

House Price Indices & Hypoport's EPX

Visit of the Delegation of the National
Bureau of Statistics of China

August 26, 2014

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- Introduction - measuring property prices in Germany
- Conceptual issues in quality adjustment when measuring house prices
- Development of the national German House Price Index of Hypoport AG EPX (Europace Price Index)
- Expansions - regional housing market analysis and bottom-up index creation
- Other topics, Q&A

Measuring Property Prices

Contents

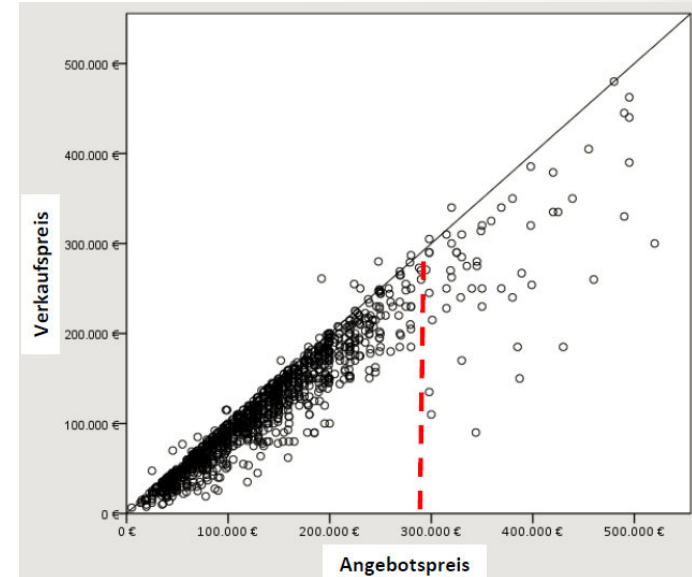
- Private Price Discovery
- Official Price Discovery
- Database of Hypoport AG

Measuring Property Prices

Private Price Discovery Dominates

- Multiple private information collection efforts
 - Bank transactions: Verband deutscher Pfandbriefbanken, Hypoport AG (Europace).
 - Real estate transactions: Zentraler Immobilienausschuss (commercial).
 - Real estate advertisements: empirica.
 - Real estate agents: Ring deutscher Makler.
 - Expert assessments/appraisers: Bulwien.
- There is no official nationwide land and housing transactions database !
 - Official appraisal committees (Gutachterausschuesse) exist on the state and communal level, coverage gaps,
 - Outdated fiscal cadastre value assumptions: Constitutional Court judgement enforces change.

Sales Prices vs. Advertisements

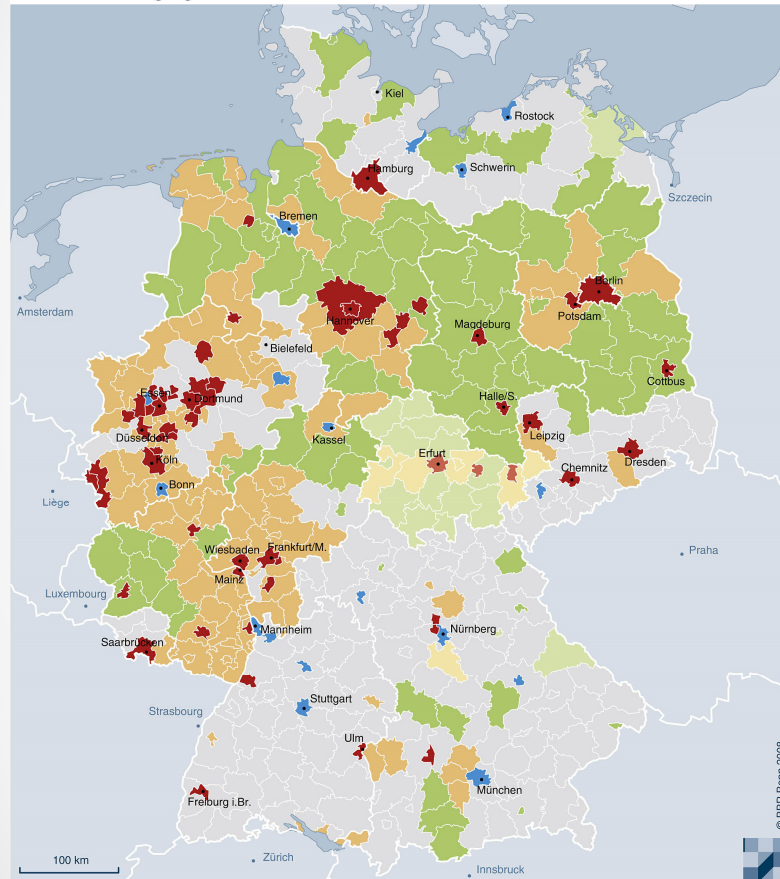


Source: Technische Universität Kaiserslautern, 2011 sample of 625 communal transaction databases and related newspaper ads.

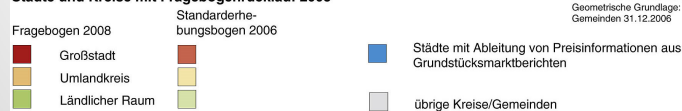
Measuring Property Prices

Official Price Discovery Gaps

Rücklauf der Befragung der Gutachterausschüsse für Grundstückswerte 2008



Städte und Kreise mit Fragebögenrücklauf 2008



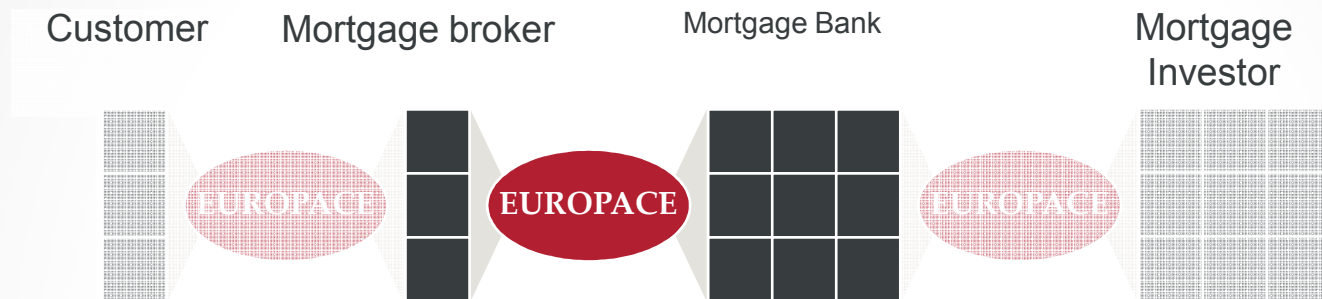
Datenbasis: BBR-Immobilienpreismonitoring
Geometrische Grundlage: BKG, Kreise 31.12.2007,
Gemeinden 31.12.2006

- Official appraisal committees
 - Large areas uncovered (laws exist, but underfunded or not executed),
 - Instruments are used for assessments (e.g. land values for house prices),
 - Focus is on appraisals, not market transactions,
 - Only one state (Niedersachsen) fully advanced, i.e. official hedonic index.
- Impact of lack of official data on index construction efforts
 - Competition on data generation instead of best index construction,
 - Insufficient sample sizes: max is 15-20%,
 - Different markets with different characteristics, not fully comparable,
 - No coverage of many small markets, insufficient detail on properties,
 - Bottom-up hedonic index based on regional regressions only in distant future.

Measuring House Prices

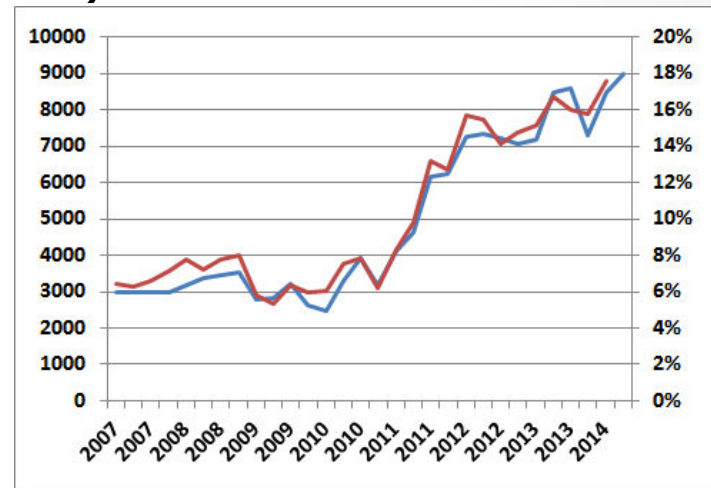
Database for Europace Price Index EPX

EUROPACE Business-to-Business Brokerage Platform



- Central role in residential mortgage intermediation in Germany via brokers and other originators,
- All lender groups now represented, including retail banks with fixed branch networks,
- Has reached 18% market share by 2014,
- Verifiable transactions data,
- Reliable data entry quality, no paper work, everything is processed electronically,
- Data is available quickly, i.e. monthly, one week after end of month.

Europace Quarterly Volumes (mln EUR) and Market Share



Source: Hypoport, Bundesbank, Finpolconsult computations.

Conceptual Issues in Quality Adjustment

Contents

- Impact of quality adjustment on price measurement
- Methodological comparison
 - Repeat Sales Method
 - Hedonic Regression - Imputation and Time Variable Methods
 - As before, with Time-Dependent Beta Matrix.

Conceptual Issues in Quality Adjustment

Impact of quality adjustment on price measurement

Step 1: cross-sectional data analysis

How variable are housing characteristics across the transacted stock?

- **If not (very) variable, non-quality adjusted metric feasible.**
 - US repeat sales with quality-adjustment by identity (no omitted variable bias).
- **Repeat sales not ideal for Germany**
 - Data availability, data protection.
 - Housing in Germany far more rarely is transacted than in the US (very low mobility of homeowners, regional economic policy),
 - New housing to be essentially excluded in German context (one transaction),
 - Frequent repeat sales properties are likely to have special characteristics, e.g. counterparty changes affecting price changes (rental investor buys, sells to tenant; forced sales),
 - Strong depreciation through environmental standard, energy cost changes,
- **Ignoring characteristics (averages) is out of question, too**
 - Variable age structure, capital repair needs, construction qualities, sizes/layouts and amenities of stock,
 - Regional and even local economic disparities.

Conclusion:

- apply some form of hedonic regression against giving up purity of repeat sales approach (possibly going forward hybrid).

Development of the EPX of Hypoport AG

Hedonic Regression

Hedonic Regression Model with Explicit Time Variables

$$\ln P_t^h = \sum_{c=1}^C \beta_c X_{c,t}^h + \alpha_t T_t + v_t^h$$

P_t^h Price of a house (h) at time (t);

$\beta_c X_{c,t}^h$ β_c shadow prices for $c=1,2,\dots,C$ characteristics

$\alpha_t T_t$ Dummy variables

v_t^h Error terms

β_c is independent of time \rightarrow key assumption

Notes:

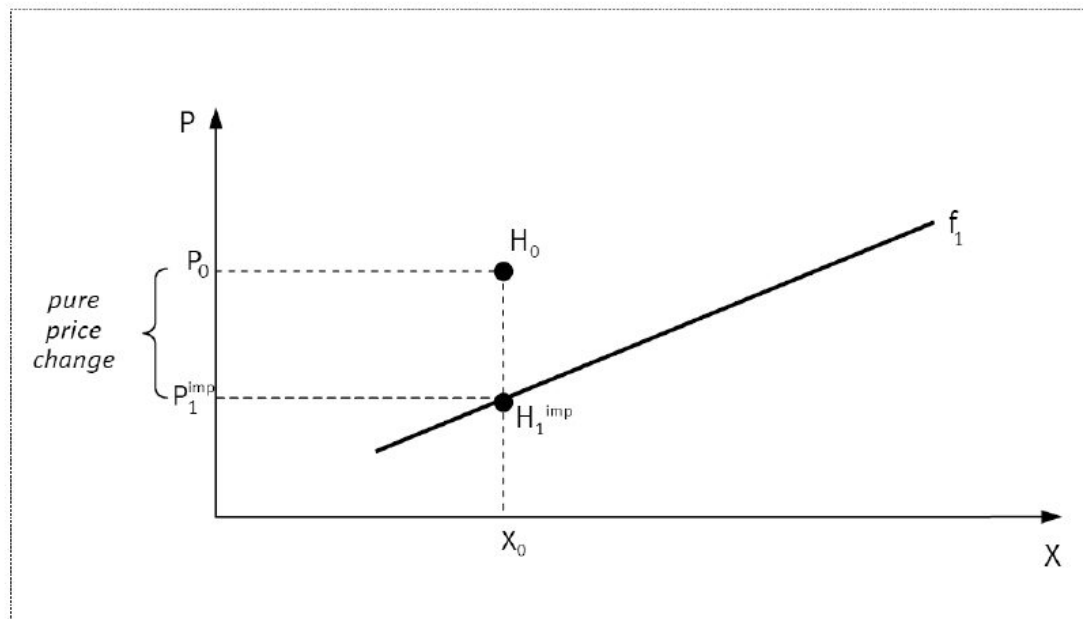
- Repeat sales regressions are an explicit time variables sub-model, i.e. omit the beta matrix, with price changes as the regressand.
- Strictly cross-sectional hedonic regressions omit the time variables.
- Adjacent regressions estimate beta matrix and two (one) time variables.

Conceptual Issues in Quality Adjustment

Hedonic Imputation

Hedonic Imputation based on Cross-Sectional Hedonic Regression

$$\hat{P}_s^h(x_t^h) = \exp\left(\sum_{c=1}^C x_{c,t}^h * \hat{\beta}_{c,s}\right), \quad s > t$$



Quelle: Linz/Behrmann (2004).

Case: $t=0, s=1$

Laspeyres index, weights of characteristics today determine the price index for tomorrow.

- Requires a cross-sectional base period regression to estimate the beta matrix.

Conceptual Issues in Quality Adjustment

Impact of quality adjustment on price measurement

Step 2: intertemporal data analysis

How fast do housing characteristics and their shadow prices change?

- If not very fast, constant beta matrix can be assumed.
- Factors: technological progress, environmental standards, land supply constraints etc..
- Germany: increasing dynamics in all these factors, partly swiftly changing shadow prices (more later).

Conclusion:

- **Reject assumption of constant beta matrix.**
Rejects repeat sales model, except for hybrids.
- **Options:**
 - Recompute hedonic imputation base regression in regular intervals → risk of jumps in inflation time series.
 - Explicitly model time-variant beta matrix → potentially costly.
 - Hedonic regression with time variables → distortions of inflation time series as regression period extends.

Conceptual Issues in Quality Adjustment

Hedonic Regression with Modelling of Beta-Matrix

Hedonic Regression Model with Time-Dependent Beta-Matrix

$$\ln P_t^h(x_t^h) = \sum_{c=1}^C x_{c,t}^h * \beta_{c,t} + v_t^h,$$

P_t^h Price of a house (h) at time (t);

$\beta_{c,t} X_{c,t}^h$ $\beta_{c,t}$ shadow prices for $c=1,2,\dots,C$ characteristics and $t=1,2,\dots,T$, following e.g. the simple autoregressive process

$$\beta_{c,t} = \beta_{c,t-1} + \eta_t$$

v_t^h η_t Error terms, distributed independently from each other

Full beta matrix modelling with high costs (income/substitution effects, supply effects).

Autoregressive specification is a 'low-cost' model. Implemented through adjacent cross-sectional regressions. Used for computer and other fast characteristics changing products.

Shortcut for housing is to either extend autoregressive process period or 'roll over' the hedonic time variable regression period.

Roll-over: add one and drop one beta innovation every period. → de-facto moving average specification of the beta matrix.

Conceptual Issues in Quality Adjustment

Summary

METHODS		MODELS
Quality-adjusted	Hedonic regression	- Explicit time-variable - Strictly cross-sectional
	Repeat-sales	- Ordinary repeat-sales - Weighted repeat-sales
	Hybrid	- Case and Quigley's (1991) - Quigley's (1995) - Hill, Knight and Sirman's (1997) - Englund, Quigley and Redfean's (1998)
Non quality-adjusted	Average	- Mean - Median

Source: Anthony Owusu-Ansah, University of Aberdeen, 2012

Development of the EPX of Hypoport AG

Contents

EPX = Europe Price Index
(used to be HPX)

Concept paper of 2008, sequencing:

- Data sources and quality
- Matching of in-house data with spatial data of Federal Office for Construction and Spatial Planning
- Specification of Variables and Dummies
- First regression models and test statistics
- Tests for shadow price stability, definition of regression period
- Decision aggregation of regional or federal regressions
- Decision on final regressions specifications
- Other issues: weighted vs. unweighted, treatment of new construction, seasonal adjustment

Development of the EPX of Hypoport AG

Data Sources and Quality

Available Data for Hedonic Analysis

Hypoport / Europace

Housing characteristics

- Object type
- Usage
- Age
- Living surface
- Plot surface
- Number of apartments/building

Financing characteristics

- Loan purpose
- Purchase price
- Costs of modernisation
- Building costs
- Price for plot

BBSR

Spatial / density characteristics:

- Population of municipality
- Urban density classes
- Commuting times
- Distance classes (Center, commuter rings)
- 4 Regions (East/West/North/South)

Matching
-By postal code

Missing hedonic property characteristics

- Number of rooms, bathrooms,
- Modernization status of bathrooms
- Garage
- Floor level, lift yes/no

Banks are hard to motivate to collect characteristics beyond what is necessary to provide for loan contracts.

Development of the EPX of Hypoport AG

Matching with Spatial Data of BBSR

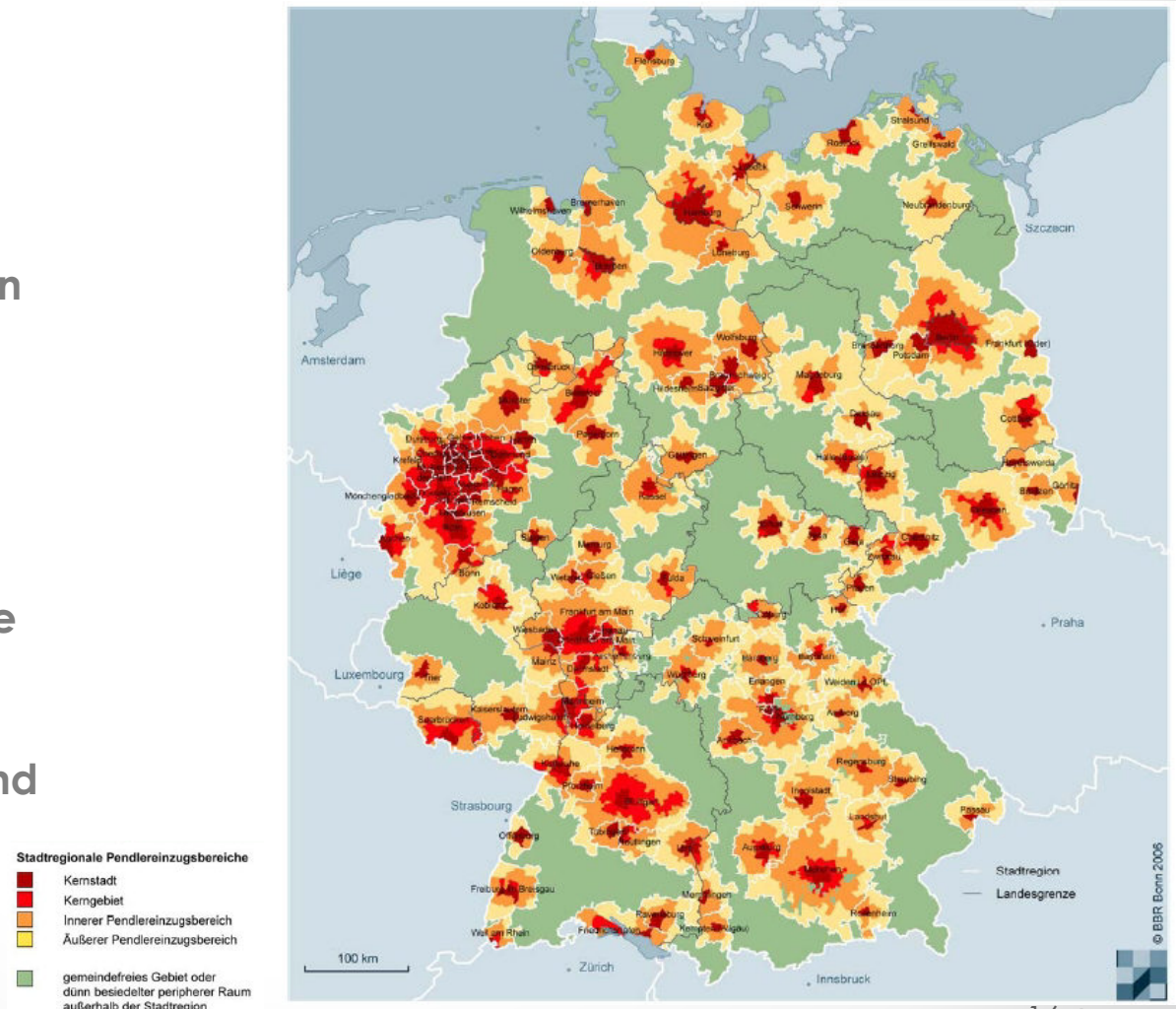
Purpose:

- Gain global proxies for land prices structure
- Shortcut to expedite the computation of a national (top-down) index rather than modelling each region (bottom-up).

Issues:

- Land price structure is heterogeneous → significance varies.
- High multicollinearity risk → strict focus on spatial and urban characteristics.
- No micro spatial structures.

Commuting Rings around Economically Homogeneous Zones Determined by BBSR



Development of the EPX of Hypoport AG

Spatial Variables Used in the Literature

Table 2.2. Neighbourhood and accessibility variables used in previous studies

Authors	Study area	Variables used
Palmquist (1980)	Washington, USA	Distance to nearest park, location to highway, access to recreational facilities
Case and Quigley (1991)	Hawaii, USA	Distance to shore
Des Rosiers and Theriault (1992)	Canada	Distance to highway exists, major work places, parks, primary schools, Regional and neighbourhood shopping centres, welfare housing
Garrod and Willis (1992)	Britain	Approximate distance from nearest urban centre, post office and schools. The presence of pub, post office, river, canal etc.
Adair et al. (1996)	Ireland	Aggregate accessibility index
So et al. (1997)	Hong-Kong	Walking distance to bus stations, availability of car parks, car sport facilities, shopping centre, and swimming pool
McChuskey et al. (2000)	Northern Ireland	X and Y coordinates
Bateman et al. (2001)	Glasgow	Neighbourhood variables like people who own cars, unemployment rate, number of young families, people who do not own property, etc.
Frew and Wilson (2002)	Portland, USA	Distance to city centre, highway and highway intersection
Bourassa et al. (2003)	New Zealand	Distance to CBD and neighbourhood variables like population densities, % of unemployed, rooms per house, ethnic composition, % of people who receive support, home ownership rate, etc.
Day (2003)	Glasgow	Straight line distance to city centre, car travel time, walking distance
Wilhelmsson (2004)	Stockholm, Sweden	Distance from CBD
Rodriguez and Targa (2004)	Colombia	Shortest walking time to nearest BRT station, travel time to CBD, and other railway stations
Gibbons and Machin (2005)	London, UK	Straight line distance to nearest railway station
Bourassa et al. (2006)	New Zealand	Distance from CBD and distance from subcentre
Dehring and Dunse (2006)	Aberdeen, Scotland	Proximity to urban parks

Source: Anthony Owusu-Ansah, University of Aberdeen, 2012

Development of the EPX of Hypoport AG

Basic Regression Specification

Standard Hedonic Regression Model with Time Dummies

$$\ln P_t^h = \sum_{c=1}^C \beta_c X_{c,t}^h + \alpha_t T_t + v_t^h$$

P_t^h Price of a house (h) at time (t);

$\beta_c X_{c,t}^h$ β_c shadow prices for $c=1,2,\dots,C$ characteristics

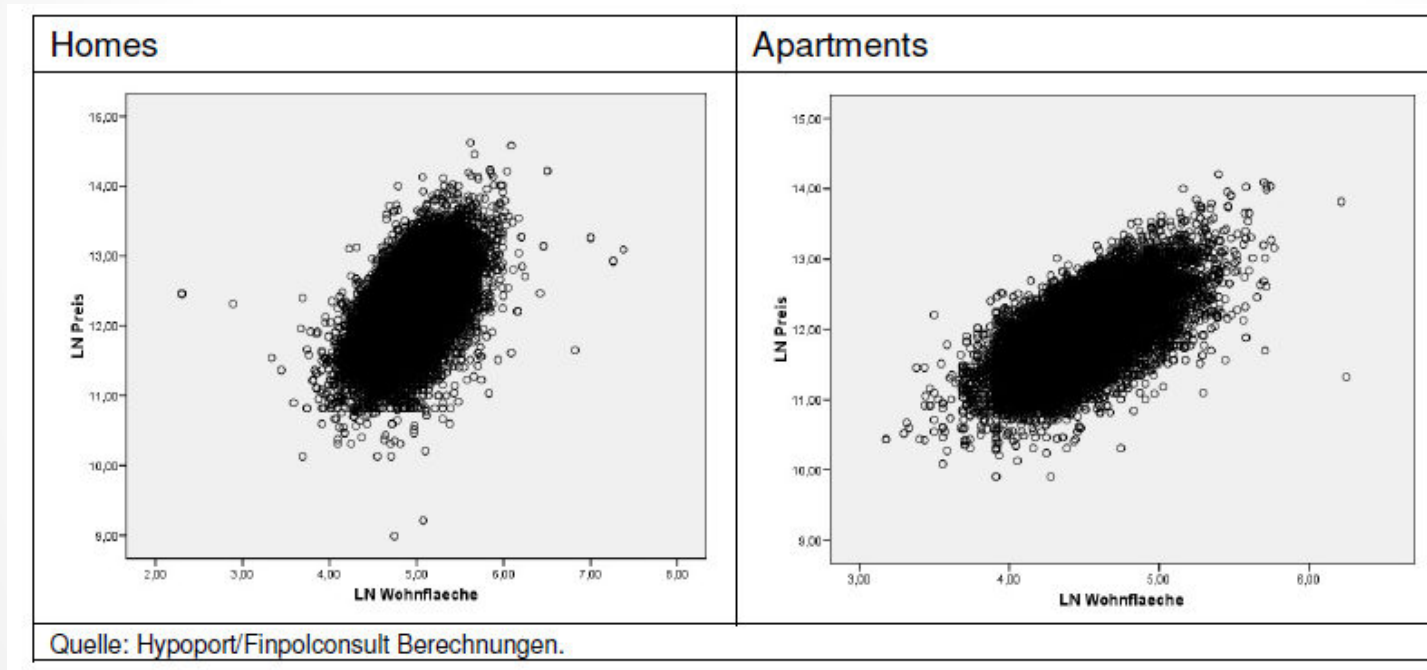
$\alpha_t T_t$ Dummy variables

v_t^h Error terms

Development of the EPX of Hypoport AG

Specification of Variables and Dummies

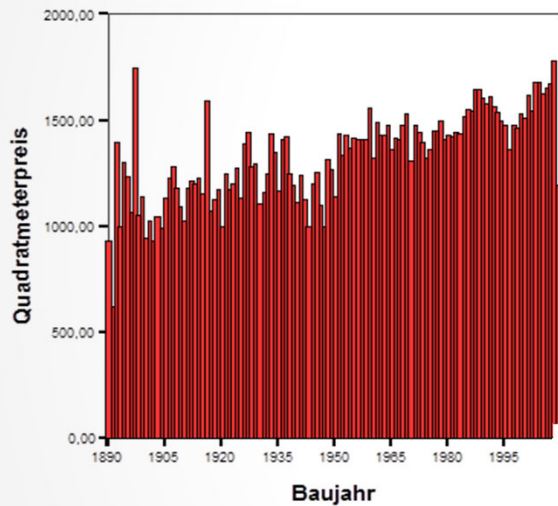
- Logarithmic specifications of price and space



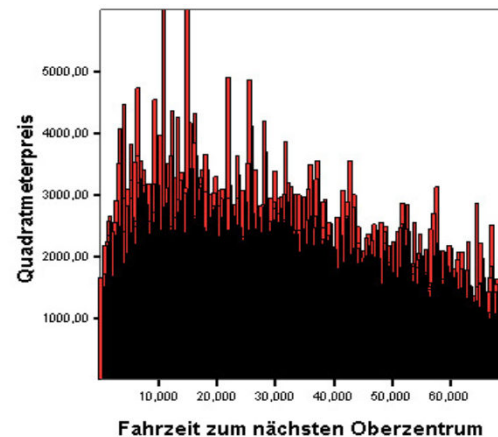
Development of the EPX of Hypoport AG

Specification of Variables and Dummies Homes

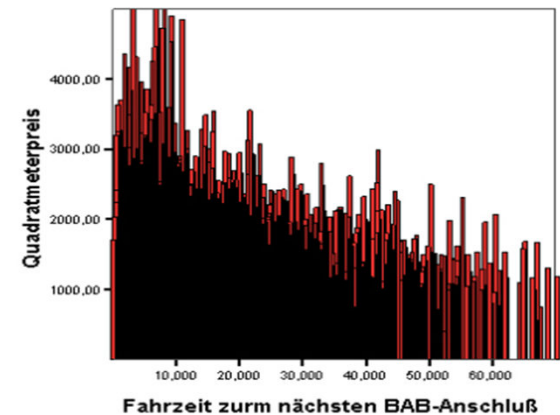
- Age effect



- Travel time to next larger city



- Travel time to motorway



Development of the EPX of Hypoport AG

Specification of Variables and Dummies Homes

	Selbstnutzung		Selbstnutzung und Teilvermietung					Selbstnutzung		
	Standard	Dummy Modernisierung	Standard	Dummy Teilvermietung	.. mit Modernisierung	.. mit Bevoelkerung	.. mit Entfernung-30	Baualter funktional	Wie (8) ohne TV/Mod	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
Beobachtungen	61478	80111	89618	89618	89618	89618	89618	89580	81451	
Teststatistiken										
R ²	0.509	0.510	0.489	0.500	0.501	0.511	0.518	0.522	0.526	
Ajustiertes R ²	0.509	0.510	0.489	0.500	0.500	0.511	0.518	0.521	0.526	
Variablen	Typ									
KONSTANTE	stetig	8.357	8.448	8.903	8.537	8.538	8.159	8.212	8.229	8.111
FLAECHE										
Wohnflaeche	stetig, LN	0.762	0.741	0.644	0.722	0.721	0.714	0.708	0.701	0.743
Grundstuecksflaeche	stetig, LN	0.047	0.049	0.052	0.051	0.051	0.061	0.067	0.069	0.064
BAUJAHR										
vor 1919	1/0	0.762	-0.421	-0.449	-0.429	-0.421	-0.416	-0.414	X	X
1919 - 1949	1/0	0.047	-0.310	-0.353	-0.335	-0.327	-0.334	-0.332	X	X
1950 - 1979	1/0	0.762	-0.230	-0.267	-0.251	-0.244	-0.249	-0.249	X	X
1980 - 1999	1/0	0.047	-0.115	-0.130	-0.124	-0.120	-0.121	-0.119	X	X
2000 und juenger	1/0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	X	X
Baualter in Jahren	1/0	X	X	X	X	X	X	X	-0.007140	-0.007295
Baualter i.J.quadriert	1/0	X	X	X	X	X	X	X	0.0000286	0.0000297
INVESTITION										
Teilvermietung	1/0	X	X	X	-0.170	-0.170	-0.167	-0.163	-0.160	X
Modernisierung	1/0	X	-0.011	X	X	-0.014	-0.014	-0.014	-0.010	X
VERDICHTUNG										
Bevoelkerung	stetig, LN	X	X	X	X	X	0.037	0.032	0.033	0.026
Entf. Oberzentrum >30min	1/0	X	X	X	X	X	X	-0.092	-0.092	-0.079
Metropole	1/0	0.222	0.257	0.270	0.266	0.266	0.113	0.106	0.111	0.093
Grossstadt	1/0	0.033	0.050	0.057	0.055	0.055	-0.035	-0.048	-0.046	-0.051
Laendlich	1/0	-0.167	-0.186	-0.188	-0.186	-0.185	-0.147	-0.134	-0.134	-0.127
Umland	1/0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
REGION										
Ostdeutschland	1/0	-0.216	-0.235	-0.238	-0.237	-0.238	-0.232	-0.223	-0.224	-0.206
Norddeutschland	1/0	-0.089	-0.095	-0.096	-0.097	-0.096	-0.086	-0.086	-0.089	-0.083
Sueddeutschland	1/0	0.165	0.162	0.162	0.163	0.162	0.175	0.173	0.172	0.173
Westdeutschland	1/0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Age specifications: classes vs. functional

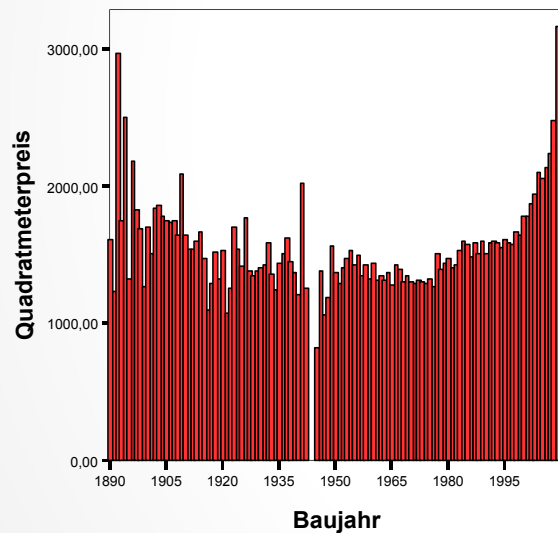
Investment: inclusion / exclusion of modernized and partially rented homes
→ modernization time dummies.

Density specifications: population vs. distances vs. urban classifications.

Development of the EPX of Hypoport AG

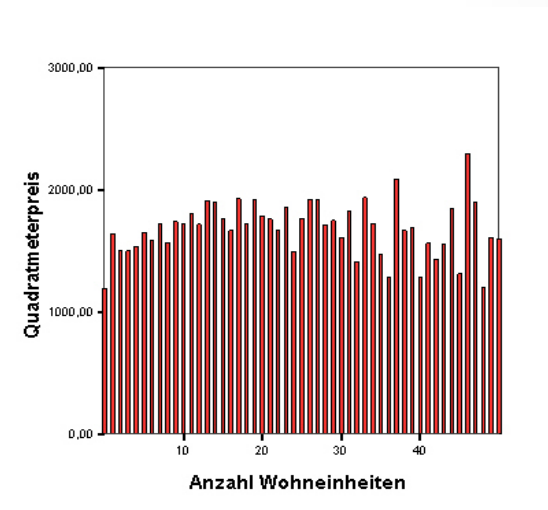
Specification of Variables and Dummies Apartments

- Age effect



High prices for pre-WW I apartments
Low prices for post-WWI and II
apartments

- Number of housing units in apt building



Development of the EPX of Hypoport AG

Specification of Variables and Dummies Apartments

		Selbstnutzung		Selbstnutzung einschl. Modernisierungen		Selbstnutzung	
		Standard	Modernisierungen	und Anzahl	und	Baualter	Wie (5)
		(1)	(2)	(3)	(4)	funktional	ohne Modernis.
		19966	24946	24946	24946	24900	19923
Beobachtungen							
Teststatistiken							
	R ²	0.632	0.627	0.629	0.635	0.640	0.647
	Ajustiertes R ²	0.631	0.627	0.628	0.634	0.639	0.646
Variablen	Typ						
KONSTANTE	stetig	7.847	7.804	7.737	7.296	7.307	7.369
FLAECHEN	Wohnflaeche stetig, LN	0.921	0.932	0.942	0.941	0.937	0.925
BAUJAHR							
	vor 1919	1/0	-0.220	-0.219	-0.219	X	X
	1919 - 1949	1/0	-0.362	-0.347	-0.344	X	X
	1950 - 1979	1/0	-0.429	-0.415	-0.413	X	X
	1980 - 1999	1/0	-0.261	-0.255	-0.255	X	X
	2000 und juenger	1/0	0.000	0.000	0.000	X	X
	Baualter in Jahren	1/0	X	X	X	-0.020740	-0.021672
	Baualter i.J.quadriert	1/0	X	X	X	0.0002720	0.0002840
	Baualter i.J. hoch drei	1/0	X	X	X	-0.00000091	-0.00000093
INVESTITION							
	Modernisierung	1/0	X	-0.046	-0.045	-0.038	X
VERDICHUNG							
	Bevoelkerung stetig, LN	X	X	X	0.045	0.047	0.046
	1-4 Wohneinheiten	1/0	X	X	0.000	0.000	0.000
	5-20 Wohneinheiten	1/0	X	X	0.038	0.028	0.032
	ueber 20 Wohneinheiten	1/0	X	X	0.001	-0.016	-0.010
	Metropole	1/0	0.258	0.266	0.261	0.105	0.103
	Grossstadt	1/0	0.008	0.008	0.005	-0.083	-0.077
	Laendlich	1/0	-0.124	-0.132	-0.130	-0.086	-0.083
	Umland	1/0	0.000	0.000	0.000	0.000	0.000
REGION							
	Ostdeutschland	1/0	-0.142	-0.156	-0.155	-0.180	0.103
	Norddeutschland	1/0	-0.023	-0.034	-0.032	-0.035	-0.077
	Sueddeutschland	1/0	0.176	0.170	0.169	0.177	-0.083
	Westdeutschland	1/0	0.000	0.000	0.000	0.000	0.000

Age specifications: classes vs. functional

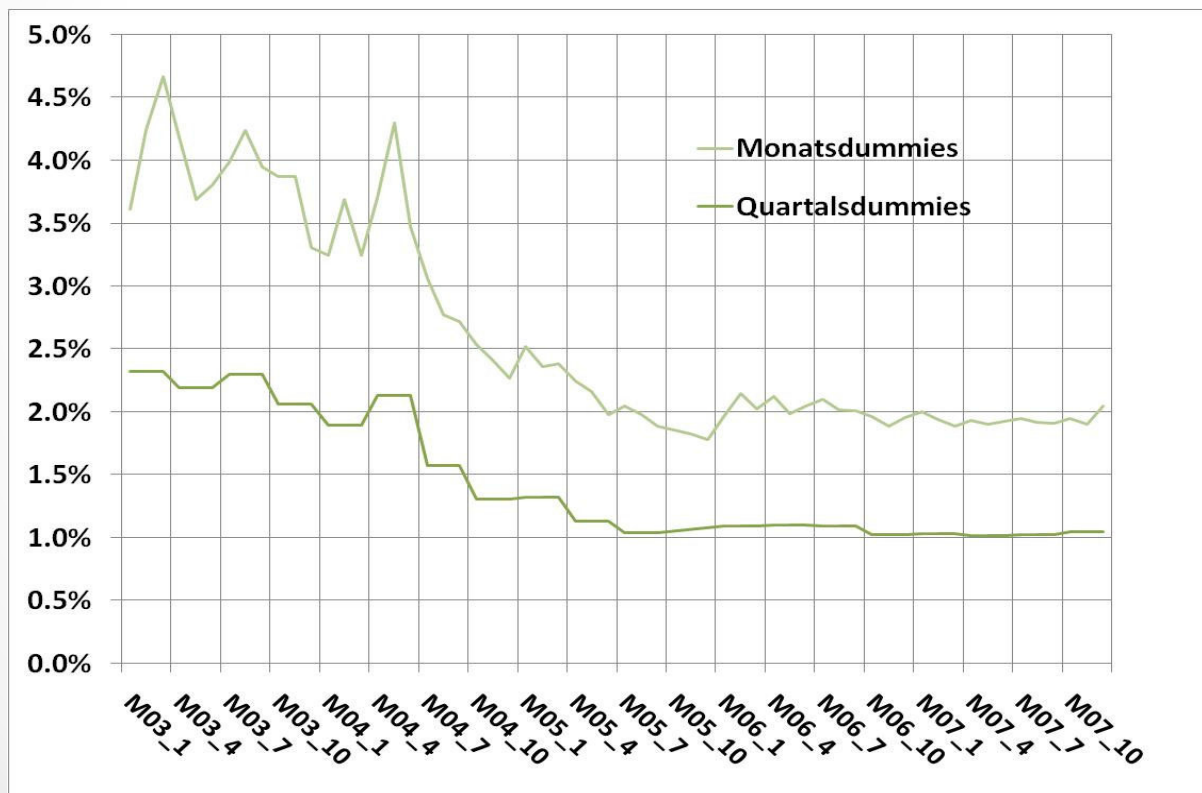
Investment: inclusion / exclusion of modernized, rental always excluded in federal reg.

Density specifications: population vs. size of building vs. urban classifications.

Development of the EPX of Hypoport AG

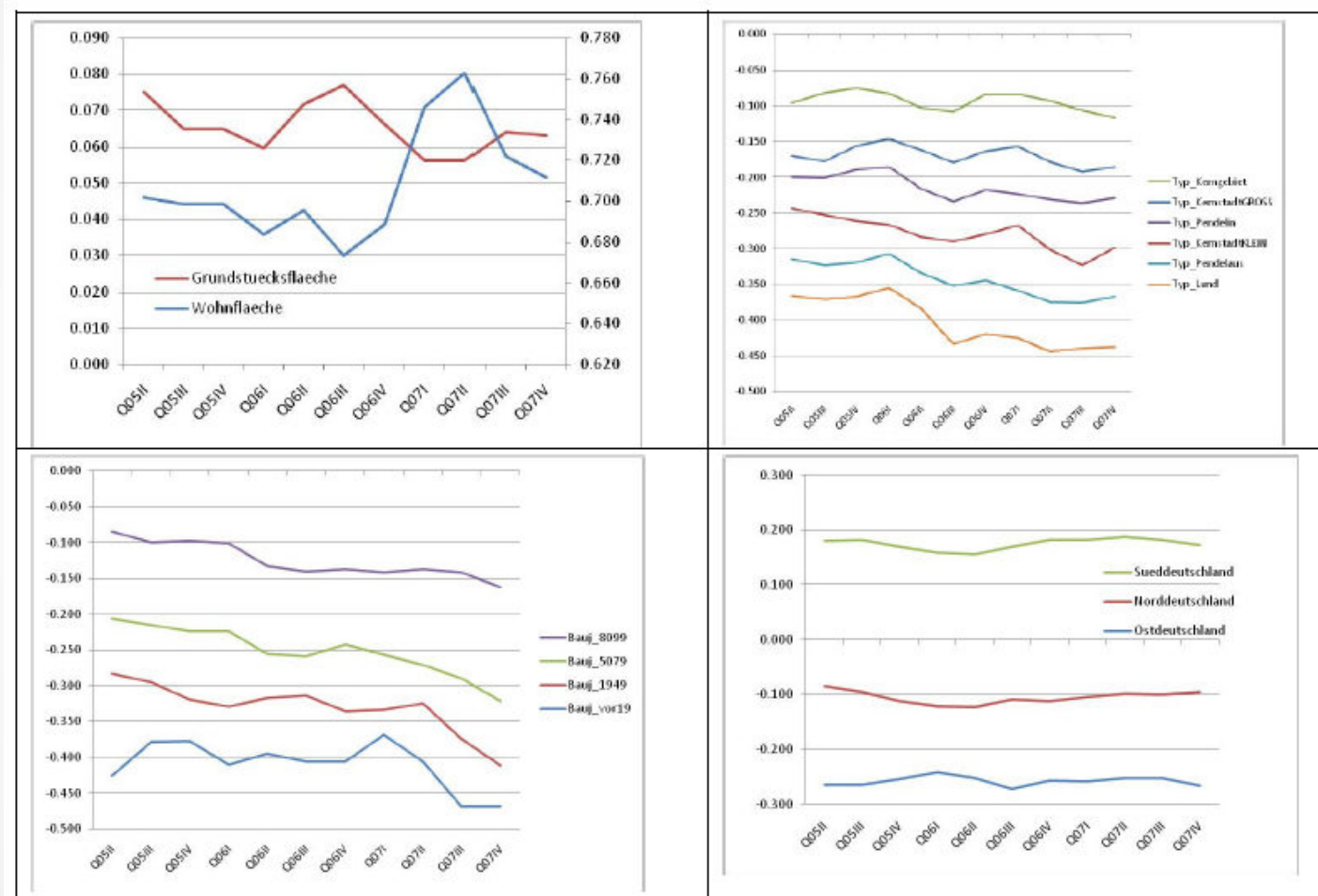
Monthly vs. quarterly time variables

- T-test to be rejected since true price inflation can be zero → standard error or 95% confidence interval
→ monthly accepted based on 95% CI
→ index computation starts in 2005 when CI range stabilizes



Development of the EPX of Hypoport AG

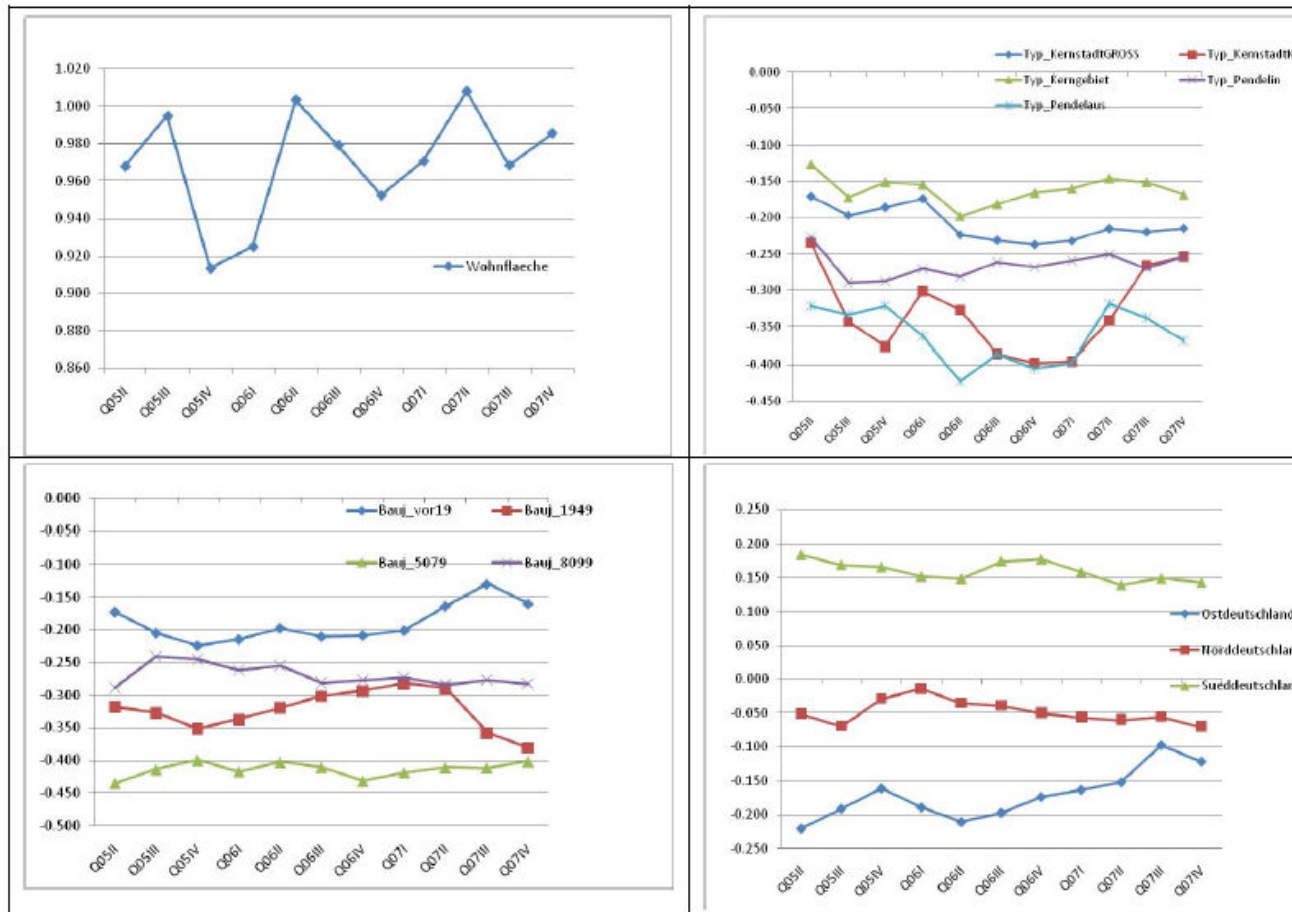
Beta matrix estimate with adjacent regressions, homes



- Optimized regressions are computed for adjacent quarters.
- Shadow prices are NOT generally constant, leading to bias.
- Esp. age and spatial effects (gas prices, tax benefits for commuters etc).

Development of the EPX of Hypoport AG

Beta matrix estimate with adjacent regressions, apartments



- Catch-up growth in East Germany
- Increasing demand for large urban apartments.

Development of the EPX of Hypoport AG

Dealing with beta matrix instability

Conclusions:

- Decision: hedonic time variable regressions are computed over 8 quarters and rolled over each quarter.
- Interpretation: housing is a good which changes its character in terms of supply and demand for characteristics every few years (but neither every few quarters like computers, nor never).

Regional adjacent regressions display higher shadow price volatility → to be excluded until data volumes increase.

Development of the EPX of Hypoport AG

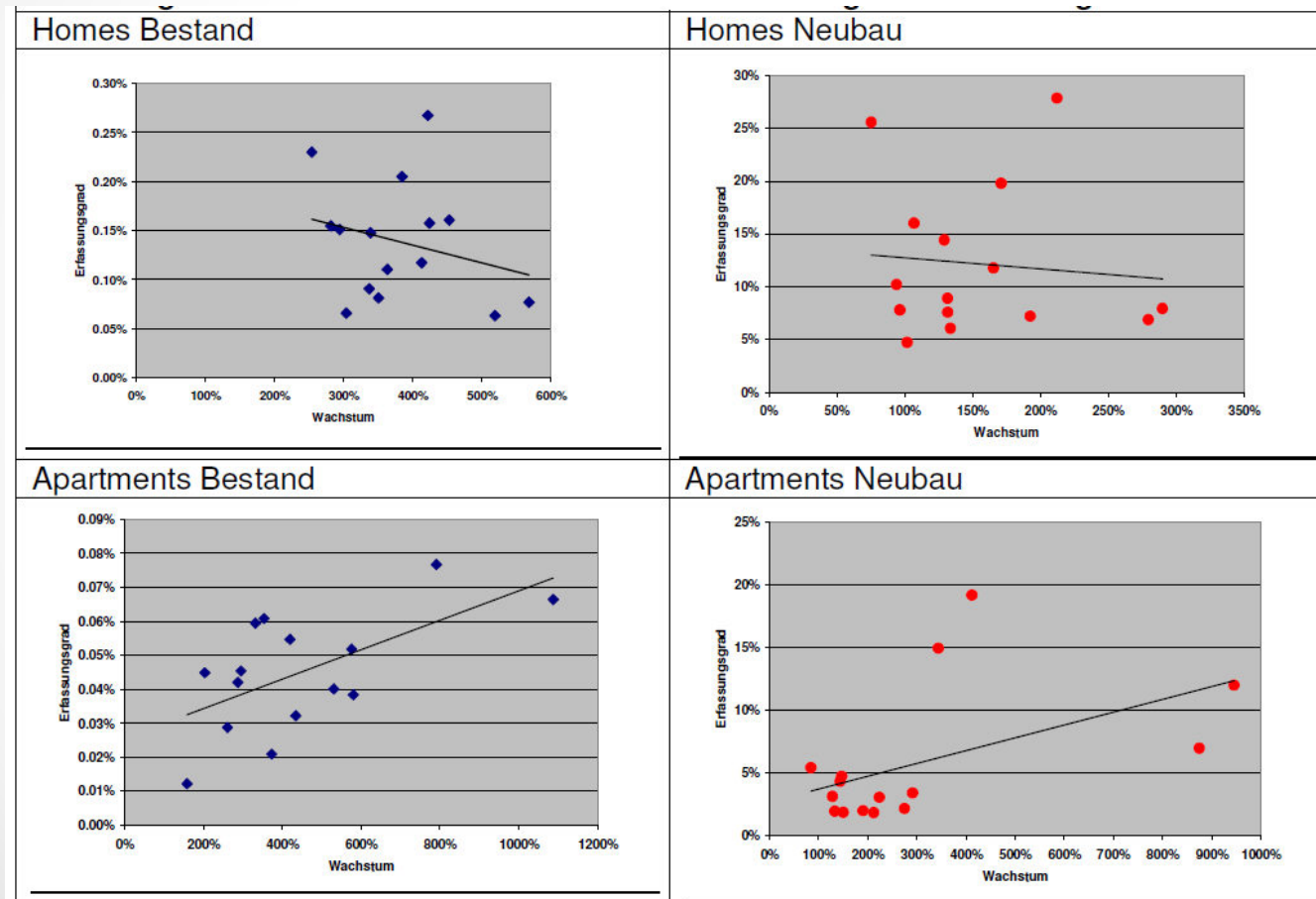
Other issues

- **Treatment of new construction**
 - Separate index for homes, but not for apartments.
 - Management, not econometric, decision. Price gradient steeper in the case of apartments.
- **Seasonal adjustment**
 - INSEE standard in local regressions.
 - In Europace, prior to 2008/9 only homes with clear patterns.
 - Distortions through financial crisis - flight to safety in early 2009 – destroy seasonal patterns. Effect continues.
- **Weights**
 - So far unweighted regressions, due to lack of official information about transaction activity on postal code or higher level.
 - Weight proxies are biased against transactions. Examples population or housing stock.
 - Tests with proxies did not alter price index significantly.
 - Some perceived bias in favor of Northern / Eastern Germany, slowly corrected over time.

Development of the EPX of Hypoport AG

Regional bias of federal top-down index

2008 analysis of Europace sample relative to total market proxies



Y-axis – growth of Europace in given regional market

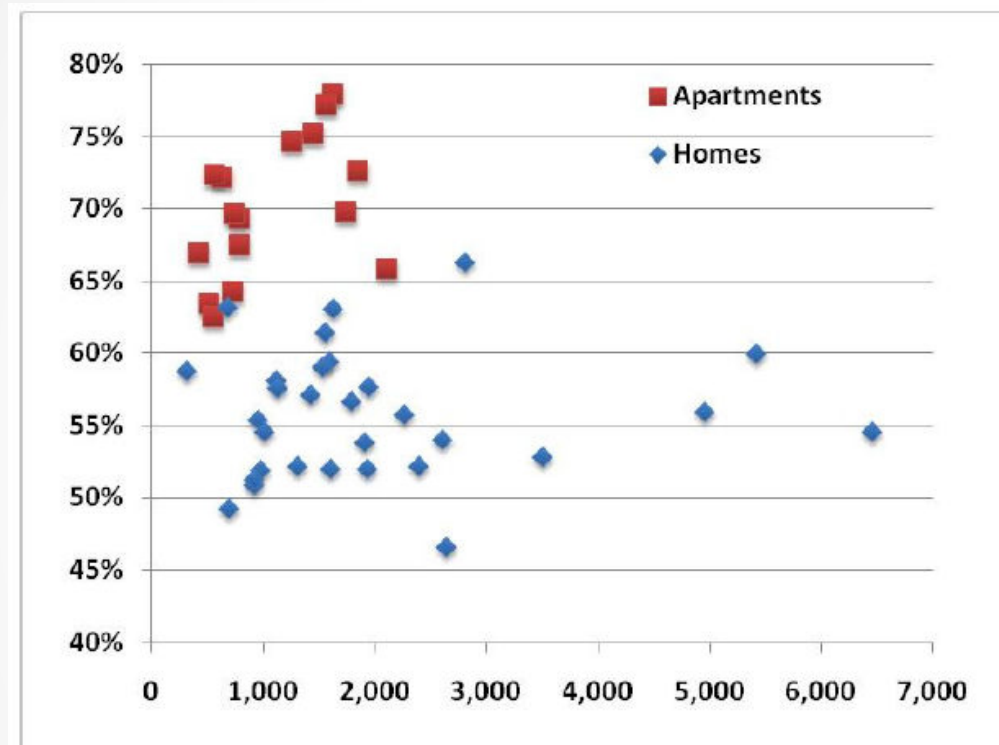
Expansions

Contents

- Regional housing market and submarket analysis
- Options for bottom-up index construction

Expansions

Regional Housing Markets and Submarkets I

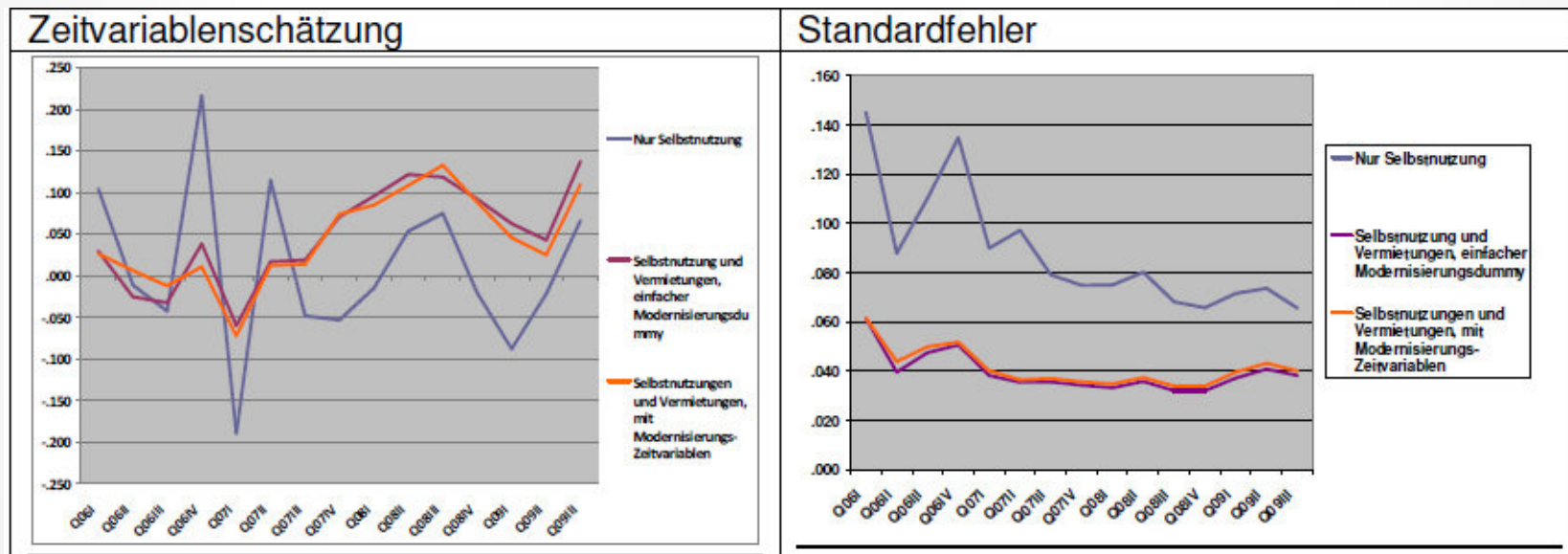


- Initial 2008 analysis (30/16 regions) not supportive:
 - R2 often too low, sample sizes and lack of detail variables on houses.
 - Options: focus on fewer regions, expand data (e.g. add rental), further research regional housing markets to improve fit quality.

Expansions

Regional Housing Markets and Submarkets

Effects of adding rented apartments to the apartment estimates for the city of Leipzig



Rental apartments introduce price bias, but add volume and improve estimate quality.

The hope is that price bias remains constant over time.

Separate time variables for apartments with modernization needs (usually rental).

Expansions

Regional Housing Markets and Submarkets

Effects of stratification of regions, Koeln-Bonn

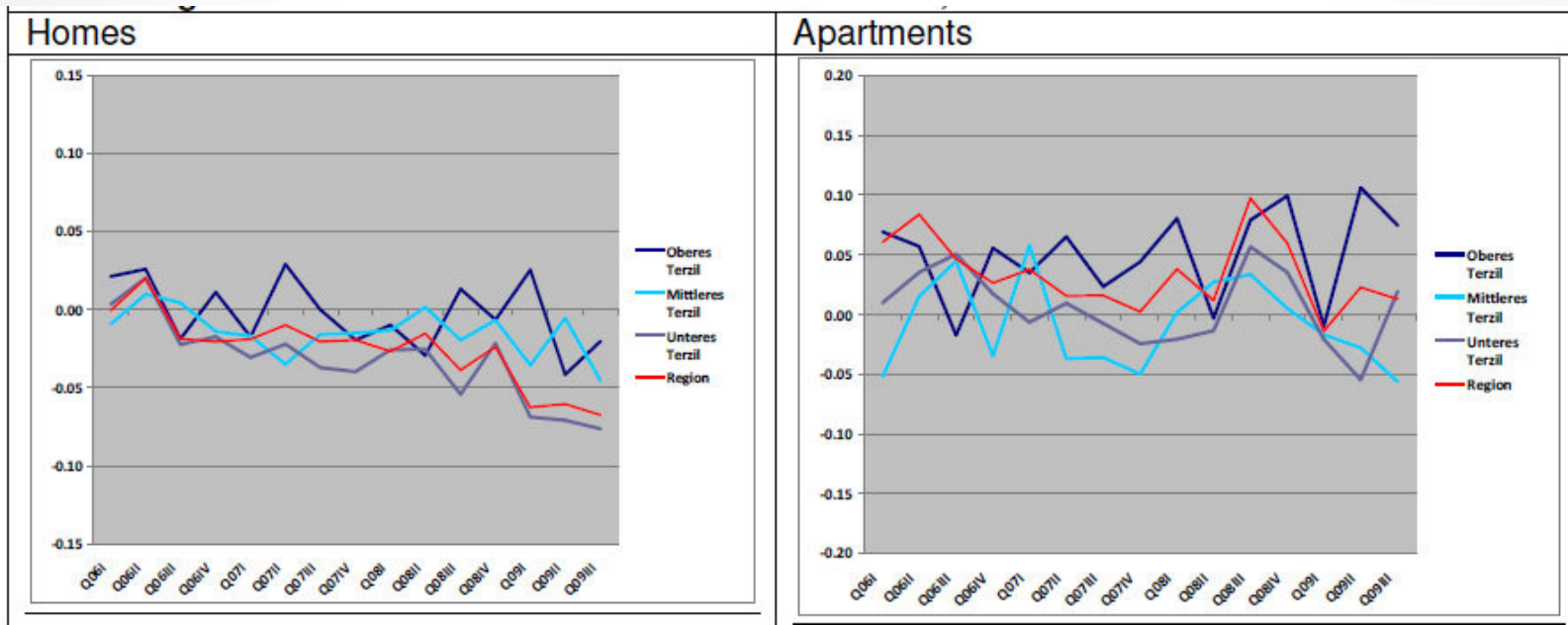


Stratification by cities reveals economically important results, but does not improve fit quality.

Expansions

Regional Housing Markets and Submarkets

Effects of stratification of regions, Koeln-Bonn



Ex-ante price tercile stratification of postal codes more promising regarding fit quality.

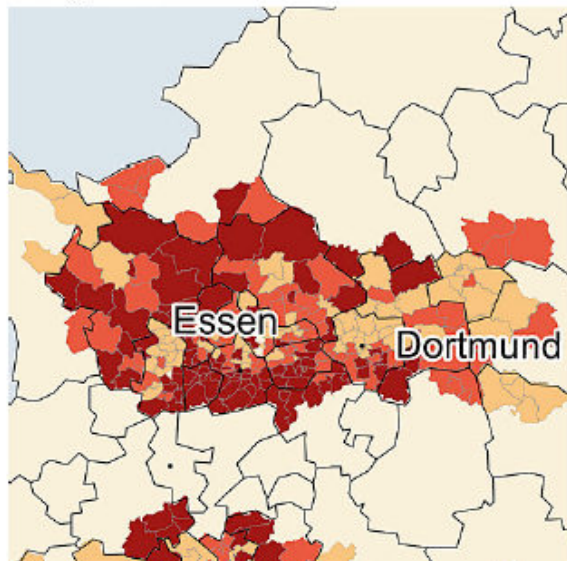
INSEE approach in France.

Expansions

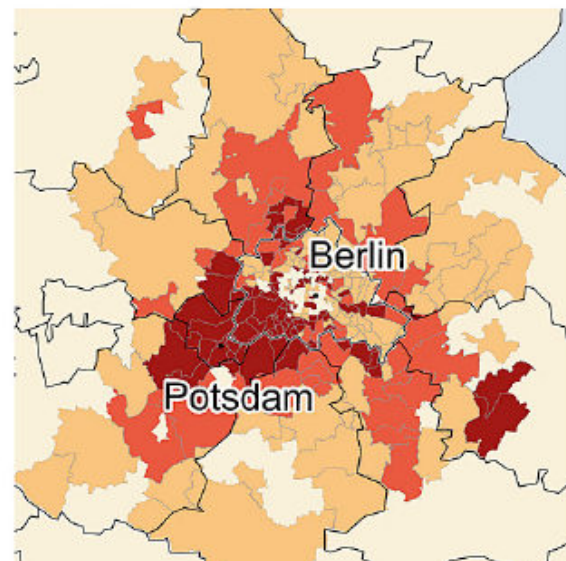
Regional Housing Markets and Submarkets

Tercile maps, homes

Ruhrgebiet



Berlin/Potsdam



Homes - Preisterzile der Stadtregionen

- teuer
- mittel
- günstig

- Postleitzahlbezirksgrenze
(innerhalb der Stadtregion)
- Kreisgrenze

Expansions

Bottom-up Index, Repeat Sales

INSEE

- Bottom-up on the basis of data and weights derived from notary transaction recordings (80% of the market),
- 250 regions 750 intra-regional regressions,
- Beyond reach for any German provider of indices.

Hypoport/Europace strategy

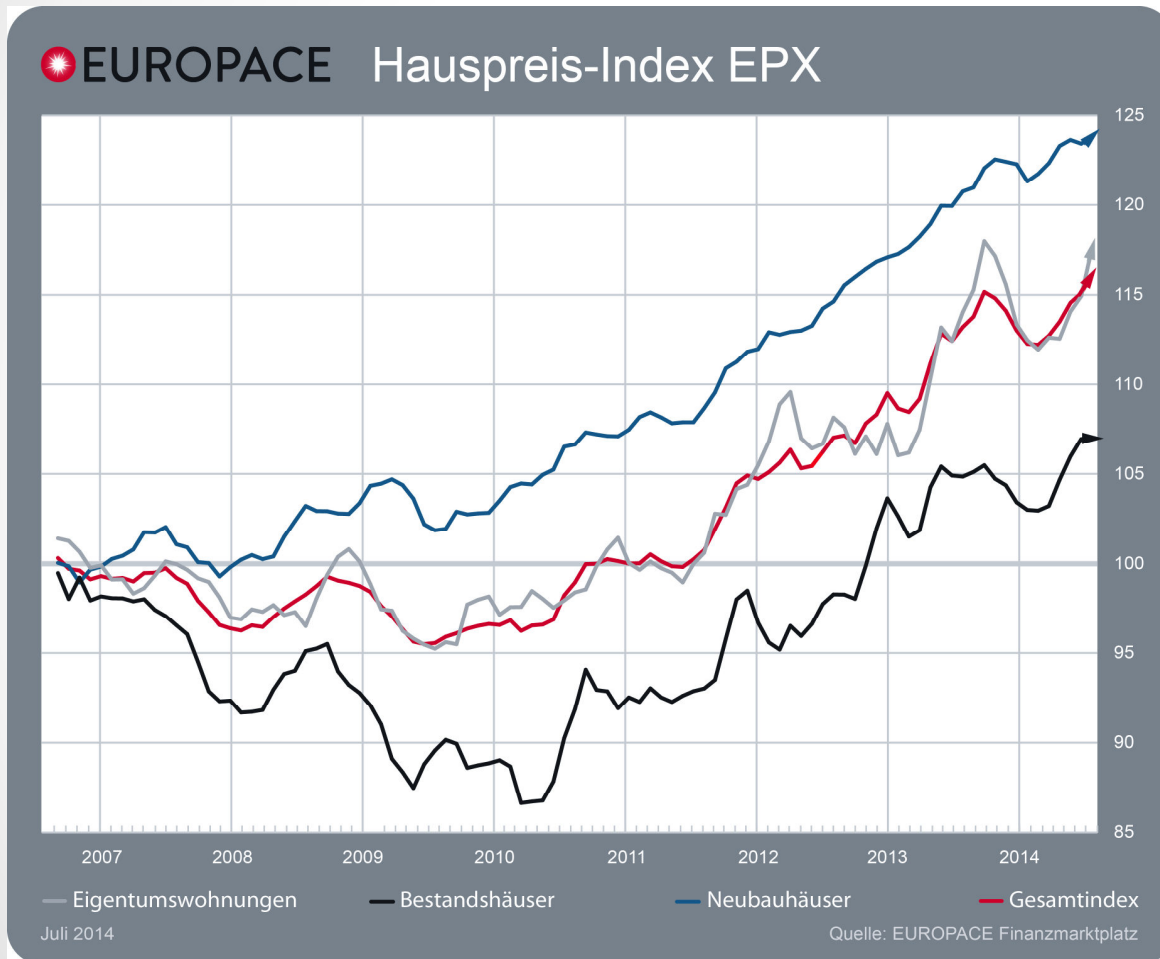
- Since 2012 publishes regional indices, as platform turnover grows (some results below).
- Short-term goal is to develop national 'bottom-up' index w. ca. 10 apartment and 20 home regressions.
- Likely then extension on the basis of tercile differentiations of regions. i.e. target would be 80-100 regressions.
- Repeat sales index may be possible with smaller subset of data inside Hypoport. Desirable?

Some Results and Housing / Housing Finance Market Context

- General and cross-sectional results from EPX
- German housing market
- German housing finance
- Comparison with France

Housing Market Dynamics

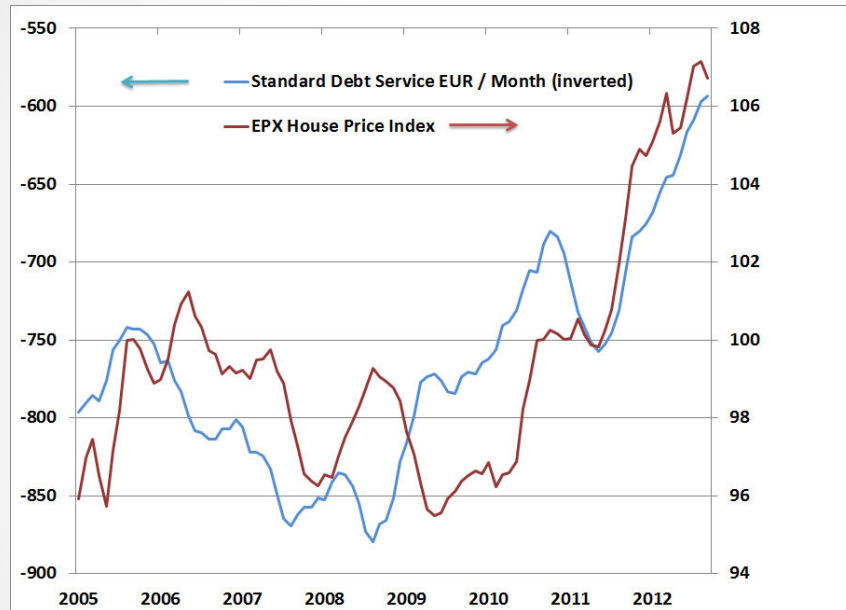
EPX Development by Subindices, 2007 - 2014



Housing Market Dynamics

Is there a German House Price Bubble?

EPX Combined Price Index and Standard Monthly Rate of a EUR 150,000 Loan



Source: Hypoport AG (Europace), Bundesbank, Finpolconsult computations

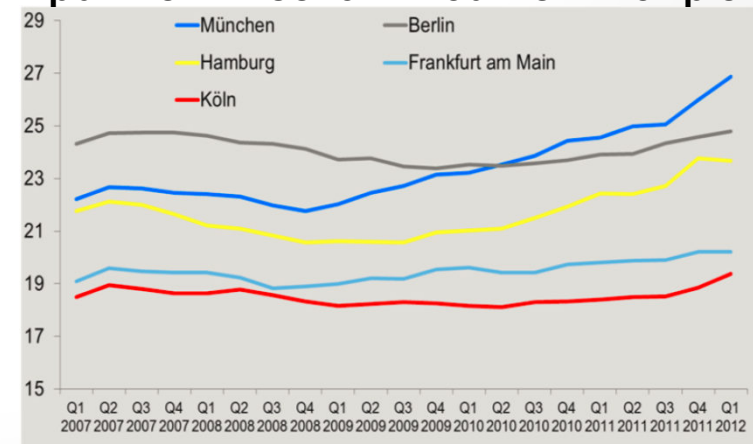
Financials:

- Strong decline in rates, debt service,
- But no increase in mortgage debt → equity, foreign boom,
- Moderate increase in rent multiples only.

Fundamentals:

- Strong real demand support,
- But some demand patterns may be unsustainable.

Apartment Price to Annual Rent Multiple



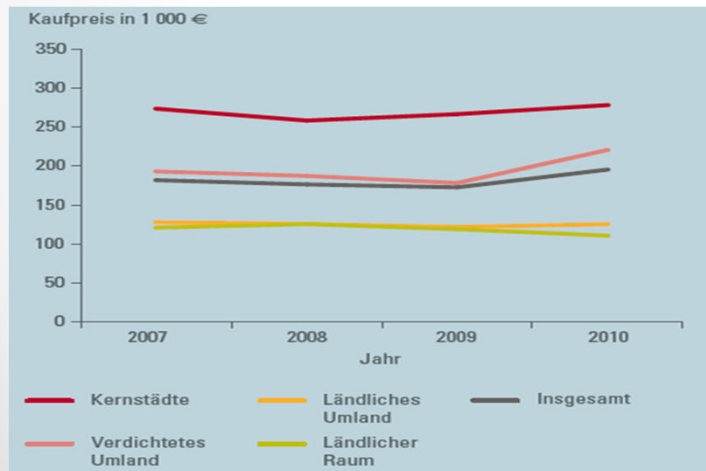
Source: Institut der deutschen Wirtschaft, data Immobilienscout 24

Housing Market Dynamics

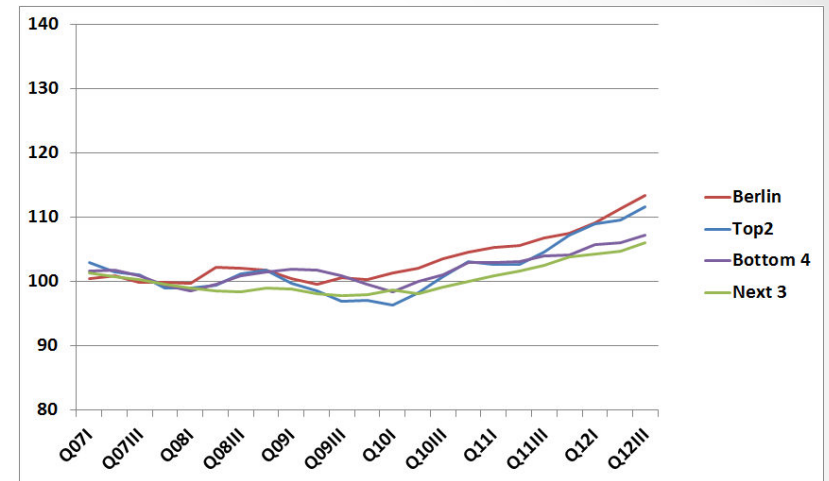
Evolution of Prices by Regions

- Recent boom in urban apartments (prices, transactions),
- Stagnation in rural / commuting areas after decline during 06-08 (VAT and energy cost increases).
- Increasing age effects due to energy modernization needs, to be accelerated ('passive house'/CO2 emission regulations).

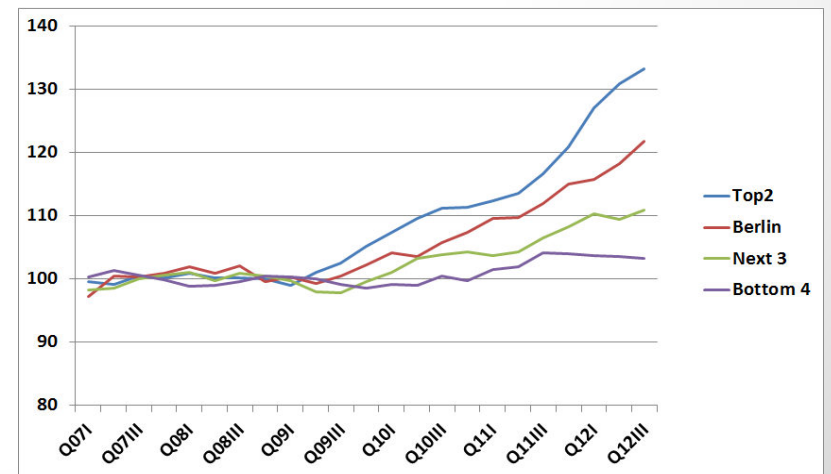
Home Prices: Cities vs. Periphery vs. Rural



EPX Homes Prices in Top-10 Regions



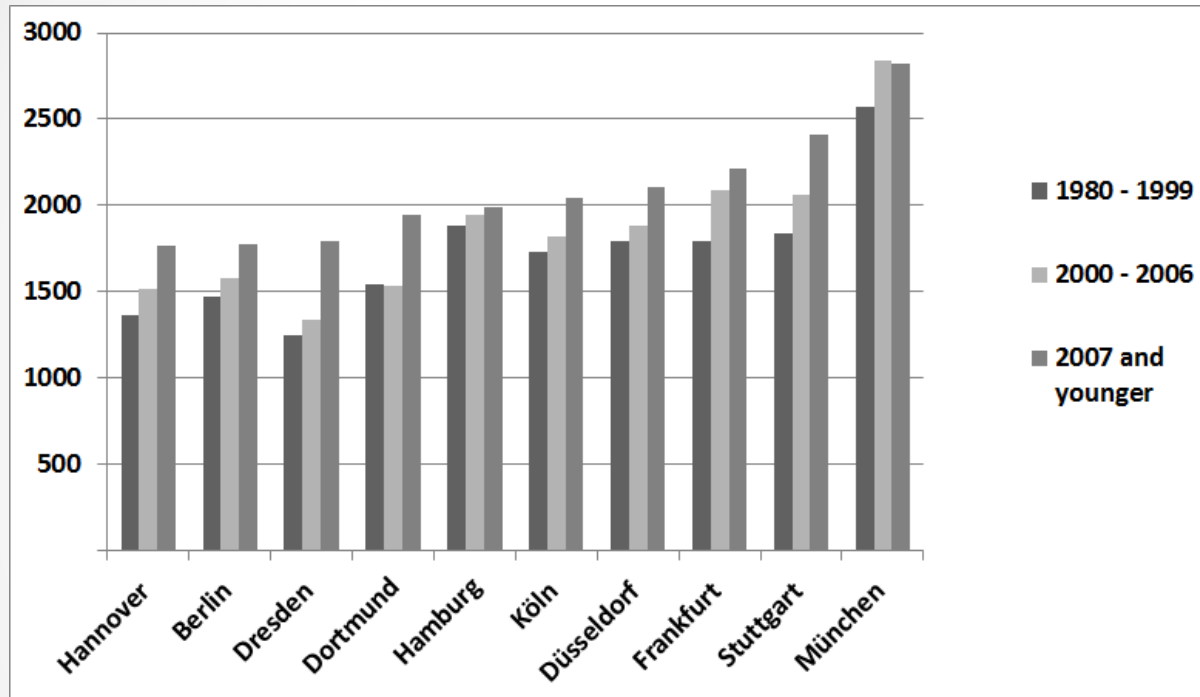
EPX Apartment Prices in Top-10 Regions



Cross-Sectional Results

Homes: Regional Price Variations

EPX Price Levels per SQM by Region, Homes by Age Classes, QIV 2011-QIII 2012



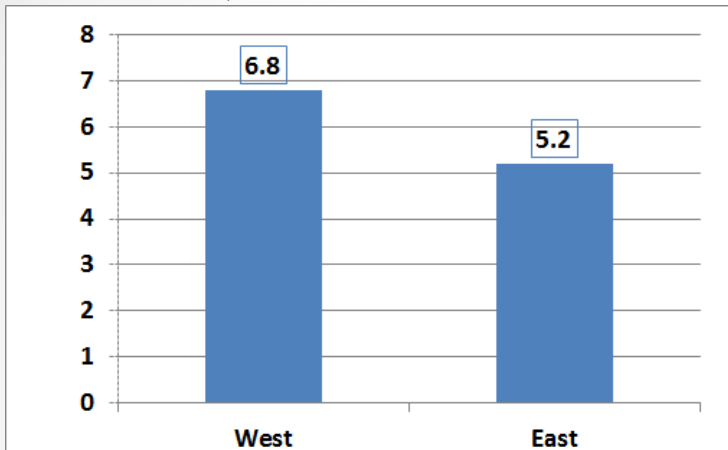
Source: Hypoport AG (Europace bank transactions data), Finpolconsult computations.

- National median for new construction is in the range of EUR 1,750/SQM (w land), i.e. EUR 262,500 for 150 SQM Home.
- Local property transfer taxes to be added may vary from 2-4.5% after regionalization (1990s: national 2%).

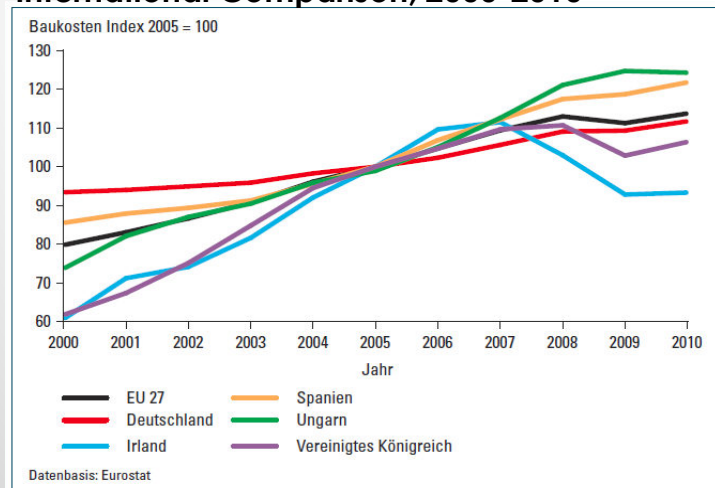
Cross-Sectional Results

Homes: 1990s Initiatives to Reduce Costs

New SFH House Price Income Relation in East & West, 2003



German Residential Construction Cost in International Comparison, 2000-2010



- Reunification effect: East adds low-cost housing, low land prices,
- Building standard deregulation in the 1990s,
- Emergence of low-cost SFH construction techniques, e.g. Scandinavian wood construction, pre-fabricated,
- Smaller lot sizes (limits?),
- Moderate labor cost increase,
- Anticipative land supply policies,
- Industrial land conversions in some cities/regions (e.g. Dortmund).

Cross-Sectional Results

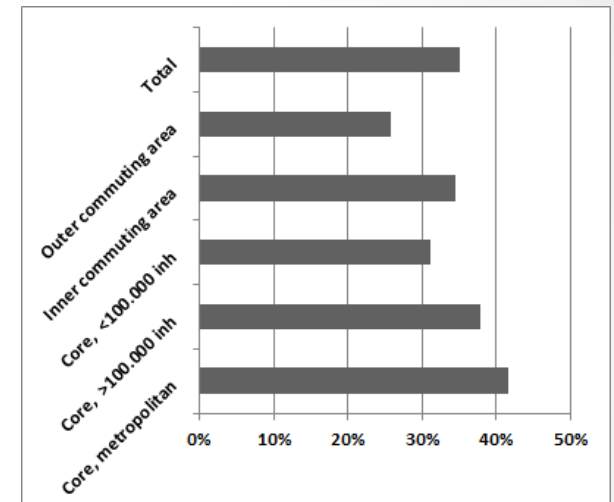
Homes: Increasing New Construction Cost in the 2000s

Single-family Home Mean Statistics 2004 - 2010

Item	Unit	2004	2005	2006	2007	2008	2009	2010	2010/2004 growth p.a.
SFH price	EUR/SQM	1589.7	1577	1566.1	1553	1553.1	1542.5	1563.5	-0.28%
Construction cost	EUR/SQM	1230.9	1224.5	1234.1	1254.3	1291.6	1322.8	1337.1	1.39%
Land cost	EUR/SQM	119.8	128.5	124.6	124.9	124.6	126	130	1.37%
Production costs	EUR/SQM	1590.3	1610	1607.9	1629	1665.4	1700.8	1727.1	1.38%
Price/production cost	Ratio	1.00	0.98	0.97	0.95	0.93	0.91	0.91	-1.64%
Memo: Cost of 150 sqm SFH	EUR	238,545	241,500	241,185	244,350	249,810	255,120	259,065	

Source: Oliver Lerbs, Inwis/Ruhr-Universität Bochum, 413 cities and districts (Kreise) (NUTS3).

Land to Total Production Cost Share, New SFH, by Urban Density, Medians 2003 – 2011



Source: author, from Europace bank transactions dataset.

Result: 10% cumulative gap between new construction cost and existing home prices within 7 years, correlated with decline in the investment ratio.

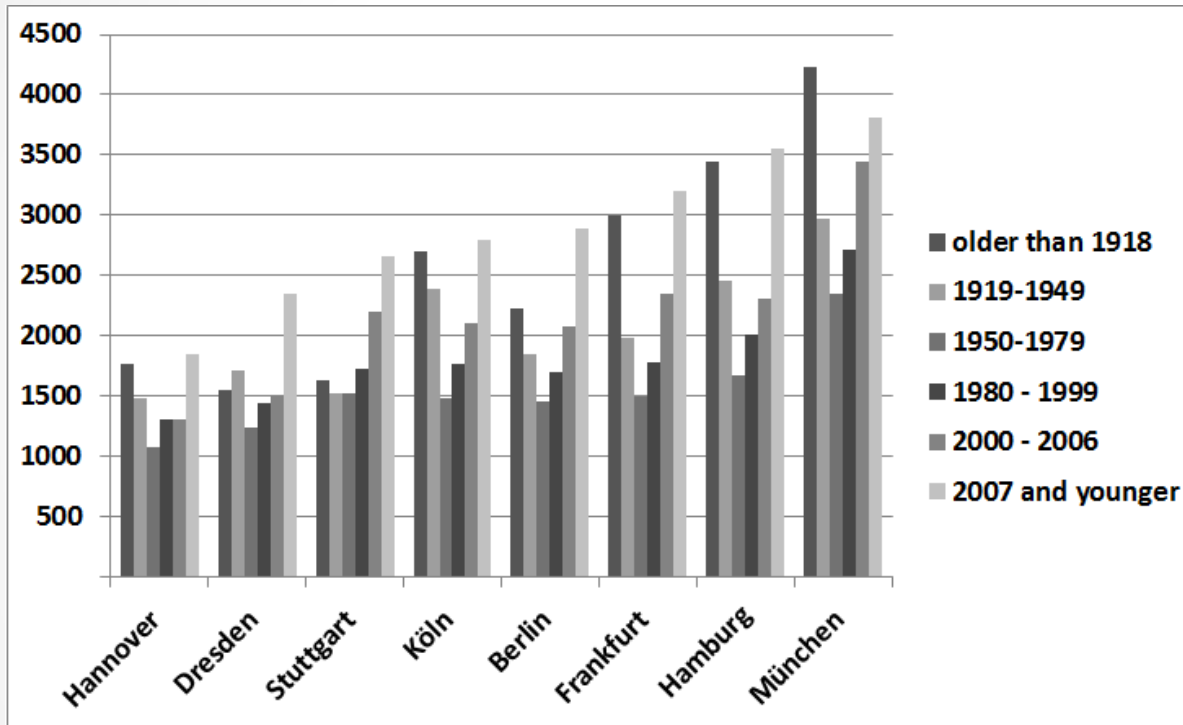
Notes:

- New construction in Germany is taxed with accumulating VAT (included in data) and property transfer tax (not included in data). Both strong VAT and PTT increases,
- Land cost share, in Europace: mean 25.7%, median 33.9%.

Cross-Sectional Results

Apartments: Regional Price Variations

EPX Price Levels per SQM by Region, Apartments by Age Classes, QIV 2011-QIII 2012



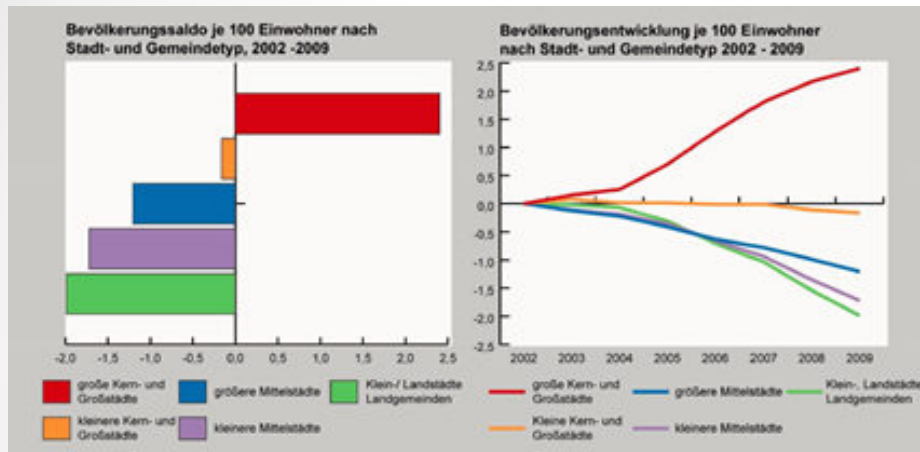
Source: Hypoport AG (Europace bank transactions data), Finpolconsult computations.

- De-facto elimination of rental housing subsidies in 2005.
- More market-based construction: higher ceilings, larger units, elevators / sub parking, roof-top apartments.
- 'Gruenderzeit' (late 19th century) with high ceilings, representative facades, still in strong demand.
- Dübel, Finpolconsult

Housing Market Dynamics

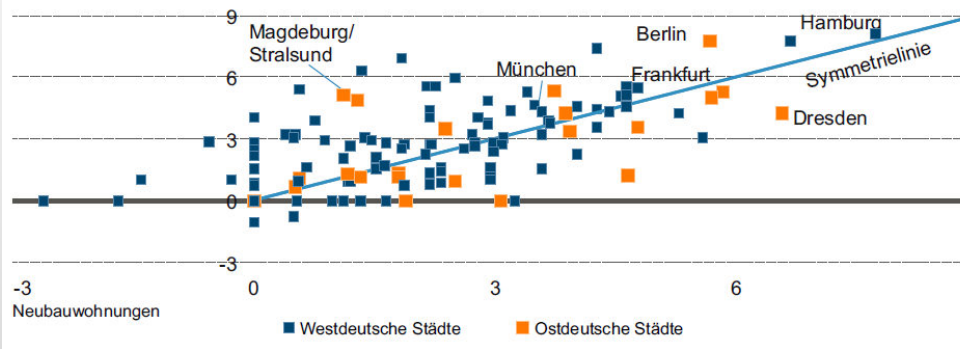
Lagged 'Metropolization' or Real Bubble?

Large German Cities are the Urbanization Winners



Rent and Price Increases, Apartments, German Cities 2009-11*

x-Achse: Mittlere Mietsteigerung in den letzten drei Jahren (2009, 2010, 2011), in % p.a.
 y-Achse: Mittlere Preissteigerung in den letzten drei Jahren (2009, 2010, 2011) in % p.a.



- Metropolization
 - Job growth in 'creative' industries vs. traditional industries in mid-sized cities,
 - Say's law: labor supply (demographics) creates demand (jobs), i.e. do jobs move where young people want to be?
- War legacy city hierarchy distortion
 - Zipf's law: number of people in a city is inversely proportional to the city's rank among all cities → Berlin = Paris?

*Note: x-axis – rent changes %, y-axis – price changes %, accumulated

Housing Market Dynamics

Berlin Price Levels are Still Far From Paris

Metropolitan apartment prices

- Paris: EUR 8,339/SQM
- Berlin: EUR 2,230/SQM

Munich is closest: EUR 4,227/SQM

Secondary cities in Germany within a wider range than in France

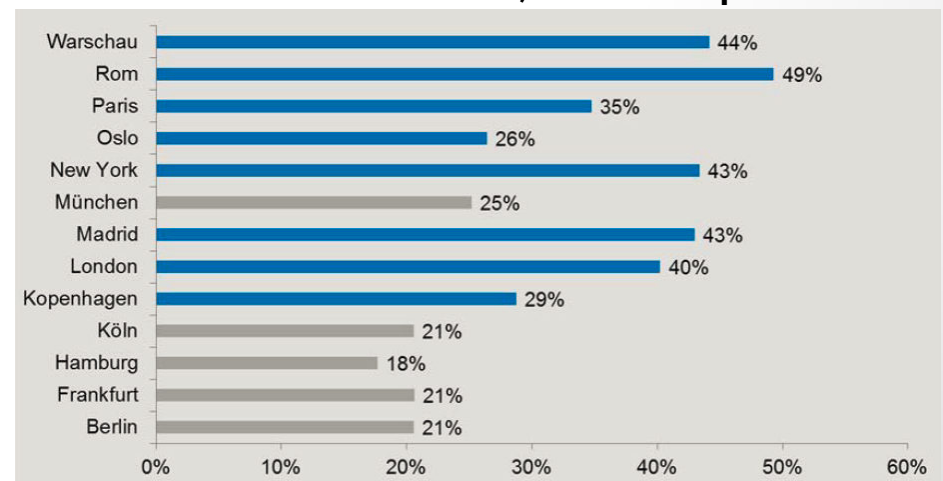
- Grenoble: EUR 2,381/SQM
- Toulouse: EUR 2,544/SQM
- Bordeaux: EUR 2,930/SQM

- Hannover: EUR 1,764 /SQM
- Koeln: EUR 2,700 /SQM
- Frankfurt: EUR 2,999/SQM

Notes:

- Medians
- France: old apartments
- Germany: Gruenderzeit (pre-1918 apartments)

Rent-to-Income Ratios, 1 Room-Apartments

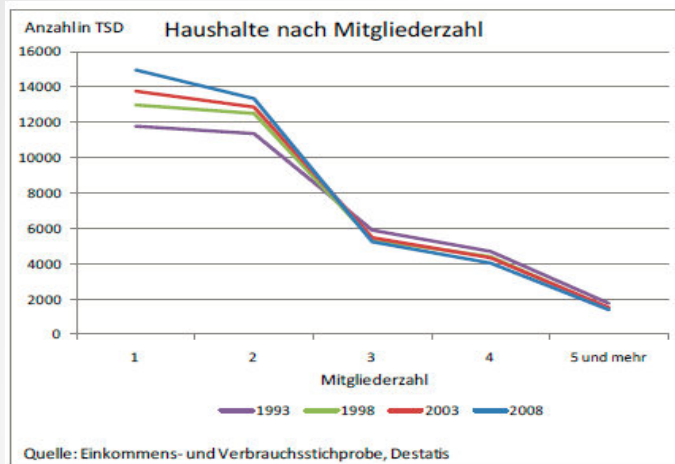


Source: M. Voigtlaender / Institut der Deutschen Wirtschaft; Numbeo.com

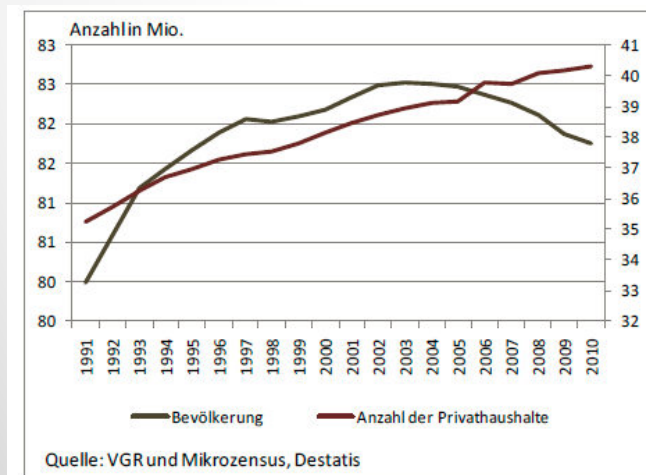
Housing Market Dynamics

Demographics and Household Growth

Average Household Size is Drastically Declining



Population and Number of Households are Diverging



- Demand driven by
 - Household size, number of single-person households,
 - Space consumption patterns esp. of the elderly (growing),
 - Immigration trend.
- Overall housing demand continues to rise until ca 2020 – 2030:
 - East Germany peak ca 2015,
 - West Germany peak ca 2030.

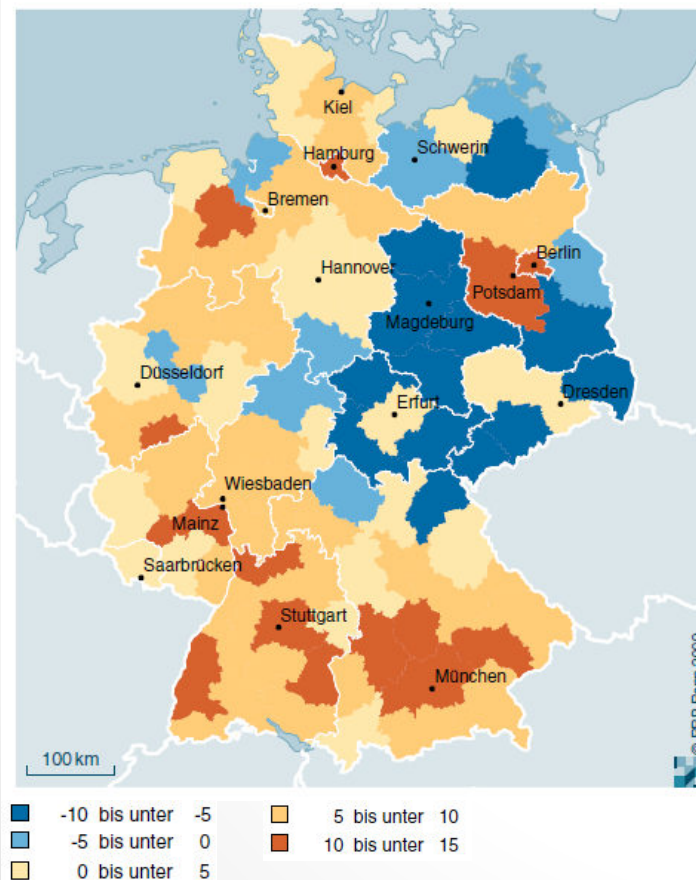
Source: Bundesbank, Destatis.

Housing Market Dynamics

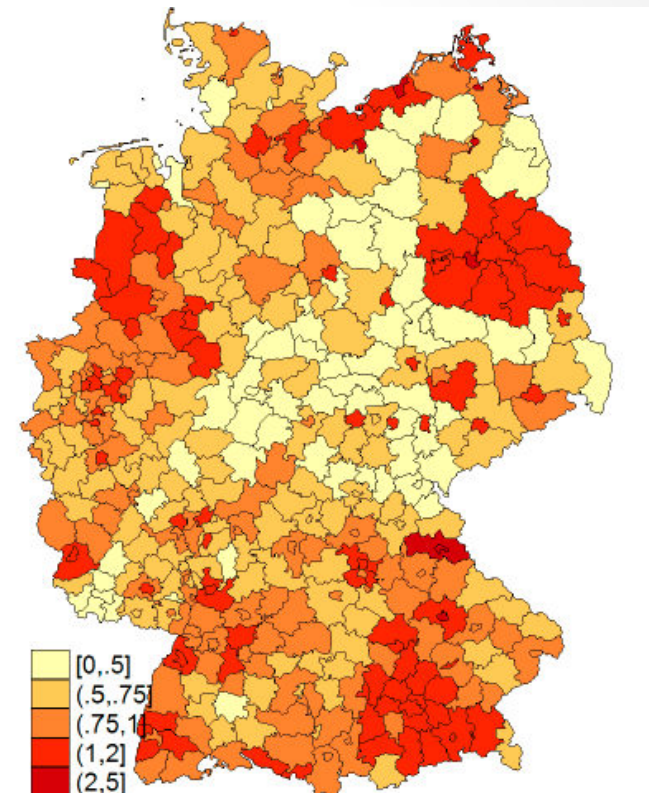
Regional Space Demand Pattern Is Reflected in Activity

Long-term Housing Space Demand
Forecast, 2010-2025, % Change

Entwicklung der Wohnflächennachfrage



SFH Construction Activity 2000-2010,
% of Existing Stock



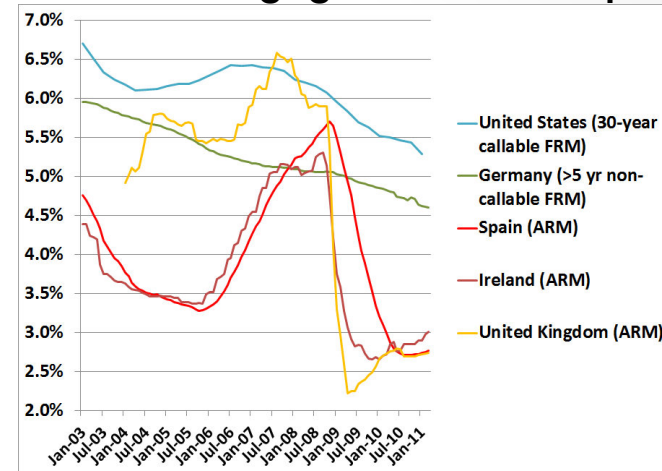
Housing Market Dynamics

Housing Finance System Drivers (1)

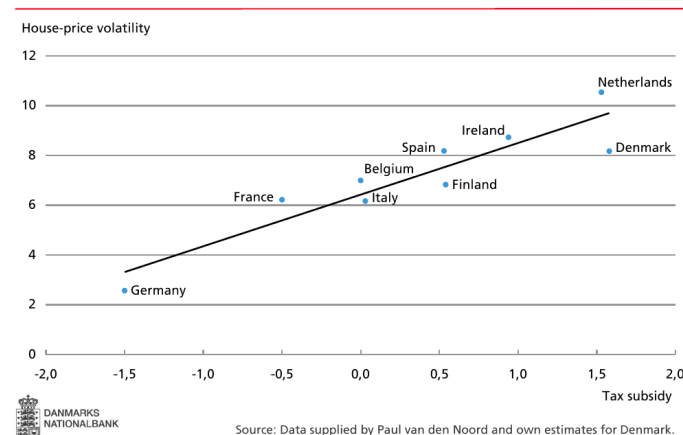
Potentially stabilizing

- Low homeownership ratio self-targeted to higher income levels,
- Social housing investments of the 70s render subprime market redundant,
- Conservative tax support policy (no tax deduction for mortgage interest),
- Long-term fixed-rate product means pricing of housing over less volatile long-term rates,
- No equity release products that would artificially enhance the value of house for debt purposes,
- Conservative loan-to-value ratios and valuation standards,
- Source of equity is mainly cash as a result of savings culture, low house price inflation,
- Agency (KfW) programs leave credit risk to banks rather than nationalizing.

German Mortgage Rates in Comparison



House Price Fluctuations and Tax Subsidies

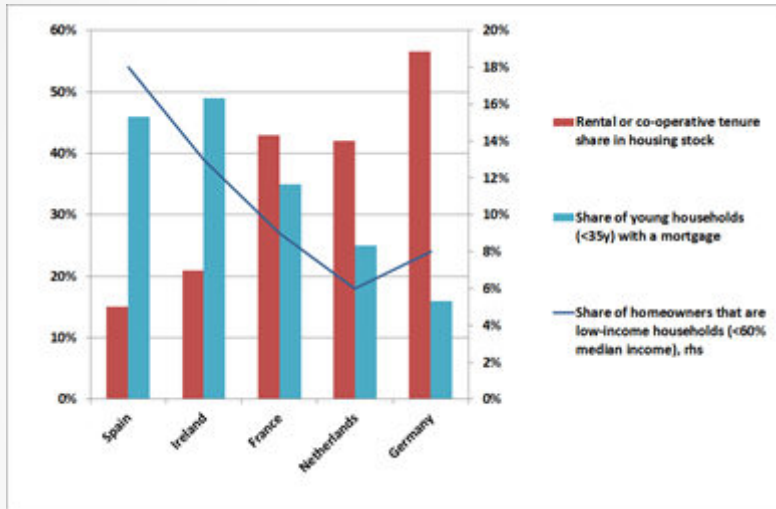


Sources: National central banks and statistical institutes, Danish Central Bank/Paul van Noord, Finpolconsult calculations.

Housing Market Dynamics

Housing Finance System Drivers (2)

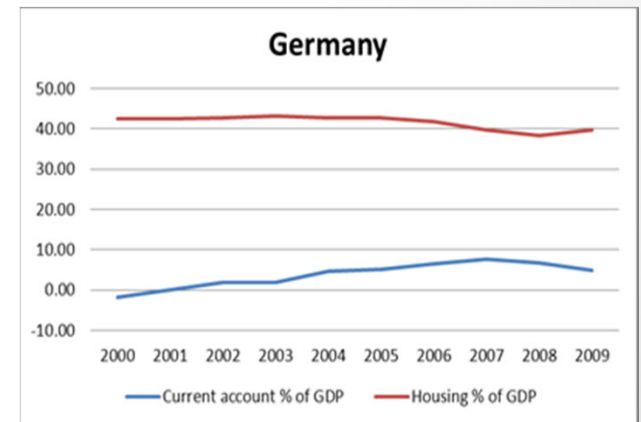
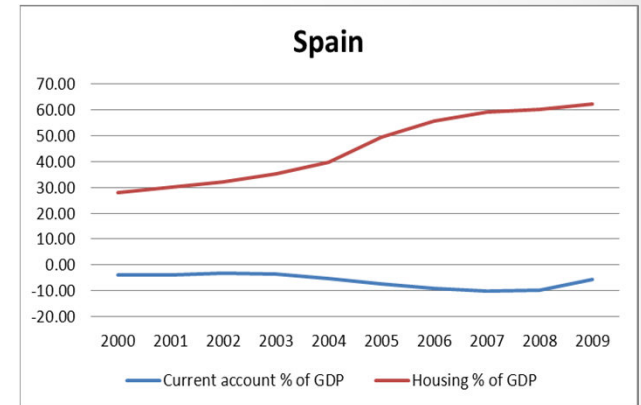
Rental Sector Share and Incidence of Mortgage Lending to Vulnerable households, ca. 2005



Potentially destabilizing

- Repatriation of cross-border capital flows, flight to 'safety',
- No capital gains tax,
- Low amortizations, only slowly rising,
- Too low interest rates of fixed-rate lending due to lender mismatches,
- Large role of public savings banks (cajas?).

Current Account and Outstanding Housing Loans to GDP 2000 - 2010



Sources: European Statistics on Housing, IMF, Finpolconsult computations.

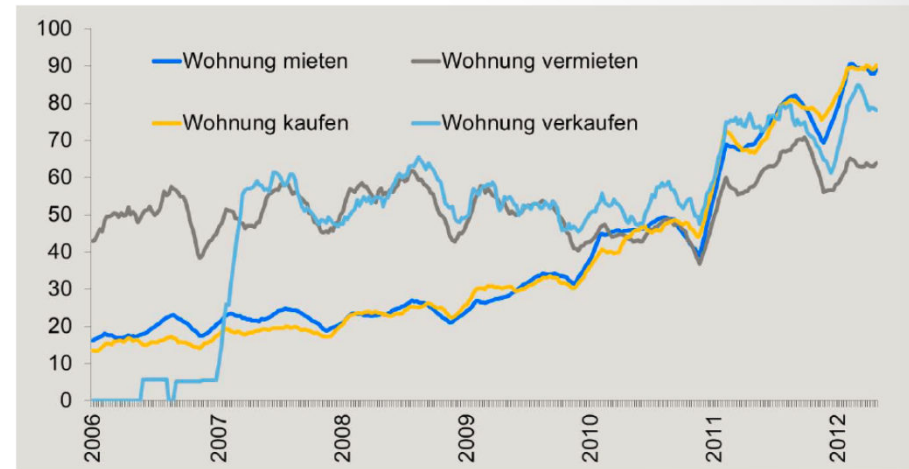
Housing Market Dynamics

Capital Market Drivers

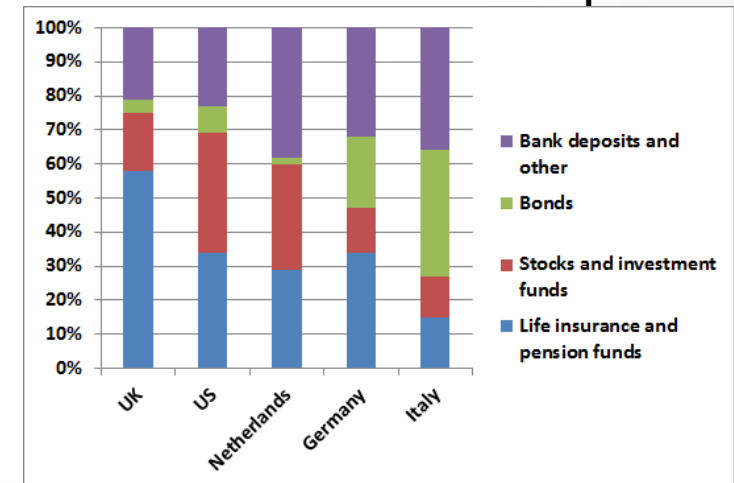
- **Financial crisis aftershocks**
 - High safety preference of German households backfires through low rates (gov bonds),
 - or turns out to be potentially unsafe (banks).
- **Declining pension risk amnesia**
 - Doubtful public pension promise & rising retirement age,
 - More volatile employment situation, reduced employment chances over 50.
- **In combination supports real estate investment**
 - Increased saving ratio,
 - High aversion against stocks forces move into real estate.

Sources: upper chart Institut der deutschen Wirtschaft based on Google data; lower chart OECD
 Legend upper chart: 'Wohnung – Dwelling, 'mieten – take lease', 'vermieten – give lease', 'kaufen – purchase', 'verkaufen – sell'.

Household Motives for Purchasing/Renting



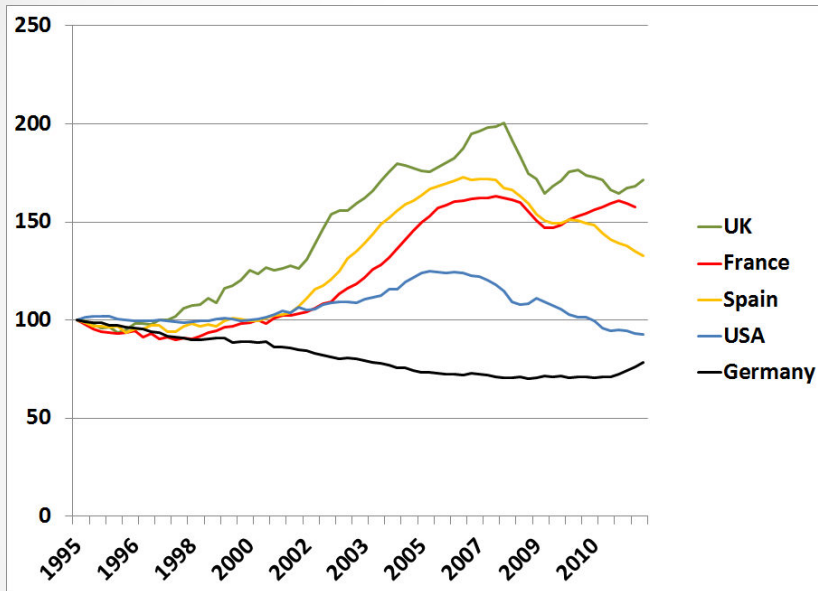
Household Financial Asset Composition



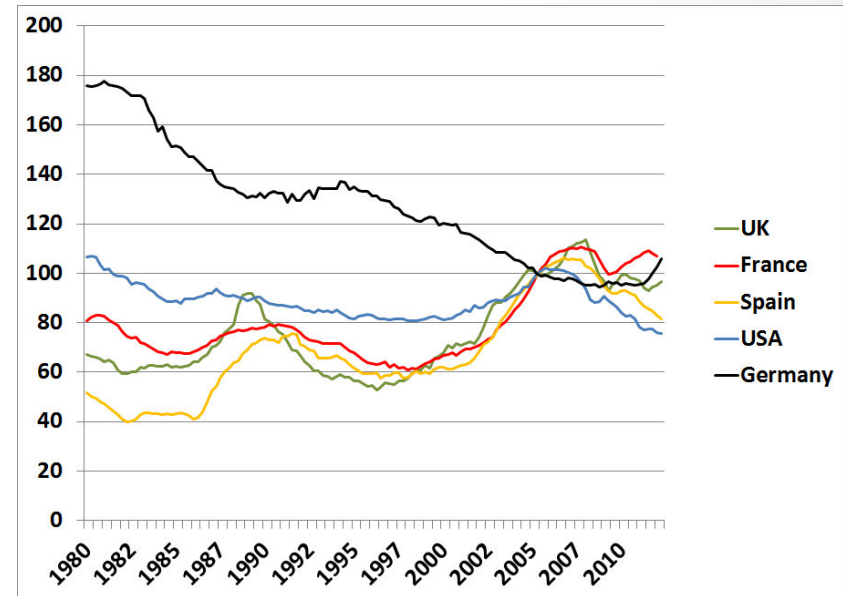
International Comparison

Are French Prices too High or German Prices too Low?

House Price-to-Income Ratios, Short-Term

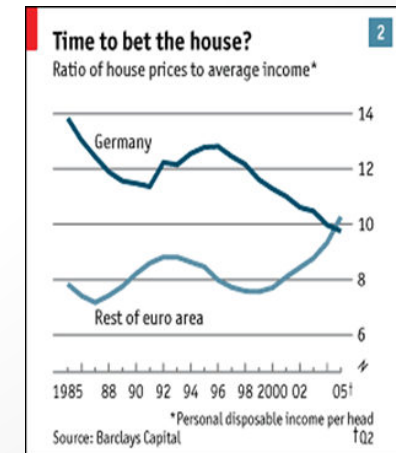


House Price-to-Income Ratios, Long-Term



- Goldman-Sachs: 2 groups of markets
- Germany/France still in take-off group? Or exuberance?
- Long-term view important.
- Denmark: proposal to tie bank house price valuation to income growth

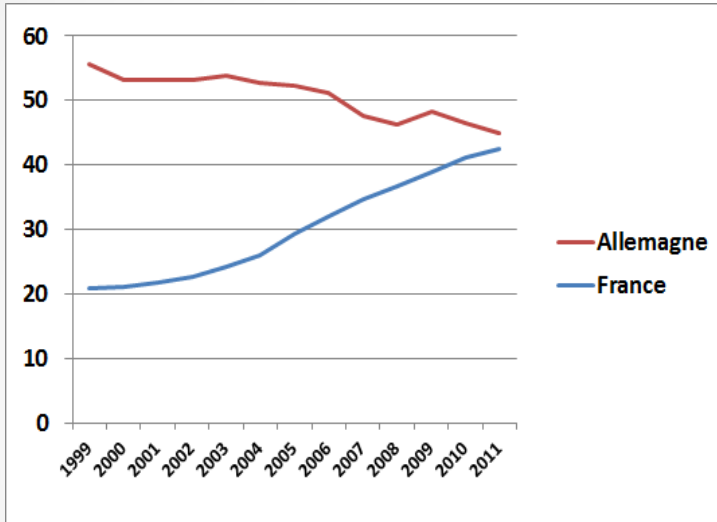
Source: OECD, Finpolconsult computations, The Economist



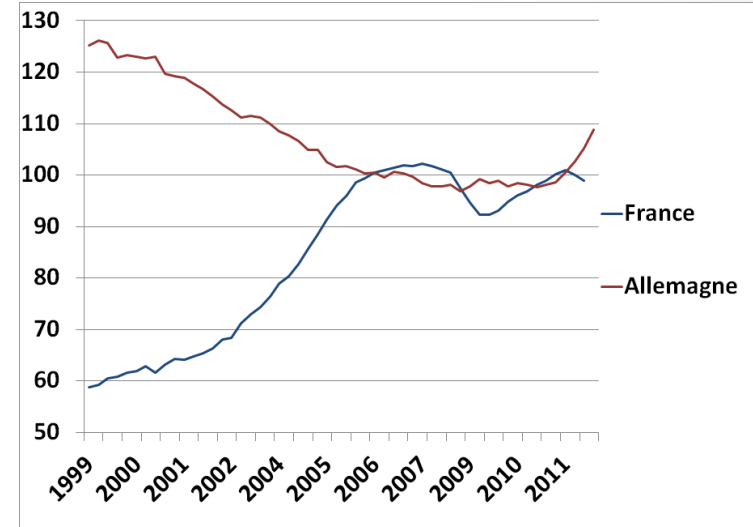
International Comparison

Debt Dynamics Explain Some of the Differences

Mortgage-to-GDP Ratios

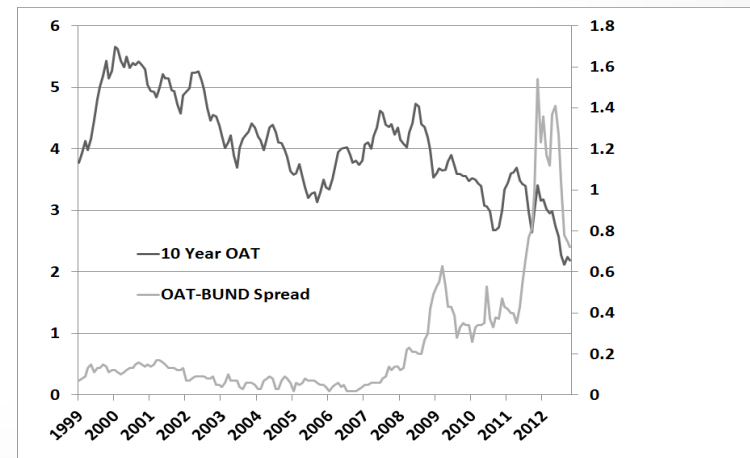


House Price-to-Income Ratios*



- Rate compression and catch-up effects have boosted French mortgage market more than German,
- Otherwise similar structures (fixed-rate product, conservative LTV etc.),
- Is France importing too much capital?
- Effect limited to hot spots (Paris) or nationwide?

French Government Bond Rates



Source: Hypostat, OECD, ECB, Finpolconsult computations. *reindexed to 2011.

Additional Topics for Discussion

- Other statistical questions of interest
- Other housing or mortgage market questions of interest