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The Q-Theory in the German Housing Market

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Presentation Outline

- ▶ Motivation
- ▶ Related Literature
- ▶ Tobin's q in real estate markets
- ▶ Some descriptive statistics and data
- ▶ Panel regressions
- ▶ Individual regressions
- ▶ Summary

Motivation

- ▶ How close is the correlation between house prices and building activity?
- ▶ Can Tobin's q explain the level of housing investments?
- ▶ Are there systematically differences across cities/ regions?
- ▶ Does the currently observed recovery in the housing markets trigger a significant resumption of building activity (in the future)?

Literature: Tobin's q

- ▶ Tobin (1969), Hayashi (1982): Tobin's q measures efficiency in the use of capital
- ▶ Jud and Winkler (2003) apply Tobin's and Hayashi's theories to real estate sector in detail. Find that Tobin's q can explain up to 86% of real estate investment in the US market.
- ▶ Berg and Berger (2006) reaffirmed these findings for the Swedish market, achieving coefficients of determination of around 70%.
- ▶ Nitsch (2011) introduced rent relations into Tobin's q and found R^2 up to 75% for some German cities.

Tobin's theory

- ▶ Tobin's original q = ratio of the market value of an asset to its replacement cost
- ▶ Applied on real estate markets (Nitsch, 2011):

$$q_M = \frac{\text{Price}(\text{existing stock})}{\text{Price}(\text{newbuild})} * \frac{\text{Rent}(\text{newbuild})}{\text{Rent}(\text{existing stock})}$$

-> q increases with higher stock prices and higher newbuild rents

$Q > 1 \Rightarrow$ invest to create more of the asset, because they are "worth" more than the price they paid for them.

$Q < 1 \Rightarrow$ disinvest to reduce asset

$Q = 1$ market is in equilibrium

Data

Investments: Official statistics, Statistisches Bundesamt (Destatis)

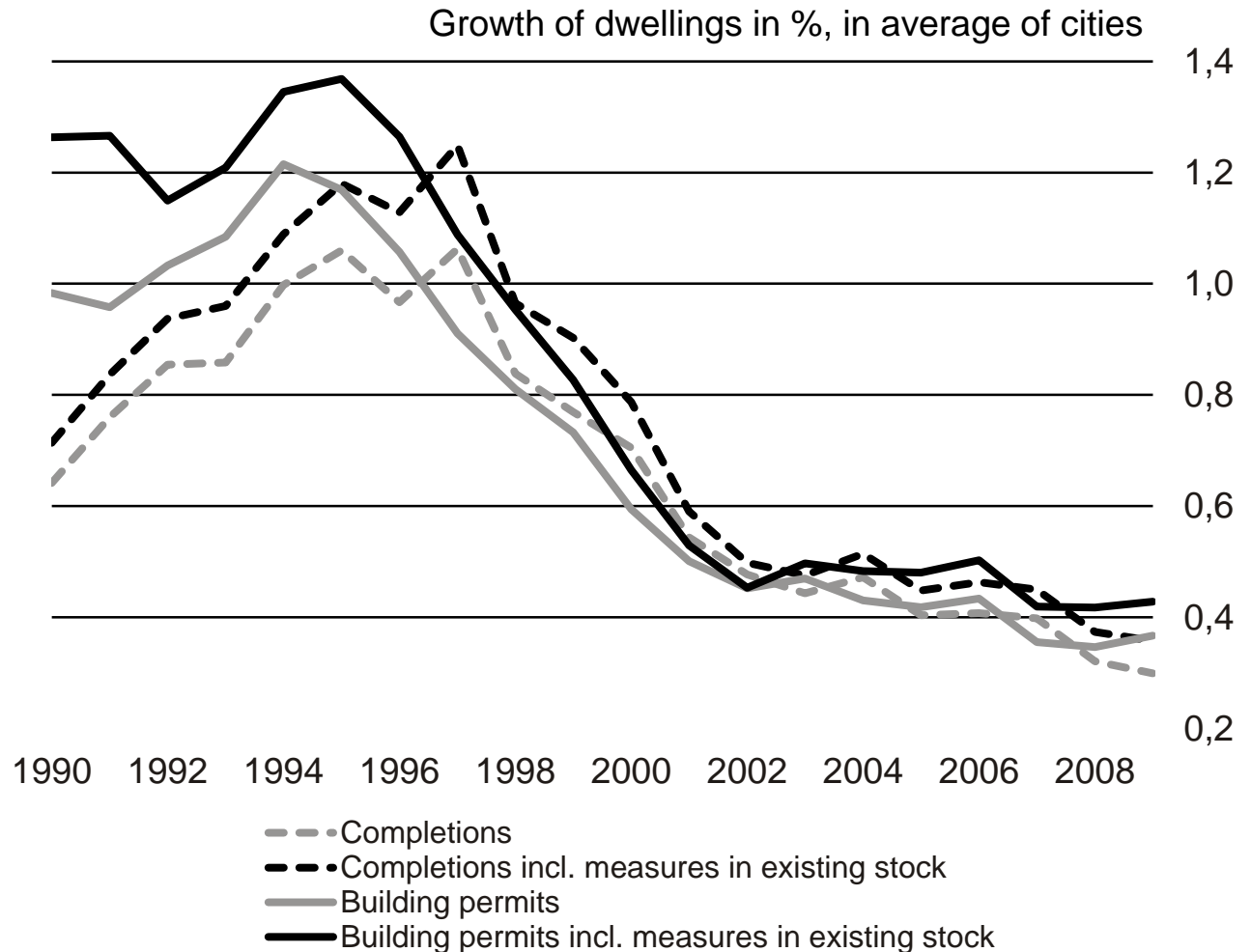
- ▶ Dwelling permits incl. measures in existing stock (annual data for communities)

Tobin's q: BulwienGesa (RIWIS): Annual data for 95 cities since 1995

- ▶ Prices (existing stock, newbuilds): Average prices for owner-occupied flats, average to good location, ca. 70 m² living space
- ▶ Rents (existing stock, newbuilds): Average rents for flats, average to good location, ca. 70 m², living space

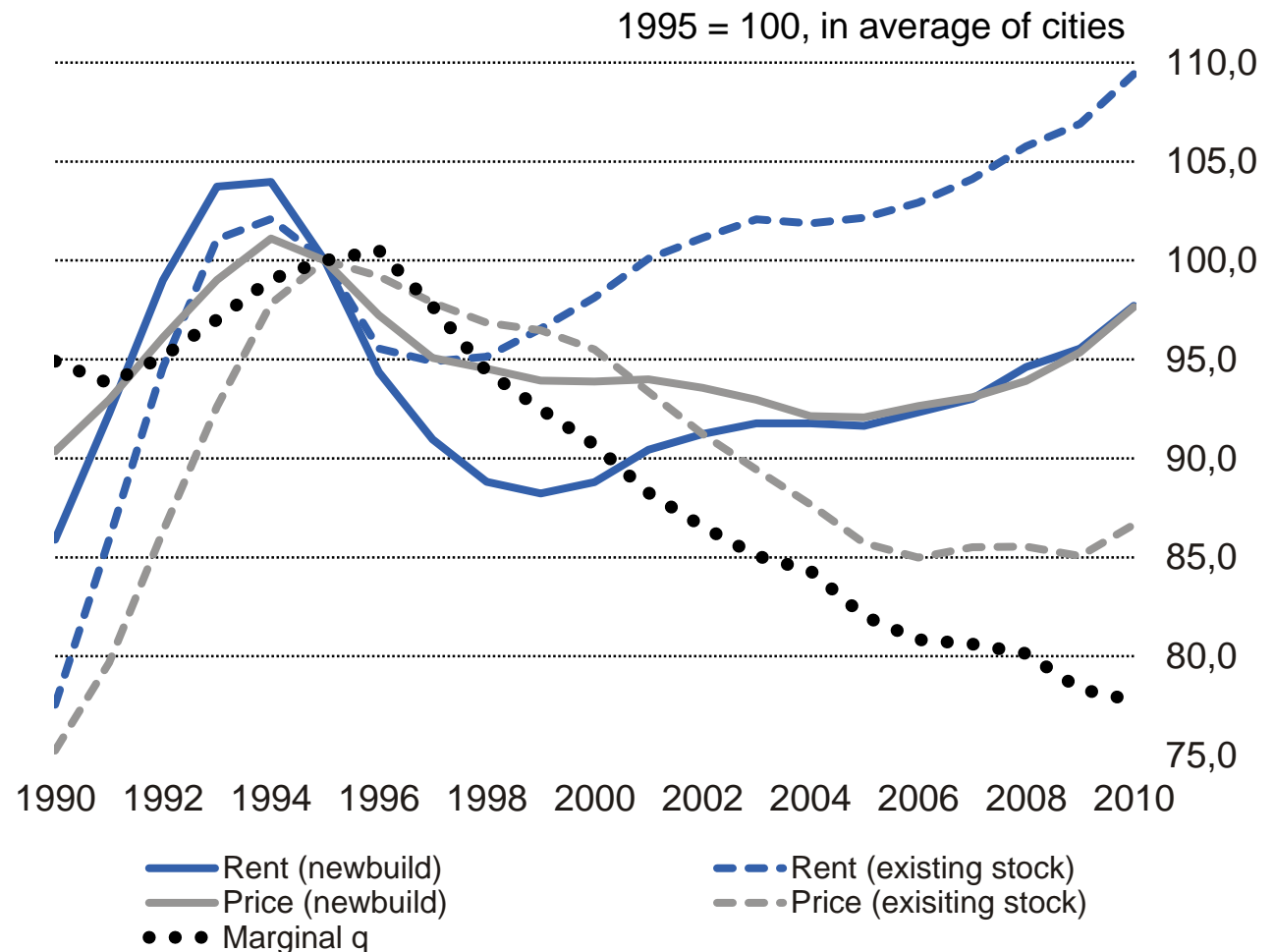
Investments

- ▶ Unification boom until the middle of 1990ies
- ▶ After this, investments turn down constantly



Prices, rents and marginal q

- ▶ strong increase in prices and rents following unification
- ▶ price gap widens slightly
- ▶ steady decline in Tobin's q since the middle of 1990ies



Panel regression model

Fixed Effects model:
$$\left(I_{it} / K_{it} \right) = \alpha_i + \beta_{it} q_{it} + \varepsilon_{it}$$

Interpretation:

- ▶ I_{it} investment activity (building activity) in relation to the capital stock K_{it} (existing dwelling stock)
- ▶ q_{it} is the q ratio of a city i in period t .
- ▶ α_i and β_{it} are the estimated coefficients
- ▶ ε_{it} is an error term

Results of panel regressions

	All	A-Rated cities	B-Rated cities	C-Rated cities	D-Rated cities
Panels / Cities	95	7	14	21	53
Periods	15	15	15	15	15
Observations	1,425	105	210	315	795
Constant	-0.998*** (-10.80)	-1.295*** (-6.27)	-0.866*** (-2.69)	-0.667*** (-4.12)	-1.155*** (-9.17)
Tobin's q_M	1.896*** (18.41)	2.139*** (9.60)	1.623*** (4.68)	1.513*** (8.47)	2.132*** (14.90)
Within-R ²	0.203	0.488	0.102	0.197	0.231
Overall-R ²	0.163	0.294	0.076	0.200	0.189

ABCD-city categorisation according to its functional importance, largely according to its population (BulwienGesa). A-Rated cities represent the 7 most populated cities in Germany. All variables (in whole sample and subsamples) are (trend)stationary at all significance levels (Levin-Lin-Chu Test).

Results of panel regressions (ii)

- ▶ The investment fluctuations in a city can be explained to around 20% altogether on the basis of Tobin's marginal q
- ▶ The explanatory power is considerably higher for A-rated cities, at 49%, while it is lower for B-rated cities at 10%. For the smaller C-rated and D-rated cities it is around 20%. -> city size seems not to matter
- ▶ -> Tobin's q cannot possibly contain all market information (e.g. abolition of home-ownership grant (2005), unification boom years (early 1990ies))

Individual regression model

- ▶ Equal as panel regression model, but extension with investments in the adjacent counties
- ▶ Idea: Integrating investment spillovers to suburbs and metropolitan area
 - ▶ Supply of building land in an agglomeration is low and building land is more affordable in the periphery -> Investor search for locations is not restricted within city limits.
 - ▶ Tobin's q for the central city is expected to have a great impact on local housing markets in the suburbs / metropolitan area.
- ▶ Forming of two rings around every city:
 1. The first ring factors in the directly adjacent counties.
 2. The second ring corresponds to the metropolitan region in which the respective major city is located.

Results of individual regressions (Adj. R²)

	City	Ring 1 (Adjacent counties)	Ring 2 (Metropolitan region)
Berlin	0.799	0.888	0.910
Bremen	0.429	0.694	0.718
Dortmund	First Diff.: 0.009 (Standard: 0.097)	First Diff.: -0.069 (Standard: 0.054)	n/a
Dusseldorf	0.480	First Diff.: -0.083 (Standard: 0.690)	n/a
Essen	First Diff.: 0.149 (Standard: 0.024)	0.911	n/a
Frankfurt	-0.006	0.803	0.834
Hamburg	0.491*	0.628	0.675
Cologne	0.571	First Diff.: 0.062 (Standard: 0.712)	n/a
Munich	-0.073	0.078	First Diff.: -0.083 (Standard: -0.076)
Stuttgart	First Diff.: -0.063 (Standard: 0.011)	First Diff.: 0.072 (Standard: -0.064)	First Diff.: 0.086 (Standard: -0.063)

Results of individual regressions (ii)

- ▶ Regressions reveal stark differences across cities/regions
- ▶ Adj. R^2 of Tobin's q for building activity correlates strongly with building activity for half of the cities (i.e. 42% to 80%)
- ▶ With the other cities investments are barely explained by Tobin's q
- ▶ Explanations: poor data, scarce supply (because of topographical reasons (valley basin of Stuttgart) or restrictive land use policy)
- ▶ Demand for construction investment expressed by Tobin's q cannot be satisfied within a major city. "Improvement" holds for 7 of 10 cases (city to ring 1) or 5 of 6 cases (ring 1 to ring 2)

Summary

- ▶ Findings show that Tobin's q exerts a positive and significant influence on investment activity
- ▶ However, correlations were less clear than might have been expected (in light of the theoretical stringency of the concept)
- ▶ Factoring in surrounding municipalities shows that Tobin's q impacts on suburban housing markets, i.e. very often do not stop at city limits

Thank you
for your attention!