of the BMR sector varies between countries. For each country-year, we divide the share of each income tertile living in the BMR rental sector by the relative size of that sector. If the BMR rental sector houses disproportionately more households from the bottom income tertile, this measure will be greater than 1. The higher this index >1 the higher the degree of residualization.

Fifth, we estimate separate bivariate logistic regression models by country and year. Here, we are interested in probability of BMR rental housing conditional on income.[11] The dependent variable is coded "1" if a household currently occupies a dwelling with a rent below the market price and coded "0" otherwise. To account for complex survey designs when estimating regression coefficients and standard errors we use the tools provided by Goedeme[12] (Goedemé 2013, Goedemé & Zardo, 2016).

5. Results

5.1. Explaining residualization

Tables 3 and 4 contain indicators for explanatory factors of residualization (Section 2). Table 3 reveals that the share of households renting below market rates is lowest in Southern Europe. Ownership is by far the dominant tenure type in these countries. At the other end of the spectrum, we observe relatively high shares of BMR renters

Table 4. Institutional structure.

20..	Share of bottom income third in BMR (%)[1,6]		Rent ratio[2,6]		Mortgage costs[3]		Total Outstanding Residential Loans to GDP Ratio, %[4]		Δ GDP after GFC[5], %
	16	Δ16-05	16	Δ16-05	16	Δ16-05	16	Δ16-05	Δ09-08
Iceland	73	11	1.34	−0.35	3.87	−0.3	65.4	−7.6	−6.8
Finland	70	9	1	−0.02	1.16	−1.83	43.5	14	−8.1
Belgium	68	5	1.74	0.08	2.11	−1.54	52.1	19.6	−2
Spain	66	20	3.99	0.59	2.01	−1.21	45.7	−5.4	−3.8
Germany	61	10	1.25	0.05	1.76	−2.49	42.2	−8.3	−5.7
Italy	60	13	1.81	0.16	2.02	−1.71	21.9	7.3	−5.3
Ireland	59	2	2.78	−1.82	3.26	−0.16	31.5	−27	−5.1
Portugal	53	9	4.31	0.54	1.9	−1.44	51.4	1.3	−3.1
UK	53	−10	1.5	0.45	2.34	−2.83	64.3	−4	−4.2
France	49	9	1.15	0.02	1.61	−1.88	40.4	12.3	−2.9
Switzerland	48	−4[a]	1.3	−0.01[a]	1.63	−1.69[a]	142.1	n/a	−2.2
Austria	47	16	1.17	−0.19	1.92	−1.66	28.6	6.9	−3.8

Notes: Countries ranked by share of households from bottom income tertile.
[1]Income tertiles are derived from the overall distribution of household income. Switzerland: Δ2016-2007.
[2]Median rent in the MR sector divided by the median rent in the BMR sector.
[3]EMF (2017, 2019), Representative Interest Rates on New Residential Loans. Annual average based on monthly figures, %.
[4]EMF (2017, 2019).
[5]Great Financial Crisis, Eurostat.
[a]values for 2007.
[6]own calculations with EU-SILC UDB version 2019-03.

in the Anglo-Saxon countries, Finland and Iceland. These countries – often considered as "dualist" (see Table 2) – also have a roughly equally sized market rate rental sector. In between are the four Central European countries (Austria, Germany, Belgium, Switzerland). In this group, – often considered to have less targeted systems (Table 2) – renting is generally more common than ownership. In our observation period, market rate renting increased for the majority of our sample, whereas the share of homeowners decreased. We observe only minor changes in the relative size of BMR renting, where countries with increases and countries with decreases almost balance.

The rent ratio captures cost differences between MR and BMR renting. In 2016, differences are lowest in countries with less targeted systems (e.g. Austria, France). This fits to the literature on housing regimes. Hoekstra (2009) hypothesizes that due to highly unequal degrees of rent regulation one can expect larger differences between rents in the social and private rental sectors in a dualist rental regime, whereas direct competition between the social and the private rental sector in unitary rental systems should result in smaller differences between rents.

The ratio of total outstanding residential loans to GDP and mortgage costs are used as two measures for housing market financialization (Dewilde, 2018). We observe a decrease in the former in all countries, whereas for the latter the change over time is on balance across countries (Table 4).

We now use the information on institutional context to explore pairwise correlations of 2016-2005 changes in these indicators with the 2016-2005 change in share of the bottom income third in the BMR sector (our first measure of residualization). There is a weak positive correlation with the rent ratio (0.15), mortgage costs (0.29), residential loans to GDP-ratio (0.18) and a weak to moderate negative correlation

Table 5. Two-way fixed effects regressions, dependent variable is Pearce residualisation index.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Expctd. effect:	(-)	(-)	(-)	(-)	(+)	(+)	(+)	(+)
BMR, % of total	−0.776*	−0.719*						
Mortg. costs[1]			0.018	0.019$^+$				
Residential loans/GDP[1], %					−0.000	−0.001		
Rent ratio[1]							0.055***	0.052***
Controls								
Ln(real GDP)		−0.447*		−0.569**		−0.577**		−0.203
Social protect.exp./GDP[2], %		−0.013*		−0.014*		−0.013$^+$		−0.006
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	0.317***	5.262*	0.176***	6.396**	0.267***	6.561**	0.132***	2.374
N	142	142	131	131	130	130	142	142
R^2	0.247	0.282	0.224	0.281	0.216	0.274	0.375	0.381

$^+p < 0.10$,
$*p < 0.05$,
$**p < 0.01$,
$***p < 0.001$.
Own estimations based on Eurostat EU-SILC UDB (03/19 release). Country and time fixed effects (dummies) not displayed. [1] See Table 4 for definitions of independent variables. [2] Source is Eurostat (ESSPROS). N = country-years.

with the change in the share of BMR households (-0.55) and GDP growth after the GFC (-0.21). Except for the financialization indicators, these explorative results fit to what was hypothesized in Section 2.

To investigate the relation between institutional variables and residualization in more detail we proceed in a similar vein as Borg (2019). We estimate panel regression models with residualization measured by the Pearce/Vine index as dependent variable. The unit of observation are country-years. We control for country fixed effects (everything that remains constant in a given country over time) and time fixed effects (everything that affects all countries the same way in a given year). Furthermore, we include real GDP and public expenditure on social protection (% of GDP) as time-varying control variables.

Table 5 shows the expected significant negative correlation between the share of the BMR sector and the degree of residualization (Hypothesis 1). Furthermore, there is evidence that a decrease in GDP is correlated with an increase in residualization although this is not statistically significant in model 8.

For housing market financialization (col. 3-6), we do not find any significant effects (no evidence for Hypothesis 2). One reason for this result could be that easier access to mortgages due to lower mortgage costs is translated in higher house prices (see Section 2) which in turn makes outflows from relatively more well-off households from the BMR less likely. In the regression model, the effect of such costs and housing price increases could suppress the presumably negative effect of mortgage costs on residualization. As a background check, we added housing price indicators[13] to models (3)-(6). We find that the effects of mortgage costs and mortgage ratios do not change and the effect of housing prices is statistically insignificant[14]. Measurement problems with housing prices could be one explanation why we do not observe significant effects of mortgage costs/mortgage ratio once we control for house prices. Another reason might be further cost-of-becoming-an-owner (Section 2) that are not captured (and not available in our data).

Table 6. BMR Residualisation indicators, 2005-2016.

20..	(1) Pearce /Vine Index		(2) Stephens /Burns/MacKay Index		(3) Median income ratio: owners / BMR tenants		(4) Median income ratio: MR tenants / BMR tenants	
	16	Δ16-05	16	Δ16-05	16	Δ16-05	16	Δ16-05
Austria	0.15	0.15	1.30	0.36	1.29	0.25	0.99	0.07
Belgium	0.47	0.07	2.04	0.21	1.7	0.14	1.23	−0.02
Finland	0.33	0.04	1.59	0.05	1.48	0.08	1.06	−0.04
France	0.22	0.13	1.43	0.27	1.3	0.1	0.98	0.1
Germany	0.35	0.14	1.78	0.38	1.73	0.44	1.3	0.22
Iceland	0.40	0.08	1.82	0.16	1.42	0.07	1.11	0.11
Ireland	0.40	−0.03	1.91	−0.07	1.63	−0.07	1.29	−0.24
Italy	0.31	0.13	1.59	0.24	1.63	0.38	1.2	0.17
Portugal	0.37	0.16	1.76	0.30	1.46	0.11	1.26	0.17
Spain	0.40	0.17	1.81	0.29	1.67	0.34	1.23	0.07
Switzerland	0.20	−0.03	1.29	−0.20	1.32	n.a	1.11	n.a.
UK	0.33	−0.09	1.67	−0.21	1.53	−0.08	1.28	−0.02
Standard dev.	0.094	−0.042	0.213	−0.099	0.155	−0.037	0.120	−0.066

Notes: own calculations basedon Eurostat EU-SILC UDB (03/19 release). N.a. no data available. Higher values refer to a higher level of BMR residualisation. Δ for Switzerland refers to 2016-2007.

Finally, as expected, if the difference between median MR rents and BMR rents is larger this is associated with larger residualization in the BMR sector (Hypothesis 3). Overall, these results remain robust when we use the Stephens/Burns/MacKay residualization index as dependent variable (Table A3).

5.2. Differences and similarities between countries

In this section, we explore whether there are similar trends of residualization. From Table 4 we already see that the concentration of low-income groups in the BMR rental sector increased in almost all countries under study. The UK and Switzerland are the only exceptions.

Table 6 compares several indicators that capture residualization of the BMR sector and income differences to other sectors.[15] Larger figures refer to a larger degree of residualization or inequality. First, for the majority of countries, we observe an increase in BMR residualization and an increase of inequality between the BMR rental sector and other sectors. Second, as measured by the decrease in the standard deviation between 2005 and 2016 we also see convergence for all indicators.

However, when we look at the most recent year available (2016) there are still differences. As of 2016, the smallest shares of low-income households can be found in Austria, France and Switzerland (Table 4). In general, these countries – often considered to have allocation systems that aim at broader income groups (Table 2) – consistently display the lowest degree of residualization (Table 6, Table A4). Germany, described by Kemeny (1995) as unitary system in in the 1990s, has seen a rather large shift to a more residualized BMR sector from 2005 to 2016. This overlaps with observations from the recent literature on the German allocation system (Table 2). Conversely, in the UK – a typical example of a dualist system – residualization reduced. At the other end of the spectrum, we find Belgium, Iceland, Spain and Ireland with high levels of residualization.
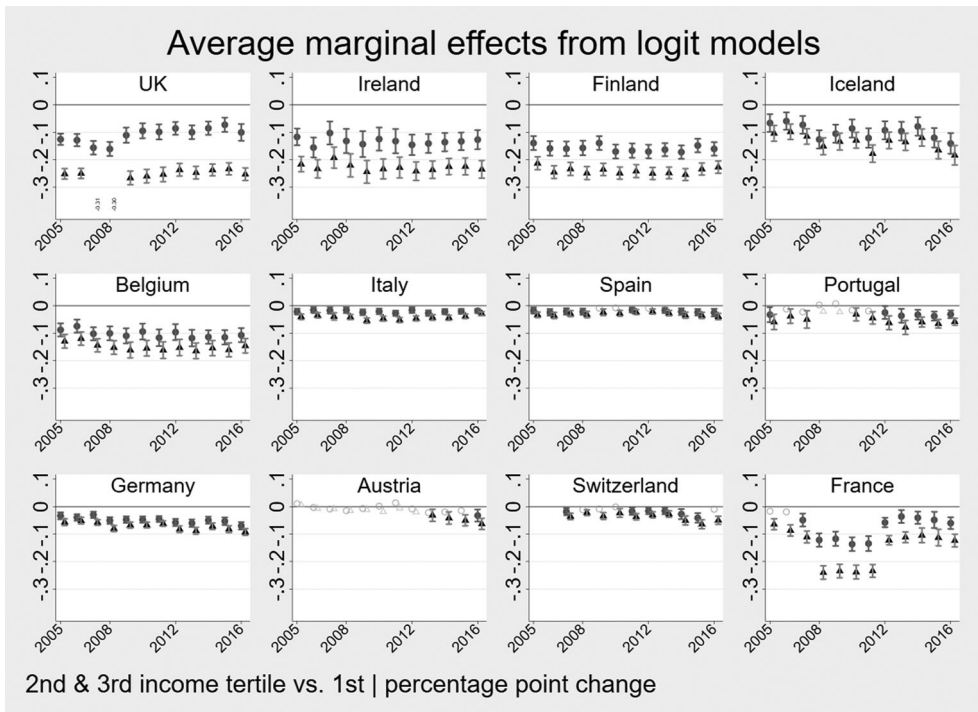
Figure 1. How income relates to the likelihood of BMR rental housing.
Caption: Countries grouped by rental/eligibility regime. Own calculations based on EU-SILC UDB (03/19 release). 1st tertile is reference group. Circles: 2nd tertile. Triangles: 3rd tertile. Average marginal effects and 95% confidence intervals from logistic regression models. Vertical axis shows the percentage point change in the probability of being a BMR renter for the 2nd and 3rd tertile compared to the 1st tertile. Hollow circles/triangles: statistically insignificant estimates (p-value > 0.05). Regression tables available upon request

In the last step, we use bivariate logistic regression models to look at the likelihood of being a BMR renter for a given income group (the "income gradient of BMR renting"). Figure 1 contains average marginal effects from logistic regressions. The vertical axis represents the percentage point change for the probability of renting at a reduced rate (vs all other tenure types) if we switch from the first to the second income tertile (circles) or from the first to the third income tertile (triangles). We expect negative effects for the 3rd and 2nd tertile compared to the 1st (poorest) tertile. Statistically insignificant estimates (p-value >0.05) are represented by hollow circles/triangles.

Three subgroups can be identified. The first one comprises the UK, Ireland (dualist countries) and Finland, with large effects (around minus 20 to 30 percentage points for the third tertile and minus 10 to 20 percentage points for the second tertile). A second group, again with the expected negative but slightly weaker income effect, includes Iceland and Belgium. The remaining southern European countries (Italy, Spain and Portugal) constitute a third group with only marginal and sometimes statistically insignificant effects of income. However, this is largely due to their small BMR sector (Table 3)[16]. If we look at the residualization indicators which focus on the income structure of the BMR population (Table 6) we see that these countries have a middle to high level of residualization.

In countries with less targeted systems, we find generally weaker (< -10 percentage points, Germany, Switzerland) or mostly insignificant (Austria) effects. From Figure 1, it is salient that France and the UK exhibit temporarily stronger effects during and in the aftermath of the GFC 2008, which bounce back thereafter. Moreover, in Austria, the income effect gets significant in the last years of our observation period. All these results remain robust if we estimate linear (OLS) probability models or add control variables. [17]

Regression modelling also allows us to test if the effect of income on the probability of BMR renting significantly increased in magnitude between 2005 and 2016. To test this we add interaction effects between income and n-1 time dummies for 2005-2016 (with 2005 as base year) to our baseline specification[18]. A negative coefficient means that the income effect has become stronger as compared to the base year. Our focus is on the year 2016. In Germany, Austria, France and Iceland, we find robust statistically significant negative interaction effects for 2016 (Figure A7). This provides further evidence that also in countries with a tradition of less social targeting (Austria, France, Germany), income has become more relevant for explaining whether a households resides in the BMR rental sector.

6. Conclusions

Who should have access to the publicly subsidized rental sector is a crucial policy question. A key term in this context is residualization. First, residualization refers to the *process* whereby publicly subsidized rental housing moves towards a position in which it provides only a 'safety net' for low-income households. Second, we can have different *levels* of residualization between countries. Our paper addresses both dimensions: changes over time and differences in the cross-section at a given point in time.

Several scholars argue that eligibility rules in Europe have become more targeted towards the socio-economically disadvantaged in the recent past. Yet, how many socio-economically disadvantaged households eventually reside in publicly subsidized rental housing does not only depend on eligibility rules, but also on households' preferences, affordability, the public image and the number of social housing dwellings among others. A complementary perspective to measure residualization is to look at tenants' income.

In this paper, we use various measures of residualization based on income to get a comprehensive picture of income differences between tenants in the reduced rate sector (below market prices) and other tenure groups. Our contribution to the literature is twofold. First, we investigate how residualized (in terms of income) the BMR sector currently is across housing systems in Europe and if countries have become more similar from 2005 to 2016. The existing literature largely focuses on eligibility rules (Scanlon et al. 2014). We look at tenants' income and contribute by providing the 'outcome' side to this literature on presumed residualization convergence. Second, we quantitatively explore the effect of the relative size of the BMR sector and the cost of alternative tenure forms on residualization. Both has not been done before in a cross-country comparative manner and complements the small number of single country studies.

Our regression models show that decreases in the share of the BMR sector are associated with significant increases in residualization. This fits to the literature on single countries (e.g. Borg, 2019 for Sweden).

We also hypothesized that cheaper access to mortgage ownership is correlated with higher levels of residualization (as the more well-off BMR renters become owners), but did not find any evidence. Part of an explanation could be (Aalbers, 2015) that in the post-GFC crisis period, particularly for younger generations, real income growth slowed down and the economic outlook worsened. This, in turn, might reduce demand for mortgages, despite cheaper access. Moreover, better access to mortgages could be translated in higher house prices. Another obstacle (but not available in our data) could be the legal costs to gain an ownership title. In sum, it seems that low mortgage costs alone do not provide a sufficient condition for renters to exit the BMR sector. In contrast, for the relative rent difference between MR and BMR renters we observe that increases are significantly related to a larger degree of BMR residualization.

With our method and data, we observe BMR residualization in a given year as total outcome of the income structure of inflows, outflows and stayers. While e.g. our second hypothesis refers to outflows, our third hypothesis captures the total effect of outflows and inflows (see Section 2). Our study thus only serves as a starting point for explaining the variation of residualization between countries over time with macro variables. A more fine-grained analyses of the different impacts of institutional variables on exits and entries in the BMR sector is beyond the scope (and data) of this paper but would be a promising avenue for further research.

As for the second part of our analysis, we observe broadly similar trends and convergence of residualization for the majority of countries[19] between 2005 and 2016. This complements what is found for policy rules (e.g. Scanlon et al., 2014). Moreover, in countries with a tradition of less social targeting (Austria, France, Germany), income has become more relevant (2005 to 2016) for explaining whether a households resides in the BMR sector.

Yet, if we look at the most recent data available, there remain differences between countries. As of 2016, Austria, France and Switzerland – often considered to have allocation systems that aim at broader income groups– though catching up still display the lowest degree of residualization. One explanation could be that other tools to manage the social mix of tenants (besides checking eligibility at the outset) leave room for path dependencies in policymaking. Among these instruments, we have periodic eligibility reviews, fixed-term tenancies or deposits to be paid upon entry into social dwellings to co-finance construction cost (OECD, 2020). Policymakers coming from a tradition of more universalistic systems might fine-tune these tools to keep the BMR sector less residualized, even if eligibility is narrower defined at the outset. E.g., as in the case of Austria, deposits can be a significant barrier to entry for low-income households (Mundt, 2018). Moreover, in systems without periodic eligibility reviews (like Austria), sitting tenants will not be affected and only gradually substituted with households who entered the sector under more targeted access rules.

Our study inevitably has limitations and comes with some cautionary notes. First, SILC differentiates between 'renting at a market rate' and 'renting at a reduced rate'.

As the latter can also be provided by non-government landlords this is not equivalent to distinguishing between social renting provided by public bodies and private renting. While we discussed the advantages of the SILC operationalization, this to some extent limits the comparison of our work with previous studies using different data. Second, although Eurostat demands a broad range of quality checks one can never totally rule out classification error of the housing tenure variable (e.g. caused by the respondent, interviewer or during data processing). Third, within our research design we do not aim at a causal evaluation of specific policies, (e.g. well-defined changes in eligibility rules, right to buy-legislation). Further research could exploit exogenous variation of such policy rules to investigate their impact on the level of residualization in BMR rental sector.

Future work could also revisit our research questions by taking a closer look at outcomes for various subgroups (e.g. tenant cohorts based on the number of years spent in a dwelling or income structure of inflows and outflows only). Exploratory analysis of our data showed that this is not feasible as samples sizes get very small. In our paper, we also did not include post-socialist housing systems. Such an analysis is beyond the scope of this paper. Applying our method to tenure groups in Eastern Europe could help to understand the degree of homogeneity of residualization in these countries. Finally, replicating our analysis based on a different concept of disposable income that includes imputed rent from owner-occupied or other rent-free accommodation (Frick et al., 2010) could provide an additional perspective on inequality between tenure groups.

Notes

1. According to the Treaty of Maastricht economic competition must not be distorted by government intervention. However, there are some exceptions for so-called "services of general economic interest". Government aid is allowed, if social housing is reserved for disadvantaged groups, which due to income constraints are unable to obtain market housing. In this case, competition will hardly be distorted.
2. In Kemeny (1995) rental markets that are structured by public policy in such a way as to enable non-profit providers to compete with profit providers were interchangeably termed 'unitary' or 'integrated'. In Kemeny *et al.* (2005), it was proposed to differentiate the use of these terms. The core interest is in the relation between non-profit and for-profit providers in the rental market. For the non-profit sector to influence the rental market directly through competition, two conditions must hold: (1) competition between non-profit providers and profit providers must be free and (2) the supply of non-profit housing must be competitive, provide good market coverage and be of sufficient magnitude. Integrated rental markets satisfy both conditions whereas unitary rental markets only satisfy the first condition. As we are mainly interested in residualization and not in rent levels, stock or quality, well will use these terms interchangeably (unitary/integrated).
3. Figure A1 in the online appendix represents an excerpt from this document.
4. https://ec.europa.eu/eurostat/web/income-and-living-conditions/quality/questionnaires, retrieved on Feb. 13, 2019.
5. In addition, affordability and/or below-market prices or rent is also what Hansson & Lundgren (2019) find in their review of the literature as a widely accepted defining criteria of social housing.

6.   Greece, Cyprus, Norway, Croatia, Serbia. (https://ec.europa.eu/eurostat/cache/metadata/en/ilc_esms.htm: section 7.2)
7.   Table A2 in the Online Appendix provides a numerical example for this argument.
8.   Pearce & Vine (2014) state that narrower bands would be preferable. However, given the small samples in some countries this is not feasible in our case.
9.   Table A2 in the Online Appendix provides a numerical example.
10. The index of residualization is derived from the Lorenz Curve, similarly as the Gini coefficient. K is the area under the 45° line in a situation of proportionality and thus 0.5 if we scale the cumulative percentages between 0 and 1. See Pearce & Vine (2014) for further details.
11. This approach is also independent of the overall size of the BMR rental sector. Furthermore, regression modelling – via interaction effects of income and year- allows us to test if the effect of income on the probability of BMR renting significantly changed between 2005 and 2016.
12. https://timgoedeme.com/eu-silc-standard-errors, retrieved on December 10, 2018.
13. Indicator 18 from EMF (2019).
14. Tables available upon request.
15. More detailed time series for these indicators are available in the online appendix (Fig. A2, A3, A4).
16. For ease of interpretation, we display marginal effects that measure the percentage point change of the likelihood. In a country with a small BMR sector, the difference in absolute terms between income group is thus likely to be smaller. Instead if we look at relative differences (odds ratios for BMR renting), the income gradient indeed becomes larger (see figure A8)
17. Cf. figure A5 and A6. Results (available upon request) are also robust if we use the log of income instead of tertiles. By estimating linear probability models, we account for controversies related to the comparison of coefficients across logistic regression models (Mood, 2010). Control variables are age, highest education ISCED, country of birth (all measured for 'the person who is responsible for the accommodation'), the degree of urbanization and the household composition (adults/children). Adding covariates cleans the income effect from other supply (e.g. number of children, discrimination due to citizenship) and demand side restrictions (e.g. access to information or search and moving behavior correlated with socio-demographic variables, changing socio-demographics of the low-income households). However, our focus is not on any kind of "causal" effect of income, but on the gross correlation with the likelihood of BMR renting. Thus, our main specification is without covariates.
18. 2007 for Switzerland.
19. The UK is a notable exception from this pattern, which sits well in the existing literature. E.g. Pearce & Vine (2014) show that residualization has been broadly stable over the last decades in the UK.

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