ESTIMATING INCOME INEQUALITY IN OECD METROPOLITAN AREAS

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BETTER POLICIES FOR BETTER LIVES

Outline

1. Context and objectives of the paper
2. Units of analysis and data sources
3. Income levels: method and results
4. Income inequality: method and results
5. Spatial inequality within metropolitan areas
6. Concluding remarks

1. Why look at inclusive growth in cities?

- Slow productivity growth and rising inequalities
  - importance of inclusive growth, i.e. growth that is contributed by, and beneficial to, all

- Cities are drivers of national growth
  - local governments play a major role in providing services and investment for more inclusive growth

- The OECD report *Making Cities Work for All* offers:
  - new evidence on well-being and inclusiveness at city level
  - guidance in 5 key policy areas: jobs, education and skills, housing, transport, quality services and environment

Objectives of the paper

Understand economic well-being in cities from an international comparative perspective through the assessment of income levels and inequalities

- Are there large differences in income levels across cities within the same countries?

- Do people in larger cities have higher incomes?

- What makes a city more unequal?

- Does inequality translate into spatial segregation in cities? What's the portion of inequality explained by the sorting of people across municipalities (segregation)?

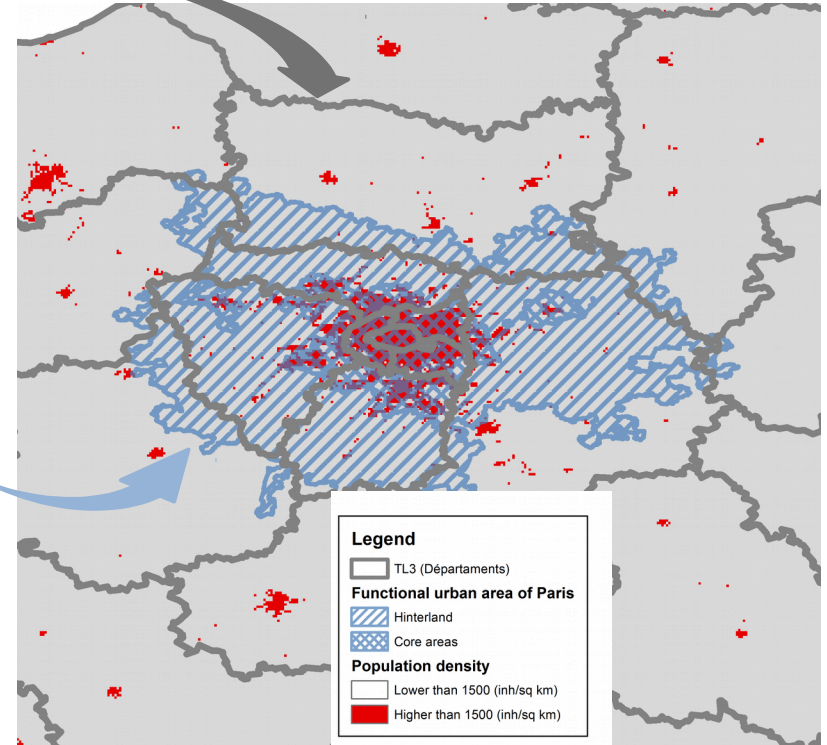- Is administrative fragmentation associated with spatial segregation?

2. OECD-EU definition of cities, applied to 31 countries

Geographies

- Administrative
- Functional Urban areas

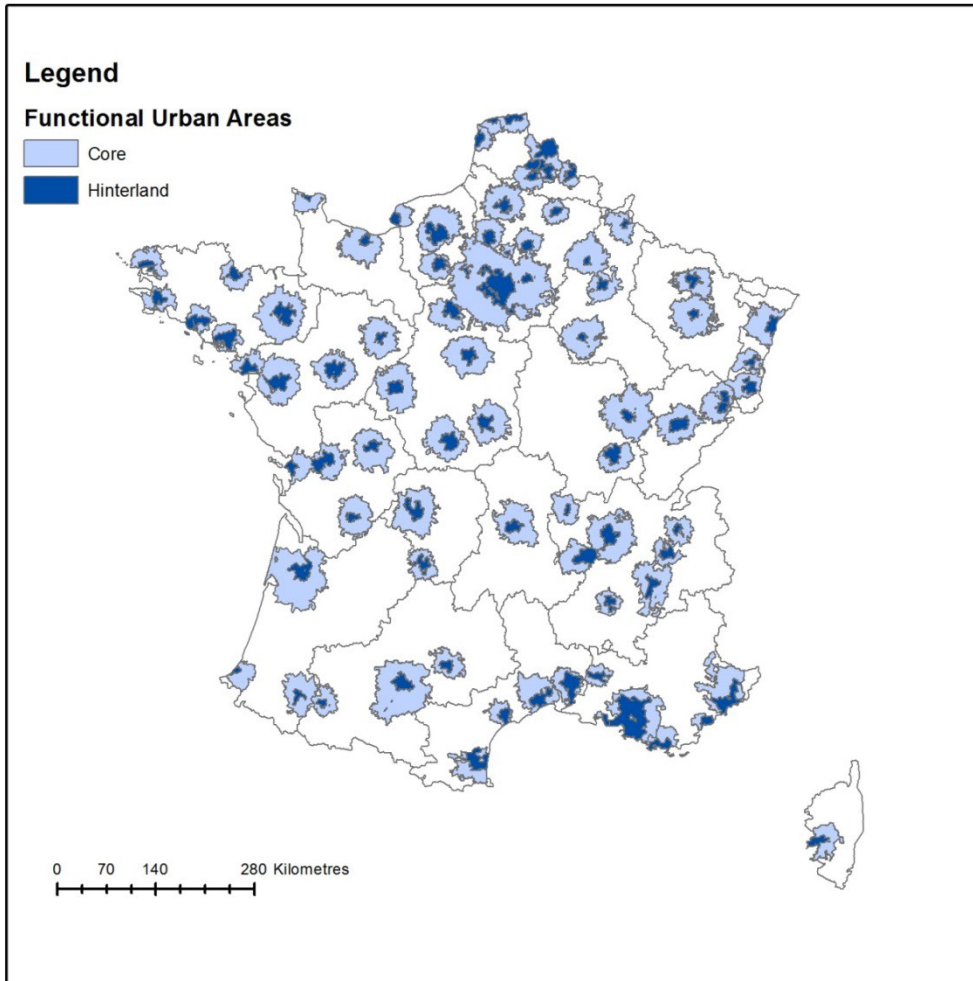(metropolitan areas)

Supply of sub-national statistics data sources

- NSO
- Data produced by users
- Data produced by local institutions
- Geospatial data
- Web data

Legend

TL3 (Départements)

Functional urban area of Paris
Hinterland
Core areas

Population density
Lower than 1500 (inh/sq km)
Higher than 1500 (inh/sq km)

http://measuringurban.oecd.org/#

2. Units of analysis
A map of French Functional Urban Areas

Legend

Functional Urban Areas
- Core
- Hinterland

0   70   140   280 Kilometres

What are the advantages of this definition?

- Economic rather than administrative (a city is the space where people live and work);

- Cities can be compared with their "similar peers";

- Monitor the connection of the urban cores with the surrounding areas.

83 FUAs in France, of which 15 are metropolitan areas

2. Data sources and collection
For most countries income data was collected in micro-aggregated form (i.e. municipality) from tax records

Country	Source	N. of local units	N. of metro areas	Type of data	Information on income distribution	Years
Australia	Australia Bureau of Statistics	1125	6	Tax records	No	2006-11
Austria	Statistics Austria	649	3	Tax records	Yes	2004, 2007, 2012
Belgium	Statistics Belgium	200	4	Tax records	Yes	2005, 2007, 2013
Canada	Statistics Canada	-	34	Tax records	Yes	2006, 2013
Chile	CASEN – Min. of Social Devel.	62	3	Household income survey	Yes	2009, 2013
Denmark	Statistics Denmark	49	1	Register data	Yes	2000-13
Estonia	Estonian Tax and Customs Board	28	1	Tax records	No	2003-14
Finland	Statistics Finland	22	1	Register data	No	2000-14
France	INSEE	1409	15	Tax records	Yes	2001-11
Hungary	National Tax and Customs Administration of Hungary	183	1	Tax records	No	2000-13
Italy	Ministry of Economy and Finance	775	11	Tax records	Yes	2008-13
Japan	Ministry of Internal Affairs and Communication	570	36	Tax records	No	1990, 1995, 2000, 2005, 2013
Mexico	CONEVAL	296	33	Small areas estimations using hh survey and Census	Yes	2010
Netherlands	CBS (Regional Income Research)	130	5	Register data	No	2006-13
Norway	Statistics Norway	30	1	Tax records	Yes	2006-13
Sweden	Statistics Sweden	54	3	Register data	Yes	2000-13
United Kingdom	ONS	2974	13	Small area estimations	No	2008, 2012
United States	ACS web platform	380	70	Household survey	Yes	2010-14

3. Income levels: method and results

Method

1) Collect micro-aggregated data on taxable income or the other definition available

2) Match the data with OECD metro area and with TL2 regional boundaries

3) Estimate a coefficient to convert from taxable to disposable income at TL2 level by comparing with regional disposable income statistics (Regional Well-being database)

4) Apply the regional coefficients to the respective local units (i.e. municipalities) and aggregate the new municipal values at the metropolitan area geography

Example

| Levels	Coefficient for California (U.S.)
Overall mean	0.9
1st quintile	1.3
2nd quintile	1.0
3rd quintile	0.9
4th quintile	0.9
5th quintile	0.8

3. Income levels: method and results
Incomes of MA residents are on average 18% higher than the rest of the population

Metropolitan vs. non metropolitan household disposable income ratio by country
per equivalent household; 2014 or latest available year
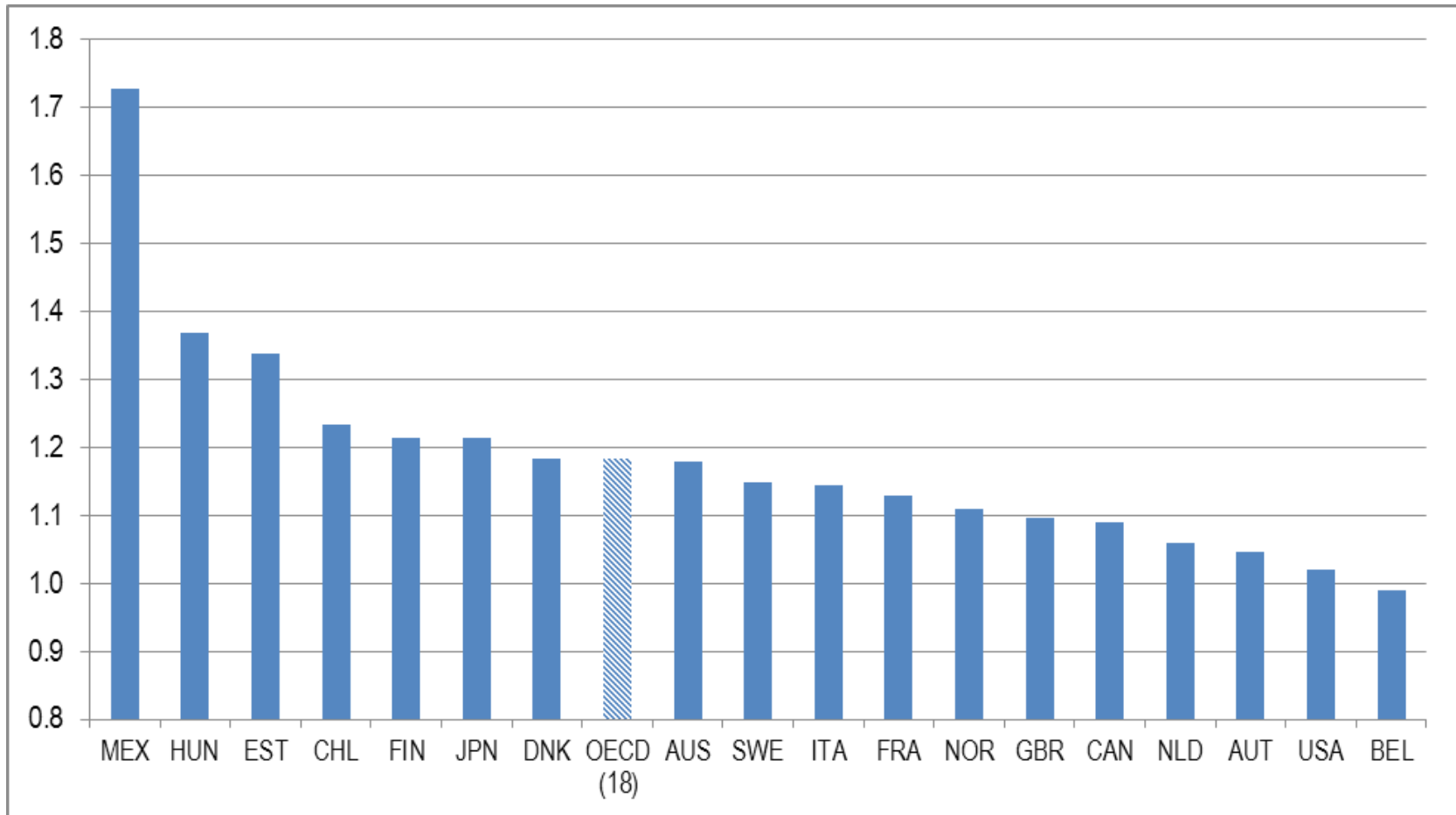
Note: The graph plots the ratio between household disposable income per equivalent household in metropolitan areas over that in the rest of the national territory. Countries are ordered by increasing value of that ratio.

Method

Hypothesis of lognormal distribution of disposable income: **to generate** samples of this distribution, it's sufficient to estimate μ and σ of the related normal distribution. The Gini coefficient depends uniquely on σ: $G = 2\Phi\left(\frac{\sigma}{\sqrt{2}}\right) - 1$

Criterion of minimum sum of absolute errors: to generate a sample that fits observed data – income quantiles or intervals in a municipality –, the optimization algorithm estimates the set of μ and σ for a lognormal sample that minimize the function below:

$$criteria = \sum_{q=1}^{Q} |y_q - y_{th,q}|$$

1. Synthetic data obeying to a lognormal distribution with the estimated parameters for each municipality were generated; the size of each sample being equal to the number of households.
2. All municipal samples are gathered together in order to reconstitute the metropolitan population and compute the Gini coefficient on it.

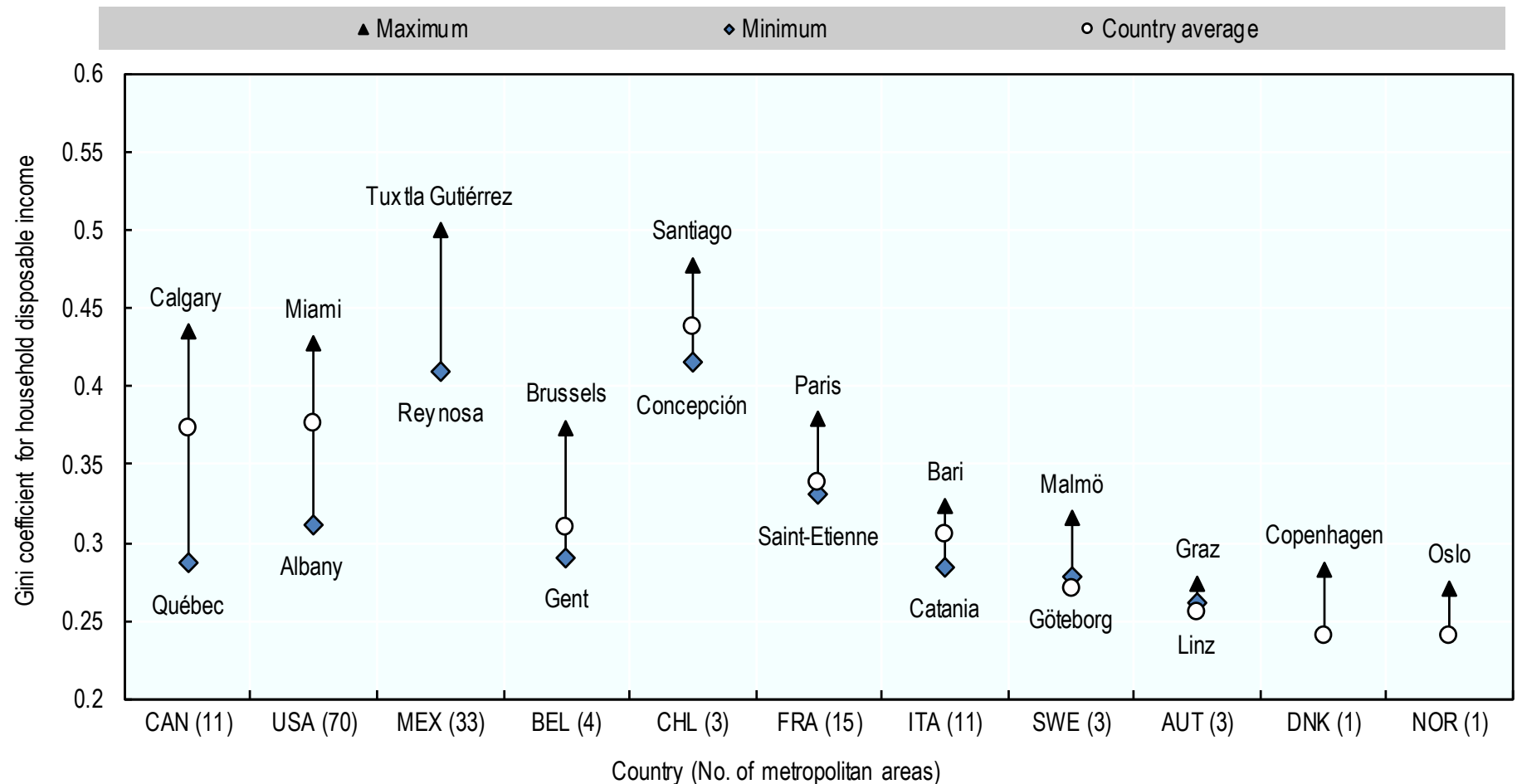**Gini coefficients for household income in metropolitan areas, circa 2014**
Metropolitan areas with minimum and maximum Gini coefficients, by country

▲ Maximum   ◆ Minimum   ○ Country average

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5. Spatial de-composition of inequality (between and within units)

Method

Theil = Theil within-group component + Theil between-group component

Groups are identified by local units (e.g. municipalities)

A simple index of spatial segregation at municipal level is the ratio of the between-group component and the total Theil inequality index

$$I_{spatialsegr} = 100*(T_b/T)$$

**Different size and number of local units challenge the comparability of spatial inequality across cities:**

the denominator is replaced by the maximum between-group inequality that could be obtained if the number and size of groups were restricted to be the same as for the numerator ($I_b I_{elmo}$). That means re-allocating all individuals in the groups so as to maximise the between-group inequality.

Disposable income growth and change in spatial segregation by income across municipalities, 2007-14
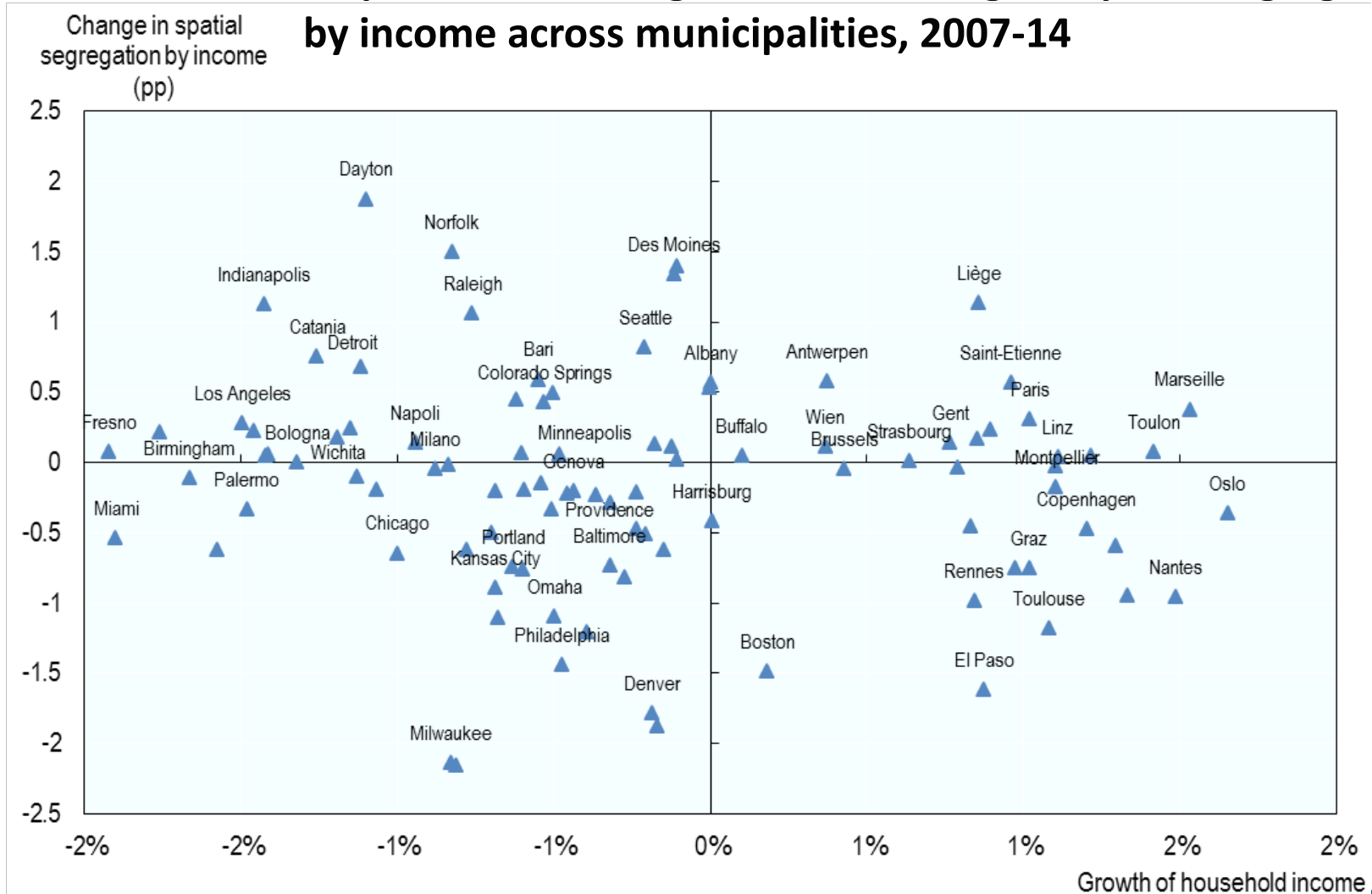
The more fragmented the city, the more income segregated
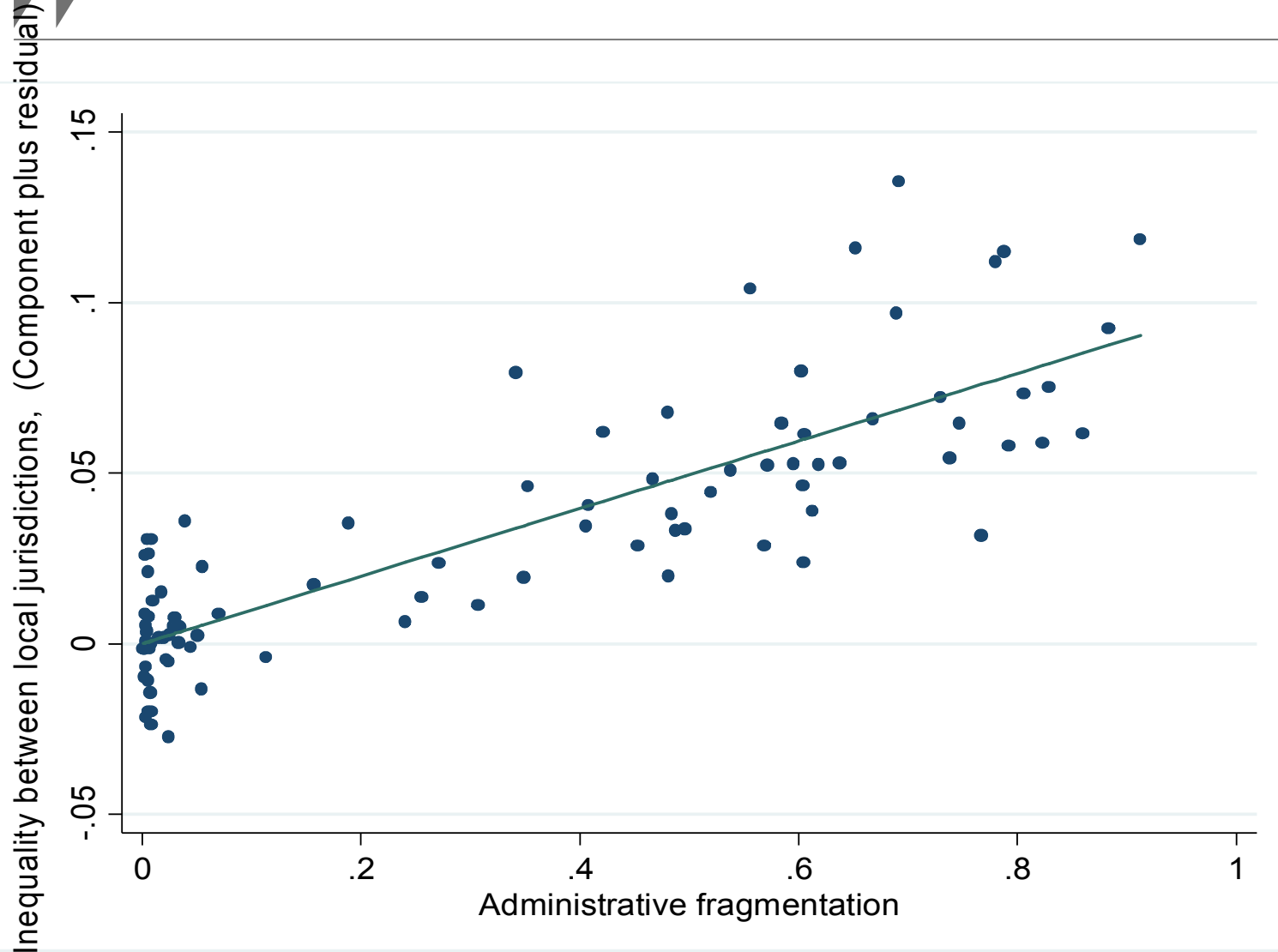
6. Conclusions

- The use of administrative data (i.e. tax records) allows income statistics to be produced at small spatial scales. As such, it represents an increasingly important source of information (not only for income!), though it has some limitations in terms of comparability.

- Metropolitan areas have higher income and higher inequality than other locations. Urban size is positively associated to both. However, metropolitan areas are not homogenous inside them, with people sorting in space according to their income.

- When data are provided at the scale of local jurisdiction, it is important to take into account the modifiable areal unit problem (MAUP) when comparing different countries.

- Important extension: assessing real income differences across cities by accounting for differences in price levels

THANK YOU

- Boulant, J., Brezzi, M., and P. Veneri (2016) **Income levels and inequality in OECD metropolitan areas;** OECD Working Paper 2016/06; OECD Publishing http://dx.doi.org/10.1787/5jlwj02zz4mr-en
- **Making Cities Work for all** (available in English): https://www.oecd.org/gov/making-cities-work-for-all-9789264263260-en.htm

- **Policy Highlights** (available in English, French and Spanish): http://www.oecd.org/gov/making-cities-work-for-all-policy-brief-en.pdf

- **Video** (available in English and with Spanish subtitles): https://www.youtube.com/watch?time_continue=11&v=1xK1dHjPEVg