

Empty Offices and Urban Transitions: The Impact of Work from Home on Commercial Real Estate

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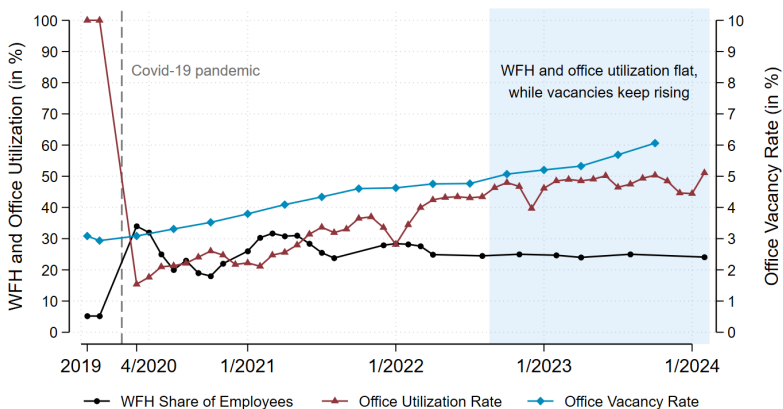
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Motivation: Work From Home and Office Real Estate

- ▶ **Post-pandemic work-from-home (WFH) rate has stabilized** at permanently elevated level (~25% employees in Germany)
- ▶ **Office utilization rate** has stabilized at only ~50% of pre-pandemic level, while **office vacancies** have doubled



Data sources: WFH data are from Eurostat (2012-2019), infas360 (2020-2021), ifo Institute (2021-2023). Office Utilization Rate (average of top 10 US metros) is from Kastle (2024), and Office Vacancy Rates (average of top 7 German metros) are from Colliers (2024).

Motivation: Work From Home and Office Real Estate

- ▶ **Sustained WFH adoption may impact commercial real estate (CRE)**, especially in city centers and high-WFH industries, raising concerns of an “urban doom loop”
- ▶ **Urban agglomeration and dispersion forces in an era of WFH:** housing demand and economic activity has shifted to suburbs, but potential long-term impact on office locations is still uncertain
- ▶ **Limited empirical evidence** regarding **firm-level** association between WFH and office demand as well as WFH-induced **spatial shifts** of office locations within cities

This Project: Firm-level & Urban WFH Effect on Office Real Estate

1. **Stylized model:** provides intuition on WFH arrangement and determination of demand for office space, quality, and location
2. **Setting and data:** unique micro-data on firm-level WFH and individual office leases in major German cities between 2014–2023
3. **Firm-level analysis:**
 - ▶ Association of WFH and changes of office space, rents, and quality
 - ▶ Short-term (subleases) vs. long-term adjustments (new leases)
4. **Urban analysis:**
 - ▶ Association of WFH and spatial shifts in urban office locations
 - ▶ Future extension: In which locations do vacancies concentrate?
 - ▶ Future extension: Does WFH impact valuation of urban amenities?
5. **Demand-side mechanisms** behind the WFH effect and **supply-side implications** for conversions and new developments

Preview of Preliminary Results: WFH Reshapes Urban Office Real Estate Demand

1. **Office space demand** declines most in high-WFH-growth industries
 - ▶ Fewer total leases and smaller average office spaces
 - ▶ Short-term space adjustment via subleasing
2. **Office rents and quality** increase in high-WFH-growth industries
3. Indicates **market dispersion** with a flight to quality
4. Minor, **insignificant spatial shift** towards the center
5. **Increases** of office rents **concentrated in urban centers**
6. Firms demand **office buildings that are complimentary to WFH**

Contribution to Literature

1. Economic and societal impacts of WFH

(Althoff et al., 2022; Aksoy et al., 2022; Barrero et al., 2021a,b, 2023; Bloom et al., 2024; Hansen et al., 2023)

- ▶ Prior research has detailed comprehensive effects of WFH and why particularly hybrid work is likely here to stay
- ▶ Provide novel evidence on the substantial implications for CRE

2. WFH and urban real estate markets

(Gupta et al., 2021, 2022; Ramani and Bloom, 2021; Rosenthal et al., 2021; Duranton and Handbury, 2023; Bergeaud et al., 2023; Liu and Su, 2021; Brueckner et al., 2021; Davis et al., 2024; Delventhal and Parkhomenko, 2023; Delventhal et al., 2022; Mondragon and Wieland, 2022; Monte et al., 2023)

- ▶ Prior research has documented that WFH carries the potential to reshape the economic geography of cities
- ▶ Extend our knowledge by investigating firm-level and spatial link in cities between WFH and office demand

Sketch of Stylized Model: How Does WFH Affect Office Demand?

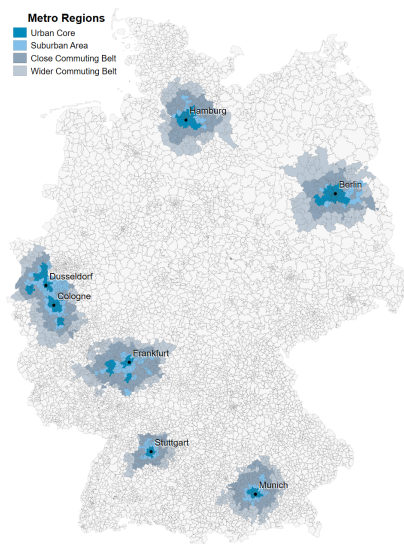
Simple two-step model:

1. Heterogeneous firms and employees choose work arrangement (on-site, hybrid, or remote), which yields their office utilization
2. Firms determine changes to their offices in terms of space, quality, and location

Takeaways:

- ▶ Hybrid WFH arrangements maximize utility for firms and employees
- ▶ Firms consider peak office utilization in decisions about adjustments to their office spaces

Setting and Data: Office Real Estate in Major German Cities



- ▶ **Scope: 7 largest German office markets 2014-2023**
 - ▶ **>40k individual office leases** (and >10k sales) with information about firms and office buildings from Colliers
 - ▶ Office **utilization and vacancy rates** from Colliers
 - ▶ **WFH survey among >7.7k firms** (ifo Business Survey) and in >1k postal codes (infas360)
- **Ongoing:** Linking individual firms from the ifo survey with office leases from Colliers

Empirical Approach: Identify Firm-level and Urban Effect of WFH on Office Real Estate

- ▶ **Challenge:** Disentangle WFH effect on changes in office leases from other influencing factors
- ▶ **Identification:** Exploit differential exposure to Covid-induced WFH shock to identify effect of hybrid work on office leases
 - ▶ Leverage variation across firms / across space
- ▶ **Analysis:** firm-level and urban effects of WFH on offices
 - ▶ Investigate differential effects on office demand by firms/industries
 - ▶ Investigate spatial heterogeneity within cities

Empirical Approach: Industry-Level WFH Growth Since 2019 was Determined by Pre-Pandemic WFH Levels

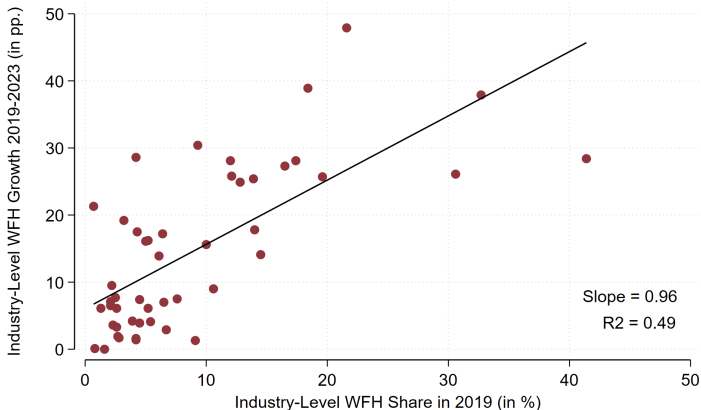


Figure: Correlation Industry-Level WFH Level 2019 & Growth 2019-2023

Descriptive Result 1a: Industry-Level Association of WFH With Office Space Downsizing and Increased Rents

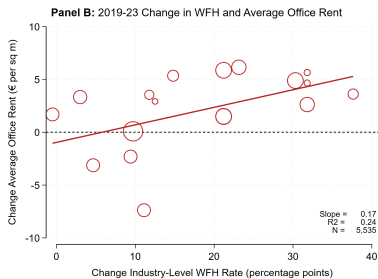
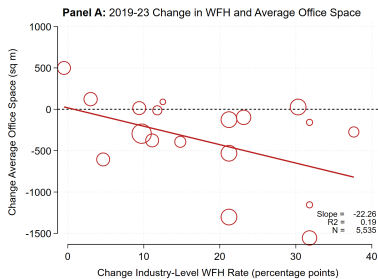


Figure: Industry-Level Changes in Office Space and Rents Relative to WFH Growth

Descriptive Result 1b: Industry-Level Association of WFH With Enhanced Office Quality

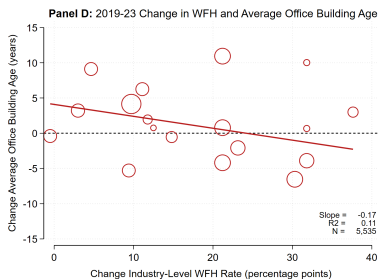
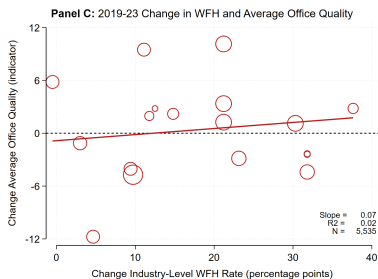


Figure: Industry-Level Changes in Office Quality and Age Relative to WFH Growth

Descriptive Result 2: Short-term Adjustments via Subleasing of Office Space Have Quadrupled Since Pandemic

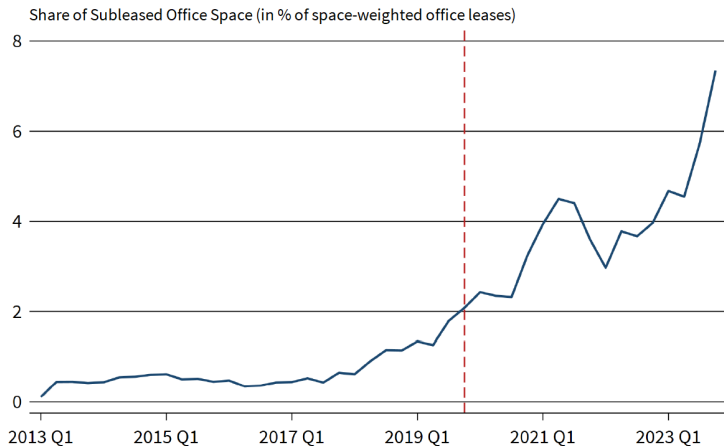


Figure: Change over Time in Share of Subleased Office Space

Descriptive Result 3a: Minor Spatial Shift Associated with WFH

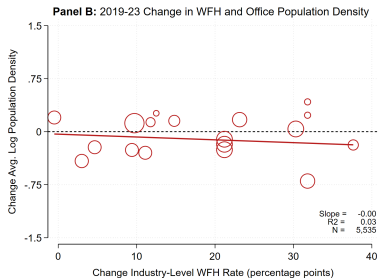
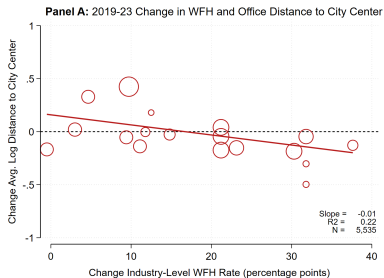


Figure: Urban Changes in Office Locations Relative to WFH Growth

Descriptive Result 3b: Concentration of Increasing Rents in City Centers

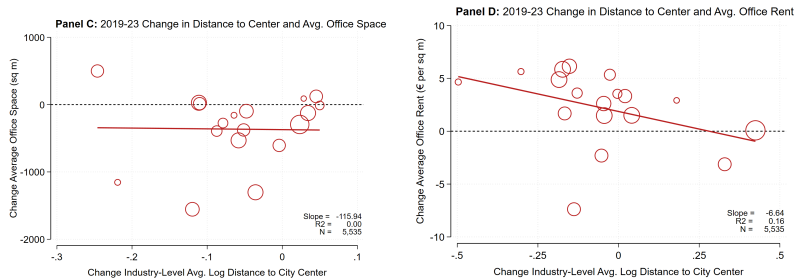


Figure: Urban Changes in Office Characteristics Relative to Distance to Center

Empirical Strategy: Persistent WFH Effect on Office Real Estate

- ▶ **Estimate long DiD from 2019–2023** to capture the persistent impact of WFH on office real estate
- ▶ **Leverage differences in WFH growth across industries**, induced by Covid-19 shock, with expansion potential largely pre-determined

$$\text{Office}_{ict} = \beta_1(\text{WFH_Growth}_i \times \text{Post}_t) + \beta_2\text{WFH_Growth}_i + \beta_3\text{Post}_t + \gamma_m + \delta_c + \epsilon_{ict} \quad (1)$$

- ▶ Office_{ict} : Office lease characteristics (e.g., space, rent, quality)
- ▶ WFH_Growth_i : Industry-level WFH growth (2019 vs. 2023)
- ▶ γ_m, δ_c : Metro area and industry fixed effects
- ▶ Standard errors clustered at postcode level

Long DiD Estimates: WFH Effect on New Urban Office Leases

	Industry Aggregate Office Space Demand	Industry Aggregate Office Rent Paid	Individual Office Space	Individual Office Rent sqm	Individual Office Quality	Individual Building Age
	(1)	(2)	(3)	(4)	(5)	(6)
WFH Growth						
× Post (2023)	-645.6095*** (194.9476)	-11,191.0591** (5,111.0504)	-11.3507* (6.5909)	0.0364** (0.0175)	-0.0771 (0.0550)	-0.0779 (0.0751)
Pre-Pandemic Mean	26,128.83	569,005.51	1,105.17	18.83	75.60	23.40
R^2	0.48	0.58	0.08	0.36	0.10	0.05
N	240	240	5,535	5,535	5,535	5,535
Metro Area FE	×	×	×	×	×	×
Industry FE			×	×	×	×

Table: Long DiD Results of WFH Growth Effect on New Office Lease Characteristics

- ▶ Results imply for average WFH growth of 15 pp. from 2019–2023:
 - ▶ Industry aggregate new office space demand: decrease by 9,684 sqm
 - ▶ Industry aggregate new office monthly rent paid: decrease by €167,866
 - ▶ Individual new office space: reduction by 170.3 sqm
 - ▶ Individual new office rent per square meter: increase by €0.5/sqm

Demand-Side Mechanism: Changing Importance of Criteria in Office Leasing Decisions

Qualitative evidence from structured expert interviews with CRE brokers:

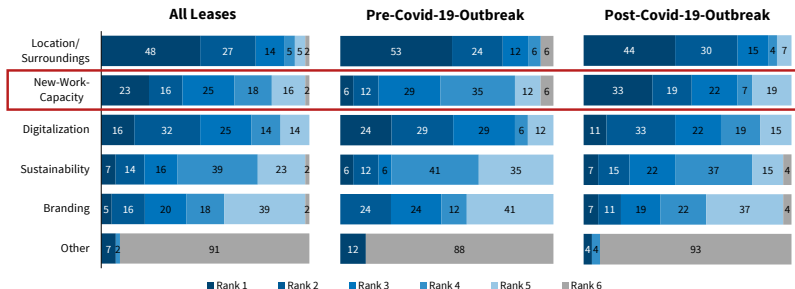


Figure: Changing Importance of Criteria in Office Leasing Decisions

Mechanism Employment: Urbanization Trend in Employment Growth Broken Since Pandemic

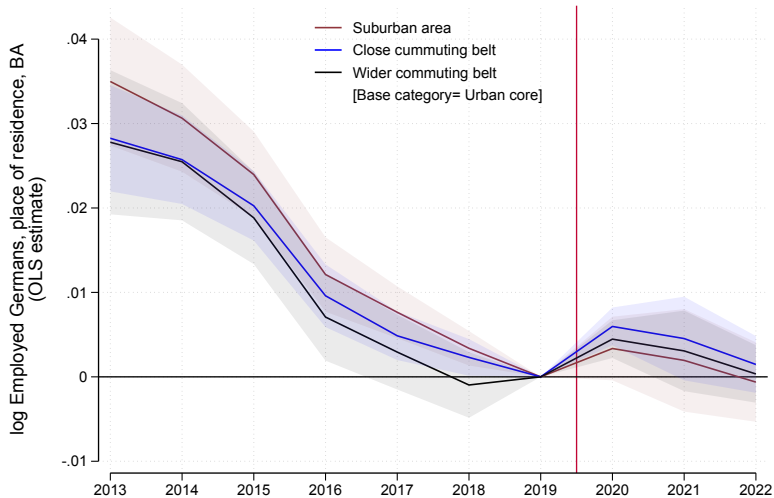


Figure: Changes in Metro Area Employment Relative to Urban Core

Conclusion and Next Steps

Conclusion:

- ▶ Permanent increase in WFH significantly impacts urban office CRE
- ▶ Higher industry-level WFH growth linked to lower office demand, higher rents, and better quality, with minor spatial shifts
- ▶ Substantial implications for urban planning and CRE

Next Steps:

- ▶ Complete firm-level linkage of ifo WFH survey and Colliers office data
- ▶ Analyze firms moving offices & spatial concentration of vacancies
- ▶ Extend to supply-side implications and impact on urban amenities

Thank you,

I look forward to your questions and suggestions!



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