

Social Connectedness in Europe

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October 8, 2020

Motivation

- Social networks shape important aspects of European society
- Understanding what factors shape these networks informative for a wide range of social science questions
- **Challenge:** The geographic structure of social networks is difficult to measure on a national or global scale
- **Solution:** Aggregated measure of connections between region pairs from de-identified Facebook social graph
 - Facebook global social network = 394 million active users in Europe
 - Limit on friends & required consent of both parties → more likely to capture real-world connections than other online networks

Social Connectedness Index

- Social Connectedness Index (Bailey et al., 2018)

$$Social\ Connectedness_{i,j} = \frac{FB\ Connections_{i,j}}{FB\ Users_i * FB\ Users_j}$$

- Normalized number of Facebook friendship links between regions
- Captures relative probability of friendship between Facebook users in regions i and j
- Focus on NUTS2 regions (standardized data collection)
- Data are widely available to other researchers!

<https://data.humdata.org/dataset/social-connectedness-index>

Approach

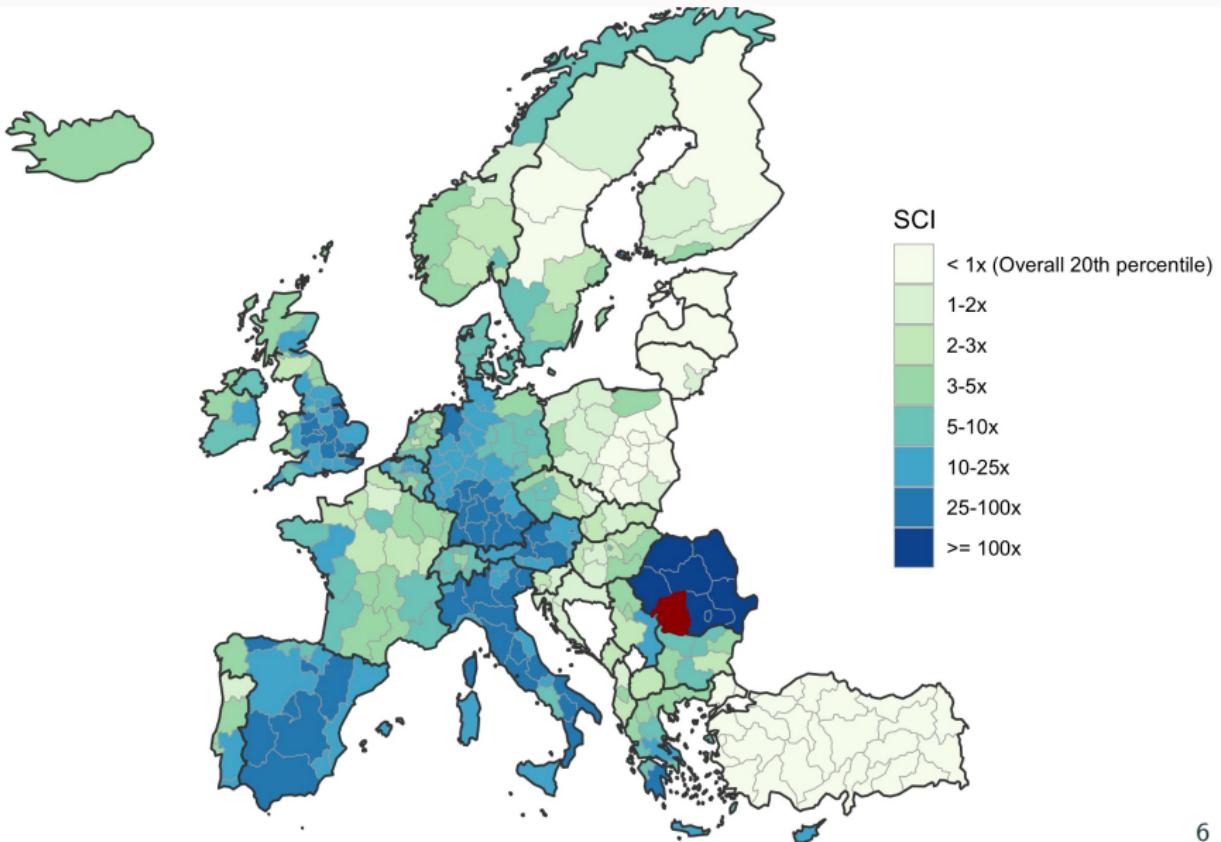
Two-step approach to understanding the factors that shape European social connectedness:

1. Unsupervised exploratory analyses
 - Case studies
 - Generate socially connected communities
2. Regression analyses
 - Test potential factors found in exploration

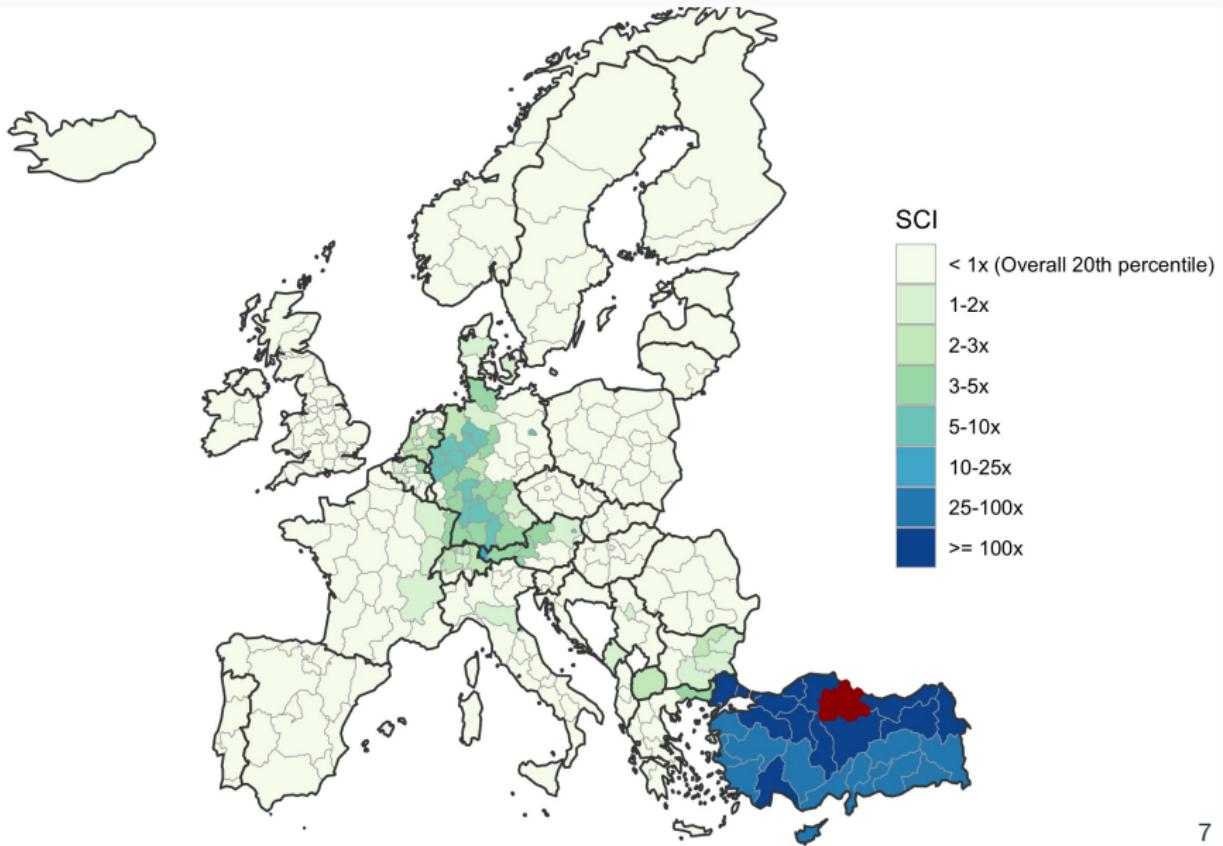
Case Study 1/2: Romania & Turkey

- South-West Oltenia, Romania
 - Romania joined EU in 2007
 - 3-5 million Romanians live & work abroad (1/5 of country's pop.)
 - Top destinations = Italy, Spain, Germany, US, and UK
- Samsun Subregion, Turkey
 - Turkey not an EU member state
 - Turkey + West Germany 1961-1973 labor recruitment agreement (*Anwerbeabkommen*) → many workers re-settling

Case Study 1/2: South-West Oltenia, Romania (RO41)



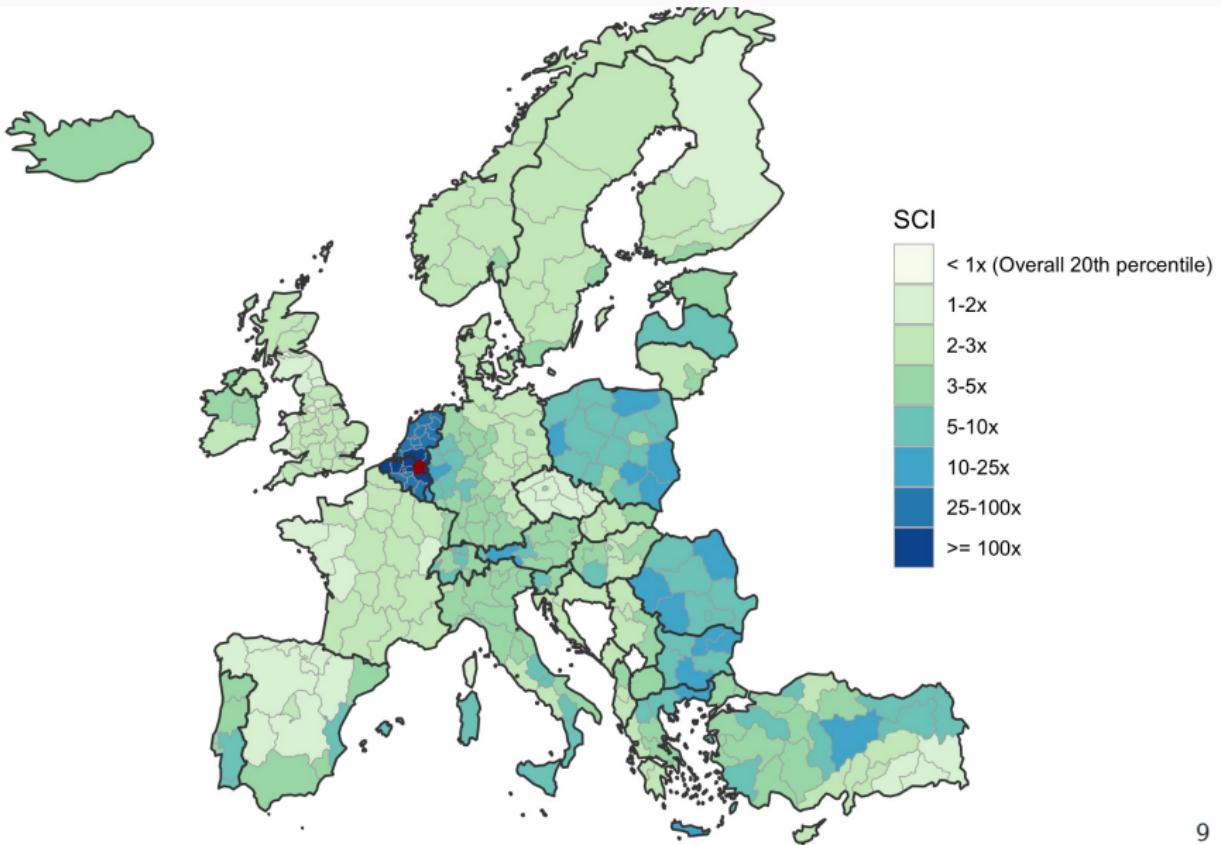
Case Study 1/2: Samsun Subregion, Turkey (TR83)



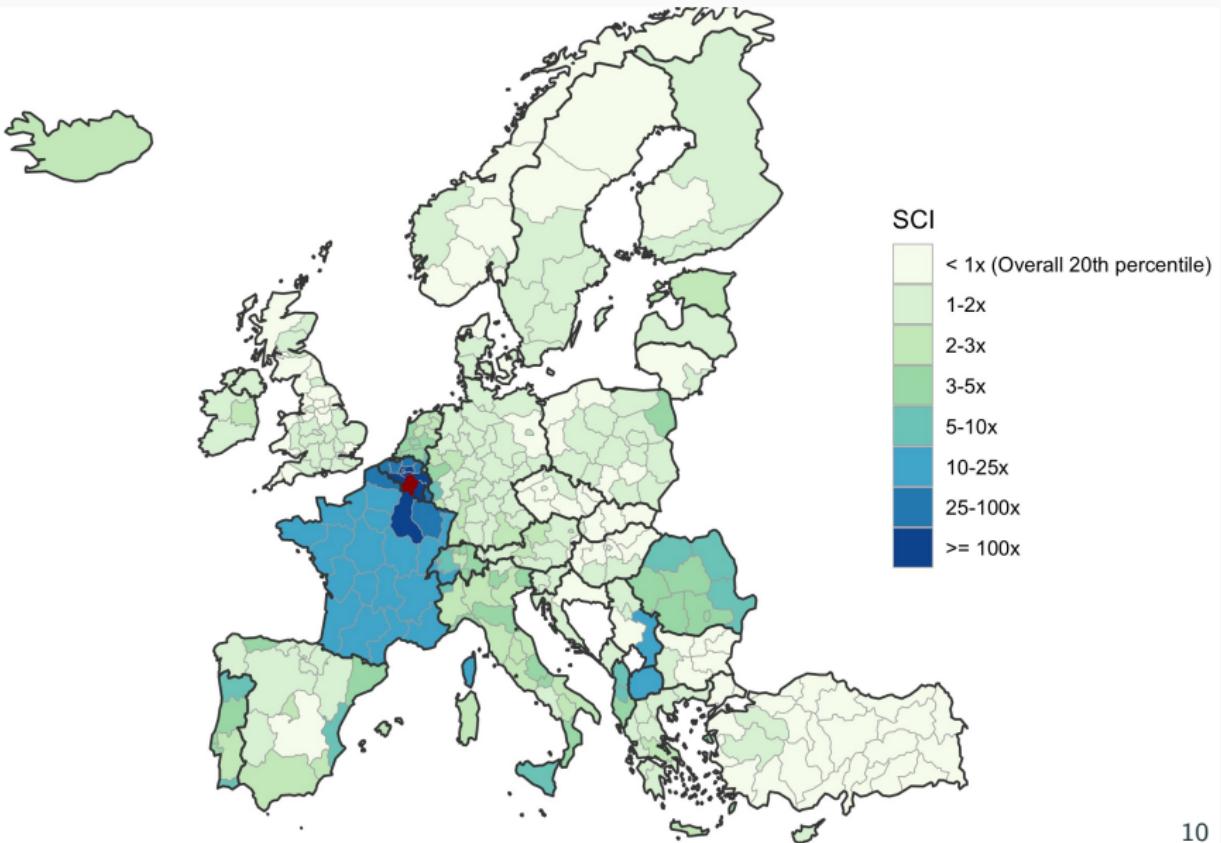
Case Study 2/2: Belgium

- Limburg, Belgium: Official language = Dutch
- Namur, Belgium: Official language = French
- Capitals of two regions (Hasslet and Namur) less than 70km apart

Case Study 2/2: Limburg, Belgium (BE22)



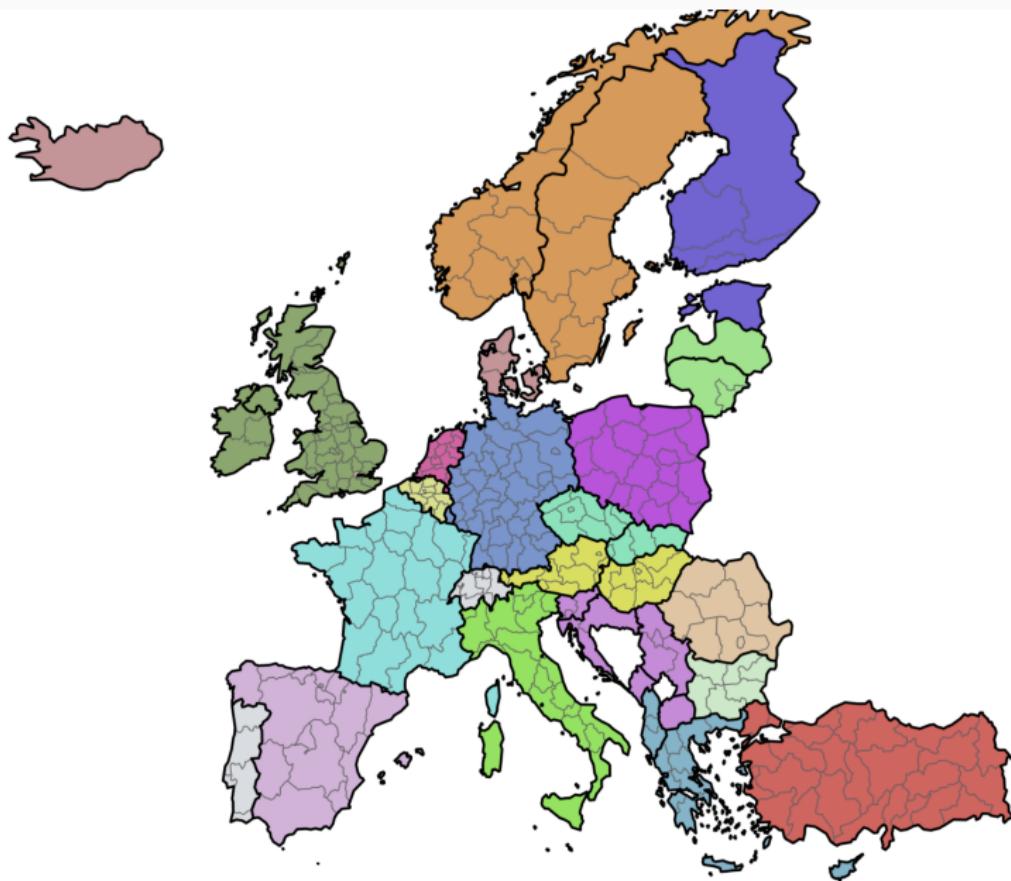
Case Study 2/2: Namur, Belgium (BE35)



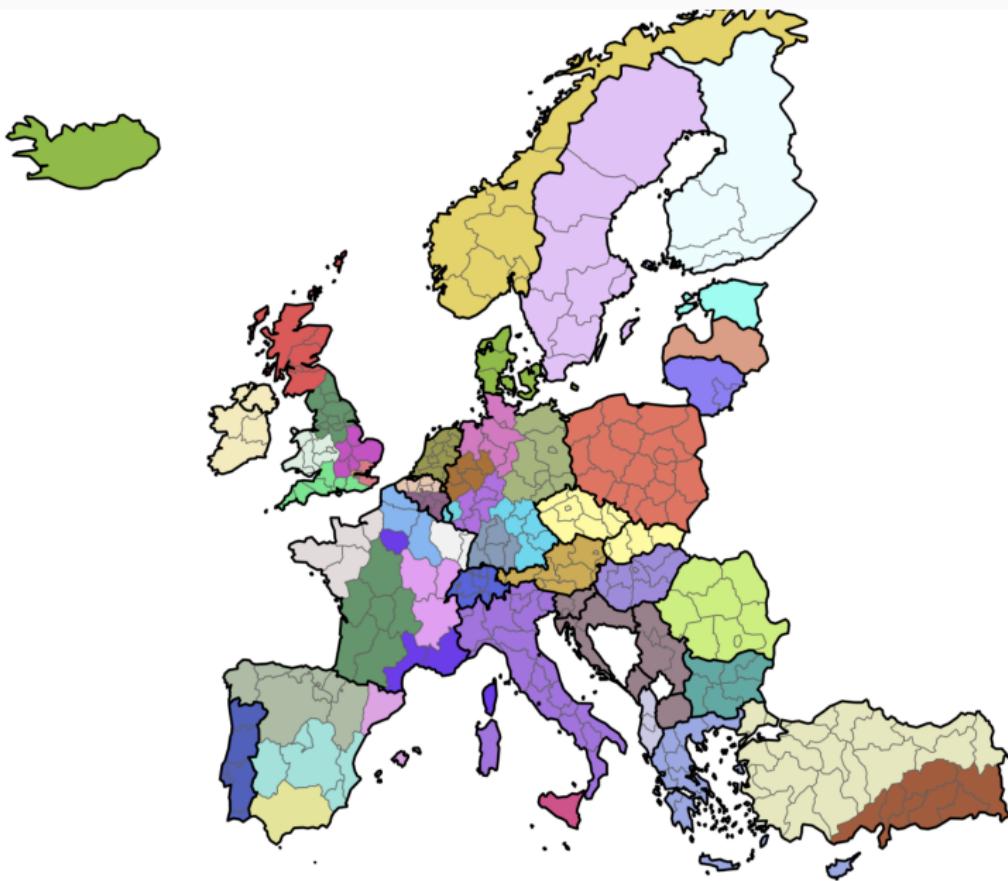
Clustering Communities by Connectedness

- Another exploratory approach: generate communities with strong intra-community connections
- Do this by maximizing within-community pairwise SCI
- Use simple hierarchical agglomerative clustering ($\text{dist.} = 1/\text{SCI}$)

20 Socially Connected Communities



50 Socially Connected Communities



Socially Connected Communities

- 20 Communities
 - Line-up very well with country borders
 - Only one non-contiguous cluster: Outer London West w/ Romania
 - Includes Burnt Oak, large Romanian immigrant community
 - Cross-country connections line-up with historical borders:
Yugoslavia; Czechoslovakia; UK & Ireland; Denmark & Iceland
- 50 Communities
 - Sub-national linguistic communities
 - Belgium into French and Dutch speaking
 - Spain into Catalan and Andalusian speaking
 - Well-heeled residents in Ile-de-France & French Riviera
 - Czechoslovakia and Yugoslavia remain; East & West Germany split

Determinants of Social Connectedness: Regression Framework

- Exploration suggests importance of: migration, political borders (past & present), geographic distance, language, other demographics
- Next, look systematically using regression framework

$$\log(SocialConnectedness_{ij}) = \beta_0 + \beta_1 \log(d_{ij}) + X_{ij} + \psi_i + \psi_j + \epsilon_{ij}$$

- d_{ij} = Geographic distance
- X_{ij} = Similarity across demographics; same/border country
- ψ_i, ψ_j = FEs by region (control for regional FB usage)

Determinants of Social Connectedness

	Dependent Variable: log(SocialConnectedness)		
	(1)	(2)	(3)
log(Distance in KM)	-1.318*** (0.046)	-0.558*** (0.053)	-0.582*** (0.041)
Same Country		2.896*** (0.077)	1.651*** (0.124)
Border Country			0.285*** (0.044)
Δ Share Pop Low Edu (%)			-0.013*** (0.002)
Δ Median Age			-0.017*** (0.004)
Δ Avg Income (k €)			0.053*** (0.003)
Δ Unemployment (%)			-0.000 (0.005)
Same Religion			0.027 (0.031)
Same Language			1.493*** (0.097)
Industry Similarity			0.128 (0.169)
NUTS2 FEs	Y	Y	Y
R ²	0.490	0.669	0.745
Number of Observations	75,900	75,900	75,900

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- Takeaway 1: ↑ Geographic distance → ↓ Connectedness

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- Takeaway 2: Country borders predict connectedness (above dist.)

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- Takeaway 3: Homophily by edu, age, religion, language, industry

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- Takeaway 4: ↓ Income/employment similarity → ↑ Connectedness
 - Somewhat surprising (due to migration?)

Historical Determinants of Social Connectedness

- In exploratory analyses, historical borders seemed important in shaping *present* connections
- A regression approach:
 - Map present NUTS2 region to past borders (using max area overlap)
 - Add 10 major historical European border changes to our regression
- As with previous results, somewhat hard to pin-down causality

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- **Takeaway:** Historical borders — even back to early 1900s! — correlate w/ modern patterns of connectedness (full results in paper)

Conclusion

- *Social Connectedness Index* = unique measure to overcome measurement challenges in many social science applications
- Geographic distance, political borders (past & present), migration, and homophily shape patterns of European social connectedness
- Online Appendix explores some *effects* of European connectedness
 - Pairwise-connectedness predicts train travel flows
 - Share of connections within country predicts anti-EU sentiment
- Many opportunities for future research
 - Data available for U.S. counties; Europe NUTS3; GADM1 or GADM2 in much of the rest of the world

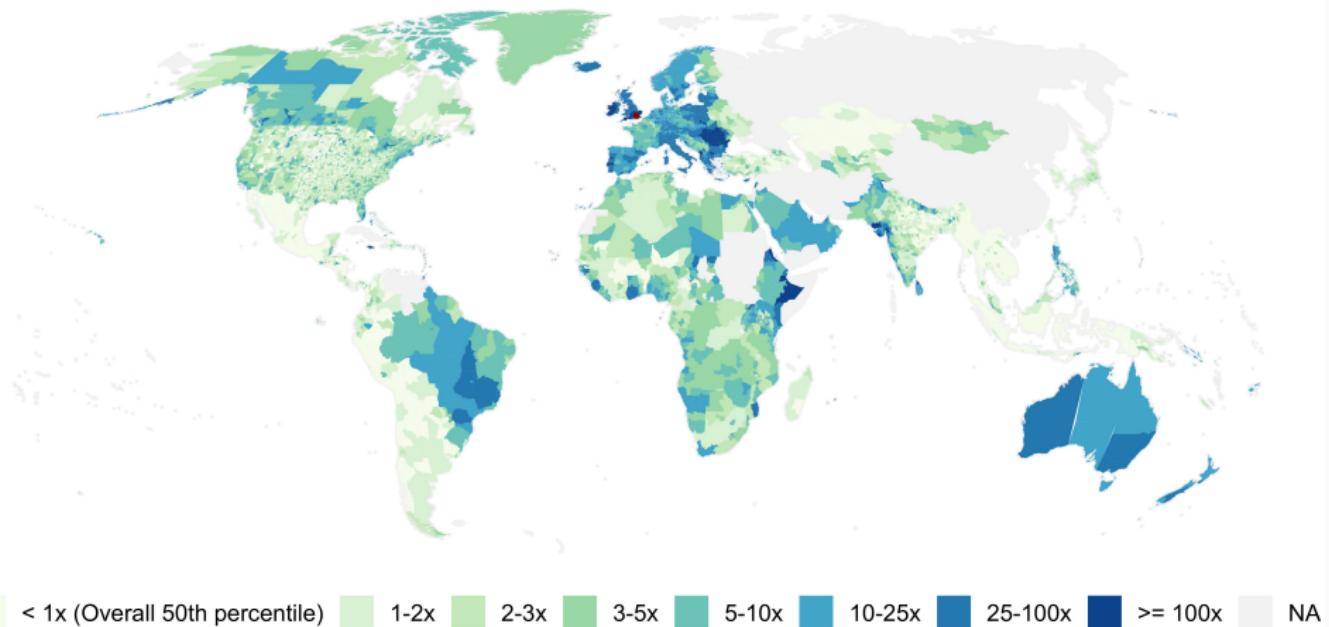
Data: <https://data.humdata.org/dataset/social-connectedness-index>

Example Code: <https://github.com/social-connectedness-index>

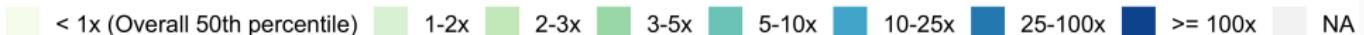
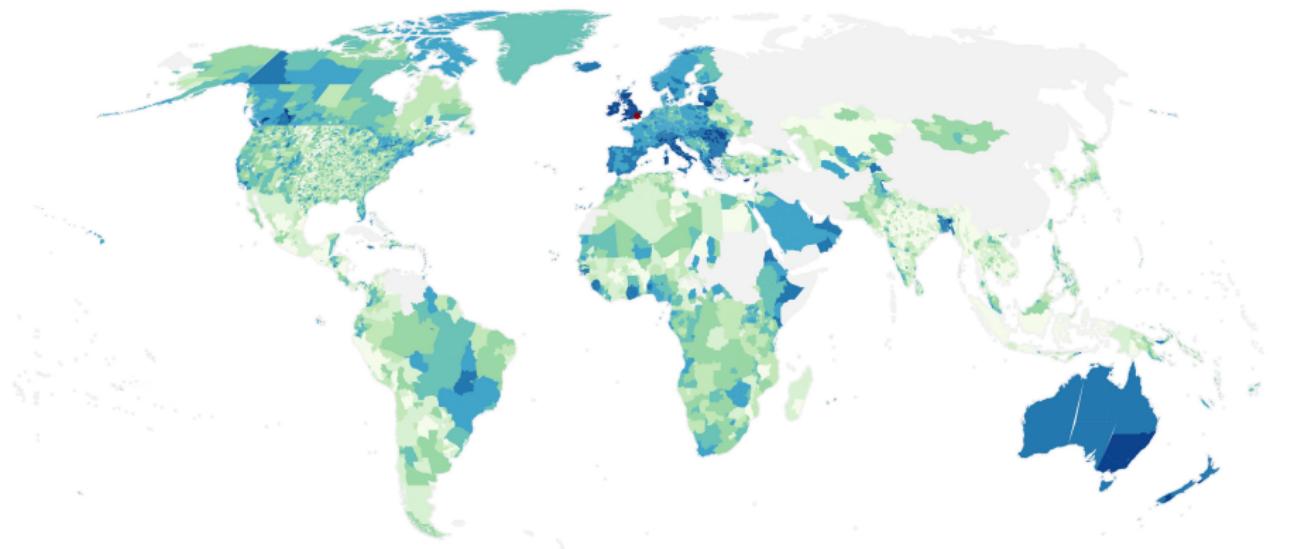
Other SCI examples: London

- Brent, London
 - Includes West Oak, a densely Romanian immigrant community
 - Some of largest communities from Brazil and Western India in UK
- Tower Hamlets, London
 - Largest Bangladeshi community in UK (32% of borough)

Brent, London to the World



Tower Hamlets, London to the World

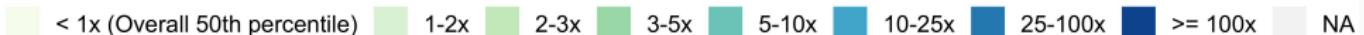
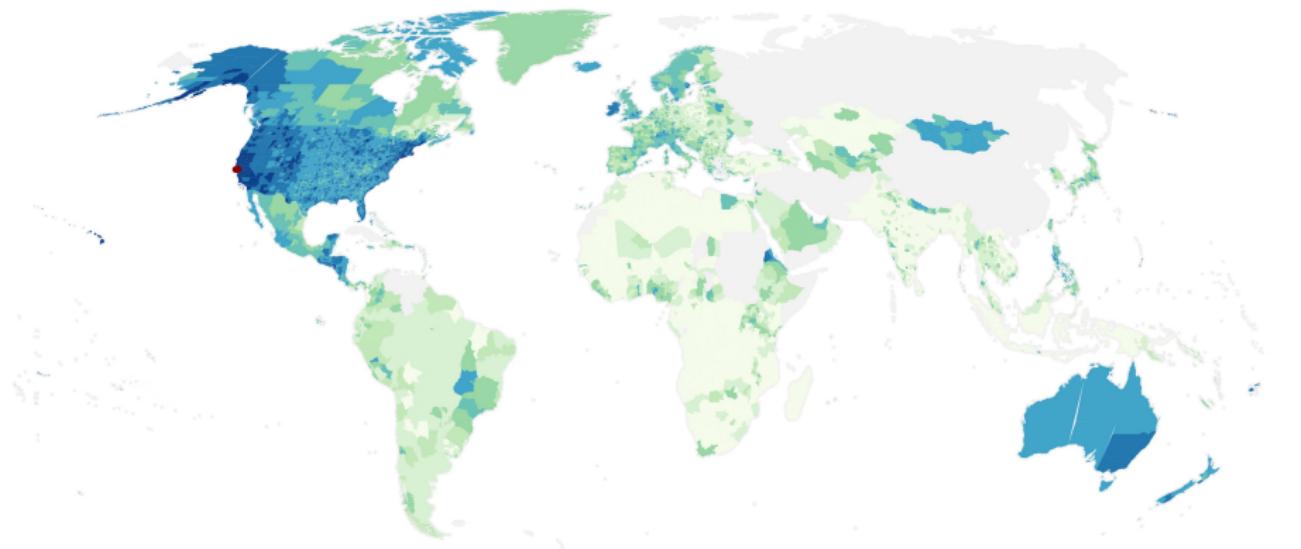


Other SCI examples: San Francisco & Kern Counties

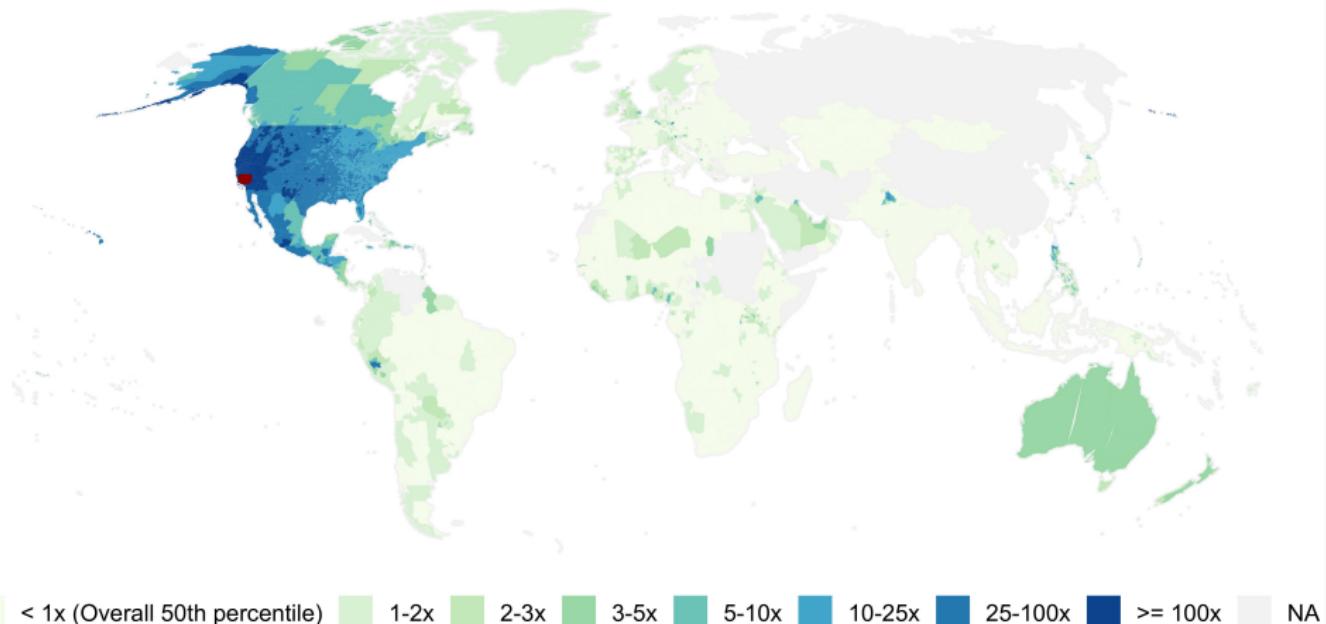
- San Francisco County, CA
 - Median Household Income: \$72,947
 - Median age: 39 years
 - Share non-Hispanic White: 41.9%
 - Share Hispanic: 15.1%
 - Share Black: 6.1%
 - Share Asian: 33.3%

- Kern County, CA
 - Median Household Income: \$48,021
 - Median Age: 32 years
 - Share non-Hispanic White: 49.5%
 - Share Hispanic: 38.4%
 - Share Black: 6.0%
 - Share Asian: 3.4%

Other SCI examples: San Francisco County to the World



Other SCI examples: Kern County to the World



Other SCI examples: SCI in San Francisco & Kern Counties

- San Francisco County, CA
 - Stronger connections to US east coast, western Europe (esp. Ireland), Australia, and Mongolia
- Kern County, CA
 - Stronger connections to western Mexico (consistent with large Hispanic population) and close-by areas in California
 - Connections to Oklahoma (Dust Bowl migration) and North Dakota (oil boom)
 - Generally less connected to rest of US and world

Historical Determinants of Social Connectedness - Results

	Dependent Variable: log(SocialConnectedness)				
	(1)	(2) 1990	(3) 1960	(4) 1930	(5) 1900
Border Country	0.418*** (0.045)	0.399*** (0.045)	0.392*** (0.045)	0.372*** (0.045)	0.310*** (0.043)
Both Czechoslovakia		3.525*** (0.217)	3.529*** (0.217)	3.541*** (0.216)	2.945*** (0.217)
Both Yugoslavia		3.108*** (0.105)	3.110*** (0.105)	3.123*** (0.105)	2.616*** (0.114)
Both West Germany		0.006 (0.046)	0.005 (0.046)	0.015 (0.044)	-0.005 (0.043)
Both East Germany		1.088*** (0.053)	1.092*** (0.053)	1.072*** (0.055)	1.124*** (0.050)
Both Soviet Union		1.884*** (0.080)	1.874*** (0.081)	1.882*** (0.081)	2.052*** (0.077)
Both United Kingdom 1960			1.015*** (0.155)	1.016*** (0.156)	0.998*** (0.157)
Both Germany 1930				0.465*** (0.104)	0.159** (0.063)
Both Austro-Hungarian Empire 1900					0.920*** (0.111)
Both German Empire 1900					0.492*** (0.074)
Both United Sweden-Norway					2.057*** (0.123)
All Table 1 Controls Indiv. Same Country FEs	Y Y	Y Y	Y Y	Y Y	Y Y
R ²	0.784	0.790	0.791	0.792	0.801
Number of Observations	75,900	75,900	75,900	75,900	75,900

- Persistent relationship between political borders and connectedness

References

References

-  Bailey, Michael and Cao, Rachel and Kuchler, Theresa and Stroebel, Johannes and Wong, Arlene
Social connectedness: Measurements, determinants, and effects.
Journal of Economic Perspectives, 2018.