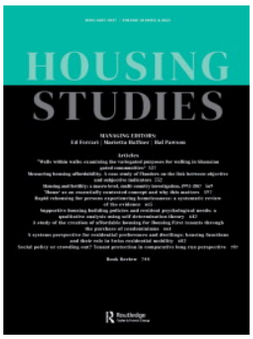

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Social policy or crowding-out? Tenant protection in comparative long-run perspective

Konstantin A. Kholodilin[a,b] and Sebastian Kohl[c,d]

[a]DIW Berlin, Berlin, Germany; [b]NRU HSE, Kantemirovskaya ul. 3, St. Petersburg, Russia;
[c]Max-Planck-Institut für Gesellschaftsforschung Paulstraße 3, Cologne, Germany;
[d]Sociology and IBF, Uppsala University, Uppsala, Sweden

ABSTRACT

Private rental markets have become increasingly important since the Global Financial Crisis 2008–2009 and rent controls are back on the political agenda. Yet, they have received less attention from housing scholars than homeownership and public housing. This paper presents new data on the development of private tenancy legislation based on a content-coding of rent control, protection of tenants from eviction, and rental housing rationing laws across more than 15 countries and 100 years. This long-run perspective allows for inquiring about the dynamic effects of rent control on the rise of homeownership as the dominant tenure during the twentieth century. We find that both rent regulation and rationing measures were followed by increases of homeownership and decreases of private rentals. We suggest that homeownership was not just produced by generous subsidies or the homeownership dream, but also through the push-effect of regulation crowding out rental units.

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1. Introduction

A significant number of citizens, especially in urban areas depend on private rental markets for their housing provision. In German-speaking countries, this makes up a majority of households. The private tenancy rate is increasing in many high-homeownership countries in the aftermath of the Great Recession. Historically, private tenancy has dominated large parts of the twentieth century: interpolated homeownership rates crossed the 50% threshold as early as 1955 in Spain, in 1968 in Portugal, in 1970 in Great Britain, 1982 in France, and 1998 in the Netherlands. Even if the remainder is partially public or municipal housing as our decomposition of the rental sector shows below, private tenancy is not negligible, as public housing has been declining in most countries since the 1970s. In general, after World War II (WWII) and until the Great Recession of 2008–2009, homeownership rates had been

CONTACT Konstantin A. Kholodilin kkholodilin@diw.de DIW Berlin, Mohrenstraße 58, 10117, Berlin, Germany

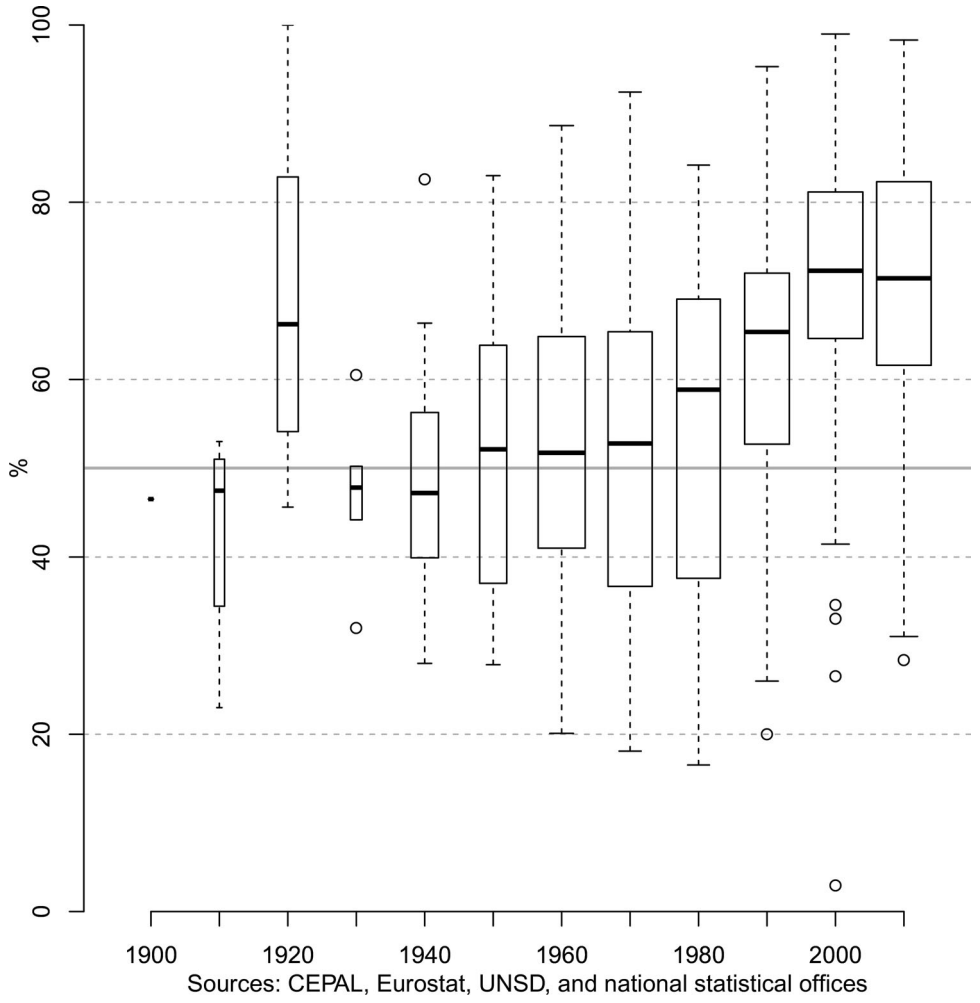

Figure 1. Evolution of homeownership rate in the world, 1900–2010s.

increasing. In the 2010s, they stabilized and have even started to decline in formerly high-homeownership countries where a new' Generation Rent' has made the headlines; see Figure 1.

Despite its prominence, both historically and even presently, the private rental market, as a field of social policy, is neglected in both academic literature and the political realm when compared to the other two dominant housing market areas: the owner–occupier and the public housing sectors (Arnott, 1995). In politics, for instance, the issue of rent regulation appears significantly less frequently in manifestos of political parties than questions of homeownership and public housing (Kohl, 2018b). In economics, there is a relatively large body of literature examining negative effects of rent control (see Tables A2 and A3 in the Appendix), but less than for the other market segments and hardly anything in historical comparison. One reason for the low academic attention lies in the lack of comparative national data on very specific regulatory environments. Whereas public and owner–occupier housing is more a question of finance and budgets, private renting is one of legal regulation.

This paper, therefore, draws on new content-coded data of legislation in the three dominant domains of the regulation of private tenancy—rent control, security of tenure, and housing rationing—covering a panel of more than hundred countries from WWI through 2020. These data tell a story of how tenancy legislation was pushed forward by the two World Wars, especially in Europe, where a first generation of rent-freezing regulation was passed, tenure security implemented, and short-time rationing measures were used. The second generation of more flexible rent controls replaced the rent freezes in the post-war years nearly everywhere outside developing countries and housing rationing measures were mostly phased out, while levels of tenure security, once achieved, were hardly ever retrenched. Continental Europe scores generally higher in terms of tenure security and second-generation rent controls than all other continents, particularly in comparison to Anglophone countries.

The paper takes advantage of these new data to address the question of whether rent legislation is an indirect factor behind the rise of homeownership and fall of private rental housing in most countries through the twentieth century. Economists' standard assumption is that rent legislation of any kind makes investment in rental real estate less attractive and induces landlords to sell existing rental units and to not construct new ones. Our multivariate panel data models confirm this: both rationing and rent regulation, but not tenure security regulation, are followed by homeownership increases and decreases of private rentals.

Our interpretation is that tenancy legislation, rent regulation, in particular, is used as an inexpensive social policy favoring tenant majorities at the expense of landlord minorities and, thereby, reducing the very same form of tenure it is meant to protect. While many subsidies have been spent on pulling more households into homeownership, excessively restricting private tenancy has worked as a push away from tenancy and into homeownership. In a cross-country perspective, this helps to explain why tenancy-regulated continental Europe caught up with the historically high homeownership rates of tenancy-underregulated Anglophone countries. It, moreover, explains why European homeownership rates are still below those of the tenancy-overregulated Global South. The paper suggests that it was not only pull factors, such as the homeownership dream, which converted more households into owner–occupiers, but that supply-side push factors such as the shrinking rental stock also played an important role. We support this interpretation with anecdotal evidence from the housing historiography of individual countries.

The paper is organized as follows: after reviewing the literature on rent regulation and its effects on homeownership, we present the new data, methods, and descriptive statistics of the rent regulation indices. We then report and discuss the multivariate results of the regressions on homeownership rates. The discussion draws some parallels between rent legislation and other welfare policies, arguing for more research on private rentals.

2. Literature on rent regulation and homeownership determinants

Housing research has generally been more focused on homeownership and social housing than on private rentals (Zavisca & Gerber, 2016), with notable exceptions

(Harloe, 1985; Malpezzi & Ball, 1993). This has to do with the fact that private rentals have gradually declined over the last century, being replaced in most countries by social housing, particularly in the respective post-war periods (Harloe, 1995), and by the long rise of the owner–occupier sector, particularly since the 1970s (Ronald, 2008). There is not a single country in which private rental rates have significantly risen over the past century, a statistic that is hardly discussed. Not surprisingly, it is rather understood as a reflection of other tenure forms than in its own right.

Yet, while long thought a relic of the past—particularly in its pre-WWI urban tenement form—private rental housing has made it back on the agenda of newspapers, policy makers, and housing research, including in this journal (Kemp, 2015; Soaita *et al.*, 2017; Goering and Whitehead, 2017). Ever since the Global Financial Crisis, high-homeownership countries have witnessed declines in homeownership rates—sometimes the first in their recent history—in favor of what has been called the 'Generation Rent' (Lund, 2013). This term refers less to the voluntary choice of the younger generation for the more flexible rental option than to the increasing unaffordability of homeownership in high-priced urban centers, in spite of low interest rates (Richard, 2018). This growing population of tenants only adds to the still high population share of tenants in urban centers. According to Eurostat's urban audit, the City of London, Paris, Berlin, and Amsterdam stood at homeownership rates of 42.6%, 33.1%, 14.8%, and 21.0%, respectively, around 2010. In light of rising rental prices, these considerable constituencies of urban tenants can be instrumental in demanding stronger protection and regulation of rent prices.

Rent regulation has been assessed through measurements in a small but growing body of literature (see Table A1 in the Appendix for an overview). The majority of studies assesses the stringency of housing policies for a single period of time. The cross-sectional dimension varies between four (Miletić, 2016) and 126 countries (Global Property Guide). The degree of regulation is measured for various cross-sections: the stringency of rent control by Malpezzi & Ball (1993) for 1991, a procedural formalism index by Djankov *et al.* (2003) for 2000, a rent control index by Andrews *et al.* (2011) for 2009, as well as landlord and tenant law and practice of the Global Property Guide (GPG) for 2017. Kholodilin (2017) is the first study in which indices depicting the evolution of governmental regulations over time are constructed, while Weber (2017) is the first researcher to develop a panel of indices encompassing eighteen countries between 1973 and 2016.

Rent regulation measures have been used to examine various effects (see Table A3), such as on rents and mobility (Munch & Svarer, 2002; Krol & Svorny, 2005); maintenance quality (Kutty, 1996); efficiency of allocation and segregation (Glaeser, 2003; Field *et al.*, 2008); and homelessness (Grimes & Chressanthis, 1997; Early & Olsen, 1998). There are fewer studies on the effects of tenure security regulation, with one exception being Iwata (2002)'s study on housing supply. Few studies examined its effect on homeownership, mostly suggesting a crowding-out (see Table A2). Historical-comparative studies beyond qualitative comparisons are still lacking in this literature.

In contrast to the decline of private rentals, the simultaneous rise of homeownership across almost all countries during the last century has received much more

attention. There are many micro-level studies of the tenure choice for homeownership (Borjas, 2002; Burgess, 1982; Tan, 2008). However, there are also a number of macro-level studies explaining homeownership rates across cities, regions, or countries. Table A4 in the Appendix lists the detailed findings of the determinants of homeownership rates. In a nutshell, all studies include variables concerning social characteristics of the population (age structure, level of education, urbanization, percentage of divorced and married people, presence of children in the family), indicators of economic development (median income, GDP per capita, growth index), as well as financial and tax regulation indicators (reform indices, tax rates). In most cases, these factors are shown to be significant. In addition, some take into account geographic characteristics, ideological orientation of government, political aspects, square-meter prices and their changes. However, not all are significant. These studies have a strong US bias, are cross-sectional or lack dynamic specification, and are based on post-1980 data, i.e. a time when arguably many homeownership increases had already taken place. Due to a lack of tenancy regulation data, its effect is not yet properly examined.

Two factors found to be at play in determining homeownership are homeownership policies (Atterhög, 2005) and the privatization of public housing (Forrest, 1991). The first refers to pull effects through policy incentives, whereas the latter rather refer to push effects, with the decrease of public housing units leaving potential tenants with fewer supply options. In the literature, this 'crowding out' is more often used to describe the negative relationship between regulation of public housing and the owner–occupier sector. In what follows, we will transfer the idea of a crowding out to the relationship of private rental and homeownership to see whether this potential push factor holds in the light of the pull from homeownership subsidies. Our central guiding hypothesis is therefore:

> Crowding out hypothesis: Higher prior regulation intensity of rents, tenant protection, and housing rationing is conditionally followed by higher homeownership rates.

3. Data: tenancy regulation in the long-run

3.1. Data and methods

In this section, we draw on previous work and a published dataset on rental market regulation (Kholodilin 2020b). In order to assess the impact of governmental regulations, they must be measured. However, there are two major concerns regarding the measurement of formal laws. First, the laws' enforcement may differ across the sample and there is a certain complexity of measurements of the quality of enforcement. Second, formally different legal systems lead to the same functional outcome, the only difference being in the means. However, these arguments cannot be applied to the case examined in our study because rental housing market law is statutory and deviations from statutes occur rarely. Moreover, we measure functional differences in laws, not just differences of formal rules.

The common approach to measuring formal regulations in the examined literature is constructing indices. However, some authors underline the complexity of

measuring formal regulations and raise some methodological objections; see Deakin *et al.* (2007). One of the most important problems regards weighting. Another problem is that this law-based approach abstracts from different degrees of law enforcement. Rent regulation, in particular, can be subject to considerable administrative discretion both within a country (O'Toole *et al.*, 2019) and across countries. Comparing similarly developed countries only partly controls for this setback, which needs to be kept in mind when interpreting results. A final problem raised is the inability of binary variables to capture gradations in the effects of legal rules in different countries. While we do capture differences in nominal and real rent controls, we ignore how strict the levels used are. Deakin *et al.* (2007) stress that these problems are inevitable for any coding project, so the aim is to approximate the reality as closely as possible. The general idea most commonly used is that the higher values of indices refer to the higher degree of control, or, in other words, stricter legal protection; see Deakin *et al.* (2007), Botero *et al.* (2004) and La Porta *et al.* (1998).

In our approach, we strike a balance between the feasibility of a multi-country comparison in the long run and the degree of the information we can capture. It is an extended version of the methodology of Weber (2017) and involves the quantification of legal acts in several steps. The first step consists of exploring the literature that summarizes governmental housing market regulations in the country of interest. In a few select cases, there is already systematic description of the evolution of such legislation. The main sources of such information are the Tenlaw project at the Universität Bremen[1] for the 28 European Union member states plus Japan, Norway, Serbia, Switzerland, and Turkey; the 'Tenancy Law and Procedure in the EU' project of the European University Institute in Florence[2] for 13 EU member states plus Switzerland; International Labour Office (1924) for the origins of housing policies in 17 European countries; historical and legal studies; as well as preambles of legal acts or parliamentary discussions of law drafts that provide justification of regulations and contain an analysis of preceding legislation (e.g. Belgium, Portugal and Romania).

In the second step, a list of relevant legal acts is compiled and the search for their original (not revised) texts is conducted. Since we are interested in the evolution of the housing legislation, we need the 'real time' texts, as formulated at the moment of their enactment. Most frequently, such texts are found in government or official gazettes. Fortunately, many of these gazettes are digitized and available as online archives. Hence, it is relatively easy to search for the necessary information. In other cases, laws can be obtained free of charge by contacting the national parliaments (e.g. as is the case for Denmark, Iceland and Norway). Still other countries charge fees for providing the relevant laws (e.g. Bulgaria, Singapore and Sweden). For those cases where we were unable to locate laws as published in an official gazette, we use drafts of the laws from parliamentary proceedings (e.g. Belgium and Switzerland). In the worst case, answers to questions submitted remotely are not forthcoming (some African, Asian, as well as Latin American and Caribbean countries) or one must visit a library in the country of interest.

In the third step, the compiled legal acts are summarized. The relevant provisions are identified and recorded. In particular, the following fields are captured: area of application, rent control, tenant protection, and housing rationing. Language barriers

are a significant challenge at this stage. In many cases, knowledge of the various foreign languages permits the co-authors to understand the legal texts. In other cases, native speakers help decipher these texts (e.g. those in Greek and Finnish). Otherwise, the authors use machine translation (e.g. Google Translator) in order to translate the texts. Although the quality of modern machine translations is relatively high, there is still a room for error, especially of the older texts, which often have a different orthography and vocabulary.

In the fourth step, the textual summaries of legal acts are mapped into numeric values. Here, we rely upon the approach from Weber (2017) to code rent laws and tenure security and from Kholodilin (2017) to code housing rationing. Based on a set of questions formulated in the above two studies, binary variables are constructed that equal one, if regulation is more stringent and zero otherwise:

$$I_{jt}^{k} = \begin{cases} 1, & \text{if restriction } j\text{of type } k\text{is present in period } t \\ 0, & \text{otherwise} \end{cases}$$

Below, the coding is described in more detail.

Rent control

Weber (2017) defines six binary variables: 'Real rent freeze' (the rents are not allowed to grow faster than inflation), 'Nominal rent freeze' (the rents are frozen in nominal terms), 'Rent level control' (some government body, arbitration council, or court fixes the rent level at the beginning of new contracts), 'Intertenancy decontrol' (if the rent control ceases with a change of tenant), 'Other specific rent decontrol' (certain types of dwellings or settlements are no longer subject to the rent control), and 'Specific rent recontrol' (certain types of dwellings or settlements are subject to more stringent controls).

Tenure security

Here, four binary variables are used: 'Eviction protection during term or period' and 'Eviction protection at the end of term or period' take the value one, if, in order to evict a tenant during the contract term or at the end of it, the landlord is required to present justified reasons. The 'Minimum duration' variable equals one, if the contract duration must be at least two years, while the 'short-term tenancies' variable is 1, if letting dwellings for a period of less than one year is prohibited.

Housing rationing

This policy is approximated with eight binary variables. 'Registration of housing' equals 1, if landlords are obliged to report vacant, or all available, premises. The binary variable 'protection of housing' is 1, if it is prohibited to use dwellings for non-residential purposes, merge or demolish them, or to convert rental dwellings into condominiums. The variable 'creation of housing space' equals 1, if the state prescribes the use of all available space for housing purposes, e.g., through the reconstruction or conversion of non-residential premises or through the subdivision of big dwellings into smaller ones. 'Requisition' equals 1, if requisition with subsequent

compulsory letting of the vacant dwellings is conducted. 'Restriction of freedom to move' is 1, if residential mobility is restricted: for example, if access to areas with an acute housing shortage is closed to all persons, who are neither 'indispensable' for these areas nor residing there on a permanent basis. 'Conservation of social composition' is 1, if a balanced social composition of the population in particular urban areas is protected through interdiction to upgrade the dwellings to a state considered being above the standard level. The variable 'Housing consumption norms' equals 1, if restrictions on the amount of housing that might be used by tenants are imposed. The dummy variable 'Nationalization of housing' takes the value 1, if the state nationalizes housing stock, and 0, if no nationalization or privatization or restitution occurs. Unlike requisition, nationalization means the loss of property rights for the owner and no compensation for property taken.

For each regulation type, k, a composite index is computed as a simple average of binary variables:

$$I_t^k = \frac{1}{N_k}\sum_{j=1}^{N_k} I_{jt}^k$$

where $k = \{\text{ Rent control, Tenure security, Housing rationing}\}$.

The binary and composite indices are constructed for a large panel of countries. The choice of countries is dictated by the availability of legal acts. Finally, an even more general index can be constructed (rental market regulation index):

$$\text{RMRI} = \frac{I_t^{\text{Rent control}} + I_t^{\text{Tenure security}}}{2} \tag{1}$$

which simultaneously accounts for both rent control and protection from eviction.[3]

3.2. Tenancy regulation: a descriptive account

The resulting country-specific indices aggregated at the continent level are presented in Figure 2. National tenancy regulation became a widespread phenomenon in all countries affected by war-time inflation during World War I and was, therefore, a very European phenomenon. Private rental contracts were previously only formally regulated like any other tenancy in most Civil Codes and—disregarding general usury laws—were not subject to any state restrictions. However, with families of active soldiers facing evictions on the home front, states used temporary ordinances to freeze rents, interdict evictions, and even redistribute housing space. This war-time consumer socialism was usually extended to all tenants and survived the war longer than governments had originally intended; see Führer (1995). The pent-up demand of returning soldiers and postponed family formation, along with political radicalism and private capital shortages, made social policy through tenancy regulation a necessity even beyond the war in Europe. Tenancy security became a permanent part of many Civil Codes and rent controls were repeatedly prolonged throughout the 1920s, whereas the emergency measures of direct rationing were usually cut back. While the

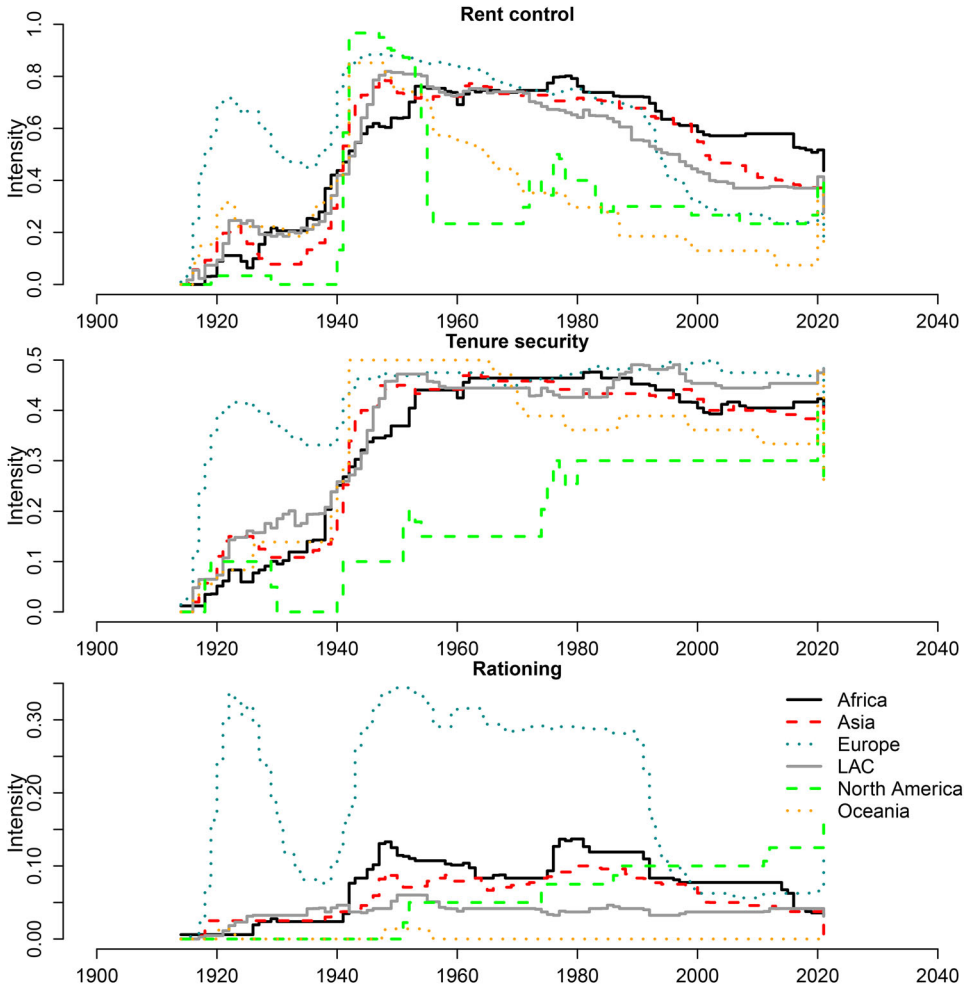

Figure 2. Rental regulation intensity by continents. Note: The heights of the curves correspond to the intensity of governmental regulations: higher values mean that the state imposes more restrictions on landlords.

1930s were a short era of liberalization, World War II forced countries—this time even on a more global scale—to re-activate strong war-time measures. These emergency measures largely disappeared after World War II, while the first generation of rent controls, in form of rent freezes, gradually gave way to the second generation of softer restrictions (Arnott, 1995).[4]

As for rent control, we included the following variables: real rent freeze, nominal rent freeze, rent level control, intertenancy decontrol, other specific rent decontrol, specific rent recontrol, and subletting.

Comparatively, Europe has been the leader of both hard and soft rent control, tenancy security, and rationing measures. Countries such as Australia, Canada, or the United States were much more reluctant to introduce similar measures and were speedier in abolishing them. Other countries followed the European example, but with a lag and with less intensity. This becomes, perhaps, most visible for measures

of forceful redistribution of housing and tenants, arguably the most intrusive ones; see Figure 2 showing regulation intensity by continent. Only North America appears to have escaped such a policy at large scale. It is known, though, that some US cities, e.g., Santa Monica (California), used forms of housing rationing like the obligatory registration of vacant housing and the prohibition of using dwellings for non-residential purposes (Keating, 1983). The continent that most actively made use of housing rationing is Europe. The two periods of the most extensive use of such policies coincide with the two world wars and their aftermath. Nevertheless, with the passage of time, European countries, although markedly reducing the application of housing rationing, did not dismantle them completely. In Western Europe, new forms of housing rationing were sometimes introduced, such as the protection of social composition areas in Germany (Kholodilin, 2017).

The comparative differences are also noticeable for tenure security, which was rarely cut back once introduced. Here, Anglophone countries again show lower levels of tenant protection than their continental European counterparts. With regard to rent control, Europe was the first to introduce hard controls, but also the first to replace them with softer controls. Again, this trajectory differs from Anglophone countries, where hard controls were a war-time-specific emergency measure, after which the free rental market gained upper hand again. However, it also differs from the rest of the world, where controls of the first generation set in later but with greater intensity and permanence. Only recently did soft controls emerge in these countries. Thus, continental Europe lies internationally in between an over-regulated Global South (and the former socialist countries) and a rather under-regulated Anglophone world. There are also notable differences within Europe, as Figure 3 and 4 show. Particularly after the 1970s, countries of German legal origin occupied a middle position in rent regulation, lying between a more under-regulated UK and a relatively more regulated South and North of Europe. As regions with similar legal origin possess themselves internal heterogeneity Haffner *et al.* (2008), we use country dummies in the following analysis.

4. Estimation results

4.1. Estimation technique

In order to assess the longitudinal association between tenancy regulation and homeownership rates (HOR) we use panel data models. Due to multiple missing observations, the homeownership rates from Census benchmark years are interpolated using the *stinterp* function of the *stinepack* library of the statistical programming language **R**, which is based on piecewise rational functions using Stineman's algorithm (Stineman, 1980). Given the strong persistence of homeownership rates and in order to remove serial correlation and potential non-stationarity, we compute the dependent variable as the first difference of the HOR. The model can be formulated as:

$$y_{it} = \beta' x_{i,t-1} + \gamma' z_{i,t-2} + \eta_i + \theta_t + \nu_{it} \tag{2}$$

where y_{it} is the first difference of the HOR in country i in year t; x_{it} is the vector of explanatory variables; z_{it} is the vector of rental market regulation indices; η_i is the

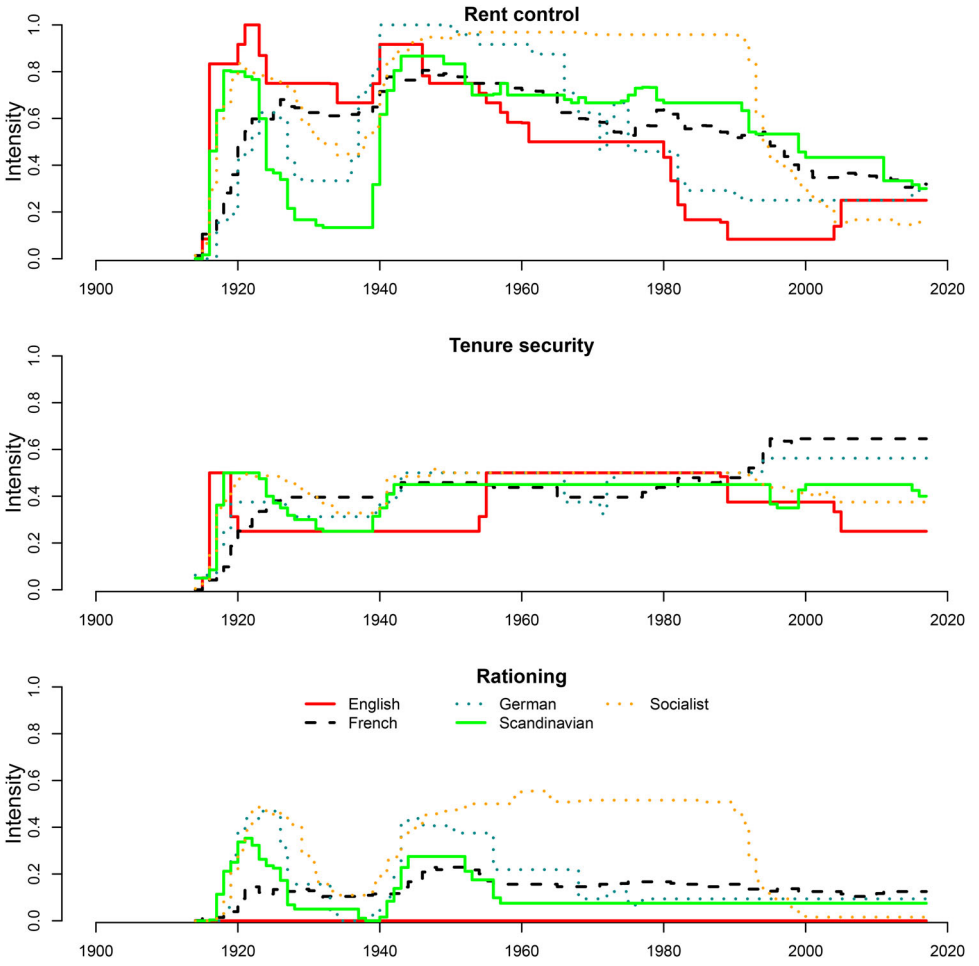

Figure 3. Rental regulation intensity in Europe by legal origin. Note: The heights of the curves correspond to the intensity of governmental regulations: higher values mean that the state imposes more restrictions on landlords.

country fixed effects; θ_t is the year fixed effects; v_{it} is the random disturbance; and β and γ are the vectors of coefficients to estimate.

As to control variables, we follow the studies cited above, taking into account the more limited availability of long-run data. We use growth rates of the real GDP per capita, the total dependency ratio, price-to-rent ratios, nominal long-term interest rates, the new dwelling completions per capita, and the mortgage loans to GDP ratios. Table A5 in Appendix reports sources, defines variables and presents descriptive statistics for the dependent variable, control variables, and regulation indices. The price indices from different sources are chain linked and we computed medians of different indices available for overlapping periods. Due to the long-run nature of the data, high quality repeat-sale or hedonic indices are obviously not available for all countries and time periods. The series are standardized by house types within countries in the post-1950 period and post-1970 period when OECD price series set in, but less so in the more historical periods. The data format does not allow for fine-

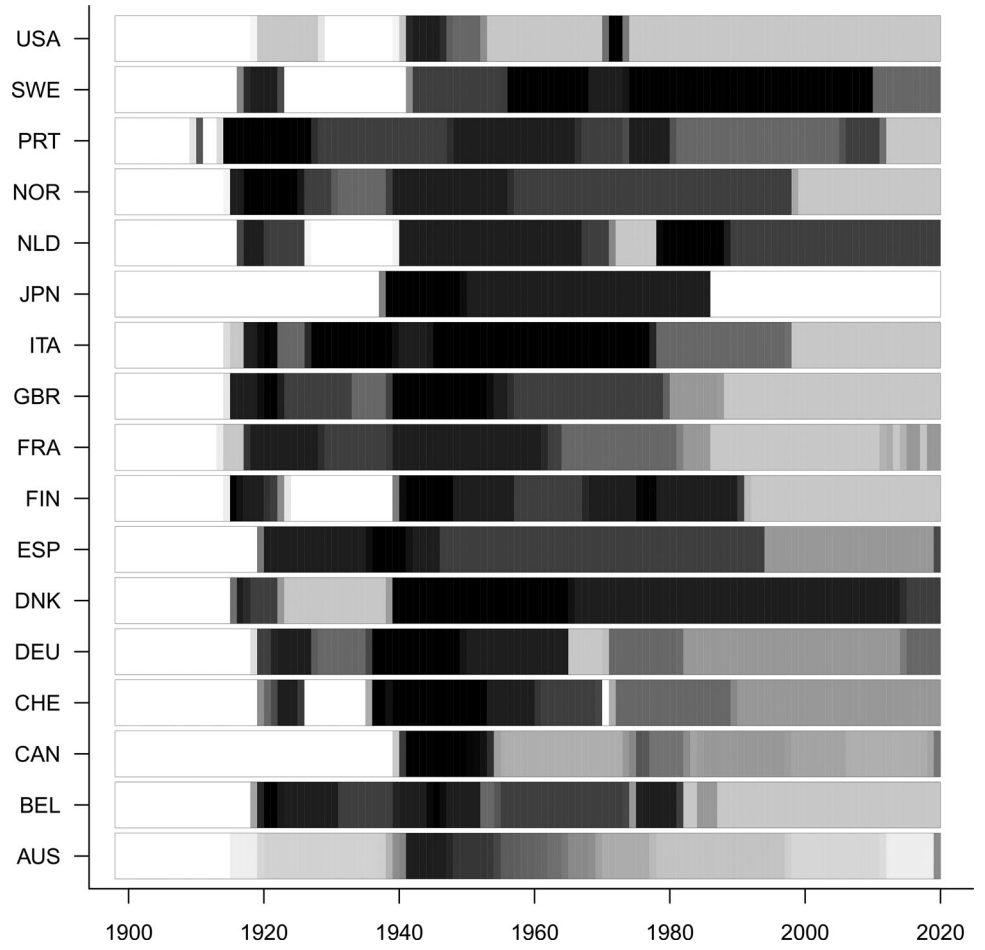

Figure 4. Evolution of rent control intensity in individual countries. Note: Each horizontal bar corresponds to an individual country and shows the evolution of rent control intensity in this country over time. The shades of gray correspond to the intensity of rent control: the darker the color the stricter the rent control. The white color means that no restrictions are imposed on the rent setting, while dark shades of gray or black color imply that rents are frozen.

grained quality adjustments, for instance for aging of housing stock (Gallin, 2008). For interest rates, we use the nominal and not the real measure for two reasons. First, as Modigliani & Cohn (1979) and Campbell & Vuolteenaho (2004) show, due to money illusion investors seem to value equities using the nominal interest rate instead of the real interest rate. Second, since the computation of real interest rates requires data on the CPI, we would lose observations.

4.2. Diagnostic tests

Before embarking on the estimation, we conducted some diagnostic tests in order to determine the correct specification of our models. Table A6 in the Appendix contains *p*-values of several specification tests. The first column shows models based on different combinations of regulation indices.

Hausman test

First, we test whether fixed or random effects should be used. The null hypothesis of the corresponding Hausman test starts from random effects. In all models, it can be rejected at any conventional significance levels. Thus, we use models with fixed effects.

F-tests for individual and time fixed effects

The second test is concerned with choosing more concretely the fixed effects types to use. First, we compare the pooled model with the model containing the individual or, in our case, country effects. The null hypothesis of this test is the absence of country effects. It is rejected for all models. The second test compares a model with country effects to the model with both country and year fixed effects. Again, according to the H_0, there are no year effects. It can be rejected at the 1% significance level in all cases. Therefore, we also use year effects.

Sampling attrition bias

The third test focuses on the possible attrition bias related to the fact that our panel data are unbalanced. The test boils down to checking whether the countries leave the sample and return to it in a non-systematic way. For this, we use the testing approach of Fitzgerald *et al.* (1998). In particular, a probit model is estimated with the dependent variable, A, being a binary indicator taking the value of 1, when the difference of homeownership rate is missing, and 0, otherwise. The regressors of this model contained all the regressors of the panel data model plus the lagged difference of HOR. For all estimated models, the estimated coefficients of the latter variable are not statistically significant, all p-values being greater than 0.1. The null hypothesis states that no attrition bias is present. As seen in Table A6, it cannot be rejected.

4.3. Results

We estimate four different models which all share the same control variables —dependency ratio (Dep_ratio), growth of real per-capita GDP (DLGDP), long-term interest rate (LTIR), new construction (New_constr), price-to-rent ratio (P2R), and mortgage debt-to-GDP ratio (Mort2GDP)—but different combinations of regulation indices. Model 1 includes three aggregate indices —rent controls (Rent_laws), tenure security (Tenure_security), and housing rationing (Rationing). Model 2 contains the rental market regulation index, RMRI—a simple average of rent laws and tenure security indices, defined in equation (1)—and housing rationing. Model 3 is similar to model 1, except that the indices of the first- and second-generation rent control (RCG1 and RCG2) are used instead of the average rent control index. Finally, model 4 differs from model 1 in that it includes a square of the rent control index. The idea is to test for possible non-linear effects: whether very weak or very strong regulations favor ownership, while 'balanced' regulation levels encourage tenant occupation.

The estimation results are reported in Table 1. The model uses an unbalanced panel consisting of 15 countries,[5] with the number of years varying between 23 (Portugal) and 87 (USA). As a result, the sample includes 1021 country-year observations. Without prices and mortgages as controls, we can increase the number of countries to 25 (upon request).

Table 1. Estimation results of panel data model with country and year fixed effects.

	Model 1	Model 2	Model 3	Model 4
Rent_laws_lag2	0.34***			0.58
	(0.10)			(0.31)
Rent_laws2_lag2				−0.23
				(0.29)
RCG1_lag2			0.19**	
			(0.07)	
RCG2_lag2			0.15	
			(0.09)	
Tenure_security_lag2	−0.02		−0.09	−0.04
	(0.13)		(0.15)	(0.13)
Rationing_lag2	0.06	0.07	0.13	0.06
	(0.25)	(0.25)	(0.25)	(0.25)
RMRI_lag2		0.41**		
		(0.16)		
Dep_ratio	1.74**	1.52*	1.36*	1.79**
	(0.60)	(0.59)	(0.59)	(0.60)
DLGDP_PC	−0.87	−0.80	−0.92	−0.88
	(0.57)	(0.57)	(0.57)	(0.57)
LTIR	0.00	0.01	0.00	0.00
	(0.01)	(0.01)	(0.01)	(0.01)
LNew_const	0.15*	0.13*	0.11	0.15*
	(0.06)	(0.06)	(0.06)	(0.06)
P2R	0.04	0.03	0.05	0.03
	(0.07)	(0.07)	(0.07)	(0.07)
Mort2GDP	0.01	−0.00	0.04	0.01
	(0.18)	(0.18)	(0.18)	(0.18)
R^2	0.02	0.02	0.02	0.02
Adj. R^2	−0.10	−0.10	−0.10	−0.10
Num. obs.	1020	1020	1020	1020

Notes: Significance levels are defined as follows $^{***}p<0.001, ^{**}p<0.01, ^{*}p<0.05$. The dependent variable is the first difference of the share of private rental housing. Explanatory variables include the second lags of rental housing market regulation indices and the current values of control variables.

Although our diagnostic tests showed that both country and year effects need to be accounted for, we also show the results of the model including only country fixed effects, see Table 2. As seen, both specifications produce quite similar results, which are discussed below.

Regulation indices

Rent price regulation has mostly a positive and statistically significant effect. A one unit increase in the stringency of rent control, i.e. switching from no to the hardest controls, is followed by a 34 percentage point increase in the HOR change (Table 1). When the two generations of rent control are compared, it turns out that only the first-generation rent control is followed by homeownership increases, while the more flexible second-generation rent control exerts no such impact on the HOR. The RMRI leads to quicker homeownership formation. Finally, the coefficients of tenure security and housing rationing are not significant, although housing rationing has a consistently positive sign. The non-linear effect of rent controls, while negative, is not significant.

Control variables

The dependency ratio affects the change in the HOR positively, since families with children and the elderly are more likely to be homeowners: the former prefer to raise

Table 2. Estimation results of panel data model with country fixed effects.

	Model 1	Model 2	Model 3	Model 4
Rent_laws_lag2	0.26**			0.29
	(0.08)			(0.30)
Rent_laws2_lag2				–0.03
				(0.29)
RCG1_lag2			0.13*	
			(0.06)	
RCG2_lag2			0.11	
			(0.09)	
Tenure_security_lag2	–0.11		–0.15	–0.11
	(0.12)		(0.14)	(0.13)
Rationing_lag2	0.04	0.08	0.12	0.04
	(0.23)	(0.23)	(0.24)	(0.23)
RMRI_lag2		0.28*		
		(0.14)		
Dep_ratio_lag1	0.23	0.29	0.20	0.23
	(0.44)	(0.44)	(0.44)	(0.44)
DLGDP_PC_lag1	–0.61	–0.55	–0.61	–0.61
	(0.46)	(0.46)	(0.46)	(0.46)
LTIR_lag1	0.02**	0.02***	0.02***	0.02**
	(0.01)	(0.01)	(0.01)	(0.01)
LNew_const_lag1	0.12*	0.11*	0.12**	0.11*
	(0.04)	(0.04)	(0.05)	(0.05)
P2R_lag1	0.06	0.06	0.08	0.06
	(0.06)	(0.06)	(0.07)	(0.06)
Mort2GDP_lag1	–0.30*	–0.40***	–0.38**	–0.30*
	(0.13)	(0.12)	(0.13)	(0.13)
R^2	0.07	0.07	0.07	0.07
Adj. R^2	0.05	0.04	0.04	0.05
Num. obs.	1021	1021	1021	1021

Notes: Significance levels are defined as follows $^{***}p<0.001, ^{**}p<0.01, ^{*}p<0.05$. The dependent variable is the first difference of the share of private rental housing. Explanatory variables include the second lags of rental housing market regulation indices and first lags of control variables.

children in larger owner-occupied housing, while the latter possess larger wealth, especially in rich countries. New construction has positive and statistically significant coefficients: an expansion of housing supply opens better opportunities for becoming a homeowner. Real GDP growth and price-to-rent ratio appear to have no statistically significant impact on the homeownership rates. Finally, the mortgage debt-to-GDP ratio exerts either no impact (models with country and year fixed effects) or a negative impact (models with country fixed effects only). Similarly, long-term interest rates have positive statistically significant coefficient estimates. Both findings suggest that the narrative of more accessible mortgages leading to more homes seems to be more complicated (Kohl, 2018a).

4.4. Robustness check

In order to see whether the reported results hold under different specifications, we undertook several further robustness checks and additional analyses addressing problems of different models, omitted variable bias and endogeneity. First, regarding different models, the results hold up when using 5- or 10-year averages of the benchmark years for homeownership rates instead of the interpolated yearly data. They also hold when dropping price and mortgage variables to extend the number of countries to 25. The results are also robust when using different combinations of

fixed effects or when using the post-1950 period only, ignoring the potentially special interwar period. When using first differences instead of levels, by contrast, the significance of all variables disappears, i.e. the changes of homeownership being unexplained, which we interpret rather as a statistical artifact than a substantive result.

Second, an obvious omitted variable in the above analysis is governments' simultaneous attempts to foster homeownership through various subsidies and incentives, i.e. the pull effect of homeownership. We, therefore, include the two best indices, to our knowledge, for homeownership subsidies (Atterhög 2005), on the decade-level, and for financial liberalization (yearly IMF database of financial reform of Abiad *et al.*, 2010), into our analysis, producing shorter subsamples for the more recent decades (1960 to 2000 and 1973 to 2005, respectively). The results (Table A8) shows that there is, indeed, a direct policy effect of certain homeownership subsidies (particularly: low property taxes and homeownership allowances). The effects of financial liberalization reforms—using first differences here to measure reform effects—particularly the development of securities' markets and the deregulation of interest rates, are also positive. Interestingly, openness to international capital has a more ambiguous, negative effect. This might reflect the lack of long-term reliability on this source of capital or the negative effects of foreign-currency mortgages. Most importantly, the inclusion of both direct subsidies indices in the model leaves the indirect impact of rent price regulation on homeownership intact, whereas rationing and tenancy security regulation remain without effect, probably because this regulation played a more important role before the 1970s, before the direct-subsidy indices set in.

A third check concerns endogeneity: homeownership rates and rental market regulation indices can mutually affect each other, thus, creating the problem of endogeneity. On the one hand, as shown above, rental regulations can make rental housing unattractive for both landlords and tenants and, hence, marginalize it. On the other hand, a society with renters in the majority tends to promote legislation protecting them, while one dominated by homeowners would be rather indifferent to such regulations. The failure to account for endogeneity can lead to false estimation results.

We addressed the problem of endogeneity in two ways. First, we use regulation indices in period $t-2$, which makes them exogenous with respect to the dependent variable defined as $y_t = HOR_t - HOR_{t-1}$. In this case, the estimated coefficients of regulation indices remain statistically significant. Second, we chose several variables that can serve as instruments, such as top income tax rate (Scheve & Stasavage, 2009) and several competition law indices of Bradford & Chilton (2018). We selected these potential instruments because they are among the few long-run variables available and also measure regulation. Fighting monopolies, inequality, and protecting tenants are, moreover, all motivated by center-left ideas. These variables are therefore correlated with our rental market regulation indices without being correlated with housing costs. Unfortunately, they seem to be rather poor instruments, as their correlation with rental market regulation indices is still too low. The goodness of fit of the first-stage regression is very low—it explains only one-fifth of the variation of rental market regulation. As a result, the models using these instruments produce non-significant results for our regulation indices. Due to the lack of better instruments,

which are extremely difficult to find for such a large long-run panel, we have to fall back on the lag variables to weaken the endogeneity objection. We also refrain from stronger causal language regarding our central claim and hence speak of homeownership increases being conditionally followed by rent regulation.

For a final robustness analysis, we collected the shares of the social housing in the total housing stock for benchmark years of national housing counts for a subsample of 744 country-years after WWII. This allows calculating the private rental market share in national housing stocks as the residual of the owner-occupied and the social-housing sectors. We use these interpolated private rental shares as an alternative dependent variable in an analogous panel data regression on the rental regulation indices (Tables A9 and A10). The results show the expected negative regulation effect on the overall supply of private rentals, confirming the inverse finding for homeownership above, but including the important information on different social housing shares across countries.

5. Discussion and conclusion

Homeownership rates have increased in virtually all countries since the 1920s. While the urbanizing and industrializing European countries were still homeownership laggards in the early twentieth century, they have broadly caught up with Anglophone countries, but still lie below the homeownership rates found in the Global South. Our findings suggest that these general trends were not only associated with economic or demographic background variables, but also indirectly with the use of tenancy regulation, implemented as a form of social policy. Although direct homeownership subsidies did have a direct impact on the rise of homeownership also, the indirect rent-regulation effects should not be downplayed.

As with many other welfare policies, tenancy regulation was pushed by a particular war-time solidarity with urban soldiers and tenants facing strong rent inflation. With European countries and, in particular, cities dominated by tenant majorities, largely outnumbering a dispersed private landlord class, it is not surprising that tenancy regulation was maintained even after the wars in Europe concluded. Strong tenant movements emerged, naturally outnumbering landlords and property owner organizations. It was not just left-wing parties that made the protection of tenants their policy issue, but conservative governments also enacted protective legislation in the post-war era. In this regard, private tenancy politics has much in common with housing and other welfare policy fields, such as progressive income taxation or perhaps the fight against monopolies. From a comparative perspective, the already high homeownership rates in Anglophone countries other than the UK and the low initial urbanization in the Global South probably explain the lag and absence of this regulation outside of Europe.

However, as effective as these measures were in socially protecting rental housing market insiders, they have tended to crowd out private tenancy by homeownership. Protecting tenants in the short run, regulation contributed to their disappearance in the long run. The most intrusive rationing measures, along with the protection of tenants and rent control, significantly increased homeownership rates in the long run,

partially explaining why homeownership rates increased, why Europe caught up with Anglophone countries, and why the Global South still has some of the highest rates of homeownership.

This might also explain why some of the largest homeownership spurts in countries occurred around the war decades and during the hard post-war regulations. This has been best evidenced for the United States, where private landlords could more easily convert rented single-family houses into owner-occupied ones (Fetter, 2016, p. 1): 'the rate of home ownership increased by approximately 10 percentage points between 1940 and 1945, about half the size of the overall net change over the 20th century'. Similar evidence is reported from postwar Japan, where 'the maintenance of rent control on houses after the war, along with heavy taxation, precipitated the change in the ownership structure of rented houses. An increasing number of them were turned into owned houses" (Ono, 2017, p. 61). Other evidence has been cited to explain large private rental market in Germany when compared to its Southern-European counterparts where post-war rent restrictions were more strongly in place (Voigtländer, 2009).[6] In Northern Europe, similar historical processes are reported about the conversion of older rental into the owner–cooperative units in Norway (Wessel, 1996). With the legalization of conversions of rentals into ownership units (in Denmark in 1968) and the liberalization of price controls of owner–cooperatives in Denmark and Sweden in the same year, the private rental stock witnessed further decreases (Sørvoll, 2014, p. 474). Inversely, in countries with still dominant private rental stock, e.g. for Germany (Voigtländer, 2009) or Switzerland (Müller, 2021), market-friendly rental regulation is often mentioned as one contributory factor.

Finally, our finding might also explain some of the intra-European homeownership differences: Southern European countries, like Spain, Portugal, Italy, or France, used hard rent controls more than other countries, largely replacing private tenancy by condominium ownership. This occurred, even intentionally, in an effort to transform tenant societies into homeownership societies; it was not just as a by-product of excessive goodwill for tenants (Di Feliciantonio & Aalbers, 2018). Tenants became homeowners not necessarily through the lure of the homeownership dream or attractive subsidy schemes, but also through the push of fewer rental alternatives.

Since the 1970s, rent regulation has either stagnated or even declined in Western countries compared to post-war levels. Only in light of increasing numbers of tenants and soaring rent prices in big cities has renewed tenancy legislation been enacted. An additional impetus to strengthen tenant protection came from the recent pandemic-related world economic crisis in 2020 (Kholodilin, 2020a). The lesson to be taken away from our historical analysis for the current situation is that well-intentioned policies in protection of sitting tenants can run the risk of reducing the overall extent of this form of tenure. This holds, of course, only given the clear limits of this research design, which lacks an instrumental-variable approach and only measures the absence or presence of national regulation of different sorts. Further detailed analyses should investigate how much regulation results in crowding out, even taking into account different regional levels of price regulation. This study is just a first attempt to put rental markets much more on the agenda of housing studies.

Notes

1. http://www.tenlaw.uni-bremen.de/.
2. https://www.eui.eu/DepartmentsAndCentres/Law/ResearchAndTeaching/ResearchThemes/ProjectTenancyLaw.
3. The country-specific legislation and rental housing market regulation indices can be found in an interactive and continuously updated database on the author's website, www.remain-data.org.
4. There exist also alternative classification. For example, Lind (2001) distinguishes between five main types of rent control.
5. Due to missing observations among control variables the effective number of countries is much smaller than the cross-sectional dimension of the potential regulation data.
6. This effect is also mentioned for Lebanese rent regulation (Marot, 2018).

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ORCID

Sebastian Kohl http://orcid.org/0000-0002-8358-6021

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Appendix A

Table A1. Literature on measurement of housing regulations.

Study	Period	Countries	Regulation aspect			
			Rent control	Tenure security	Housing rationing	Enforcement
Malpezzi and Ball (1993)	≈ 1991	51 market economies	+	+		+
Djankov et al. (2003)	2000	109		+		+
Andrews et al. (2011)	2009	30	+			
Global Property Guide	≈ 2017	116	+	+		
Miletić (2016)	1918–1928	4	+		+	
Weber (2017)	1973–2016	18 advanced economies	+	+		
Weber (2017)	≈2016	66	+	+		
Kholodilin (2017)	1914–2015	1 (Germany)	+	+	+	
Kholodilin (2020b)	1910–2020	101	+	+	+	

Table A2. Literature on effects of housing regulations on homeownership.

Study	Place and period	Type of data	Method	Effects
Diamond et al. (2019)	San Francisco, 1990–2016	Micro, address history of individuals	Difference-in-differences	Decreased mobility of tenants in controlled dwellings; conversion of rental dwellings to condos
Werczberger (1988)	Israel, not defined	Macro	Informal descriptive analysis	Increases homeownership
Werczberger (1997)	Switzerland, not defined	Macro	Informal descriptive analysis	No effect on homeownership, which is 'primarily the result of the high cost of owning caused by the taxation of imputed rent and capital gains, and by the lack of financial incentives to save for a down-payment'
Lauridsen et al. (2009)	Denmark, 1999–2004	Macro, municipalities	Pooled SUR model with time-specific coefficients	Decreases homeownership
Bourassa and Hoesli (2010)	Switzerland, 1998	Micro, Enquête sur les revenus et la consommation	Logistic regression	Decreases homeownership
Fetter (2016)	51 US cities, 1940–1946	Macro	Panel data model	Increases homeownership
Heskin et al. (2000)	4 California cities, 1980 and 1990	Meso, census blocks	Spatial lag regression	Vacancy control increases homeownership, reduces rent and mobility
Gyourko and Linneman (1989)	New York, 1968, NYC Housing Survey	Micro	Cross-sectional regression	Rent controls without distributional effect, decrease propensity to own and mobility

Table A3. Literature on effects of housing regulations on various aspects.

Study	Place and period	Type of data	Method	Effects
Ault et al. (1994)	New York, 1968	Micro, housing vacancy survey	Cross-sectional regression	Lower mobility
Munch and Svarer (2002)	Denmark, 1992–1999	Micro, 10% random sample of adult population	Proportional hazard model	Lower mobility
Bailey (1999)	4 Scottish cities, 1987-1996	Ad data	Descriptive analysis	Deregulation led to supply increase in upper-market segment only
Krol and Svorny (2005)	New Jersey, 1980, 1990, and 2000	Census tract data	Cross-sectional regression	Higher commute times
Bettendorf and Buyst (1997)	Belgium, 1920–1939	Macro	Rotterdam demand model	Redistribution of household expenditure toward non-housing consumption
Sims (2007)	Massachusetts, 1985–1998	Micro, housing survey		little effect on new housing construction, shift units away from rental status, and lower rents
Sims (2011)	Massachusetts, 1985–1998	Micro, housing survey	First-difference regression	Rent control increases segregation, minorities, decreases poor population shares
Glaeser and Luttmer (2003)	New York City, 1993	Micro, housing surveys	Cross-sectional regression	Misallocation of housing
Autor et al. (2014)	Cambridge (Massachusetts), 1995	Micro, parcels of land	Cross-sectional regression	Large and significant positive indirect effect of decontrol on the valuation of properties that were exposed to controlled units
Moon and Stotsky (1993)	New York, 1978–1987	Micro, housing units	Tobit and panel data model	Decline in the quality of rent-controlled dwellings or reduction of the chances that housing units improve in quality
Grimes and Chressanthis (1997)	200 US cities, 1990	Macro, census data	TSLS	Higher homelessness
Early and Olsen (1998)	44 US metropolitan areas, 1985–1988	Macro, housing survey and micro, homelessness survey	TSLS and logit	Net effect: lower homelessness
Olsen (1972)	New York, 1968	Micro, survey of housing units	Cross-sectional regression	Increase of cost of landlords is larger than increase of real income of households in controlled units, hence, negative net cost for society

(*continued*)

Table A3. Continued.

Study	Place and period	Type of data	Method	Effects
Kattenberg and Hassink (2017)	Netherlands, 2006–2008	Micro panel	Linear probability regression	Rent control lowers mobility, increases misallocation
Oust (2018)	Norway, 1970–2008	Ad data	Panel regression	Rent control increases search costs and spatial misallocation
Svarer et al. (2005)	Denmark, 1997–2000	Micro, 10% sample of adult population	Competing risks duration model	Individuals occupying controlled units are less (more) likely to accept jobs outside (in) their local market labor, hence, longer unemployment duration
Skak and Bloze (2013)	Denmark, 2004	Micro, 20% sample of the rental market	Hedonic regression	Significantly lower rents in the controlled sectors and to a negligible increase in the uncontrolled rent
Wilhelmsson et al. (2011)	Sweden, 1994–2004	Macro, municipalities	Panel data model	Lower vacancy rates
Gibb (1994)	Glasgow, Edinburgh 1988,1992	Ad data	Mean-comparison, regression	Deregulation led to limited new competition and supply increases
Gyourko and Linneman (1990)	New York, 1968	Housing and vacancy survey	Logit-regression	Regulation leads to quality deterioration

Table A4. Literature on HOR determinants.

Study design and explanatory variables	Lauridsen et al. (2009)	Chevan (1989)	Fisher and Jaffe (2003)	Schmidt (1989)	Gwin and Ong (2008)	Andrews et al. (2011)	Blanco Blanco (2014)
Countries/regions	270 Danish municipalities	HOR in the USA	106 countries	18 countries	232–237 cities from 111 to 113 countries	Households in 23 countries	
Period	1999–2004	1930–1979	Between 1980 and 1999	Early 1970s-mid-1980s	1993 and 1998	2009	2006–2011
Method		Logit	OLS			Probit	OLS
Data			Cross-section				Cross-section
Rent regulations	+						
Government encouragement of home ownership		0					
Share of population living in subsidized housing	+.						
Share of households receiving housing subsidies	+						
Share of 15-66 year-olds receiving rent subsidies	+						
Share of govt expenditure in GDP				−			
Housing price or construction cost	+	+					
Price-to-rent ratio		0			+		
Property tax	+						
Tax rate	−						
Tax base	−						
Tax advantage of homeowners		0				+	
Mandatory finance			+				
Financial reform index						+	
Interest rate					+		
Loan-to-value ratio						+	
Population density	+						
Urbanization	+		+				
Share of young population	−		−				
Share of working age population	+		+				
Share of old population	+						
Share of population widowed	−						
Share of population divorced	+						
Share of population unmarried	+						
Share of households with children > 18	+						
Share of households without children <18	−						
Share of population with higher education	−						
Share of population on social disability pension	−						
Share of population receiving social benefits	+						
Unemployment rate	−						
Number of immigrants from the 3rd world	+						
GDP per capita or GDP growth			+		+		
Share of socialists in parliament				0			
Continent dummy					−		
Communist country					−		

Table A5. Description of variables used in the analysis.

Variable	Description	Source	Period	Minimum	Mean	Maximum	Standard deviation
HOR	Homeownership rate defined as a share of owner occupied dwellings in total housing stock, %	Kohl (2017), Compendium of Housing Statistics of the UN, national statistical offices	1900–2019	21.297	61.377	93.600	15.031
Rent_laws	Rent laws index, [0,1]	Own calculations	1910–2020	0	0.440	1	0.390
Rent_laws2	Square of rent laws index, [0,1]	Own calculations	1910–2020	0	0.345	1	0.367
RCG1	First-generation rent control index, [0,1]	Own calculations	1910–2020	0	0.456	1	0.498
RCG2	Second-generation rent control index, [0,1]	Own calculations	1910–2020	0	0.060	1	0.238
Tenure_security	Tenure security index, [0,1]	Own calculations	1910–2020	0	0.322	1	0.250
Rationing	Housing rationing index, [0,1]	Own calculations	1910–2020	0	0.059	0.750	0.118
RMRI	Rental market regulation index, [0,1]	Own calculations	1910–2020	0	0.381	0.917	0.291
GDP_PC	Real GDP per capita, 1990 international Geary-Khamis dollars	Maddison Project Database	1910–2016	0.521	11.050	77.638	12.320
Dep_ratio	Ratio of dependent (younger than 15 and older than 64 y.o.) population to working-age (15 through 64 y.o.) population, [0,1]	World Development Indicators of the World Bank and European University Institute	1899–2016	0.243	0.688	1.143	0.190
New_const	Housing completions by 1000 inhabitants	Kohl (2020)	1860–2016	0.020	5.855	21.893	3.237
LTIR	Long-term interest rate, %	Macrohistory database and Organisation for Economic Co-operation and Development	1870–2018	–0.251	6.096	23.917	3.466
P2R	Housing price-to-rent ratio	Macrohistory database, Bank of International Settlements, International House Price Database of the Federal Reserve Bank Dallas, Organization for Economic Cooperation and Development, and own calculations	1899-2019	0	0.746	5.217	0.390
Mort2GDP	Mortgage loans to GDP ratio	Macrohistory database, Bank of International Settlements, and own calculations	1899–2016	0.001	0.279	1.468	0.261

Table A6 Diagnostic tests.

Model	Hausman test, H_0: random effects	*F*-test, H_0: no country effects	*F*-test, H_0: no year effects	Sample attrition test, H_0: there is no attrition bias
Rent_laws_lag2 + Tenure_security_lag2 + Rationing_lag2	0.022	0.00000	0.0001	0.994
RMRI_lag2 + Rationing_lag2	0.016	0.00000	0.0001	0.984
RCG1_lag2 + RCG2_lag2 + Tenure_security_lag2 + Rationing_lag2	0.034	0.00000	0.0001	0.997
Rent_laws_lag2 + Rent_laws2_lag2 + Tenure_security_lag2 + Rationing_lag2	0.012	0.00000	0.0001	0.998

Note: The table presents results of several panel data diagnostic tests: Hausman test (fixed vs. random effects), *F*-tests for country and year fixed effects, and sample attrition test.

Table A7. Estimated coefficients for alternative indices (without new construction).

Source	Index	Number of observations	Rent_laws + Tenure_security + Rationing	RMRI + Rationing	RC_1 + RC_2 + Tenure_security + Rationing	Rent_laws + Rent_laws2 + Tenure_security + Rationing
Atterhoeg	OPI	59	2.01*	1.69	1.79	1.85
Atterhoeg	direct_grants_for_buying	59	0.07	−0.06	0.43	0.18
Atterhoeg	other_subsidies	59	0.27	0.26	0.17	0.28
Atterhoeg	mortgage_deduction	58	1.55**	1.46***	1.61**	1.52**
Atterhoeg	grant_tax_deduction	59	−0.17	−0.19	−0.39	−0.31
Atterhoeg	low_property_tax	59	2.16***	2.18***	1.6**	2.22***
Atterhoeg	homeownership_allowances	54	0.02	0.11	−0.83	−0.08
IMF	Ddirectedcredit	66	−0.01	−0.23	0.02	−0.1
IMF	Dcreditceilings	41	6.38	6.23	4.91	6.57
IMF	Dcreditcontrols	66	0.26	−0.11	0.27	0.2
IMF	Dintratecontrols	66	1.38*	1.21	0.85	1.29
IMF	Dentrybarriers	66	−2.15	−2.11	−2.08	−1.65
IMF	Dbankingsuperv	66	−1.78	−1.88	−1.49	−1.5
IMF	Dprivatization	66	−0.9	−1.62	−0.87	−0.09
IMF	Dintlcapital	66	−1.83**	−1.81*	−1.23*	−1.17
IMF	Dsecuritymarkets	66	2.53**	2.57**	2.11	2.41*
IMF	Dfinreform_n	66	−6.32	−7.78	−6.11	−2.83

Notes: (1) Ownership policies are described in Atterhög (2005); (2) the IMF financial reforms indices are described in Abiad et al. (2010).

Table A8. Estimated coefficients for alternative indices (with new construction): estimated coefficients.

Source	Index	Number of observations	Rent_laws + Tenure_security + Rationing	RMRI + Rationing	RC_1 + RC_2 + Tenure_security + Rationing	Rent_laws + Rent_laws2 + Tenure_security + Rationing
Atterhoeg	OPI	59	2.02*	1.66	1.81	1.84
Atterhoeg	direct_grants_for_buying	59	0.05	−0.1	0.42	0.16
Atterhoeg	other_subsidies	59	0.24	0.24	0.1	0.24
Atterhoeg	mortgage_deduction	58	1.63**	1.49***	1.73**	1.6**
Atterhoeg	grant_tax_deduction	59	−0.12	−0.17	−0.3	−0.27
Atterhoeg	low_property_tax	59	2.14***	2.17***	1.56**	2.19***
Atterhoeg	homeownership_allowances	54	0.02	0.07	−0.83	−0.09
IMF	Ddirectedcredit	63	−0.12	−0.34	0	−0.19
IMF	Dcreditceilings	41	5.43	5.37	4.78	6.26
IMF	Dcreditcontrols	63	0.17	−0.21	0.37	0.12
IMF	Dintratecontrols	63	1.08	0.95	0.69	1.04
IMF	Dentrybarriers	63	−1.94	−1.94	−1.86	−1.48
IMF	Dbankingsuperv	63	−1.49	−1.68	−1.22	−1.26
IMF	Dprivatization	63	−1.02	−1.79	−1.06	−0.25
IMF	Dintlcapital	63	−1.66**	−1.67**	−1.01*	−1.01
IMF	Dsecuritymarkets	63	2.46**	2.51**	2.53**	2.36*
IMF	Dfinreform_n	63	−5.65	−7.35	−4.7	−2.41

Notes: (1) Ownership policies are described in Atterhög (2005); (2) the IMF financial reforms indices are described in Abiad et al. (2010).

Table A9. Estimation results for private rental sector share (panel data model with country fixed effects).

	Model 1	Model 2	Model 3	Model 4
Rent_laws_lag2	−0.69***			−0.65
	(0.11)			(0.42)
Rent_laws2_lag2				−0.03
				(0.40)
RCG1_lag2			−0.43***	
			(0.07)	
RCG2_lag2			−0.28*	
			(0.11)	
Tenure_security_lag2	−0.24		−0.30	−0.24
	(0.20)		(0.21)	(0.21)
Rationing_lag2	−0.81*	−0.84**	−0.76*	−0.81*
	(0.31)	(0.31)	(0.32)	(0.31)
RMRI_lag2		−1.12***		
		(0.17)		
Dep_ratio_lag1	0.22	0.18	−0.03	0.22
	(0.50)	(0.51)	(0.51)	(0.51)
DLGDP_PC_lag1	1.59*	1.64*	1.75*	1.59*
	(0.70)	(0.70)	(0.70)	(0.70)
LTIR_lag1	0.00	0.00	−0.00	0.00
	(0.01)	(0.01)	(0.01)	(0.01)
LNew_const_lag1	−0.35***	−0.35***	−0.32***	−0.35***
	(0.06)	(0.06)	(0.06)	(0.06)
P2R_lag1	0.37***	0.37***	0.27*	0.37***
	(0.11)	(0.11)	(0.11)	(0.11)
Mort2GDP_lag1	0.22	0.27	0.40*	0.22
	(0.16)	(0.16)	(0.16)	(0.16)
R^2	0.21	0.21	0.21	0.21
Adj. R^2	0.19	0.19	0.18	0.19
Num. obs.	744	744	744	744

Notes: Significance levels are defined as follows $^{***}p<0.001, ^{**}p<0.01, ^{*}p<0.05$. The dependent variable is the first difference of the share of private rental housing. Explanatory variables include the second lags of rental housing market regulation indices and first lags of control variables.

Table A10. Estimation results for private rental sector share (panel data model with country and year fixed effects).

	Model 1	Model 2	Model 3	Model 4
Rent_laws_lag2	−0.42**			−0.14
	(0.13)			(0.47)
Rent_laws2_lag2				−0.27
				(0.43)
RCG1_lag2			−0.25**	
			(0.08)	
RCG2_lag2			−0.24*	
			(0.12)	
Tenure_security_lag2	−0.59**		−0.56*	−0.61**
	(0.22)		(0.23)	(0.23)
Rationing_lag2	−0.57	−0.56	−0.63	−0.55
	(0.37)	(0.37)	(0.37)	(0.37)
RMRI_lag2		−0.95***		
		(0.19)		
Dep_ratio_lag1	0.19	0.19	0.41	0.23
	(0.80)	(0.80)	(0.81)	(0.81)
DLGDP_PC_lag1	2.59**	2.59**	2.66**	2.55**
	(0.93)	(0.93)	(0.93)	(0.93)
LTIR_lag1	0.00	0.00	0.00	0.00
	(0.01)	(0.01)	(0.01)	(0.01)
LNew_const_lag1	−0.39***	−0.40***	−0.33***	−0.39***
	(0.09)	(0.09)	(0.09)	(0.09)
P2R_lag1	0.35**	0.36**	0.28*	0.35**
	(0.12)	(0.12)	(0.12)	(0.12)
Mort2GDP_lag1	−0.57*	−0.56*	−0.54*	−0.60*
	(0.23)	(0.23)	(0.23)	(0.24)
R^2	0.11	0.10	0.11	0.11
Adj. R^2	−0.03	−0.03	−0.03	−0.03
Num. obs.	744	744	744	744

Notes: Significance levels are defined as follows $^{***}p<0.001, ^{**}p<0.01, ^{*}p<0.05$. The dependent variable is the first difference of the share of private rental housing. Explanatory variables include the second lags of rental housing market regulation indices and first lags of control variables.

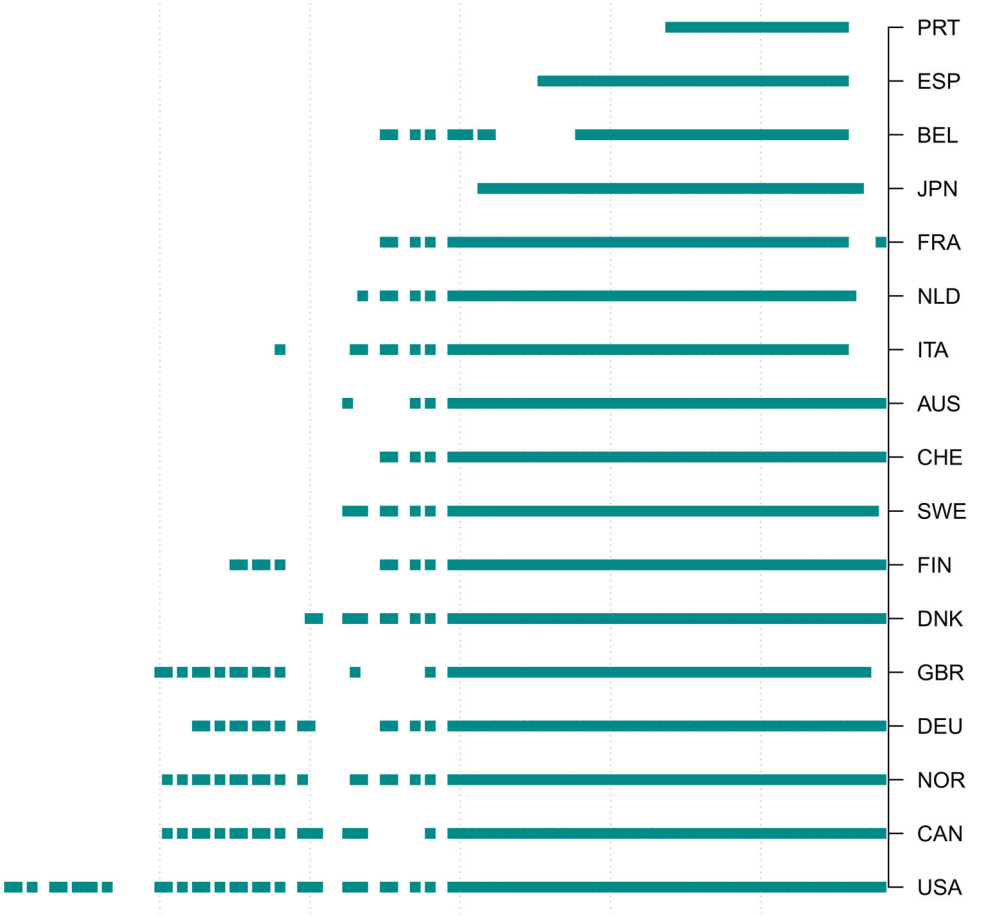

Figure A1. Panel data availability. Note: The points correspond to the years for which data covering relevant variables (dependent variable, rental housing market regulation indices, and control variables) are available for the respective country.

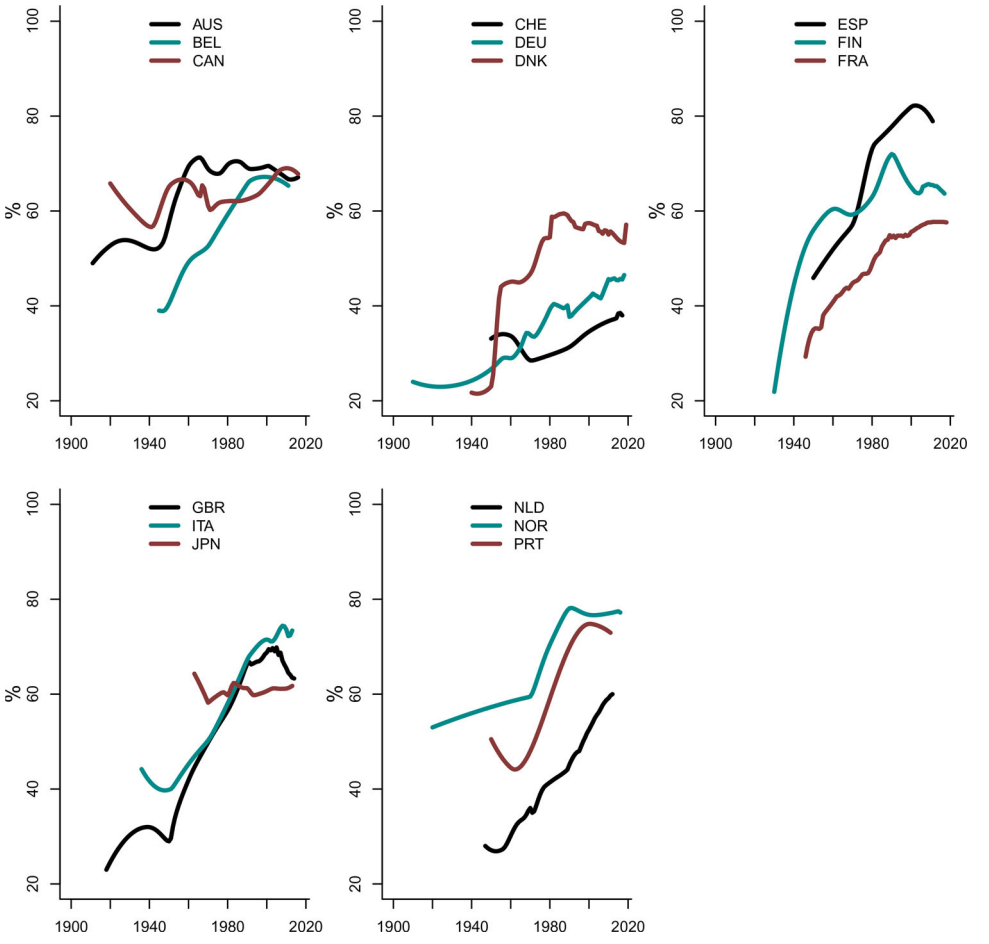

Figure A2. Development of the homeownership rates in individual countries. Note: The vertical axis measures the homeownership rate in percent, while the horizontal axis depicts years.

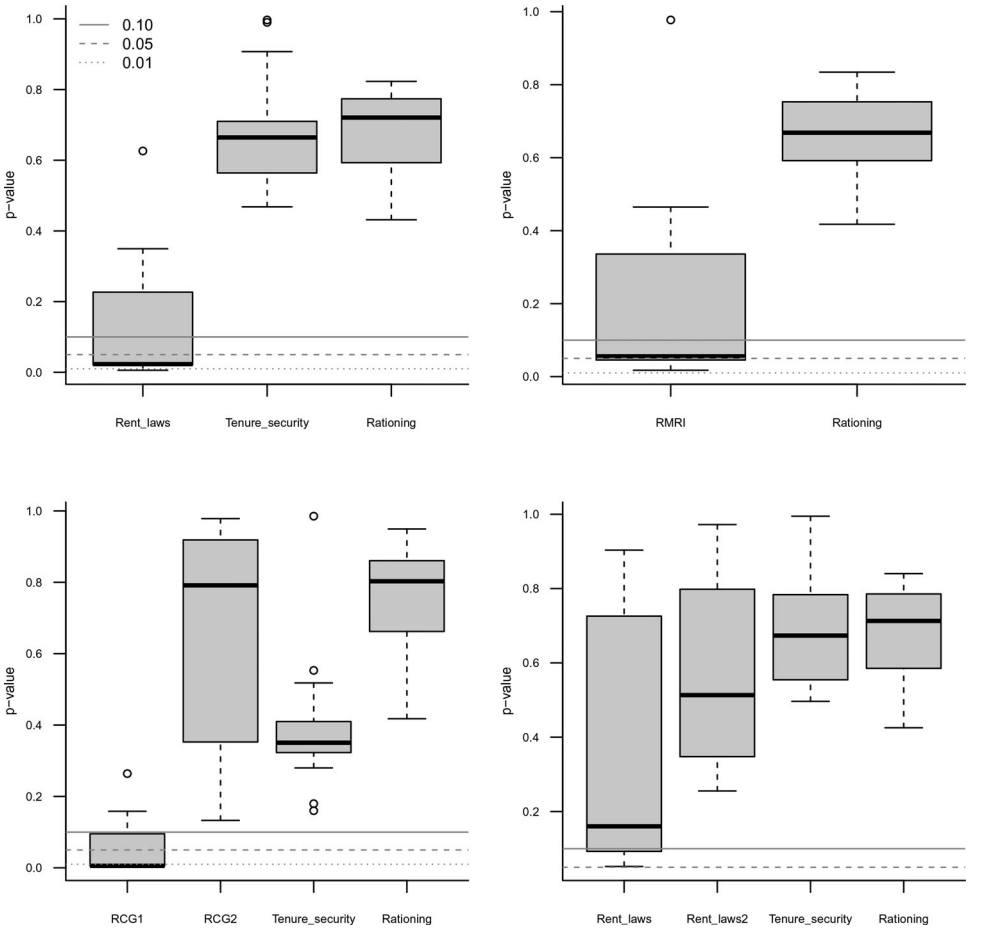

Figure A3. Distribution of *p*-values of rental regulation indices in regressions with alternative indices. Note: The distribution of *p*-values is displayed using boxplots. The lower and upper edges correspond to the first and third quartiles, while the thick horizontal line is the median. The gray horizontal (continuous, dashed and dotted) lines represents 0.10, 0.05 and 0.01.