Productive cities
Evidence from the OECD

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OECD
BETTER POLICIES FOR BETTER LIVES

Motivation

- A country's productivity is, in large part, determined by the productivity of its cities; understanding how to increase the productivity of these cities is therefore an urgent policy question.
- Large urban agglomerations account for over 50% of total GDP while taking up less than 5% of total surface area.
- It is well known that, in many countries, economic productivity increases with city size. This is in part a result of sorting, as better educated individuals have a tendency to live and work in larger cities. However, productivity increases are present even when controlling for sorting- as we do for this project.
- Using city definitions based on functions rather than administrative boundaries (FUA), the paper contrasts the complexity of administrative boundaries by FUA and hence examines the role of urban governance in the economic productivity of a city.

Background for the presentation

Evidence for 5+2 OECD countries:

- Germany, Mexico, Spain, UK and US
- Netherlands and Japan in progress

Coherent and comparative methodology

- Use wage microdata & OECD Metropolitan Areas Database: City definition based on **economic links (commuting flows)**, rather than administrative boundaries
- Two-step econometric framework → account for individual characteristics that determine productivity
- Estimate **agglomeration benefits**, examine the role of **urban governance** and other characteristics for city productivity and

City productivity: Results from 5 (+1) OECD countries

- Size matters: Estimated elasticity for **agglomeration benefits** around 0.02-0.06 (roughly: 2-6% higher productivity for a doubling in population)
- Productivity is higher in cities with more **skilled workers**; with larger employment shares in **high-tech manufacturing, finance and business services**; larger **neighbouring cities** and lower levels of governmental fragmentation.
- Cities with **fragmented governance** structures exhibit lower levels of productivity:
  Doubling the number of municipalities within a metropolitan area is associated with 6% lower productivity
- The presence of a **governance body** halves this penalty

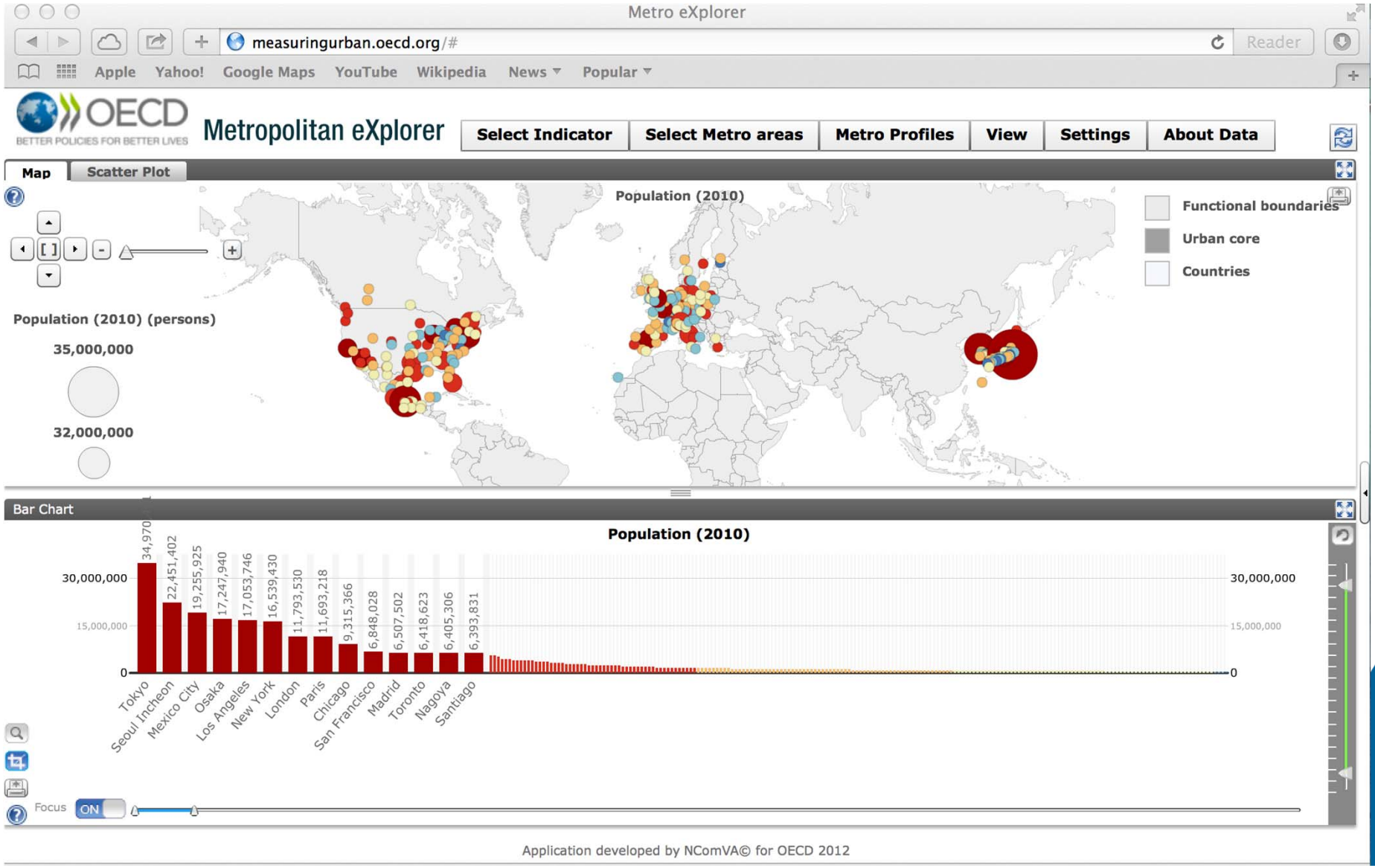
A functional definition for cities

- Definition of Functional Urban Areas based on population density in 1km^2 cells that are matched to municipal boundaries and connected via commuting patterns.

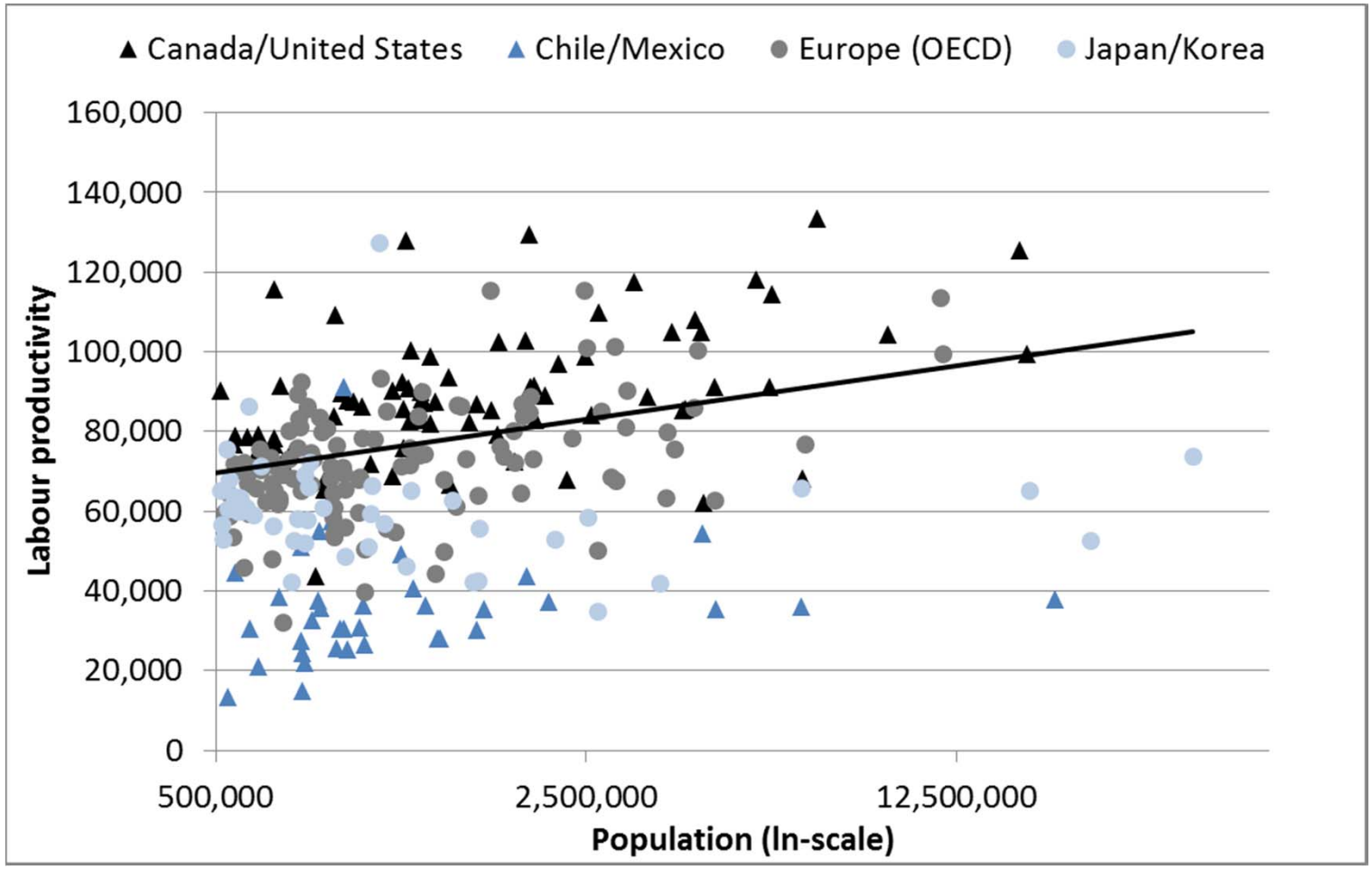
- Urban centres are identified by aggregating densely populated 1km^2 cells. Urban centres with at least 50,000 inhabitants are kept.
- They are matched with the boundaries of the lowest administrative level for which statistical data is typically available (NUTS5/LAU2)
- Urban centres and the less densely populated municipalities in the commuting zone are combined into Functional Urban Areas based on commuting flows (>15%).

- More info: OECD (2012) Redefining Urban

OECD metropolitan areas
http://measuringurban.oecd.org



Larger Metropolitan Areas are more productive (higher GDP per worker)



Source: OECD Metropolitan Explorer.
Labour Productivity is measured as GDP (Millions of US$ constant PPP, constant prices, reference year 2005) divided by the total number of employees in a Functional Urban Area.
Data refer to 2010 or the closest available year.

Empirical strategy: Two step approach

- Results from Ahrend, Farchy, Kaplanis and Lembcke (2014). Estimation follows Combes, Duranton and Gobillon (JEconGeo, 2011)

- Use microdata and follow a 2-step approach:

i. apply **individual wage regressions** in order to estimate the differential productivity levels of cities, controlling for sorting (on observables)

ii. explain the differential city productivity levels found in the first step by regressing them on a number of **city explanatory variables**

- Accounts for bias arising from non-random sorting of more productive (e.g. skilled) individuals across cities

Empirical strategy: Two step estimation

- **First step:**

$$y_{iat} = \beta X_{iat} + \gamma_{at} d_{iat} + \varepsilon_{iat}$$

y_{iat}: wage (ln)

X_{iat}: gender, education, experience, occupation, part-timing

d_{iat}: city-year FE

- **Second step:**

$$\hat{\gamma}_{at} = \delta Q_{at} + \mu Z_a + \theta_t d_t + u_{at}$$

- Allows for flexible country time trends d_{ct}
- Sample limit sample to years available for all countries (2005-2007)

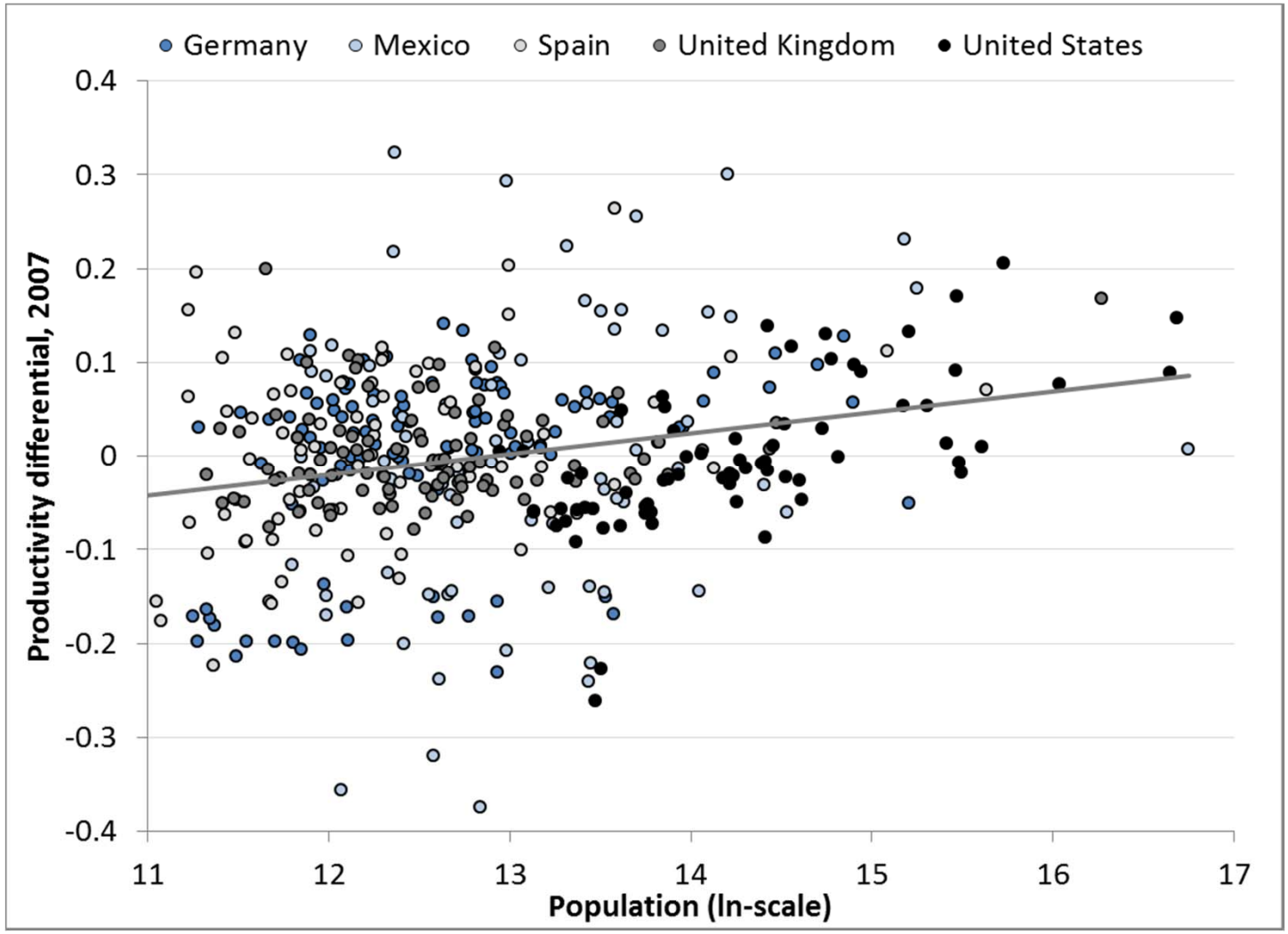
Empirical strategy: Explaining productivity differentials

- Explain first stage estimates with a set of relevant FUA level controls ($Q_{at}; Z_a$)
  - **agglomeration**: population; density and area (logged)
  - **human capital**: share of university graduates
  - **industrial structure**: specialisation, composition and technological intensity
  - **urban governance**: administrative fragmentation (ln number of municipalities; governance body)
  - **location "fundamentals"**: port; capital city; pop in cities within 300km radius

Data

- Microdata with info on wages and workplace location
- **UK**: ASHE first stage (1% sample); city-year controls from QLFS; 2003-2010
- **Spain**: MCVL; administrative data (4% sample); 2005-2011
- **Germany**: Employment panel of the German Federal Employment Agency (2% sample); German weakly anonymous BA-Employment Panel (version 1998-2007)
- **US**: IPUMS data; Census 1990, 2000 and American Community Survey 2005-2007
- **Mexico**: ENE 2000-2004; ENOE 2005-2010

City productivity increases with city size - even after controlling for sorting



Pooled regression results, 2005-2007

	(I)	(II)	(III)	(IV)
ln(population)	**0.038*** **			
	(0.005)			
ln(density)		**0.038*** **	**0.045*** **	**0.045*** **
		(0.006)	(0.006)	(0.006)
ln(area)		0.038***	0.070***	0.070***
		(0.006)	(0.009)	(0.009)
ln(municipalit.)			**-0.032*** **	**-0.035*** **
			(0.006)	(0.006)
Log (popul. in catchment area)				0.017**
				(0.008)
R-Squared	0.76	0.76	0.78	0.78
Observations	1,290	1,290	1,290	1,290
FUAs	430	430	430	430

- Analysis on the pooled data estimates elasticity of around 0.04

- Effect is disaggregated into a pure size effect measured by (log) area covered by FUA and agglomeration benefits captured by (log) population density

Sources of agglomeration benefits

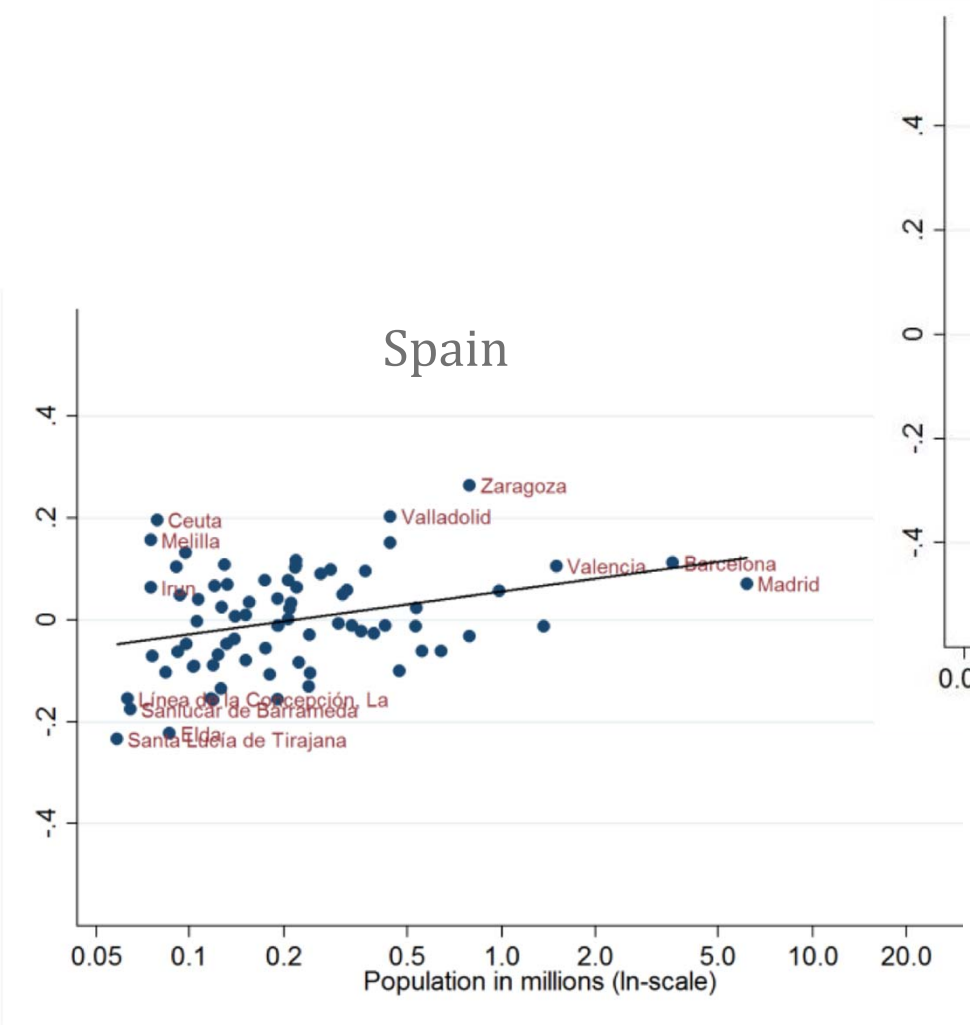
- Sources of agglomeration from Marshall (1890); reviews by Rosenthal and Strange (2004), Puga (2010)

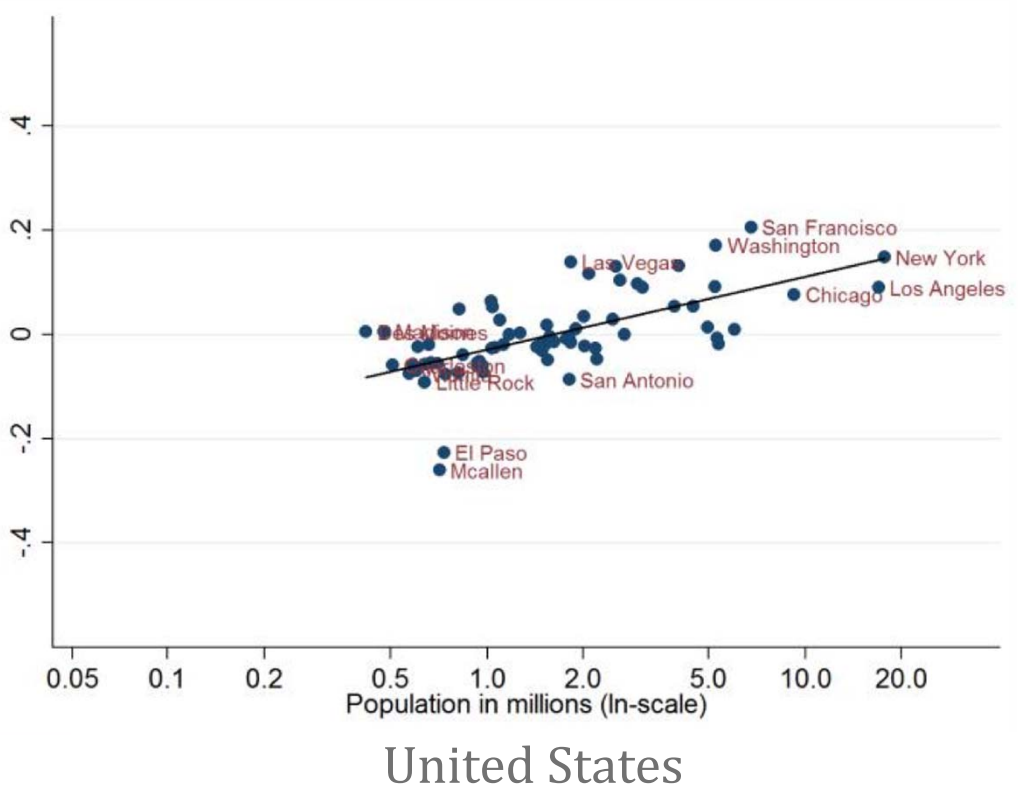
- ***Thicker labour markets****: labour market pooling; better matching*
- gain from reduced labour acquisition and training costs in thick local labour markets with abundant specialised labour force

- ***Sharing*** *facilities, inputs, gains from specialisation*
- firms may face lower costs for specialised non-traded inputs that are shared locally in a geographical cluster.

- ***Knowledge spillovers***
- face-to-face contact can enable tacit knowledge spillovers through increases in the intensity of the interactions with other firms or individuals

Heterogeneity: bigger is better

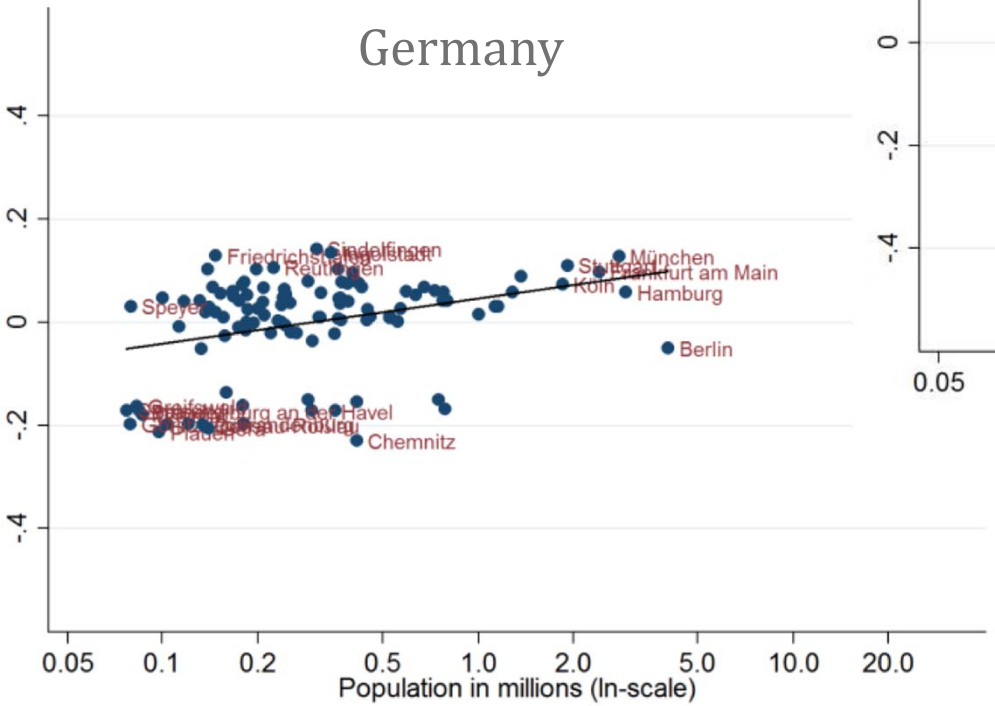




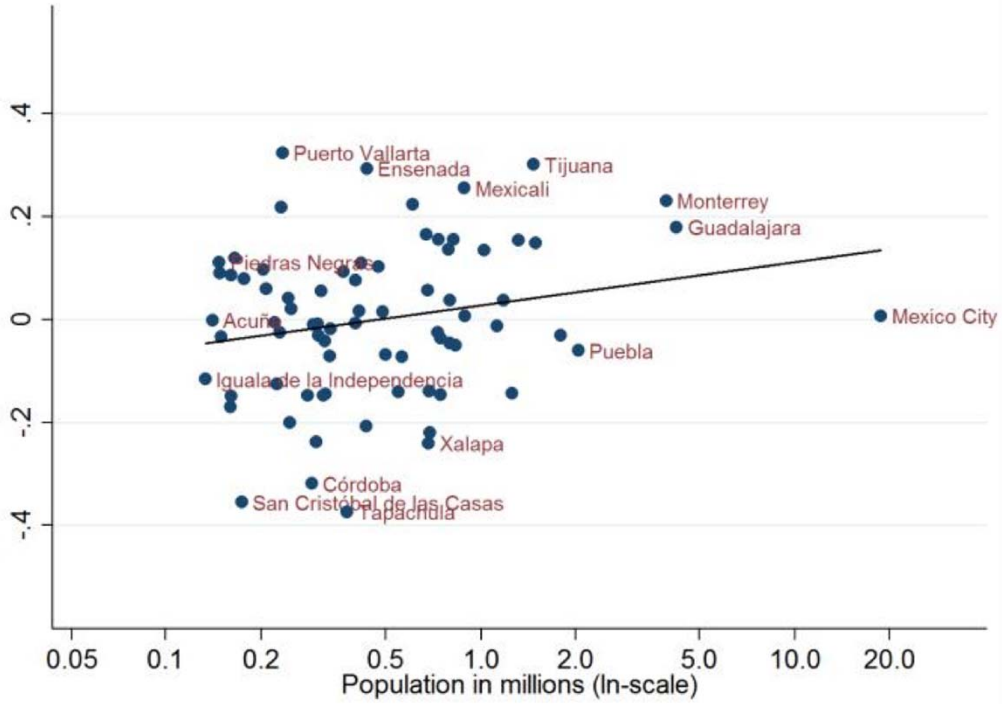
United States

Heterogeneity: borders matter(ed)

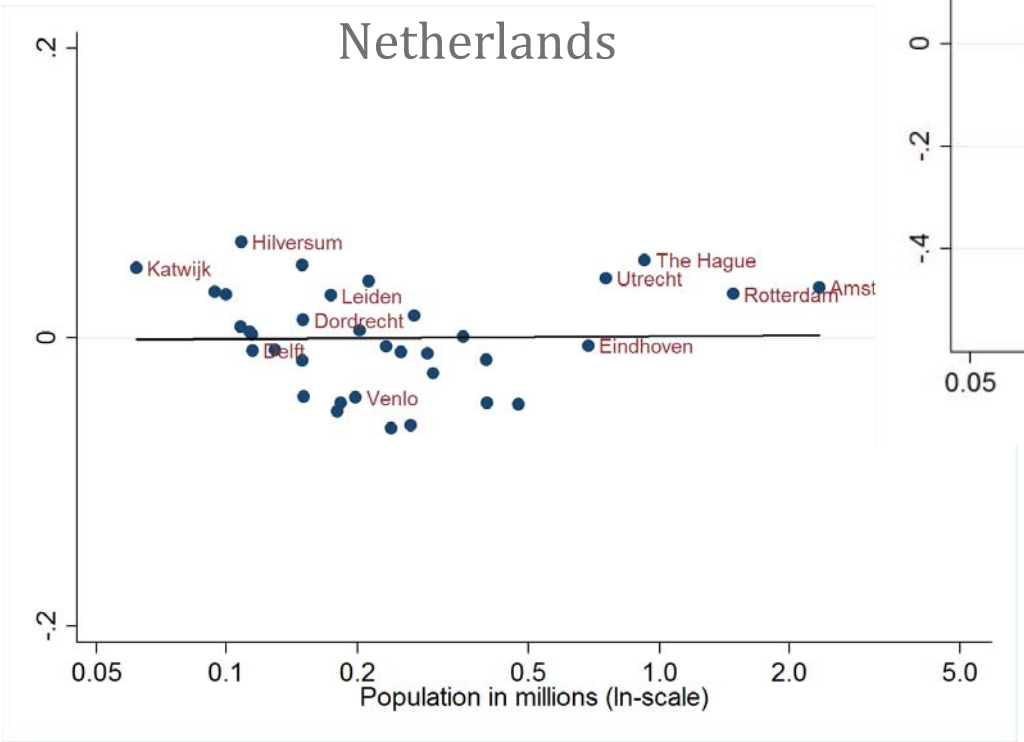
Germany

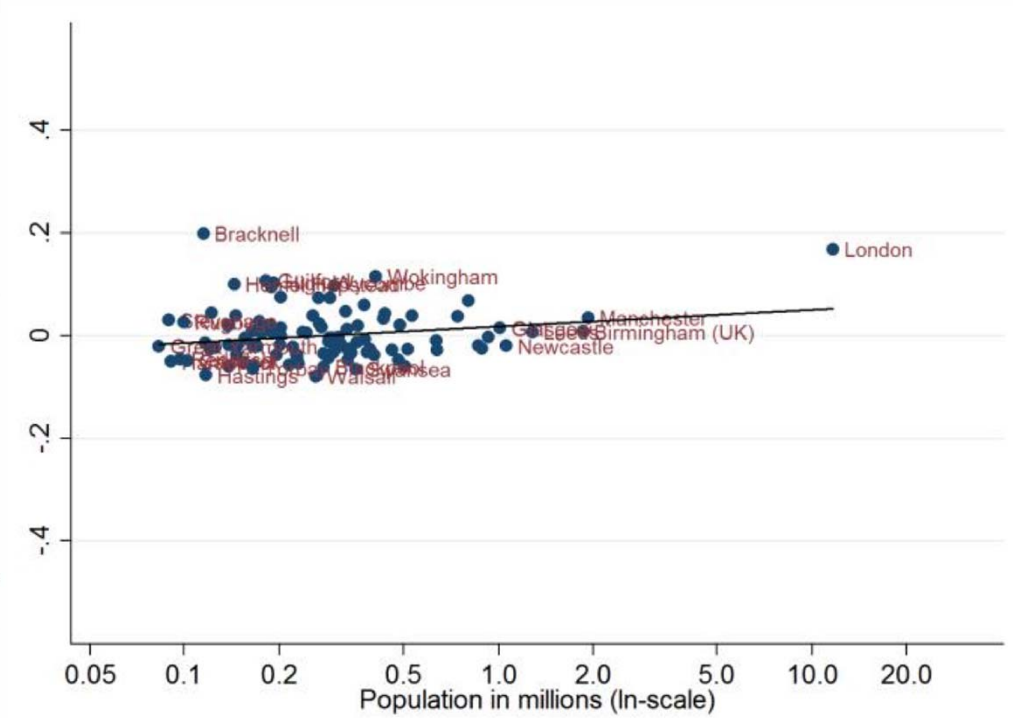


Mexico



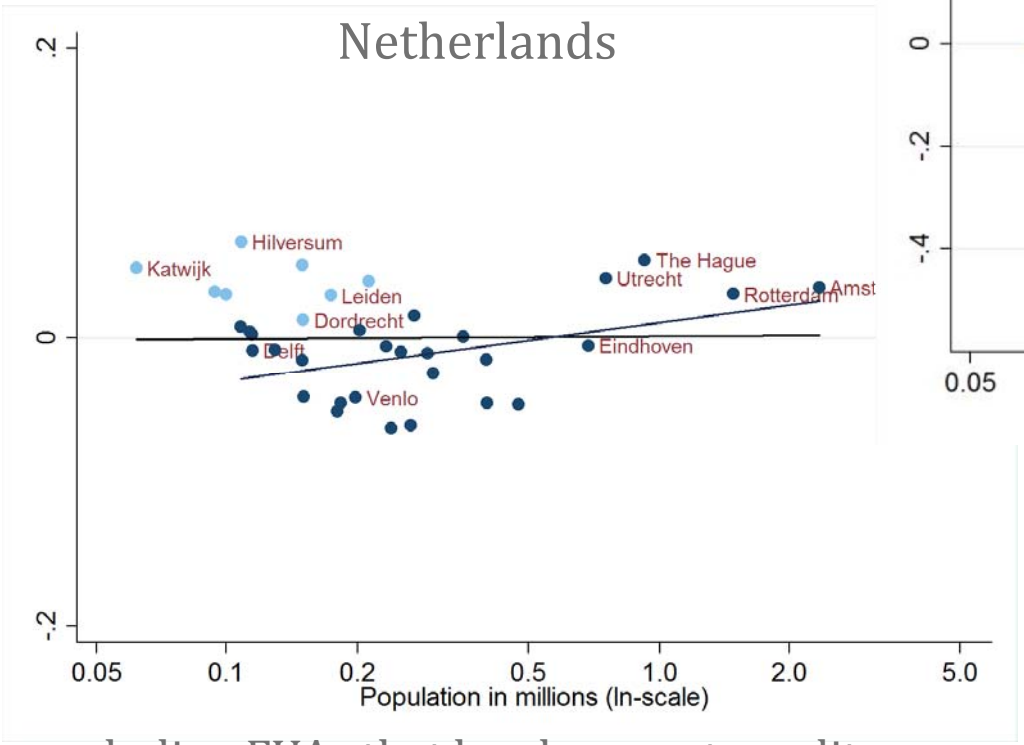
Heterogeneity: distance matters

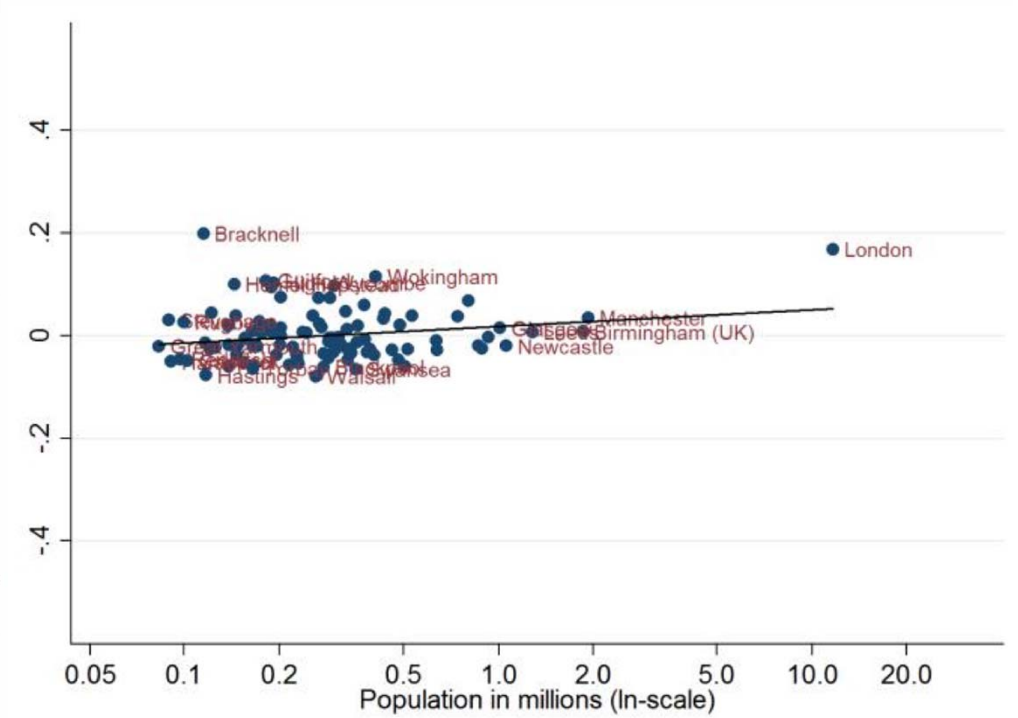




United Kingdom

Heterogeneity: distance matters



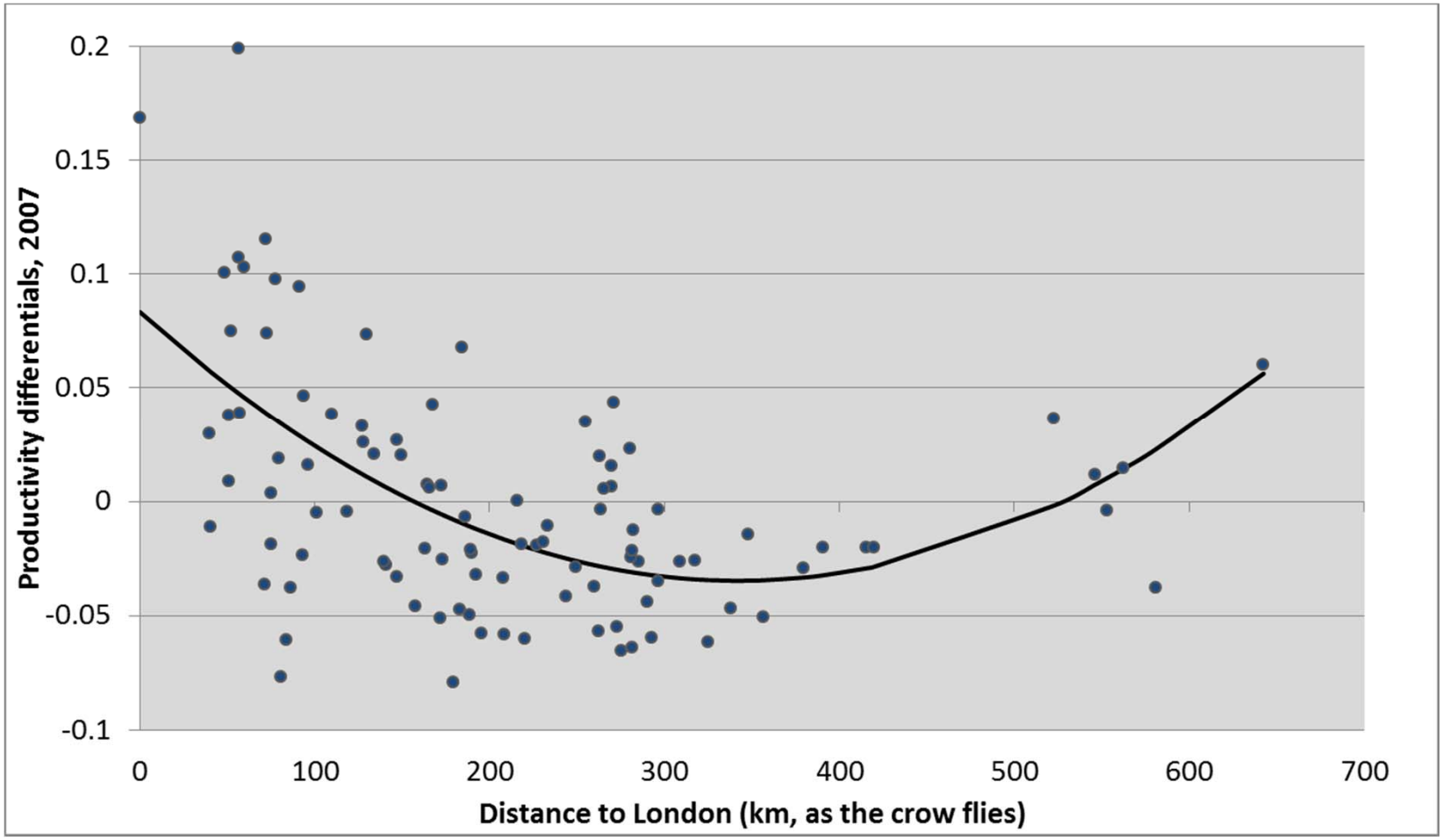


United Kingdom

excluding FUAs that border a metropolitan area (light blue)

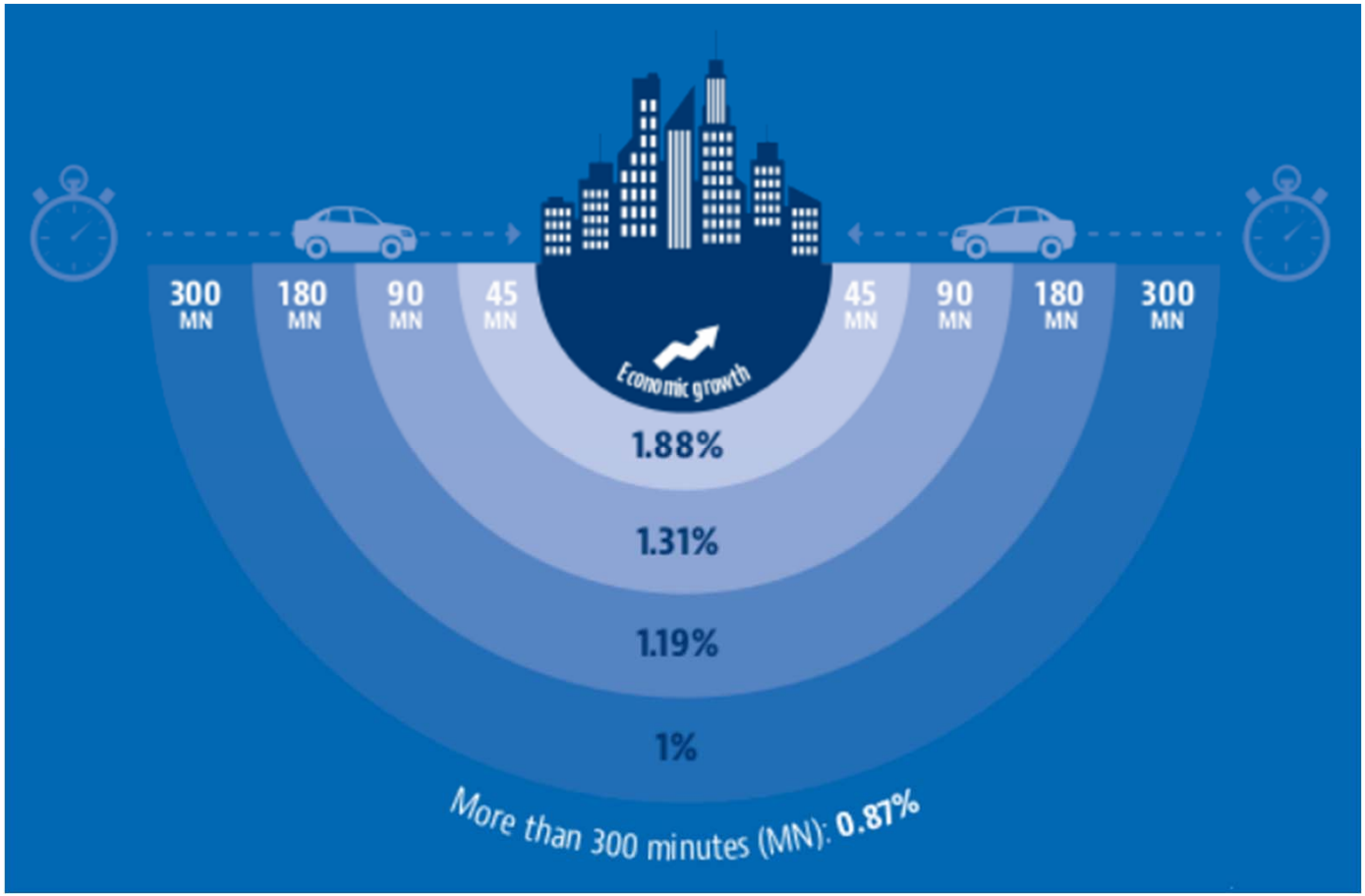
Distance matters

Productivity differentials and distance to London



Spillovers of large cities: Economic growth in EU regions

Annual per capita GDP growth rates (1995-2010) and driving time to the closest metro area of 2 million or more inhabitants



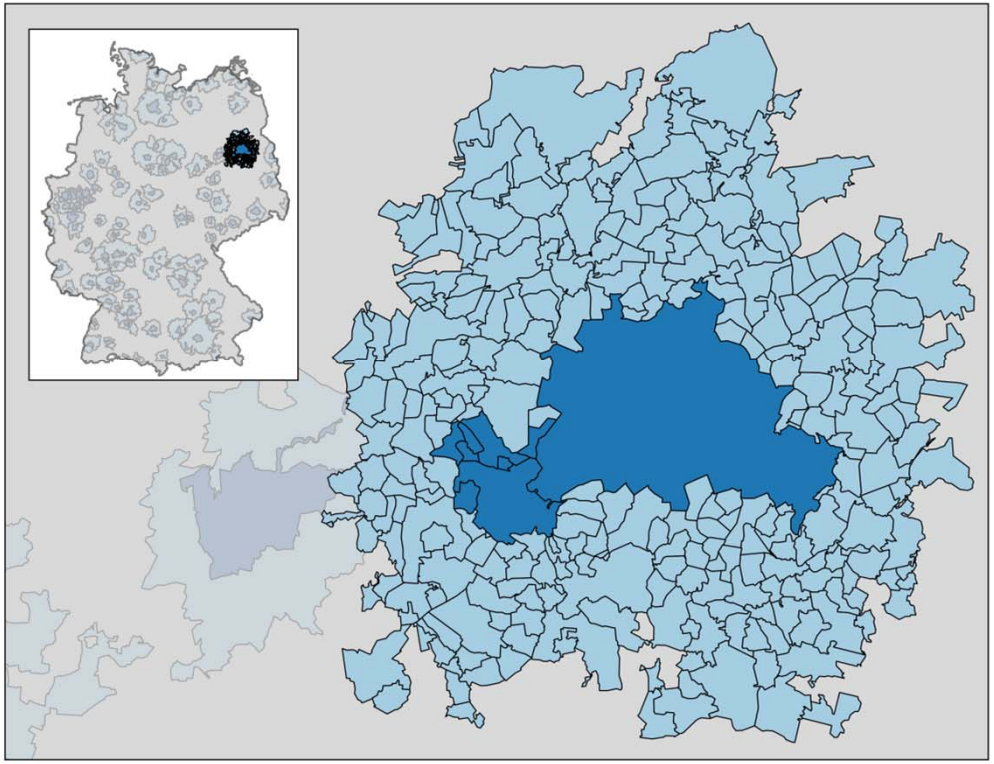
The role of governance

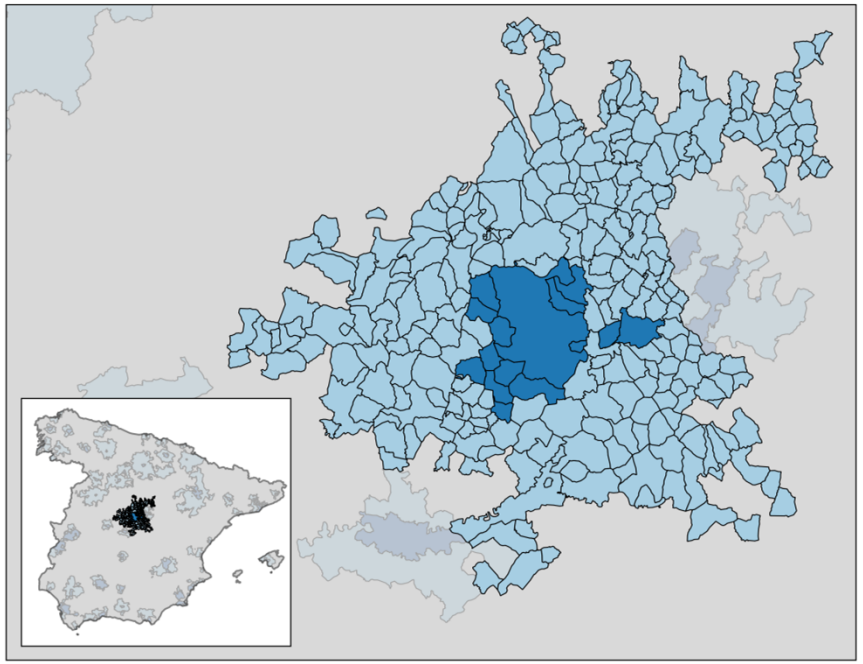
- In many countries, the governance structure of urban areas is inadequate, as **administrative borders do not correspond to the economic area**.
- This discrepancy might lead to conflicts of interest among the various agents → not the right scale for policy (lack of policies or duplication) (Cheshire and Gordon, 1996; Cheshire and Magrini, 2009)

- Some areas affected by coordination problems:
  - **transport**; stymie transport infrastructure investments → congestion
  - **land use**; inadequate land use planning → urban sprawl
  - **ease of doing business**; additional bureaucracy → underinvestment

Administrative fragmentation in two OECD metropolitan areas

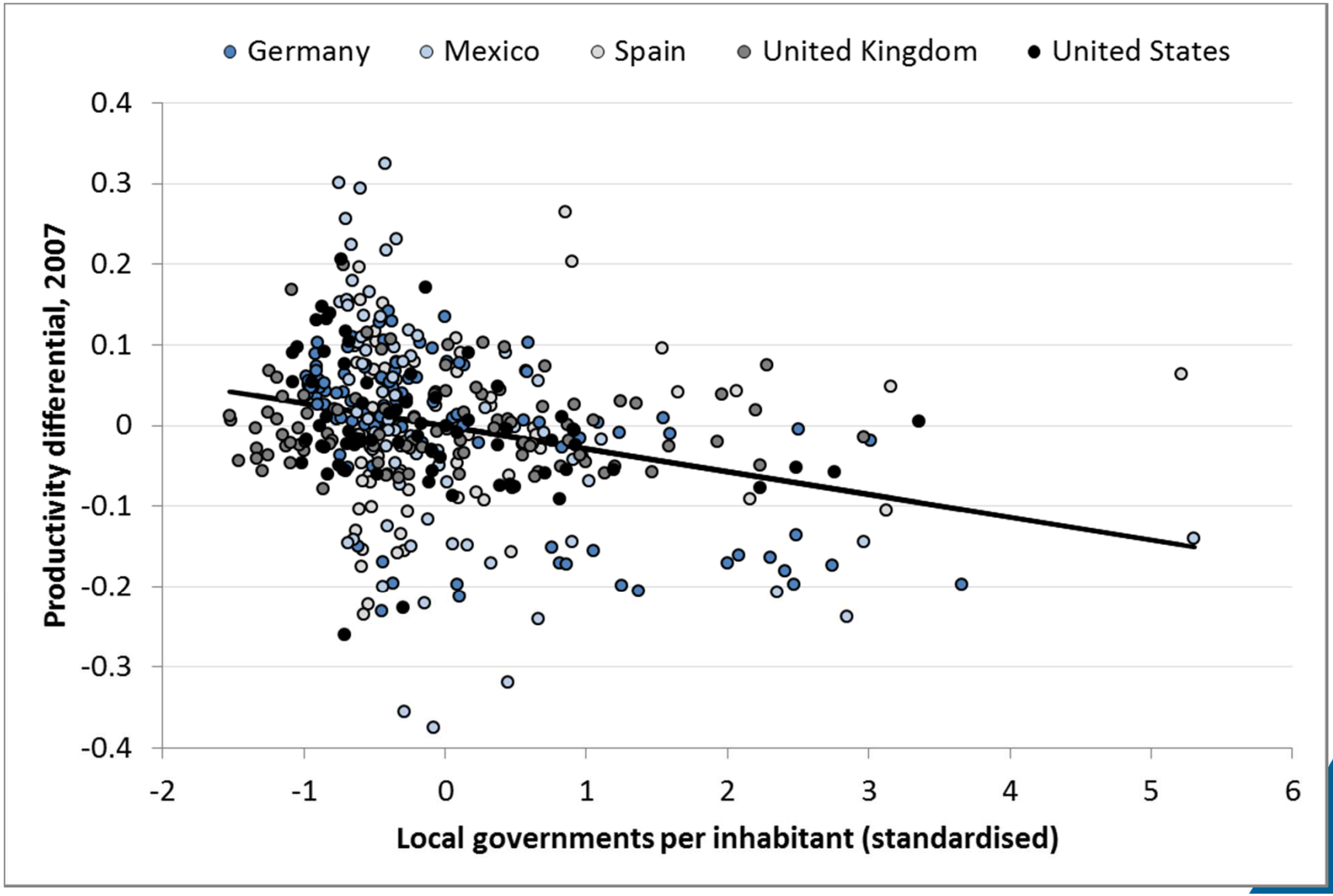
Berlin





Madrid

City productivity decreases with fragmentation



Fragmentation and governance bodies

	All FUAs	Metro areas	Metro areas	Metro areas
ln(density)	0.048***	0.064***	0.065***	0.047***
	(0.006)	(0.012)	(0.012)	(0.012)
ln(area)	0.064***	0.082***	0.085***	0.087***
	(0.008)	(0.012)	(0.012)	(0.013)
ln(municipalit.)	**-0.032*** **	**-0.032*** **	**-0.057*** **	**-0.066*** **
	(0.006)	(0.010)	(0.016)	(0.017)
ln(municipalit.)			**0.031** **	**0.036** **
x govern. body			(0.014)	(0.015)
governance body			-0.079**	-0.092**
			(0.034)	(0.038)
Add.controls	no	no	no	yes
R-Squared	0.779	0.847	0.855	0.880
Observations	1,290	420	420	420
FUAs	430	140	140	140

Concluding remarks

- The empirical analysis confirms that the **productivity of residents increases with city size**. But it also shows heterogeneity across countries
- **Human capital, high-tech and knowledge intensive services** oriented cities make their residents more productive
- Smaller cities can **"borrow" agglomeration benefits**.
- Importantly, the analysis shows that **administrative fragmentation reduces productivity**, a penalty that is **alleviated (but not negated) by governance bodies**.

Thank you

The presentation draws from:

Ahrend, Farchy, Kaplanis and Lembcke (2014) "What Makes Cities More Productive? Agglomeration economies and the role of urban governance: Evidence from 5 OECD Countries"

Ahrend and Schumann (2014) "Does regional economic Ggowth depend on proximity to urban centres?"

OECD (2015) The Metropolitan Century: Understanding Urbanisation and its Consequences

OECD (2015) Governing the City

OECD (forthcoming) Metropolitan Review: Rotterdam-The Hague

OECD (2012) Redefining Urban: a new way to measure metropolitan areas

Summary statistics: Regression controls

Variables	USA	MEX	DEU	GBR	ESP
population	2.47	0.88	0.47	0.46	0.39
	(3.115)	(2.211)	(.615)	(1.169)	(.810)
area	11.2	4.3	1.2	0.7	1.6
	(12.907)	(6.989)	(1.136)	(.878)	(2.205)
pop.density	0.35	0.41	0.51	0.74	0.63
	(.379)	(.542)	(.513)	(.518)	(.913)
% university graduates	0.28	0.16	0.14	0.19	0.12
	(.056)	(.051)	(.041)	(.07)	(.054)
Capital	0.01	0.01	0.01	0.01	0.01
	(.12)	(.115)	(.096)	(.1)	(.115)
Port	0.48	0.19	0.17	0.16	0.32
	(.503)	(.392)	(.381)	(.367)	(.468)
Herfindahl index	0.06	0.06	0.05	0.05	0.07
	(.006)	(.018)	(.013)	(.009)	(.025)
# local governments per 1,000 inh.	5.0	5.4	44.3	4.3	31.8
	(3.8)	(10.1)	(50.4)	(7.0)	(52.2)
% of pop.in largest municip.	0.67	0.81	0.52	0.72	0.72
	(.233)	(.232)	(.183)	(.221)	(.165)
Governance body	0.87	0.81	0.83	0.29	0.13
	(.341)	(.402)	(.381)	(.469)	(.354)

UK Productivity differentials and latitude