Robust networks make resilient regions

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Motivation

Britain 'facing highest risk of recession since 2007'

Policy may be constrained by the fact Bank has already deployed its tools to curtail the last recession

▲ Mark Carney warned there had been a sea change in the world's markets driven by pessimism about the economic outlook. Photograph: Reuters

The New York Times

'We are living through the first economic crisis of the Anthropocene'

Forget the butterfly effect, this is the bat effect – our stranglehold on nature has unleashed the coronavirus outbreak. And the pandemic is forcing us to rethink how to run our networked world

▲ Where do we go from here? The Bank of England on Threadneedle Street during the lockdown. Photograph: Antonio Olmos/The Observer

The New York Times

UK's poorest to fare worst in age of automation, thinktank warns

Machines threaten jobs generating £290bn in wages and could widen inequality gap, according to IPPR

▲ The IPPR suggests factory workers are likely to be among those losing their jobs or facing fewer hours due to automation. Photograph: Toshifumi Kitamura/AFP/Getty Images

The New York Times

TheUpshot

The Most Important Least-Noticed Economic Event of the Decade

A localized recession in manufacturing-heavy areas can explain a lot of things.

CRISIS AND CONSEQUENCES

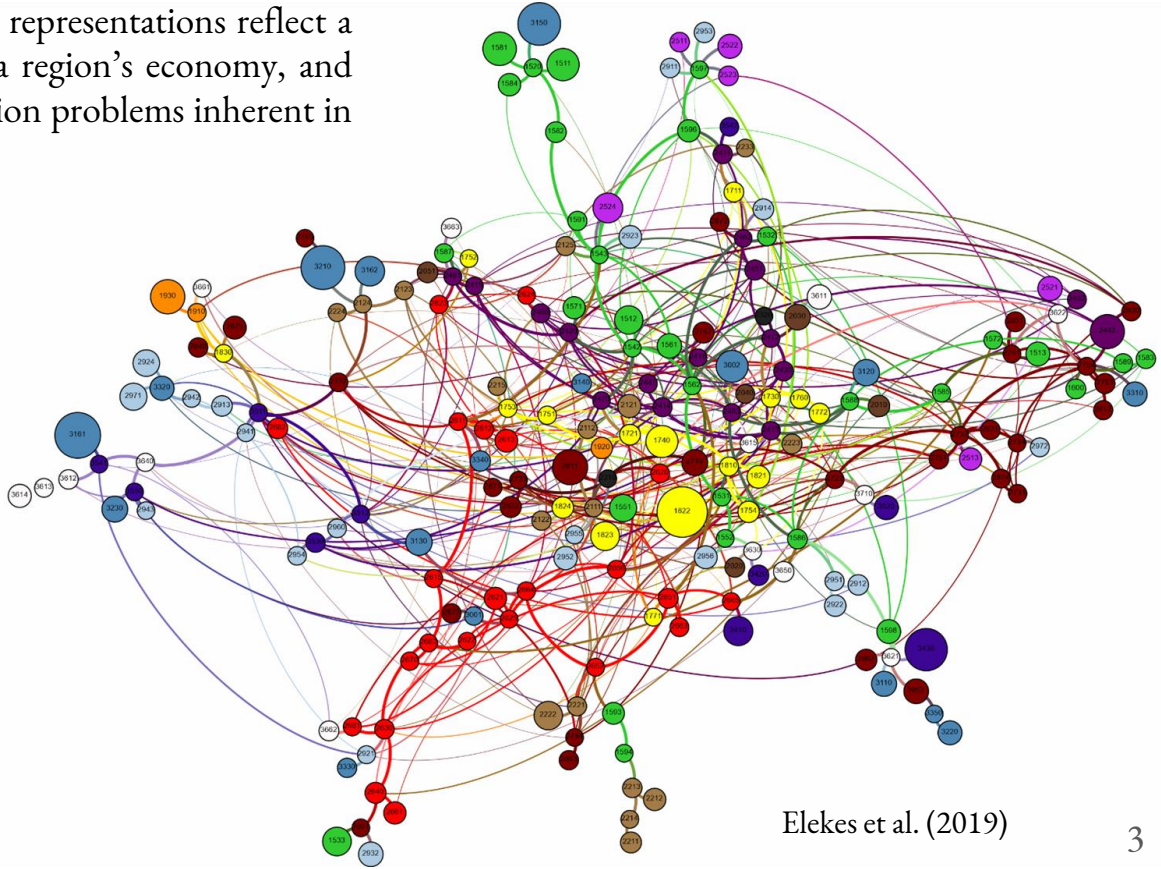
The Great Recession Knocked Them Down. Only Some Got Up Again.

Markets Are Shaken by New Signs of Global Economic Trouble

Background

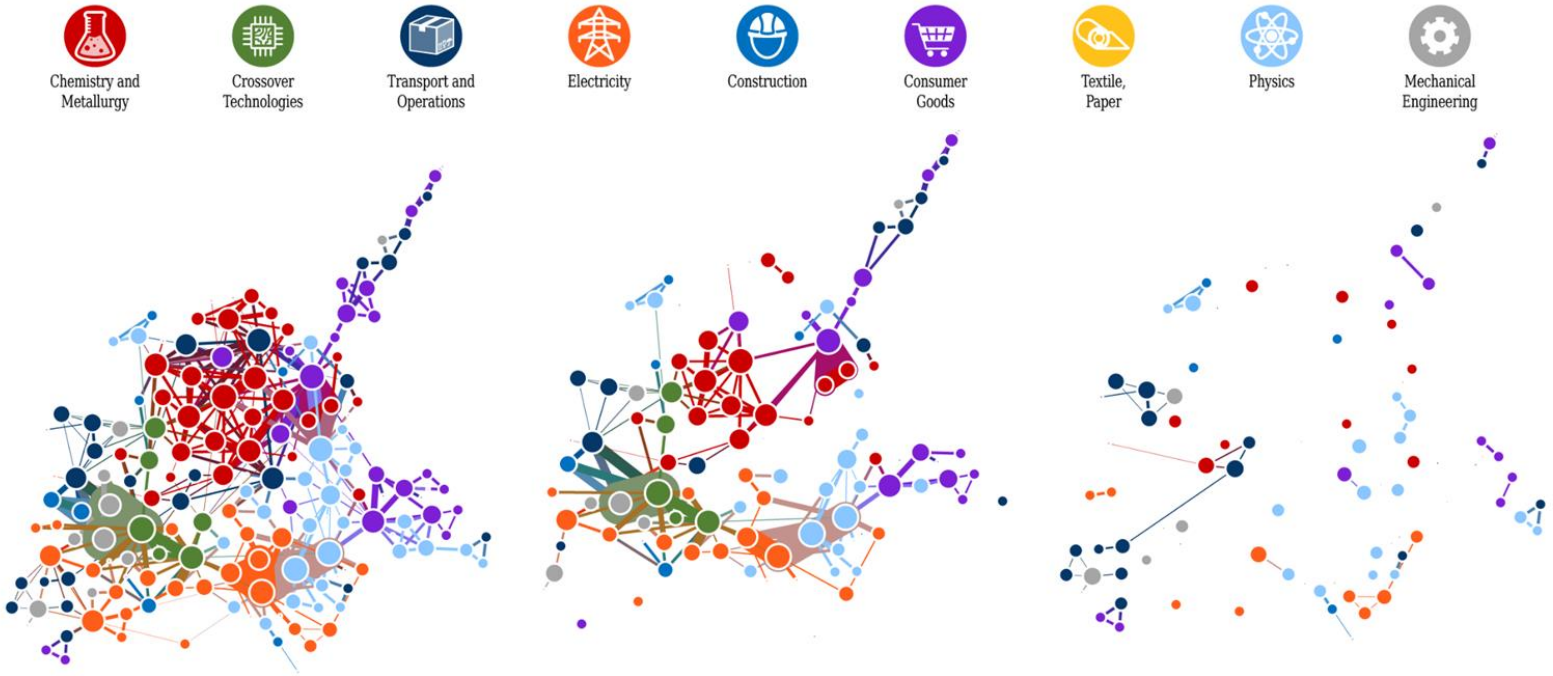
Extending on Shutters et al. (2018): network representations reflect a division of labour between the elements of a region's economy, and links reflect solutions to particular co-ordination problems inherent in the production of goods and services.

"[...] in the regional resilience literature, it is remarkable **how little attention has been paid to the sensitivity of regional networks to the removal of specific nodes or the dissolution of particular linkages**. One can depict a regional economy as a knowledge network in which the nodes stand for **industries/technologies** and the ties reflect the degree of technological relatedness between these nodes." Boschma (2015, pp. 714)



Elekes et al. (2019)

Research design



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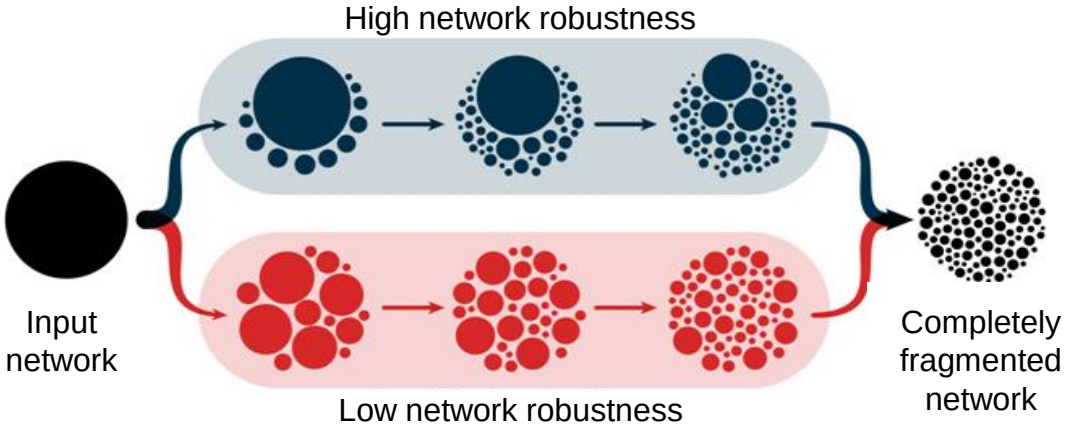

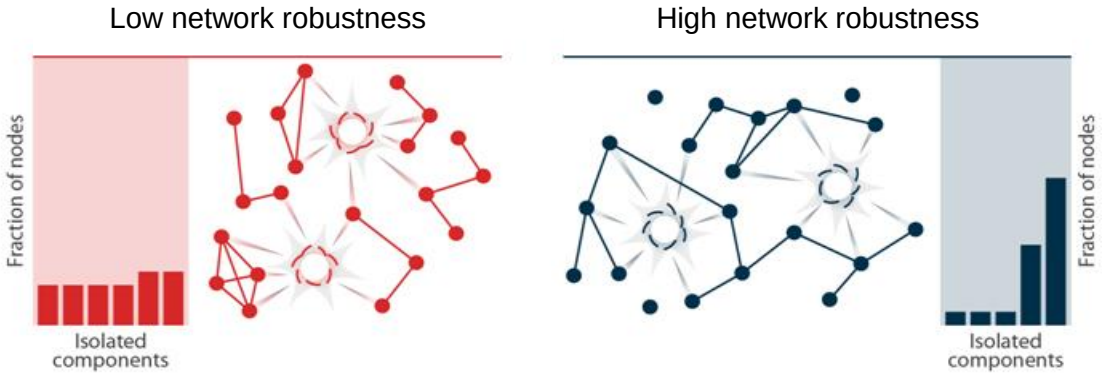

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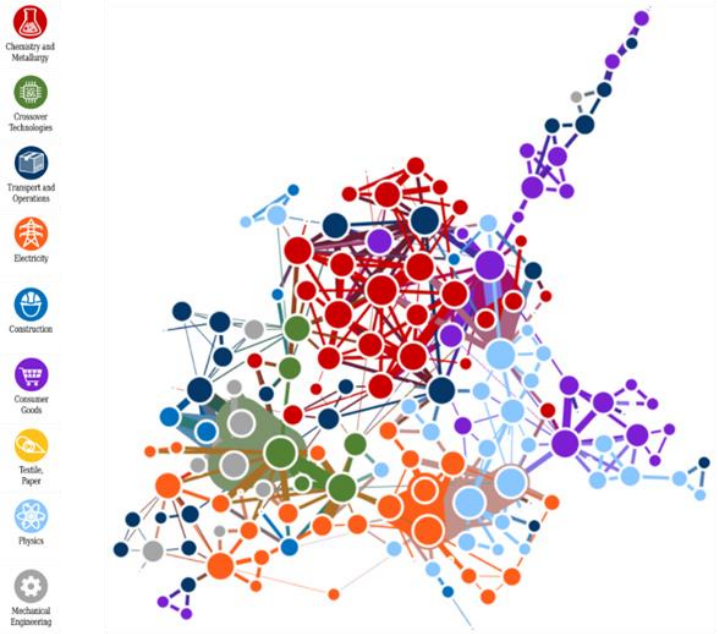
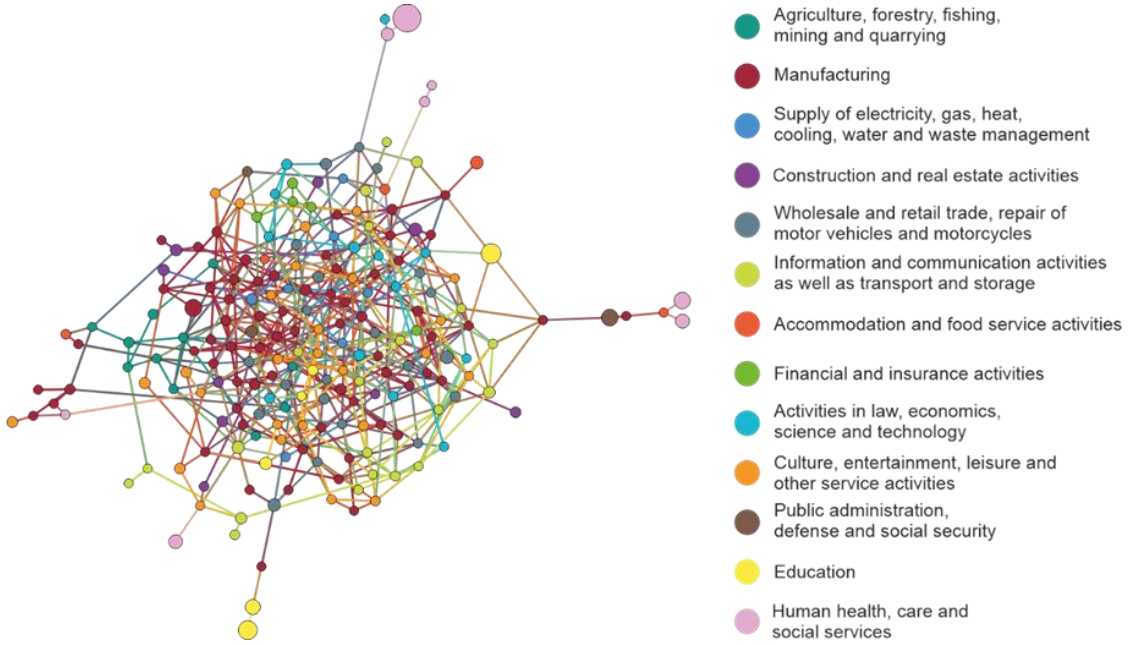
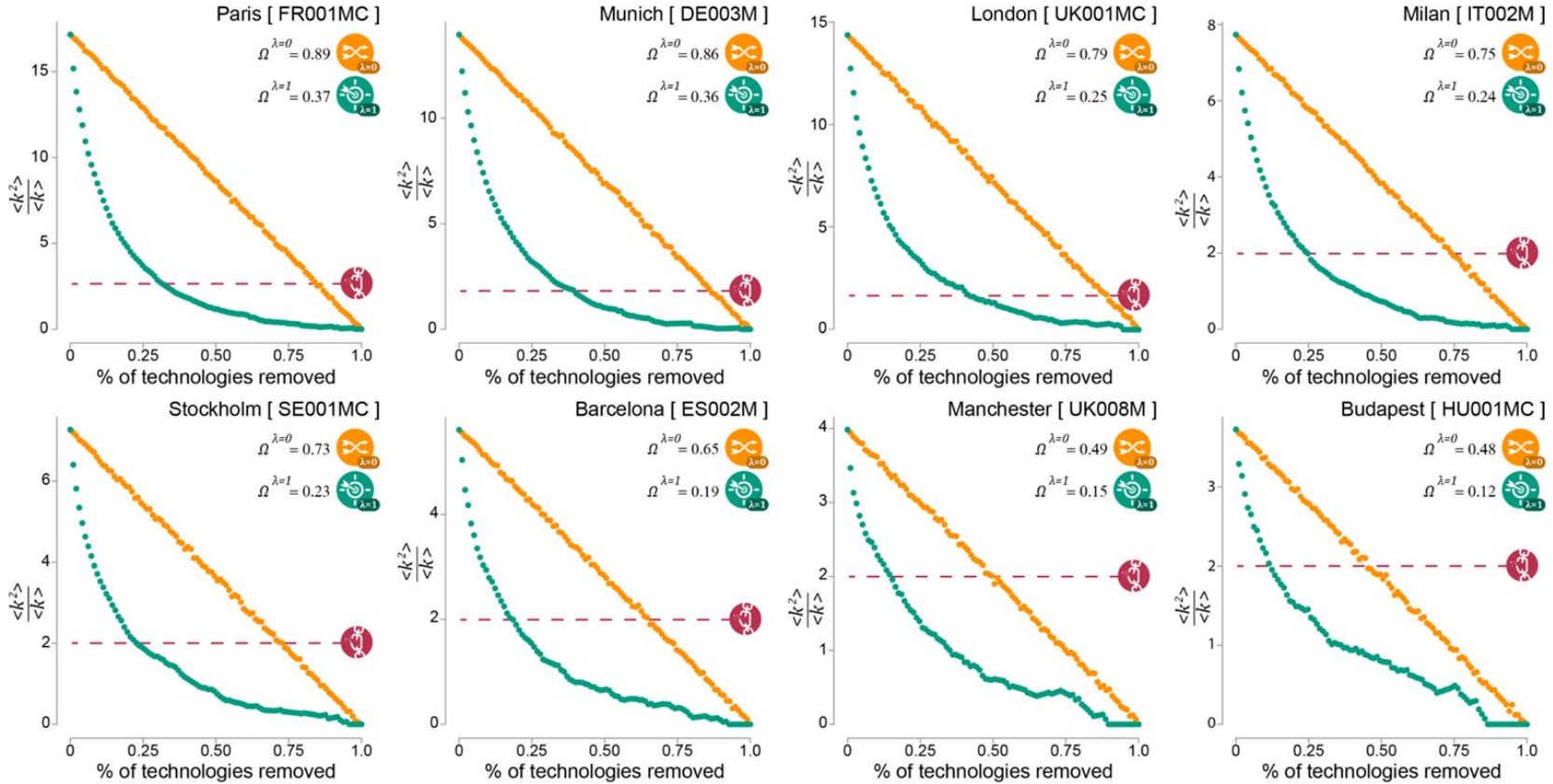


Dublin's technology space

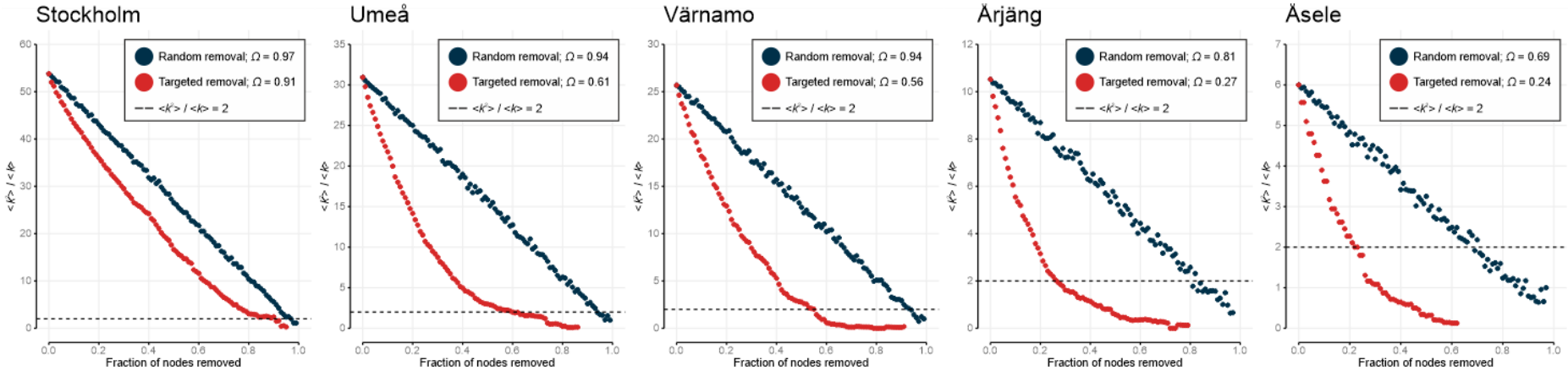


Umeå's local skill-relatedness networks

Results


Paris [FR001MC]
$\Omega^{\lambda=0} = 0.89$
$\Omega^{\lambda=1} = 0.37$
Munich [DE003M]
$\Omega^{\lambda=0} = 0.86$
$\Omega^{\lambda=1} = 0.36$
London [UK001MC]
$\Omega^{\lambda=0} = 0.79$
$\Omega^{\lambda=1} = 0.25$
Milan [IT002M]
$\Omega^{\lambda=0} = 0.75$
$\Omega^{\lambda=1} = 0.24$
Stockholm [SE001MC]
$\Omega^{\lambda=0} = 0.73$
$\Omega^{\lambda=1} = 0.23$
Barcelona [ES002M]
$\Omega^{\lambda=0} = 0.65$
$\Omega^{\lambda=1} = 0.19$
Manchester [UK008M]
$\Omega^{\lambda=0} = 0.49$
$\Omega^{\lambda=1} = 0.15$
Budapest [HU001MC]
$\Omega^{\lambda=0} = 0.48$
$\Omega^{\lambda=1} = 0.12$
$\frac{\langle k^2 \rangle}{\langle k \rangle}$
% of technologies removed

Results


Stockholm
Random removal; Ω = 0.97
Targeted removal; Ω = 0.91
<k²> / <k> = 2
<k²> / <k>
Fraction of nodes removed
Umeå
Random removal; Ω = 0.94
Targeted removal; Ω = 0.61
<k²> / <k> = 2
<k²> / <k>
Fraction of nodes removed
Värnamo
Random removal; Ω = 0.94
Targeted removal; Ω = 0.56
<k²> / <k> = 2
<k²> / <k>
Fraction of nodes removed
Ärjäng
Random removal; Ω = 0.81
Targeted removal; Ω = 0.27
<k²> / <k> = 2
<k²> / <k>
Fraction of nodes removed
Åsele
Random removal; Ω = 0.69
Targeted removal; Ω = 0.24
<k²> / <k> = 2
<k²> / <k>
Fraction of nodes removed

Results

	Dependent variable: Employment Growth					
	European Metro Regions Technology Network				Swedish FA Regions Industry SR Network	
	All sectors	Industry	All sectors	Industry	All sectors	All sectors
	(1)	(2)	(3)	(4)	(5)	(6)
$\Omega^{\lambda=0}$	0.0594	0.1046***			2.0601**	
	(0.038)	(0.036)			(0.914)	
$\Omega^{\lambda=1}$			0.1618**	0.2487***		0.4840**
			(0.076)	(0.079)		(0.239)
Constant	1.2078***	1.4034***	1.1993***	1.3947***	0.301	0.9182***
	(0.140)	(0.174)	(0.139)	(0.176)	(0.260)	(0.046)
Clustered SE	Yes	Yes	Yes	Yes	No	No
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Mean VIF	3.38	3.38	3.12	3.12	11.96	7.31
R^2	0.209	0.191	0.216	0.195	0.282	0.272
Adj. R^2	0.184	0.166	0.192	0.170	0.239	0.229
Observations	269	269	269	269	72	72

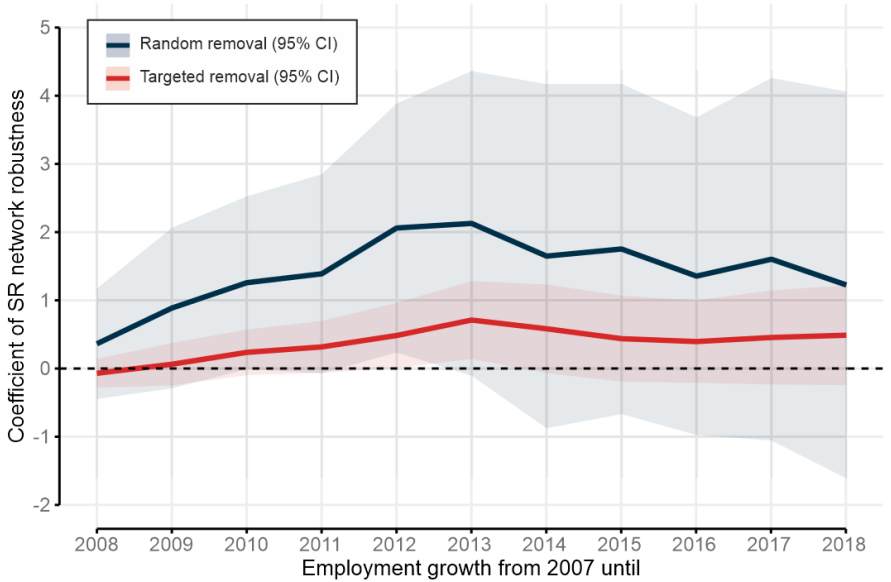
Note: standard errors in parentheses; * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Results

Regression results on employment rate change in the 2008-2015 period.

	(1)	(2)	(3)	(4)
	All sectors	Industry	All sectors	Industry
$\Omega^{\lambda=0}$	0.0576 (0.036)	0.0880** (0.039)		
$\Omega^{\lambda=1}$			0.1284 (0. 084)	0.1646** (0.079)
Constant	1.1257*** (0.155)	1.1377*** (0.205)	1.2485*** (0.155)	1.1365*** (0.208)
Controls	Yes	Yes	Yes	Yes
Clustered SE	Yes	Yes	Yes	Yes
R^2	0.200	0.167	0.203	0.165
Adj. R^2	0.175	0.141	0.178	0.139
Observations	265	265	265	265

Note: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. Data for four Bulgarian and Romanian regions (Varna, Craiova, Constanta, and Galati) were not available for 2015.



Conclusions

(1) Solutions to coordination problems of both technological and labour force capabilities show heterogeneous capacity to withstand disturbances.

(2) Validated for the case of a grand recession. In particular, technology network robustness of European metro areas associated positively with employment rate change most prominently in industry. Robustness of skill-related industries in Swedish local labour markets also positively associated with employment growth.

(3) Findings go beyond urban areas.

(4) Robustness of static network representations proved more important in the resistance stage of a crisis in particular.

Robust networks make resilient regions

Thank you!

Tóth G., Elekes Z., Whittle, A., Lee, C., & Kogler, D. F. (2020): Technology network structure conditions the economic resilience of regions. *Papers in Evolutionary Economic Geography*, No. 2048. University Utrecht, Faculty of Geosciences.

Elekes Z., Tóth G., Eriksson, R. (2021-22): Robust skill-relatedness networks of industries make resilient regions. *On the way...*

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