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Do rent controls and other tenancy regulations affect new construction? Some answers from long-run historical evidence

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ABSTRACT

The (re-)introduction of tenancy regulation in the form of rent controls, tenant protection or supply rationing is back on the agenda of policymakers in light of rent inflation in many global cities. While rent controls promise short-term relief, economists point to their negative long-run effects on new construction. This study presents new long-run data on both rent regulation and housing construction for 16 developed countries (1910–2016) and finds that more restrictive rental market legislation generally has a negative impact on both new housing construction and residential investment. This is especially true for strict rent controls and housing rationing measures in the post-1960 period. Tenancy security can on average also dampen construction activity. The negative effect is overall less significant and strong in magnitude than expected and may have been offset by exemptions for new construction, by compensating social housing construction and by a flight of new construction into the owner-occupied sector. Still, on average, rent controls came at the cost of less construction activity.

KEYWORDS: Residential construction; rent control; tenure security; housing rationing; panel data model

JEL CODES: C23; O18; R38

Introduction

Long thought to be a relic of the past, rent controls and other measures protecting urban tenants are back on the political agenda in a wide range of countries. Even if the move towards homeownership has made owner-occupying households the majority almost worldwide, many of larger cities possess significant tenant populations. They still make up an

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important constituency which advocates for rent regulation as a form of social policy.

Particularly in 2019, several countries and states have introduced new or reinforced measures to cap rent price increases. For example, in February 2019, the authorities of the state of Oregon (USA) imposed upper bounds on rent increases on the consumer price index (CPI) growth rate above 7%.[1] In June 2019, in New York, several measures to enhance rental regulations were introduced, including the removal of the vacancy decontrol, which was previously possible, if rent prices for a dwelling or the income of tenant renting exceeded certain thresholds.[2] In February 2020, a so-called *Mietendeckel* (literally meaning 'rental lid') was introduced in Berlin (Germany) leading to a rent freeze for the following five years and even providing the possibility to cut rents in the case they were found to be too high.[3] However, on 25 March 2021, the rent freeze was abolished by the German constitutional court. During the September 2021 Bundestag elections, the issue of extending the rent freeze to the whole of Germany was debated. Similarly, a law was enacted in Catalonia (Spain) in September 2020 capping initial rents at a local reference rent (plus 10%) for non-luxury units in tense housing market areas. Simultaneously rent increases were pegged to the index of competitiveness recovery of Spain with respect to the European Monetary Union.[4] The Covid-19 pandemic provided an additional impetus for rent regulations. Thus, almost 50 countries introduced eviction bans, while over 20 countries enacted rent freezes, including rent reductions and moratoria of rents during the emergency period.[5] Yet, despite this surge of regulations in private *rental* markets, housing scholars still focus predominantly on social housing or homeownership as dominant segments in the housing market.

The renaissance of rent control even in the rigid forms of freezing rents introduced as first-generation controls during both World Wars is surprising, given the almost unanimous agreement among economists on the negative effects of tenancy regulation in general and rent controls in particular on the allocation and supply of housing, as several surveys conducted among economists between 1979 and 2009 show (Kearl et al., 1979; Alston et al., 1992; Jenkins, 2009). Among the negative effects attributed to these market regulations the allegedly negative effect on new construction is probably the most prominent one. Richard Arnott also observed the 'widespread agreement that rent control discourages new production' (Arnott, 1995, p. 99). Restrictive housing market regulation such as protections from rent increases or evictions are thus made responsible for lowering construction activities and increasing housing shortages. They are seen as measures which reduce the incentives for investing in new residential construction, especially of rental housing, since governmental restrictions limit rental revenues and the freedom to dispose freely of one's real estate property. Today's climate of urban housing shortages in most booming European cities has led many economists to regard the removal of rent

regulations as stimulus for new housing supply (Diamond, 2018), even though the existing literature shows relatively mixed results.

This study investigates the relationship between restrictive governmental housing regulations—not just rent controls but also protection from eviction and housing rationing measures—and residential construction for the first time with international historical long-run data. It draws on two novel data collections ranging between 1910 and 2016 for 16 developed countries: the first one contains rent regulation indices based on manual codings of all major tenancy-related laws in a country, and the second one contains data on building activity. The regulation data include measures for three types of restrictive housing policies: rent control, security of tenancy and rationing of housing units. Our dependent variables are annual time series of new residential construction (housing units, investment) and we control for economic (real GDP per capita, long-term interest rates and mortgage debt) and demographic factors (population growth, total dependency ratio and marriage rates) in panel-data models.

While our findings are broadly in line with economists' general expectations, i.e., in normal and post-war periods, rent controls, tenancy-security and rationing regulation have on average negative effects on new construction activity, the surprising finding is that the significance is not as persistent as economists would expect. Whereas the severe rationing measures are significant almost throughout, security of tenancy and rent price regulation are only significant under certain conditions: in their strict form of rent freezes and in the post-1960 period. Increasing the regulation by 1 on a scale from 0 to 1, i.e., shifting from zero to full control, decreases new construction by 0.06 per 1000 inhabitants, which is a sizeable magnitude when accumulated over several years, but also not a complete construction stopper.

We suggest that this rather surprising non-universality of a strong negative tenancy-regulation effect could be explained by the fact that new construction has often been exempted from rent control. Moreover, tenancy regulation may crowd out rental units in favour of owner-occupied ones which can enjoy ongoing construction despite rent control (Kholodilin & Kohl, 2021b; Fetter, 2016). While this article only focuses on new construction, the regulation effects on existing stock should also be kept in mind. Finally, strict rent control rarely comes without active social housing policies in favour of new construction which can compensate for the loss of private construction. The findings also highlight that tenancy regulation beyond rent controls, and the war-related housing rationing measures, in particular, can significantly impact new construction and that for rent control effects themselves, the historical and country context matters. In that, our findings on rent control appear to be similar to mixed findings on the effect of minimum wages on labour supply, i.e., the labour market equivalent of price controls (Doucouliagos & Stanley, 2009).

Existing research on private rental markets and rent control is rather scarce, uses mostly geographically limited data for snapshot moments or

the short run. Our main contribution is to expand on this understudied topic by extending the geographic and temporal scope of the analysis with the help of new international long-run data, which cover the historical time periods in which rent control was first introduced and most widespread. Against the backdrop of these long-run data, our findings confirm a long-held expectation about tenancy policies' negative effects on building activity, but also show that the effects are less consistent and smaller than expected. The implication of our findings is that strong rent controls or rationing measures, if not compensated by social housing construction, may have negative effects on housing construction and investment.

The study proceeds as follows. The next section reviews the literature on the effects of governmental regulations on residential construction. The following section describes the data used and explains the methodology applied in this study, while the third section discusses the results obtained. The last section points to potential interpretations of the main finding and concludes.

Determinants of residential construction

Rental housing market regulations and most prominently rent controls are a phenomenon that has attracted quite some attention from economists. We identified 99 empirical studies published in peer-reviewed journals between 1967 and 2022 that overall cover 36 different countries, with one-third of the studies being devoted to North America and more than a half of studies concentrating on European countries, the remainder focussing on the Global South (Kholodilin, 2022). Together they investigate 19 different effects that rent controls can typically have, while many studies examine several impacts at a time. Most authors are interested in the effects of rent control on rents of controlled apartments (31 studies), residential mobility (19), new housing construction (12) and homeownership (11). Other studies are interested in effects on welfare, segregation, misallocation, vacancies, quality, homelessness, etc.

This literature generally finds that rent regulation in the form of price controls significantly lowers controlled rents (and returns) but increases uncontrolled rents (e.g., Attia, 2016; Baye & Dinger, 2022; Ahrens et al., 2019). At the same time, it tends to increase homeownership, as it crowds out rental housing units (Diamond et al., 2019; Asquith, 2019; Appelbaum et al., 1991; Fetter, 2016). Studies unanimously find that rent controls lower residential mobility, as tenants have a strong incentive to remain in controlled units (Gyourko & Linneman, 1989; Clark & Heskin, 1982; Bonneval et al., 2022; Karpestam, 2022; Gardner, 2022). The literature also agrees on the negative effects on housing quality, as landlords lose the means and incentive for proper maintenance (Gilderbloom & Ye, 2007; Breidenbach et al., 2022; Tan, 2021).

The number of studies investigating rent control effects on residential construction is already more limited and much more mixed in comparison to the articles studying other outcomes. We identified a total of 12 published studies. These studies mostly cover Canada, Scotland, Sweden and the United States. The estimation techniques are rather rudimentary, except for Sims (2007) who uses difference-in-differences regressions, although the authors are sometimes very inventive regarding their data sources. Most studies (seven out of 12) find a negative impact of rent control (Lind, 2003; Smith & Tomlinson, 1981; Smith, 1988) or a positive effect of deregulation (Bailey, 1999; Gibb, 1994) on new housing construction. Only Gilderbloom and Ye (2007) and Ambrosius et al. (2015), using more or less the same data and the same methodology as Gilderbloom and Markham (1996), find no impact of rent control on new residential construction. Moreover, in this particular case, rent controls are thought to be moderate. Goetz (1995) concludes that the multifamily-housing production in San Francisco has accelerated after the introduction of rent control. However, he does not control for other factors, except for dummy variables of rent control introduction, that could explain higher construction rates after rent control was adopted in 1979.

The best evidence comes from sub-national case studies. The most prominent recent quasi-experimental study of San Francisco estimated the effect of rent controls on new construction as high as a 15% reduction in new supply (Diamond et al., 2019). Also studying San Francisco, Asquith (2019) finds a reduction in rental housing supply, as landlords sell off apartments in the condo-market or simply hold back supply. A similar phenomenon—a conversion of rental into owner-occupied units—was found by Fetter (2016) for the US rent controls during and immediately after World War II (WWII). However, Sims (2007), using microdata from a housing survey conducted in Massachusetts in 1985–1998, finds little effect of rent control on new housing construction. Studying the same de-control moment, Autor et al. (2014) also find a very low effect of de-control on new residential investment. Mense et al. (2018), who investigate a recent strengthening of German rental policy—the rental brake (*Mietpreisbremse*)—establish that it fostered new construction in the controlled municipalities.

Overall, the existing literature on the construction and supply effects has predominantly focussed on the effects of rent price controls and not on other forms of tenancy regulation (such as supply restrictions or tenant protection). The existing macro-studies have been rather narrow in terms of geographic scope and regarding the length of time series data used. Almost all studies ignore the historical moments with highest rent regulation activity. We address these shortcomings below by increasing both geographic and time coverage and by including different dimensions of tenancy regulation.

Data

In this section, we present the variables and operationalisation used in this study. For the sake of convenience, we split them into tenancy regulation indices, dependent construction variables and control variables. Table 1 reports the sources of data in more detail and presents the descriptive statistics.

Regulation indices

The main explanatory variable is the intensity of tenancy regulation which we approximate by drawing on the restrictive rental market regulations indices, as developed by Kholodilin (2020) and Weber (2017). They cover three types of regulations: rent control, tenure security and housing rationing. The rent control index measures the intensity of restrictions imposed on the level of rent and its rate of increase. This index is computed as a simple average of six binary indices reflecting the following policies: real rent freeze, nominal rent freeze, rent level control, inter-tenancy decontrol, other specific rent decontrol and specific rent re-control. Thus, the rent control index varies on a continuous scale between 0 and 1.

Moreover, economists distinguish between the first and the second generation of rent control (Arnott, 1995). The first generation implies a hard rent freeze, when rents are fixed at a given level, while under the softer second-generation rent control, the starting rent is generally set at market level, but its growth rate is tied to a measure of living or building costs. Here, we use regulation indices of the first- and second-generation rent control. In case of the first-generation rent control, there are both real and nominal rent freezes as well as rent level controls. By contrast, under the second-generation rent control, only real rent freezes are present. The Rent laws index, on the one hand, and first- and second-generation rent control indices, on the other hand, are constructed in a different way. Unlike the continuous Rent laws index, the generation indices of rent control are binary indices—being equal either to 0 or to 1—reflecting whether the state uses the first or second generation of rent control or not. Therefore, they contain related but not the same information.

The tenure security index, in turn, reflects the degree of protection of tenants from evictions by landlords. The main instruments of protection are eviction protection during a given lease term or period; eviction protection at the end of the term or period; imposition of a minimum duration of rental contracts; and a prohibition of short-term tenancies (of less than one year).

Finally, the housing rationing index measures the intensity of redistribution within the existing housing stock. It includes such policies as registration of housing; protection of housing (e.g., prohibitions to convert residential premises to other uses or to short-term rentals); requisition of vacant housing; restriction of freedom to move into areas with tight

Table 1. Description of variables used in the analysis.

Variable description	Source	Period	Minimum	Mean	Maximum	Standard deviation
Housing completions by 1000 inhabitants	Kohl (2021)	1900–2016	0.020	5.447	17.314	2.928
Share of residential construction in GDP, %	Macrohistory	1900–2017	0.039	4.806	12.081	2.079
Rent laws index, (0, 1)	RHMR	1900–2021	0	0.488	1	0.361
First-generation rent control index, (0, 1)	RHMR	1900–2021	0	0.493	1	0.500
Second-generation rent control index, (0, 1)	RHMR	1900–2021	0	0.128	1	0.334
Tenure security index, (0, 1)	RHMR	1900–2021	0	0.393	1	0.245
Housing rationing index, (0, 1)	RHMR	1900–2021	0	0.109	0.750	0.165
Rental market regulation index, (0, 1)	RHMR	1900–2021	0	0.440	0.917	0.255
Real GDP per capita, 1990 international Geary–Khamis dollars, 1000	Maddison	1900–2018	1.833	17.116	84.580	14.156
Real per-capita GDP growth rate	Own calculations	1901–2018	−0.878	0.020	0.506	0.056
Long-term interest rate, %	Macrohistory and OECD	1900–2018	−0.251	5.675	21.502	3.180
Total loans-to-GDP ratio, %	Macrohistory and own calculations	1900–2016	0.019	0.641	2.045	0.365
Population growth	Maddison and own calculations	1901–2018	−0.075	0.007	0.034	0.006
Housing return minus equity return (relative rate of return)	Macrohistory	1900–2015	−0.096	0.014	0.102	0.025
Government budget balance-to-GDP ratio	Macrohistory and own calculations	1900–2016	−0.752	−0.022	0.201	0.059
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	1900–2016	0.425	0.544	0.993	0.067
Number of marriages per 1000 population	Mitchell (2013) and OECD Vital Statistics	1900–2016	2.113	7.058	17.959	1.838

Note: BIS = Bank for International Settlements (https://www.bis.org/statistics/pp_detailed.htm); Federal Reserve Bank of Dallas (https://www.dallasfed.org/institute/house-price#tab2); Macrohistory = Jordà–Schularick–Taylor Macrohistory Database (http://www.macrohistory.net/data/); Maddison = Maddison Historical Statistics (https://www.rug.nl/ggdc/historicaldevelopment/maddison/); OECD = Organisation for Economic Cooperation and Development Housing prices data (https://data.oecd.org/price/housing-prices.htm); RHMR = Rental Housing Market Regulation database (https://rpubs.com/Konstantin_Xo/RHMR).

housing markets; conservation of social composition of the neighbourhoods in order to prevent gentrification; imposition of maximum housing consumption norms; and nationalisation of private housing stock.

All three indices range between 0 and 1: the higher the index the more intense the regulation. In addition, following Weber (2017), we computed a rental market regulation index (*RMRI*) as a simple average of the rent control index and tenure security index. Thus, it measures an overall security of tenants by simultaneously capturing the protection of tenants from rent increases and from eviction.

The indices are constructed based on a manual content coding of the corresponding legal acts (see https://rpubs.com/Konstantin_Xo/RHMR for details) and, to the best of our knowledge, represent the best available data source for comparative long-run measures of tenancy regulation. It is important to note that the indices do not measure how tight each regulation in place is, but whether regulations of different sorts are generally in place or not and how many of them are enacted. It is also important to keep in mind that this law-based approach cannot deal with different degrees of enforcement of laws. A final note of caution is that these laws are enacted on the national level and do not account for regional variations. In most cases, the national focus reflects the most important regulation level, with decentralisation of housing policies starting in the 1980s in many countries. The indices thus measure, for instance, that the US federal government does not implement any rent controls and that this differs from Germany, which allows municipalities to use regionally specific comparative-rent tables to enforce soft rent controls, but the index ignores differences between the enforcement in Berlin and Cologne.

While these are some obvious shortcomings of the indices, they are the only available long-run regulation data at hand. There are two additional arguments speaking in their favour. First, our indices correlate quite well with alternative ones, as shown in Kholodilin (2020). Second, there are already quite a few researchers, including those from the IMF and the OECD, who are using the indices for their research, where they have become a common data currency.[6]

Housing construction intensity

Our dependent variable is housing construction intensity, which is defined as the number of completed dwellings per 1000 persons (cf. Kohl 2021). Surveying construction requires a certain governmental control of property rights and of the construction sector which is not given in many developing nations and therefore restricts the countries we can sensibly include in the study. Construction volume is available as permits, starts and completions and with the exception of a few countries such as the US, completions are reported throughout. The advantage of

housing starts (and permits) as measure is that they are the most sensitive measures to reveal macroeconomic impacts on initiated construction activity. Their obvious shortcoming is that not all housing starts end up in completions due to construction-loan problems, bad calculations or speculation. Completions, in turn, have the disadvantage that they lag behind starts by one or two years. However, they indicate what has been constructed and their coverage across countries is highest. For these reasons, we choose completions as our measure for new construction volume.

To control for demography right from the start, we divide completions by the current population, which yields a commonly used variable in the range of 2 to 15 completed units per 1000 inhabitants (cf. Kohl 2021). In cases of missing completion data due to countries not having surveyed them at all or only at certain points in time, we approximate completions through housing starts and permits. Our rule of approximation is the following: If available, we use the first lag of housing starts multiplied by the median ratio of housing completions and starts in our sample excluding the war and post-war years, namely 0.98. If starts are also not available, we use the first lag of permits again multiplied by the average ratio of housing completions and permits, namely 0.95. This is to make sure that the levels of completions are approximated, as the over-time trends are highly similar. For the available data, both lagged permits and lagged housing starts strongly correlate ($r = 0.98$).

To include new housing quality and investments in existing stock, we also rely on total residential construction investment per GDP as an alternative dependent variable, which comes with the advantage of being a monetary variable, but is therefore also subject to price effects.

Control variables

The existing literature usually points to a list of control variables, mainly the common economic and demographic background variables, which need to be available for the very long-run for our purposes. On the economic side, we control for GDP per capita as higher income levels allow for more construction to take place. The business cycle is also known for its strong correlation with the building cycle (Leamer, 2007). With government activity being important for the building sector, we also include the governmental budget balance as a variable. Most new construction is not financed out of equity, which is why capital markets play a crucial role. We, therefore, include long-term interest rates that govern mortgage lending. Moreover, we include the growth of mortgages outstanding to GDP: in normal times, more mortgage supply should lead to new construction, but we also include its quadratic term, as too high levels of mortgage indebtedness has been found to just drive up prices and to not extend supply further (Kohl, 2021). New construction depends on the relative

attractiveness to build; we, therefore, include the relative rate of return computed as a difference between housing rental returns and stock market returns in the estimation. Finally, we would include homeownership rates, but their coverage reduces our sample to a post-1950 sample, giving away our long-run data advantage.[7]

On the demographic side, we control for population growth to account for rising demand. As a more refined measure, we also control for marriage rates per population because they indicate the formation of new households. Family formation requires the extension of living space, whereas older household cut back living space at higher ages. We therefore also include a dependency ratio by interpolating the age composition of the population surveyed at census points.[8]

Econometric methodology

Methodologically, the availability of longitudinal data suggests the use of a panel data model. Given the strong persistence of construction intensity and in order to remove serial correlation and potential non-stationarity, we compute the dependent variable as the first difference of the log of construction intensity.

$$y_{it} = \beta' x_{i,t-1} + \gamma' z_{i,t-2} + \eta_i + \theta_t + v_{it} \qquad (1)$$

where y_{it} is the first difference of the construction intensity or the percentage of residential construction in GDP in country i in the year t; x_{it} is the vector of control variables; z_{it} is the vector of regulation indices; η_i is the country fixed effects; θ_t is the time fixed effects; v_{it} is the random disturbance; and β is the vector of coefficients.

We transform the explanatory variables that Dickey-Fuller tests reveal to be non-stationary (population, mortgages and GDP per capita) into growth rates or first differences which also transforms some of these stock-variables into flows, more apt to explain the flow of new constructions. We use the second lag of the regulation indices in order to capture the fact that housing construction takes time to reach completion. The plot of land must be found, the architectural plans must be made, the building permit must be obtained and finally, the house must be built. All these procedures take time and on average two years can pass between the decision to build and the completion. In addition, factors such as bad weather and unavailability of subcontractors and workers during periods of busy construction activity can lengthen the process even more. For example, according to the US Census Bureau 2020 statistics, it takes on average about 7 to 16 months between the start and completion of single- and multi-family houses, respectively.[9] For the control variables we use their first lags. Given that we work with annual data, one lag should be sufficient. Wooldridge (2012, p. 658), for instance,

suggests to use at most two lags for annual time series. A larger number of lags would reduce the already modest degrees of freedom in our models.

Results

We first describe how construction and tenancy regulation developed across time and different regions to then present the multivariate results.

Descriptive findings

Figure 1 depicts the evolution of the three regulation indices between 1900 and 2021. All curves show a two-hump structure: regulation set in with WWI as consumer socialism for the home front of soldiers' families.

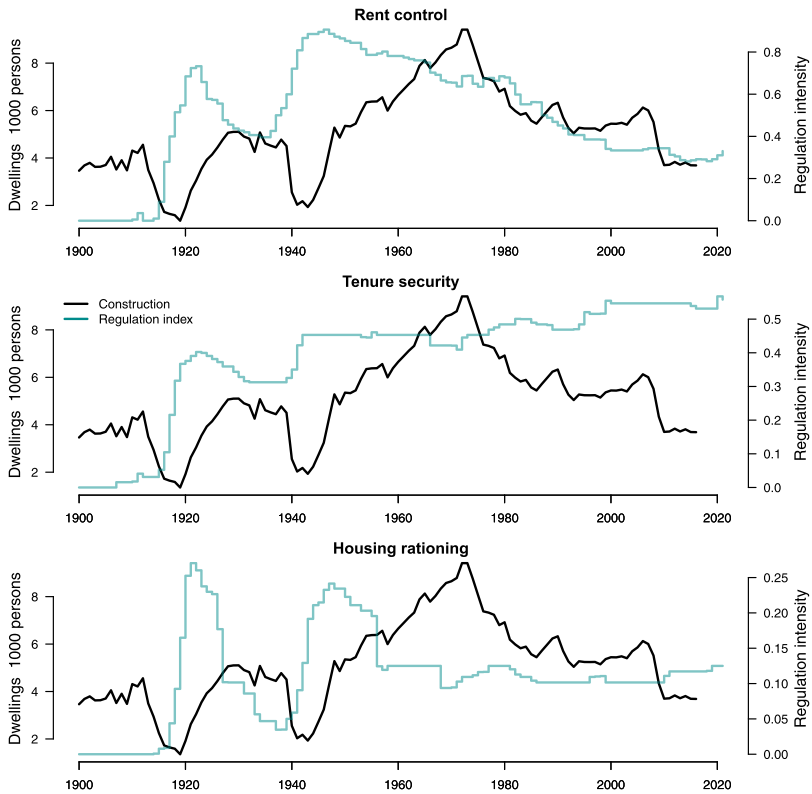

Figure 1. Residential construction intensity and rental housing market regulations. *Note*: Construction intensity is measured as the number of completed dwellings per 1000 persons. The indices of rent control, tenure security and housing rationing vary between 0 (no rent control) and 1 (very strict control). All indices are obtained by averaging from the country-specific indicators of 16 countries under investigation.

It was then reversed during the interwar years only to spike again during WWII. But whereas the rationing supply side restrictions were almost completely dismantled in the post-war development, tenancy security was on average maintained throughout all jurisdictions. Rent regulation itself reduced in intensity everywhere: the strong first-generation freezes of absolute rent levels softened into second-generation regulation of rent increases. While this is the broad common story across jurisdictions, there are notable differences between low-regulation Anglophone countries and continental European countries with a tradition of stronger tenancy regulation.

In addition, Figure 1 shows the long-run construction cycle. With the exception of socialist countries, there is a rough counter-cyclical movement of construction and rent regulation over the 20th century: rent regulation surges in war times when construction is low and it fades out with the building cycle taking off. Towards the end of the reporting period, the negative correlation is less evident as building cycles can occur even at a constant rent level.

Multivariate estimations

In what follows, we estimate four different models, depending on the combination of rental regulation indices and control variables included. We choose these models to uncover different combinations of the regulation indices (models 1–2), to distinguish soft from hard rent controls (3) and to uncover potential non-linear effects (4). We estimate these models for two dependent variables: completed housing units per population and residential investments per GDP.[10] We include a total of 16 countries: with the exception of Portugal, all countries start at least in the interwar period, most even before the First World War.

Tables 2 and 3 report estimation results for housing completions for the whole sample and the war-unaffected, post-1960 subsample, respectively. We distinguish war- from post-war-times because the former are arguably very unrepresentative times for housing policies and rent policies in particular. A first observation is that the different combinations of regulation indices share a persistent negative coefficient sign (with the exception of second generation controls), but at low significance levels. A closer look shows that three regulation indices are statistically significant: tenancy security in the whole sample, housing rationing and rent price controls in the war-unaffected subsample. The effect of the general rent price regulation is entirely driven by the remaining hard first-generation price controls. All affect the intensity of residential construction negatively. Thus, stricter regulations, limiting the freedom of landlords to set prices and to select tenants, diminish the incentives to build new housing.

Table 2 presents estimation results for the whole sample using the intensity of housing construction as a dependent variable.

Regarding the magnitude of the effect, it is sizeable, but also not extremely large. The linear effects are the smallest for the models

Table 2. Estimation results of panel data model: construction intensity, whole period.

Dependent variable: growth rate of construction intensity				
	Model 1	Model 2	Model 3	Model 4
Rent laws$_{t-2}$	−0.026			−0.160
	(0.036)			(0.111)
Rent laws$^2_{t-2}$				0.127
				(0.110)
First-generation rent control$_{t-2}$			−0.031	
			(0.020)	
Second-generation rent control$_{t-2}$			0.013	
			(0.027)	
Tenure security$_{t-2}$	−0.083*		−0.102*	−0.073
	(0.041)		(0.051)	(0.039)
Rationing$_{t-2}$	−0.081	−0.082	−0.071	−0.087
	(0.095)	(0.096)	(0.096)	(0.099)
RMRI$_{t-2}$		−0.094		
		(0.063)		
Per-capita GDP growth$_{t-1}$	0.252	0.256	0.260	0.256
	(0.179)	(0.179)	(0.181)	(0.177)
Long-term interest rate$_{t-1}$	−0.003*	−0.003*	−0.002	−0.003
	(0.001)	(0.001)	(0.001)	(0.002)
Relative rate of return$_{t-1}$	−0.045	0.007	0.014	−0.004
	(0.222)	(0.225)	(0.232)	(0.227)
Change in loan-to-GDP ratio$_{t-1}$	0.177	0.189	0.185	0.195
	(0.176)	(0.179)	(0.177)	(0.180)
Change in loan-to-GDP ratio $^2_{t-1}$	−5.032***	−5.142***	−5.068***	−5.140***
	(1.079)	(1.029)	(1.056)	(1.088)
Government balance-to-GDP ratio$_{t-1}$	0.015	−0.013	0.030	−0.001
	(0.191)	(0.179)	(0.190)	(0.197)
Population growth$_{t-1}$	1.874	1.593	1.816	1.792
	(1.637)	(1.634)	(1.701)	(1.667)
Dependency ratio$_{t-1}$	−0.275	−0.292	−0.314	−0.279
	(0.196)	(0.212)	(0.203)	(0.195)
Marriage rate$_{t-1}$	0.027*	0.028*	0.028*	0.027*
	(0.011)	(0.011)	(0.011)	(0.011)
R^2	0.054	0.052	0.057	0.055
Number of observations	1005	1005	1005	1005

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

estimated over the whole period: the largest decline of the growth rate of construction intensity is obtained for the maximum rent control intensity (equal to 1) and is between −1.3% for all and −1.6% for developed economies. For the post-1960 period, the effects are much larger, varying from the largest decline of about −6% for all countries to almost −8% for developed ones. Assume that in the initial situation (period t) there is no rent control and that construction intensity is 10 dwellings per 1000 inhabitants. If in the following year ($t+1$) the strictest possible rent control is introduced, in $t+3$ the construction intensity would fall to 9.84–9.87 dwellings per 1000 persons for the whole period and to 9.2–9.4 dwellings per 1000 persons for the post-1960 period. In a country with 100 million inhabitants, it would correspond to a reduction in residential construction by 13,000–16,000 and 60,000–80,000 dwellings, respectively, which is a sizeable magnitude over several years, but also not a complete construction stop.

Table 3. Estimation results of panel data model: construction intensity, 1960–2016.

Dependent variable: growth rate of construction intensity				
	Model 1	Model 2	Model 3	Model 4
Rent laws$_{t-2}$	−0.085**			−0.013
	(0.027)			(0.104)
Rent laws $^2_{t-1}$				−0.069
				(0.100)
First-generation rent control$_{t-2}$			−0.043*	
			(0.019)	
Second-generation rent control$_{t-2}$			0.003	
			(0.025)	
Tenure security$_{t-2}$	−0.069		−0.087	−0.072
	(0.036)		(0.046)	(0.038)
Rationing$_{t-2}$	−0.221***	−0.221***	−0.231***	−0.224***
	(0.056)	(0.054)	(0.061)	(0.055)
RMRI$_{t-2}$		−0.157**		
		(0.050)		
Per-capita GDP growth$_{t-1}$	0.629**	0.627**	0.629**	0.628**
	(0.207)	(0.202)	(0.206)	(0.207)
Long-term interest rate$_{t-1}$	−0.003*	−0.003*	−0.002	−0.003*
	(0.002)	(0.002)	(0.001)	(0.002)
Relative rate of return$_{t-1}$	0.162	0.142	0.169	0.160
	(0.324)	(0.305)	(0.341)	(0.325)
Change in loan-to-GDP ratio$_{t-1}$	0.153	0.150	0.140	0.140
	(0.196)	(0.196)	(0.198)	(0.196)
Change in loan-to-GDP ratio $^2_{t-1}$	−3.144*	−3.113*	−3.153*	−3.090*
	(1.276)	(1.298)	(1.276)	(1.286)
Government balance-to-GDP ratio$_{t-1}$	0.303	0.310	0.337	0.311
	(0.201)	(0.193)	(0.212)	(0.202)
Population growth$_{t-1}$	1.443	1.499	1.405	1.639
	(0.774)	(0.798)	(0.897)	(0.873)
Dependency ratio$_{t-1}$	−0.055	−0.054	−0.030	−0.070
	(0.129)	(0.127)	(0.141)	(0.141)
Marriage rate$_{t-1}$	0.026***	0.026***	0.027***	0.026***
	(0.007)	(0.007)	(0.007)	(0.007)
R^2	0.095	0.095	0.094	0.096
Number of observations	807	807	807	807

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

Over the whole sample, growth of real per-capita GDP is statistically significant among the control variables. It exerts a strong positive effect on the construction intensity, which corroborates economic theory and common sense. Higher interest rates, in turn, rather depress new construction, whereas more mortgage debt (insignificantly) increases construction, but only up to a certain point (significantly negative square term). Among the demographic variables, marriage rates have a statistically significant positive effect. Even when people marry less, marriage rates might be a proxy for years when demographic cycles produce more family formation and hence construction demand. The addition of demographic and particularly economic variables normally associated with the building cycle takes away the significance of regulation indices.

Much of the regulation effect is driven by the war-time effects as the war-unaffected subsample results in Table 3 shows: post-1960, rent and

rationing regulation indices are negatively associated with construction intensity and significantly so. Apparently, the housing rationing, being one of the most drastic measures, has a strong negative impact on the confidence of investors and, therefore, on their willingness to build new houses. Thus, the threat of being expropriated represents an effective obstacle to residential construction. The rent control effect is again driven by the strict rent freezes and not the second-generation controls.

The coefficient estimates obtained for the alternative dependent variable, construction investment per GDP, are very consistent with those obtained for the construction intensity (not shown). Restrictive housing policies appear to exert a negative impact on residential construction, especially since 1960, but at low significance levels. For the more recent period, rent price controls have again a significantly negative effect, mostly driven again by the first-generation rent controls. Supply rationing measures are highly significant in this period and reduce new constructions. Tenure security regulations are only statistically significant for the estimation over the whole sample. Increasing tenancy regulation to a maximum leads to a decrease of residential investment per GDP of 0.085 percentage points and of up to 0.043 for the strict first-generation controls. The control variables behave very similarly to the results in the previous two estimates.

Although we find negative effects of restrictive regulations on housing construction, these effects are often not statistically significant. It is possible that due to factors internal to each country positive and negative effects in different types of countries cancel each other out. This issue could theoretically be addressed by focussing on specific countries. However, such a country-specific analysis is rather difficult due to the limited number of observations per country. This is the reason why we opted for using the panel-data approach that dramatically increases the number of observations. To some extent, the country-specific effects are captured by the fixed effects. However, it can be true that an offsetting of effects in various countries occurs. Nevertheless, as an overview of the empirical literature on rent control effects shows, most studies using different methodologies and data find that rent control exerts either a negative or no impact on housing construction (Kholodilin, 2022). Thus, the cancelling out of effects could hardly affect our main conclusion.

Discussion and conclusion

The general finding points to the expected negative effect of rent regulation on new residential construction: throughout different samples and specifications, the regulation coefficients are negative, albeit with changing levels of significance. The finding is most persistent for rationing and first-generation rent controls and most pronounced for the war-unaffected period which reaches up to the current day. Higher levels of security of tenure can depress new construction. However, this finding is not always confirmed, as the corresponding coefficient is only statistically significant

in the total sample. Overall, with the most complete historical-comparative data available, the received wisdom among economists of a negative construction and investment effect of rent controls seems to hold, but with far less persistence and magnitude than is usually assumed. In many models, new construction depends more on economic or demographic factors than on tenancy regulation. This is in line with the rather mixed results of existing studies of smaller geographic and temporal scope, where almost half of the studies produce null findings.

The models covering the whole time period do not find any significant rent-control effect other than for the war-related first-generation controls and for the rationing measures. One explanation could be that lower rent control intensity corresponds to the more flexible first-generation rent control, while higher ones correspond to the much more restrictive first-generation rent control. This is in line with previous research (Mense et al., 2018). Finally, one could argue that the magnitude of the examined effects is not particularly high in general. It is not the case that private construction completely stops after the introduction of rent control measures.

What could explain the deviance from the usually expected result? In the following, we want to discuss potential data and model configurations which could explain our main results. One obvious explanation is that rent control laws often exempt new construction from regulations. A subitem in the regulation data set measures whether exceptions to rent controls exist (e.g., for the luxury market segment, new construction, and certain geographies). In the global sample, these exceptions were present in about 70% of all country years during which rent legislation was in place. Unfortunately, the variable is coded too broadly, not taking into account kind and degree, to produce any significant results. Yet, the purpose of many exceptions is to guarantee that the incentives for building new houses are not diminished. Thus, the rents for newly built dwellings are not controlled and so the investors can earn decent profits on it. But investors might still shy away from further investment in rental stock, as they might expect a general deterioration of investment climate and a slippery slope towards even more state intervention.

A second explanation can draw on the fact that tenancy regulation crowds out rental dwellings in favour of owner-occupied ones in the existing housing stock (Fetter, 2016; Kholodilin & Kohl, 2021b). What holds for the existing housing stock may as well hold for new construction: A potential reduction in completions of rental dwellings could thus be more than offset by the increase in the completion numbers in the owner-occupied housing segment. This is all the more probable, given the evidence that homeowner-dominated societies are more prone to speculative house price dynamics (Rünstler, 2016). Homeowners or would-be homeowners who observe house price increases and expect them to continue are eager to participate in the overall speculative movement hoping to obtain capital gains. Thus, more housing is built in such economies than in the tenant-dominated ones, where most people are rather unwilling to see house prices

increases, since this often goes hand in hand with rent increases. It should be noted also that the switch from tenant to homeowner dominance can be the result of too strict rental regulations. In principle, one would need to replace our current dependent variable of all new constructions by new rental constructions, but the future use of a housing unit is unfortunately not known, let alone surveyed at the point of its construction.

A final explanation for why rent regulation is not universally affecting new construction resides in the fact that in many historical cases the restrictive rental measures are accompanied by housing policies seeking to foster the building activities through social housing or the stimulation of more private housing construction. This has especially been the case after major housing supply shocks caused by wars or natural catastrophes. The inevitable rent increases are anticipated by using rent controls and the resulting unwillingness to build by private investors makes the government step in to either replace the private building initiative or stimulate it artificially. This could also explain why the global sample results show less significant results than the shorter sample estimates as they included the period of strongest state intervention in housing markets, including social housing construction.

What then are the implications? Rent control measures of even the hard first-generation rent freezes or rationing measures are currently debated and passed in European countries and beyond. Even though they are often introduced with good intentions as social policy in favour of tenants and even potentially lowering short-term inequalities (Kholodilin & Kohl, 2021a), our results suggest that economists do have a point when warning about unintended consequences of depressing new construction. Rent controls help sitting tenants in the short run but contribute to future housing shortages for new tenants in the longer run. This long-run result can partially be offset by additional state policies stimulating housing construction. However, under rent control, the efforts to spur residential construction have to be much larger than in its absence. This undermines the frequently used argument that rent control is an interim measure deployed in order to combat rent increases, while awaiting for construction to gain momentum. Therefore, if one wants to overcome housing shortages as soon as possible, it may be better to abstain from restricting rents, especially from using strict first-generation rent controls.

Notes

1. Senate Bill 608 relating to residential tenancies; creating new provisions; amending ORS 90.100, 90.220, 90.323, 90.427, 90.600, 90.643, 90.675 and 105.124; and declaring an emergency.
2. Housing Stability and Tenant Protection Act of 2019.
3. See 'Gesetz zur Mietenbegrenzung im Wohnungswesen in Berlin (MietenWoG Bln)' as of 11 February 2020. The law was enacted on 23 February 2020.
4. *Ley 11/2020, de 18 de septiembre, de medidas urgentes en materia de contención de rentas en los contratos de arrendamiento de vivienda y de modificación de la Ley 18/2007, de la Ley 24/2015 y*

de la Ley 4/2016, relativas a la protección del derecho a la vivienda. This regulation was apparently influenced to a large extent by the so-called rental brake (*Mietpreisbremse*) introduced in Germany in 2015. However, in March 2022, the Catalan rent control law was revoked by the Spanish Constitutional Court as unconstitutional—*Sentencia de Tribunal Constitucional de España—Sentencia 37/2022, de 10 de marzo de 2022. Recurso de inconstitucionalidad 6289-2020*.

5. See https://rpubs.com/Konstantin_Xo/COVID19_housing_policies.
6. To name just a few: (1) Cournède et al. (2019) find that a tighter rental regulation tends to exacerbate the risk of severe economic downturns; (2) Cavalleri et al. (2019) suggest that restrictive rental market regulations can decrease the price elasticity of housing supply; while (3) Elfayoumi et al. (2021) investigate the link between rental market regulations and affordability of rental housing.
7. In such a regression, the homeownership variable does not have significant effects.
8. Marriage rates and age composition are interpolated using the **R**-package *stinepack* based on Stineman (1980).
9. Average Length of Time from Start to Completion of New Privately Owned Residential Buildings; https://www.census.gov/construction/nrc/pdf/avg_starttocomp.pdf. The larger the building, the lengthier the process: it takes 18 months for buildings with 20 units and more. Thus, changes in regulations affect the willingness of investors to apply for permits. Only after the permits are obtained the construction can begin.
10. The results for the second dependent variable are available upon request, and more documentation is shown in the longer working paper version.

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The authors confirm that the article involves no conflicts of interest.

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