

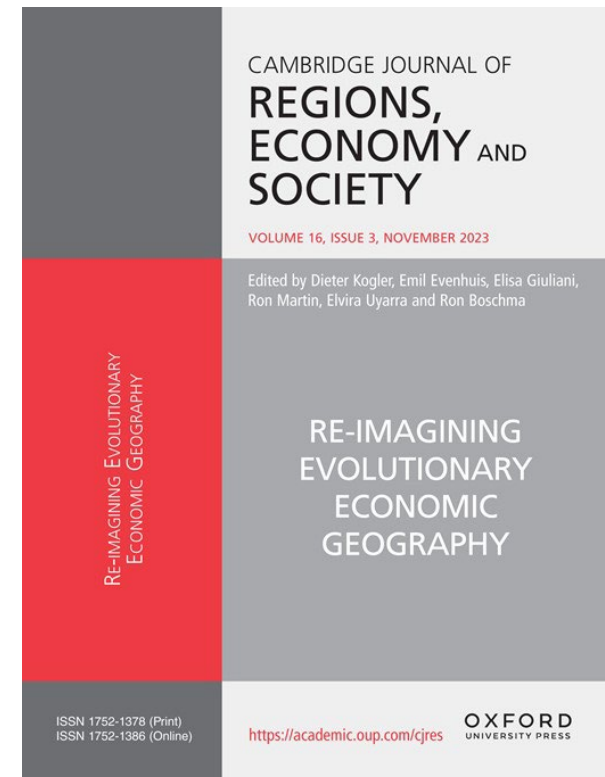
# Advancing our Understanding of Lock-ins in Economic Geography

Han Chu & Robert Hassink  
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Economic geography "... is concerned with concrete questions about the location and distribution of economic activity, the role of uneven geographical development and processes of local and regional economic development. It asks the key questions of 'what' (the type of economic activity), 'where' (location), 'why' (requiring explanation) and 'so what' (referring to the implications and consequences of particular arrangements and processes)" (MacKinnon & Cumbers 2019, 15).

Lock-ins and path dependence play a role in several paradigms and perspectives, but particularly in evolutionary economic geography



However, lock-ins have been used in a relatively narrow way, focusing on issues around regional economic restructuring, particularly in old industrial areas, using classical economic indicators

Meanwhile, economic geography has new orientations because of changing societal developments and needs and related directionality: tackling grand societal challenges, such as climate change, and related sustainability transitions, in which lock-ins and path dependence play a prominent role, as well.

Rethinking and advancing lock-ins in economic geography

## 1 Introduction

## 2 Manual review

- Origin of the concept: technological lock-ins
- The application of the concept in economic geography
- Extension to path literature
- Path dependence and lock-in

## 3 Bibliometric analysis

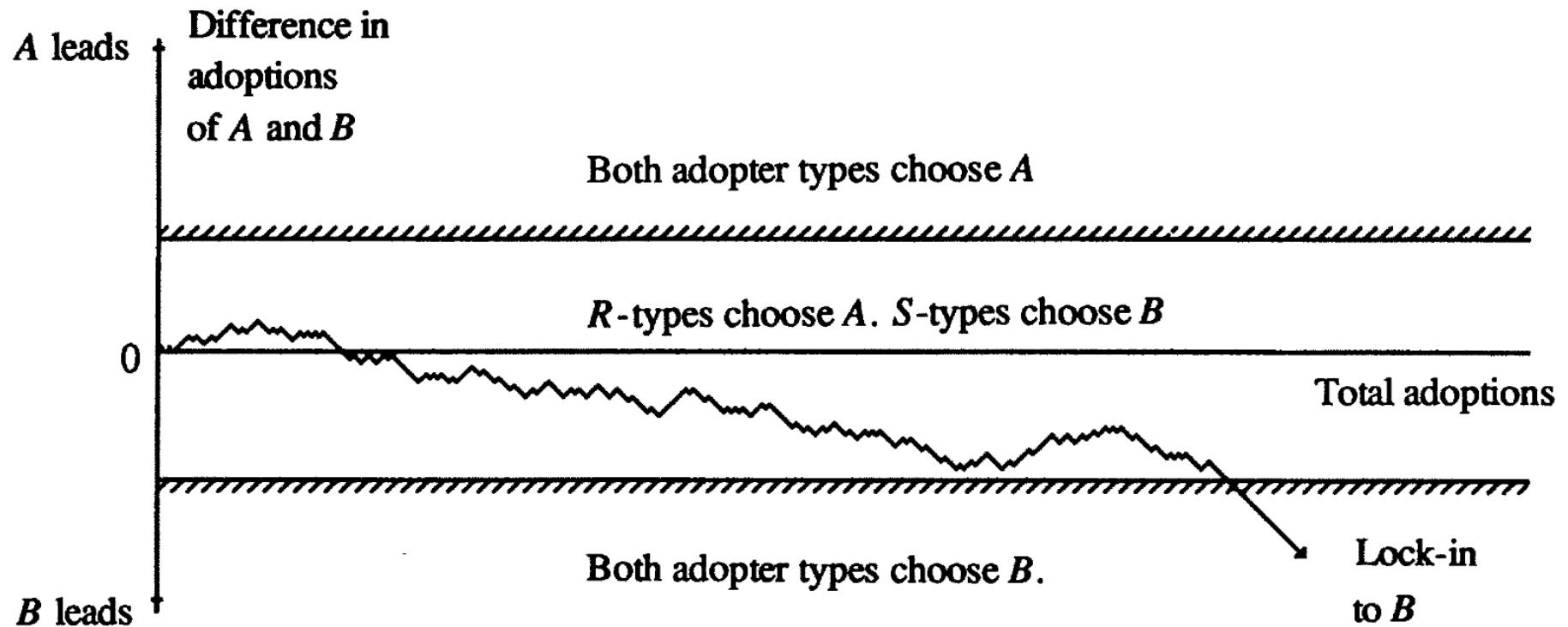
- Output trend
- Research fields

## 4 Conclusions

## Technological Lock-ins

QWERTY Keyboard: Despite more efficient alternatives, the QWERTY layout remains standard due to historical adoption.

Source: David, 1985



**Path dependence and lock-ins of a technology under increasing returns**

Source: Arthur 1989

# Perspectives by David and Arthur

## *Processes Generating Lock-in in the Canonical Path Dependence Model*

---

### David's Model "Network Externalities"

1. *Technical interrelatedness* (the reinforcing effects of complementarity and compatibility among the different components of a technology and its use)
2. *Economies of scale* (the benefits associated with the increasing use of a technology—such as a decline in user costs—as the technology gains in acceptance relative to other systems)
3. *The quasi-irreversibility of investments* (the difficulties of switching technology-specific capital and human skills to alternative uses)

### Arthur's Model "Increasing Returns Effects"

1. *Large initial fixed setup costs* (in effect the inertia of sunk costs)
  2. *Dynamic learning effects* (learning by doing or using and learning by interaction tend to entail positive feedbacks)
  3. *Coordination effects* (which confer advantages to going along with other economic agents taking similar actions)
  4. *Self-reinforcing expectations* (when the increased prevalence of a product, technology, process, or practice enhances beliefs of further prevalence)
- 

**Positive effects:** Promotes growth and success through increasing returns and positive externalities.

**Negative effects :** Leads to rigidity, inflexibility, and relative economic decline.

## Relationship Between Path Dependence and Lock-in

- Path dependence describes the process where historical events and decisions shape the evolution of a system.
- **Lock-in is a potential outcome of path dependence**, where the system becomes entrenched in a particular state.

## Driving Mechanisms

- **Increasing returns, network effects, learning effects, and sunk costs** drive both path dependence and lock-in.
- As these mechanisms accumulate, they create barriers to switching paths, leading to lock-in.

## Contrasting Focus

- Path dependence highlights how **past decisions influence current trajectories**.
- Lock-in emphasizes **the stability and persistence of these trajectories**.
- Path dependence allows for the possibility of change.
- Lock-in represents a situation where change is significantly constrained.

“A basic issue is that local and regional economies, and the industries of which they are composed, differ in substantial and significant ways from the technologies and examples discussed by David and Arthur” (Martin 2010, 12)

„ ... the basic model needs reworking to accommodate the empirical variety and complexity found in the economic landscape” (Martin 2010, 12)



# Types of regional lock-ins

- **Functional Lock-ins:**

Based on hierarchical firm relations

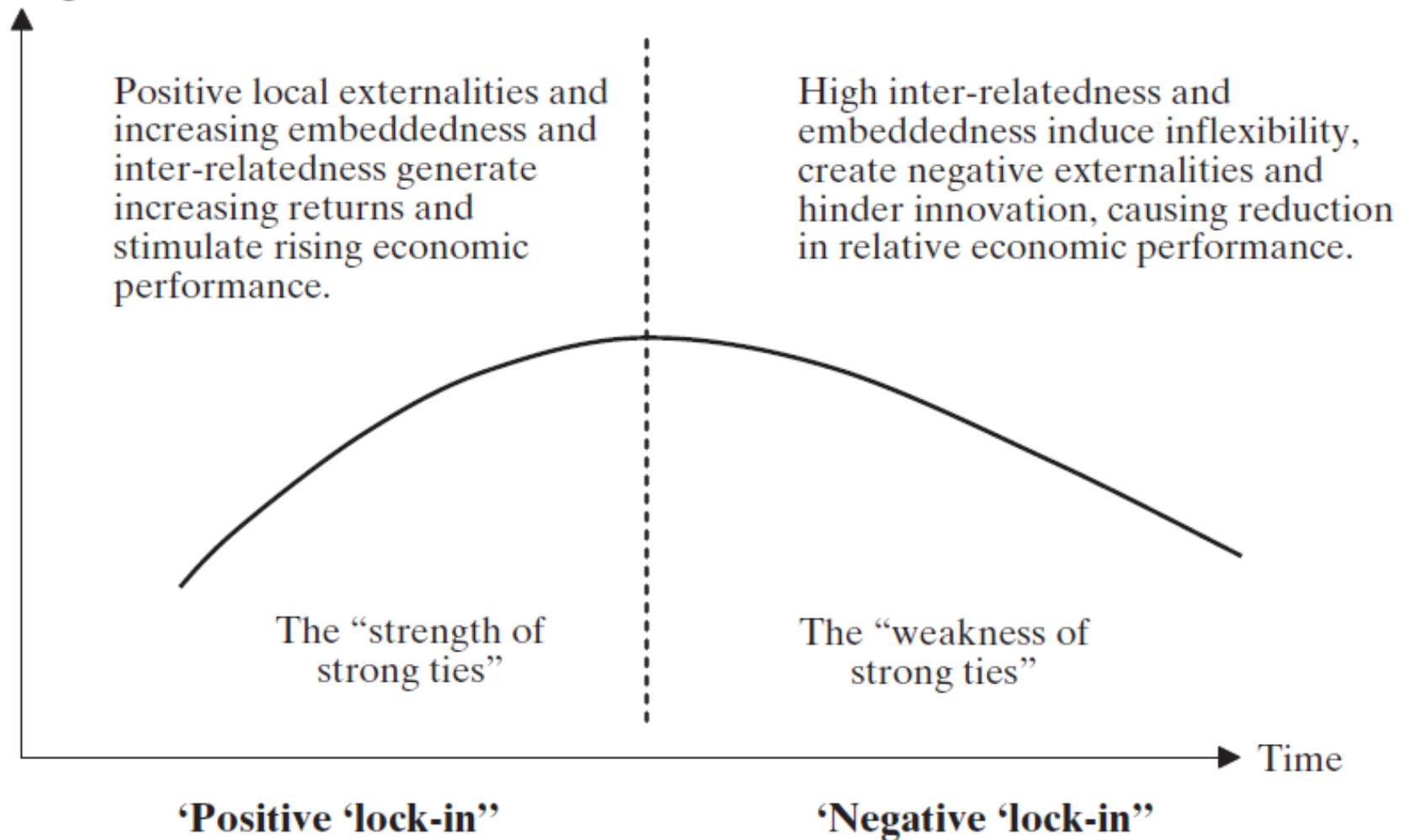
- **Cognitive Lock-ins:**

Consisting of a common worldview

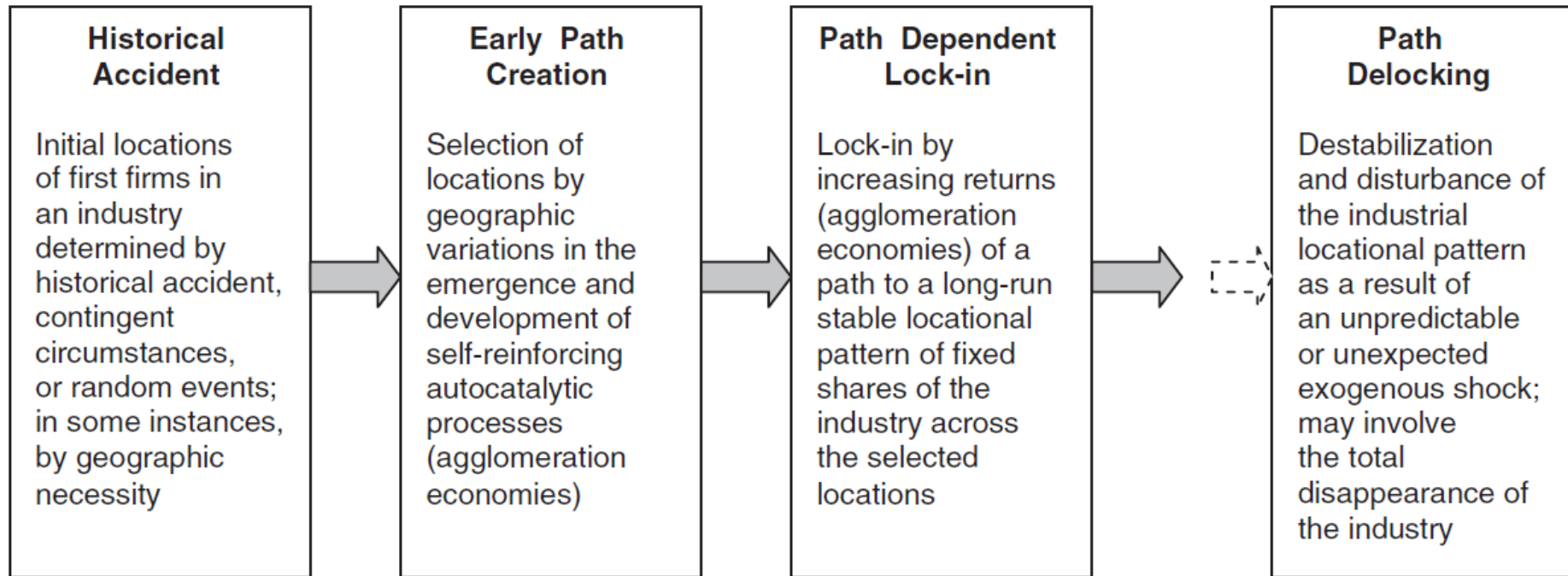
- **Political Lock-ins:**

A thick and dense institutional structure that hampers restructuring

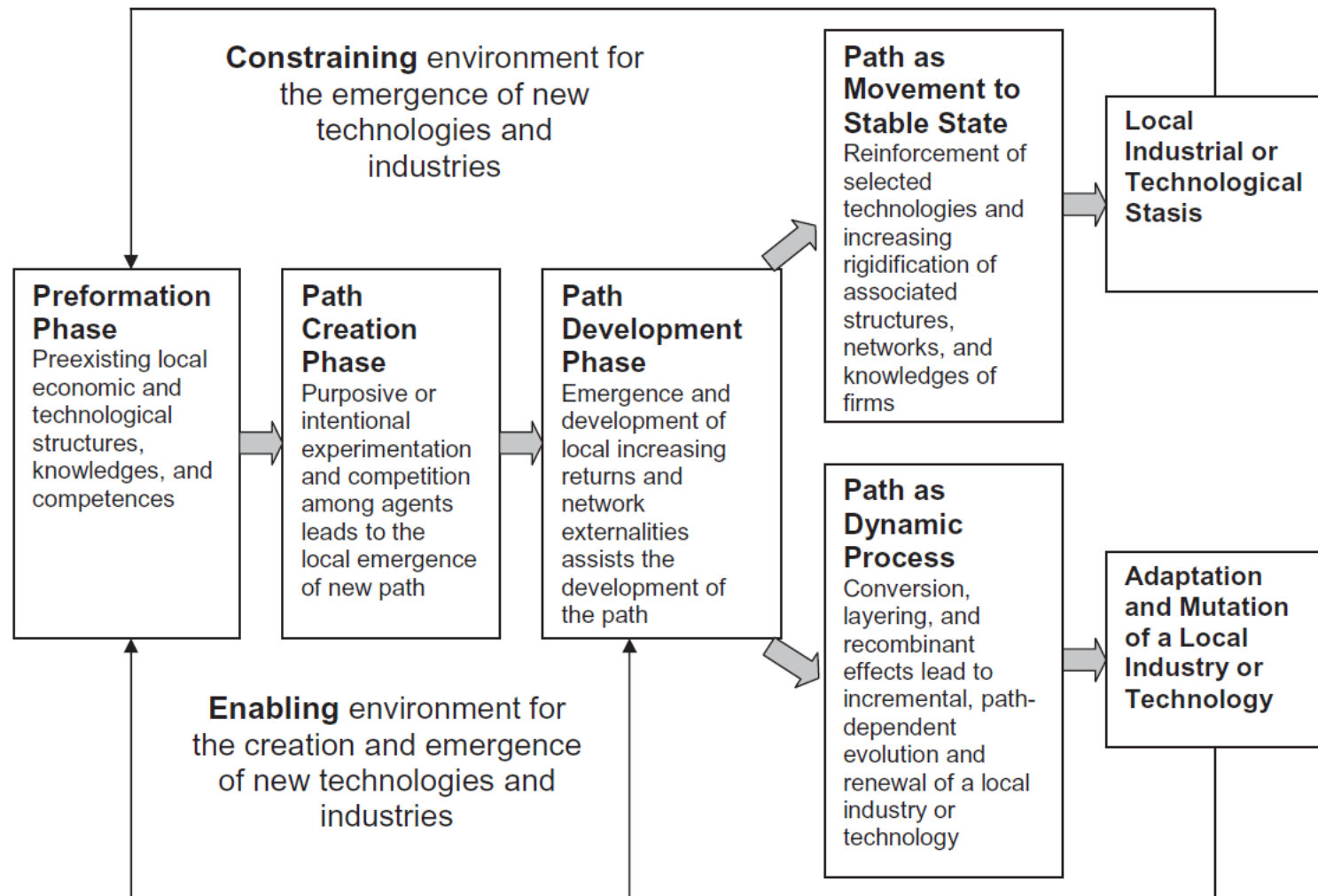
## Regional Relative Economic Performance



Source: Martin & Sunley 2006



Source: Martin 2010



“Indeed, the notion of path dependence, or some variant of it, is now employed in **anthropology, history, political science, sociology, economics and management studies** (see Hirsch and Gillespie, 2001; Magnusson and Ottosson, 1997)”.

“Thus, we find the concept being applied to topics as diverse as **decision-making and social behavior** (Anderlini and Ianni, 1996; Goldstone, 1998); industrial organization (Antonelli, 1997); **power generation technologies** (Cowan, 1990; Cowan and Hulten, 1996); **pest control programmes** (Cowan and Gunby, 1996); **industrial technology strategies** (Ruttan, 1997; Araujo and Harrison, 2002); **technological leadership** (Redding, 2002); **corporate governance** (Bebchuk and Roe, 1999); **legal systems and social institutions** (North, 1990); **historical sociology** (Goldstone, 1998; Mahoney, 2000); and **politics and state intervention** (Bridges, 2000; Pierson, 2000; Dimitakopoulos, 2001; Magnusson, 2001).”



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World Development


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Development Review

# Unlocking “lock-in” and path dependency: A review across disciplines and socio-environmental contexts

[Jenny E. Goldstein](#)<sup>a</sup> , [Benjamin Neimark](#)<sup>d</sup>  ,

[Brian Garvey](#)<sup>c</sup> , [Jacob Phelps](#)<sup>b</sup> 

Discipline	Term/Concept	Definition
A. Economics	Path dependency	Technologies and economic systems heavily determined by historical events
B. Sociology	Behavioral lock-in	Behavior (e.g., of consumers) is “stuck” by factors such as habit, culture, or organization, into an inefficient or sub-optimal arrangement. These patterns/outcomes can often be traced to specific historical events.
C. Political science	Institutional path dependence/ junctures; new institutionalisms; informal governance and norms	The timing and sequence of political junctures shape institutional decisions that are then too costly to reverse
D. Development studies	Path dependence & poverty traps	Specific institutional arrangements become entrenched and make efforts to change difficult
E. Energy studies	Carbon lock-in	Interlocking technological, institutional, and social forces; policy inertia

F. Political ecology	Marginalization; structural uneven development; maladaptation	Sub-optimal choices observed as a factor of uneven development, marginality of peasants, and other forms of social differentiation
G. Agrarian studies	Interlocking factor markets; debt traps; poverty traps; land dispossession	Powerful social agents control capital and create interlocking relations with rural communities that shape livelihoods and wellbeing
H. Socio-environmental Systems	Panarchy; maladaptive rigidity traps; complexity theory; path re- orientation	Socio-environmental systems are pushed into fundamentally new states due to exogenous factors <i>contra</i> lock-in



Themes emerging across disciplinary literature:

1. Spatial scale

2. Temporality

3. Structural unevenness

Quotes:

Goldstein et al. 2023, 12

“the lock-in concept has much to offer to identify, analyze, and find solutions to seemingly intractable socio-environmental problems”

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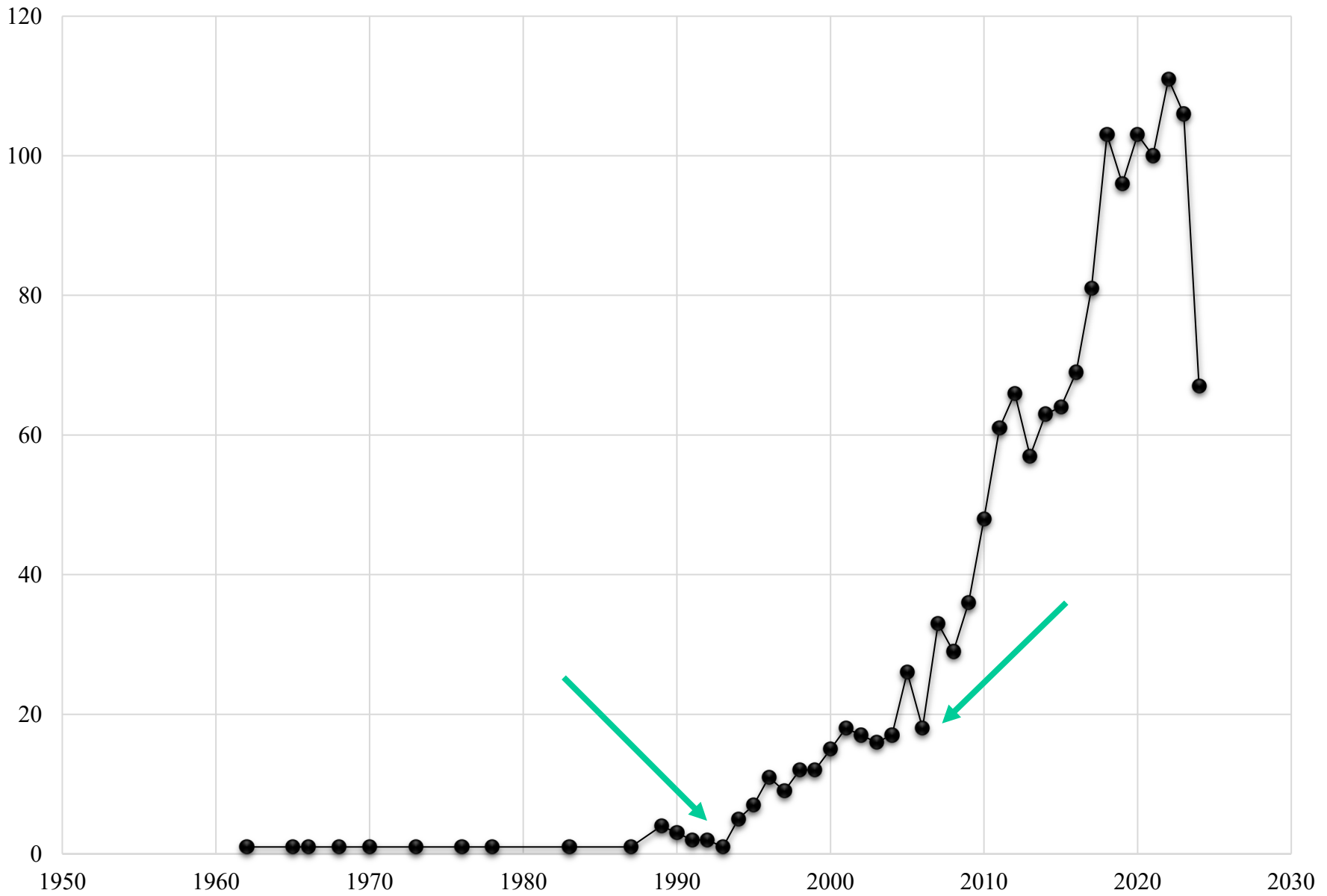
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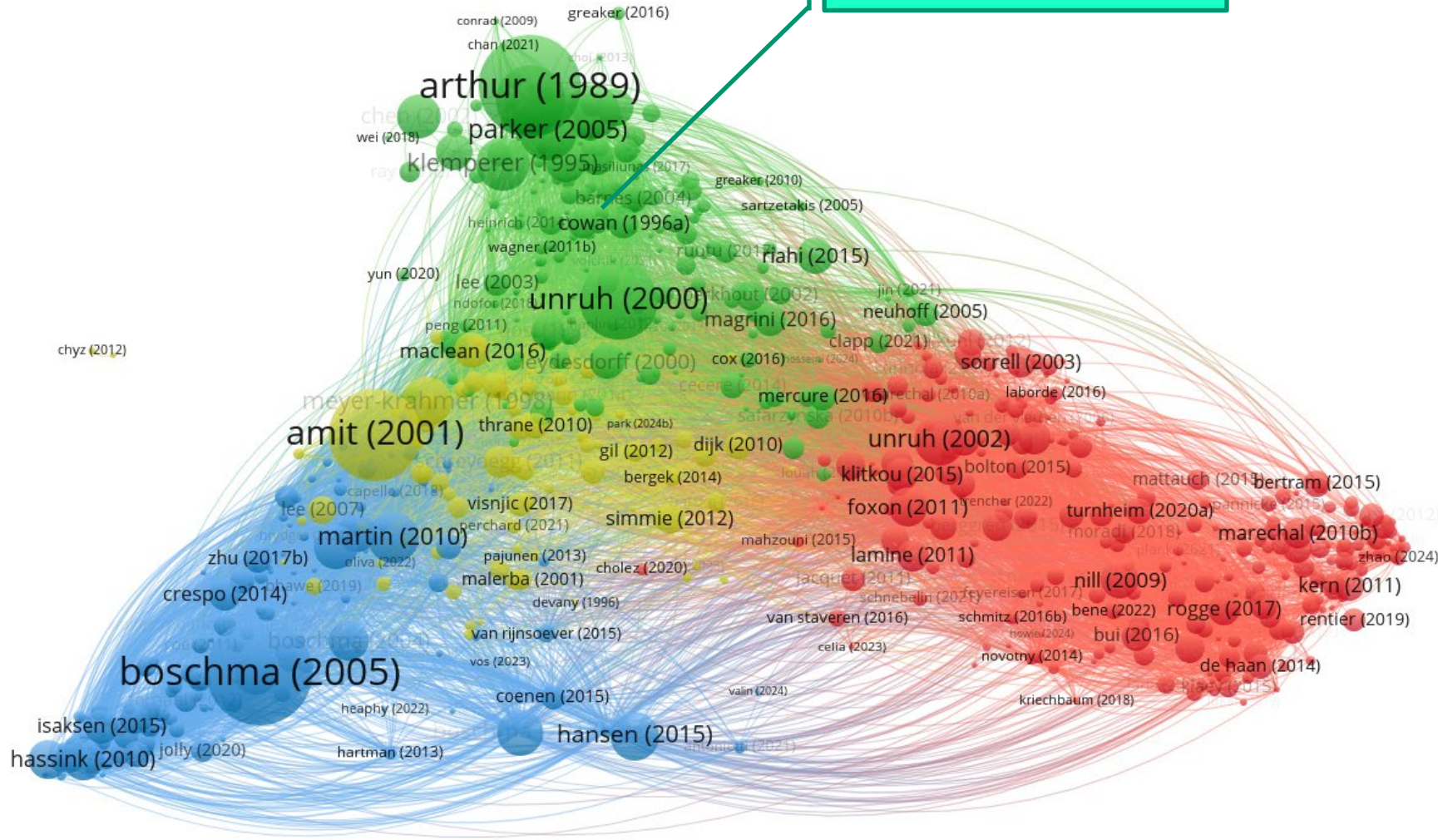
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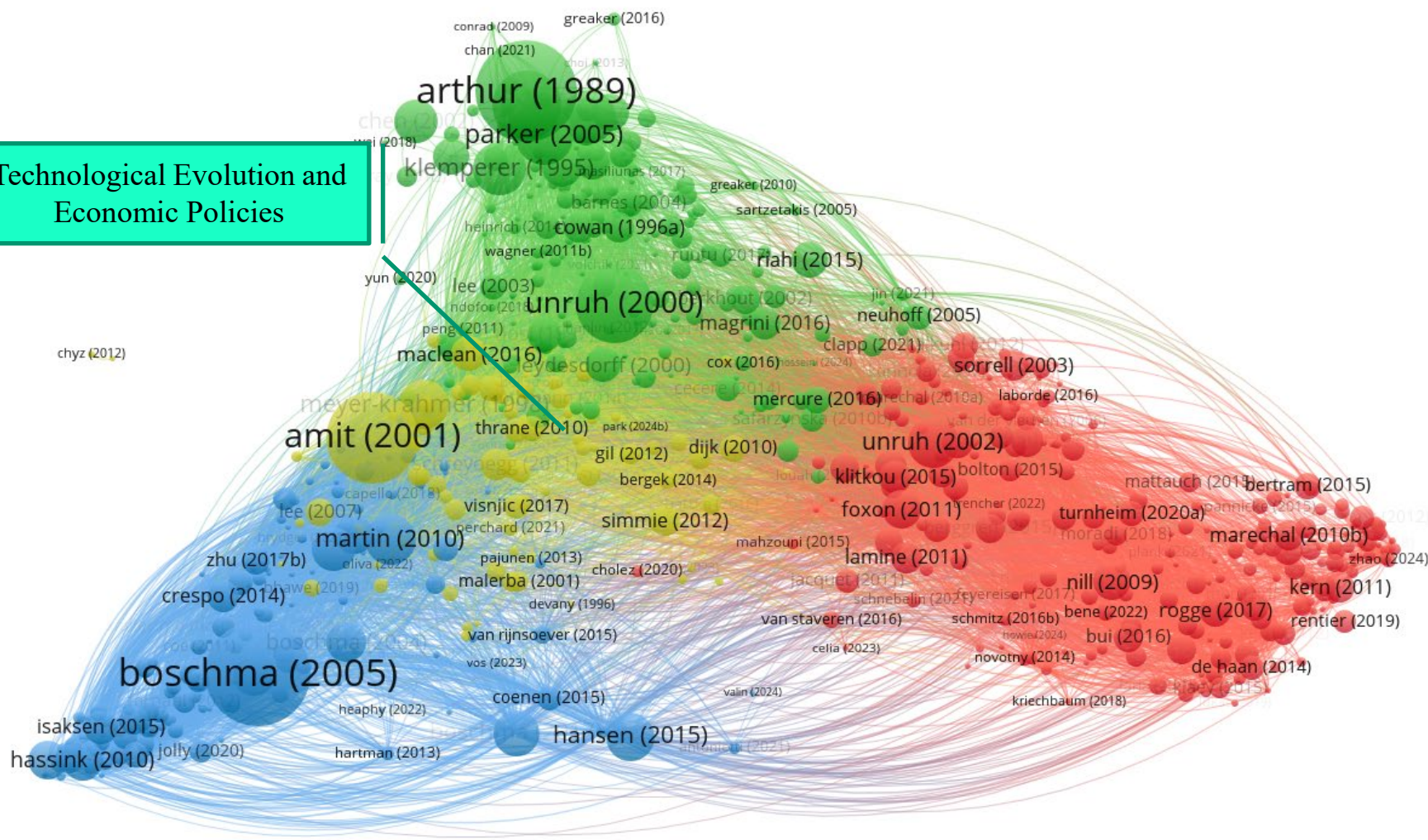




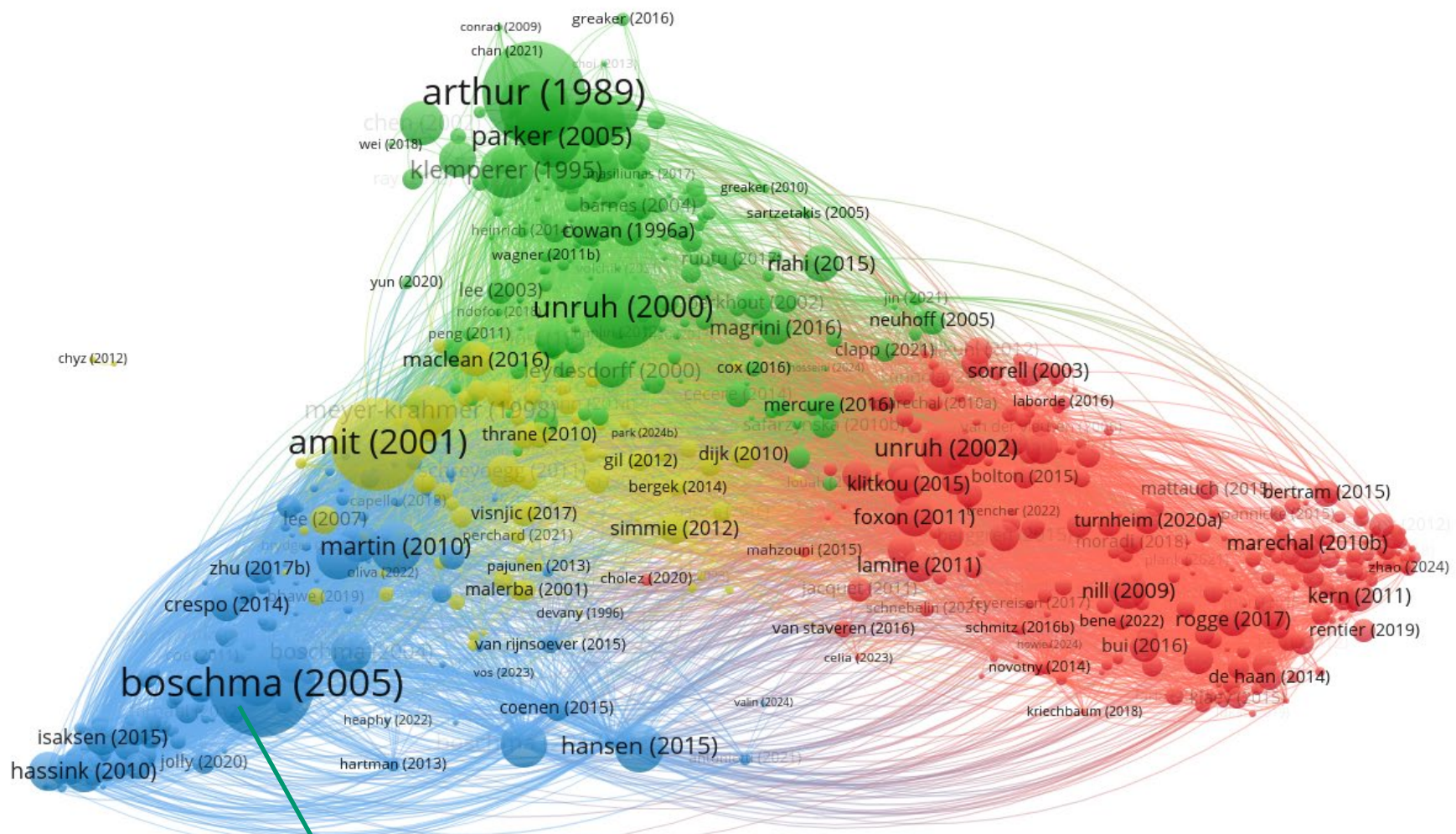
Behavioral and Systemic Lock-ins



Technological Evolution and Economic Policies







Regional Innovation and  
Economic Geography





## Conclusions

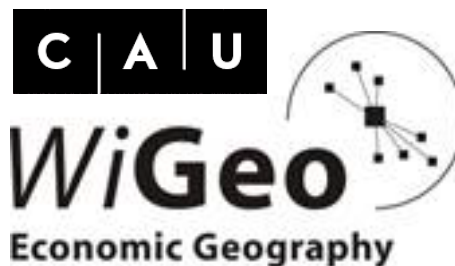
- In our view, lock-ins in economic geography are certainly not obsolete, but they are now important in new fields
- Example of successful introduction and adaptation of a concept from a neighboring discipline
- Like Goldstein et al. (2023) we see particular potential by emphasizing positionality, scale, temporality and structural unevenness, as well as unlocking lock-ins and path breaking
- Bibliometric analysis can help to advance lock-ins in economic geography, by identifying bridges with other social disciplines

# Many thanks!

## Han Chu & Robert Hassink

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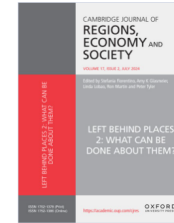
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Volume 17, Issue 2

July 2024

### Rethinking Path Dependence and Lock-Ins in Regions, Economy and Society

The *Cambridge Journal of Regions, Economy and Society* is accepting submissions to a forthcoming special issue, titled 'Rethinking Path Dependence and Lock-Ins in Regions, Economy and Society', edited by Han Chu, Robert Hassink, Ron Martin, Peter Sunley, and Gregory Unruh.

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Volume 3, 2018 - Issue 2

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Original Articles

# The restructuring of old industrial areas in East Asia

 Robert Hassink , Xiaohui Hu , Dong-Ho Shin, Sakura Yamamura  & Huiwen Gong 

Pages 185-202 | Received 13 Mar 2017, Accepted 30 Nov 2017, Published online: 22 Dec 2017

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## ABSTRACT

The shift of manufacturing industry from Japan, the first industrializing nation in East Asia, to neighbouring South Korea and China saw the emergence of restructuring problems and policies in traditional industries and regional economies depending on them. Based on a literature review on this topic in East Asia, this paper draws three conclusions. First, the resource endowments of the three countries differ greatly and consequently also the magnitude of restructuring problems. Second, governments in all three countries strongly affect restructuring processes, albeit with different policies and at different spatial scales. Third, although many studies have a strongly applied, policy-oriented character, recent research, particularly in China, has started to use evolutionary theories and to engage with debates of mainstream economic geography.



Volume 11, Issue 1

March 2018

## Article Contents

Abstract

From hectoring to revenge

The dominant narrative

Places that matter and places that don't matter


# The revenge of the places that don't matter (and what to do about it)


Andrés Rodríguez-Pose ✉


*Cambridge Journal of Regions, Economy and Society*, Volume 11, Issue 1, March 2018,  
 Pages 189–209, <https://doi.org/10.1093/cjres/rsx024>


**Published:** 23 January 2018

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## Abstract

Persistent poverty, economic decay and lack of opportunities are at the root of considerable discontent in declining and lagging-behind areas the world over. Poor development prospects and an increasing belief that these places have “no future” — as economic dynamism has been posited to be increasingly dependent on agglomeration economies — have led many of these so-called “places that don't matter” to revolt against the status quo. The revolt has come via an



Countering the geography of discontent

STRATEGIES FOR

LEFT-BEHIND

PLACES



Guardian 2017: "A map of [Trump's] support ... coordinates ... with deindustrialization and despair, with the zones of economic misery that 30 years of Washington's freemarket consensus have brought the rest of America".

Economist 2016: "That resentment can motivate votes against the institutions of globalisation. Just as America's Midwest helped carry Mr Trump to power, Brexit triumphed thanks to support from deindustrialising places like Middlesbrough and Wolverhampton. The liberalminded are learning that they ignore regional disparities at their peril".

## Recent relevant international research projects:

- Regional growth against all odds (ReGrow)
- Agents of change in old industrial regions in Europe (ACORE)
- Beyond "left behind places"



Further areas of application:

Restructuring in the agricultural sector

Migrant entrepreneurship

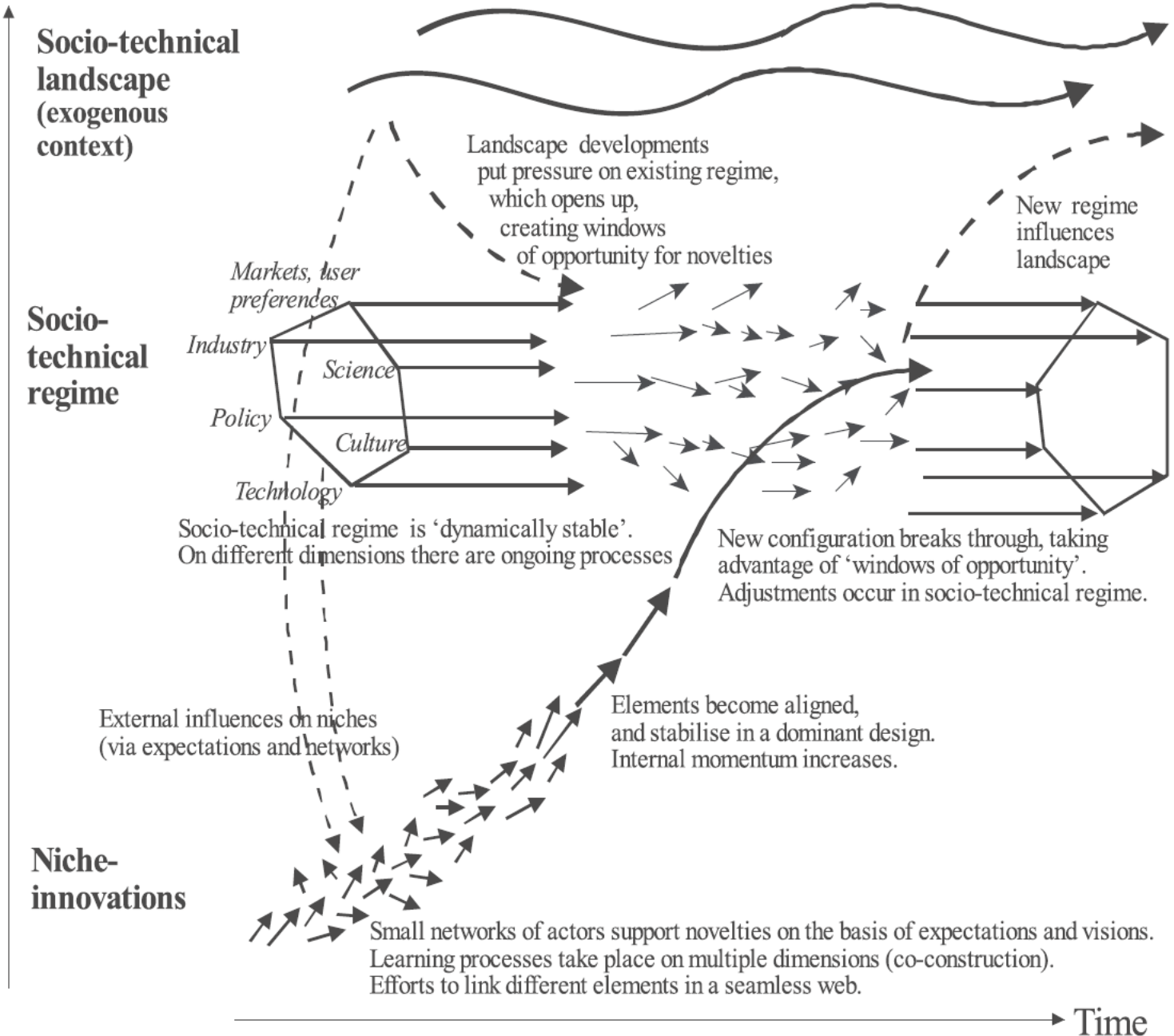
Lock-ins and crises, such as COVID 19: *bouncing back or bouncing better forward* (transformative resilience)

“A path dependent process or system is one whose outcome evolves as a consequence of the process’s or system’s own history” (Martin & Sunley 2006, 399)

*path dependence* is not *past dependence* (contingency) but it is strongly related to *place dependence* (context)

**Lock-ins:** introduced into economic geography by Gernot Grabher (1993) in his seminal study on the Ruhr area

“Lock-in is this notion that most fully captures the idea that **the combination of historical contingency and the emergence of self reinforcing effects**, steers a technology, industry or regional economy along one ‘path’ rather than another” (Martin 2010, 3)



Source: Geels, 2020

## 4. Conclusions

In our view, Lock-ins in economic geography are certainly not obsolete:

- Example of successful introduction and adaptation of a concept from a neighbouring discipline: location specific, context specific, multi-scalar, simultaneously generalizable mechanisms
- Plays a role in pathway literature
- Renewed interest in structurally weak regions
- New areas of application, especially sustainability transition

Hassink (2010): textile, shipbuilding, Westmünsterland,  
Mecklenburg Vorpommern

Fornahl et al. (2012): Shipbuilding, offshore wind energy,  
Northern Germany

Weig (2016): Chemical industry, Brunsbüttel, Germany

Mossig & Schieber (2016): packaging machinery industry,  
Mittelhessen, Schwäbisch Hall

Greco & Di Fabbio (2014): steel industry, South Italy

Underthun et al. (2014): mining, Grenland, Norwegen

Evenhuis (2017): Steel, Saarland, Teesside

Other empirical examples:

Safford (2009): steel, Youngstown, USA

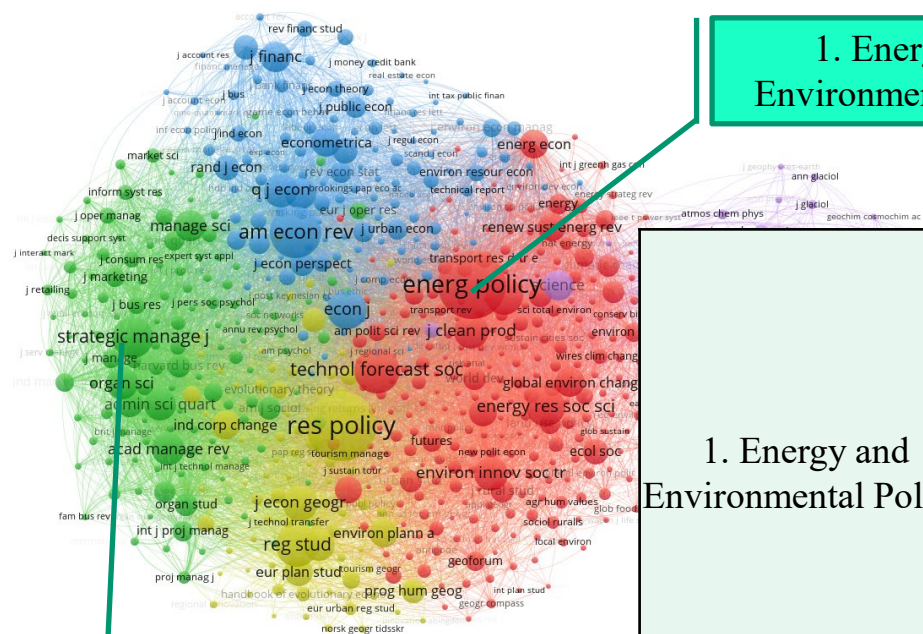
Cho & Hassink (2009): Textile, Daegu, Südkorea

Hu (2015): Coalmining, Zaozhuang, Fuxin, China

Path literature (Isaksen & Trippel 2016; Trippel 2020; Hassink et al. 2019; MacKinnon et al. 2019)

Typology (Trippel 2020; Blazek et al. 2019):

- Path decline
- Path extension
- Path renewal
- Path diversification
- Path transplantation
- Path creation



**1. Energy and Environmental Policy**

1. Energy and Environmental Policy

- Energy Policy
- Technological Forecasting and Social Change
- Energy Research & Social Science
- Ecological Economics
- Journal of Cleaner Production
- Environmental Innovation and Societal Transitions
- Global Environmental Change
- Energy Economics
- Renewable and Sustainable Energy Reviews

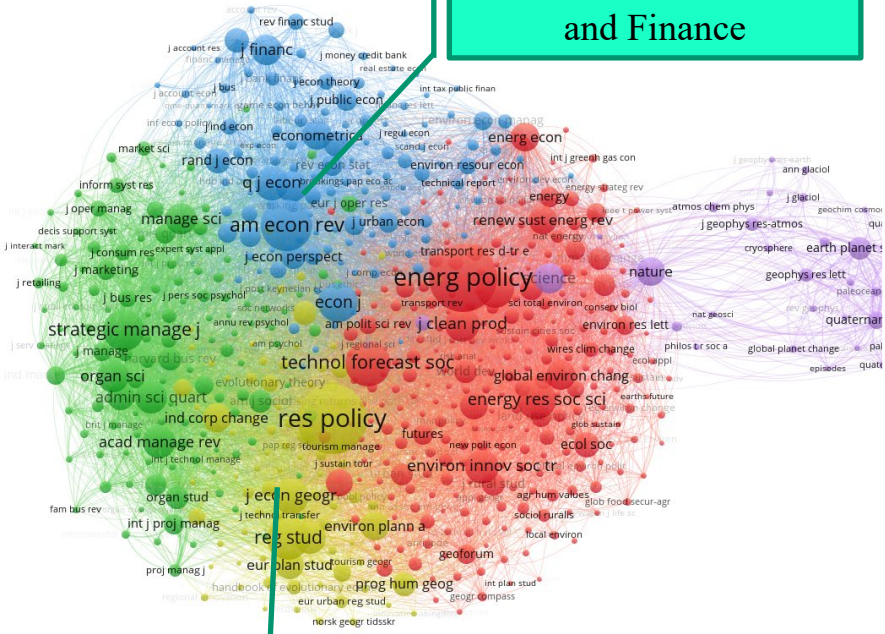
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- Sustainability
- Strategic Management Journal
- Academy of Management Review
- Organization Science
- Administrative Science Quarterly
- Management Science
- Academy of Management Journal
- Harvard Business Review
- American Journal of Sociology
- Organization Studies



3. Advanced Economics and Finance



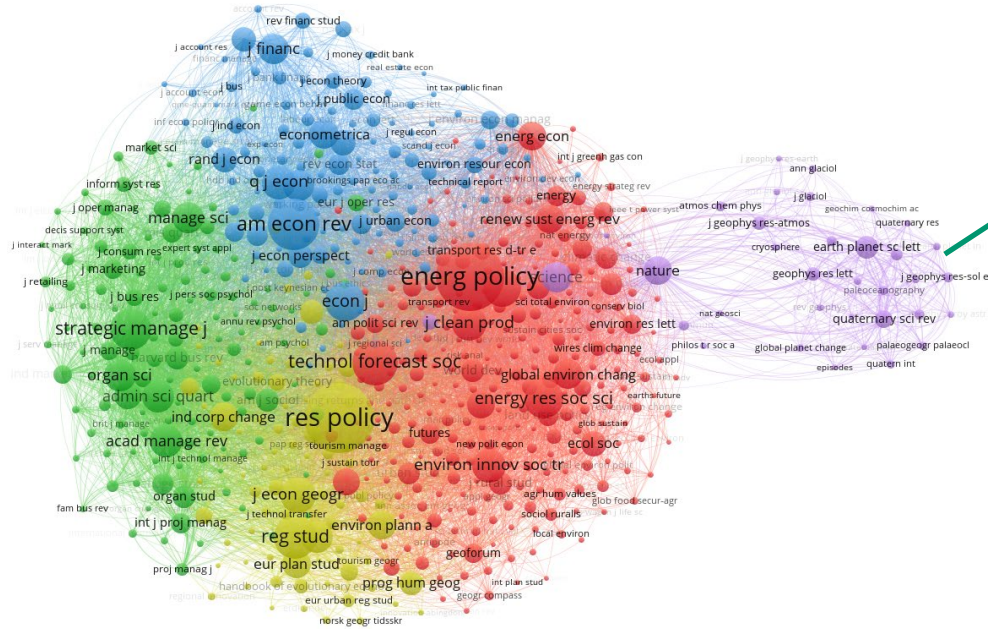
4. Economic Geography and Regional Studies

3. Advanced Economics and Finance

- Journal of Management Studies
- American Economic Review
- The Economic Journal
- The Quarterly Journal of Economics
- Journal of Political Economy
- The Journal of Finance
- Econometrica
- RAND Journal of Economics
- Review of Economic Studies
- Journal of Economic Perspectives

4. Economic Geography and Regional Studies

- Journal of Financial Economics
- Research Policy
- Regional Studies
- Journal of Economic Geography
- Economic Geography
- Environment and Planning A
- European Planning Studies
- Industrial and Corporate Change
- Journal of Evolutionary Economics
- Progress in Human Geography



## 5. Earth and Environmental Sciences

Cambridge Journal of Regions, Economy and Society

Science

Nature

Earth and Planetary Science Letters

Quaternary Science Reviews

Thesis (commonly refers to doctoral

5. Earth and Environmental Sciences  
dissertations or master's theses, not a  
Environmental Sciences specific journal)

Journal of Geophysical Research:  
Atmospheres

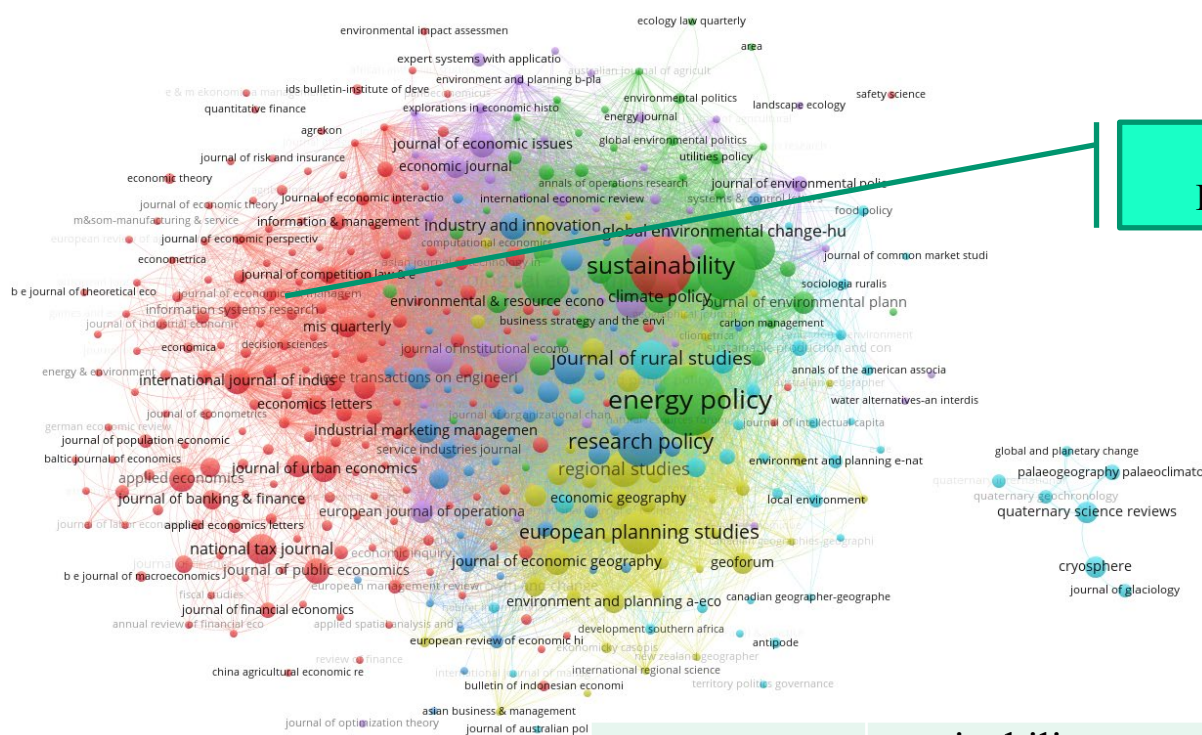
Geophysical Research Letters

Geochemistry, Geophysics, Geosystems

Journal of Geophysical Research: Solid  
Earth

Climate of the Past

h-index	Unit	Citation sum within h-core	All citations	All articles
9	Boschma ron	4935	4935	9
7	Hassink Robert	950	950	7
6	Van Den Bergh Jeroen C J M	379	379	6
5	Zhao Congyu	91	99	7
5	Wang Kun	67	67	5
5	Marechal Kevin	273	278	7
5	Edenhofer Ottmar	605	605	5
5	Dong Kangyin	91	99	7
5	Cowan robin	803	803	5
5	Coenen Lars	1077	1077	5

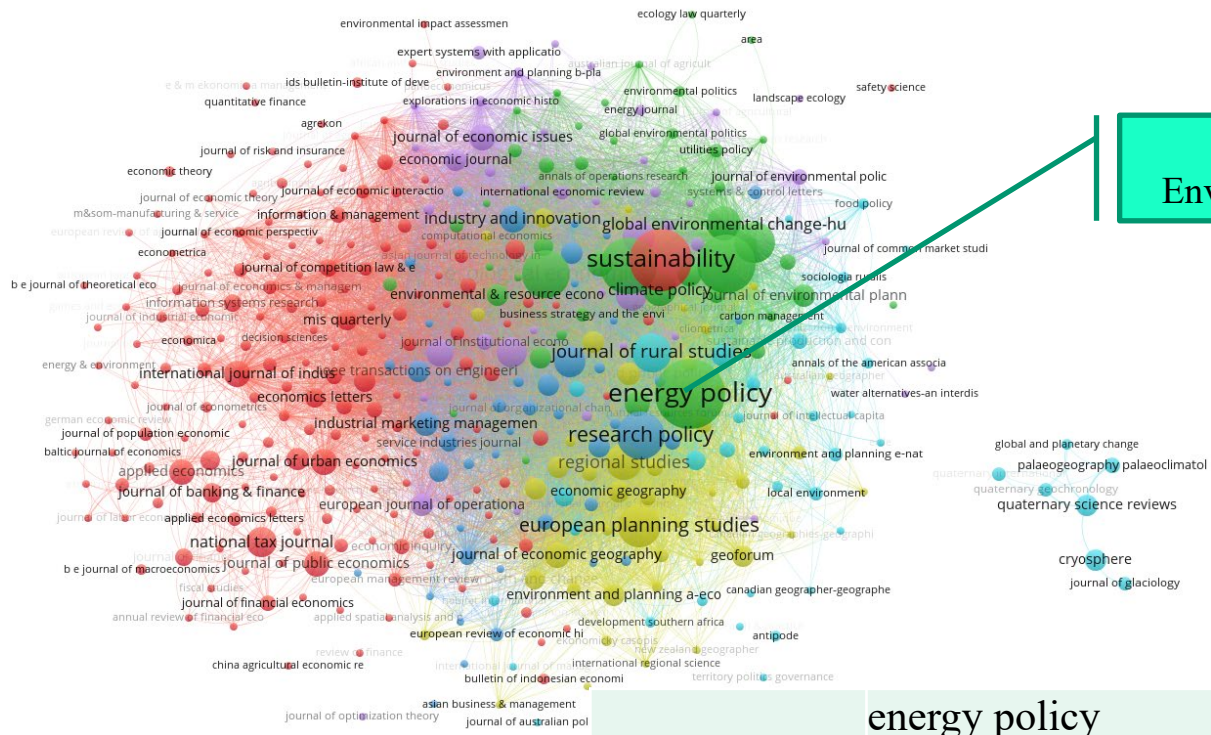


1. Economic and Financial Studies

# The bridges

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	journal of urban economics
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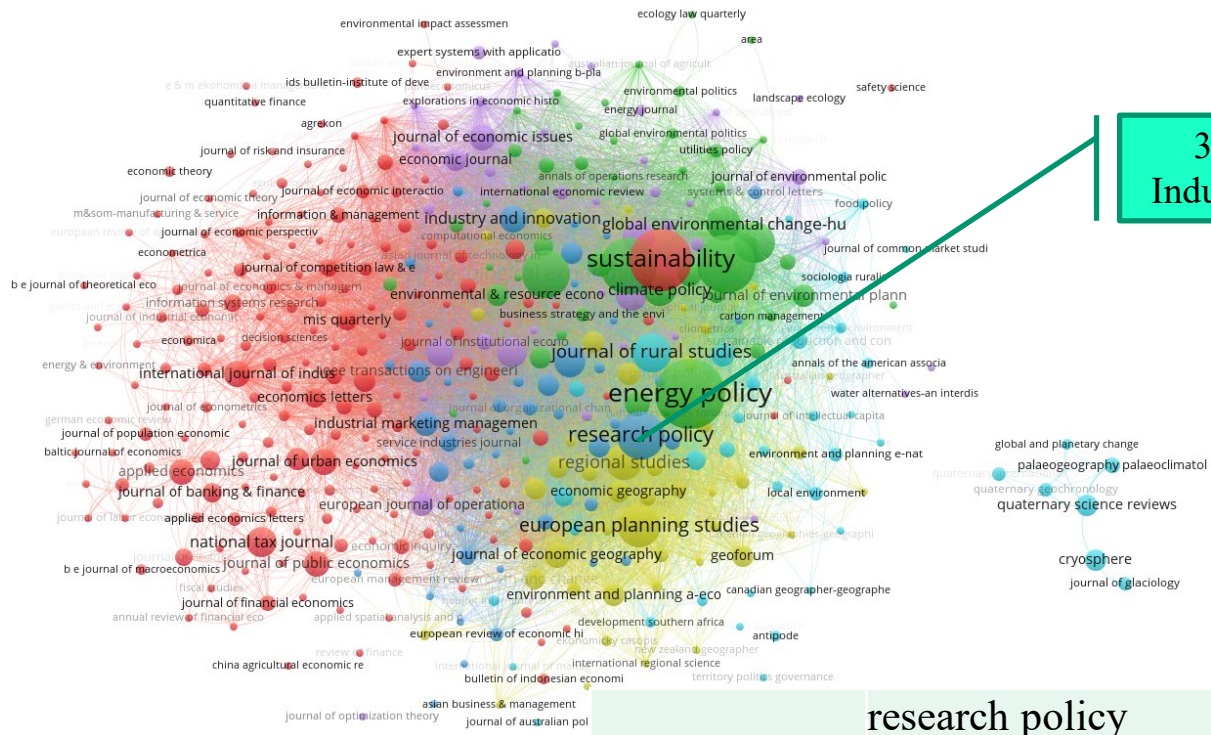




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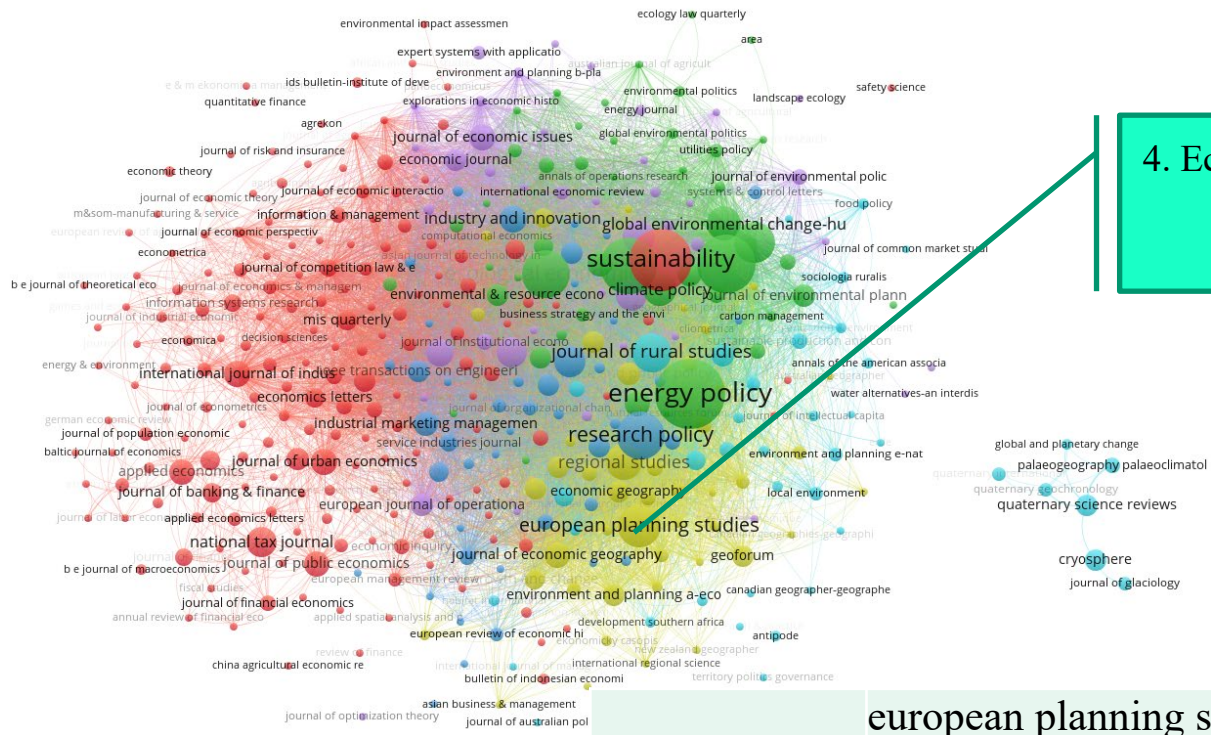
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- energy research & social science
- technological forecasting and social change
- ecological economics
- environmental innovation and societal transitions
- global environmental change-human and policy dimensions
- climate policy
- cities
- futures
- energy economics



3. Innovation and Industrial Management

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- research policy
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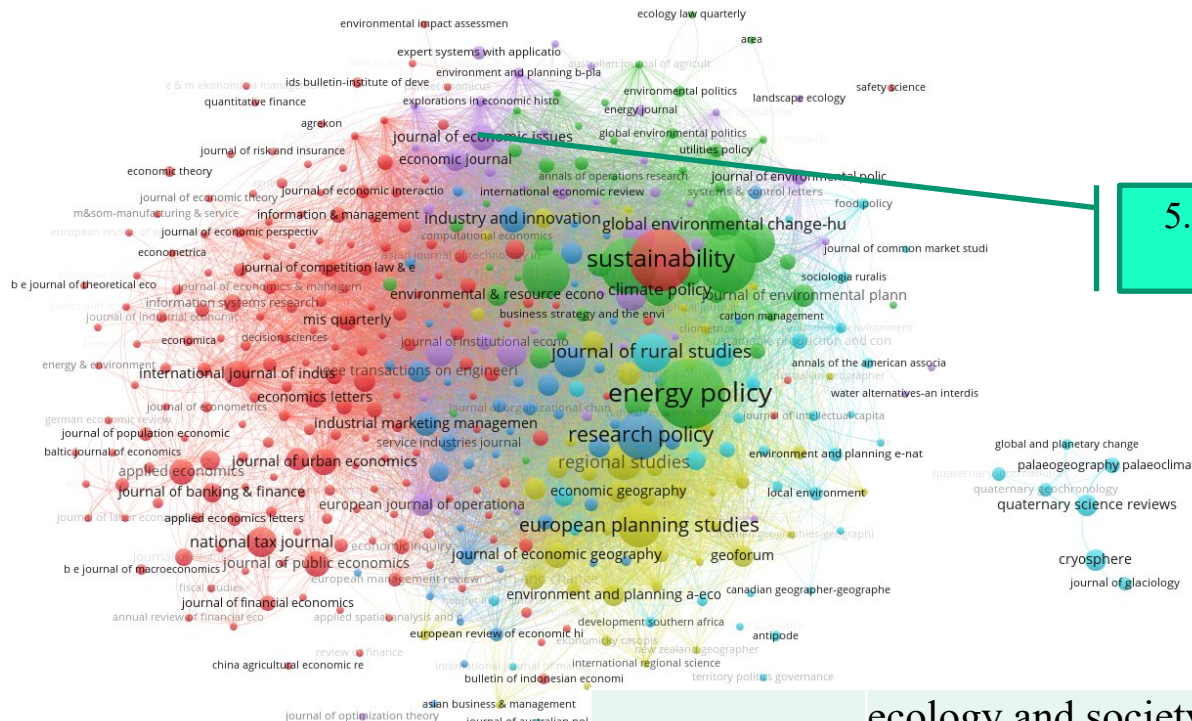


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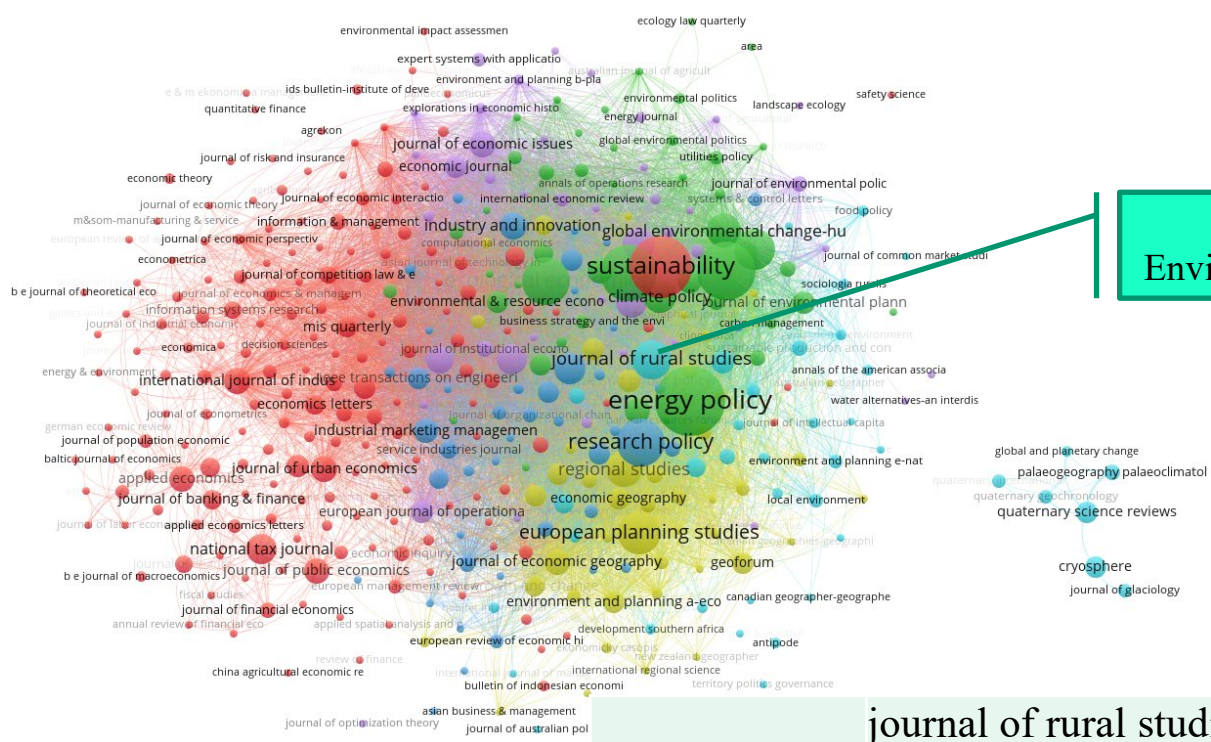


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- expert systems with applications

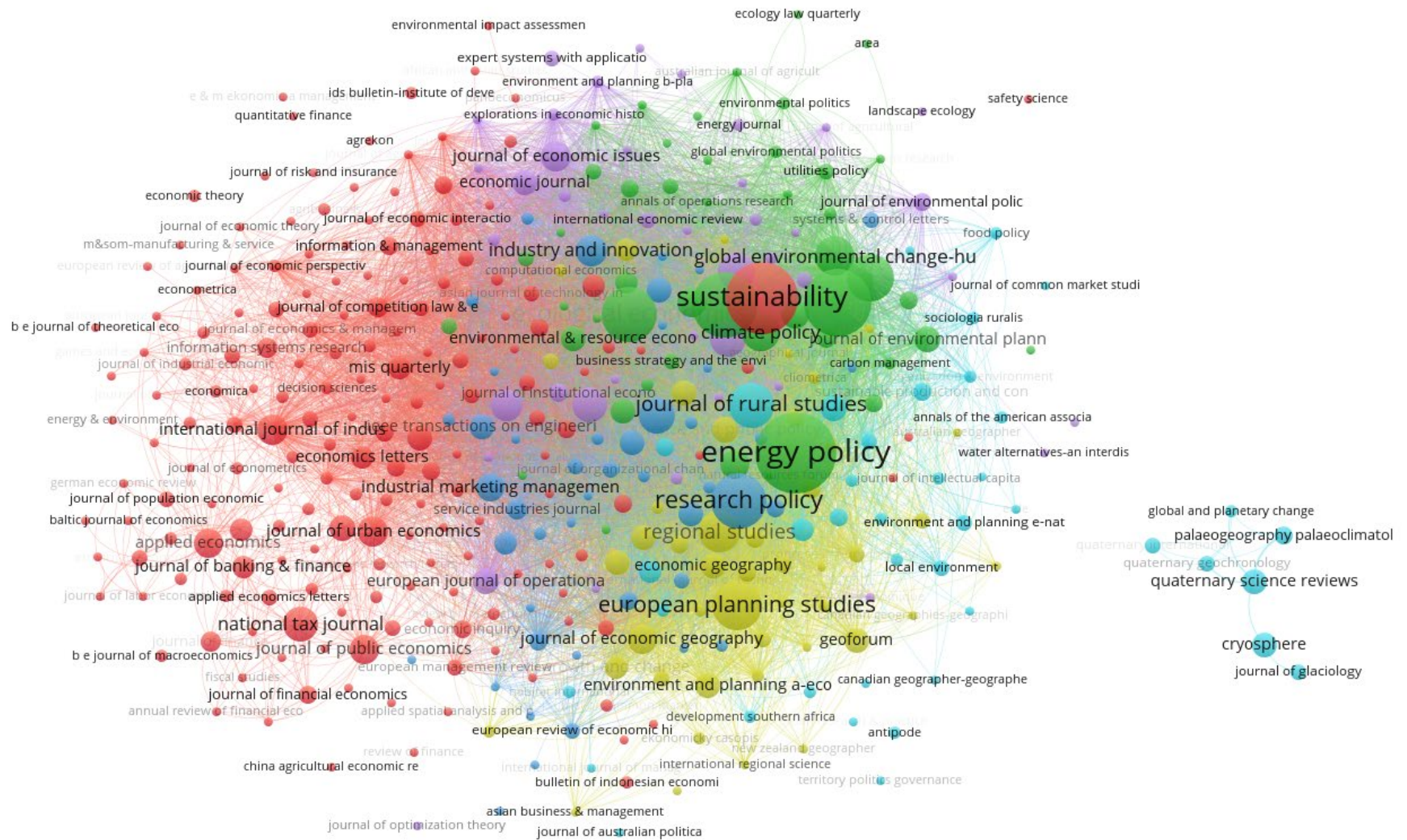




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- environmental policy and governance
- cryosphere
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- oxford review of economic policy
- world development
- international journal of sustainable transportation
- palaeogeography palaeoclimatology palaeoecology
- regional environmental change
- sustainable production and consumption



*Boundary objects* refer to objects that are dynamic, egalitarian and flexible concerning interpretations, and have "... sufficient acceptance across different scholars and disciplines of the idea in broad terms ... as to permit the exchange ... of ideas between different perspectives" (Martin 2021, 21).

*Bridging concepts*, however, go one step further and actually "actively link[s] fields and stimulates dialog" in an integrative way (Baggio et al. 2015, 2).