ESPON Big Data for Territorial Analysis and Housing Dynamics

Wellbeing of European citizens regarding the affordability of housing

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Inspire Policy Making with Territorial Evidence

// New indicators for monitoring housing dynamics (Affordability, Big Data, Housing)

Known facts and policy context

Housing inequalities: a major policy issue

- Pact of Amsterdam (2016): recognise housing as a key priority of the Urban Agenda of the EU.

- Cities are the heart of the Urban Agenda of the EU. But EU has no direct competence in the area of housing.

- 25 States in the OECD promote homeownership (subsidies and fiscal incentives).

- Housing issue have gained increasing attention since the financial crisis (descreasing construction activities accross Europe).

- 11.3 % of the EU population lived in households which spent 40 % or more of their disposable income on housing;

- Housing prices have increased faster than the income of renters and buyers : real estate become an important driver of socio-economic inequalities.

  - ❖ For homeowners : socially selective access to housing markets (spatial exclusion and increased social tensions).

  - ❖ Cost of ownership impacts rent : availability of housing, competition with Airbnb offer...

Existing international statistics and studies

A. Households' housing cost burden (mortgage and rent cost) as a share of disposable income, 2014 or latest year available

Median of the mortgage burden (principal repayment and interest payments) or rent burden (private market and subsidized rent) as a share of disposable income, in percent
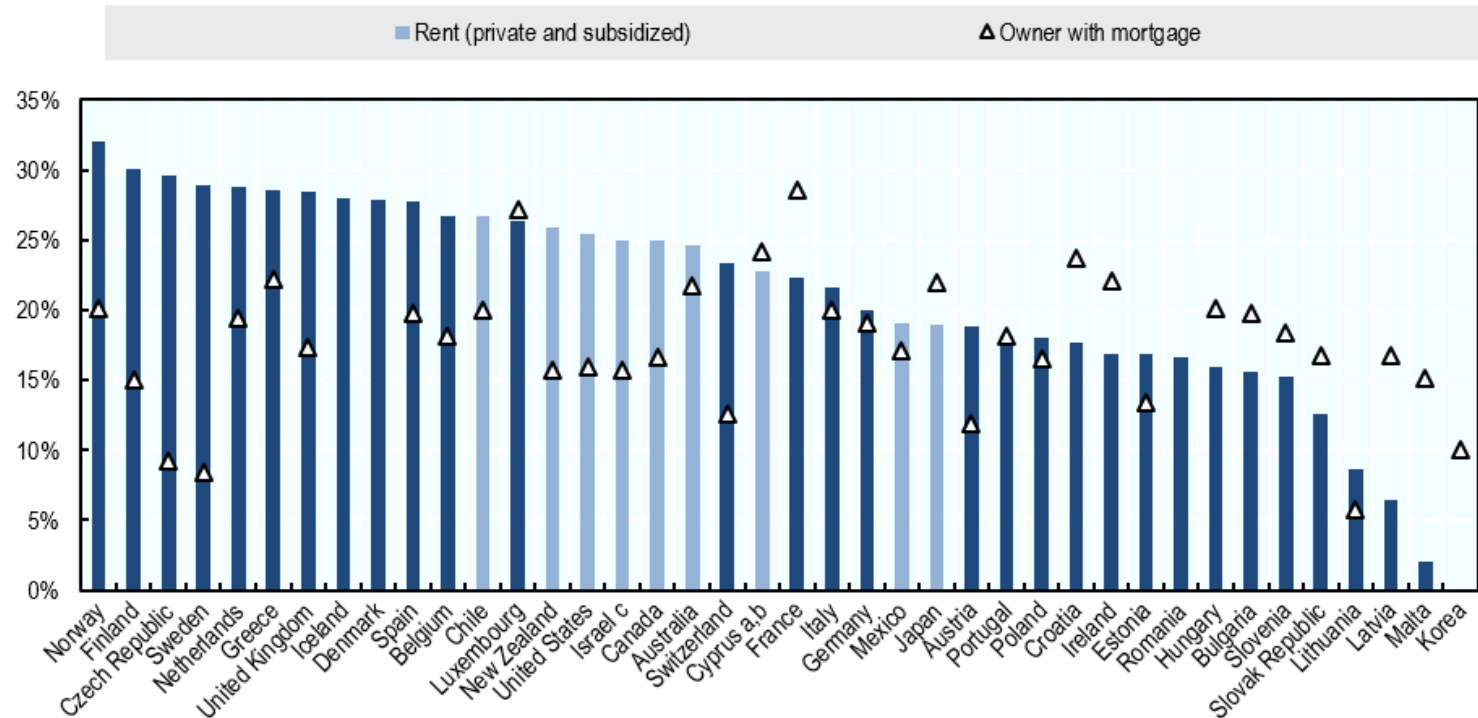
- Source : *OECD Affordablie Housing Database, 2016*

Existing international statistics and studies

B. Housing cost overburden rate among low-income owners (with mortgage) and tenants (private rent and subsidized rent), 2014 or latest year

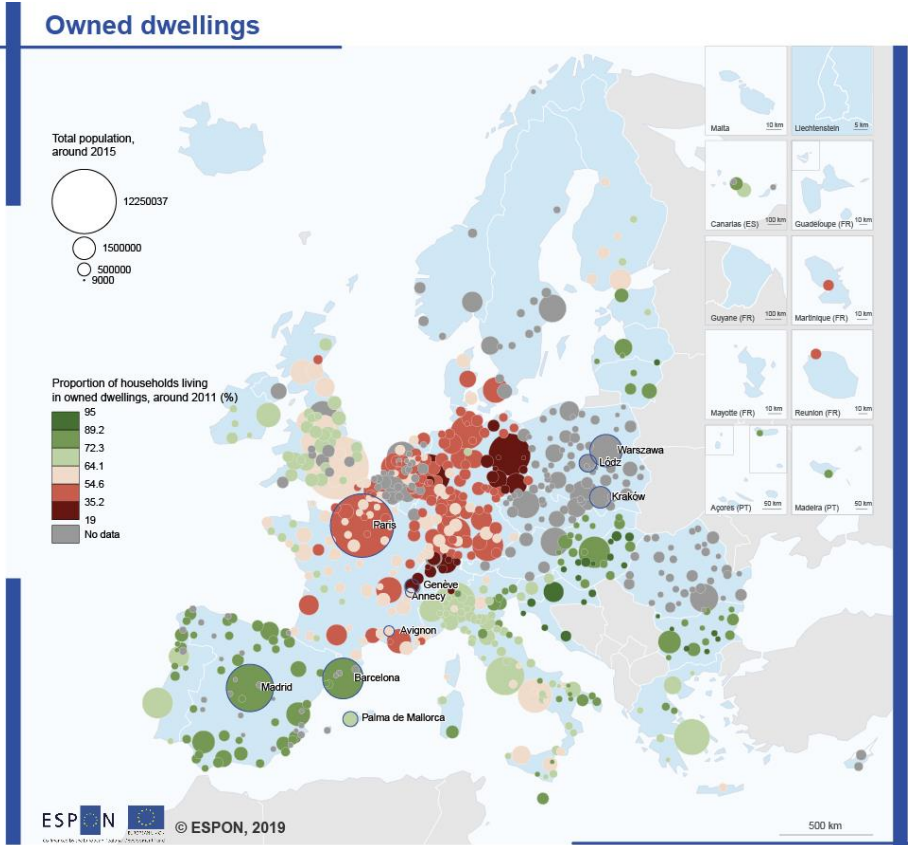Share of population in the bottom quintile of the income distribution spending more than 40% of disposable income on mortgage and rent, by tenure, in percent
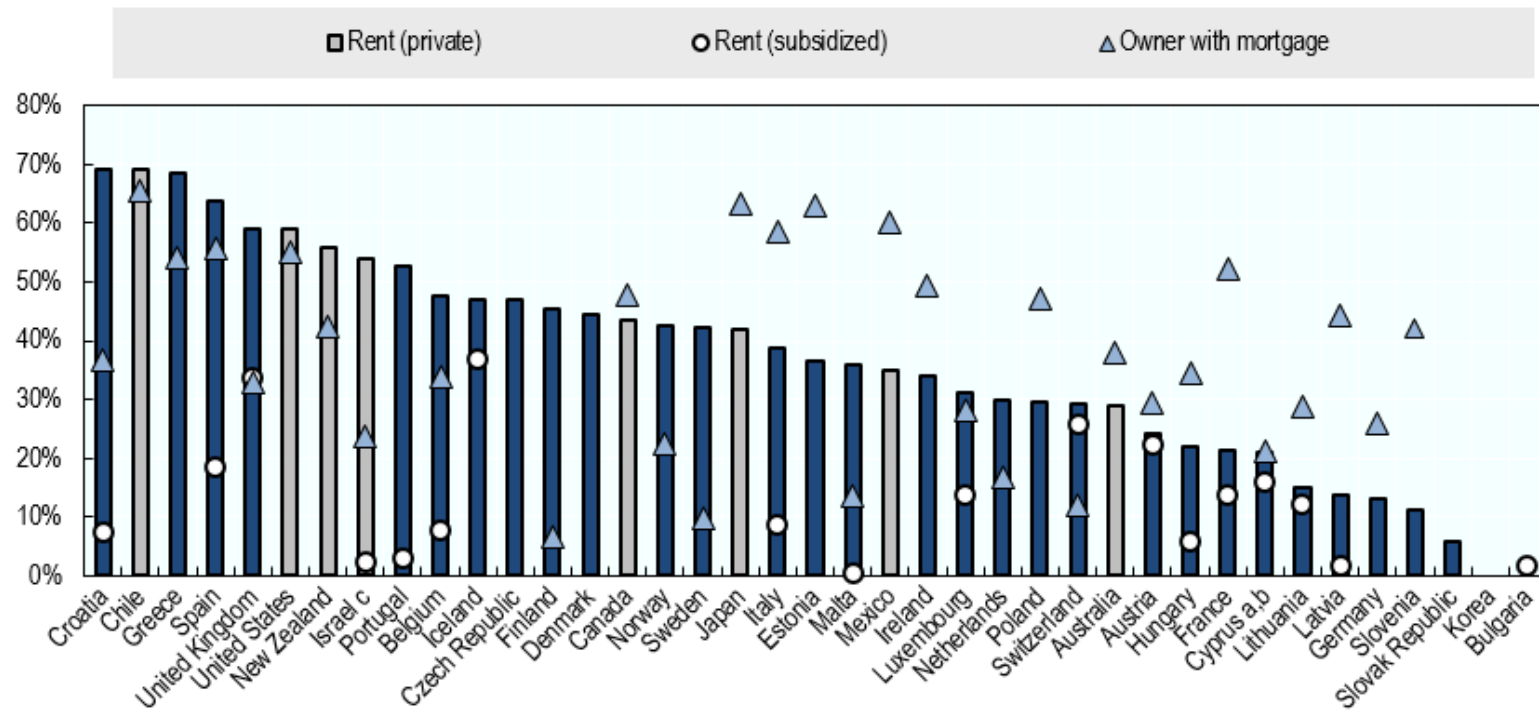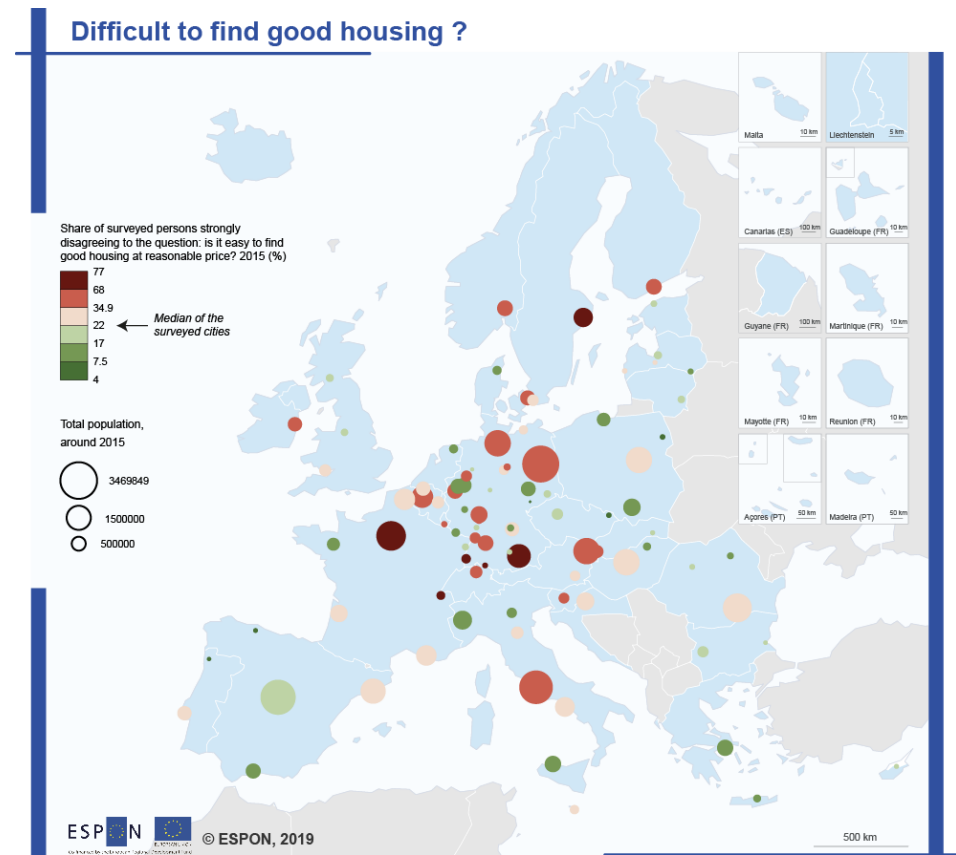

- Source : *OECD Affordablie Housing Database, 2016*

Existing international statistics and studies

Owned dwellings

Total population, around 2015

12250037
1500000
500000
9000

Proportion of households living in owned dwellings, around 2011 (%)

95
89.2
72.3
64.1
54.6
35.2
19
No data

Malta — 10 km
Liechtenstein — 5 km
Canarias (ES) — 100 km
Guadeloupe (FR) — 10 km
Guyane (FR) — 100 km
Martinique (FR) — 10 km
Mayotte (FR) — 10 km
Réunion (FR) — 10 km
Açores (PT) — 50 km
Madeira (PT) — 50 km

Warszawa
Łódź
Kraków
Paris
Genève
Annecy
Avignon
Madrid
Barcelona
Palma de Mallorca

500 km

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Regional level: FUA (version 2017)
Source: ESPON Big Data for Territorial Analysis and Housing Dynamics, 2019
Origin of data: Eurostat, 2019
(CC) UMS RIATE for administrative boundaries

Difficult to find good housing ?

Share of surveyed persons strongly disagreeing to the question: is it easy to find good housing at reasonable price? 2015 (%)

77
68
34.9
22 ← Median of the surveyed cities
17
7.5
4

Total population, around 2015

3469849
1500000
500000

Malta — 10 km
Liechtenstein — 5 km
Canarias (ES) — 100 km
Guadeloupe (FR) — 10 km
Guyane (FR) — 100 km
Martinique (FR) — 10 km
Mayotte (FR) — 10 km
Réunion (FR) — 10 km
Açores (PT) — 50 km
Madeira (PT) — 50 km

500 km

© ESPON, 2019

Regional level: Core Cities (version 2017)
Source: ESPON Big Data for Territorial Analysis and Housing Dynamics, 2019
Origin of data: Eurostat, 2019
(CC) UMS RIATE for administrative boundaries

▪ Source : *Urban Database (FUA)*

▪ Source : *Urban Audit Perception Survey, 2015*

A need for more detailed information...

- More **thematic details**: contextuam indicators are available (censuses), but do not provide information on the real-estate market itself > **A need of information based on prices and characteristics of the property.**

- More **comparable indicators at international level**: which indicators, which methodology, which data sources? > **international comparisons between cities**

- More **geographical** details: the FUA scale is not the only one to be considered for analysing housing dynamics > **intra-urban analysis**

- More **temporal** depth: **evolution of the market/affordability**, **last trends**

- More links to be made with other big data sources > **Increase of Airbnb offer in World core cities**...

2

Conceptual framework

Mixing conventional and unconventional data sources

- **Conventional data**: public conventional census data (income data derived from censuses)

- **Unconventional institutional data**: real-estate transaction databases, when available = prices paid.

- **Unconventional harvested big data sources**: real-estate websites = advertized prices.

- ➤ **Harmonised indicators** at several scales such as **price-to-income** ratios.

- ➤ Price : ownership or rental

- ➤Income : at local scale (LAU2) or national levels (EU harmonised statistics).
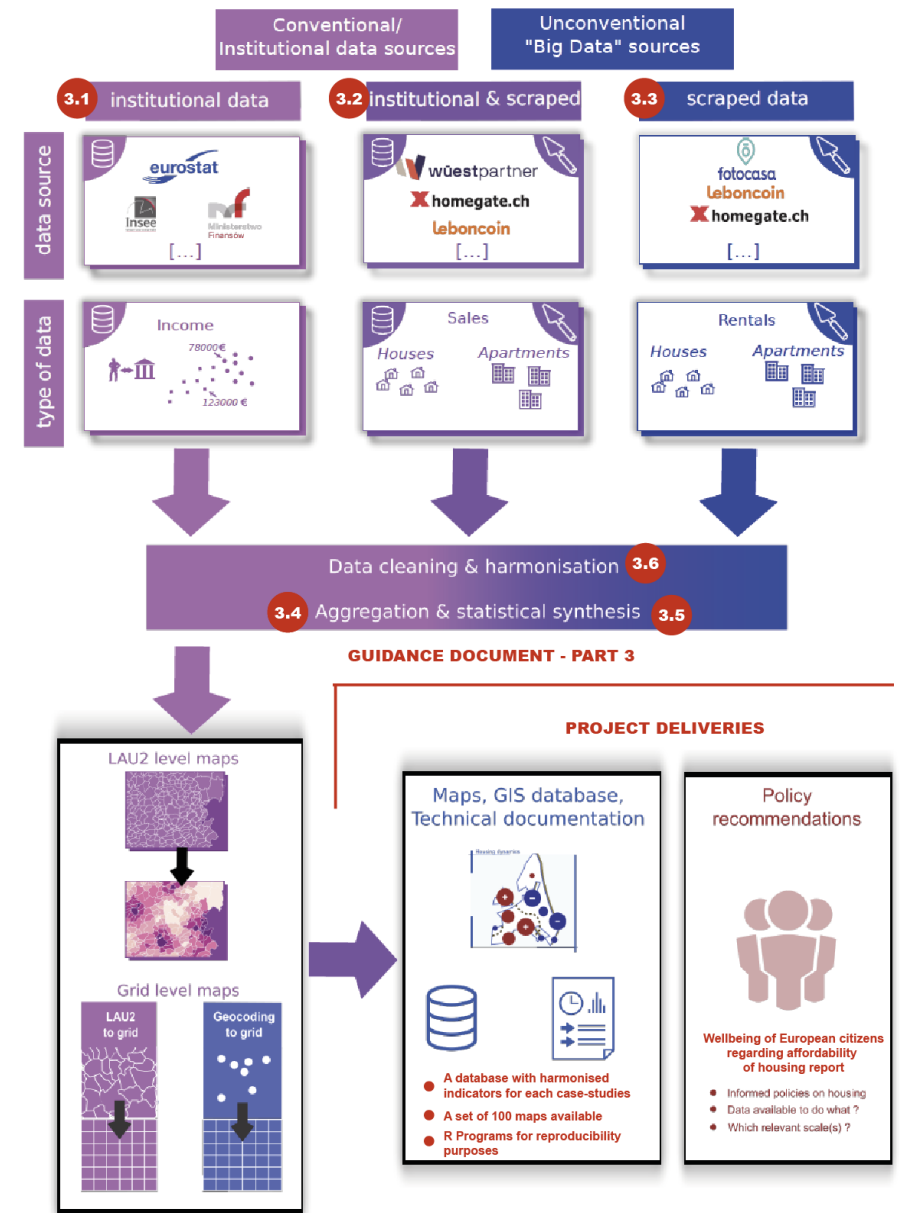
Mixing conventional and unconventional data sources

- **Harmonised indicators at several scales such as price-to-income ratios**

- **Price : ownership or rental**

- **Income:** at local scale (comparison between cities of the same country) or national levels (EU harmonised statistics for international comparisons).

1. Average income *(Złoty per month)*

2. Market price *(Złoty per sqare meters)*

1/2 =

3. Area that an average salary can buy *(square meters)*
- Primary market prices
- Secondary market prices

Łódź
Warszawa
Kraków

Case-studies location

Funtional Urban Areas of Poland and its EU neighbourhood

POLAND — Warszawa
Łódź
Kraków

100 km
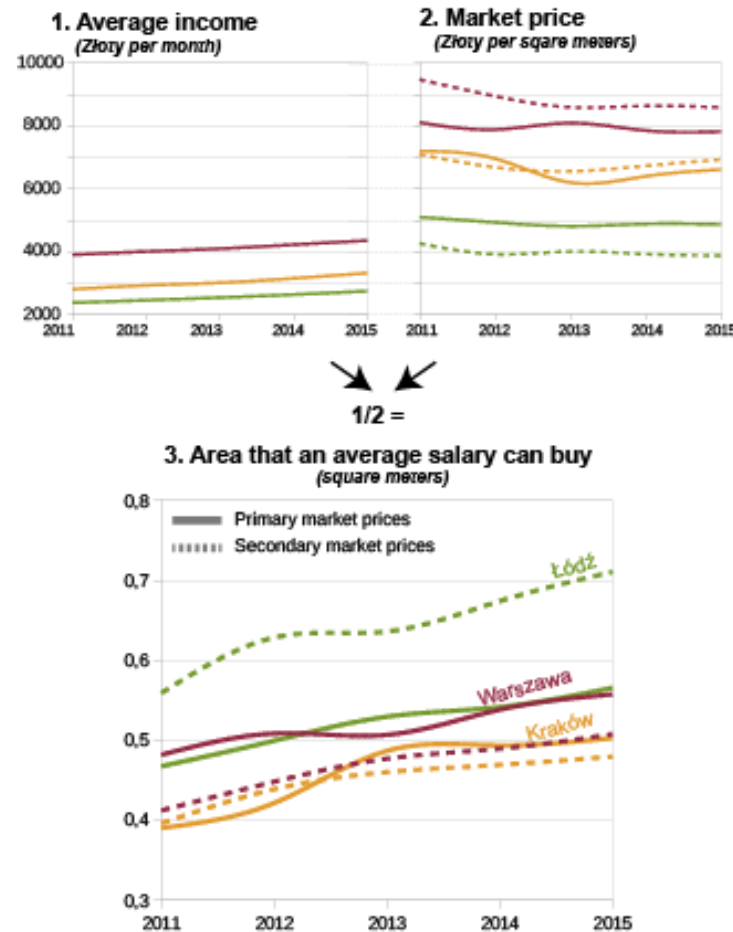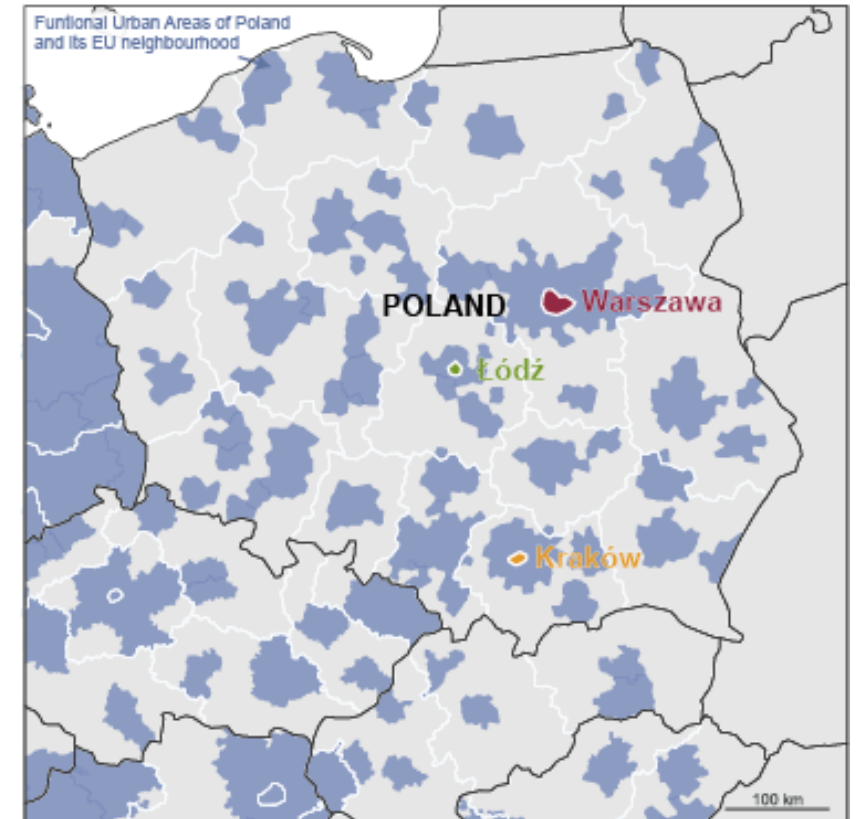
Territorial level : LAU2 (version 2011)
Source : UMS RIATE, UNIWERSYTET LODZKI, 2018
Origin of data : Average income: Ministry of Finance (Ministerstwo Finasów)
Real estate prices: National Bank of Poland (Narodowy Bank Polski)
University of Geneva for administrative boundaries

The overall process...

Identifying relevant data sources (country by country)

>

Data collection and cleaning

>

Data aggregation and harmonised indicators provision

>

Data sources combination

Conventional, unconventional data sources (which available information, which condition access? Which scale?)

Data harvesting, database access (sometimes costful) Managing extraordinary values...

Harmonised and comparable indicators in a multiscalar perspective(LAU2, FUA, grid)

Comparison with other relevant Big Data Sources (Airbnb...)

Study areas and data sources

- Use reference geographical objects at EU level : **FUA** and **LAU2** delineations.

Paris
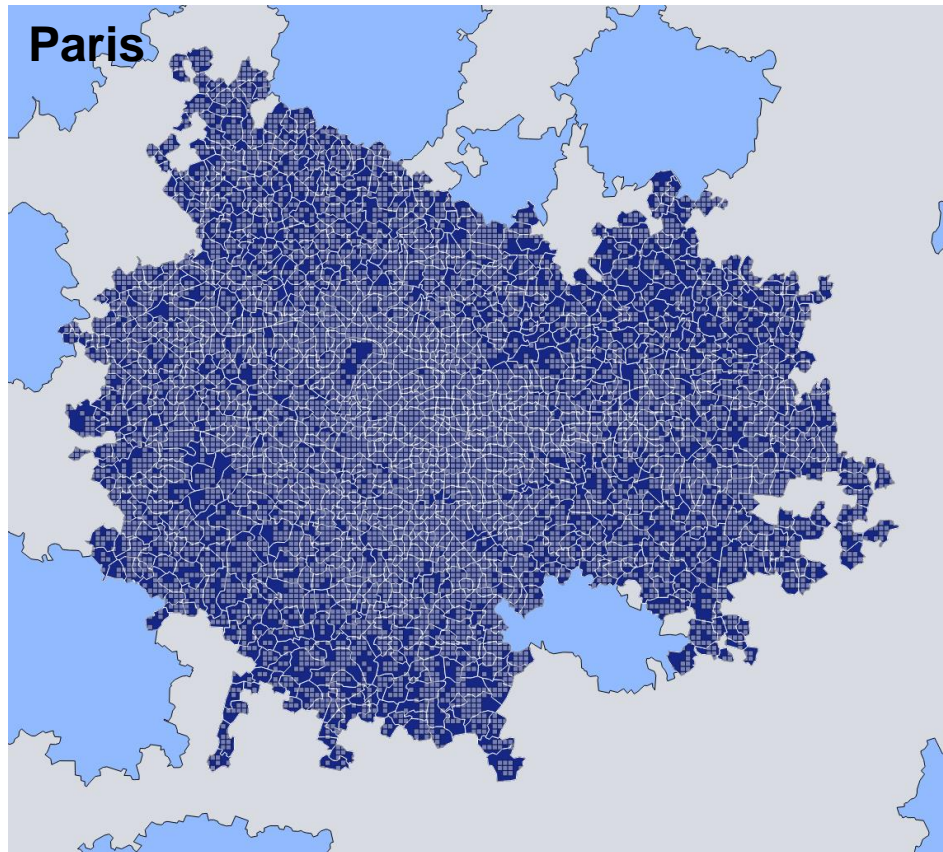
... And promoting a **multiscalar approach**

- Compare urban objects **globally**: FUA > synthetic indicators

- Analyze i**ntra-urban inequalities**: LAU2, 1km Grid

Geneva

Annecy
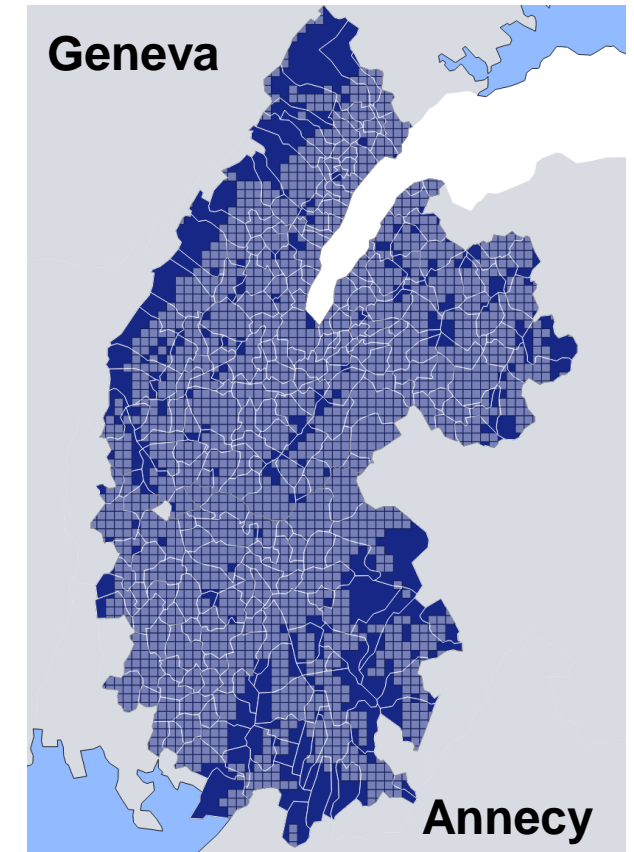
RiATe

Study areas and data sources

- Each EU country has its own reference sources both for conventional and unconventional data: which possible indicators? Price free?

		BIEN DATABASE	Demande de Valeur Foncière (DVF)	Le Bon Coin	Meilleurs Agents	InsideAirbnb	INSEE	Eurostat
DATA PROVIDER CHARACTERISTICS	Type	Transactions	Transactions	Data harvesting / web scrapping	Data harvesting / web scrapping	Data harvesting	Census	Survey
	Cost	40000 euros for the Ile-de-France sample.	Free	Data harvesting	Data harvesting	Data harvesting	Free	Free
	Prodiver	Paris Notaires Service, Chamber of the notaries	Direction Générale des Finances Publiques	Le Bon Coin	Meilleurs Agents	Airbnb	INSEE	Eurostat
	Description	Full database of transaction records	A database of transaction records for the 5 latest years.	Real estate classified posts	Real estate classified posts	Online collection of Airbnb scrapped datasets	Census	Income distribution by quantile. Income definition harmonized.
	Condition of use	Proprietary data. Limited to the Coord. partner. UMS RIATE and Geographie-cités, via LabEx DynamiTe 2014-2017 (Sample of transactions on the period 1996-2012).	Public domain	Public website	Public website	Public domain	Public database	Public database
	URL	https://basebien.com/	https://www.data.gouv.fr/en/datasets/demandes-de-valeurs-foncieres/#_	https://www.leboncoin.fr	https://www.meilleursagents.com/	http://insideairbnb.com/get-the-data.html	https://www.insee.fr/fr/information/1303416 (LAU2) https://www.insee.fr/fr/statistiques/2520034 (200m Grid)	http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ilc_di01 https://ec.europa.eu/eurostat/cache/metadata/en/ilc_esms.htm
SPATIO-TEMPORAL DIMENSION	Geographical Object	Points (X,Y locations)	Points (X,Y locations)	Zip codes. Some addresses	Zip codes. Some addresses	Points (X,Y locations)	LAU2 units and INSPIRE GRID	Countries
	Time coverage	1996-2019	2014-2019	present	present	2015 to 2018	31 december 2010 for the grid, 2012-2015 at LAU2 level	1995-2018
	Geographical coverage	Paris – Ile de France	All France (excepted Alsace-Moselle)	All France	All France	Inner cities of Paris, Bordeaux and Lyon	All France	EU28 + EFTA countries
TARGETED EUROPEAN HARMONISED INDICATORS	Price paid	x	x					
	Price asked			x	x			
	Rent paid							
	Rent asked			x	x	x		
	Surface of apt	x	x	x	x	x		
	Surface of built structure	x	x	some	some			
	Approx building date	x		some	some			
	Surface of gardens and land	x	x	some	some			
	Property characte-ristics	x		some	some	some		
	Dwelling info	partial	partial					
	Income						x	x
	Credit / mortgage	partial						
	Time on market							
	Literal description of the property	no	no	yes	yes	yes		
	Other variables of interest for the contract / Additional information	The PERVAL database, also disseminated by the Chamber of Notaries, provide the same of information for the rest of France. It is also proprietary data.						Median income of households at LAU2 level, sum of income for grids (France). To take into account the impact of differences in household size and composition, the total disposable household income is "equivalised". The equivalised income attributed to each member of the household is calculated by dividing the total disposable income of the household by the equivalisation factor. Equivalisation factors can be determined in various ways. INSEE (since 2012) and Eurostat applies an equivalisation factor calculated according to the OECD-modified scale first proposed in 1994 - which gives a weight of 1.0 to the first person aged 14 or more, a weight of 0.5 to other persons aged 14 or more and a weight of 0.3 to persons aged 0-13.

Study areas and data sources

- Each EU country has its own reference sources both for conventional and unconventional data: which possible indicators? Price free?

		BarcelonaTran	Idealista	Cadaster	Fotocasa	InsideAirbnb	Airbnb	AEAT	Eurostat
DATA PROVIDER CHARACTERISTICS	Type	Tax on transactions	Data harvesting	Data harvesting	Data harvesting	Data harvesting	Data harvesting	Official Tax Declarations	Survey
	Cost	Free (agreement)	Data harvesting	Data harvesting	Data harvesting	Data harvesting	Data harvesting	Free	Free
	Prodiver	Barcelona City Hall	Idealista	Cadaster	Fotocasa	Airbnb	Airbnb	AEAT (National Tax Agency)	Eurostat
	Description	Full database of transaction records	Online collection of Idealista scrapped datasets	Census	Online collection of Fotocasa scrapped datasets	Online collection of Airbnb scrapped datasets	Online collection of Airbnb scrapped datasets	Average income data at municipality level	Income distribution by quantile
	Condition of use	Propietary data, obtained under a research agreement in a previous project.	Public Website	Public API with certain protection	Online collection of Fotocasa scrapped datasets	Public domain	Public Website	Public database	Public database
	URL		http://www.idealista.com	http://www.catastro.meh.es/esp/sede.asp	https://www.fotocasa.es/es/	http://insidea...the-data.html	http://www.airbnb.com	https://www.agenciatributaria.es/AEAT/	http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ilc_di01
SPATIO-TEMPORAL DIMENSION	Geographical Object	quarters	areas and, sometimes, address	depends on the information with property values only averages per quarter, others up to the single houshold	areas and very likely (x,y, locations)	Points (X,Y locations)	areas and very likely (x,y, locations)	Municipalities with at least 1000 inhabitants	Countries
	Time coverage	2010-2014	2017-2018	Present	2019-...	2015-2018	2016-2017	2016	1995-2018
	Geographical coverage	Bacelona municipality, not all FUA	All Spain	All Spain	Madrid, Balears, Barcelona	Mallorca, Barcelona, Madrid, Malaga, Sevilla, Valancia	Mallorca, all Palma FUA	All Spain	EU28 + EFTA countries
TARGETED EUROPEAN HARMONISED INDICATORS	Price paid	x							
	Price asked		x		x				
	Rent paid								
	Rent asked		x		x	x	x		
	Surface of apt	x	x	x	x	x	x		
	Surface of built structure	x	some	x	some		some		
	Approx building date			x					
	Surface of gardens and land		some	x	some		some		
	Property charecte-ristics	x	some	x	some	some	some		
	Dwelling info								
	Income							x	x
	Credit / mortgage								
	Time on market		indirectly				inderectly		
	Literal description of the property	no	yes	no	yes	yes	yes		
	Other variables of interest for the contract / Additional information			the info includes land use parameters, it goes beyond housing				https://www.agenciatributaria.es/AEAT/Contenidos_Comunes/La_Agencia_Tributaria/Estadisticas/Publicaciones/sites/irpfmunicipios/2016/jrubik1ef468a251d390b847ce88908aaafc743028fb8d.html#	https://ec.europa.eu/eurostat/cache/metadata/en/ilc_esms.htm

Study areas and data sources

- **10 case-studies**: Paris, Avignon, Geneva (cross-border area), Warsaw, Lodz, Cracow, Madrid, Barcelona, Palma de Mallorca.

Requires expertise (project partners)

For which reasons ?

Technical skills:
Database processing and analysis/ data harvesting

Thematic knowledge:
Real estate issues, local market specificities

Faisability:
Data availability, Data collection cost...

Thematic complementarity regarding housing dynamics

- **In the urban hierarchy**: From Avignon (320 000 hab), to Palma de Mallorca (620), Lodz (920), Paris (12 millions) or Madrid (6.6 millions).

- **In the former political system**: former socialist / vs capitalist economies.

- **In economic and social specializations**: touristic economies (Paris, Barcelona, Cracow, Palma), real estate tensions (Paris, Barcelona, Geneva), shrinking industrial activities (Lodz).

Data harvesting

- **Leboncoin (FR)**

- **Domiporta (PL)**

- **Fotocasa (ES)**

- To manage : national language/currency, location identification, mistakes/exceptional values, relevant fields...

Harmonised indicator creation

NUMERATOR / DENOMINATOR

- **Number of real estate transactions / offers** (rental / sale)

- **Price paid / advertized, surface of properties, number of rooms** (Q25, Q50, Q75, sum, IQR)

- **Muncipal income** (average or median depending on the countries)

- **National income** (D1, D5, D9)

RATIOS

- **Average Advertized/paid price per square meter** (average locally, Q25-50-75 for FUA)

- **Time required to buy/rent 1 sq.meter locally** (average) and **nationally** (D1,5,9)

	Local income		Transactions		Scrapping real-estate		Scrapping rental	
	LAU2	Grid	LAU2	Grid	LAU2	Grid	LAU2	Grid
Krakow – Lodz - Warsaw	✅	❌	⛔	❌	✅	✅	✅	✅
Barcelona-Madrid-Palma de Mallorca	✅	❌	⛔	❌	✅	✅	✅	✅
Geneva Swizz part	✅	❌	✅	❌	✅	⛔	✅	⛔
Geneva French part	✅	❌	✅	✅	✅	⛔	✅	⛔
Avignon	✅	⛔	✅	✅	✅	⛔	✅	⛔
Paris	✅	⛔	✅	✅	✅	⛔	✅	⛔

RiATE

From harmonised indicator creation...

Price paid for property, 2010−2015
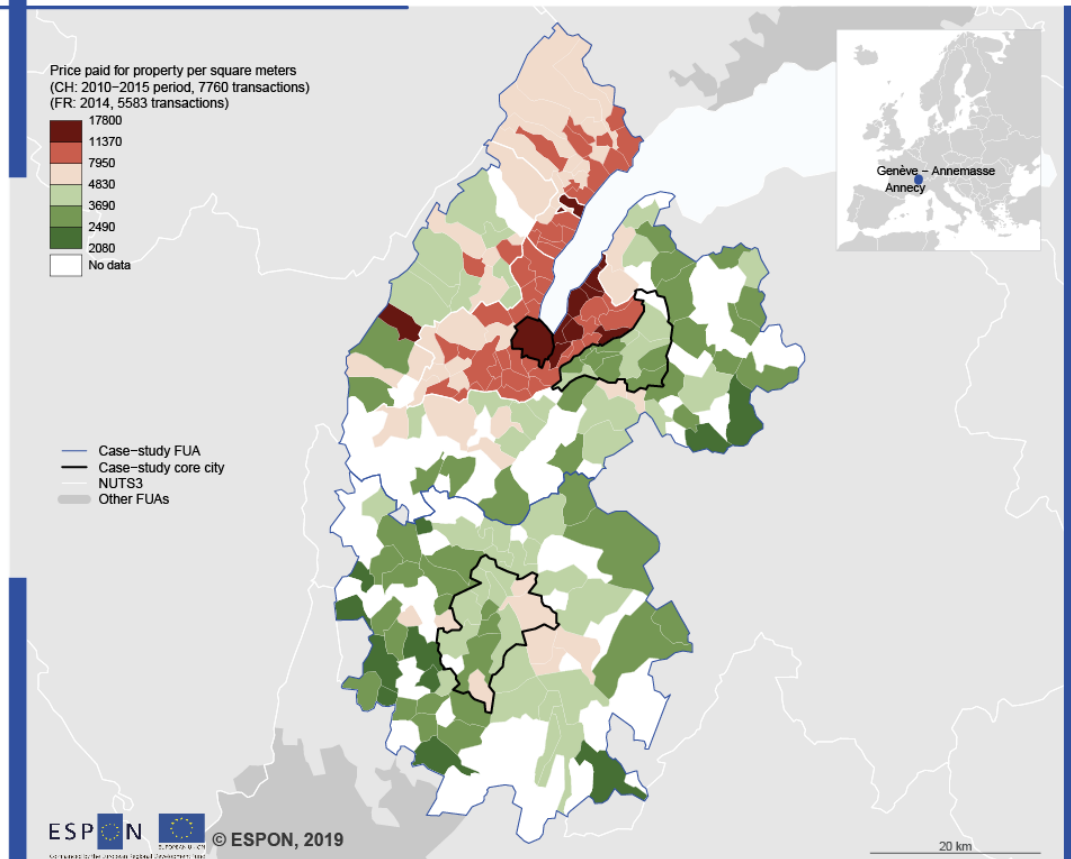
Price paid for property per square meters
(CH: 2010−2015 period, 7760 transactions)
(FR: 2014, 5583 transactions)

17800
11370
7950
4830
3690
2490
2080
No data

Genève – Annemasse
Annecy

Case−study FUA
Case−study core city
NUTS3
Other FUAs

20 km

© ESPON, 2019

Regional level: LAU2 (version 2011)
Source: ESPON Big Data for Territorial Analysis and Housing Dynamics, 2019
Origin of data: Wuest & Partner (CH), PERVAL Database (FR), 2019
© EuroGeographics for the administrative boundaries

Price paid for property (apartments only), 2011−2012
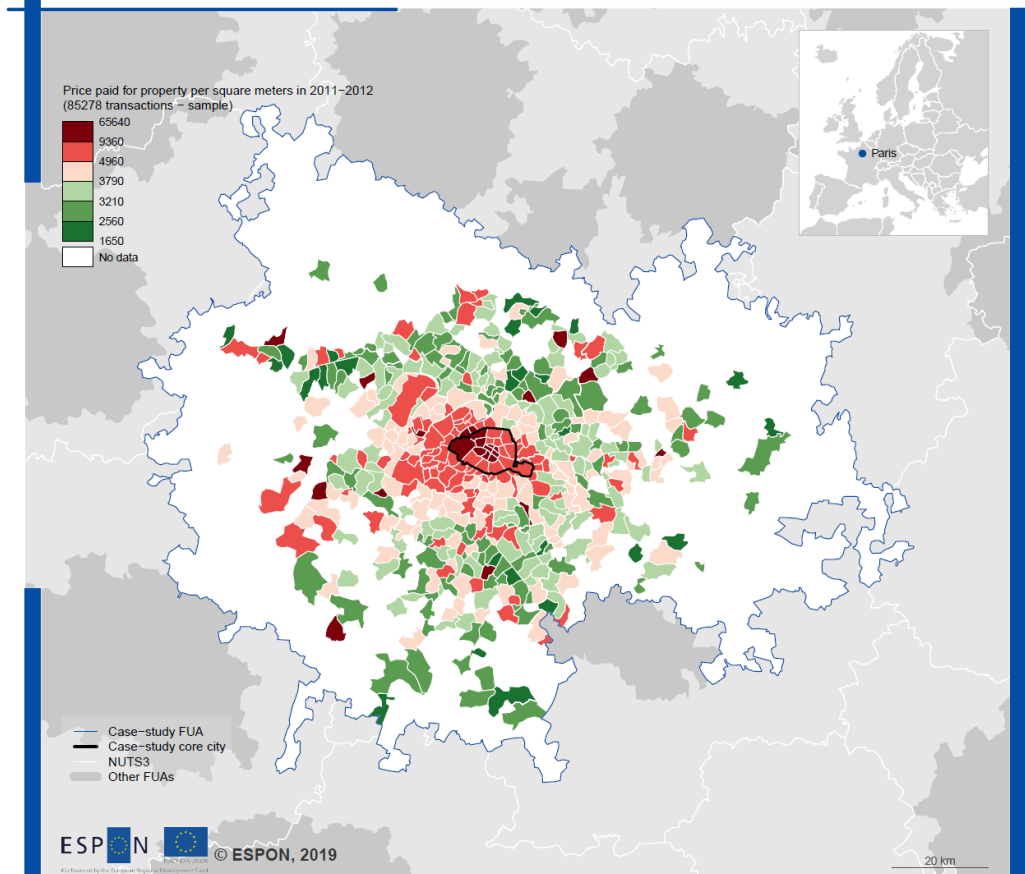
Price paid for property per square meters in 2011−2012
(85278 transactions − sample)

65640
9360
4960
3790
3210
2560
1650
No data

Paris

Case−study FUA
Case−study core city
NUTS3
Other FUAs

20 km

© ESPON, 2019

Regional level: LAU2 (version 2011)
Source: ESPON Big Data for Territorial Analysis and Housing Dynamics, 2019
Origin of data: BIEN Database (Sample), 2019
© EuroGeographics for the administrative boundaries

Average advertized price, 2019

Lódz • Warszawa
• Kraków

Average advertized price for property per square meters

4627.9
2150.1
1258.8
988.6
776.6
444.7
108.7
No data

— Case-study FUA
— Case-study core city
NUTS3
Other FUAs

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20 km

Average advertized price, 2019

Average advertized price for property per square meters

10000
3973.6
2220.8
1751.2
1447.1
963.6
2.8
No data

— Case-study FUA
— Case-study core city
NUTS3
Other FUAs

• Barcelona

E S P O N   EUROPEAN UNION   © ESPON, 2019
Co-financed by the European Regional Development Fund

20 km

RiATe

Average advertized price − Smoothed, 2019

Average advertized price − Smoothed, 2019

Average advertized price for property per square meters
(span = 2000, beta = 2, function = Pareto)

	3520
	2990
	2400
	2210
	2070
	1940
	1870
	No data

Łódź Warszawa
Kraków

Barcelona

Case-study FUA
Case-study core city
NUTS3
Other FUAs

Average advertized price for property per square meters
(span = 2000, beta = 2, function = Pareto)

	2060
	1620
	1550
	1500
	1410
	1210
	1020
	No data

Case-study FUA
Case-study core city
NUTS3
Other FUAs

ESPON © ESPON, 2019

ESPON © ESPON, 2019

Regional level: 1km Grid (version 2017)
Source: ESPON Big Data for Territorial Analysis and Housing Dynamics, 2019
Origin of data: Fotocasa, 2019
© EuroGeographics for the administrative boundaries

Regional level: 1km Grid (version 2017)
Source: ESPON Big Data for Territorial Analysis and Housing Dynamics, 2019
Origin of data: Domiporta, 2019
© EuroGeographics for the administrative boundaries

20 km

20 km
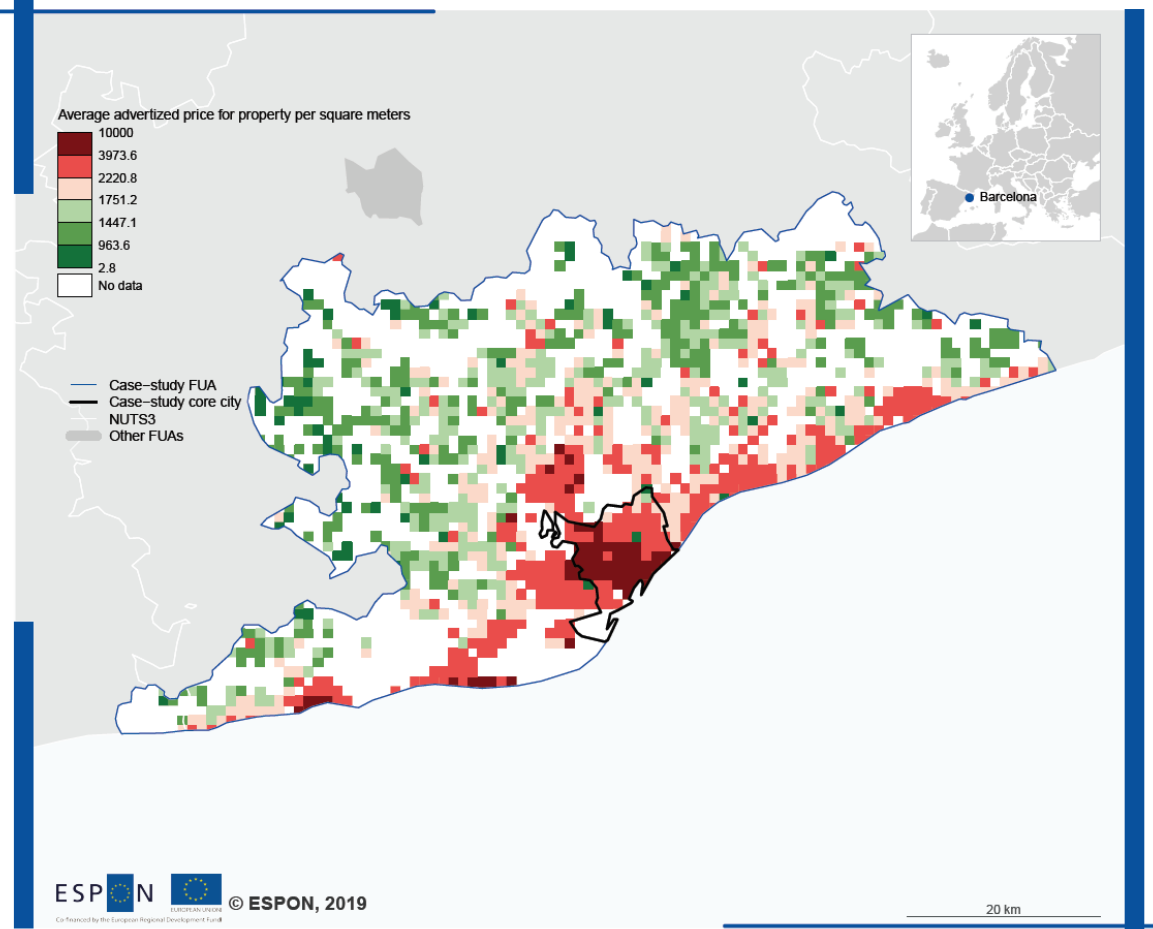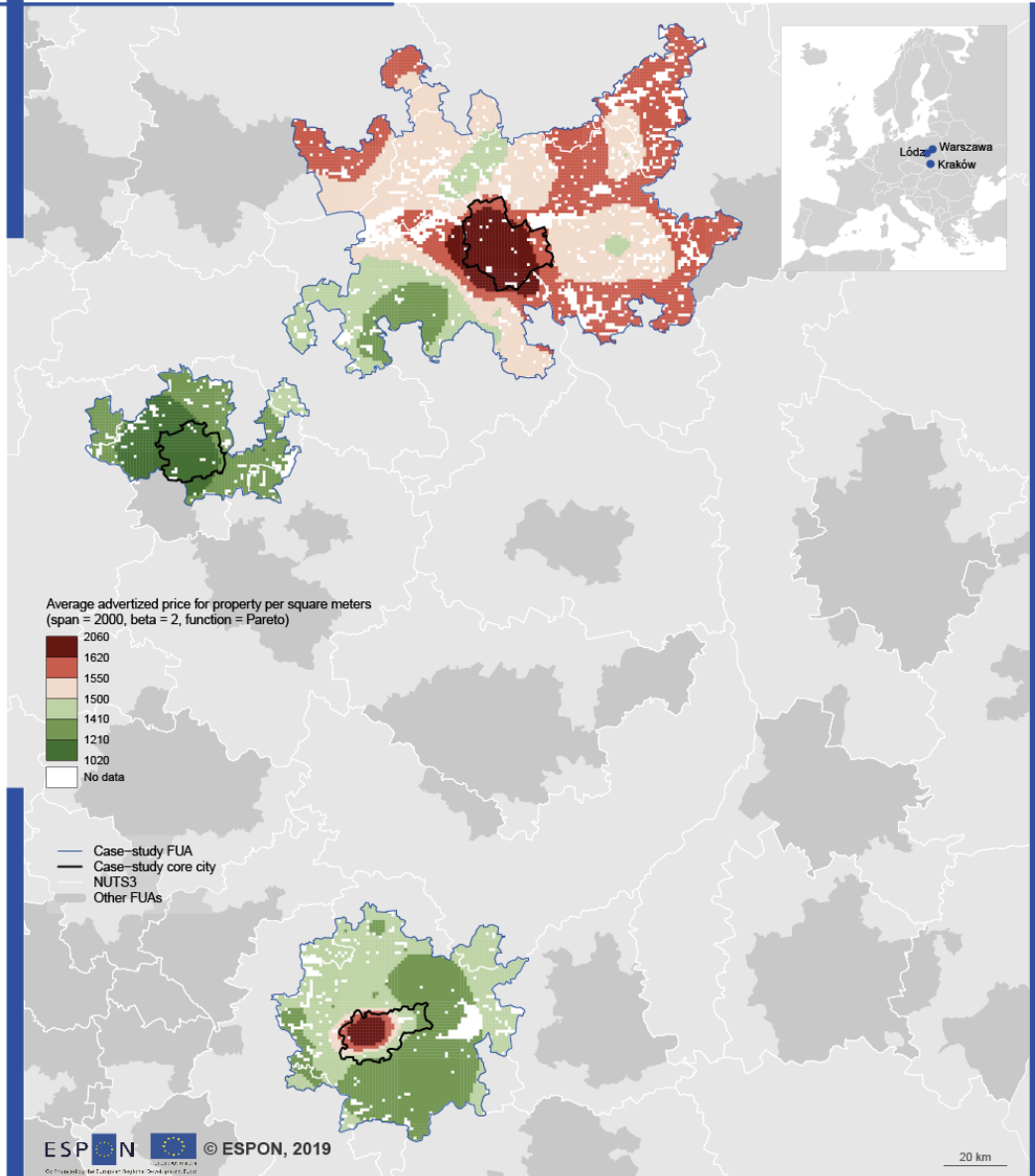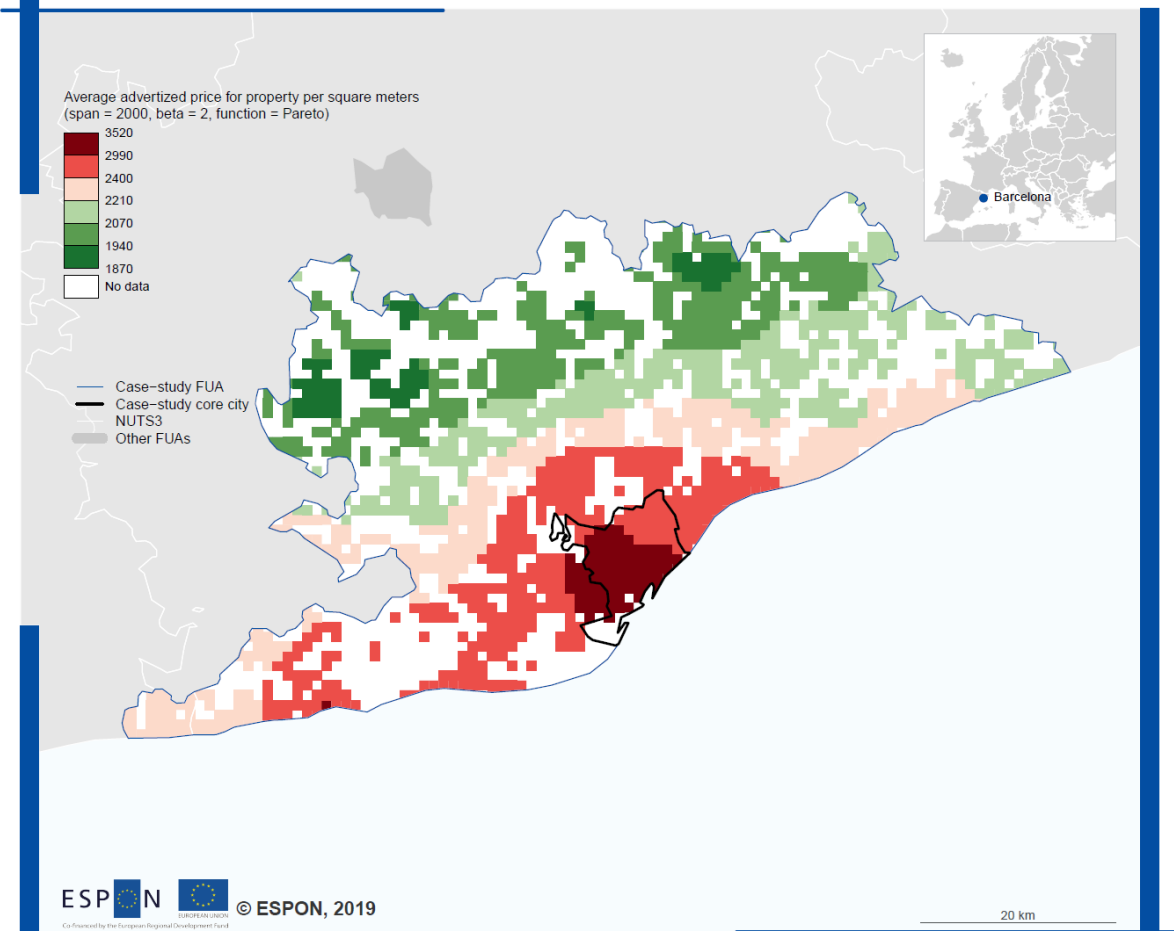
... To spatial harmonization !

RiATe

Spatial harmonisation: function, span and beta

Price paid for property (apartments only), 2011−2012
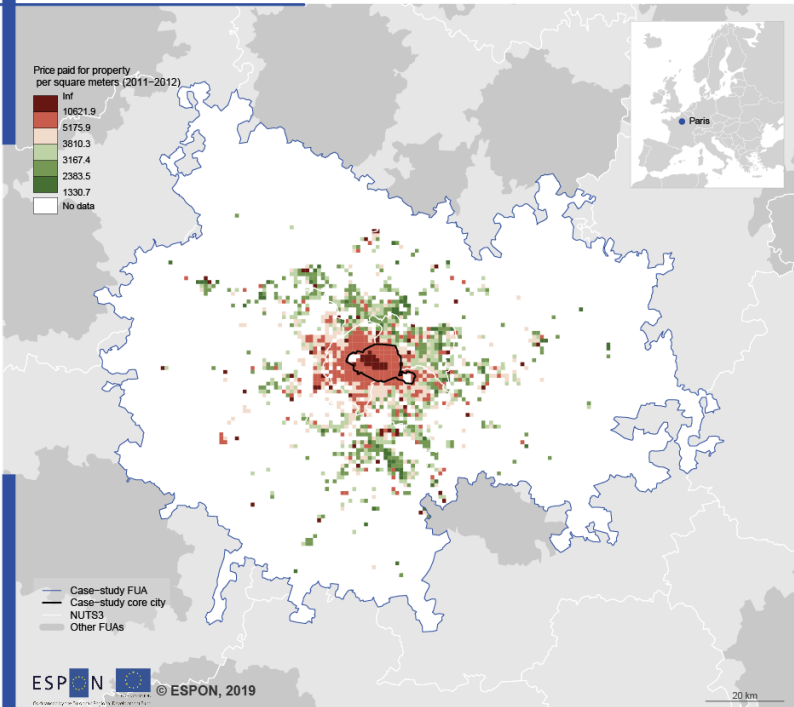
Price paid for property (apartments only) − 2km Smoothed, 2011−2012
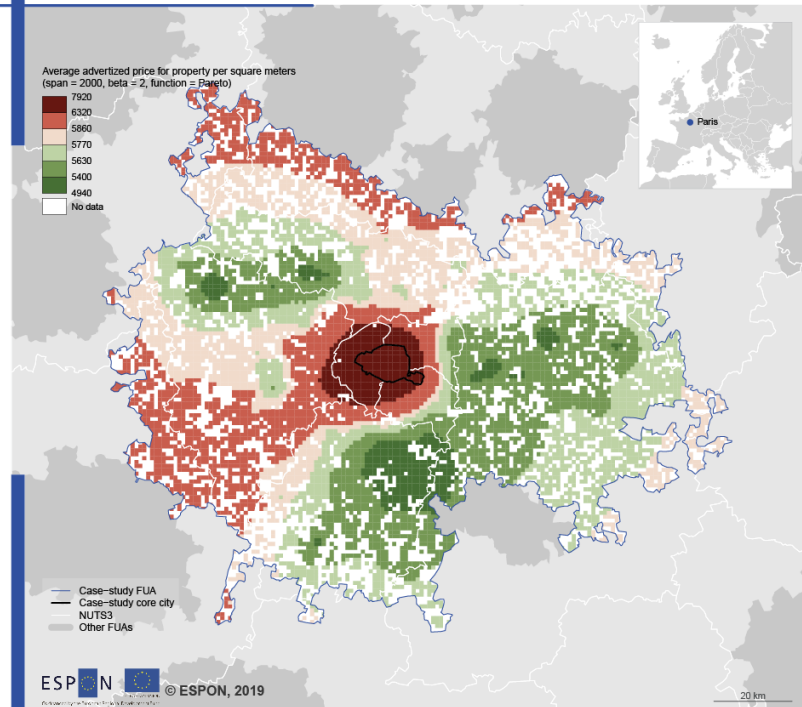
Price paid for property (apartments only) − 5km smoothed, 2011−2012
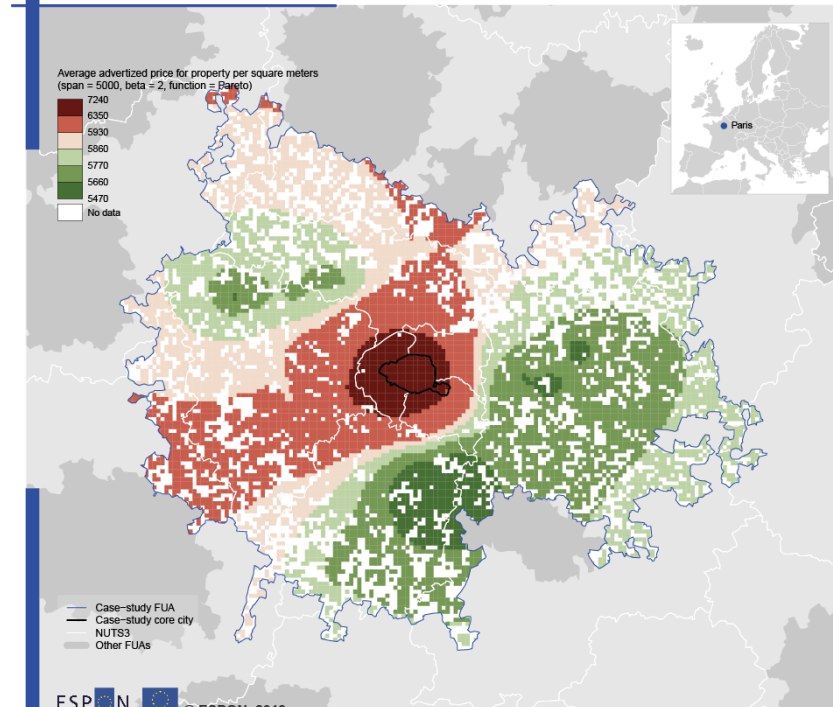
Combination with other data sources

Airbnb offer

Real-estate offer

2 km

2 km

Number of offers in a neighbourhood of 500 m (deciles)
Steward potential, Manhattan distance, exponential function, beta = 2

| 1 | 2 | 4 | 5 | 9 | 15 | 23 | 32 | 48 | 63 | 83 | 113 | 155 | 222 | 341 | 478 | 961 |

| 1 | 7 | 13 | 18 | 24 | 33 | 44 | 57 | 69 | 78 | 90 | 103 | 124 | 159 | 195 | 241 | 424 |

Relationship between Airbnb and real−estate offers

POT_AIRBNB = 1.94 * POT_REAL_ESTATE −50
R−squared = 0.8

Density (hectare) of Airbnb offers − 2018

Density (hectare) of real−estate offers − 2019

Reproductibility

More information ? Cf Guidance document R Markdown document on Western Paris

Renaud Le Goix, UMS RIATE, CNRS, Université Paris Diderot
5 November 2018

```
              legend.var.pos = "n",
              legend.var2.pos = "topright",
              #             border = "grey90", lwd = 0.2,
              legend.var2.title.txt = "Potential price \n",
              legend.var2.values.rnd = 0,
              add=T)

plot(Fleuves, add=T, lwd = 1, border = "blue", col = "blue")
plot(departements_carto, add=T, lwd = 0.5, border = "black")
# Set a text to explicit the function parameters
text(x = 570687, y = 6830000,
     labels = "2018",
     cex = 1.5, adj = 0, font = 2)
layoutLayer(title = "Potential price (EUR) of homes 2018 estimated with harvested data, within 10 min neighl
            sources = "Source : Leboncoin.fr real estate data. Powerlaw, b=-0.27, span= 10 min",
            author = "R. Le Goix, 2018, UMS RIATE & UMR Géographie-cités, Labex Dynamite")
```

Potential price (EUR) of homes 2018 estimated with harvested data, within 10 min neighborhoods.

Potential price

| 1355000 |
| 593505 |
| 456730 |
| 381000 |
| 331152 |
| 290000 |
| 260000 |
| 231000 |
| 2e+05 |
| 158595 |
| 45000 |
| no data |

2018

10 km

Source : Leboncoin.fr real estate data. Powerlaw, b=-0.27, span= 10 min
R. Le Goix, 2018, UMS RIATE & UMR Géographie-cités, Labex Dynamite

```
par(opar)

carroyage$Harvested_price2018 <- currentStewartPrix$Harvested_price
carroyage$Harvested_weight2018 <- currentStewartWeight$OUTPUT
```

Reproductibility

For 10 case-studies, all the indicators created are available at LAU2 or 1km grid level.

- Indicators_AVIGNON
- Indicators_BARCELONA
- Indicators_GENEVA
- Indicators_MADRID
- Indicators_PALMA
- Indicators_PARIS
- Indicators_POLAND

Indicator description

Code	PRICE_PAID_IQR	PRICE_PAID_SUM	SURFACE_Q25
Name	Price paid for properties (transactions), IQR	Price paid for properties (transactions), sum	Surface of properties (transactions), Q25
Abstract	Price paid for properties, interquartile range, in Euros	Price paid for properties, sum, in Euros	Surface of properties (transactions), first quartile, in square meters
Years available	2010-2015	2010-2015	2010-2015
Methodology Description / formula	Switzerland : All data were transmitted by Wuest & Partner, a real estate consulting firm in Switzerland who has the most complete data base for the country, and aggregated at the Commune scale. For statistical relevance, transactions were selected over the period 2010-2015, and prices were indexed (1 euro = 1,15 CHF) France : transactions in 2015	Switzerland : All data were transmitted by Wuest & Partner, a real estate consulting firm in Switzerland who has the most complete data base for the country, and aggregated at the Commune scale. For statistical relevance, transactions were selected over the period 2010-2015, and prices were indexed (1 euro = 1,15 CHF) France : transactions in 2015	Switzerland : All data were transmitted by Wuest & Partner, a real estate consulting firm in Switzerland who has the most complete data base for the country, and aggregated at the Commune scale. For statistical relevance, transactions were selected over the period 2010-2015, and prices were indexed (1 euro = 1,15 CHF) France : transactions in 2015
Metadata date	2019-28-05	2019-28-05	2019-28-05
Use constraint	public	public	public
Point of Contact	Project coordinator : Renaud Le Goix (renaud.legoix@univ-paris-diderot.fr)	Project coordinator : Renaud Le Goix (renaud.legoix@univ-paris-diderot.fr)	Project coordinator : Renaud Le Goix (renaud.legoix@univ-paris-diderot.fr)
Project	ESPON Big Data for Territorial Analysis and Housing Dynamics, 2019	ESPON Big Data for Territorial Analysis and Housing Dynamics, 2019	ESPON Big Data for Territorial Analysis and Housing Dynamics, 2019
How to source this indicator	ESPON Big Data for Territorial Analysis and Housing Dynamics, and Haute-École Arc, UMS RIATE, 2019	ESPON Big Data for Territorial Analysis and Housing Dynamics, and Haute-École Arc, UMS RIATE, 2019	ESPON Big Data for Territorial Analysis and Housing Dynamics, and Haute-École Arc, UMS RIATE, 2019

Source description

Provider Name	Wuest & Partner, 2019	Wuest & Partner, 2019	Wuest & Partner, 2019
Reference			
Copyright			
Publication Title			
URL	https://www.wuestpartner.com/?language=en	https://www.wuestpartner.com/?language=en	https://www.wuestpartner.com/?language=en
Provider Name	Notaires de France - base de données PERVAL, Université d'Avignon, UMS RIATE, 2019	Notaires de France - base de données PERVAL, Université d'Avignon, UMS RIATE, 2019	Notaires de France - base de données PERVAL, Université d'Avignon, UMS RIATE, 2019
Reference			
Copyright			
Publication Title	Data bought to Perval and aggregated by Université d'Avignon and UMS RIATE at grid and LAU2 level	Data bought to Perval and aggregated by Université d'Avignon and UMS RIATE at grid and LAU2 level	Data bought to Perval and aggregated by Université d'Avignon and UMS RIATE at grid and LAU2 level
URL	https://www.perval.fr/	https://www.perval.fr/	https://www.perval.fr/

3

Main results – Harmonised analysis for 10 case-study cities

ESPON **//** PowerPoint template 16:9   12/3/2019

Harmonised indicators at FUA scale

Time of work (full income) required to buy 1 sq.meter (2019)
Sources: Fotocasa (ES), Leboncoin (FR), Domiporta (PL), Homegate (CH), National statistics (municipal income),
 EU–SILC Survey (national income)
Method: The indicator corresponds to the average price per sq.meter divided by monthly income.
Realisation : ESPON Big Data for Territorial Analysis and Housing Dynamics, 2019
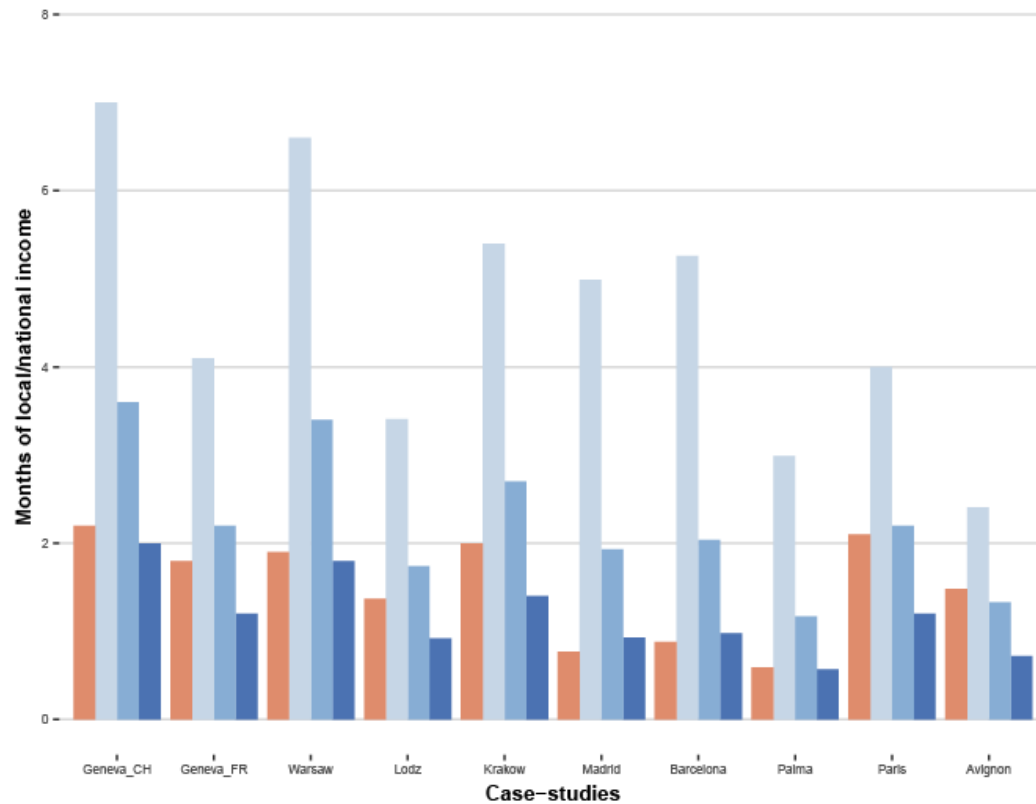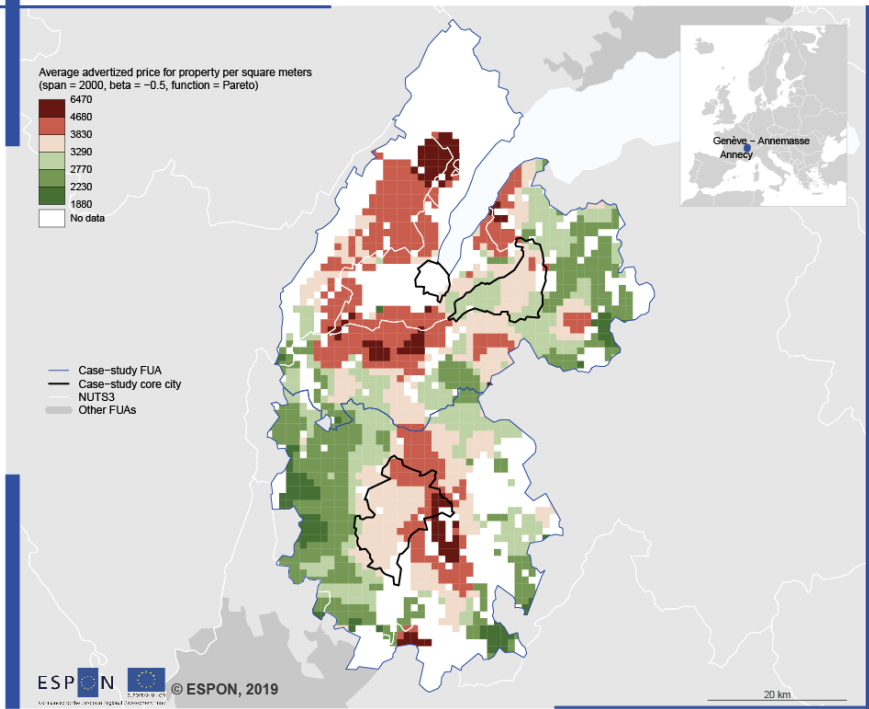

	STATISTICS	Geneva (CH)	Geneva (FR) / Annecy (FR)	Warsaw (PL)	Lodz (PL)	Krakow (PL)	Madrid (ES)	Barcelona (ES)	Palma de Mallorca (ES)	Paris (FR)	Avignon (FR)
Year of reference		2019	2019	2019	2019	2019	2019	2019	2019	2019	2019
Number of offers		1096	10801	39293	1595	9382	79227	147094	22040	4488612	5397
Surface	Q25	132.1	71	73.4	73.6	66.3	94.55	93.57	103.4	47.4	76.5
	Q50	186	82	104.2	103.2	87.7	143.33	132.61	145.9	62	98.5
	Q75	276.1	123.5	165.7	160.0	130.5	226.25	199.13	230.4	77.5	141.1
	AV.	374.3	105.1	140.9	137.5	116.6	234.57	190.13	401.7	74.8	119.9
Rooms	Q25	NA	3.2	2.5	2.55	2.5	NA	2.74	NA	2.3	3.57
	Q50	NA	3.9	3.5	3.53	3.4	NA	3.33	NA	3	4.44
	Q75	NA	4.8	4.5	4.54	4.4	NA	4.16	NA	3.8	5.61
	AV.	7.6	4.1	NA	NA	NA	3.37	3.52	3.38	3	4.65
Price (thousands euros)	Q25	1 184	282.9	116.1	62.3	89.7	209.3	233.7	242.1	209.1	167.8
	Q50	1 863	373.6	168.5	872.7	117.5	334.4	334.4	360.5	274.9	233.0
	Q75	3 076	500.4	280.8	143.4	178.0	590.7	507.8	587.3	371.3	344.8
	AV	4 460	400.2	234.6	118.65	158.4	516.7	441.8	554.8	307.9	283.8
Price per sq. meters	Q25	NA	3584.5	NA	NA	NA	1897.6	2193.6	1940.5	4138	1925
	Q50	NA	4133.6	NA	NA	NA	2550.5	2722.8	2552.3	4764	2404
	Q75	NA	4682.9	NA	NA	NA	3299.7	3388.9	3364.3	5474	2820
	AV	11915	4002.8	1665.3	863.2	1357.8	2202.9	2324	1381.1	4118	2366
Price to income	LOC[13]	67.8	15.7	22.0	15.69	19.1	15.05	14.01	19.6	12.8	14.7
	Q10[14]	217.1	35.7	77.1	39.0	52.1	93.17	79.67	100.04	25.2	24.1
	Q50	112.7	19.6	39.5	19.96	26.6	36.38	31.11	39.1	13.9	13.3
	Q90	61.4	10.6	20.7	10.48	14	17.67	15.11	19.0	7.6	7.2
Time required to buy 1sq. meter (month)	LOC	2.2	1.8	1.9	1.27	2.0	0.77	0.88	0.59	2.1	1.48
	Q10	7.0	4.1	6.6	3.41	5.4	4.77	5.03	2.99	4	2.41
	Q50	3.6	2.2	3.4	1.74	2.7	1.86	1.96	1.17	2.2	1.33
	Q90	2.0	1.2	1.8	0.92	1.4	0.90	0.95	0.57	1.2	0.72

Price paid (grid + spatial smoothing) Institutional non conventional data

Average price for real−estate property − Smoothed, 2014

Average advertized price for property per square meters
(span = 2000, beta = −0.5, function = Pareto)

- 6470
- 4680
- 3830
- 3290
- 2770
- 2230
- 1880
- No data

Genève − Annemasse
Annecy

— Case−study FUA
— Case−study core city
NUTS3
Other FUAs

© ESPON, 2019

Regional level: 1km Grid (version 2017)
Source: ESPON Big Data for Territorial Analysis and Housing Dynamics, 2019
Origin of data: PERVAL Database, 2019
© EuroGeographics for the administrative boundaries

20 km

Price paid for property (apartments only) − Smoothed, 2011−2012
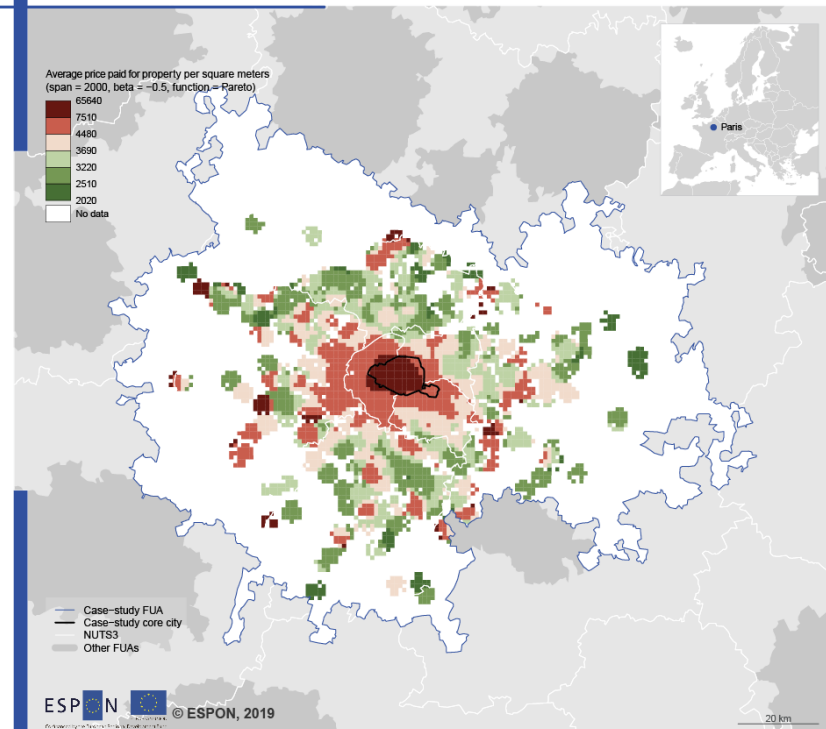
Average price paid for property per square meters
(span = 2000, beta = −0.5, function = Pareto)

- 65640
- 7510
- 4480
- 3690
- 3220
- 2510
- 2020
- No data

Paris

— Case−study FUA
— Case−study core city
NUTS3
Other FUAs

© ESPON, 2019

Regional level: 1km Grid (version 2017)
Source: ESPON Big Data for Territorial Analysis and Housing Dynamics, 2019
Origin of data: BIEN Database, 2019
© EuroGeographics for the administrative boundaries

20 km

Price paid for property − Smoothed, evolution 2010−2014

Average price paid for property per square meters
Evolution 2010−2014 (2010 = 100)
(span = 2000, beta = −0.5, function = Pareto)

- 135
- 110
- 100
- 95
- 90
- 75
- 67
- No data

Avignon

— Case−study FUA
— Case−study core city
NUTS3
Other FUAs

© ESPON, 2019

Regional level: 1km Grid (version 2017)
Source: ESPON Big Data for Territorial Analysis and Housing Dynamics, 2019
Origin of data: PERVAL Database, 2019
© EuroGeographics for the administrative boundaries

20 km

- NB / No X-Y location for Switzerland

Advertized prices (1km grid smoothed) Harvested data

Average advertized price − Smoothed, 2019

Average advertized price for property per square meters
(span = 2000, beta = −0.5, function = Pareto)

	5180
	3540
	2070
	1710
	1450
	1100
	460
	No data

Case−study FUA
Case−study core city
NUTS3
Other FUAs

Barcelona

© ESPON, 2019

Regional level: 1km Grid (version 2017)
Source: ESPON Big Data for Territorial Analysis and Housing Dynamics, 2019
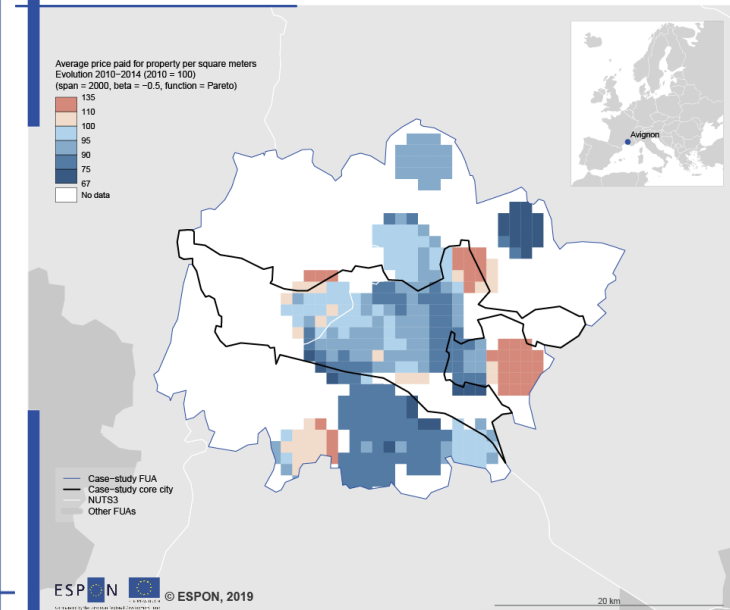Origin of data: Fotocasa, 2019
© EuroGeographics for the administrative boundaries

Average advertized price − Smoothed, 2019

Łódź • Warszawa
• Kraków

Average advertized price for property per square meters
(span = 2000, beta = −0.5, function = Pareto)

	2890
	1840
	1110
	940
	780
	500
	320
	No data

Case−study FUA
Case−study core city
NUTS3
Other FUAs

© ESPON, 2019

Regional level: LAU2 (version 2011)
Source: ESPON Big Data for Territorial Analysis and Housing Dynamics, 2019
Origin of data: Domiporta, 2019
© EuroGeographics for the administrative boundaries

Comparative analysis at LAU2 level

- Warsaw – Lodz - Krakow (PL)

Affordability − national income, 2019

Months of median national income required to buy 1sq. meter
Average advertized price for property per square meters / median national income 2016
(50270 offers scrapped from Nov. 2018 and March 2019)

4.5
2.8
2
1.8
1.5
1
0.4
No data
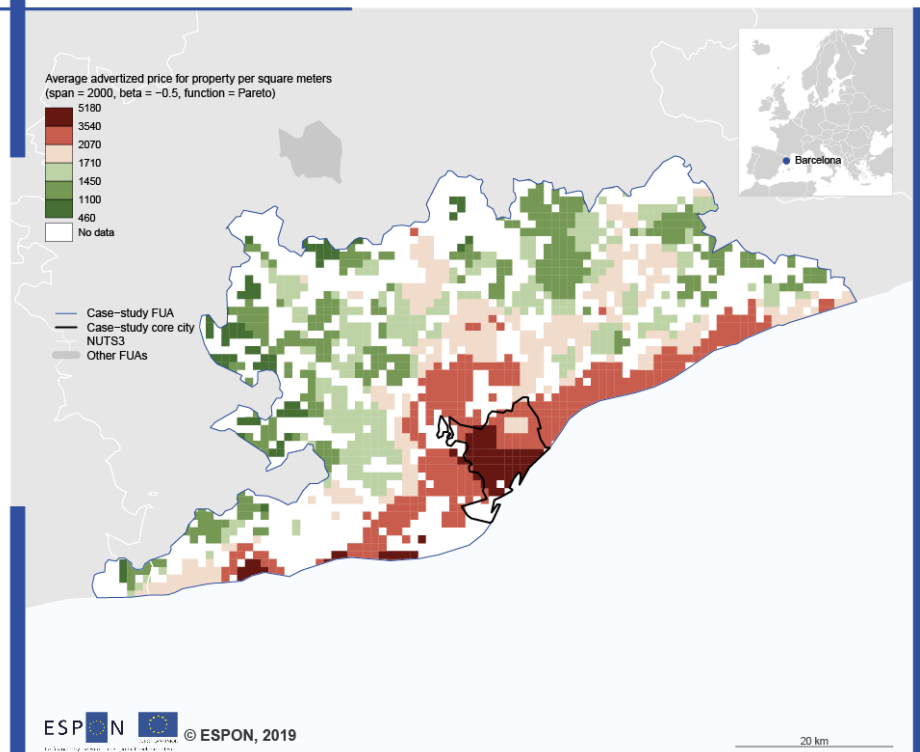
Case−study FUA
Case−study core city
NUTS3
Other FUAs

© ESPON, 2019

20 km

Regional level: LAU2 (version 2011)
Source: ESPON Big Data for Territorial Analysis and Housing Dynamics, 2019
Origin of data: EU−SILC Survey (Eurostat) and Domiporta, 2019
© EuroGeographics for the administrative boundaries

- Madrid (ES)

Affordability − national income, 2019

Months of median national income required to buy 1sq. meter
Average advertized price for property per square meters / median national income 2016
(79227 offers scrapped from Feb. 2019 and Apr. 2019)

15.6
2.4
1.3
1.1
0.9
0.2
0
No data

Case−study FUA
Case−study core city
NUTS3
Other FUAs

© ESPON, 2019

20 km

Regional level: LAU2 (version 2011)
Source: ESPON Big Data for Territorial Analysis and Housing Dynamics, 2019
Origin of data: EU−SILC Survey (Eurostat) and Fotocasa, 2019
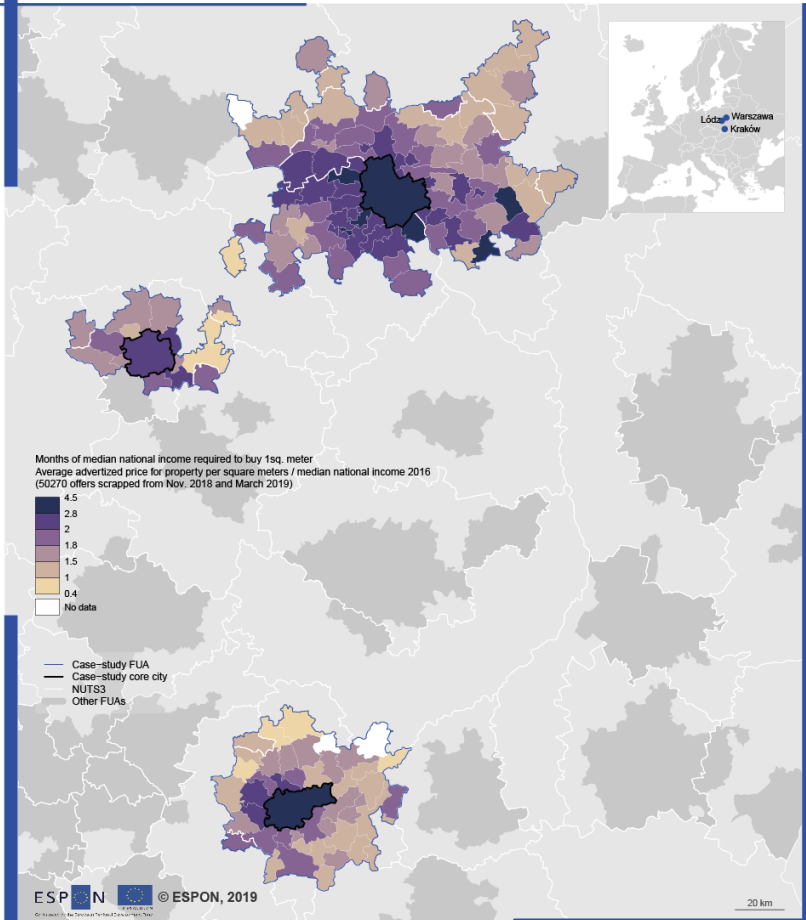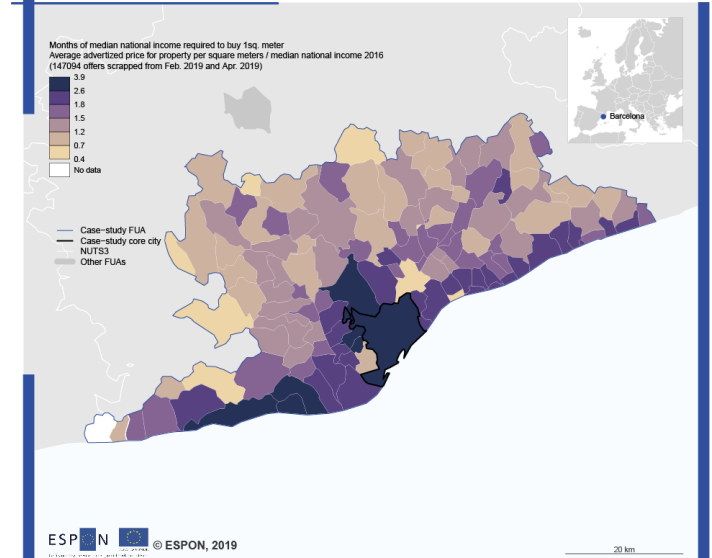© EuroGeographics for the administrative boundaries

- Barcelona (ES)

Affordability − national income, 2019

Months of median national income required to buy 1sq. meter
Average advertized price for property per square meters / median national income 2016
(147094 offers scrapped from Feb. 2019 and Apr. 2019)

3.9
2.6
1.8
1.5
1.2
0.7
0.4
No data

Case−study FUA
Case−study core city
NUTS3
Other FUAs

20 km

Regional level: LAU2 (version 2011)
Source: ESPON Big Data for Territorial Analysis and Housing Dynamics, 2019
Origin of data: EU−SILC Survey (Eurostat) and Fotocasa, 2019
© EuroGeographics for the administrative boundaries

- Palma (ES)

Affordability − national income, 2019

Months of median national income required to buy 1sq. meter
Average advertized price for property per square meters / median national income 2016
(22040 offers scrapped from Feb. 2019 and Apr. 2019)

4.5
3.5
1.8
1.3
0.5
0.2
0.1
No data

Case−study FUA
Case−study core city

© ESPON, 2019

20 km

Regional level: LAU2 (version 2011)
Source: ESPON Big Data for Territorial Analysis and Housing Dynamics, 2019
Origin of data: EU−SILC Survey (Eurostat) and Fotocasa, 2019
© EuroGeographics for the administrative boundaries

Comparative analysis at LAU2 level

- ■ Warsaw – Lodz - Krakow (PL)

Affordability − national income, 2019

Months of median national income required to buy 1sq. meter
Average advertized price for property per square m
(50270 offers scrapped from Nov. 2018 and March

4.5
2.8
2
1.8
1.5
1
0.4
No data

Case-study FUA
Case-study core city
NUTS3
Other FUAs

ESPON © ESPON, 2019

More than 2.8 months of full national income (Q50) to buy 1sq. meter

Regional level: LAU2 (version 2011)
Source: ESPON Big Data for Territorial Analysis and Housing Dynamics, 2019
Origin of data: EU−SILC Survey (Eurostat) and Domiporta, 2019
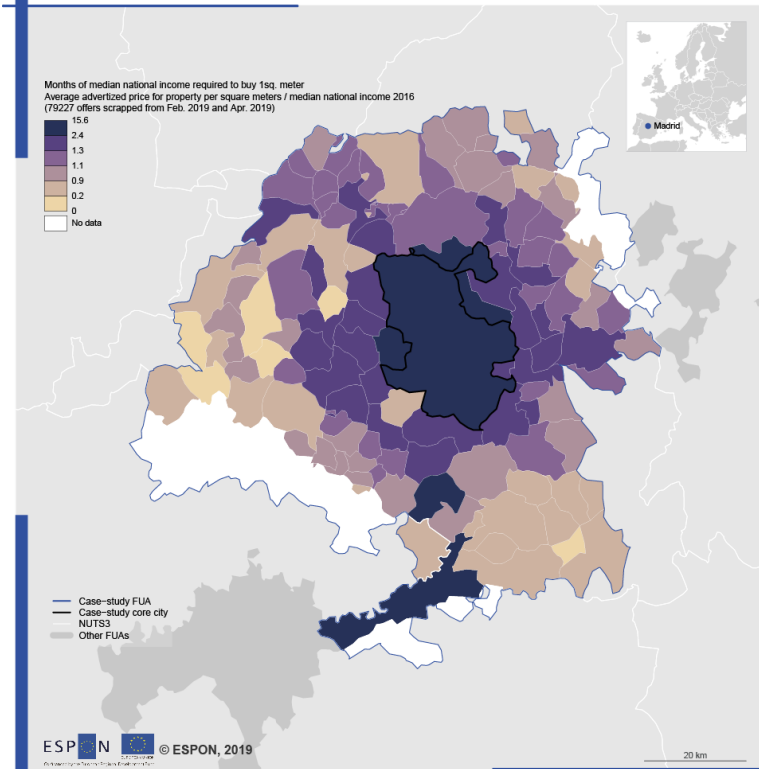© EuroGeographics for the administrative boundaries

- ■ Madrid (ES)

Affordability − national income, 2019

Months of median national income required to buy 1sq. meter
Average advertized price for property per square meters / median national income 2016
(79227 offers scrapped from Feb. 2019 and Apr. 2019)

15.6
2.4
1.3
1.1
0.9
0.2
0
No data

Case-study FUA
Case-study core city
NUTS3
Other FUAs

ESPON © ESPON, 2

More than 2.4 months

Regional level: LAU2 (version 2011)
Source: ESPON Big Data for Territorial Analysis and Housing Dynamics, 2019
Origin of data: EU−SILC Survey (Eurostat) and Fotocasa, 2019
© EuroGeographics for the administrative boundaries

- ■ Barcelona (ES)
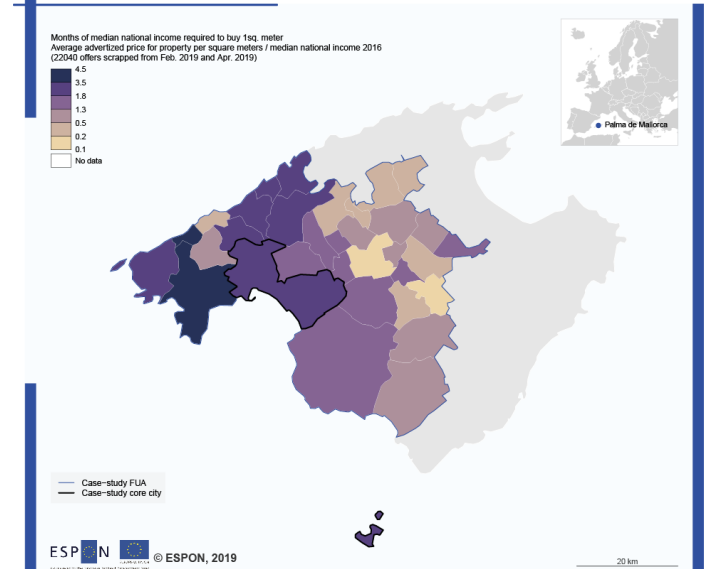

Affordability − national income, 2019

Months of median national income required to buy 1sq. meter
Average advertized price for property per square meters / median national income 2016
(147094 offers scrapped from Feb. 2019 and Apr. 2019)

3.9
2.6
1.8
1.5
1.2
0.7
0.4
No data

Case-study FUA
Case-study core city
NUTS3
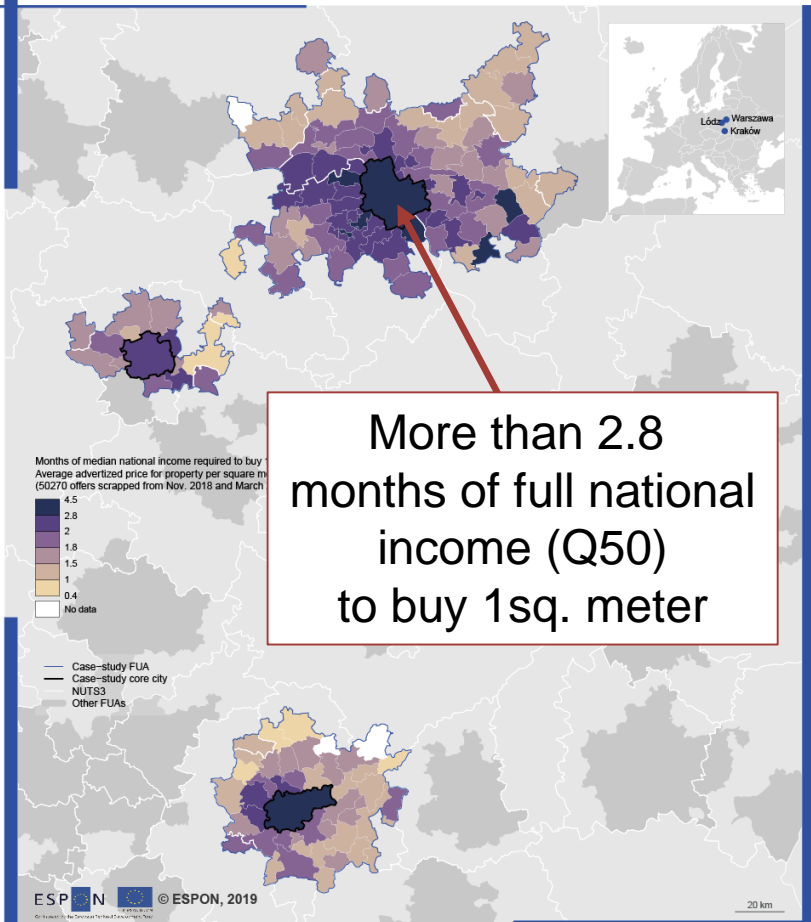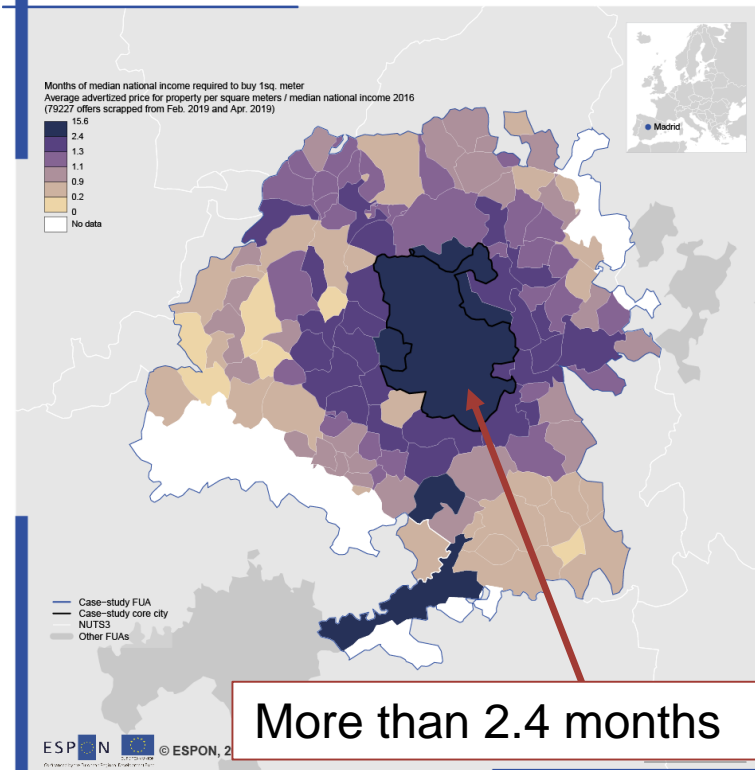Other FUAs

More than 2.6 months

ESPON © ESPON, 2019

Regional level: LAU2 (version 2011)
Source: ESPON Big Data for Territorial Analysis and Housing Dynamics, 2019
Origin of data: EU−SILC Survey (Eurostat) and Fotocasa, 2019
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- ■ Palma (ES)

Affordability − national income, 2019

Months of median national income required to buy 1sq. meter
Average advertized price for property per square meters / median national income 2016
(22040 offers scrapped from Feb. 2019 and Apr. 2019)

4.5
3.5
1.8
1.3
0.5
0.2
0.1
No data

More than 3.5 months

ESPON © ESPON, 2019

Regional level: LAU2 (version 2011)
Source: ESPON Big Data for Territorial Analysis and Housing Dynamics, 2019
Origin of data: EU−SILC Survey (Eurostat) and Fotocasa, 2019
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Comparative analysis at LAU2 level

- Paris (FR)

- Geneva – Annemasse - Annecy (CH-FR)

- Avignon (FR)

Affordability (apartments only) − national income, 2019

Months of median national income required to buy 1sq. meter
Average advertized price for property per square meters / median national income 2016
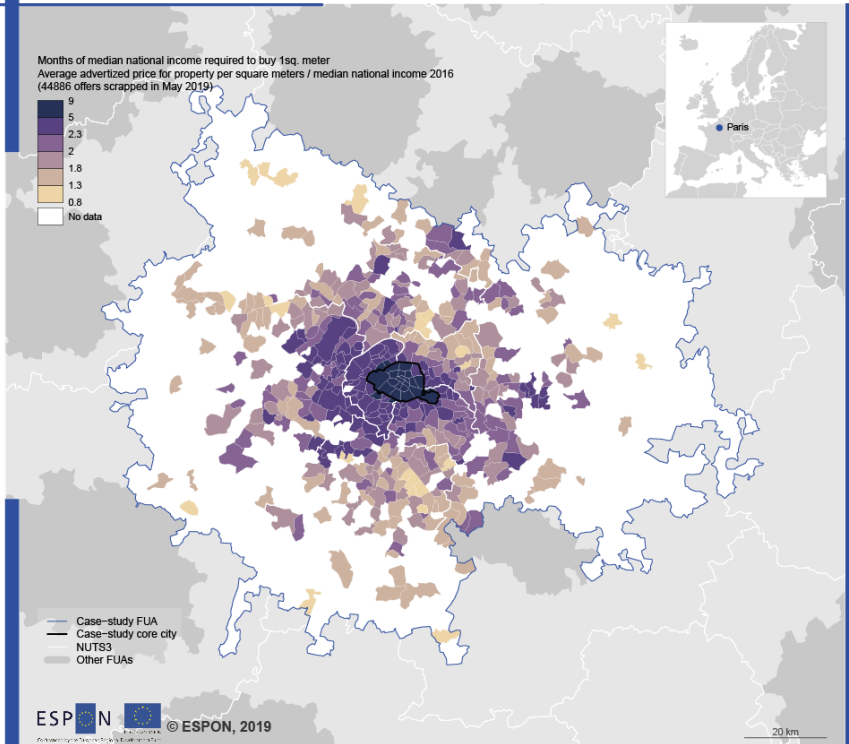(44886 offers scrapped in May 2019)

9
5
2.3
2
1.8
1.3
0.8
No data

Case−study FUA
Case−study core city
NUTS3
Other FUAs

Regional level: LAU2 (version 2011)
Source: ESPON Big Data for Territorial Analysis and Housing Dynamics, 2019
Origin of data: EU−SILC Survey (Eurostat) and Leboncoin, 2019
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Affordability − Swiss/French national income, 2019

Months of median national income required to buy 1sq. meter
Average advertized price for property per square meters /
Swiss median national income 2015 (euros)
(1096 (CH) and 10801 offers (FR) scrapped in May 2019)

6.2
3.6
1.8
1.2
1
0.7
0.6
No data

Case−study FUA
Case−study core city
NUTS3
Other FUAs

... And with French median
national income 2015

11.4
6.6
3.3
2.2
1.9
1.4
1
No data

Regional level: LAU2 (version 2011)
Source: ESPON Big Data for Territorial Analysis and Housing Dynamics, 2019
Origin of data: EU−SILC Survey (Eurostat), Homegate (CH) and Leboncoin.fr (FR), 2019
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Affordability − national income, 2014

Months of median national income required to buy 1sq. meter
Average advertized price for property per square meters / median national income 2014
(1581 transactions − sample)

1.8
1.6
1.3
1.2
1.1
0.9
0.9
No data

Case−study FUA
Case−study core city
NUTS3
Other FUAs

Regional level: LAU2 (version 2011)
Source: ESPON Big Data for Territorial Analysis and Housing Dynamics, 2019
Origin of data: EU−SILC Survey (Eurostat) and Perval Database, 2019
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Comparative analysis at LAU2 level

- Paris (FR)

- Geneva – Annemasse - Annecy (CH-FR)

- Avignon (FR)

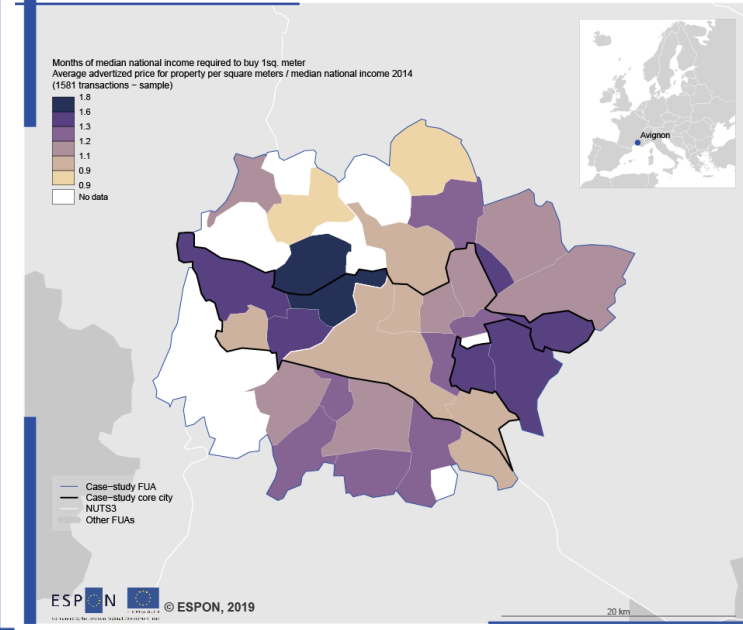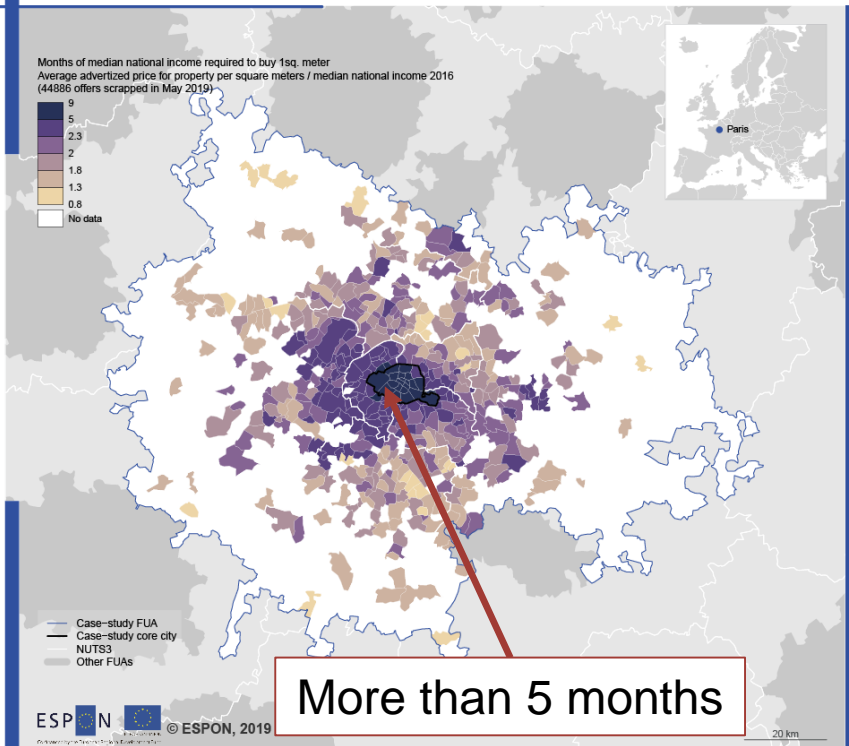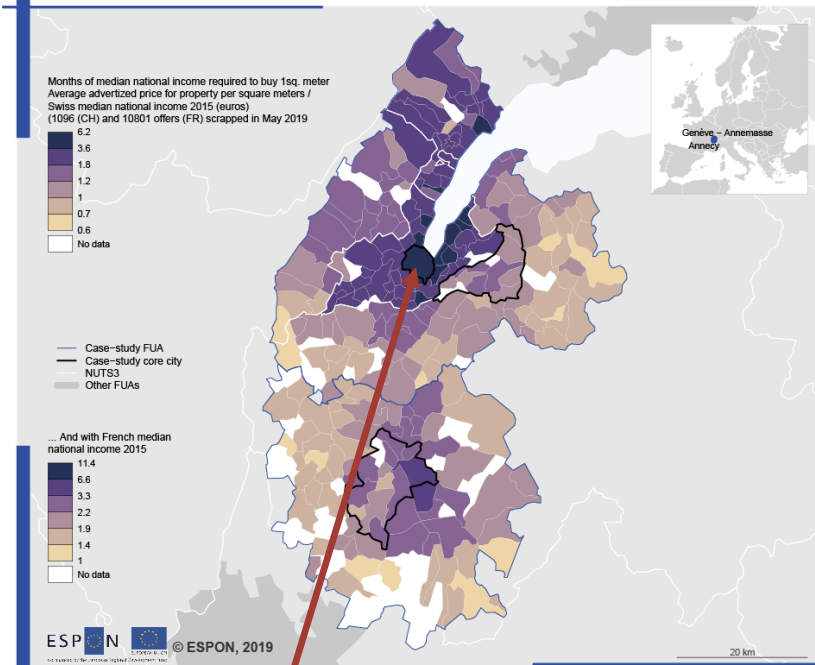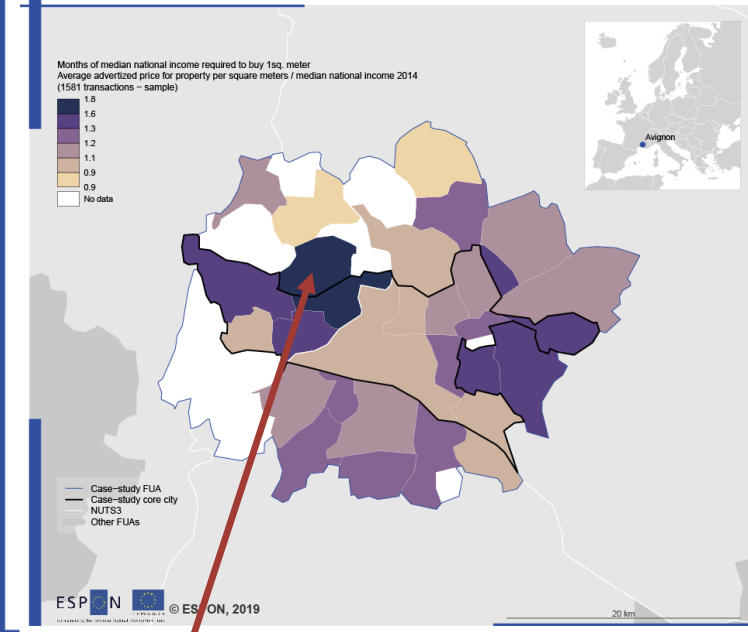**Affordability (apartments only) − national income, 2019**

Months of median national income required to buy 1sq. meter
Average advertized price for property per square meters / median national income 2016
(44886 offers scrapped in May 2019)

9
5
2.3
2
1.8
1.3
0.8
No data

Case−study FUA
Case−study core city
NUTS3
Other FUAs

More than 5 months

Regional level: LAU2 (version 2011)
Source: ESPON Big Data for Territorial Analysis and Housing Dynamics, 2019
Origin of data: EU−SILC Survey (Eurostat) and Leboncoin, 2019
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Affordability − Swiss/French national income, 2019

Months of median national income required to buy 1sq. meter
Average advertized price for property per square meters /
Swiss median national income 2015 (euros)
(1096 (CH) and 10801 offers (FR) scrapped in May 2019)

6.2
3.6
1.8
1.2
1
0.7
0.6
No data

Case−study FUA
Case−study core city
NUTS3
Other FUAs

... And with French median national income 2015

11.4
6.6
3.3
2.2
1.9
1.4
1
No data

More than 3.6 months for a Swizz and 6.8 months for a French

Regional level: LAU2 (version 2011)
Source: ESPON Big Data for Territorial Analysis and Housing Dynamics, 2019
Origin of data: EU−SILC Survey (Eurostat), Homegate (CH) and Leboncoin.fr (FR), 2019
© EuroGeographics for the administrative boundaries

Affordability − national income, 2014

Months of median national income required to buy 1sq. meter
Average advertized price for property per square meters / median national income 2014
(1581 transactions − sample)

1.8
1.6
1.3
1.2
1.1
0.9
0.9
No data

Case−study FUA
Case−study core city
NUTS3
Other FUAs

More than 1.6 months

Regional level: LAU2 (version 2011)
Source: ESPON Big Data for Territorial Analysis and Housing Dynamics, 2019
Origin of data: EU−SILC Survey (Eurostat) and Perval Database, 2019
© EuroGeographics for the administrative boundaries

Airbnb impact on real-estate offers ?

Relationship between Airbnb and real−estate offers

POT_AIRBNB = 1.94 * POT_REAL_ESTATE −50
R−squared = 0.8

Density (hectare) of Airbnb offers − 2018

1000 · 750 500 250 0

Density (hectare) of real−estate offers − 2019

0 100 200 300 400

Residuals − Pressurised market

Barcelona (ES)

Sagrada Familia quarter

La Rambla

2 km

Residuals of linear model,
density of Airbnb offer (y) and real estate offer (x)

More real-estate offers than expected
«Normal» market

−366 −326 −285 −244 −204 −163 −122 −81 −41 0 41 81 122 163 204 244

More Airbnb offers than expected
Pressurised market

Airbnb impact on real-estate offers ?

Paris (FR)

Résidus de régression, densité du marché (x) et AirBnB (y)

−123.6 −92.7 −61.8 −30.9 0 30.8 61.7 92.6 123.5 154.4 185.3 216.1 247
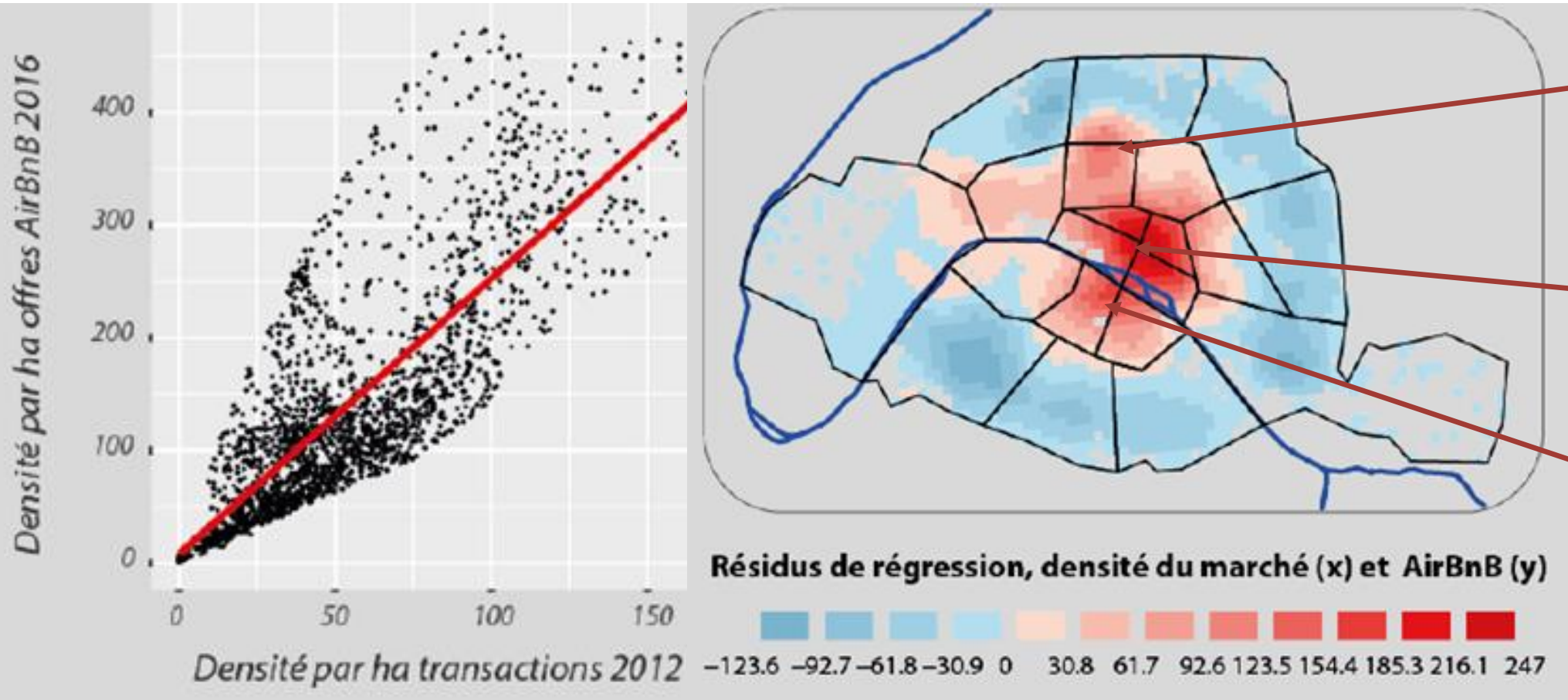
Airbnb impact on real-estate offers ?

Madrid (ES)

Plazza Mayor

Residuals of linear model,
density of Airbnb offer (y) and real estate offer (x)

−354.7 −266.1 −177.4 −88.7   0   88.7 177.4 266.1 354.7 443.4 532.1 620.8 709.5 798.2

2 km
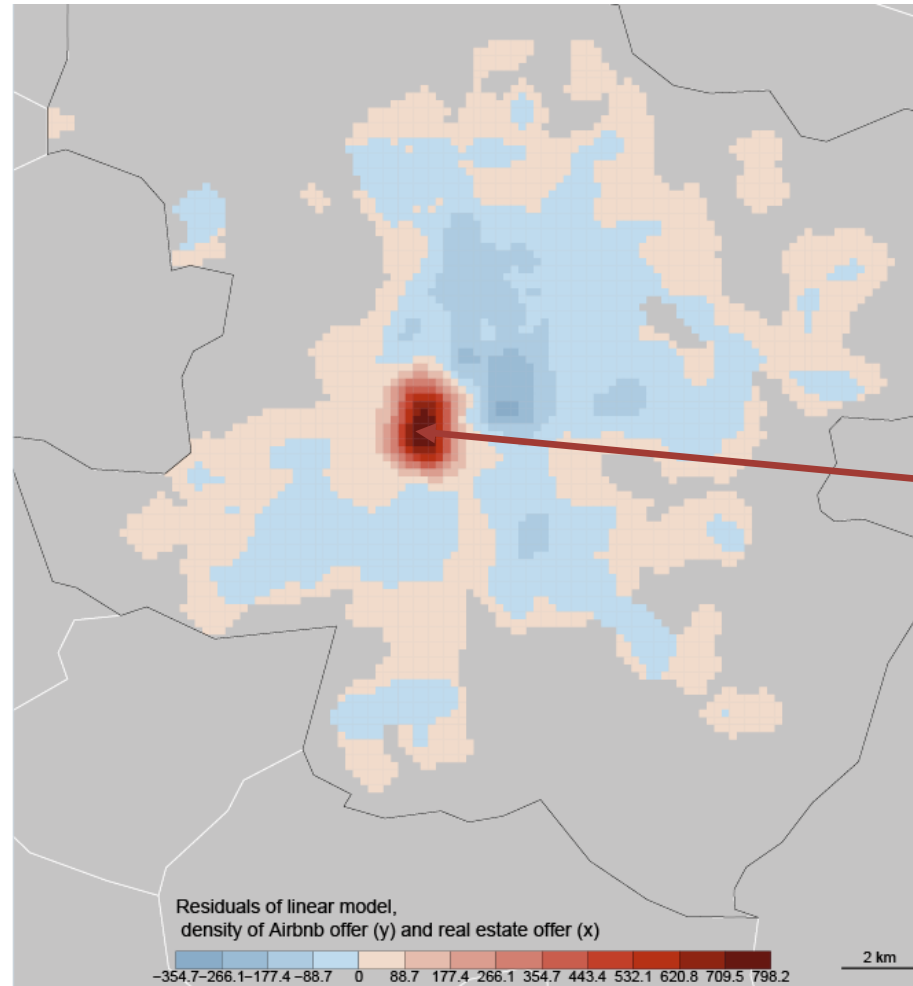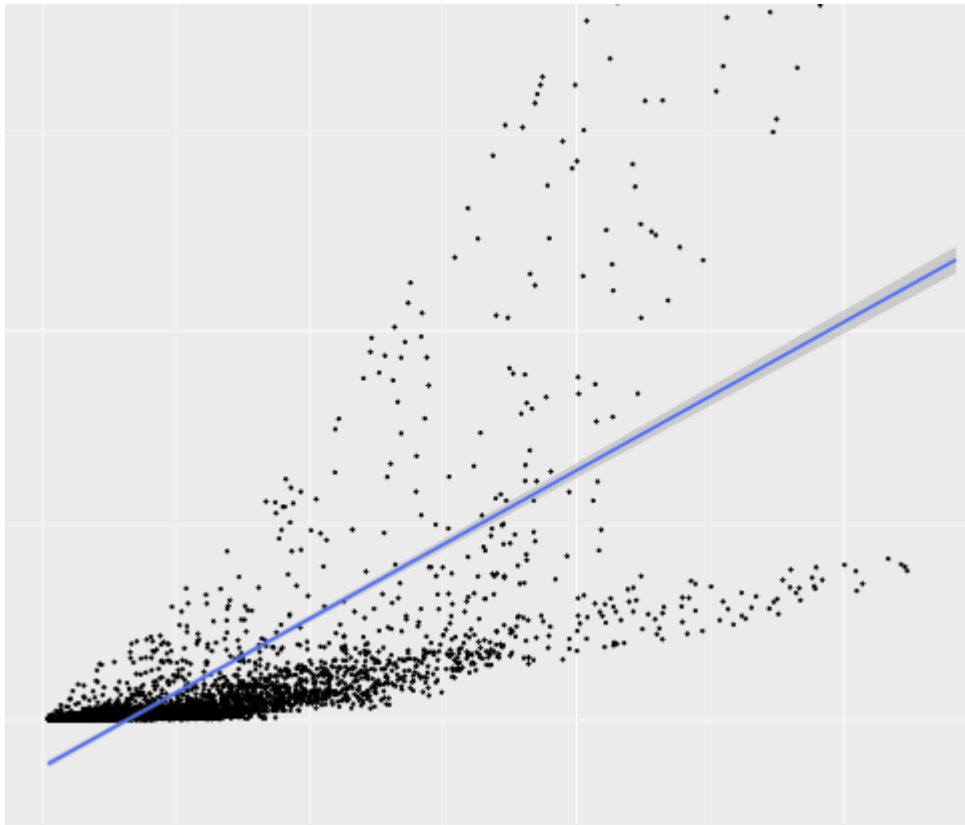
Findings [housing issue]

- For most of case-studies, major parts of the **cities are unaffordable**: effect of continuous two decades of **continuous price increase** and growing **disconnection between prices and income**.

- A typical household would require in most of the cases housing wealth or intergenerational transfer to purchase a property.

- **Inequalities** manifest in **two spatial scales**: **inter-urban and intra-urban.**

- Unequal access to affordability reinforce the **process of gentrification** and **financialisation of housing**

- Policy response to the problem of housing should be tailored to several parameters such as **urban history** (reurbanization process, like Barcelona), **local market specificity** (mortgage access and rates), presence or not of **tourism** (Paris, Palma, Barcelona)**, demographic pressure** (Madrid, Paris), class-based seggregation (Paris, Polish cities)

- At Stake, the **right to city for the middle class**: Monitor the effect of urban policies in specific urban areas.

Findings [Methods]

- Creation of an **operational methodological framework** for producing comparable analysis between case-studies: harmonised indicators, territorial scales, etc.

- Demonstration of the interest to combine **conventional and unconventional** data sources for housing thematic. But **how negociating officially the access** to these unconventional (private/institutional) data sources for monitoring public policies ?

- Added-value of multi-scalar perspective (FUA, LAU2, grid) and methodology (data smoothing) for combining complementary views on the thematics.

- Would require to extend the analysis in the time and the space (other cities): **costful** at the moment (data identification/collection/cleaning = manual/experts).

More info ?

- #1 : Wellbeing Report: Main findings (not technical), results

- #2 : Guidance document: Explains the methodological challenges. A narrative adapted to Paris and Western Paris.

- #3: Datasets (basic data, harmonised indicators) for 10 case-study cities at LAU2 and grid scale

- #4: All the maps produced on the basis of harmonised indicators (around 10 maps/case-studies).

- #5: R programs used to build harmonised indicators and analysis.

Inspire Policy Making with Territorial Evidence

// Thank you

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This presentation will be made available at: www.espon.eu/xxx