



mapadomo

A regional housing market database for the EU

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European Commission, DG ECFIN

NBP and SGH Warsaw, 30 Nov 2023

Motivation

01

Need to understand dynamics

Regional data to assess contributions to national aggregate, and to feed models (overvaluation, affordability analysis etc..)

02

Identify price determinants

Use the cross section to identify house price determinants and how do they change over time.

03

Comparability

Compare house price developments across countries. National concepts are hard to compare across regions

04

Analyse new features

Housing supply elasticities, regional PPPs, interaction with migration, etc.

Regional heterogeneity matters

1

Location Matters

In particular for house price levels!

2

Better identify the relationship between house prices and their drivers

Creating region-specific sub-aggregates

3

Solve econometric problems when identifying house price determinants

Exploiting the cross section

4

Regional differences matter for the aggregate

Differences across regional prices accumulate to different outcomes over the medium term



Spanish Case

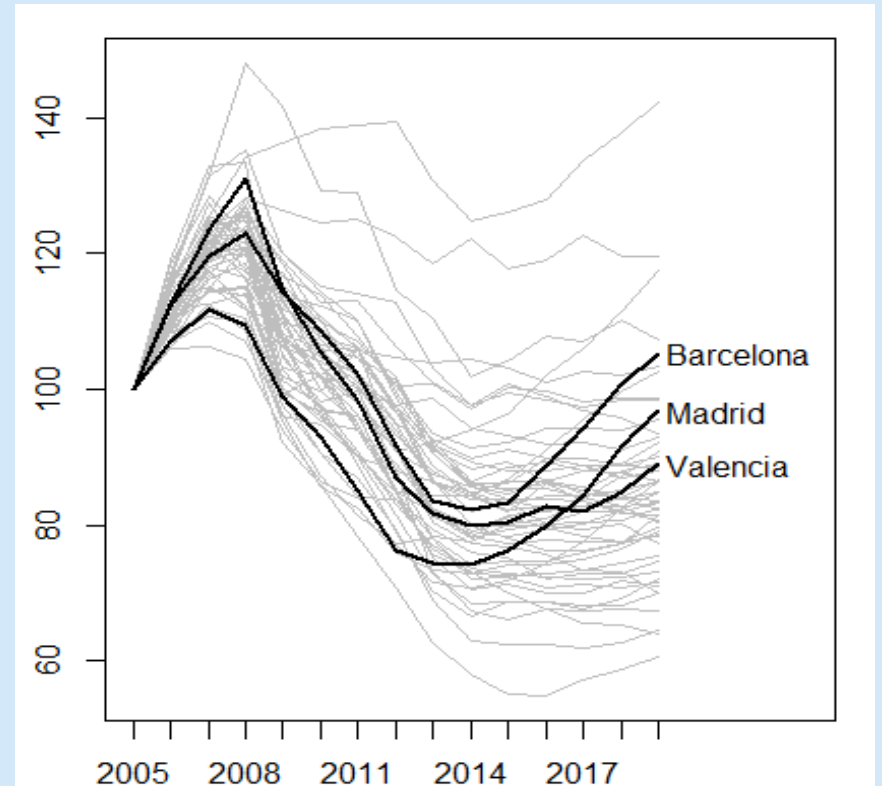
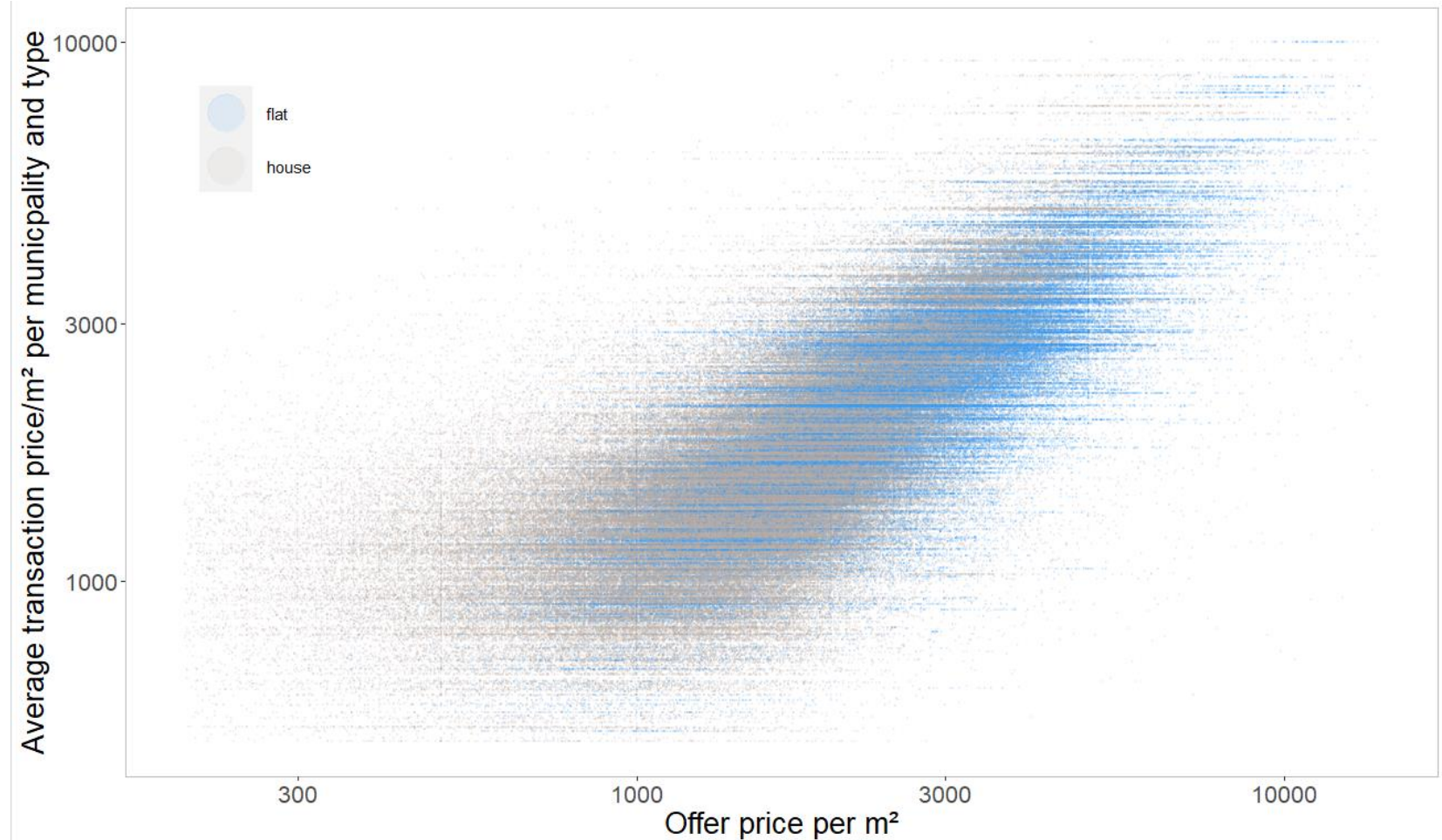


Illustration France: Heterogeneity within and across locations

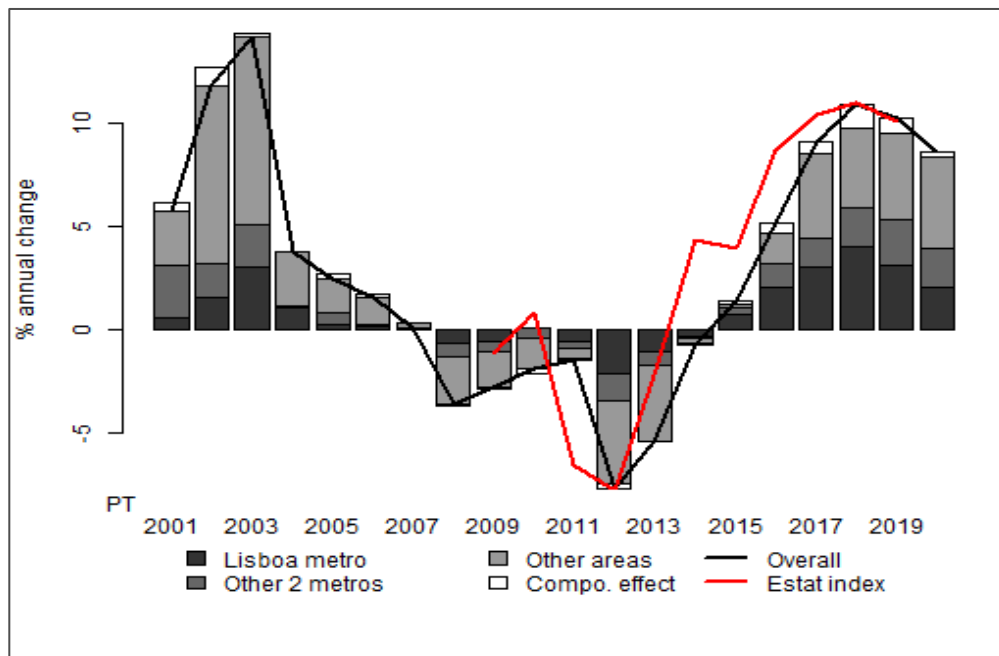
This chart displays 475,489 second-use prices per square metre on web offer in France at the end of 2018, versus the average transaction price per square metre for used dwellings by type in 5,096 municipalities, as reported by DVF3 for 2018.



Price growth contribution by type of region

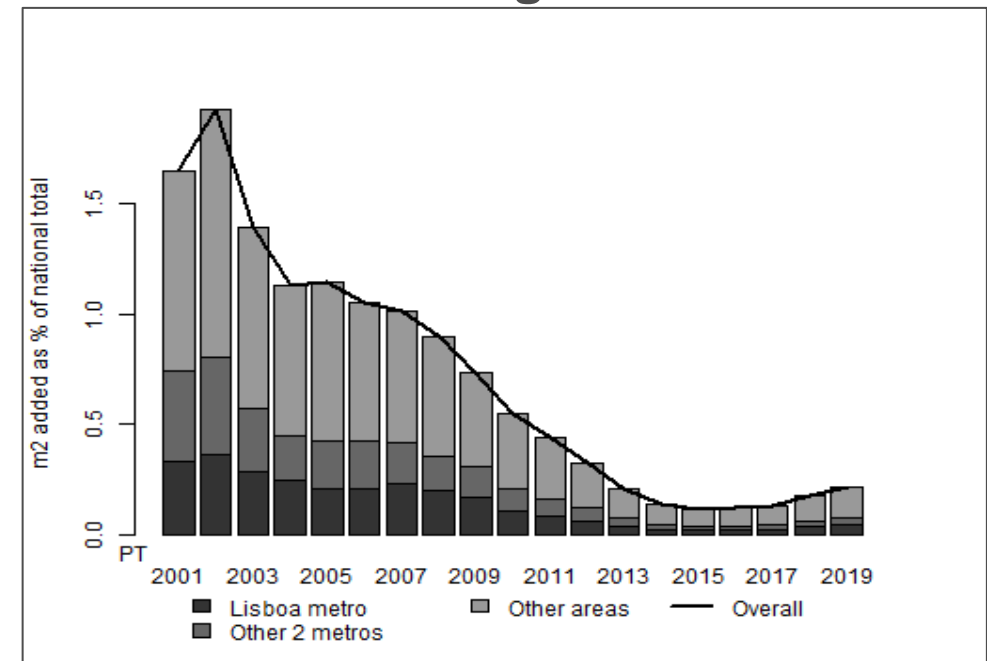
Price growth contribution by type of region

Portugal



Residential sqm contribution by type of region

Portugal

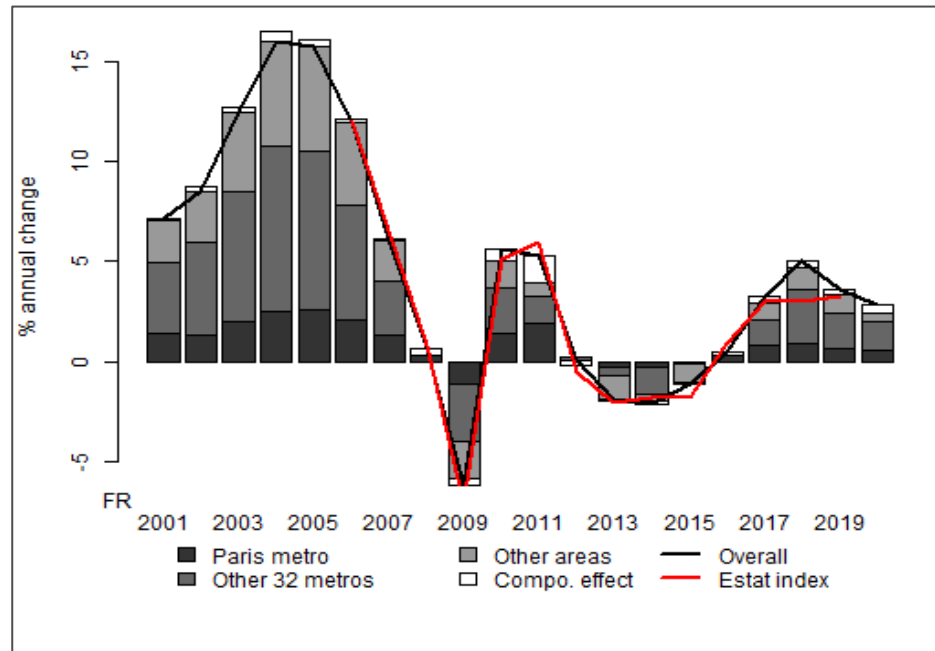


Price growth contribution by type of region

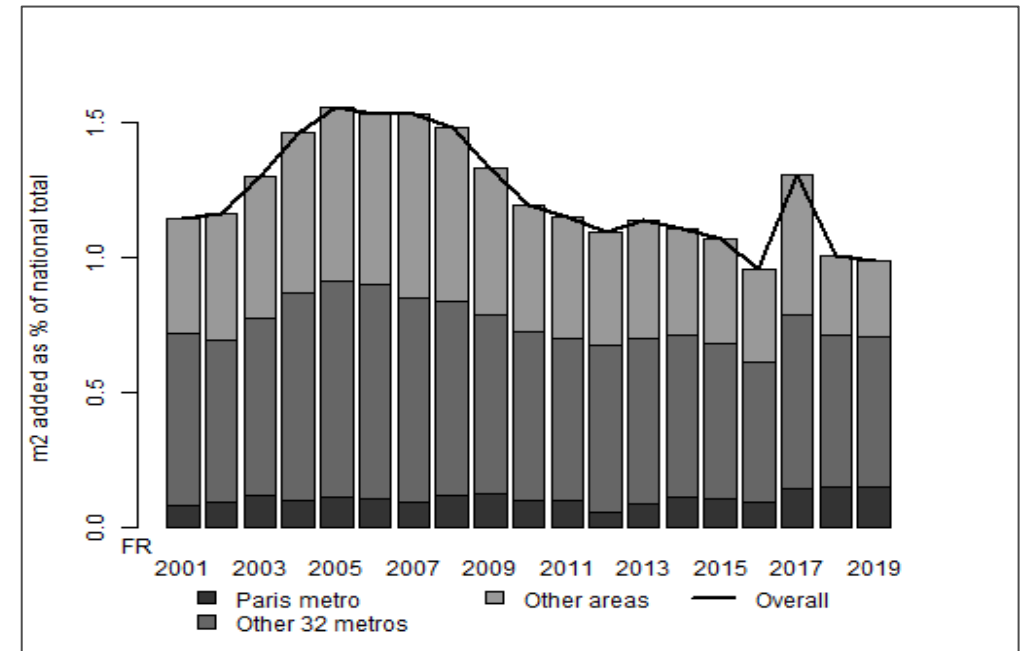
Price growth contribution by type of region

Residential sqm contribution by type of region

France



France



What is available vs what we are offering

Deloitte

Property Index Annual Report

- m2 price levels, housing stocks, and transaction prices in selected European places
- National level (NUTS-1)
- Cross-section
- Focus on prime market

OECD

House Price Database

- Only indices
- Rarely NUTS-3

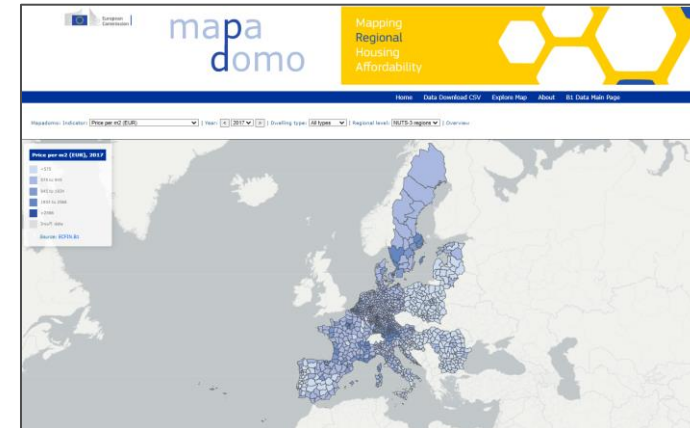
Recent WP:

- Municipality level
- Mix of data providers



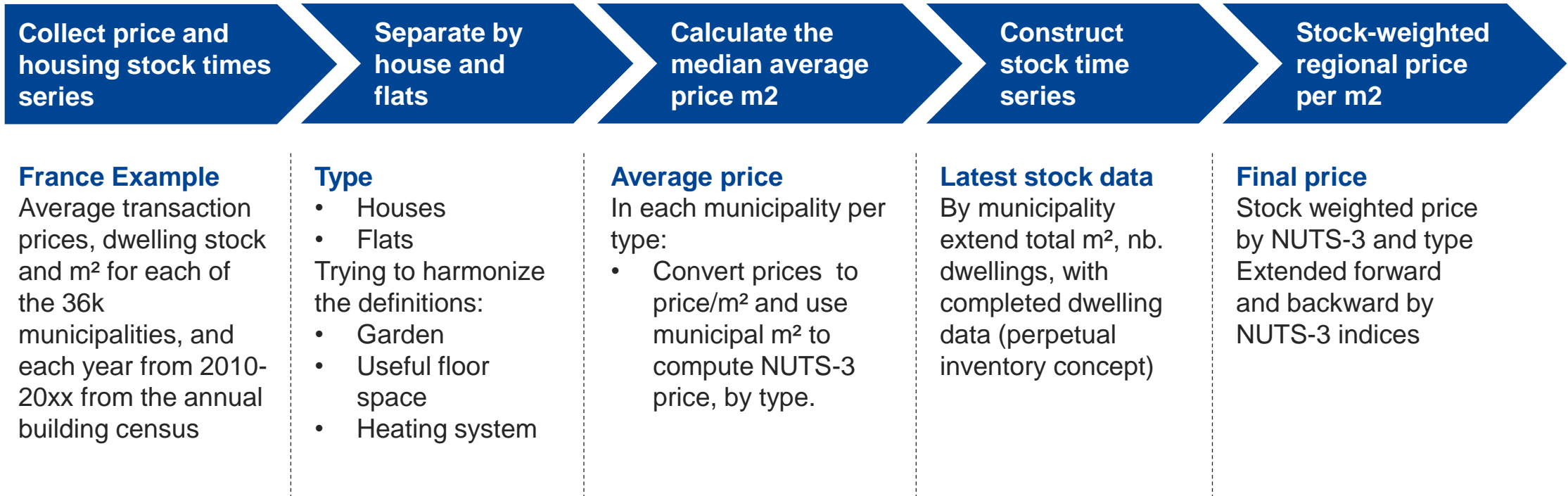
Mapadomo

Regional House Price Database



- Dwelling stocks, sizes, transaction and offer prices
- Price/m2 NUTS-3 level
- Large timeseries, also on building stocks
- Compatible with national accounts, statistics
- Focus on non-fin asset concept, second hand prices
- Also includes webscraped prices
- Available for research

Methodology



□ Extend p/m² with department price indexes forward and backward (From INSEE, notaries, webscrape aggregators).

Imputation

Missing Data

- 1 **Square meters** for specific year
- 2 **Regional prices** for specific years
- 3 Data about **specific municipalities**
- 4 Distinction betw. **flats** and **houses**

Imputation Techniques

Use statistics on completed and destroyed dwellings to impute between census dates

Use official and half-official indexes to extend (web aggregators for 2018+), sometimes for larger regions

Use neighbor data, interpolation

Attribute same price per municipality/borough, aggregate with stocks

Using the highest-quality data sources available in a region

Statistical data



Statistical offices

NSI, Cadastre

Official Data



Official sources

Tax records, public appraisals, etc.

Appraisal Data



Private sources

Academics, notaries

Webscraped data



Private providers

Real estate websites

Source overview

- 1022 NUTS-3 regions for 20 Member States
- annual price level available from 2012 at least, and from 1995 in some cases.

	BE	BG	DK	DE	EE	ES	FR	HR	IT	LV
headline price concept	T	A	T	W/A	W	T	T	A	A	W
headline official source	✓	✓	✓	X	X	✓	✓	X	✓	X
offer prices available	✓	✓	✓	✓	✓	X	✓	✓	X	✓
source per m2	X	✓	✓	✓	✓	✓	✓	✓	✓	✓
local level (sub NUTS3)	✓	X	✓	✓	✓	X	✓	✓	✓	✓
price per type	✓	✓	✓	✓	✓	X	✓	✓	✓	✓
m2 2010	X	✓	✓	✓	✓	✓	✓	✓	✓	✓
m2 time series	X	✓	✓	✓	✓	✓	✓	X	X	✓
	LT	HU	MT	NL	AT	PL	PT	RO	SI	SE
headline price concept	T	T	A	A	A	T	A	W	W	A
headline official source	✓	✓	X	✓	✓	✓	✓	X	X	✓
offer prices available	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
source per m2	✓	✓	✓	X	✓	✓	✓	✓	✓	✓
local level (sub NUTS3)	X	✓	X	✓	✓	X	✓	✓	✓	✓
price per type	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
m2 2010	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
m2 time series	✓	✓	X	✓	✓	✓	✓	✓	✓	✓

Headline price concept: T transaction, A appraisal, W based on webscraped offer prices

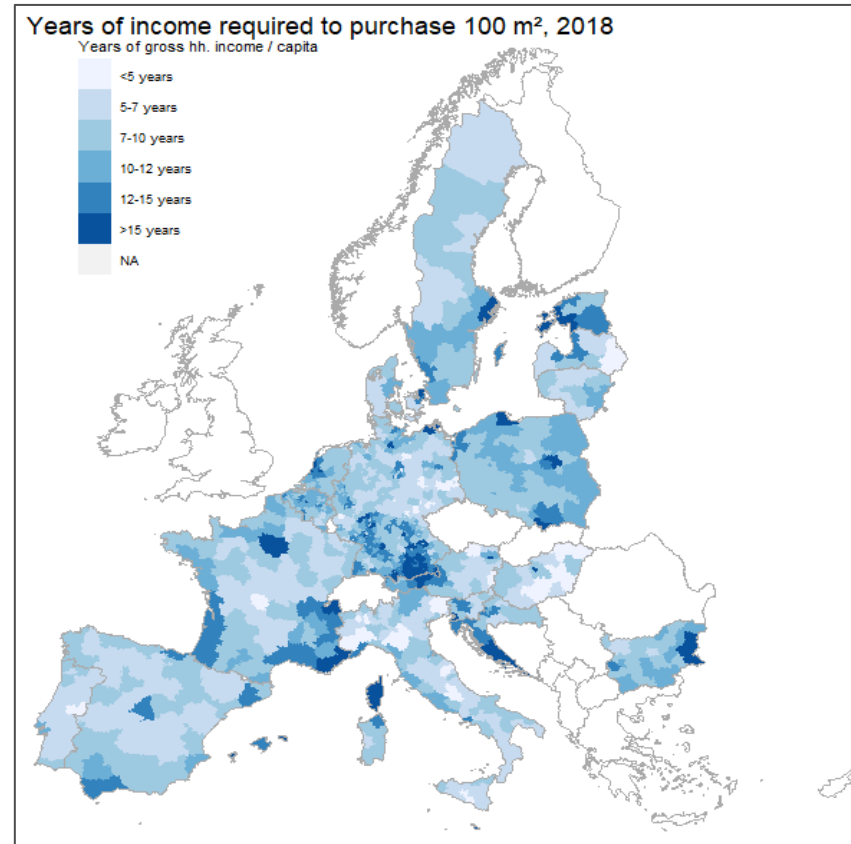
Headline official source: denotes whether headline price data is based on an official government institution (NSI, cadaster, etc.)

Preliminary insights (5/5)

Approach

- This map illustrates that the price to income variation is broadly stronger within Member States than across them.

Approach



Key Insights

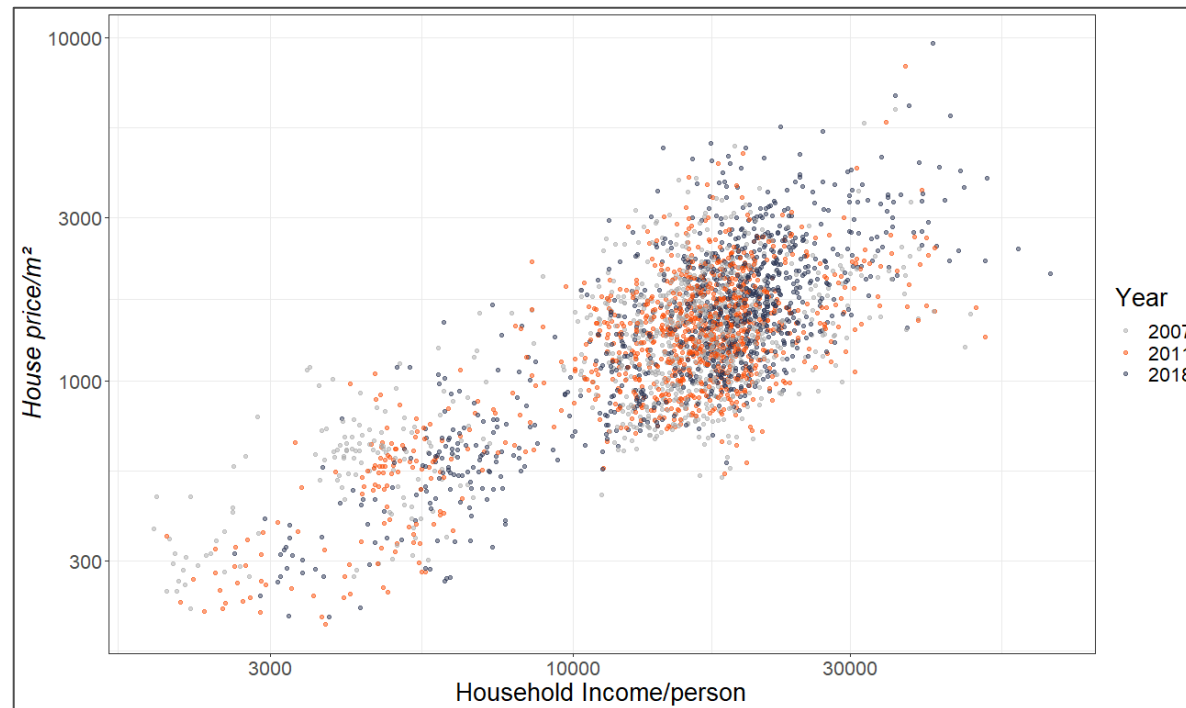
Several major metropolitan areas and some touristic areas, more than 15 years of average (not median) income per person were required in order to purchase a 100 m² dwelling.

Preliminary insights: cross-section (1/4)

Approach

- How do house prices relate to 'fundamentals'?
- Are such elasticities Member State-specific?

Price per sqm v income per capita, nominal



Key Insights

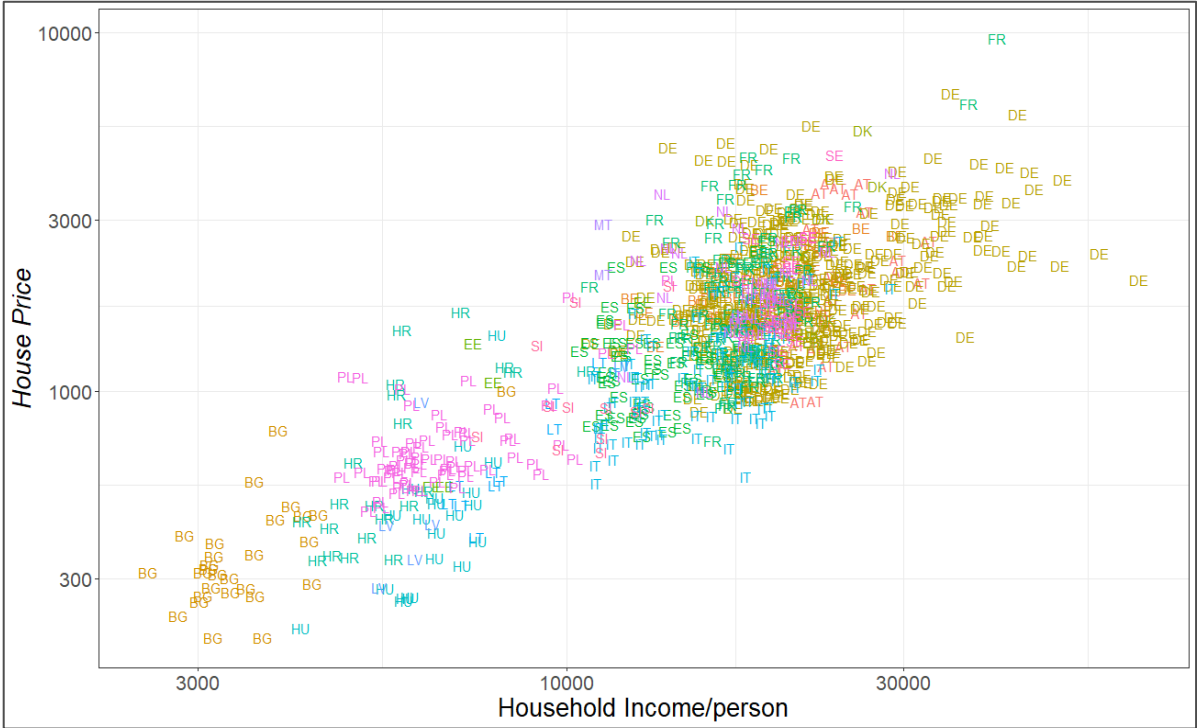
House (RRE) prices and income are clearly related: 1:1? Yet there is more to house prices than just income...

Preliminary insights: cross-section (2/4)

Approach

- Illustrates how regional data can be used to inform priors on the relationship between income and house prices

Price per m² to income per capita



Key Insights

The relationship may seem 1:1 across countries. But within countries, slopes are less clear

Preliminary insights: cross-section (3/4)

Approach

- National factors can be dealt with as fixed effects

House price v income, with national fixed effects



Key Insights

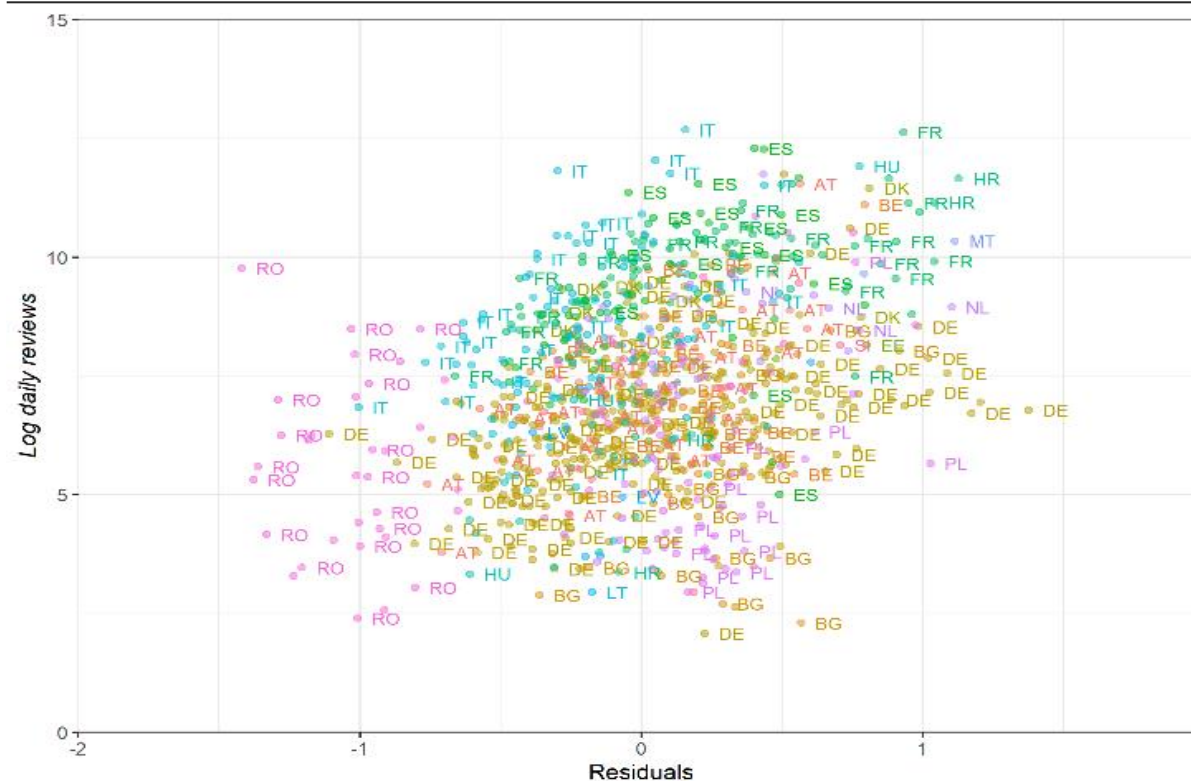
Income is only one factor to explain intra-country differences

Preliminary insights: cross-section (4/4)

Approach

- Determinants other than income matter too: Condition prices on income and see how other factors matter

Income-adjusted prices v tourism



Key Insights

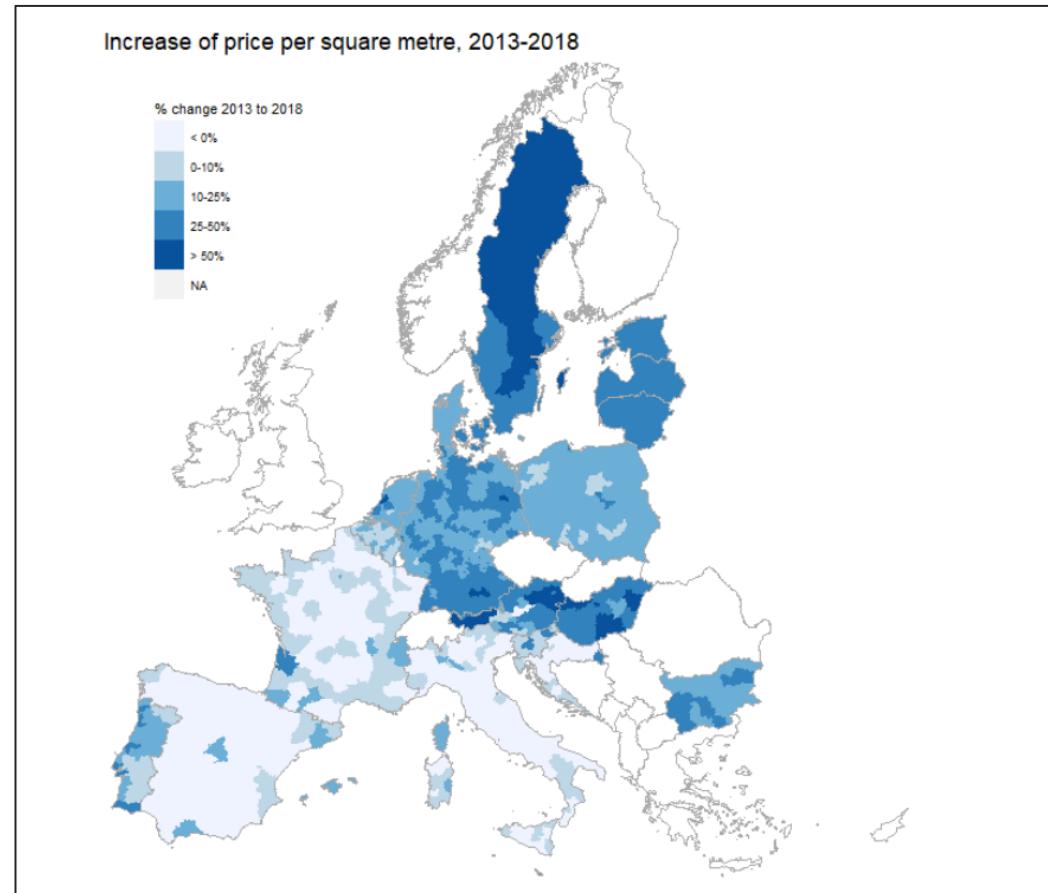
This graph compares the residual from a regression of log price on log income (x-axis) with average AirBnB reviews in the region (2018).

Preliminary insights: Dynamics (1/52)

Approach

- Look at price per m² changes
- House prices increased strongly in Germany, Nordic and Baltic countries.

Price per m² change 2013-18



Key Insights

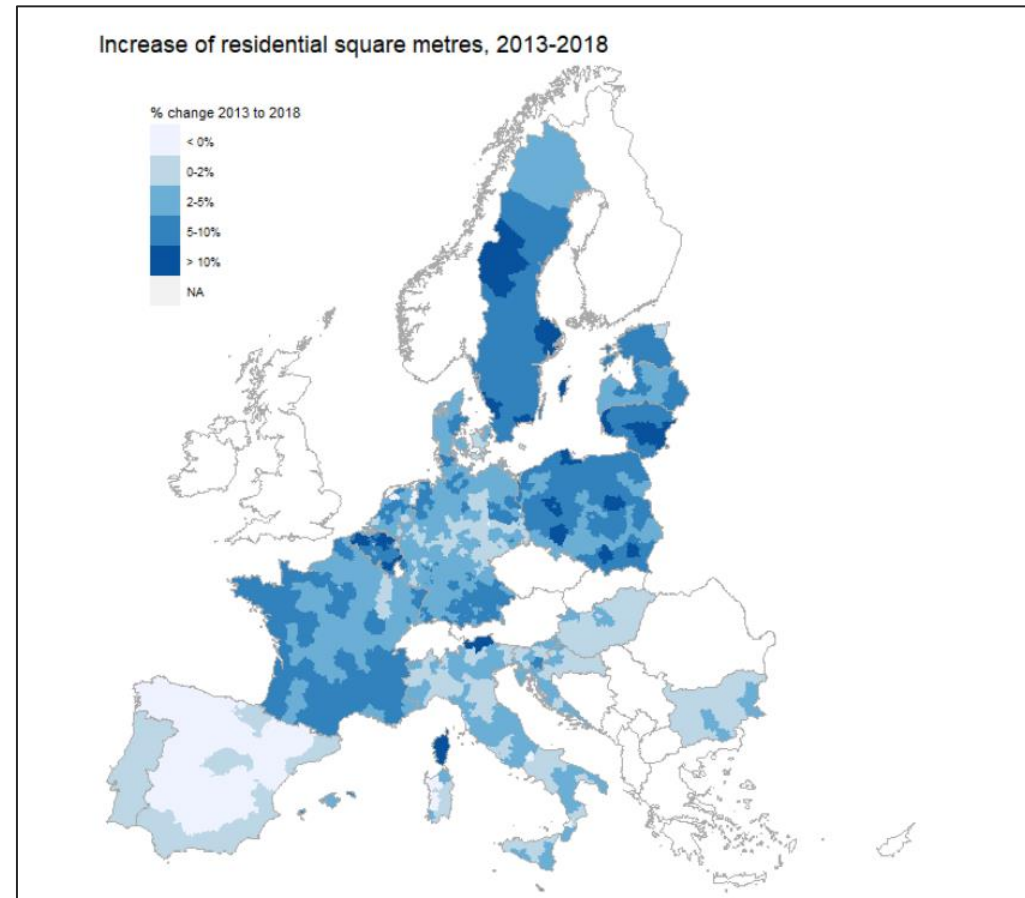
Such price increases have been relatively broad-based in most countries, whereas regional price growth differences have been more pronounced in specific countries (ie. PT)

Preliminary insights (2/5)

Approach

- Look at supply response
- Such price increase have not necessarily found a response in expanding housing stock

Increase of residential m² 2013-18



Key Insights

Despite higher house price growth in DE, German housing stock develop at a pace comparable to FR.

Mapadomo limitations

Limitations

- **Statistics:** Mapadomo is an analytical database
- **Indicator definition:** it is a tool, not a benchmark
- **Investment decision:** information regarding the quality of real estate deals. Price concepts vary greatly according to use.

To be done

- **Update:** DE, FR, PL, + in the pipeline until February
- **Add missing countries:** FI, SK, LU, CY, IE, CZ, EL
- **Improve quality:** Continuous review, constant adjustments
- **Add additional features:** transactions, owner occupancy, etc.

Conclusions

- Brings together **residential prices** per square meter (over time) and **housing stock time series** in a manner that is comparable across countries
- Allows **regional housing markets comparison** from 2005 to 2019 across the EU
- Should allow for more **robust country-specific priors** on elasticities between **house prices** and their **major drivers**

Data available to public authorities upon request

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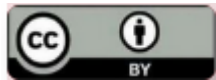
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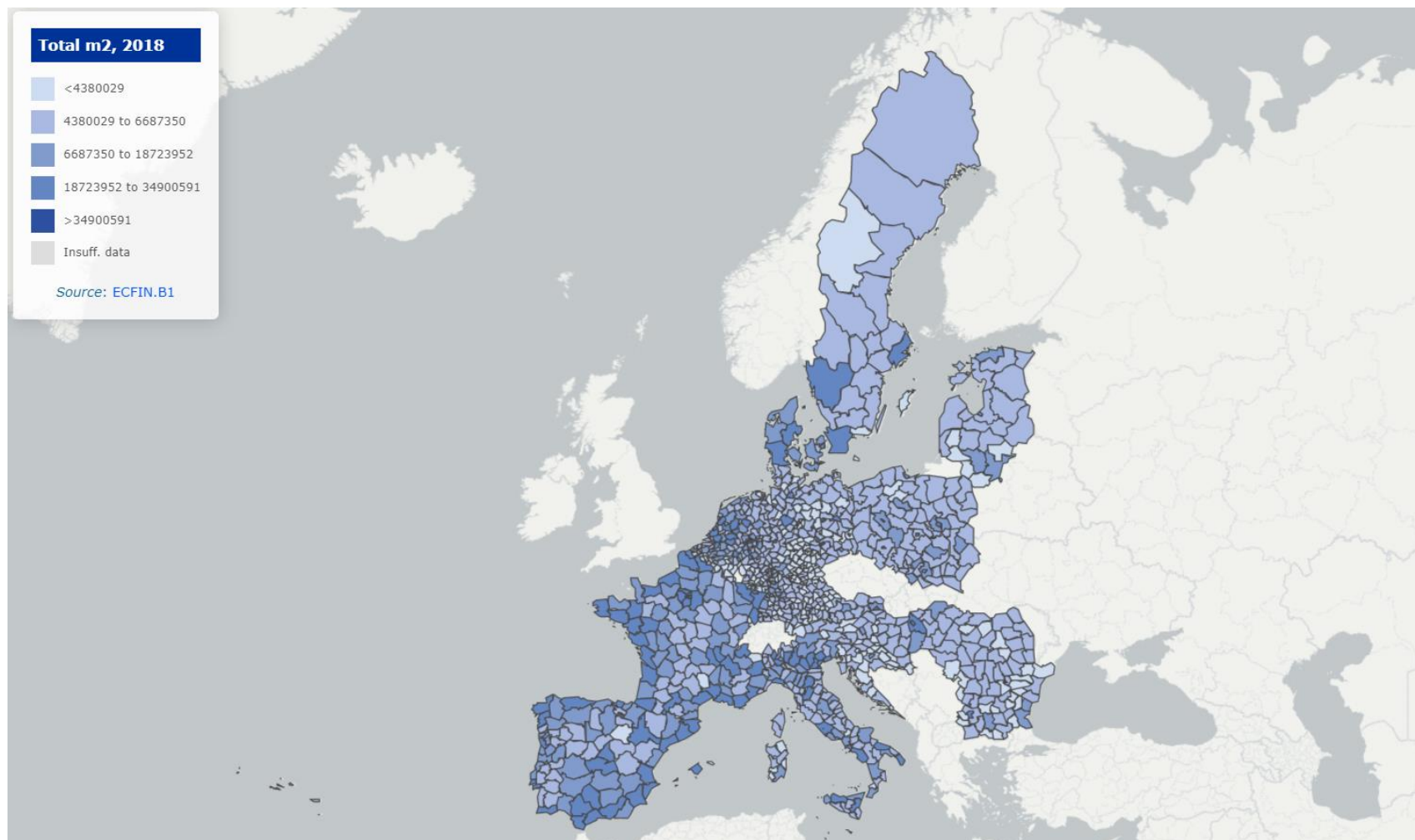


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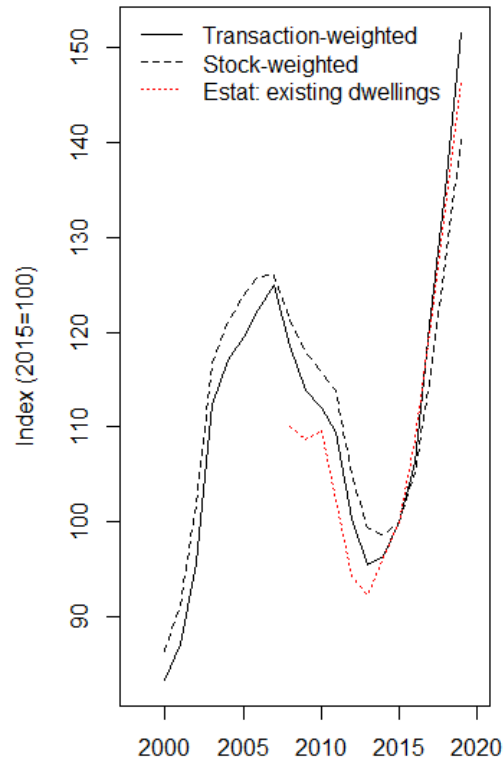
Annex

Square meters in 2018

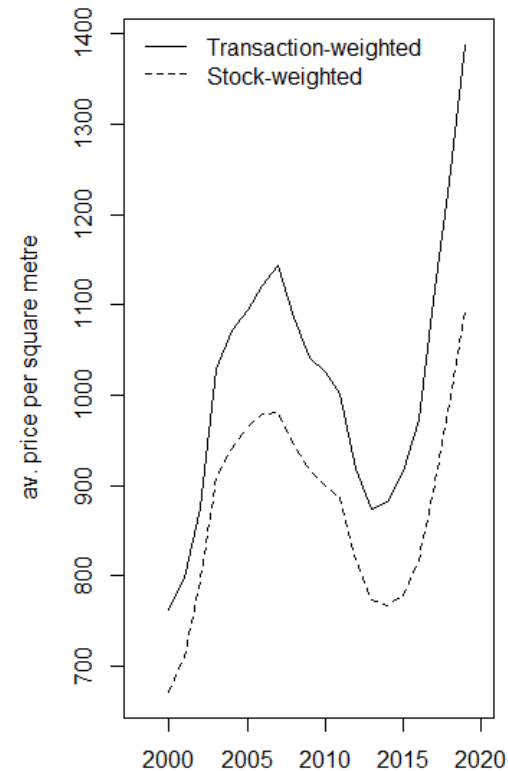


Stock v transaction weighting: the case of Portugal

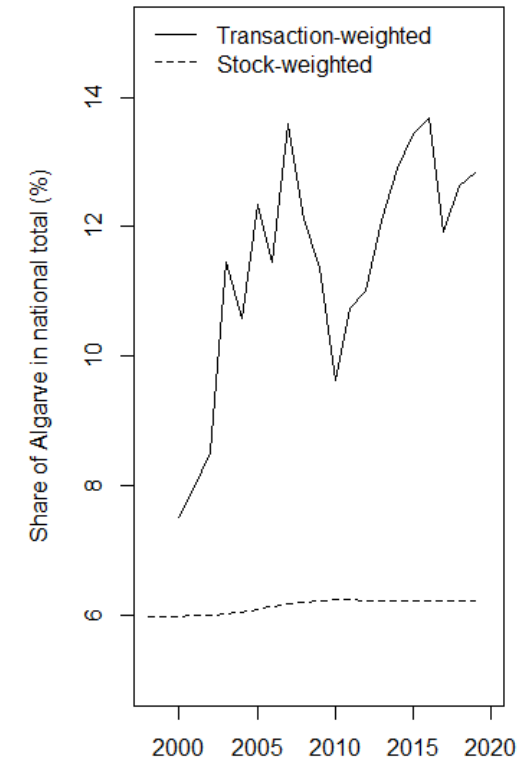
(a) Price indexes



(b) Prices per m²



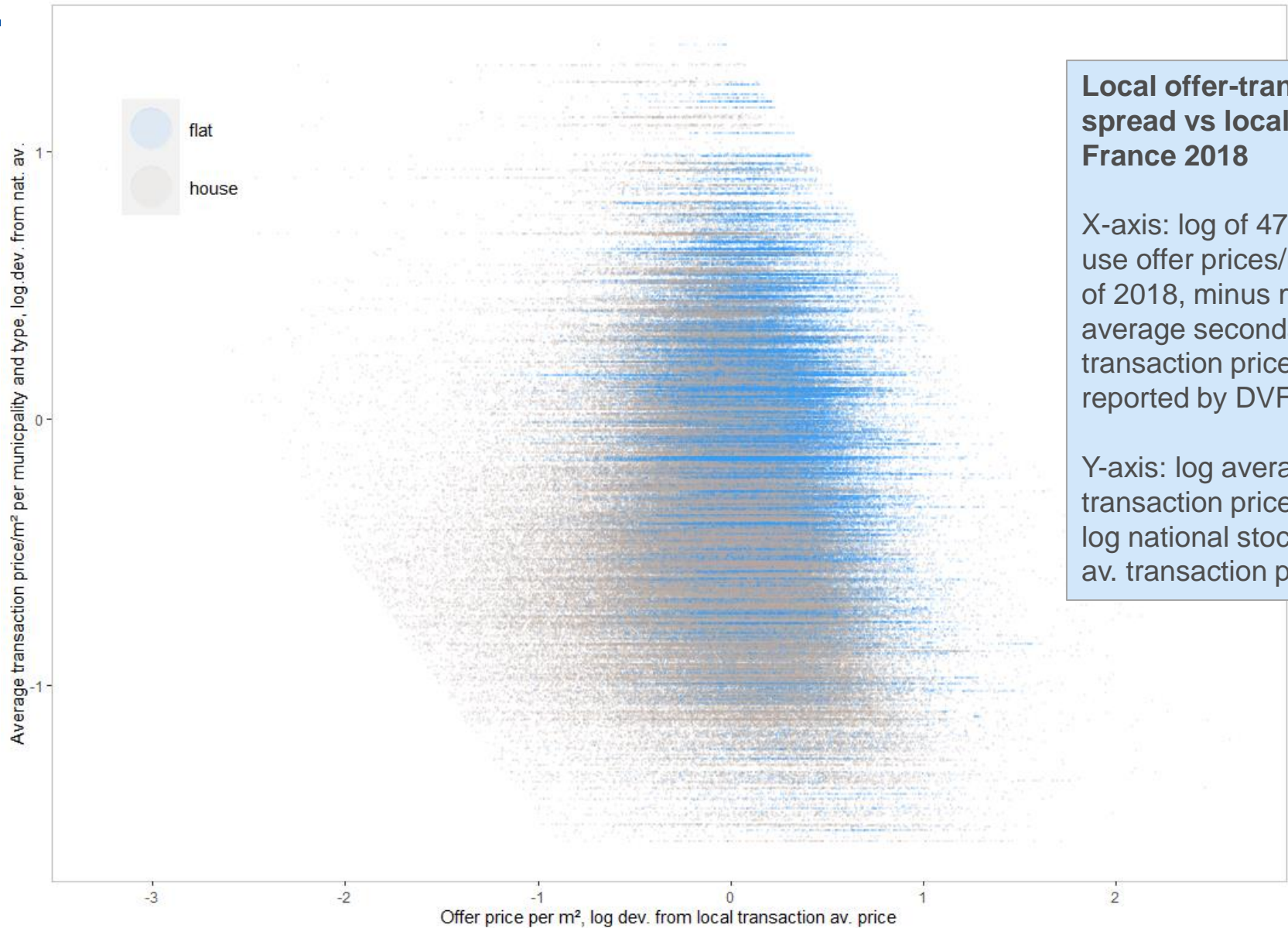
(c) Weight of Algarve



Data sources: mapadomo, Eurostat

Notes: 'Stock-weighted' denotes the headline national average for all dwellings in Portugal from mapadomo (indexed in panel a, outright in panel b). 'Transaction-weighted' denotes mapadomo NUTS-3 prices aggregated weighted by the number of annual transacted dwellings per NUTS 3 region

Apartments are more homogenous than houses

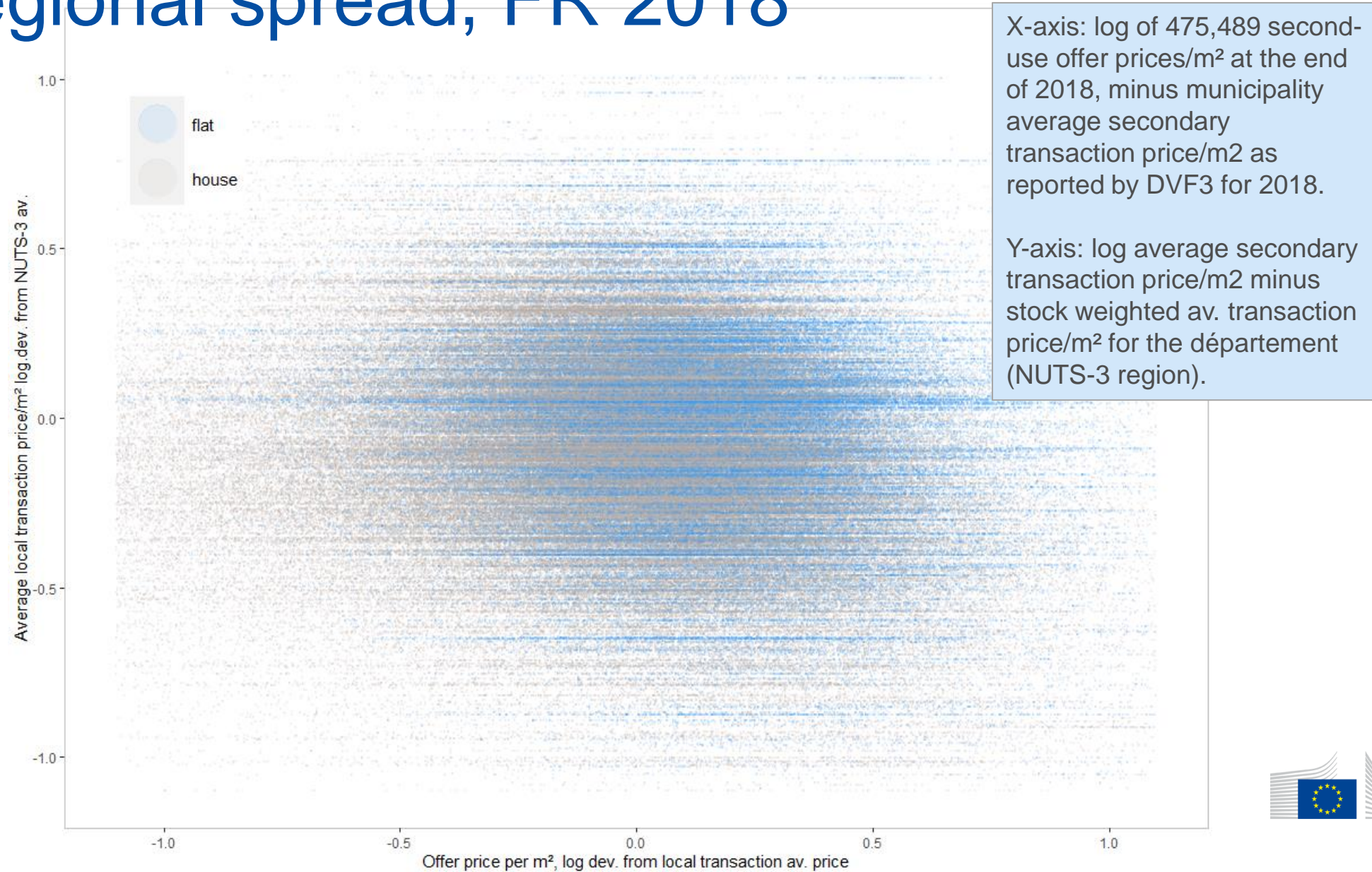


Local offer-transaction spread vs local-nat. spread, France 2018

X-axis: log of 475,489 second-use offer prices/m² at the end of 2018, minus municipality average secondary transaction price/m² as reported by DVF3 for 2018.

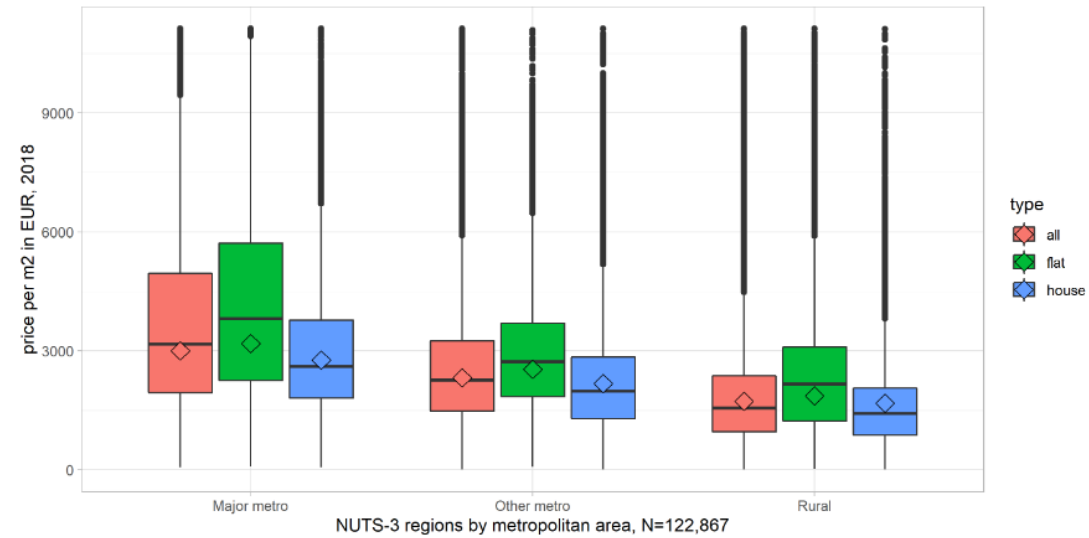
Y-axis: log average secondary transaction price/m² minus log national stock weighted av. transaction price/m².

Local offer-transaction spread vs local-regional spread, FR 2018



Offer and transaction price

Scraped prices per square metre, compared to stock-weighted average



Boxplots denote distribution of the offer price per m² for scraped listings, within regions that belong to three types of metropolitan area. Box denote 25% and 75% quantiles, whiskers correspond to 1.5 the inter-quartile range. Diamonds indicate the headline (stock-weighted) average price for the same period, i.e. the price from the main database used in the bubble chart above.

Country Fixed Effects (2018)

Table 7: Results

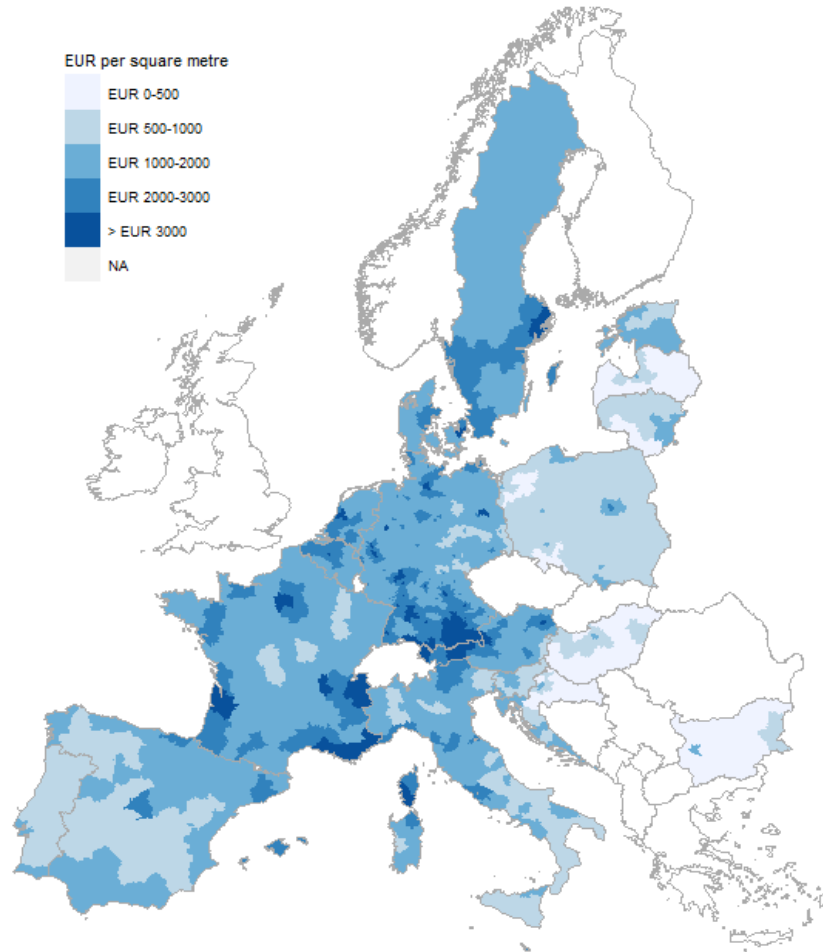
	<i>Dependent variable:</i>					
	price_log					
	(1)	(2)	(3)	(4)	(5)	(6)
inc_log	0.720*** (0.045)	0.455*** (0.041)	0.428*** (0.040)	0.271*** (0.042)	0.253*** (0.041)	0.338*** (0.043)
log_tour		0.130*** (0.007)	0.128*** (0.006)	0.109*** (0.006)	0.106*** (0.006)	0.105*** (0.007)
pop_res_log			0.529*** (0.071)	0.173** (0.078)		0.082 (0.089)
pop_dens_log				0.099*** (0.011)	0.114*** (0.009)	0.060*** (0.014)
dwel_land_log						0.152*** (0.038)
Observations	1,034	1,017	1,015	1,015	1,017	878
R ²	0.202	0.428	0.467	0.509	0.506	0.506
Adjusted R ²	0.187	0.416	0.456	0.498	0.496	0.494
F Statistic	255.921*** (df = 1; 1014)	372.285*** (df = 2; 996)	290.232*** (df = 3; 993)	257.129*** (df = 4; 992)	340.147*** (df = 3; 995)	175.440*** (df = 5; 855)

Note:

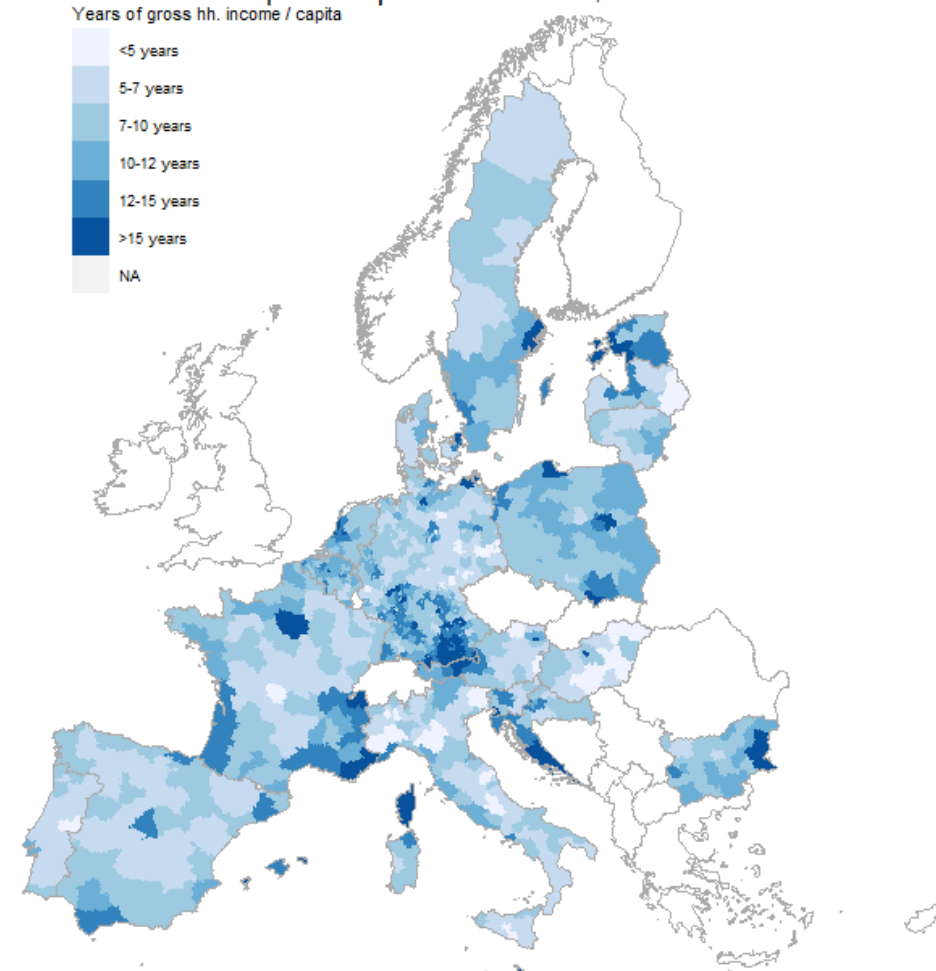
*p<0.1; **p<0.05; ***p<0.01

Prices or price-to-income?

Residential prices per square metre, 2018

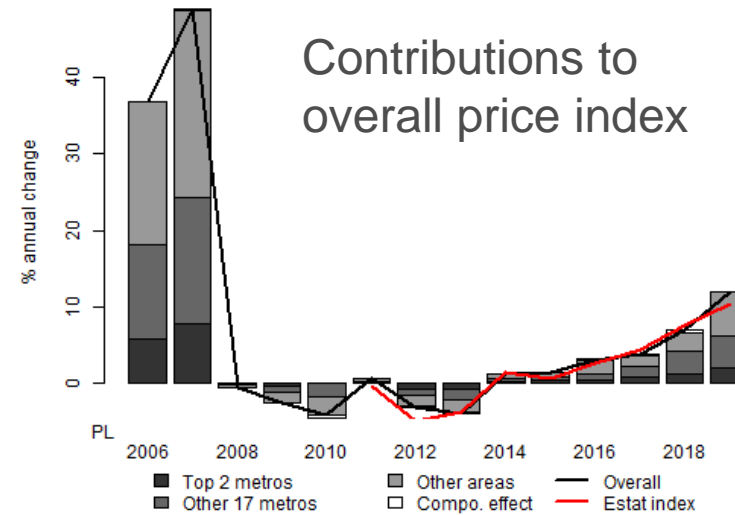
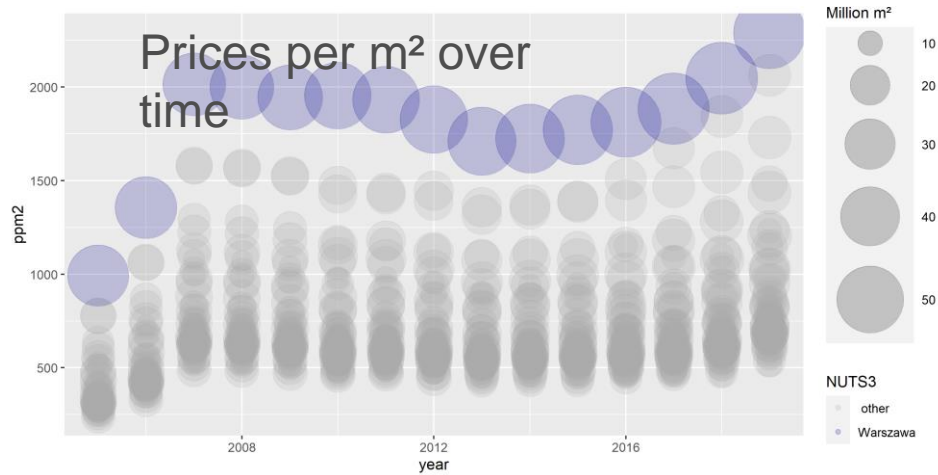


Years of income required to purchase 100 m², 2018



Income usually the most important determinant of house prices, on the macro level

Poland: some results



Scraped prices per square metre, compared to stock-weighted average

