From Crown Jewel to Problem Child?

The Role of Central Business Districts in German Housing Markets

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Abstract

Urban economists model cities as monocentric entities organised around a Central Business District (CBD), where proximity to employers, retail and entertainment is capitalised into higher rents. We investigate the level, composition and evolution of this rent gradient for all 1,108 cities in Germany between 2012 and 2024. Our central methodological contribution is to define the CBD not as a single point but as an *area*, delineated from the density and spatial distribution of commercial establishments. On this basis we compute the CBD-premium: the rent difference between the inner city and the rest of the settlement area. We find pronounced heterogeneity across Germany. On average, the inner city is about 11% more expensive than the periphery; the premium reaches 18% in cities above 250,000 inhabitants, while roughly 27% of cities exhibit a *negative* premium. Around two thirds of the CBD-premium can be attributed to superior apartment quality, more desirable neighbourhood characteristics, and better access to transport infrastructure. CBD-premiums fell markedly between 2013 and 2016 but, contrary to the experience of US cities, did not register a lasting Covid shock; instead they have risen sharply in large cities since 2022, an increase largely accounted for by a higher valuation of central apartment characteristics.

Keywords: Monocentric City Model, Central Business District, Urban Rent Gradients, Working from Home, Gentrification
JEL Classification: R12, R31, R14, O18

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1 Introduction

For a long time, inner cities were thought to be the crown jewels of a city. Since the foundational work of Alonso (1960), Mills (1967) and Muth (1969), urban economists have modelled cities as monocentric entities organised around a Central Business District (CBD). Because it is costly to commute from the periphery to the centre, rents are bid up close to the CBD and decline with distance, so that households are compensated for longer journeys by lower housing costs. While intuitive, the monocentric model has been repeatedly scrutinised: real cities are often polycentric and take a wide variety of shapes. A large empirical literature has therefore asked whether the rent gradient predicted by theory actually exists, and, more recently, how it evolves over time. In the light of the rise of e-commerce and working from home (WFH) over the last decade, a pressing question has emerged: has the shine come off the inner city? If proximity to employers and retail matters less, the relative price of central living should fall (Duranton and Handbury, 2023).

This paper answers these questions for all 1,108 cities in Germany. We propose a novel, data-driven way of defining the CBD and use it to measure the CBD-premium—the rent difference between the inner city and the rest of the settlement area—its composition, and its evolution between 2012 and 2024. Three findings stand out. First, the CBD-premium is on average about 11%, but it is highly heterogeneous: it reaches 18% in cities above 250,000 inhabitants, while around 27% of German cities exhibit a negative premium. Second, roughly two thirds of the CBD-premium can be attributed to observable differences in apartment quality, neighbourhood characteristics, and access to transport infrastructure, rather than to centrality *per se*. Third, CBD-premiums fell strongly between 2013 and 2016 but did not exhibit a lasting Covid effect; instead they have risen markedly in large cities since 2022.

Our contribution is threefold. *First*, we add to the recent literature that revisits the structure of urban rent gradients (Ahlfeldt, 2011; Duranton and Puga, 2022; Liotta et al., 2022; Noebauer, 2023) by decomposing the gradient into the parts attributable to apartment quality, neighbourhood characteristics, and transport access. *Second*, we contribute to the literature on the effect of the Covid-19 pandemic on urban structure. Several studies for the United States document reduced central amenities and a declining role of commuting costs, and hence flatter gradients (Gupta et al., 2022; Duranton and Handbury, 2023; Ramani et al., 2024); international overviews paint a more mixed picture (Biljanovska and Dell'Ariccia, 2023; Ziemann et al., 2023). We are the first to study this question for

Germany with a purpose-built definition of the CBD, and we confirm the finding of Ziemann et al. (2023) that the US experience does not generalise. *Third*, and most importantly, we propose a new methodology for identifying the CBD that moves it from the point to the plane.

In most theoretical models the CBD is represented as a single point at the city's centre, primarily for analytical tractability (Brueckner et al., 1987), and almost all empirical studies follow this simplification. We instead follow Giuliano and Small (1991) and McMillen (2001) in defining the centre via density thresholds, and—closest to our approach—Ahlfeldt et al. (2024), who identify "prime locations" across 125 cities worldwide. Like theirs, our method detects centres with global rather than merely local dominance and can identify multiple centres within a single city. It differs in important respects: our areas are considerably larger, reflecting a broader conception of urban centrality, and we capture a more comprehensive range of economic activity, so that our CBDs align more closely with the everyday notion of "downtown."

The remainder of the paper proceeds as follows. Section 2 reviews the related literature. Section 3 describes our data and the construction of the CBD. Section 4 sets out the empirical strategy. Section 5 presents the results on the level, composition and evolution of the CBD-premium. Section 6 discusses limitations and policy implications, and Section 7 concludes.

2 Related Literature

Our work connects to three strands of literature.

How to define the city centre. A first strand is concerned with the empirical delineation of urban centres. International contributions identify centres from mobile-phone and activity data (Louail et al., 2014; Ban et al., 2017) or, most recently, from the global density of high-end business activity (Ahlfeldt et al., 2024). For Germany specifically, Krehl and Siedentop (2019) and Schmidt et al. (2021) examine the identification and relevance of (poly)centric structures. The way the centre is defined is consequential: as we show below, conventional point-based definitions can misplace the centre by kilometres and, when combined with concentric rings, induce substantial measurement error.

Is the city centre actually the crown jewel? A second strand tests whether the rent gradient predicted by the monocentric model is borne out in the data. Early studies found mixed results (Coulson, 1991; Cheshire and Sheppard, 1995;

Ahlfeldt, 2011). More recent work, using richer data and improved methods, consistently finds that city centres are more expensive (Combes et al., 2019; Duranton and Puga, 2022; Liotta et al., 2022; Noebauer, 2023). Cheshire and Sheppard (1995) in particular argue that gradients become visible only once one controls for confounding apartment and neighbourhood characteristics—a hypothesis our decomposition speaks to directly.

Is the shine coming off? A third, fast-growing strand asks whether the role of the centre has declined in the wake of e-commerce and, especially, the Covid-19 pandemic. The US evidence points to a pronounced "donut effect"—a relative decline of central locations (Duranton and Handbury, 2023; Ramani et al., 2024; Gupta et al., 2022). International overviews are more equivocal (Biljanovska and Dell'Ariccia, 2023; Ziemann et al., 2023). For Germany the evidence is thin (Hamann et al., 2023; Beze and Thiel, 2024), and existing work is hampered by coarse, point-based centre definitions; Beze and Thiel (2024), the first study of Covid effects on German cities, relies on geographic centroids that, as we document, are poor proxies for the actual centre.

3 Data and the Definition of the CBD

Our central methodological contribution is a data-driven delineation of the CBD as an area rather than a point. We first describe the construction of the CBD (Section 3.1), then benchmark it against conventional centre definitions (Section 3.2) and against the closely related approach of Ahlfeldt et al. (2024) (Section 3.3), and finally describe the rent and control data (Section 3.4).

3.1 From business locations to CBD areas

The delineation builds on the universe of private and public establishments in Germany. The underlying dataset is provided by Nexiga GmbH and contains 2.9 million georeferenced establishments—retail, private and public services, restaurants and bars, firms, hotels and cultural institutions. The methodology was originally developed at empirica Institut in a project commissioned by the Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR). The construction proceeds in three steps, illustrated for the city of Bonn in Figure 1.

Step 1 — from locations to a density surface. We compute the density of establishments on a $10\,\text{m} \times 10\,\text{m}$ grid, weighting larger establishments more heavily. To obtain a smooth surface, the density of each cell is interpolated using the densities of surrounding cells.

Step 2 — from the density surface to isochrones. A greedy algorithm partitions each city into ten density "isochrones." Intuitively, it starts at the point of highest density and expands towards the highest remaining density; if expansion would move into an area that is not the highest remaining density, it stops and restarts at the next-highest point. Once 10% of all (weighted) establishments have been absorbed, the first isochrone is complete; the procedure continues until ten isochrones are formed.

Step 3 — from isochrones to city zones. We define the densest area containing 10% of a city's establishments as the *commercial inner city*, and the next densest area up to the 40% threshold as the *residential inner city.* Throughout the paper we aggregate the two and refer to their union as the CBD. The commercial inner city covers, on average, only 0.33% of a city's total area, and the residential inner city an additional 2.7%.

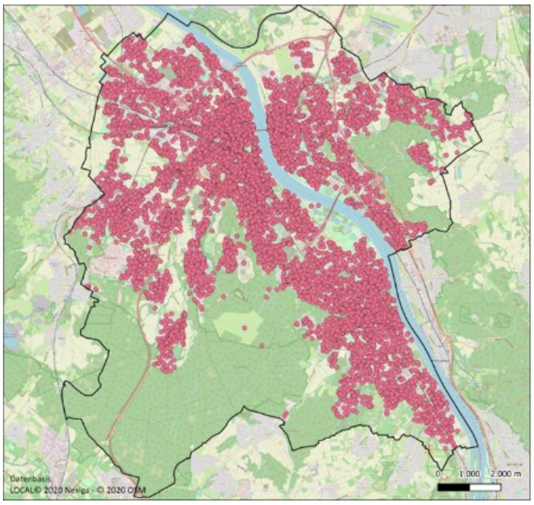
A practical challenge is that the algorithm identifies multiple centres in about half of all cities. In genuinely polycentric cities this is a feature; but in cities with weak overall urbanity it can spuriously split a single weak centre. To keep the present analysis transparent, we consider only the largest centre in each city. Exploiting the full multi-centre structure is left for future work (Section 6).

3.2 Benchmarking conventional centre definitions

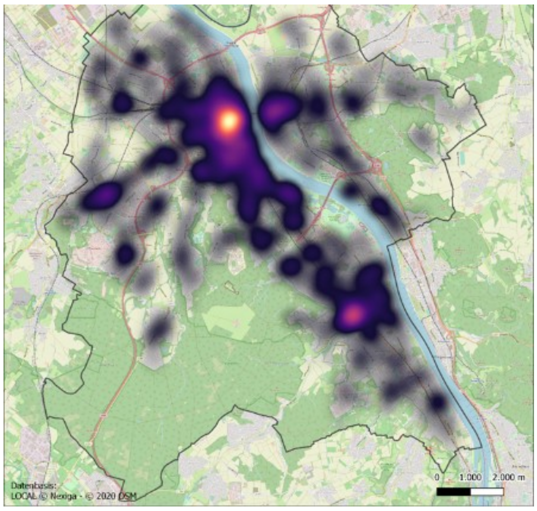
Because our method locates the centre directly from economic activity, it provides a natural yardstick for the point-based definitions used in the literature: the geographic centroid (Beze and Thiel, 2024; Combes et al., 2019), the population-weighted centroid (Nanda et al., 2024), the location of the (historic) city hall (Liotta et al., 2022; Biljanovska and Dell'Ariccia, 2023), and the tagged location in Google Maps or OpenStreetMap (OSM) (Duranton and Handbury, 2023; Noebauer, 2023).

Two results emerge. First, the methods differ greatly in accuracy. The OSM tag approximates the point of highest business density very well, with an average distance of only about 300 m. The historic city hall is on average 580 m away (across the 101 cities in which one could be identified), the population-weighted centroid about 850 m, and the plain geographic centroid about 2.3 km. Indeed, the geographic centroid falls inside the inner-city area in only 8.5% of cities—a cautionary result for studies that rely on it.

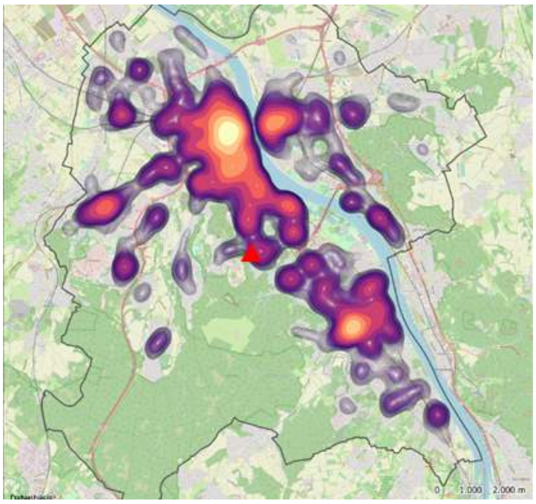
Second, urbanity decays sharply with distance, so that the concentric rings



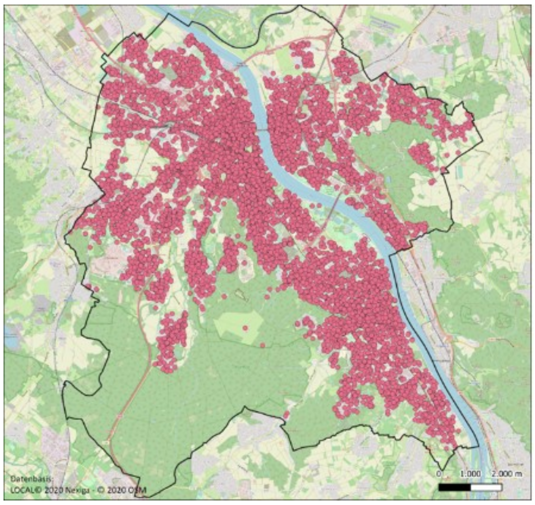
(a) Establishment locations.



(b) Weighted density surface.



(c) Density isochrones.



(d) Commercial and residential inner city.

Figure 1: Constructing the CBD for the city of Bonn. Panel (a) shows the locations of commercial establishments; panel (b) the weighted density surface, where larger establishments receive a higher weight and each cell is interpolated using surrounding cells; panel (c) the ten density isochrones; and panel (d) the resulting commercial (top 10%) and residential (10–40%) inner city. *Source:* Nexiga GmbH; own depiction.

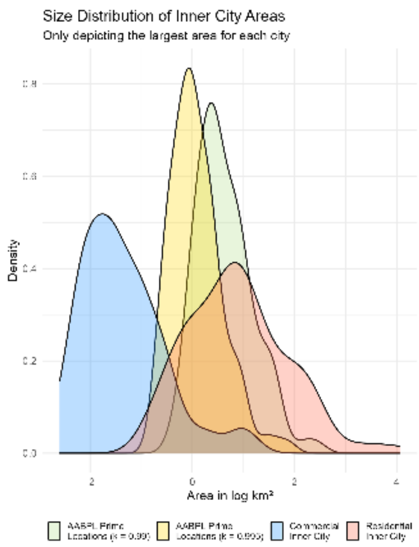
commonly drawn around a centre contain a great deal of non-central area. Even in cities above 250,000 inhabitants, only about 20% of the 1–2 km ring and just 6% of the 2–3 km ring still belong to the CBD; in smaller cities the decay is steeper still. The practical implication is that researchers should draw small rings and model distance effects non-linearly.

3.3 Comparison with Ahlfeldt et al. (2024)

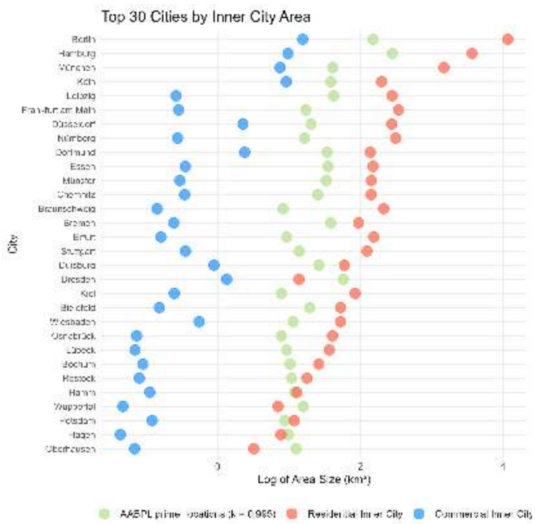
Our approach is closest to the "prime locations" of Ahlfeldt et al. (2024) (henceforth AABPL), but differs in three respects:

- *Data:* AABPL use employment densities in the United States, whereas we use weighted establishment densities for Germany.
- *Geographic scope:* AABPL focus on global superstar cities, whereas we cover all German cities.
- *Thresholds:* AABPL define prime locations as the areas in the top 0.5% of density, whereas we use *relative* thresholds (top 10% commercial, top 40% residential), yielding considerably larger areas.

Figures 2a and 3 compare the two delineations. As one would expect, the AABPL prime area is smaller than our residential inner city but larger than our commercial inner city. The choice for the threshold parameter k of the AABPL-area do not change the picture substantially.

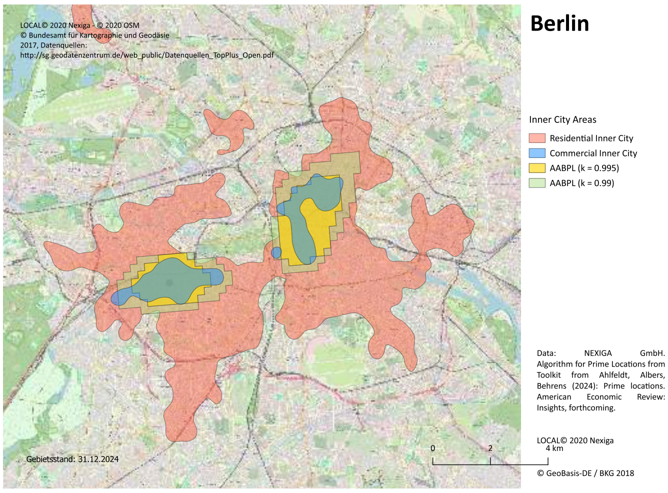


(a) Density thresholds: our approach vs. AABPL.

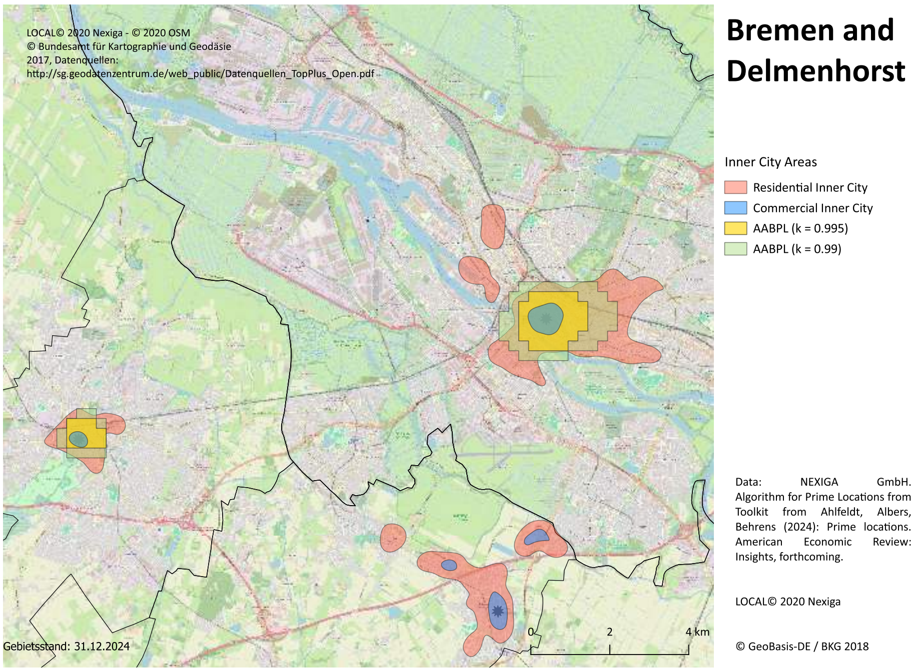


(b) Distribution of area sizes across cities.

Figure 2: Comparison of the AABPL prime-location definition and our crown-jewel definition. *Source:* Ahlfeldt et al. (2024); Nexiga GmbH; own depiction.



(a) Berlin.



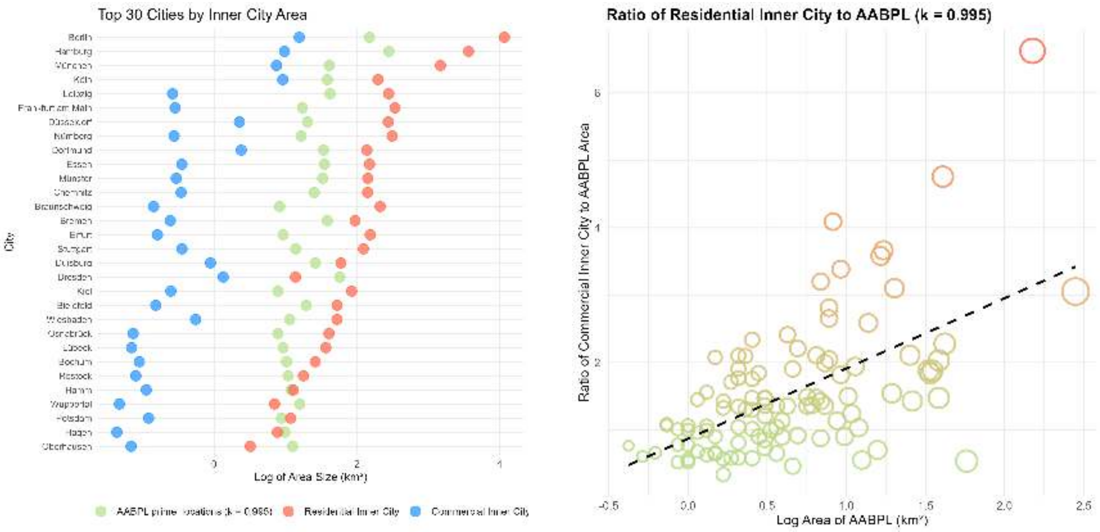
(b) Bremen and Delmenhorst.

Figure 3: AABPL prime locations and our crown-jewel CBD definition for selected cities. *Source:* Ahlfeldt et al. (2024); Nexiga GmbH; own depiction.

Interestingly, cities with large high-*absolute*-density areas (as captured by AABPL) also tend to have large high-*relative*-density areas, so the two notions of centrality are positively related across cities.

3.4 Rent data and control variables

Rent data come from the *VALUE-Marktdatenbank*. We use the universe of geo-referenced apartment listings posted online between January 2012 and December 2024 that (i) lie within one of the 1,108 cities and (ii) carry an address precise



(a) Comparison of area sizes.

(b) Ratio of AABPL to residential inner city.

Figure 4: The AABPL prime area relative to our inner-city definition. The prime area is larger than our commercial inner city but smaller than our residential inner city; cities with larger high-*absolute*-density areas (AABPL) also tend to have larger high-*relative*-density areas. *Source:* Ahlfeldt et al. (2024); Nexiga GmbH; own depiction.

enough for geocoding—about 6.1 million listings. The data are drawn from a range of platforms, cleaned of duplicate postings, and exclude furnished apartments, short-term rentals and apartment swaps; they contain more than 100 variables on apartment characteristics. Of the listings, about 4% lie in the commercial inner city, 29% in the residential inner city, and 67% in the rest of the respective city. Throughout, the dependent variable is the log of the monthly rent per square metre.

Neighbourhood characteristics are taken from the German Census (*destatis*), measured on a $100\,\mathrm{m} \times 100\,\mathrm{m}$ grid and aggregated to neighbourhoods of homogeneous construction. Data on transport infrastructure are derived from OpenStreetMap. Figure 5 shows the geographic coverage of the resulting dataset.

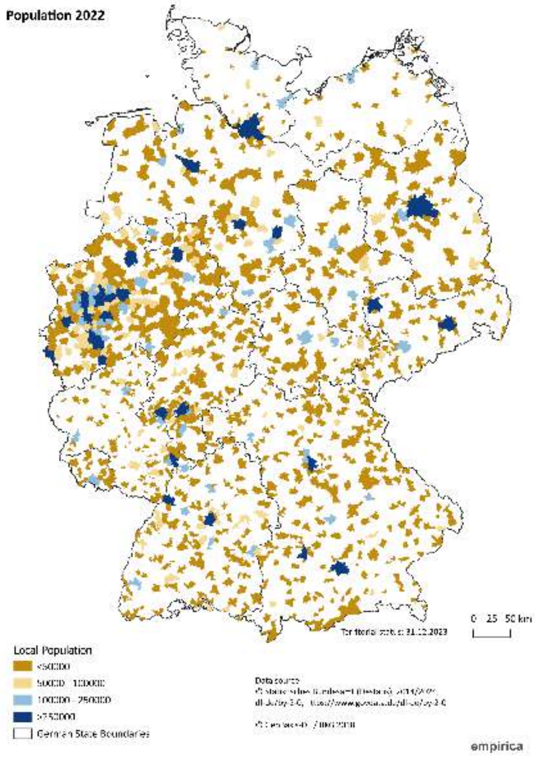


Figure 5: Geographic coverage of the dataset: the 1,108 cities included in the analysis. *Source:* destatis; own depiction.

4 Empirical Strategy

Our empirical strategy is designed to answer three related questions: (i) how large is the CBD-premium? (ii) what part of it is due to centrality—proximity to employers, retail and entertainment—and what part to “other stuff” such as superior apartments or more desirable neighbourhoods? and (iii) how has the CBD-premium evolved over time?

The idea is to compare otherwise identical apartments inside and outside the centre. We estimate a series of log-linear hedonic models of the form

$$\log(\text{Rent}_{i,j,t}) = \alpha + \mathbf{1}[\text{CBD}]_i\,\gamma + \boldsymbol{\delta}_j + \boldsymbol{\lambda}_t + \mathbf{X}_{i,t}\,\boldsymbol{\beta} + \varepsilon_{i,j,t}, \tag{1}$$

where the unit of observation is an apartment i in city j listed in year t, located either inside the CBD or not. $\mathbf{1}[\text{CBD}]_i$ is an indicator for the inner city, $\boldsymbol{\delta}_j$ are city fixed effects, $\boldsymbol{\lambda}_t$ are year fixed effects, and $\mathbf{X}_{i,t}$ is a vector of covariates added progressively. The coefficient γ measures the CBD-premium; $\varepsilon_{i,j,t}$ is the unexplained variation in rents. In an extended specification we add the log distance to the centre to capture the within-CBD gradient.

We estimate equation (1) in a sequence of specifications, starting from a pure fixed-effects model ($\mathbf{X}_{i,t} = \emptyset$) and progressively adding (1) apartment quality, (2) neighbourhood characteristics, and (3) transport access. Comparing γ across specifications reveals how much of the raw CBD-premium reflects centrality itself and how much reflects systematic differences in the characteristics of central apartments, neighbourhoods, and locations. Because the CBD-premium differs starkly by city size, we estimate the models separately for different city-size classes, and, in Section 5.4, separately by year.

5 Results

5.1 The level of the CBD-premium and its heterogeneity

Across all cities and years, the average CBD-premium is about 11% (10.8%). The city-weighted CBD-premium] is around 21%. The corresponding within-CBD gradient is steep: a 10% reduction in the distance to the centre is associated with roughly a 6% increase in rents—close to the 7% that Duranton and Puga (2022) report for the United States.

The average masks enormous heterogeneity. The CBD-premium rises monotonically with city size, reaching about 18% in the 26 cities above 250,000 inhabitants (Figure 6). At the other extreme, roughly 27% of German cities exhibit a *negative* premium—the inner city is cheaper than the periphery.

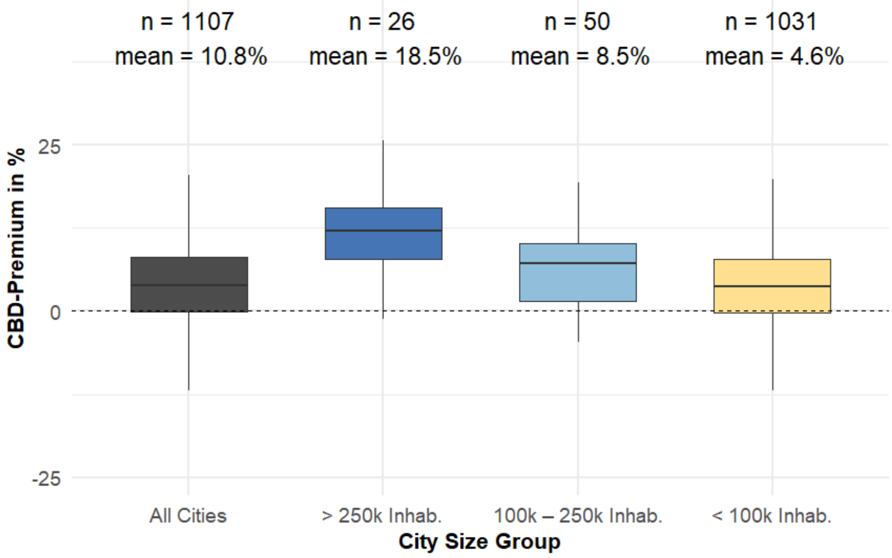
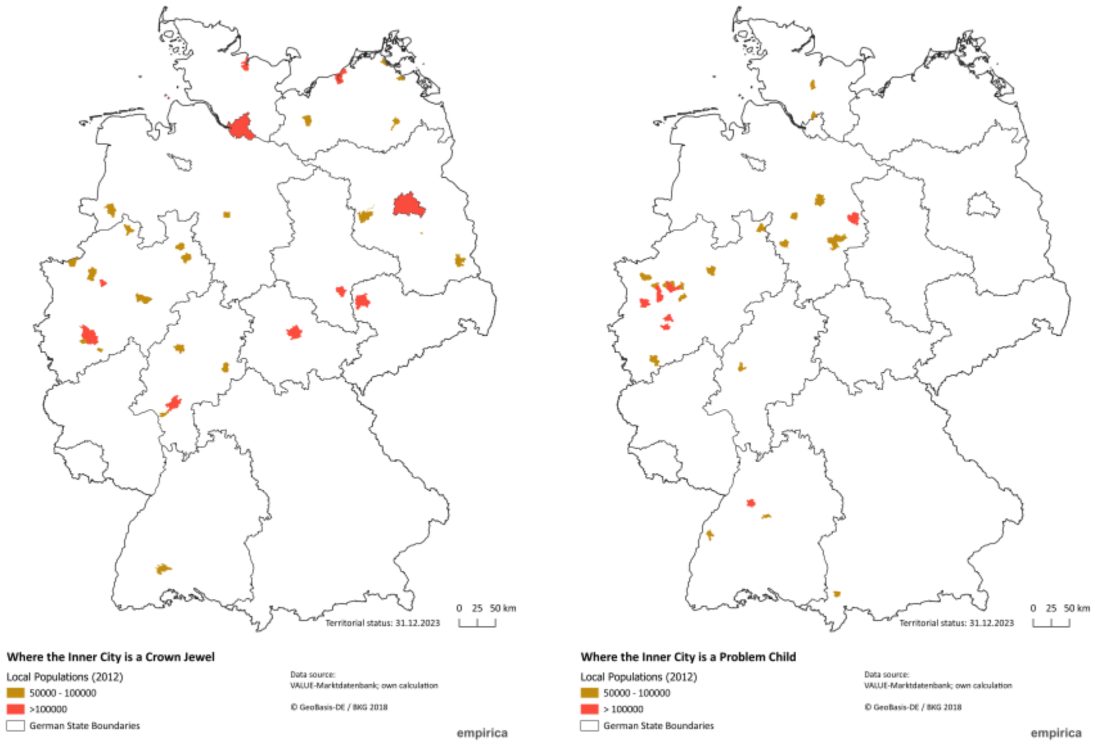


Figure 6: Distribution of the unconditional CBD-premium by city-size class. *Source:* VALUE-Marktdatenbank; own calculations.

Figure 7 maps the two tails: the "crown jewels" with the largest premiums and the "problem children" with negative premiums. The cities with the largest CBD-premiums are the metropolitan areas of Berlin, Hamburg, Cologne and Frankfurt. There are also various cities with large positive CBD-premiums in the former socialist East.

On the hand, there the cities with negative CBD-premiums are largely in the Western states of Lower Saxony and North-Rhine-Westfalia. These states feature heavy industry. Its inner cities were often heavily destroyed in the second world war.



(a) Largest CBD-premium ("crown jewels").

(b) Negative CBD-premium ("problem children").

Figure 7: Cities with the largest and the most negative CBD-premium. *Source:* VALUE-Marktdatenbank; own depiction.

Also, the size of the inner city is itself informative (Figure 8). Up to a threshold, larger inner cities are associated with larger premiums: a very small centre signals weak urban pull. Beyond that threshold, however, a larger CBD does not pay off any further, suggesting a "sweet spot" in the relative size of the centre.

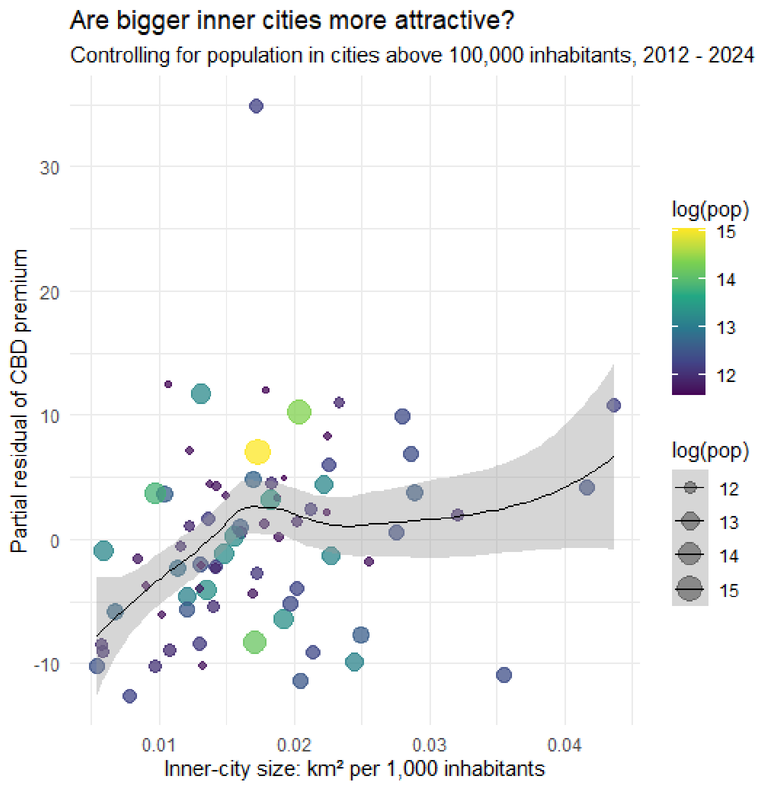


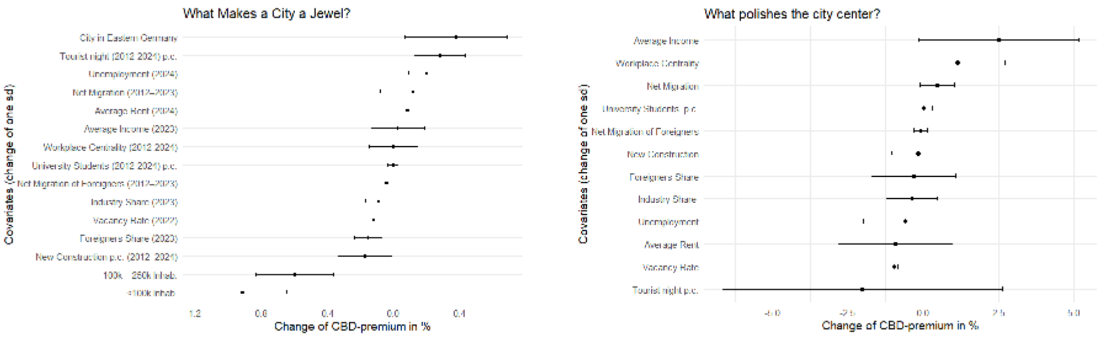
Figure 8: The CBD-premium and the relative size of the inner city. The x-axis shows the size of the inner city relative to the city. *Source:* VALUE-Marktdatenbank; own calculations.

5.2 What explains the level and the change?

Finally, we ask which city characteristics are associated with the *level* of the CBD-premium and which with its *change*. We regress the 2012–2024 average premium, and separately its year-on-year change, on a set of municipality- and county-level variables.

For the *level* (Figure 9a), more expensive cities and cities with greater tourist appeal have more expensive inner cities. One result is surprising: the coefficient on unemployment is positive even conditional on population. For the *change* (Figure 9b), the picture is different: the factors that explain the level well lose significance, and instead cities with booming labour markets develop stronger centres. Notably, the CBD-premium tends to *decrease* where overall rent levels rise—consistent with peripheral catch-up in the tightest markets.

The reshuffling is also visible in the cross-section of levels and changes (Figure 10): large cities are stable at the top, but there is considerable turnover in the hierarchy of mid-sized cities. Consistent with our chosen characterisation, the cities losing the most are not only long-standing problem children but also a number of mid-tier jewels.



(a) Correlates of the *level*.

(b) Correlates of the *change*.

Figure 9: Correlates of the level and the change of the CBD-premium. Regressions on municipality- and county-level variables for 1,108 cities; the change regression includes time and municipality fixed effects. *Source:* VALUE-Marktdatenbank; various sources; own calculations.

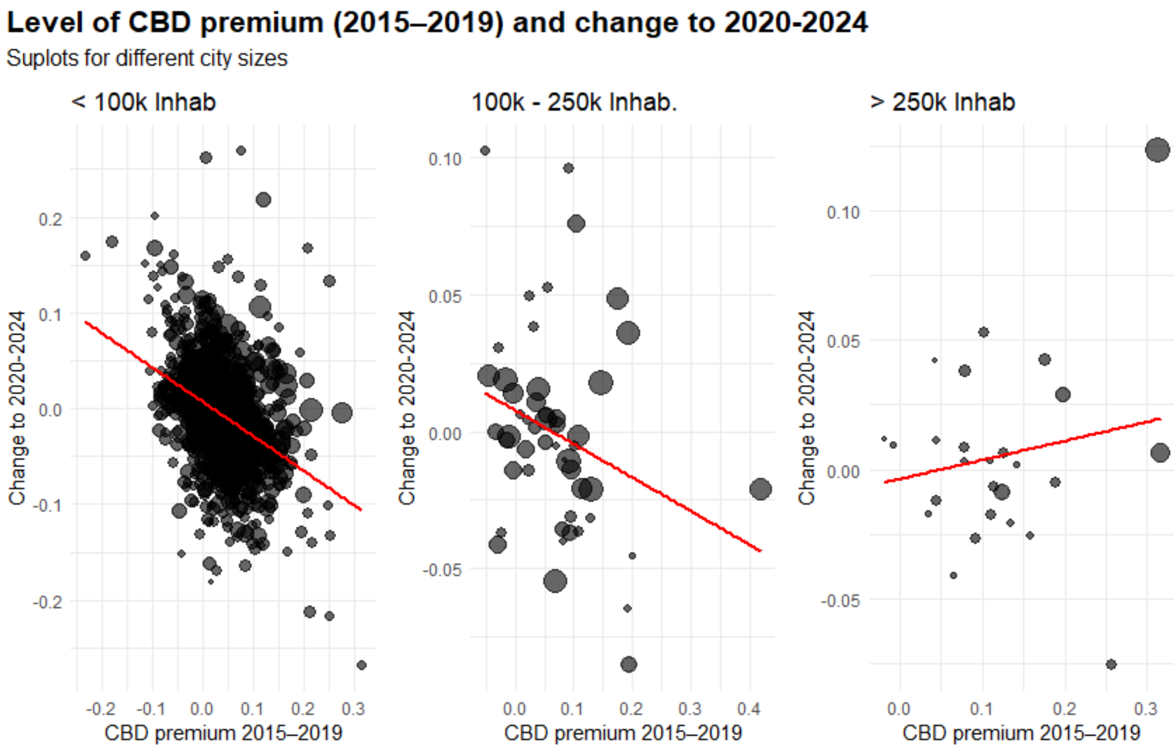


Figure 10: The relationship between the level and the change of the CBD-premium. Marker size scales with city size. *Source:* VALUE-Marktdatenbank; own calculations.

5.3 Decomposing the premium

How much of the CBD-premium reflects centrality itself, and how much the fact that central apartments, neighbourhoods and locations differ systematically from peripheral ones? Equation (1) lets us answer this by tracking γ as we add blocks of controls. The descriptive contrasts and estimated coefficients for the underlying variables are reported in Appendix A (Tables 2–4).

Table 1 reports the estimates of equation (1) and shows which aspects of the inner city make up the CBD-premium. Column (1) shows the raw inner-city premium; columns (2)–(4) add apartment, neighbourhood and transport controls in turn; column (5) adds the log distance to the centre. The inner-city coefficient falls from 0.212 in the pure fixed-effects model to 0.072 once all controls and the distance term are included—that is, around two thirds of the raw CBD-premium does not originate from centrality itself, but from correlated features such as superior apartment quality, more desirable neighbourhoods, and better access to transport infrastructure.

Table 1: Inner-city premium across specifications (all cities)

	(1) Spec. 1 FE only	(2) Spec. 2 +Apartment	(3) Spec. 3 +Neighb.	(4) Spec. 4 +Transport	(5) Spec. 5 +Distance
Inner city (dummy)	0.212***	0.157***	0.125***	0.106***	0.072***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
log(distance to centre)					−0.055***
					(0.000)
City FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Observations	6,041,501	6,041,501	6,041,501	6,041,501	6,024,001

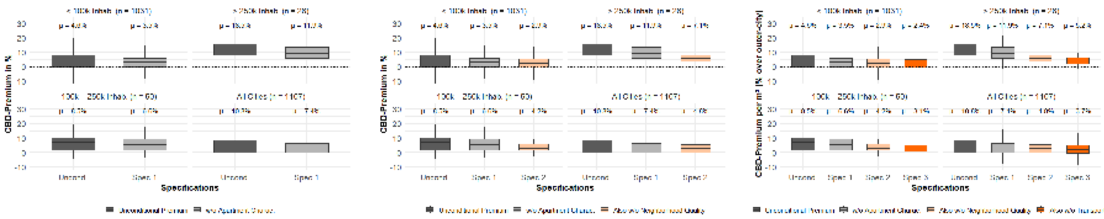
Notes: Dependent variable: log rent per m^2. Standard errors in parentheses. $^{*}\,p < 0.10$, $^{**}\,p < 0.05$, $^{***}\,p < 0.01$. *Source:* VALUE-Marktdatenbank; own calculations.

Apartment quality. We first control for 19 variables describing apartment quality (presence of a fitted kitchen, balcony, first occupancy, social-housing status, construction era, condition, size class, and so on). Central apartments are systematically different—more likely, for instance, to be in historic buildings and to feature a fitted kitchen. Controlling for these characteristics reduces the CBD-premium by about 25% overall, and by 36% in large cities (Figure 11a).

Neighbourhood characteristics. We then add 9 variables describing the neighbourhood (age structure, household composition, share of foreigners, building types, vacancy, and ownership structure). Central neighbourhoods tend to be more desirable along these dimensions. Adding them reduces the CBD-premium by a further 36% overall (40% in large cities; Figure 11b).

Transport access. Finally, we add 4 variables capturing access to transport infrastructure (distance to the nearest highway, bus stop, long-distance train station, and local subway). Central apartments enjoy markedly better access, especially to long-distance rail.

Total. Taken together, apartment quality, neighbourhood characteristics and transport access account for about 66% of the CBD-premium overall, and 72% in large cities (Figure 11c). In the city-average terms of Section 5.1, this means the gradient falls from about 11% to about 3.7% once these factors are netted out. The genuinely "central" component of the CBD-premium—the part attributable to centrality as such—is therefore modest, especially outside the largest cities.



(a) + Apartment quality (−25%).

(b) + Neighbourhood (−36%).

(c) All controls (−66%).

Figure 11: How accounting for context changes the CBD-premium, by city-size class. *Source:* VALUE-Marktdatenbank; own calculations.

The same message can be read off the distribution of city-level premiums directly: Figure 12 contrasts the unconditional premium with the "cleaned" premium that remains after all controls, by city-size class.

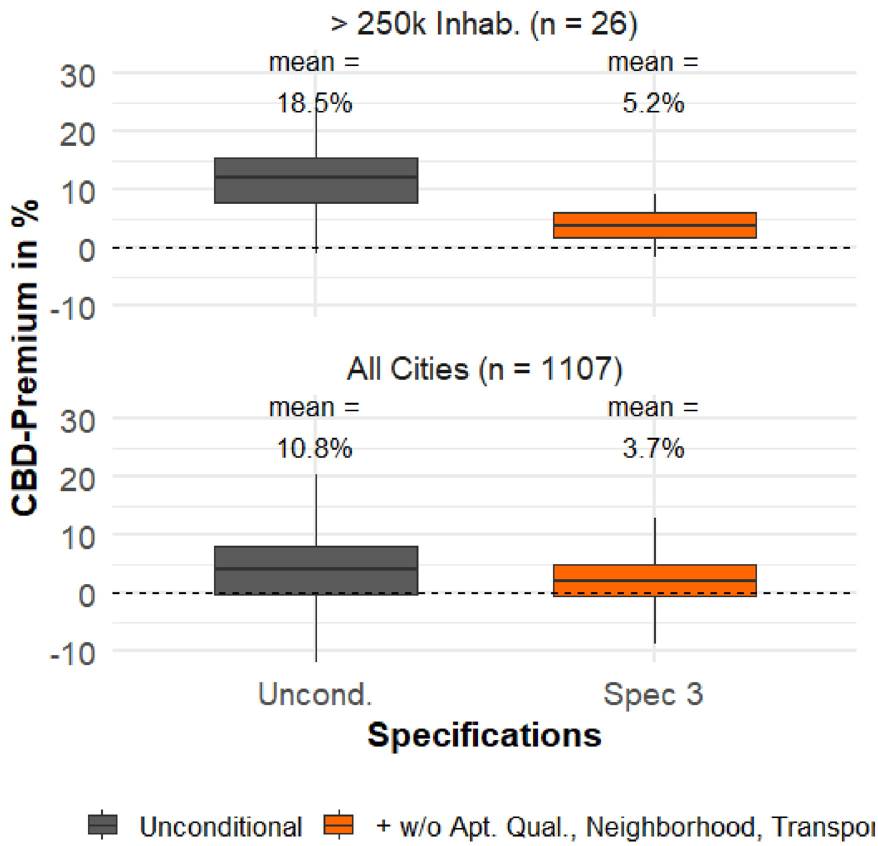


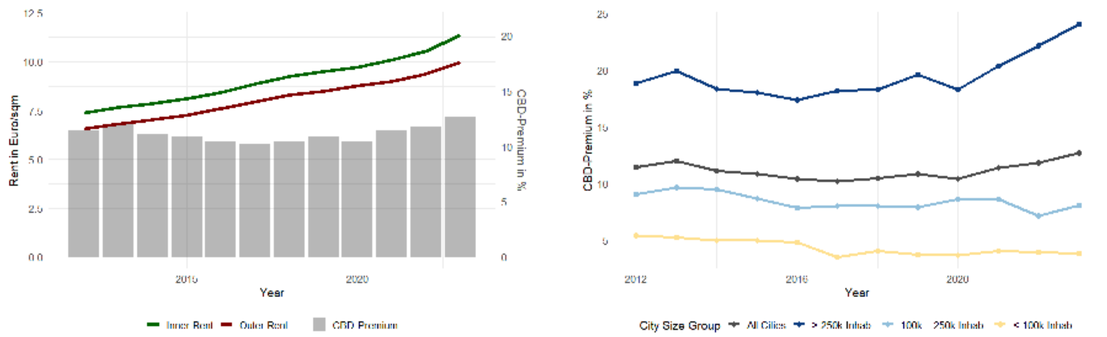
Figure 12: Unconditional vs. cleaned CBD-premium by city-size class. *Source:* VALUE-Marktdatenbank; own calculations.

5.4 The evolution of the premium over time

So far we have considered only the average CBD-premium over 2012–2024. But cities have been through a great deal over the last decade: the rise of Amazon and e-commerce, shifting consumer behaviour, and the pandemic and lock-downs of 2020–2022. To trace the dynamics, we re-estimate equation (1) year by year.

Three patterns stand out (Figure 13). First, CBD-premiums fell markedly between 2013 and 2016—by about 17% overall and 13.5% in large cities. Second, and contrary to the US "donut effect," there was no lasting Covid shock: premiums took only a minor hit, if any, during the pandemic. Third, premiums have risen strongly since 2022, and this recent increase is driven entirely by large cities, where they have climbed by about 31% since 2020—to an all-time high.

What lies behind the recent rise? Re-estimating the controlled specifications year by year shows that the increase almost completely disappears once we account for the changing valuation of central apartment characteristics (Figure 14): controlling for apartment quality reduces the post-2020 increase in large cities



(a) Rents and the CBD-premium, all cities.

(b) The CBD-premium by city-size class.

Figure 13: Evolution of the unconditional CBD-premium, 2012–2024. *Source:* VALUE-Marktdatenbank; own calculations.

from about 31% to around 10%. The recent strengthening of large-city centres is thus driven less by a higher value of centrality *per se* than by a higher willingness to pay for the superior apartments concentrated there. This may, in turn, be related to the sharp decline in homeownership affordability since 2022, which has pushed households towards the rental market (Appendix Figures 15–16).

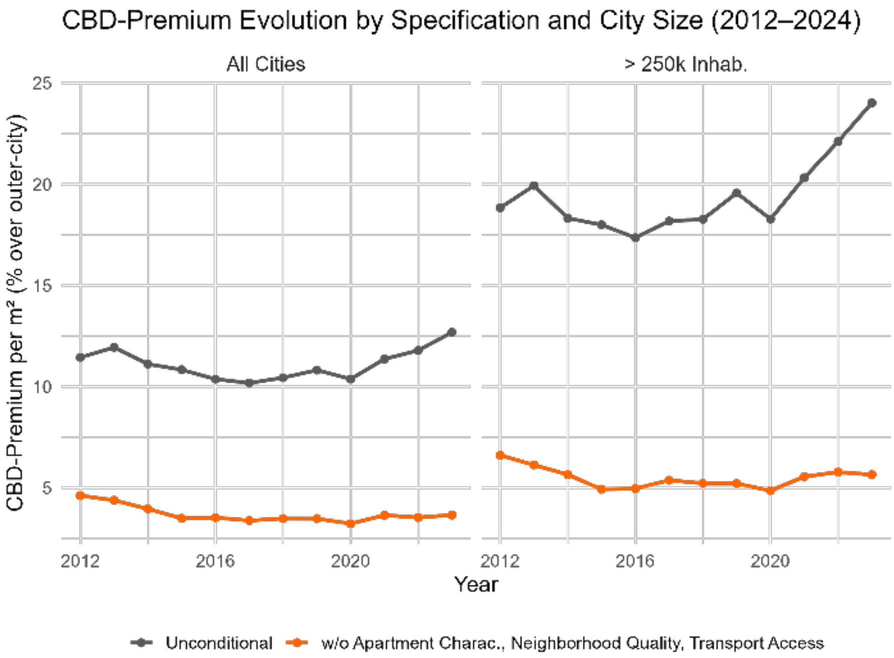


Figure 14: Evolution of the conditional CBD-premium, 2012–2024. Accounting for the changing valuation of central apartment characteristics largely erases the recent increase. *Source:* VALUE-Marktdatenbank; own calculations.

6 Discussion

6.1 Limitations

Several caveats apply, and they map directly onto our agenda for future work.

First, our estimates are descriptive. We interpret the inner-city coefficient γ, net of controls, as the CBD-premium, but we do not claim a causal effect of centrality on rents. In particular, the recent rise in large-city premiums could reflect selection—a change in the composition of *listed* apartments—as much as a genuine change in valuations; distinguishing the two is an important next step.

Second, the boundaries of the inner city rest on threshold choices (top 10% and top 40% of density). These thresholds are transparent but ad hoc. Reassuringly, the broad patterns are robust to moderate changes, but endogenising the thresholds—for example through data-driven breaks in the density distribution, in the spirit of Ahlfeldt et al. (2024)—would put the delineation on firmer ground.

Third, we currently use only the largest centre in each city, setting aside the multi-centre structure that our method recovers. Exploiting polycentricity is a natural and, we believe, valuable extension.

Fourth, our control variables for transport access and local amenities are still coarse—distances to the nearest facility rather than measures of frequency, quality, or the density of nearby amenities. Better controls would sharpen the decomposition of the CBD-premium into the parts due to urbanity ("a lot going on") and centrality ("quick to get everywhere").

Finally, the establishment data are a cross-sectional snapshot, which limits our ability to trace how the *centres themselves* have shifted over time. Moving the delineation to a time-varying, openly available source such as OSM would enable a genuinely dynamic analysis of urban centres.

6.2 Policy relevance

Our data and results speak to academics, investors and planners alike. For academics, re-translating the CBD from a point to an area allows familiar questions to be posed and answered differently. For investors, the framework identifies which inner cities remain attractive even in difficult market conditions, and where it may be worthwhile to repurpose office and commercial space. For planners, it flags which cities are struggling and may need active revitalisation.

Two substantive messages follow. First, despite e-commerce and WFH, inner-city premiums are not disappearing—if anything, they have recently strengthened in large cities. Second, however, in many cities the premium is small, especially once apartment quality is accounted for. This should temper the expectation that expensive central projects—such as office-to-residential conversions—will always be viable: residents may not be willing or able to pay a large premium for central living. The extra willingness to pay stems less from urbanity *per se* than from centrality and good transport access; these should have priority when planning new neighbourhoods.

7 Conclusion

This paper has proposed a data-driven definition of the CBD as an area rather than a point, and used it to measure the level, composition and evolution of the inner-city rent premium across all 1,108 German cities. The CBD-premium is on average about 11%, but ranges from 18% in the largest cities to negative values in roughly a quarter of all cities. About two thirds of it reflects superior apartment quality, more desirable neighbourhoods and better transport access rather than centrality as such. And while premiums fell in the mid-2010s and weathered the pandemic without a lasting shock, they have risen sharply in large cities since 2022—an increase that is largely a story of apartment quality. By bringing the inner city back from the point to the plane, we hope to open new avenues for research into the role and functioning of cities; the methodology is scalable across geographies and data sources.

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A Variable-level descriptives and coefficients

Table 2: Apartment quality: descriptives and coefficients

Variable	**Def.**	**All Cities** Outer	Inner	**Larger Cities** Outer	Inner	**β all**	**β large**
Kitchen in apartment?	share	34%	44%	35%	51%	0.0575***	0.0737***
Balcony in apartment?	share	69%	56%	69%	60%	0.0427***	0.0476***
First tenant in apartment?	share	10%	11%	12%	14%	0.0990***	0.1055***
Apartment is social housing?	share	4%	2%	6%	2%	−0.2169***	−0.2299***
Historic building (*Altbau*)?	share	20%	36%	24%	37%	−0.0120***	−0.0039***
Newly built?	share	7%	5%	7%	6%	0.0294***	0.0183***
Refurbished?	share	19%	21%	19%	21%	0.0091***	0.0099***
Flat below 35 sqm?	share	6%	8%	6%	9%	0.2959***	0.1776***
Flat 35–49 sqm?	share	16%	17%	17%	17%	0.1544***	0.0332***
Flat above 90 sqm?	share	15%	19%	14%	21%	0.0593***	−0.0399***
Constructed before 1919	share	9%	24%	12%	27%	base category	
Constructed 1949–1979	share	35%	21%	36%	26%	−0.0487***	−0.0515***
Constructed after 2011	share	8%	7%	9%	8%	0.0890***	0.0963***
Condition bad	share	1%	1%	2%	1%	base category	
Condition good	share	42%	46%	43%	50%	0.1124***	0.1190***

Source: VALUE-Marktdatenbank; own calculations. “Larger cities” are those above 250,000 inhabitants.

Table 3: Neighbourhood characteristics: descriptives and coefficients

Variable	**Def.**	**All Cities** Outer	Inner	**Larger Cities** Outer	Inner	**β all**	**β large**
Foreigners in neighbourhood	share	10%	12%	12%	16%	−0.0171***	−0.0205***
Age group <18	share	15%	14%	15%	13%	−0.0084***	−0.0089***
Age group 18–29	share	16%	20%	17%	20%	−0.0031***	−0.0131***
Age group 65+	share	21%	18%	20%	15%	−0.0063***	−0.0150***
Single parents	share	8%	7%	7%	6%	−0.0107***	−0.0161***
Singles	share	44%	52%	46%	55%	0.0055***	0.0120***
Share of large buildings	share	19%	24%	25%	37%	0.0020***	0.0074***
City-owned apartments	share	8%	7%	7%	6%	−0.0084***	−0.0118***
Empty apartments	share	5%	6%	5%	4%	−0.0117***	−0.0153***
Historic multi-storey (*Altbau*)	share	21%	50%	27%	49%	0.0121***	0.0048***
Post-war multi-storey	share	41%	34%	46%	43%	−0.0059***	−0.0185***
1980s multi-storey	share	6%	2%	6%	1%	−0.0533***	−0.0698***
Post-1990s multi-storey	share	6%	3%	6%	3%	0.0008***	−0.0154***
Mixed	share	2%	3%	2%	2%	0.0009***	0.0013***

Source: VALUE-Marktdatenbank; own calculations.

Table 4: Transport infrastructure: descriptives and coefficients

Variable	**Def.**	**All Cities** Outer	Inner	**Larger Cities** Outer	Inner	**β all**	**β large**
Distance to highway	km	6.09	6.37	4.26	4.56	−0.0021***	−0.0020***
Distance to bus stop	km	0.28	0.30	0.28	0.36	0.0067***	0.0069***
Distance to train station (long-distance)	km	11.91	11.17	5.94	2.56	−0.1247***	−0.1151***
Distance to local subway	km	1.65	1.02	1.00	0.56	−0.0094***	−0.0179***

Source: VALUE-Marktdatenbank; own calculations. Coefficients show the effect of a one-standard-deviation change in the distance variable.

B Affordability and suburbanisation

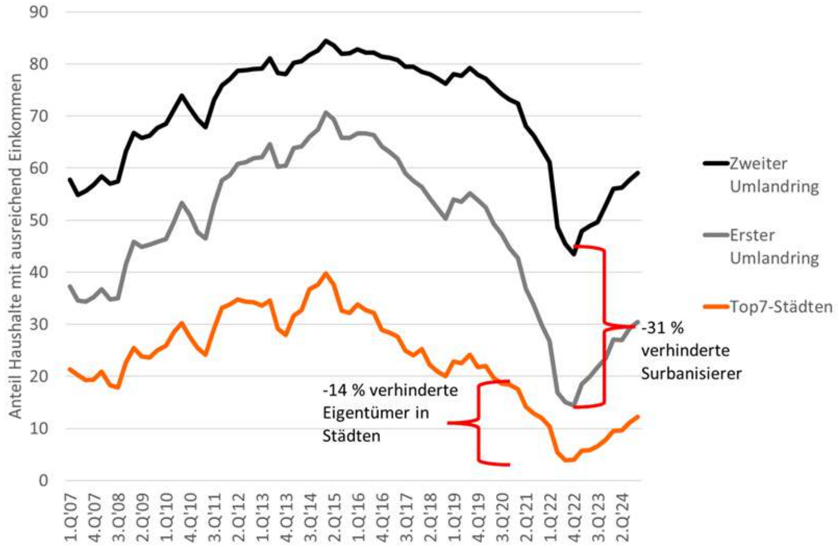

Figure 15: The drop in homeownership affordability in Germany since 2020. *Source:* VALUE-Marktdatenbank; own calculations.

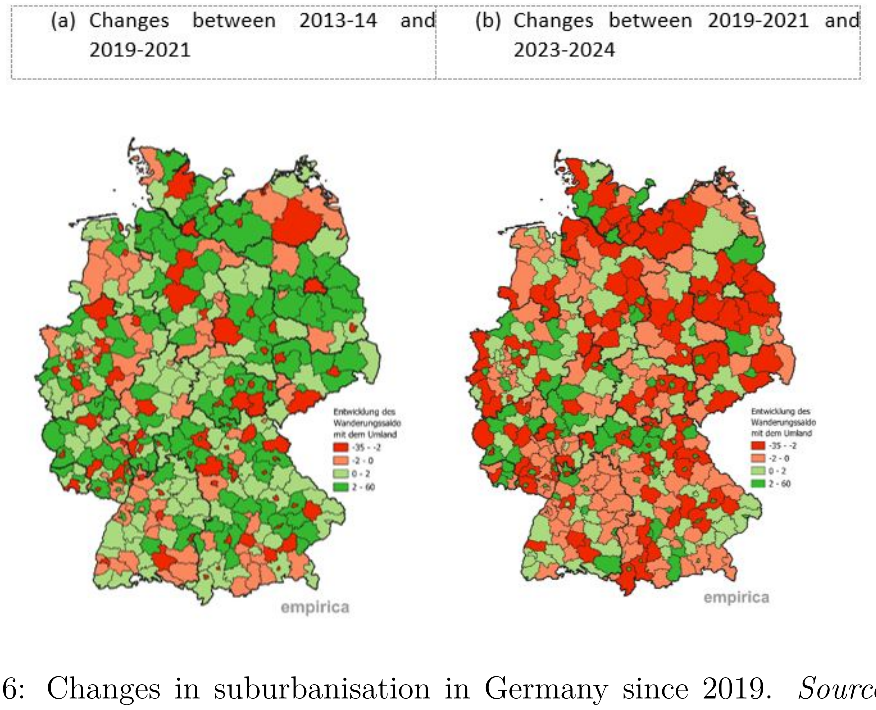

Figure 16: Changes in suburbanisation in Germany since 2019. *Source:* Wanderungsstatistik; own calculations.