The Incumbents' Cost of Living Advantage

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Abstract

We document substantial rent gaps between "market" rents and households' actual rent. For instance, households who have been in the same unit for 15 years pay about 30 percent less than households who rent a unit for the first time in the same county and type of housing. This rent gap is larger in high growth cities. We decompose the rental gap between the regulatory gap – the gap that originates from limitations in within tenure rent growth – and the residual gap. We show that the regulatory gap accounts for only slightly more than 50% of the actual gap. This evidence suggests that frictions other than existing regulation likely give incumbents' an advantage in the rental market, something that, we argue, is inconsistent with landlord market power. We embed these forces in an overlapping generations model, which we estimate using German data, to study how much frictions in the rental market limit labor mobility, and how much this, in turn, explains why housing affordability is a problem in high growth cities.

Keywords: Housing affordability, city growth, housing policy.

JEL Codes: R11, R23.

1 Introduction

The standard Rosen (1974) - Roback (1982) model used in urban and regional economics implicitly assumes that housing is homogeneous (up to hedonic considerations) within cities. One of the key aspects of this model is that higher housing prices need to be compensated with either higher wages or higher amenities. Implicit in this logic is that there is a price that summarizes the cost of living in a given location. Similarly, in the monocentric city model, while there are multiple house prices within cities, this price heterogeneity exactly reflects commuting costs into the city center, where employment is located. Hence again, there is a clear notion of the housing price of a city.

In practice, however, households may have markedly different experiences in the housing market. Some become homeowners, often under fixed-rate mortgage contracts. Mortgage payments then depend to a large extent on the state of the housing market at the time of buying. Over time, there may be a significant gap between these mortgage payments and those faced by new homebuyers (especially if house prices have increased). In the rental market, rents are negotiated more frequently, but there are multiple reasons why gaps between market rents and the rents that households actually pay may open over time. On the one hand, tenants may feel attached to the unit they reside in, giving landlords some degree of market power that allows them to charge prices above market rents. On the other hand, existing regulations often restrict the extent to which landlords can raise rents, allowing tenants to pay below-market prices. Moreover, even if rent controls are not binding, there are reasons to believe that landlords may accept below market rents, for example, if they trust that current tenants will diligently pay each month.

Whether tenants pay above- or below-market rents is, therefore, an empirical question. The presence of such discrepancies between market rents and the amounts households actually pay would, in turn, be relevant for a range of important questions. For example, if incumbents pay below market rates, incentives to move may be low. This, in turn, may decrease the effective size of the rental market, with potentially detrimental impacts on new arrivals and future generations of renters. If, instead, incumbents pay above market rents, this could indicate that market power is a prevalent feature of rental markets, and perhaps an important driver of welfare inequality between landlords and renters.

In the first part of this paper, we use comprehensive data from Germany, a country where 55% of households are renters, to shed light on these questions. We start by systematically documenting that there is a substantial difference between the prevailing market rents and the rents that many incumbent households pay for comparable housing units. While initially aligned with prevailing market rates, the rents of households who remain in the same units grow significantly slower than the market rents. On average, market rents are 27 log points higher than the rents paid by households who have remained in the same unit for 15 years. This gap is substantially larger in high-growth cities but is still positive in low-growth locations. This evidence points

to frictions in the housing market and speaks against significant market power of landlords.

The fact that rent gaps are larger in high growth cities may suggest that existing rent controls are binding. To study this, we assemble detailed information on all existing rent control laws across all German counties. For each household, we compute the maximum rent that the existing regulation would allow the landlords to charge, both at the time of entry into the tenancy and in subsequent years. This allows us to decompose the rental gap, defined as the difference between the market rent and the actual rent that the household pays, into a component that we label the regulatory gap, defined as the difference between the market rent and the maximum rent that regulations would permit, and a residual gap, defined as the difference between the regulatory rent and the actual rent charged by the landlord. The regulatory gap measures the extent to which regulation keeps rents below the competitive price in the market. The residual gap reflects other reasons why rents may be below the competitive level, such as the willingness of landlords to keep renting the unit to reliable tenants, the cost of fully applying existing legislation, or any other friction in the market. We find that, on average, 57% of the total rent gap is due to existing regulation, while 43% is due to other frictions in the rental market. We also show that the residual gap is especially pronounced for small private landlords.

In the second part of the paper, we introduce an overlapping generations model with housing market frictions. Each generation is born in a given location. As they become old, households decide whether to move or stay in their birthplace. Staying in the birthplace gives incumbents an advantage, as they keep the same rent as in the period when they first entered the housing market. This reflects both households who buy a house and have a fixed-rate mortgage, and renters who keep the old rent, either because of policy or landlord choice. We use the model to derive several results. First, consistent with the empirical evidence presented in the first part of the paper, the model predicts that a rent gap opens as a function of housing tenure, and that this rent gap is especially large in high-growth locations. Second, the model predicts that household mobility decreases as a function of housing tenure. Third, and related to the previous point, the model implies that there is a group of households that move constantly, while there is another group of incumbents that hardly ever moves (in line with evidence reported in the seminal work by Kennan and Walker (2011)). Finally, the model predicts that in high-growth locations market rents outstrip productivity, something that may be labeled as a "housing affordability crisis". The reason for this is that incumbent renters pay substantially below market rents and are therefore less likely to empty their units. This reduces the supply of units in the market and puts pressure on the housing market.

In the third part of the paper, we provide evidence for one of the main implications of the model, namely that below-market rents lead to lower mobility. Specifically, we estimate the relationship between a household's rent gap and its propensity to migrate, and benchmark this effect against housing tenure as a proxy for location attachment (e.g., social networks). We find that the rent gap is a robust and signifi-

cant negative predictor of residential mobility. Using the estimated coefficients, we simulate counterfactual migration profiles in a scenario where no rent gap emerges over the course of a tenancy. We find that the rent gap accounts for approximately 11% of the decline in mobility over the first 15 years of tenure, and up to 27% in high-growth locations. Going forward, we want to combine these reduced-form estimates with county-level data to use a quantitative version of the model to evaluate the role of incumbent's advantage for individual cities and the economy as a whole.

Literature Review

The model in this paper builds on the work by Duranton and Puga (2023). Duranton and Puga (2023) propose an overlapping generations spatial equilibrium model where incumbents have an advantage in the local housing market, since they can decide on legislation that generates a wedge between incumbents' and newcomers' prices. In this respect our main contribution will be to micro-found several reasons why such gaps may exist, above and beyond policy decisions.

Our work also contributes to the literature on rent control regulation (e.g. Glaeser and Luttmer, 2003; Sims, 2007). Empirical studies in this literature, recently reviewed by Kholodilin (2024), consistently find that rent control reduces rents for regulated units while raising rents for unregulated dwellings, often leading to reduced residential mobility (Diamond et al., 2019; Mense et al., 2023).[1] Relative to this literature, we make two main contributions. First, by matching market rents to a panel of tenants, we quantify the rent savings that households accrue by remaining in their current dwellings. We further show that these rent savings accumulate dynamically over the course of a tenancy and are particularly large for households with long housing tenure. These findings emphasize the importance of accounting for completed tenure length when assessing the (distributional) effects of rent control policies. Second, we show that rent control accounts for only about half of the observed gap between market rents and the rents paid by sitting tenants. The remaining gap reflects other frictions in the rental market. This finding aligns with a literature that explains lower rents among long-standing tenants—often referred to as a "tenure

[1] In the German context, a series of recent papers has examined the effects of the 2015 introduction of a rental cap on newly contracted rents in high-demand rental markets (Mense et al., 2019; Breidenbach et al., 2022). Our focus is rent control regulation *within* tenancies, which remained unaffected by the 2015 reform. Fitzenberger and Fuchs (2017) examine the effects of stricter within-tenancy rent control on the evolution of rents over the course of a tenancy. Contrary to our results, they find that stronger within-tenancy rent regulation reduces the rent gap between newly contracted rents and those paid later in the tenancy. Our approach differs in key respects. We match tenant-occupied units to observationally similar dwellings currently listed on the rental market, allowing us to directly compare tenant-occupied rents with market rents for comparable units. Moreover, the period studied by Fitzenberger and Fuchs (2017)—the early 2000s—was characterized by low market rent growth. For that period, we similarly find only modest differences in the rent gap across moving-in cohorts, which is consistent with our theoretical framework, in which rent gaps only occur when (local) market rents are rising.

discount"—through information asymmetries and search costs (Guasch and Marshall, 1987; Miceli and Sirmans, 1999; Genesove, 2003). Tenant quality is initially unobserved at the time of contract signing and only revealed over time.[2] As landlords learn about tenant quality, they have incentives to retain high-quality tenants by offering lower rents. This mechanism helps explain why long-tenured tenants typically pay lower rents than newly entering households (Hubert, 1995). Consistent with this mechanism, we find that private landlords, who are more likely to face higher turnover costs and greater information frictions, tend to raise rents less than professional landlords for sitting tenants. We differ from this literature in that we quantify the joint contribution of rent regulation and market frictions to the rent gap for long-standing tenants, and that we analyze how this gap varies across space. We document that rent gaps are particularly large in high-growth urban areas, with implications for the spatial distribution of households and economic activity. We differ from this literature by quantifying the joint contribution of rent regulation and market frictions to the rent gap experienced by long-standing tenants. Moreover, we analyze how this gap varies across space and document that it is particularly large in high-growth urban areas. Using our quantitative model, we show that these spatial patterns have important implications for the distribution of households and the allocation of economic activity.

Finally, our paper is related to the growing empirical literature that studies the degree of market power in housing markets. Evidence from large U.S. cities such as New York suggests that landlords exert market power in the rental market (Costa, 2025; Watson and Ziv, 2025). In the German context, Löffler and Siegloch (2024) show that landlords fully pass through property taxes to rents, suggesting a lack of market power. Using a novel empirical approach, we provide additional evidence that is inconsistent with landlord market power by showing that landlords do not raise rents up to the legally permitted maximum. This behavior is particularly pronounced among private individual landlords—the largest landlord group in both Germany and the United States—and less evident among institutional landlords, who have been associated with greater market power in the U.S. rental market (Barbieri and Dobbels, 2025; Coven, 2025).

The remainder of the paper is structured as follows. Section 2 outlines the data and institutional background. Section 3 presents descriptive evidence on rent gaps, while Section 4 develops the theoretical framework. Section 5 then estimates the model and explores its quantitative implications. Section 6 concludes.

[2] Tenant quality can be interpreted as the extent to which a tenant imposes additional service costs on the landlord, for instance through higher depreciation of the unit.

2 Institutional Context and Data

2.1 Institutional Context: Tenants in Germany

As of 2022, 55% of households in Germany rented their homes, compared to an average of 24% across OECD countries. Renting is particularly prevalent in urban areas, where 72% of households are tenants, and among younger individuals and low-income households, with 75% of the bottom income quintile residing in rental housing (OECD, 2022). Strong tenant protections and caps on rent increases make renting in Germany an appealing long-term choice, particularly for households that remain in the same unit. During our study period (1998-2022), the average tenant household in our sample has lived in the same dwelling for around 11 years.

Throughout our study period, tenants in Germany benefit from limited within-tenancy rent increases due to rent control legislation. Landlords may raise the rent only once every 15 months. Moreover, any newly set rent following an increase must remain below the local reference rent (ortsübliche Vergleichsmiete), which is defined as the average rent per square meter for comparable dwellings in the same municipality over the past four years.[3] In addition, cumulative rent increases are capped (*Kappungsgrenze*). Prior to 2001, the nationwide limit was 30% over three years. Since then, increases have been restricted to a maximum of 20% over three years, or 15% in municipalities designated as tight housing markets (Fitzenberger and Fuchs, 2017).[4] Although some exemptions apply, the vast majority of tenant households fall under these regulatory limits.[5] Landlords are required to notify tenants of any rent increase in written form at least three months in advance. In 2015, the federal government introduced unit-level rent control, extending regulation to new rental contracts in high-demand areas, while leaving existing tenancy rent control rules unchanged. In affected municipalities, rents for new tenants may not exceed the local reference rent by more than 10%, thereby limiting rent increases even across tenancies (Mense et al., 2023).

On the supply side of the rental market, Germany is characterized by a high share of housing units owned by private individuals. According to the 2022 census, private individuals owned 63% of all dwellings available for rent, followed by 20% held by local governments or housing cooperatives.[6] We exploit this variation in our analysis to assess whether rent gaps vary systematically across different types of landlords.

[3] More precisely, the reference rent is formed from units of similar type, size, equipment and condition, location in the same or a comparable municipality during the past four years (§558 BGB). In 2020, the reference window was extended by two years to cover the previous six years.

[4] In 2015, around 30% of households lived in municipalities subject to the 15% cap.

[5] Three main exceptions apply. First, when the initial rental contract includes pre-specified rent increases (Staffelmiete). Second, when units transition from publicly subsidized housing to the private rental market. Third, in the case of modernization, landlords are permitted to temporarily raise rents by passing on a portion of the modernization costs to tenants.

[6] See Table 4000W-2027, available at https://ergebnisse.zensus2022.de/datenbank/online/.

2.2 Data

We combine three datasets in our main analysis. We obtain longitudinal information on tenant-occupied rents from the German Socio-Economic Panel (hereafter SOEP) for the years 1998 to 2019 (Goebel et al., 2019). The SOEP provides detailed information on both the tenant and the housing unit, including rent, housing tenure, unit characteristics (e.g. floor space, number of rooms, building age, building type) and characteristics of the landlord (e.g. type of landlord, change of ownership).[7] Across our datasets, we use monthly rent per square meter excluding bills (utility costs and heating) as our main measure for cost of living. In most survey years of the SOEP, households report their monthly rent expenditures inclusive of utility costs but exclusive of heating costs. We subtract utility costs whenever households report to have included them in their rent expenditures. We interpolate our rent measure for the years 2014 and 2015 as the rent survey question differed during these waves, leading to lower rent measures once bills were subtracted (see SOEP Group, 2019).[8]

While the SOEP allows us to track the same households at annual frequency, its sample size is relatively small, especially when focusing on specific regions or subsamples (see Table 1). We therefore complement these data with information from the German Microcensus, a 1% random sample of households living in Germany. Household members selected are mandated by law to participate in the survey. Starting in 1998, the Microcensus includes a housing module every four years with detailed characteristics on the housing unit, its cost and household tenure in the unit. We obtain all waves with the housing module from 1998 to 2022 (both included). We construct monthly rents (excluding bills) per square meter as in the SOEP.

To measure market-level rents, we use data from Germany's largest online real estate platform, *Immoscout24*, covering the period from 2007 to 2022. The data are provided by the FDZ-Ruhr through the RWI-GEO-RED project (see Schaffner and Thiel, 2022). The platform is estimated to cover approximately 50–70% of all real estate listings in Germany, both for sale and for rent (Barkow and Georgi, 2010; Bundeskartellamt, 2016). For each rental listing, the dataset includes the asking rent, detailed housing characteristics, and the date the listing was removed from the platform, which we use to assign the unit to a specific year. We interpret the asking rents in the listings as a measure of the price households would face when entering the rental market for a comparable dwelling. A potential concern is the extent to which asking rents reflect actual contracted rents. Ahlfeldt et al. (2023) show that, for the

[7] Startin in survey year 2014, the SOEP differentiates between six categories of housing ownership: private individual, private company, professional organization or union (e.g. housing cooperatives), non-profit organization (e.g. church), municipal government and employer-owned housing. Prior to 2014, private owners and private companies were grouped together under a single "private owner" category.

[8] More specifically, the 2014 and 2015 survey item asked participants to report their total rent expenditures, including utility costs and heating. After subtracting utility costs and heating from the reported number, the average rent excluding bills is around 10€ below the previous years, likely due to some households still reporting their rent excluding bills, as remarked by SOEP Group (p.20 2019).

same platform, asking prices for home sales are strongly correlated with transaction prices, lending credibility to our approach.

We apply a consistent cleaning protocol to harmonize the data across the three sources, closely following the methodology of Klick and Schaffner (2019) who construct hedonic rent indices based on the RWI-GEO-RED dataset. Our sample is restricted to renting households in both the SOEP and the Microcensus, and to units listed as available for rent in the *Immoscout24* dataset. We exclude observations with zero rent or monthly rents exceeding €5,000. Additionally, we drop flats with floor space below 15 or above 400 square meters and houses below 50 or above 500 square meters. In the SOEP, we additionally exclude observations from the refugee samples, as these households typically live in non-standard housing arrangements. Table A.1 in the appendix documents the number of observations after each cleaning step in all three datasets. Table 1 summarizes key housing characteristics in our final sample.

3 Rent Gaps

3.1 Descriptive Evidence

We begin by documenting how rents vary between tenants who recently moved into their dwelling ("newcomers") and tenants who moved in earlier ("incumbents"). Figure 1 shows the evolution of log (nominal) rents per square meter by four-year moving-in cohorts over the sample period. Panel (A) presents the time series for all of Germany. Throughout the period, newcomers consistently face higher housing costs compared to previous cohorts. For example, in 2018, the most recent moving-in cohort (2015–2018) paid rents that were 9 log points higher than those paid by the previous cohort (2011–2014). Over time, the gap between successive cohorts ranges from approximately 3 log points in 2002 to 12 log points in 2022. These disparities are particularly pronounced for cohorts that entered the rental market during periods of rapid rent increases. In particular, listed rents saw their steepest growth in the early 1990s and again after 2015 - both of which correspond to the periods with the largest rent gap for newcomers (see Figure B1). Panel (B) shows that these rent gaps are particularly pronounced in large cities, which have experienced especially strong growth in market rents. In these cities, the rent gap between newcomers and the preceding cohort reaches up to 14 log points during the early and later years of the sample period. This descriptive evidence suggests that newcomers pay significantly higher rents than households that moved in only a few years earlier, especially in times and locations of high market rent growth.

Next, we show that these rent gaps lead to sizable differences in income shares that are spent on housing. The housing expenditure share variable is available in the Microcensus from 2002 onward. In this measure, housing expenditures include rent

Table 1: Household and Housing Unit Characteristics by Dataset

	Household Panel SOEP (1)	Household Cross-Section Microcensus (2)	Unit Online Listings RWI-GEO-RED (3)
Household-Year Characteristics			
Rent (€/month)	387.66	396.00	591.88
Rent per Sqm (€/month)	5.59	5.79	8.02
Housing Tenure	11.41	10.79	0.00
Observations	143,927	1,140,802	21,753,018
Unit Characteristics			
Floor Space	76.25	70.04	75.88
Number of Rooms	3.04	2.77	2.72
Construction Year Cohorts			
$\leq$ 1948	0.26	0.22	0.13
1949-1978	0.36	0.48	0.23
1979-2000	0.33	0.25	0.16
2001-2010	0.03	0.04	0.04
$\geq$ 2011	0.01	0.01	0.39
Housing Units	34,991	1,140,802	21,753,018
Year Range	1998-2019	1998-2022	2007-2022

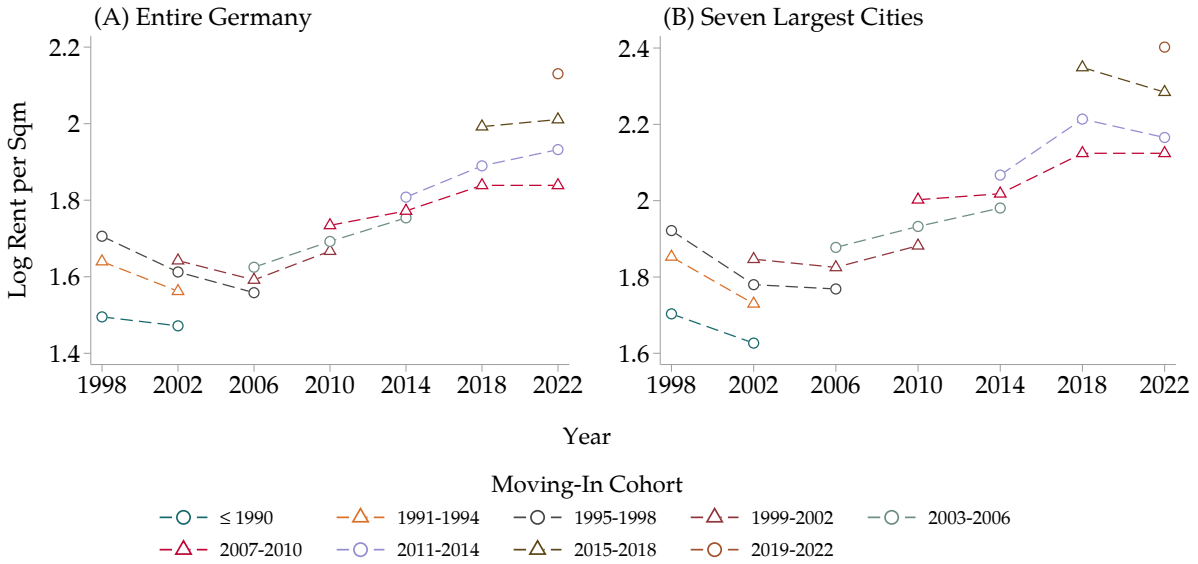
Notes: This table shows means of the indicated variables at the housing-year (top panel) and housing-unit level (bottom panel). Rent refers to nominal monthly rent excluding bills (utility and heating). In the SOEP, unit-year observations are collapsed to the unit-level by taking weighted means using cross-sectional weights provided by the SOEP. The housing tenure variable is set to zero for the online listings data. Housing tenure and the number of rooms are only available for the years 2018 and 2022 in the Microcensus data.

as well as heating and utility costs.[9] Figure 2 shows that newcomers devote a larger share of their income to rent. In most years, they spend between 2 and 4 percentage points more of their income on rent compared to households that moved in only a few years earlier.

Figure 1 shows raw data taken directly from the Microcensus. We next investigate whether the depicted rent gaps are driven by observable differences in housing or household characteristics. For example, new cohorts could systematically move into higher-quality flats, which could explain the price difference. We estimate the cohort-

[9] We cannot construct a housing expenditure share variable excluding bills, because income is only available as a categorical variable.

Figure 1: Rent Gaps across Cohorts in Germany and Seven Largest Cities



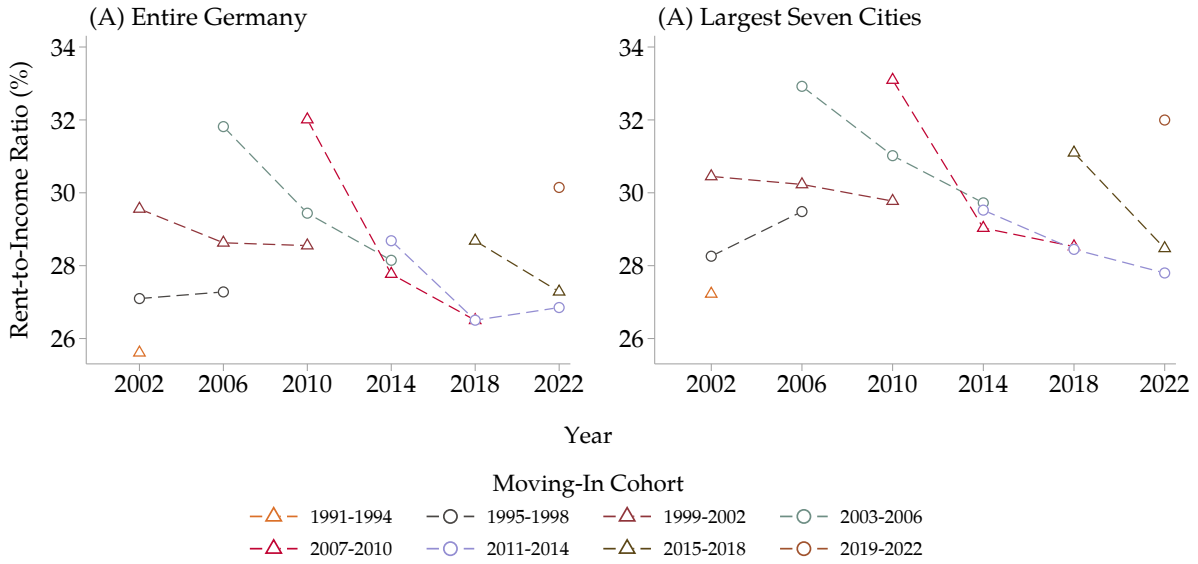
Notes: Panel (A) shows the log average monthly rent per square meter by moving-in cohorts in Germany. Panel (B) shows the corresponding time series for the seven largest cities in Germany (Berlin, Cologne, Düsseldorf, Frankfurt, Hamburg, Munich, Stuttgart). Rents refer to rent payments excluding bills. Source: Microcensus.

specific profiles non-parametrically for household h from cohort c in year t as follows:

$$y_{ht} = \beta_0 + \tau_{c(h)t} + X'_{ht}\gamma + \eta_{r(h)} + \epsilon_{ht} \tag{1}$$

where y_{ht} is either the log rent per square meter or the income share spent on housing, $\tau_{c(h)t}$ are cohort-specific year fixed effects, X_{ht} is a vector of housing unit and household controls including fixed effects for the number of rooms, construction year cohort and building type, and $\eta_{r(h)}$ are county fixed effects. Standard errors are clustered at the household level. Based on the coefficient estimates, we plot the cohort-specific profiles while holding control variables and county fixed effects at their respective means across all years in the estimation sample. These profiles thus capture variation in rents (or rent-to-income ratios) across moving-in cohorts, holding region and observable housing characteristics constant. Figure 3 shows the profiles for our two outcomes of interest, again separately for all regions in Germany and the seven largest cities. When controlling for observable characteristics, the adjusted cohort profiles closely resemble the raw means shown earlier. More recent cohorts pay significantly higher rents than households with longer tenure, particularly in their first year. They also devote a significantly larger share of their income to housing. These patterns hold for Germany as a whole and when focusing on the seven largest cities.

Figure 2: Rent-to-Income Ratios across Cohorts in Germany and Seven Largest Cities



Notes: Panel (A) shows the average income share that is spent on housing among tenants in Germany. Housing expenditure covers rent and bills (heating and utilities). Panel (B) shows the corresponding time series for the seven largest cities in Germany (Berlin, Cologne, Düsseldorf, Frankfurt, Hamburg, Munich, Stuttgart). Rent-to-income ratio refers to the fraction of income that is spent on rent (including bills). The survey item became available in 2002. Source: Microcensus.

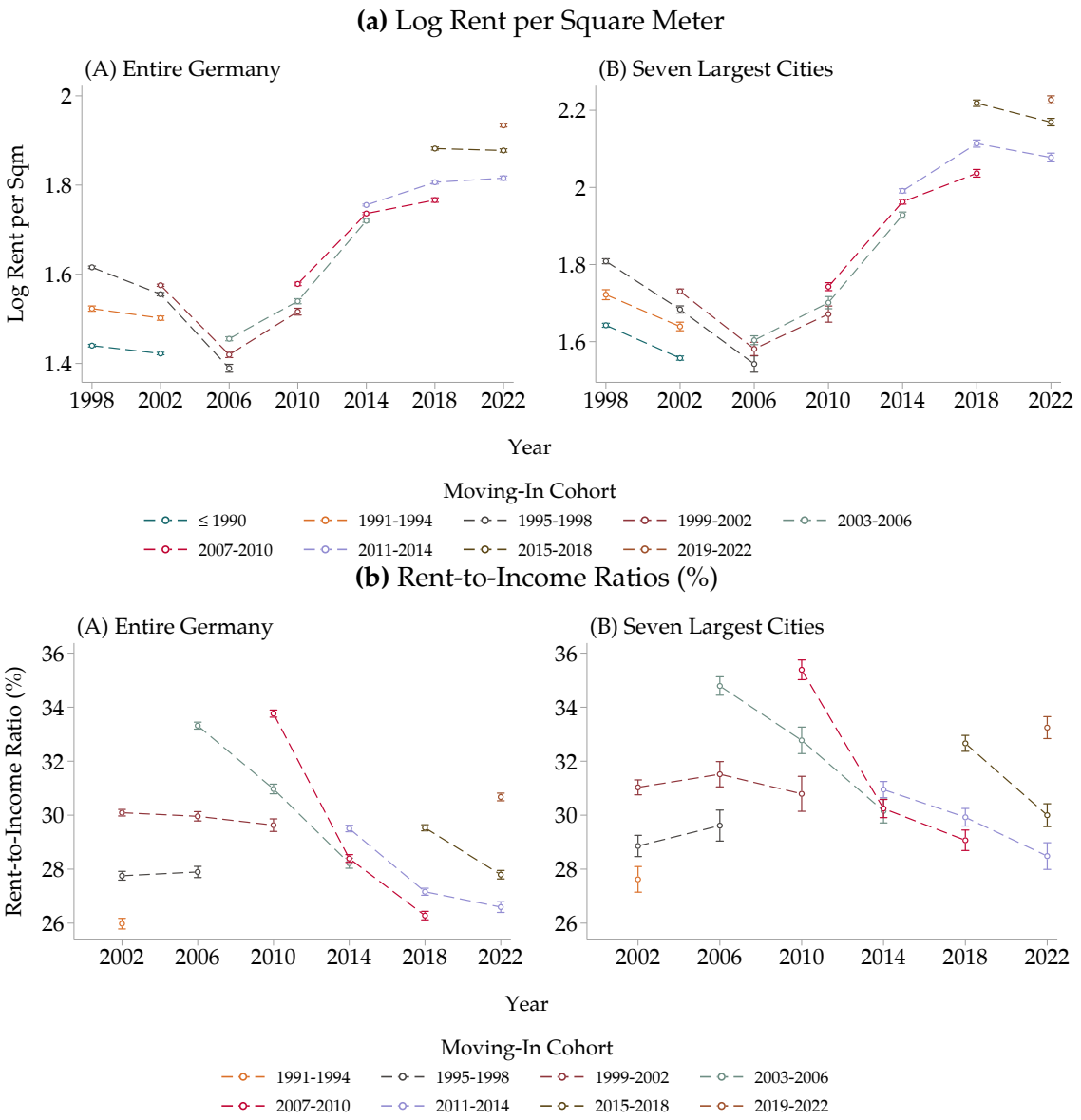
3.2 Rent Gap Dynamics

To quantify the difference between market rents and the rents paid by incumbent tenants as they accumulate housing tenure, we now turn to the SOEP household panel. Specifically, we match housing units observed in the SOEP to observationally similar units listed on the rental market, using data from Germany's largest online real estate platform *Immoscout24* (RWI-GEO-RED). We match units for the years in which the two datasets overlap, namely from 2007 to 2019.

Matching households to their market unit. We first select the set of housing characteristics on which we want to match tenant-occupied units exactly. While the online listings dataset includes a large number of housing units, the sample size within certain cells can become quite small as the number of matching categories increases. In our baseline matching procedure, we choose as object characteristics the (integer) number of rooms and an indicator for whether it is an apartment or a house. We further match exactly based on the year and on the interaction of county and distance-to-city-center categories.[10] This results in approximately 151,000 market cells, with a median of 12 and a mean of 123 market units per cell. Within each cell, we then construct the market rent by taking the average rent per square meter across all units.

[10] $\leq$ 4km, (4km, 10km], (10km, 25km], (25, 40]km or $>$ 40km of nearest city center. These correspond to the survey response items in the SOEP.

Figure 3: Adjusted Cohort-Profiles



Notes: These plots show the nonparametric cohort profiles ($\tau_{c(h)t}$) from estimating Equation (1). Control variables and county fixed effects are set to their mean values across years in the estimation sample. Panel (a) shows the profile for log rent per square meter as an outcome. Panel (b) shows the corresponding estimates for rent-to-income ratios as the outcome. Rents per square meter are measured excluding utilities. Housing expenditure covers rent and bills (heating and utilities). Capped spikes denote 95 percent confidence intervals. Source: Microcensus.

Using these matching variables, we successfully match around 83% of the tenant observations in our household panel. Adding more variables to the market segment definition leads to fewer observations on rent listings in each cell and lower matching rates among the tenant-occupied units. In our empirical specifications, we will

later include controls for additional housing unit characteristics.

We construct the rent gap (per sqm) of household h living in housing unit of market segment m in year t:

$$\text{Rent Gap}_{ht} = \log(\text{Market Rent}_{m(h)t}) - \log(\text{Actual Rent}_{ht}) \tag{2}$$

We interpret this measure as the additional amount the household would need to pay per square meter if it relocated to an observationally similar housing unit in the same location and year.

Rent gaps with accumulated housing tenure. We estimate for household h belonging to moving-in cohort c the following specification:

$$\text{Rent Gap}_{ht} = \beta_0 + \sum_{k=0}^{K} \delta_k \times \mathbf{1}\{\text{Housing Tenure} = k\} + X'_{ht}\gamma + \lambda_{c(ht)} + \epsilon_{ht} \tag{3}$$

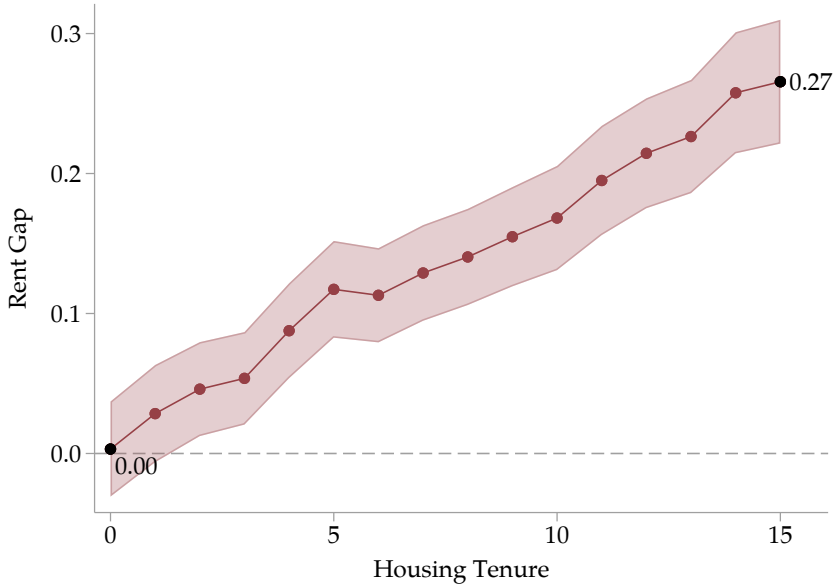
The δ_k-coefficients allow us to estimate how the rent gap evolves with housing tenure in a non-parametric manner for up to K (typically 15) years after moving in. The flat controls X_{ht} include construction year cohort fixed effects, landlord group fixed effects as well as indicators for whether the rent is publicly subsidized or reduced for other reasons.[11] Market rents typically stem from relatively newer buildings, and are disproportionately owned by private firms or individuals. Since units in newer and privately owned buildings tend to be more expensive, we account for these characteristics in our analysis. For the depicted estimated profiles, we hold these characteristics constant by setting the corresponding control variables to their sample means in the market rent data.[12] $\lambda_{c(ht)}$ are cohort fixed effects in five year intervals. Standard errors are clustered at the household level. In our baseline estimation sample, we estimate Equation (3) using an unbalanced panel of households with tenure between zero and 15 years. As a robustness check, we will restrict the sample to households for which we observe the move-in event, or to a balanced panel of households observed over the entire tenure window.

Figure 4 shows our main estimates of how the rent gap evolves as households accumulate tenure. Our matching procedure, combined with the inclusion of additional control variables in the regression, allows us to closely align the rent levels of newly occupied units in the survey data with those of comparable market rents in the listings data, as can be seen from the near-zero rent gap in year 0 of tenure. In subsequent years, the rent gap increases steadily, reaching 27 log points after 15 years of continuous residence in the same housing unit. The estimated profiles remain similar when restricting the estimation sample to households for which we observe the move-in event or to a balanced panel of households observed continuously for zero to ten years of tenure (see Figure B2). However, the magnitudes are slightly larger in

[11] For instance, employer-owned housing or dwellings owned by relatives are often rented at below-market rates.

[12] Specifically, we use the average distribution of construction cohorts shown in column (2) in Table 1 and additionally assume that the unit is privately owned and not rented out at a discounted rate.

Figure 4: Estimated Rent Gap Profile over Housing Tenure

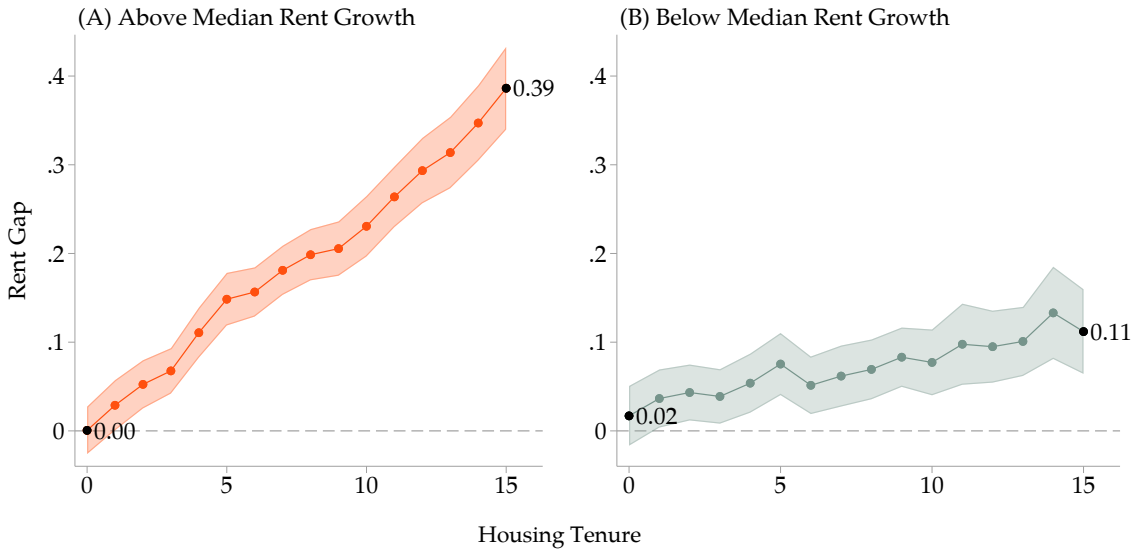


Notes: This plot shows the estimated housing tenure coefficients (δ_k) from estimating Equation (3) for the full sample of tenant-occupied units that we successfully match to units available on the market. The rent gap is measured as the difference in the log average rent per square meter among comparable units listed available for rent and the log rent per square meter for a tenant-occupied unit. Rents are measured excluding utilities.

these restricted samples, with the estimated rent gap reaching 28 log points after only ten years of tenure. When we restrict the sample to households that we observe at the time of moving in, the estimated coefficients for later tenure years are necessarily based on more recent sample years. During this period, we also observe larger rent gaps in the descriptive profiles, primarily driven by accelerated growth in market rents, which could explain the larger rent gap for these samples compared to Figure 4.

Heterogeneity across regions. We next investigate whether rent gaps vary systematically across locations. In areas with limited market rent growth, for example, the rents paid by incumbent tenants may not diverge substantially from those of comparable units on the market. To analyze this, we calculate the cumulative growth in hedonic market rent indices for each county from the beginning to the end of the sample period. We then distinguish households depending on whether they reside in a county that experienced below- or above-median rent growth for that time period. Figure 5 displays the estimated rent gap profiles for each of the two regional groups. Units located in counties with low market rent growth accumulate an estimated rent gap of only 11 log points after 15 years of housing tenure. In contrast, in regions with high market rent growth, the corresponding gap reaches 39 log points. Consequently, households that choose to relocate to comparable units in high-growth areas would incur significantly higher rental costs than incumbent households.

Figure 5: Estimated Rent Gap Profile over Housing Tenure by Rent Growth of the County



Notes: Panel (A) shows the estimated housing tenure coefficients (δ_k) from estimating Equation (3) for housing units in counties that experienced above median rent growth between 2007 and 2019. Panel (B) shows the corresponding profile for units in counties that experienced below median rent growth between 2007 and 2019. Rent growth is measured as the cumulative growth rate in the hedonic rent index among market units during our sample period. The rent gap is measured as the difference in the log average rent per square meter among comparable units listed available for rent and the log rent per square meter for a tenant-occupied unit. Rents are measured excluding utilities.

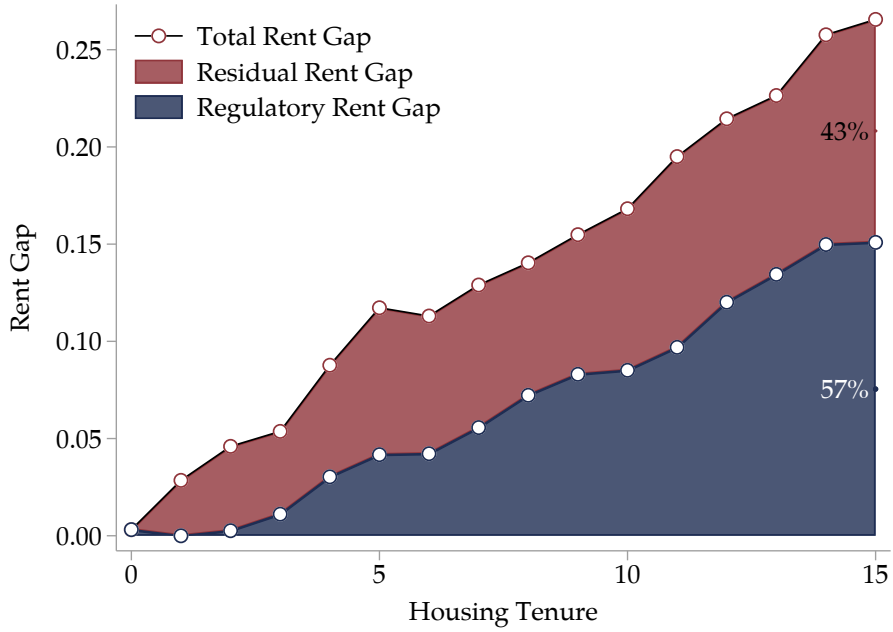
3.3 Heterogeneity

We now turn to examining why rents in tenant-occupied units grow more slowly than market rents. A widely studied explanation is rent control within tenancies (e.g. Diamond et al., 2019), which we will investigate first.

The role of regulation. As outlined in Section 2.1, rent control regulations impose limits on the extent to which landlords can increase rents within ongoing tenancies. Landlords are restricted both in terms of the rent level they can set after an increase and the frequency with which they are allowed to raise rents. We now assess the extent to which the measured rent gaps can be purely explained by this within-tenancy rent control. To this end, we construct a counterfactual rent gap that would have emerged if landlords had consistently set rents at the legal maximum throughout the tenancy. For example, when constructing the counterfactual rent level, we assume that landlords raise rents to the maximum permissible level after just one year of tenancy. Once we have constructed the counterfactual rent, we can compute a "regulatory rent gap" by taking the difference between the observed (log) market rent and the maximum legal rent for each household h in our panel:

$$\text{Regulatory Rent Gap}_{ht} = \log(\text{Market Rent}_{m(h)t}) - \log(\text{Maximum Legal Rent}_{ht}) \quad (4)$$

Figure 6: Decomposition of Rent Gap



Notes: This plot shows the total rent gap (black, red-dotted line) alongside the regulatory rent gap (black, blue-dotted line). The rent gap is measured as the difference in the log average rent per square meter among comparable units listed available for rent and the log rent per square meter for a tenant-occupied unit. The regulatory rent gap corresponds to the difference between market rents and the rents among units if landlords had set rents continuously at their legal maximum, in line with the regulation on within-tenancy rent control. Details on how we construct rents in line with regulation can be found in Appendix C.

We can also compute the "residual rent gap" which is the difference between the maximum legal rent and the actual rent paid by each household h:

$$\text{Residual Rent Gap}_{ht} = \log(\text{Maximum Legal Rent}_{ht}) - \log(\text{Actual Rent}_{ht}) \quad (5)$$

The sum of the regulatory and residual rent gaps is the total rent gap. Details on how we calculate the (counterfactual) maximum legal rents are provided in Appendix C.

Figure 6 plots the regulatory rent gap alongside our previously estimated total rent gap. It shows that even if landlords had fully exhausted the legal limits, market rents would have exceeded these regulated rents by approximately 14 log points, accounting for about 57% of the total rent gap. This suggests that the existing regulatory framework constrains rent growth in tenant-occupied units, preventing it from keeping pace with the growth of market rents. However, Figure 6 also reveals that a sizeable fraction of the rent gap cannot be attributed to within-tenancy rent control. In particular, landlords appear not to raise rents to the levels permitted under existing regulations. After 15 years of tenure, the "residual rent gap" accounts for around 43% of the total rent gap. Figure B3 in the appendix shows that regulation appears to have greater impact in areas with high market rent growth, accounting for 59% of the

Figure 7: Decomposition of Rent Gap by Landlord Group

Notes: This plot shows the total rent gap (black, red-dotted line) alongside the regulatory rent gap (black, blue-dotted line). The rent gap is measured as the difference in the log average rent per square meter among comparable units listed available for rent and the log rent per square meter for a tenant-occupied unit. The regulatory rent gap corresponds to the difference between market rents and the rents among units if landlords had set rents continuously at their legal maximum, in line with the regulation on within-tenancy rent control. Details on how we construct rents in line with regulation can be found in Appendix C.

total gap, and less in locations with limited rent growth, where it explains only 34% of the total gap. This decomposition exercise suggests that while regulation plays a major role in explaining why rents in tenant-occupied units grow more slowly than market rents, a sizeable share of the rent gap appears to be driven by factors beyond formal regulatory constraints.

Other mechanisms. Next, we examine whether the residual rent gap varies across households, focusing on whether landlord types differ in their tendency to set rents near the legal maximum. Private individuals, the largest group of landlords in Germany, may be less inclined to impose large rent increases, either due to personal relationships with the tenants or limited knowledge of the legal framework governing rent adjustments. We focus on two groups of landlords: private individuals and institutional landlords, which include private firms and cooperatives that rent out housing units. Figure 7 presents the decomposition of the rent gap separately for these two groups. The two panels show that units owned by private landlords accumulate a larger total rent gap, with a smaller share attributable to regulation compared to institutional landlords (31% versus 60%). This difference is largely driven by the fact that private landlords set rents below market levels from the very beginning of the tenancy, and do not adjust rents up to the legal limit in subsequent years.

We now provide further evidence of differences in rent-setting behavior between

Table 2: Rent Adjustments by Landlord Group

	$\mathbf{1}\{\text{Increased Rent}\}$			Δ log(Rent) | Changed Rent		
	(1)	(2)	(3)	(4)	(5)	(6)
Institutional Landlord	0.070***	0.075***	0.084***	0.013***	0.010*	0.008
	(0.012)	(0.013)	(0.014)	(0.005)	(0.006)	(0.007)
Year FE	✓	✓	✓	✓	✓	✓
Controls		✓	✓		✓	✓
County FE			✓			✓
Mean Outcome	0.22	0.22	0.22	0.04	0.04	0.04
Observations	16,818	16,818	16,818	5,390	5,390	5,371

Notes: This table presents results from estimating Equation (1). The outcome in columns (1) to (3) is a dummy variable taking the value of 1 if the household experienced a rent increase between the current and the previous year. The outcome in columns (4) to (6) is the difference in log rents between t and $t-1$, conditional on the landlord changing the rent. Institutional landlord is a dummy variable that takes the value of 1 if the landlord is a private firm or a cooperative, and 0 if the landlord is a private person. Controls include floor space and fixed effects for the number of rooms, construction cohorts and distance to the closest city center. Standard errors in parentheses are clustered at the housing unit level. Asterisks indicate *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

the two landlord groups. Using the panel dimension of the SOEP household survey, we can track how often and by how much households experience rent increases during their tenancy. In this analysis, we restrict the estimation sample to households who are observed in the same dwelling for at least three consecutive years and report their rent consistently over these years (either always including or always excluding utilities). To avoid capturing reporting errors in our measure of rent adjustments, we restrict attention to changes that are not reversed in the subsequent year. We then estimate the following regression for household h in year t and county c:

$$y_{ht} = \beta_0 + \beta_1 \mathbf{1}\{\text{Institutional Landlord}_{ht}\} + X'_{ht}\gamma + \tau_t + \eta_{c(ht)} + \epsilon_{ht} \tag{6}$$

where y_{ht} denotes either an indicator for experiencing a rent increase between $t-1$ and t, or the change in log rent conditional on a rent adjustment by the landlord. The coefficient of interest, β_1, captures the difference in rent adjustment patterns between private and institutional landlords. X_{ht} are housing unit controls, and τ_t and $\eta_{c(ht)}$ are year and county fixed effects, respectively. We cluster standard errors at the household-housing unit-level.

Columns (1) to (3) in Table 2 indicate that institutional landlords are 7–8.5 percentage points (35–42%) more likely than private landlords to raise rents in a given year. When they do adjust rents, institutional landlords impose slightly larger increases, though this difference becomes statistically insignificant once county fixed effects are included (columns (4) to (6)). We interpret these results as suggestive evidence that

factors beyond rent control—such as personal proximity to the tenant or knowledge of the legal framework on rent increases, proxied by whether the landlord is a private individual or a professional—contribute to the size of the rent gap.

4 Model

In this section, we set up an overlapping generations model in which young workers work in the location in which they are born before then choosing the location in the next period when they are old. If the destination of old workers in the second period is different from the initial location, they pay the prevailing market rent in the new destination. If they remain in their original location, they continue to pay their initial rent. Rents therefore do not change with tenure in a given location. This is the main assumption in our model, supported by the empirical evidence presented in the previous section. For simplicity, we assume that all consumption is housing and that households live hand-to-mouth. In the appendix, we set up an extended model in which households are allowed to save.

Preferences. Let a household's utility currently living in location c be given by

$$U = \ln C_{c,t} + \beta \ln C_{c',t+1}$$

which they maximize subject to their first and second period budget constraints

$$p_{c,t}C_{c,t} \leq w_{c,t} \quad \text{and} \quad p_{c',t+1}C_{c',t+1} \leq w_{c',t+1}.$$

The first-order conditions are given by

$$\frac{1}{C_{c,t}} = \lambda_1 p_{c,t} \quad \text{and} \quad \frac{\beta}{C_{c',t+1}} = \lambda_2 p_{c',t+1}$$

so that optimal consumption is given by

$$C_{c,t} = \frac{w_{c,t}}{p_{c,t}} \quad \text{and} \quad C_{c',t+1} = \frac{w_{c',t+1}}{p_{c',t+1}}.$$

Indirect utility. Indirect utility of people born in location c at time t, and moving to location c' at time $t+1$ is given by:

$$\ln V_{c,c',t} = cons + \ln(w_{c,t}) + \beta \ln(w_{c',t+1}) - \ln p_{c,t} - \beta \ln p_{c',t+1} - \mathbb{1}_{c \neq c'} \ln \kappa + \varepsilon_{i,c',t}$$

where κ denote mobility cost and $\varepsilon_{i,c',t}$ represents idiosyncratic tastes for locations that are i.i.d. draws from a Type I extreme value distribution with scale parameter σ. The systematic component of indirect utility is thus equal to life-time earnings, minus housing costs.

Location choice. Individuals choose the destination in period $t+1$ that maximizes their indirect utility. For each cohort born in c at time t, the fraction

$$\pi_{c,c',t} = (\frac{V_{c,c',t}}{V_{c,t}})^{1/\sigma}$$

moves from origin location c to destination location c', where

$$V_{c,t} = (\sum_{k} V_{c,k,t}^{1/\sigma})^{\sigma}.$$

Rental gaps. Since we assume that, for stayers, $\ln p_{c,t+1} = \ln p_{c,t}$, the relative probability of moving to location c' relative to staying in location c is given by

$$\ln \frac{\pi_{c,c',t}}{\pi_{c,c,t}} = \frac{1}{\sigma}[\beta(\ln w_{c',t+1} - \ln w_{c,t+1}) - \beta(\ln p_{c',t+1} - \ln p_{c,t}) - \ln \kappa]$$

which can be written as

$$\ln \frac{\pi_{c,c',t}}{\pi_{c,c,t}} = \frac{1}{\sigma}[\beta \underbrace{(\ln w_{c',t+1} - \ln w_{c,t+1})}_{\text{income differences}} - \beta \underbrace{(\ln p_{c',t+1} - \ln p_{c,t+1})}_{\text{market rent differences}} - \beta \underbrace{(\ln p_{c,t+1} - \ln p_{c,t})}_{\text{rental gap}} - \ln \kappa]$$

Mobility thus increases in the difference in income levels between the origin and destination location, decreases in the difference in market rents, decreases in the rental gap between the market rent in the origin location and the current rent of the household, and decreases in the migration cost. Most existing studies implicitly assume that households always pay the prevailing market rent. If there are rental gaps and these are omitted from the specification, their impact will be loaded onto the migration cost term, exacerbating the latter's role for mobility. Our analysis thus helps to open the black box of mobility costs and shed light on their origins.

Population dynamics. The law of motion for the old population in location c is

$$L_{c,t+1}^{old} = \sum_{c'} \pi_{c',c,t} L_{c',t}^{young}.$$

The law of motion for the young population in location c is

$$L_{c,t+1}^{young} = (1+n) L_{c,t}^{old}$$

assuming that every old person has (1+n) children. The total population in location c at time $t+1$ is then

$$L_{c,t+1} = L_{c,t+1}^{young} + L_{c,t+1}^{old}.$$

Labor market. The production function in location c combines capital and labor:

$$Y_{c,t} = F(K_{c,t}, L_{c,t}) = A_{c,t} K_{c,t}^{\alpha} L_{c,t}^{1-\alpha}$$

Profit maximization implies that

$$\ln w_{c,t} = \ln(1-\alpha) - \ln L_{c,t} + \ln Y_{c,t}$$

If capital is elastically supplied, then

$$\ln w_{c,t} = \ln A_{c,t} + \ln(1-\alpha) + \alpha \ln k^*_{c,t}$$

where $k^*_{c,t}$ is the (constant) capital-labor ratio.

Land allocation. Total land available in location c, denoted by T_c, can be used by households that remain in this location ("incumbents") or households that newly arrive in the location ("newcomers"):

$$T_c = T^I_{c,t} + T^N_{c,t}$$

Note that each period a fraction $\pi_{c,c,t}$ of the young remains in their original location. The land available for newcomers is the total land minus the land that continues to be used by these incumbents.

$$T^N_{c,t} = T_c - T^I_{c,t}.$$

Housing market. There is a representative firm that produces housing services according to the following production function, where Z is productivity, X is a tradable input (with $p_X = 1$), and $T_{c,t}$ is the land available for housing services:

$$H_{c,t}(T_{c,t}) = \mathbb{Z}_{c,t} X^{\gamma}_{c,t} T^{1-\gamma}_{c,t}$$

Profit maximization leads to:

$$H_{c,t}(p_{c,t}) = Z_{c,t} T_{c,t} p^{\eta}_{c,t}$$

where $Z_{c,t} \equiv \mathbb{Z}^{\frac{1}{1-\gamma}}_{c,t} \gamma^{\frac{\gamma}{1-\gamma}}$ and $\eta \equiv \frac{\gamma}{1-\gamma}$. The aggregate supply of housing services is $p_{c,t} H_{c,t}(p_{c,t})$.

Land available. Housing consumption of stayers is given by

$$\frac{w_{c,t}}{p_{c,t-1}} \pi_{c,c,t-1} L^{young}_{c,t-1}.$$

Housing services needed for this demand are:

$$Z_{c,t} T^I_{c,t} p^{\eta}_{c,t-1}.$$

Hence

$$T^I_{c,t} = \frac{w_{c,t} \pi_{c,c,t-1} L^{young}_{c,t-1}}{Z_{c,t} p^{1+\eta}_{c,t-1}}$$

leaving $T^N_{c,t} = T_c - T^I_{c,t}$ available for newcomers.

Housing market equilibrium for newcomers. Demand for housing from newcomers equals supply:

$$\underbrace{\sum_{c' \neq c} \pi_{c',c,t-1} L^{young}_{c',t-1} w_{c,t}/p_{c,t}}_{\text{newcomers from other locations}} + \underbrace{L^{young}_{c,t} w_{c,t}/p_{c,t}}_{\text{next generation}} = Z_{c,t} T^N_{c,t} p^{\eta}_{c,t}$$

which can be rearranged to

$$w_{c,t}\left(\sum_{c' \neq c} \pi_{c',c,t-1} L^{young}_{c',t-1} + L^{young}_{c,t}\right) = Z_{c,t} T^N_{c,t} p^{1+\eta}_{c,t}.$$

The market rent in location c—the price that newcomers must pay for their housing—is then given by

$$p_{c,t} = \left[\frac{w_{c,t}\left(\sum_{c' \neq c} \pi_{c',c,t-1} L^{young}_{c',t-1} + L^{young}_{c,t}\right)}{Z_{c,t} T^N_{c,t}}\right]^{\frac{1}{1+\eta}}$$

Market rents are thus increasing in the expected income of newcomers and the size of their population, and decreasing in the land available for newcomers and the productivity of the housing sector (which can be linked to legislation). Since rental gaps tie households to their locations, land becomes scarce for newcomers which raises the market rent and deters migrant inflows relative to a counterfactual world without rent gaps.

5 Quantitative Implications

5.1 Effects on Household Mobility

We now examine how the rent gap influences household mobility, specifically assessing the extent to which the decline in mobility with increasing tenure can be explained by the rent gap. For this purpose, we again draw on our matched household panel and estimate the following regression:

$$\mathbf{1}\{\text{Moves}_{ht}\} = \beta_0 + \beta_1 \text{Rent Gap}_{ht} + \sum_{l=1}^{3} \beta_{2l} \text{Housing Tenure}^l_{ht} + Z'_{ht}\delta + \tau_t + \epsilon_{ht} \quad (7)$$

where the outcome is an indicator variable for whether household h moves to a different flat between year t and the following year. Across specifications, Z_{ht} includes

Table 3: Association of Rent Gap with Household Mobility

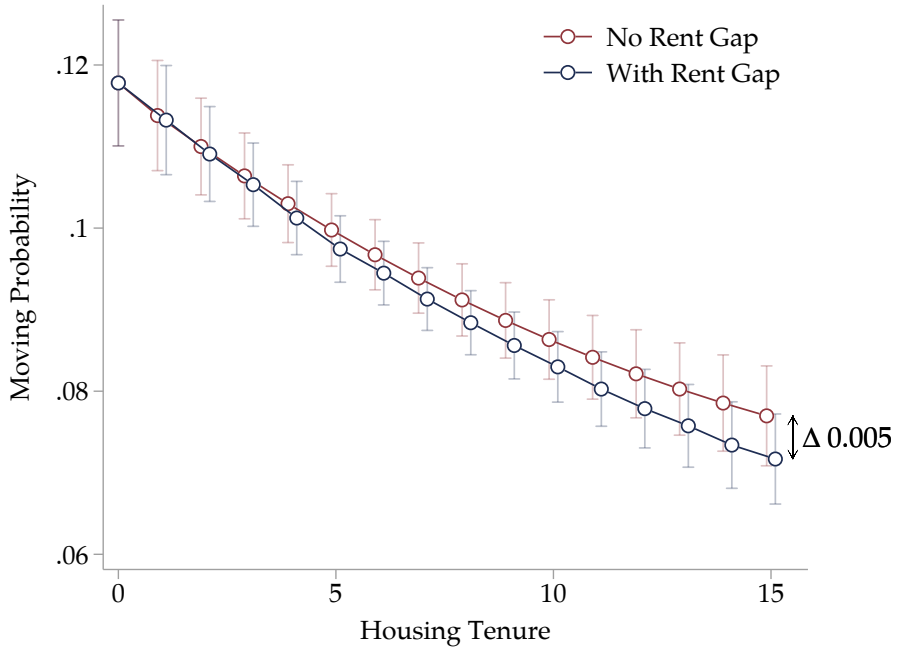
	(1)	(2)	(3)	(4)	(5)	(6)
Rent Gap	-0.0327***	-0.0163***	-0.0212***	-0.0209***	-0.0200***	-0.0214***
	(0.0053)	(0.0051)	(0.0049)	(0.0049)	(0.0049)	(0.0049)
Tenure		-0.0105***	-0.0042***	-0.0041***	-0.0041***	
		(0.0007)	(0.0006)	(0.0006)	(0.0006)	
Tenure^2 ($\times 10^2$)		0.0258***	0.0106***	0.0101***	0.0102***	
		(0.0024)	(0.0022)	(0.0022)	(0.0022)	
Tenure^3 ($\times 10^3$)		-0.0018***	-0.0007***	-0.0007***	-0.0007***	
		(0.0002)	(0.0002)	(0.0002)	(0.0002)	
Age Controls			✓	✓	✓	✓
Household Controls				✓	✓	✓
Regional Controls					✓	✓
Location Tenure						✓
Mean Outcome	0.089	0.089	0.089	0.089	0.089	0.090
Observations	63,017	63,017	63,017	63,017	63,017	63,484

Notes: This table presents results from estimating Equation (7). The outcome is a dummy variable taking the value 1 if a household moves between the current and the next year. The rent gap is measured as the difference in the log average rent per square meter among comparable units listed available for rent and the log rent per square meter for a tenant-occupied unit. Tenure refers to years since moving into the current flat. Age controls include a cubic specification in the age of the household head. Household controls include fixed effects for the household composition and migration background. Regional covariates control for expected differences in log GDP per worker at destination relative to origin, as well as the expected employment rate difference between the two. All specifications include year fixed effects as well housing unit characteristics. Standard errors in parentheses are clustered at the household level. Asterisks indicate *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

the same housing unit controls that we use in our rent gap analysis: building age and landlord group fixed effects (Section 3.2). We also include a cubic in the household head's age and additional household controls—household composition fixed effects and an indicator for migration background—in the more saturated models. τ_t are year fixed effects. We cluster standard errors at the household level. Our main results use a cubic specification for housing tenure, which we relax in the robustness checks.

The results in Table 3 show that higher rent gaps are negatively associated with household mobility. While the magnitude decreases after controlling for housing tenure, it remains largely unchanged when adding age and additional household controls in columns (3) and (4), respectively. The migration choice equation in our model (Equation (5)) implies that (expected) income differences between the destination and the origin also influence migration decisions. Accordingly, in column (5), we additionally control for expected wage differentials between the next period's location and the origin, as well as for the corresponding expected differences in employment rates. Finally, the results remain robust when controlling for tenure in the

Figure 8: Simulated Moving Profiles with and without Rent Gap



Notes: This figure shows the simulated moving profiles, based on the estimates from column (4) in Table 3. The profile with rent gap (blue) shows the predicted probability of moving as the rent gap increases with tenure as estimated in Figure 4. The profile with no rent gap (red) assumes that the rent gap remains at zero throughout the entire profile. Other control variables are set to their sample mean. Points are offset horizontally for visual clarity. Capped spikes denote 95 percent confidence intervals.

county rather than tenure in the current dwelling (column (6)). Appendix Table A.2 presents further robustness checks, including specifications with county fixed effects, household fixed effects, and variations in the estimation sample.

To illustrate the magnitude of the rent gap effect, we simulate two moving profiles based on the estimates from our preferred specification in column (5). Specifically, we compare a profile where the rent gap evolves as in our main results from Figure 4 (from zero when households move in to 0.27 after 15 years of tenure) with a counterfactual profile in which the rent gap is held at zero throughout tenure accumulation. For both profiles, all control variables are set to their sample means. Figure 8 shows the two moving profiles. Our point estimates imply that, in the absence of the rent gap, household mobility would be 0.5 percentage points higher, accounting for roughly 11% of the total decline in mobility observed over fifteen years of tenure, holding other covariates constant.

Regional heterogeneity. We next examine whether the effects vary with regional exposure to market rent growth. Following our main analysis, we classify counties into those with below-median and above-median rent growth, and then estimate Equation (7) separately for households in each group. Table 4 reports our main coefficient of interest, while Table A.3 in the appendix also presents the tenure coefficient

Table 4: Association of Rent Gap with Household Mobility by Rent Growth of the County

	Below Median Rent Growth			Above Median Rent Growth		
	(1)	(2)	(3)	(4)	(5)	(6)
Rent Gap	-0.009	0.002	0.001	-0.042***	-0.022***	-0.025***
	(0.010)	(0.009)	(0.009)	(0.007)	(0.007)	(0.006)
Tenure Controls		✓	✓		✓	✓
Age Controls			✓			✓
Household Controls			✓			✓
Regional Controls			✓			✓
Mean Outcome	0.095	0.095	0.094	0.086	0.086	0.085
Observations	26,600	26,600	26,557	36,550	36,550	36,460

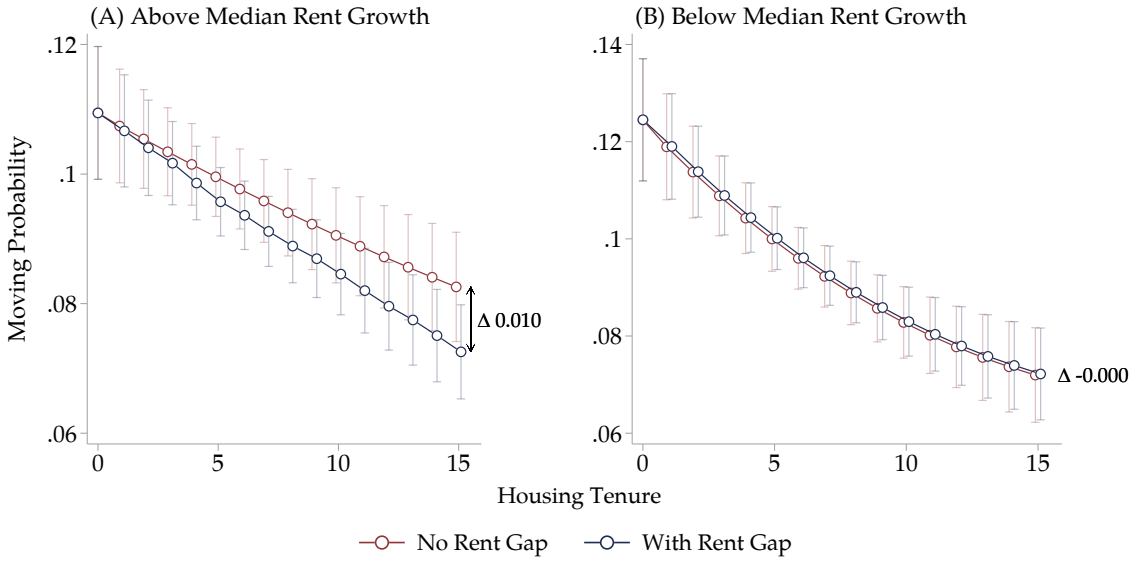
Notes: This table presents results from estimating Equation (7), separately for households in counties with below and above median market rent growth between 2007 and 2019. The outcome is a dummy variable taking the value of 1 if a household moves between the current and the next year. The rent gap is measured as the difference in the log average rent per square meter among comparable units listed available for rent and the log rent per square meter for a tenant-occupied unit. Tenure and age controls include a cubic specification in housing tenure and age of the household head, respectively. Household controls include fixed effects for the household composition and migration background. Regional covariates control for expected differences in log GDP per worker at destination relative to origin, as well as the expected employment rate difference between the two. All specifications include year fixed effects as well housing unit characteristics. Standard errors in parentheses are clustered at the household level. Asterisks indicate *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

estimates. The table shows that the rent gap is negatively associated with household mobility only in locations where market rents have grown significantly. In our preferred specification in columns (3) and (6), we only find and significant effect of the rent gap on household mobility in locations with above median rent growth. This pattern is also reflected in the rent gap's contribution to the declining mobility profile over household tenure. As shown in Figure 9, the small rent gap in low-growth regions explains very little of the change in moving rates, whereas in high-growth regions it accounts for 1 percentage points (27%) of the decline in household mobility.

5.2 Next Steps

We plan to use our estimates from the mobility regressions to quantify the parameter that governs the migration elasticity (σ) in the model from Section 4. We will then quantify the model by combining county-level aggregate data with information on local rent gaps and cohort sizes from the Microcensus. Using the quantified model, we will simulate counterfactual scenarios in which rent gaps are eliminated. With

Figure 9: Simulated Moving Profiles by Rent Growth of the County



Notes: This figure shows the simulated moving profiles, based on the estimates from column (3) and (6) in Table 4, separately for housing units in counties that experienced above (Panel (A)) and below median market rent growth (Panel (B)) between 2007 and 2019. The profile with rent gap (blue) shows the predicted probability of moving as the rent gap increases with tenure as estimated in Figure 4. The profile with no rent gap (red) assumes that the rent gap remains at zero throughout the entire profile. Other control variables are set to their sample mean. Points are offset horizontally for visual clarity. Capped spikes denote 95 percent confidence intervals.

these exercises, we want to understand how the spatial distribution of rents and, in turn, the allocation of households and economic activity would have evolved in the absence of housing market frictions.

6 Conclusion

In this paper, we document sizable gaps between market rents and the rents paid by incumbent households, particularly in areas with high rent growth. We further show that roughly half of this gap cannot be explained by rent control regulations—evidence that is difficult to reconcile with the presence of landlord market power. To interpret these findings, we embed the incumbent cost-of-living advantage in an overlapping generations spatial equilibrium model. Consistent with the model's predictions, we find that residential mobility declines as a household's rent gap increases, and that the emergence of rent gaps contributes substantially to the declining mobility profile observed in the data.

Going forward, we will combine our reduced-form estimates with county-level data to quantify the model and simulate counterfactual scenarios in which housing market frictions are absent.

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A Appendix

A Additional Tables

Table A.1: Number of Observations by Dataset During Cleaning Protocol

	SOEP (1)	**Microcensus** (2)	**RWI-GEO-RED** (3)
Cleaning Steps			
Baseline	309,428	2,619,146	21,786,084
Renting Tenants/Units	164,701	1,273,691	21,786,084
Monthly Rent $\in$ [1-5000€]	147,995	1,149,480	21,772,686
Drop Unit Outliers	146,445	1,145,270	21,698,880
Drop Refugee Samples (SOEP)	142,678	1,145,270	21,698,880
Observation Type	Household-Year	Household-Year	Listed Unit
Final Observations	142,678	1,145,270	21,698,880

Notes: This table shows the number of observations across datasets at each step of the cleaning process. The SOEP has been restricted to the years 1998 and onward at baseline. The RWI-GEO-RED has been restricted to units available for rent at baseline. Rent refers to monthly rent expenditures excluding bills, namely utility costs and heating. Units outliers are defined as apartments with more than seven rooms or a floor space smaller than 15 square meters or larger than 400 square meters. The refugee samples in the SOEP (samples M3, M4 and M5) are dropped in the last step.

Table A.2: Association of Rent Gap with Household Mobility: Robustness Checks

	(1)	(2)	(3)
Rent Gap	-0.0191***	-0.0209**	-0.0287***
	(0.0049)	(0.0106)	(0.0063)
Tenure	-0.0039***	0.0383***	-0.0039***
	(0.0006)	(0.0020)	
Tenure^2 $(\times 10^2)$	0.0097***	-0.1224***	0.0097***
	(0.0021)	(0.0102)	
Tenure^3 $(\times 10^3)$	-0.0007***	0.0128***	-0.0007***
	(0.0002)	(0.0014)	
Age Controls	✓	✓	✓
Household Controls	✓	✓	✓
Household FE		✓	
Nonparametric Tenure			✓
Mean Outcome	0.09	0.09	0.11
Observations	63,150	63,150	50,751

Notes: This table presents results from estimating Equation (7). The outcome is a dummy variable taking the value 1 if a household moves between the current and the next year. The rent gap is measured as the difference in the log average rent per square meter among comparable units listed available for rent and the log rent per square meter for a tenant-occupied unit. Tenure refers to years since moving into the current flat. Age controls include a cubic specification in the age of the household head. Household controls include fixed effects for the household composition and migration background. All specifications include year fixed effects as well housing unit characteristics. Standard errors in parentheses are clustered at the household level. Asterisks indicate *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

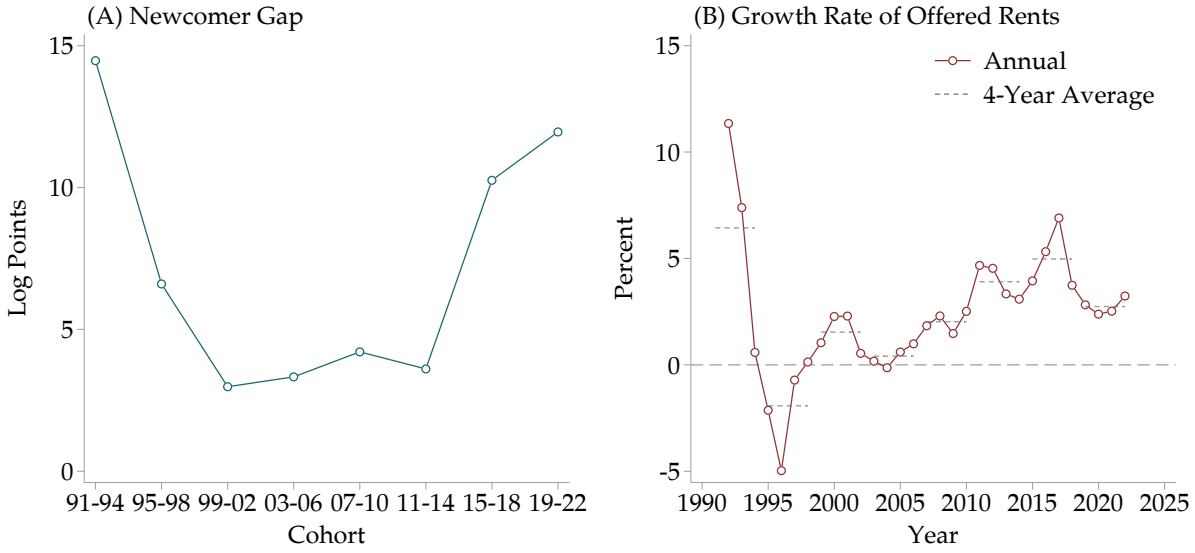
Table A.3: Association of Rent Gap and Household Mobility by Rent Growth of the County: With Tenure Estimates

	Below Median Rent Growth			Above Median Rent Growth		
	(1)	(2)	(3)	(4)	(5)	(6)
Rent Gap	-0.0146	-0.0038	-0.0050	-0.0396***	-0.0200***	-0.0230***
	(0.0093)	(0.0090)	(0.0089)	(0.0067)	(0.0064)	(0.0062)
Tenure		-0.0115***	-0.0055***		-0.0096***	-0.0021**
		(0.0010)	(0.0009)		(0.0010)	(0.0010)
Tenure^2 $(\times 10^2)$		0.0301***	0.0159***		0.0237***	0.0017
		(0.0033)	(0.0031)		(0.0049)	(0.0049)
Tenure^3 $(\times 10^3)$		-0.0022***	-0.0012***		-0.0018***	0.0002***
		(0.0003)	(0.0003)		(0.0006)	(0.0006)
Age Controls			✓			✓
Household Controls			✓			✓
Mean Outcome	0.09	0.09	0.09	0.08	0.08	0.08
Observations	26,600	26,600	26,600	36,550	36,550	36,550

Notes: This table presents results from estimating Equation (7), separately for households in counties with below and above median market rent growth between 2007 and 2019. The outcome is a dummy variable taking the value of 1 if a household moves between the current and the next year. The rent gap is measured as the difference in the log average rent per square meter among comparable units listed available for rent and the log rent per square meter for a tenant-occupied unit. Tenure and age controls include a cubic specification in housing tenure and age of the household head, respectively. Household controls include fixed effects for the household composition and migration background. All specifications include year fixed effects as well housing unit characteristics. Standard errors in parentheses are clustered at the household level. Asterisks indicate *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

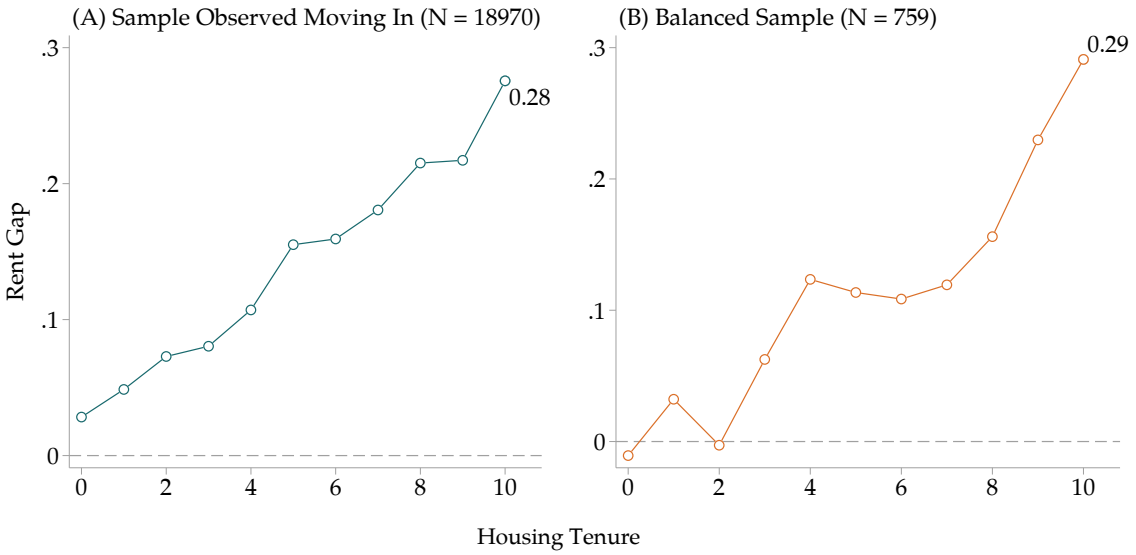
B Additional Figures

Figure B1



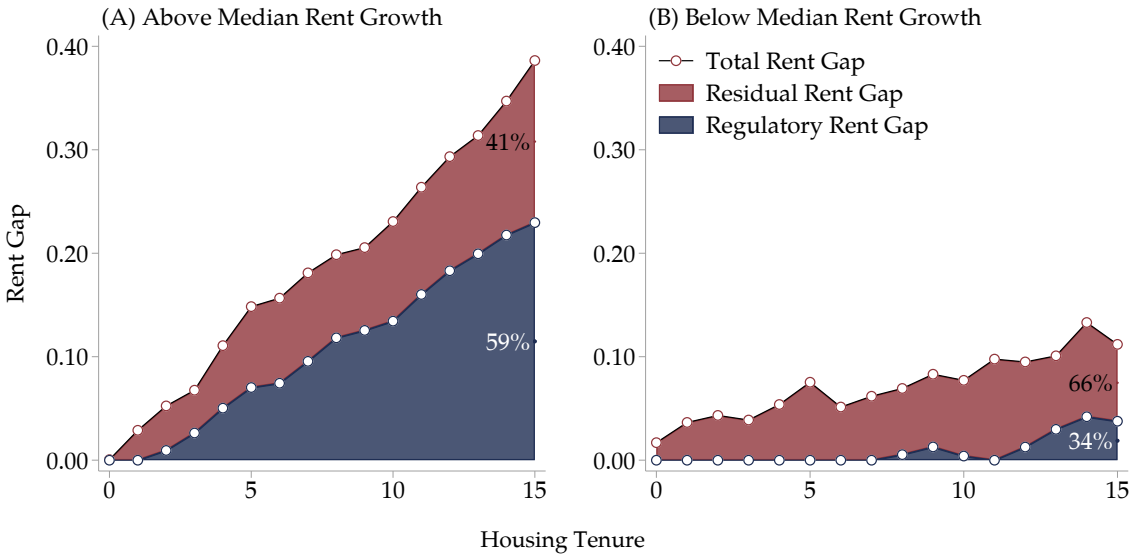
Notes: Panel (A) shows the raw rent gap in log points between newcomers from the cohort on the x-axis and the previous moving-in cohort. For example, the 2015-2018 newcomer cohort paid rents in 2018 that were around ten log points above the rent of the previous cohort. Panel (B) shows the average growth rate of listed rents at annual frequency and a four-year average. Source: Microcensus and *bulwiengesa AG*.

Figure B2: Estimated Rent Gap Profile over Housing Tenure for Different Estimation Samples



Notes: This plot shows the estimated housing tenure coefficients (δ_k) from estimating Equation (3) for different estimation samples. Panel (A) estimates the rent gap profile among households that we observe moving in to their flat. Panel (B) estimates the rent gap profile among households that we observe continuously between zero and ten years of tenure in their housing unit. The rent gap is measured as the difference in the log average rent per square meter among comparable units listed available for rent and the log rent per square meter for a tenant-occupied unit. Rents are measured excluding utilities. N refers to the number of household-year observations.

Figure B3: Decomposition of Rent Gap by Rent Growth of the County



Notes: This plot shows the total rent gap (black, red-dotted line) alongside the regulatory rent gap (black, blue-dotted line) for counties with below median rent growth (Panel (A)) and counties with above median rent growth (Panel (B)). Rent growth is measured as the cumulative growth rate in the hedonic rent index of units listed on the market during our sample period. The rent gap is measured as the difference in the log average rent per square meter among comparable units listed available for rent and the log rent per square meter for a tenant-occupied unit. The regulatory rent gap corresponds to the difference between market rents and the rents among units if landlords had set rents continuously at their legal maximum, in line with the regulation on within-tenancy rent control. Details on how we construct rents in line with regulation can be found in Appendix C.

C Constructing Maximum Rents in Line with Regulation

In this Section, we outline how we construct the maximum permissible rents that landlords could charge for a given housing unit, in accordance with existing within-tenancy rent control regulations. As detailed in Section 2.1, landlords face two primary constraints when increasing rents for sitting tenants:

1. Rents can only be raised once every 15 months.
2. The rent after the increase needs to be below the local reference rent, and cannot be 20% (15%) above the contracted rent in the same unit three years before.

For our counterfactual calculation of the legal maximum rent, we assume that landlords are permitted to raise rents once every 12 months. To construct the applicable local reference rent, we use the same set of unit characteristics as in the market rent matching procedure—namely, the county, a house/apartment indicator, the number of rooms, and distance-to-city-center bins (defining the "market cell").

We again draw on data from the RWI-GEO-RED listings (Immoscout24) to obtain the average rent per square meter for comparable units within the same market cell over the contemporaneous and three preceding years. This dataset provides asking rents, which—as shown in our main analysis—closely approximate contracted rents after adjusting for building age and whether the unit is rented at a reduced rate. To convert asking rents into a proxy for contracted rents, we assume that listed rents exceed actual contracted rents by 8%, consistent with the unadjusted gap observed in our main sample at the time of move-in. For each unit, the local reference rent is then computed as the average rent per square meter in its respective market cell, averaged over the current and three preceding years, and multiplied by the unit's floor space. Since rental listings are only available from 2007 onward, we impute reference rents for earlier years by assuming that market cell-level rents grew at the same annual rate as observed in that county between 2007 and 2008.

The second constraint is the so-called Kappungsgrenze, which limits rent increases to a maximum of 20% over a three-year period—or 15% in municipalities officially designated as tight housing markets. The 15% threshold applies in municipalities identified by the Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR), for which we use the official lists published annually during our sample period. In non-urban areas (Kreisfreie Großstädte excluded), counties (*Landkreise*) comprise multiple municipalities. In these cases, we assume the 15% cap applies at the county level if at least half of the county's population resides in municipalities covered by the 15% threshold.

Using the local reference rent and the applicable rent increase threshold, we construct the maximum legal rent that landlords could charge under within-tenancy rent control as follows. In the first year after move-in, we assume that landlords raise the rent up to the level of the local reference rent, provided that the increase does

not exceed 20% (or 15% in tight housing markets) relative to the initial rent. In each subsequent year, we apply the same logic recursively: we check whether an increase from the *counterfactual legally permissible rent* in the previous year to a new rent level complies with both constraints—i.e., it does not exceed the current local reference rent and does not represent a cumulative increase of more than 20% (15%) compared to the counterfactual rent from three years prior