COMPLEXITY & URBAN GROWTH

Pierre-Alexandre Balland

Last week’s key points

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1. Network thinking

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2. Key structural patterns of real-world complex systems

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1. Network thinking
2. Key structural patterns of real-world complex systems
3. Sublinear and superlinear scaling in cities

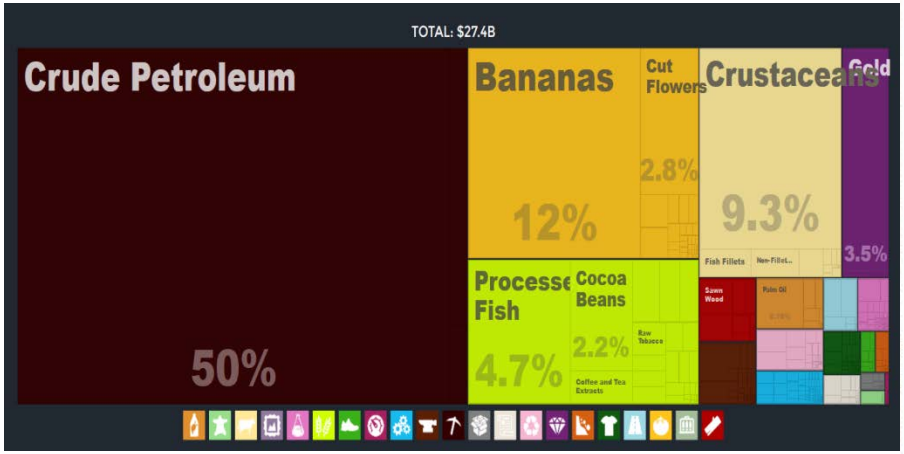
Today's goals

1. Why does economic complexity matter?
   - Complexity and growth
2. What is economic complexity?
3. How to measure economic complexity?

Reframing economic development

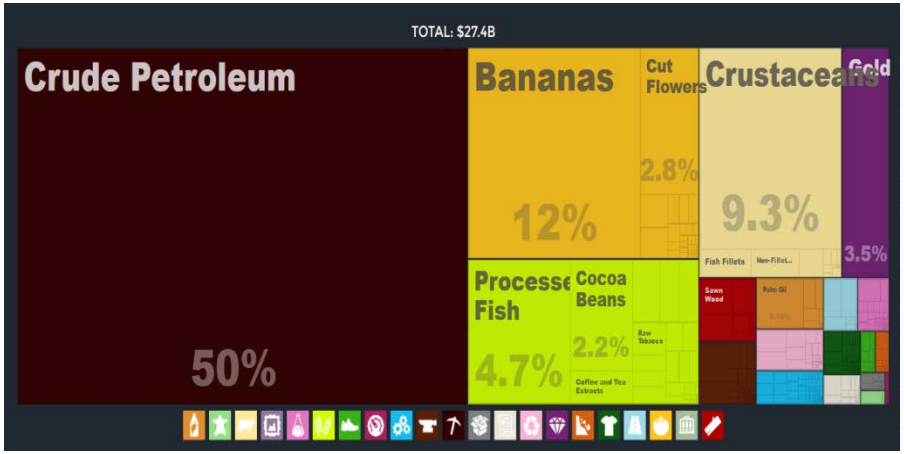
Data Source: PovcalNet - World Bank

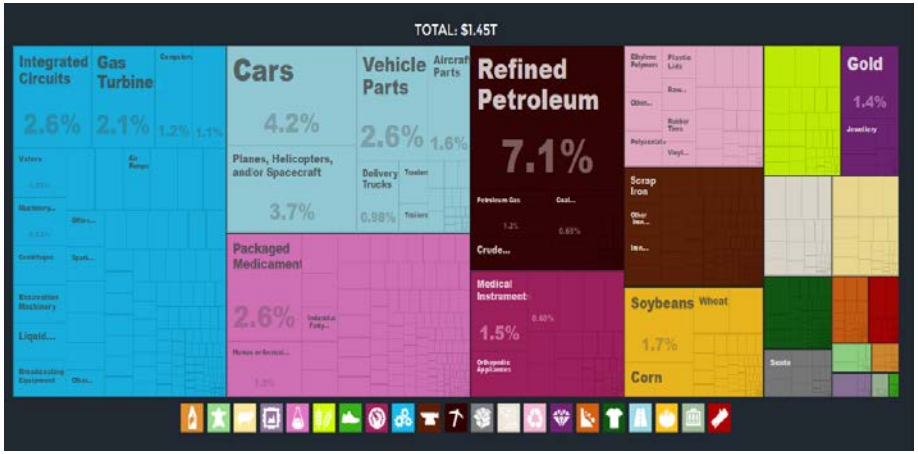
Reframing economic development



Data Source: atlas.media.mit.edu

Reframing economic development





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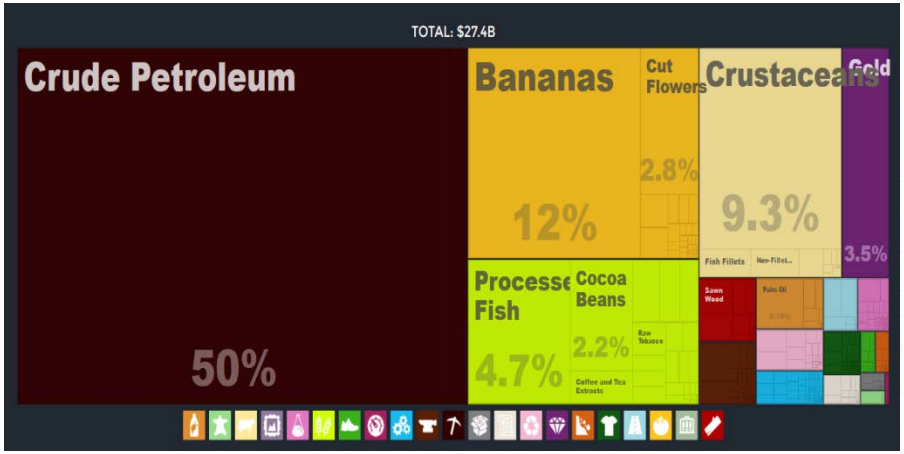

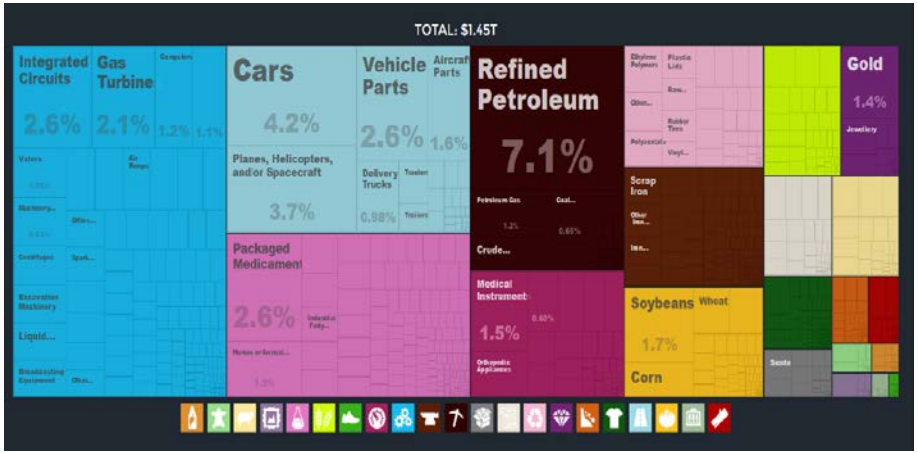

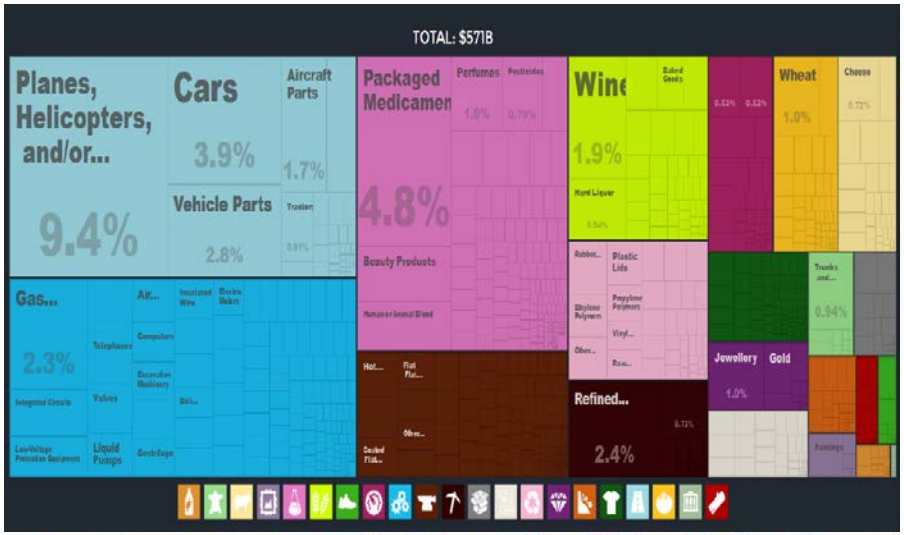

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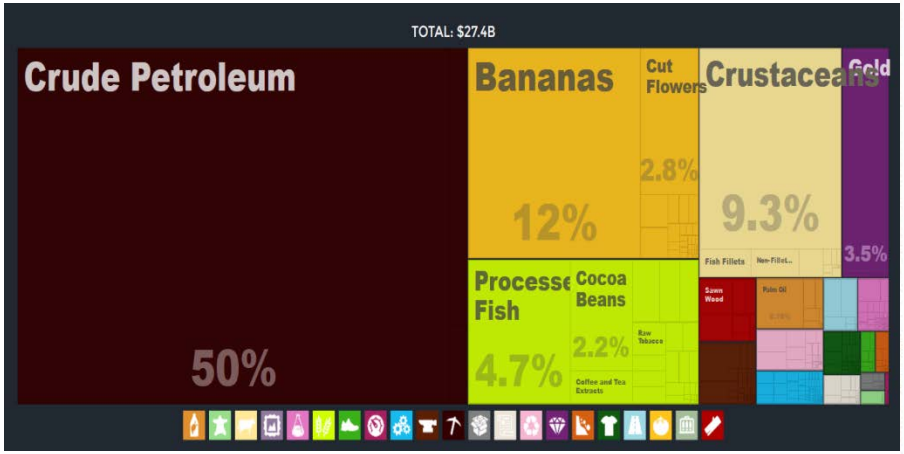

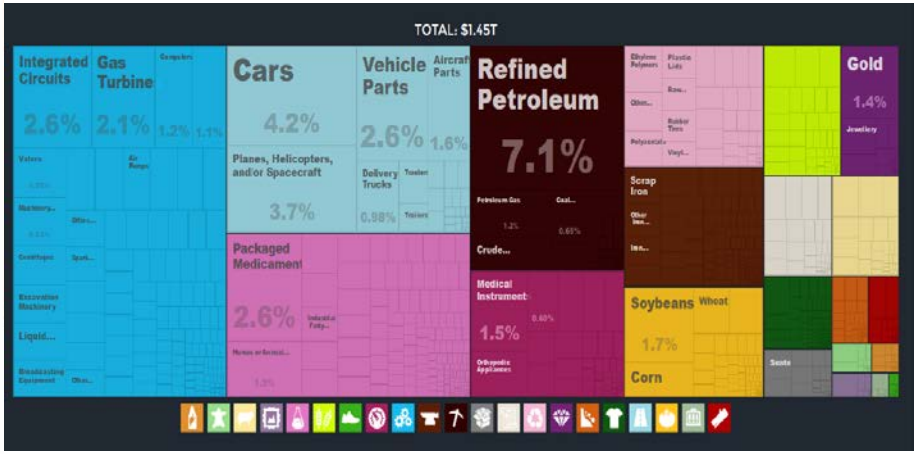

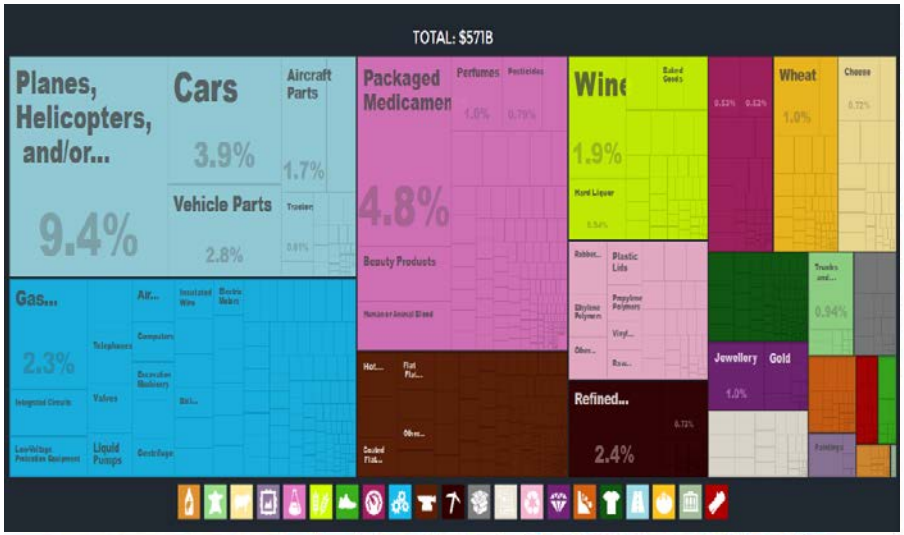

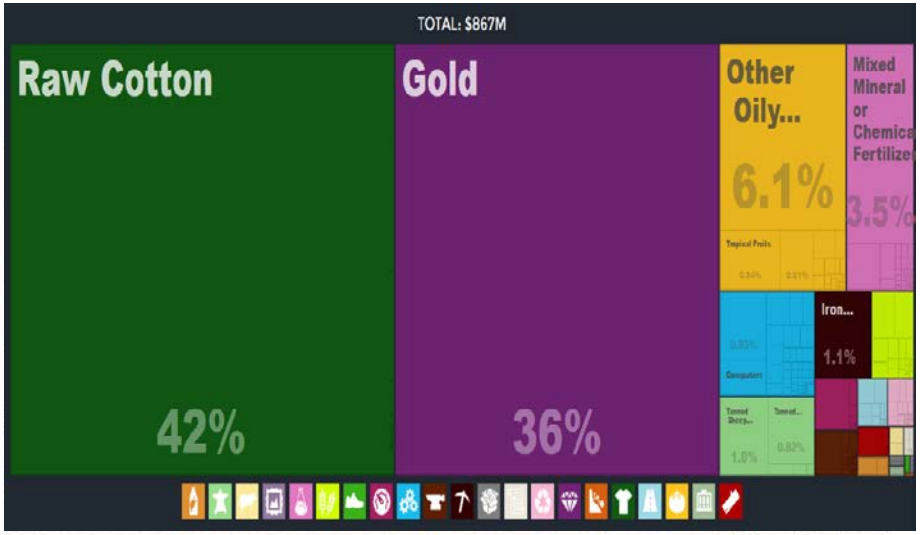

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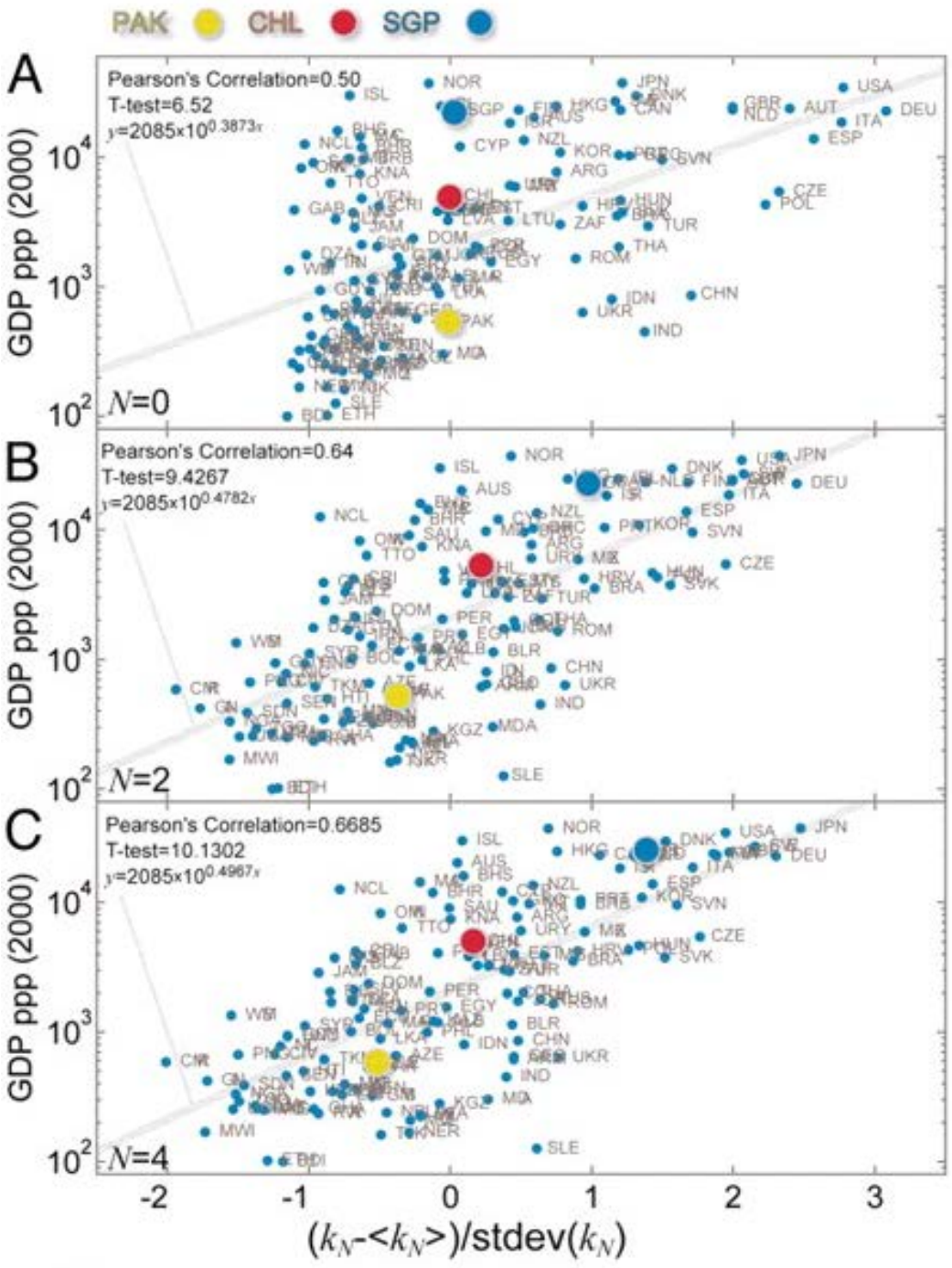

PAK
CHL
SGP
A
Pearson's Correlation=0.50
T-test=6.52
y=2085x10^0.3873x
N=0
B
Pearson's Correlation=0.64
T-test=9.4267
y=2085x10^0.4782x
N=2
C
Pearson's Correlation=0.6685
T-test=10.1302
y=2085x10^0.4967x
N=4
GDP ppp (2000)
10^4
10^3
10^2
-2
-1
0
1
2
3
(k_N-<k_N>)/stdev(k_N)

Reframing economic development

Data Source: atlas.media.mit.edu

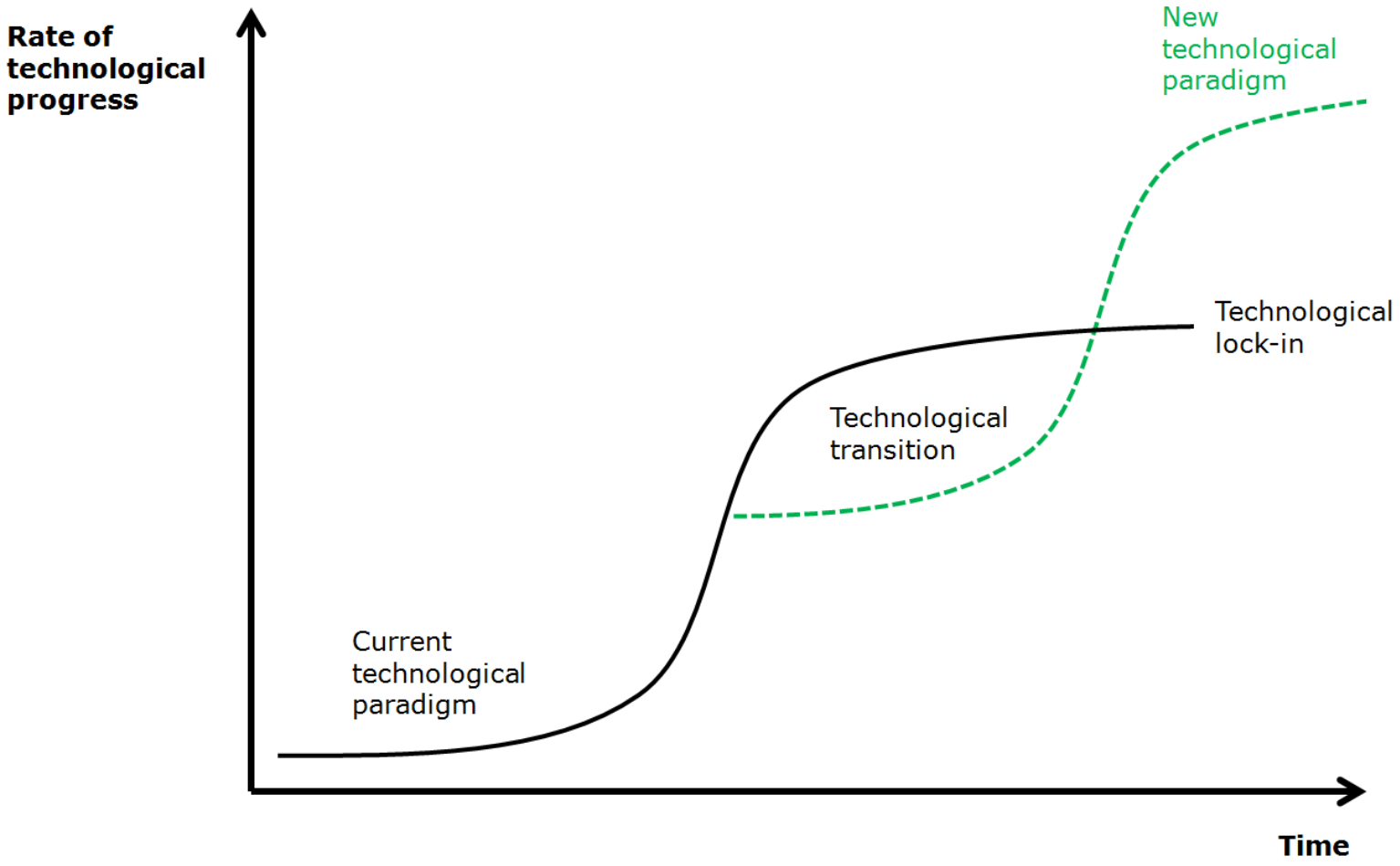
On smart specialization

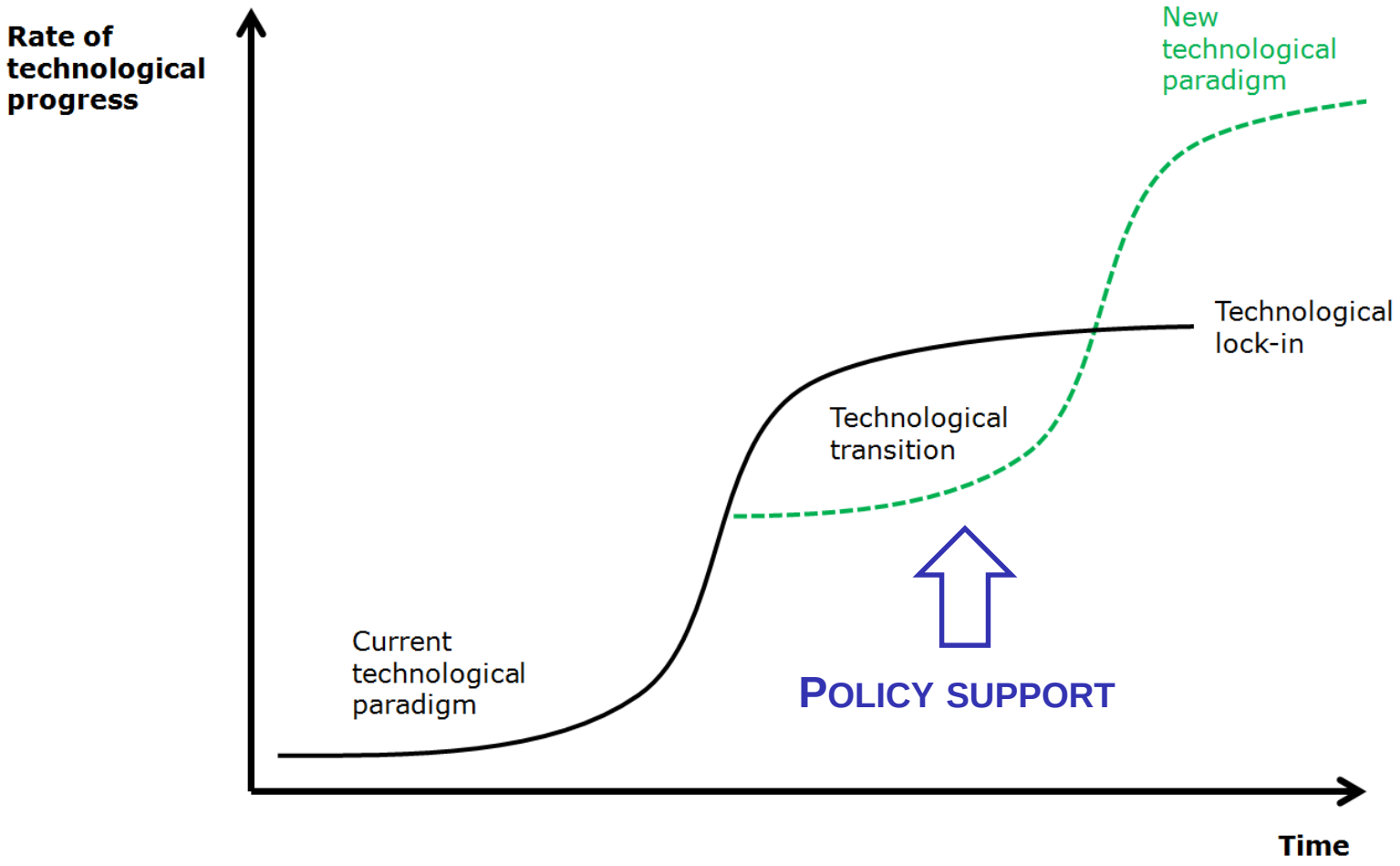
Smart specialisation

Smart specialisation is a new innovation policy concept designed to promote the efficient and effective use of public investment in research. Its goal is to boost regional innovation in order to achieve economic growth and prosperity, by enabling regions to focus on their strengths. Smart specialisation understands that spreading investment too thinly across several frontier technology fields risks limiting the impact in any one area.

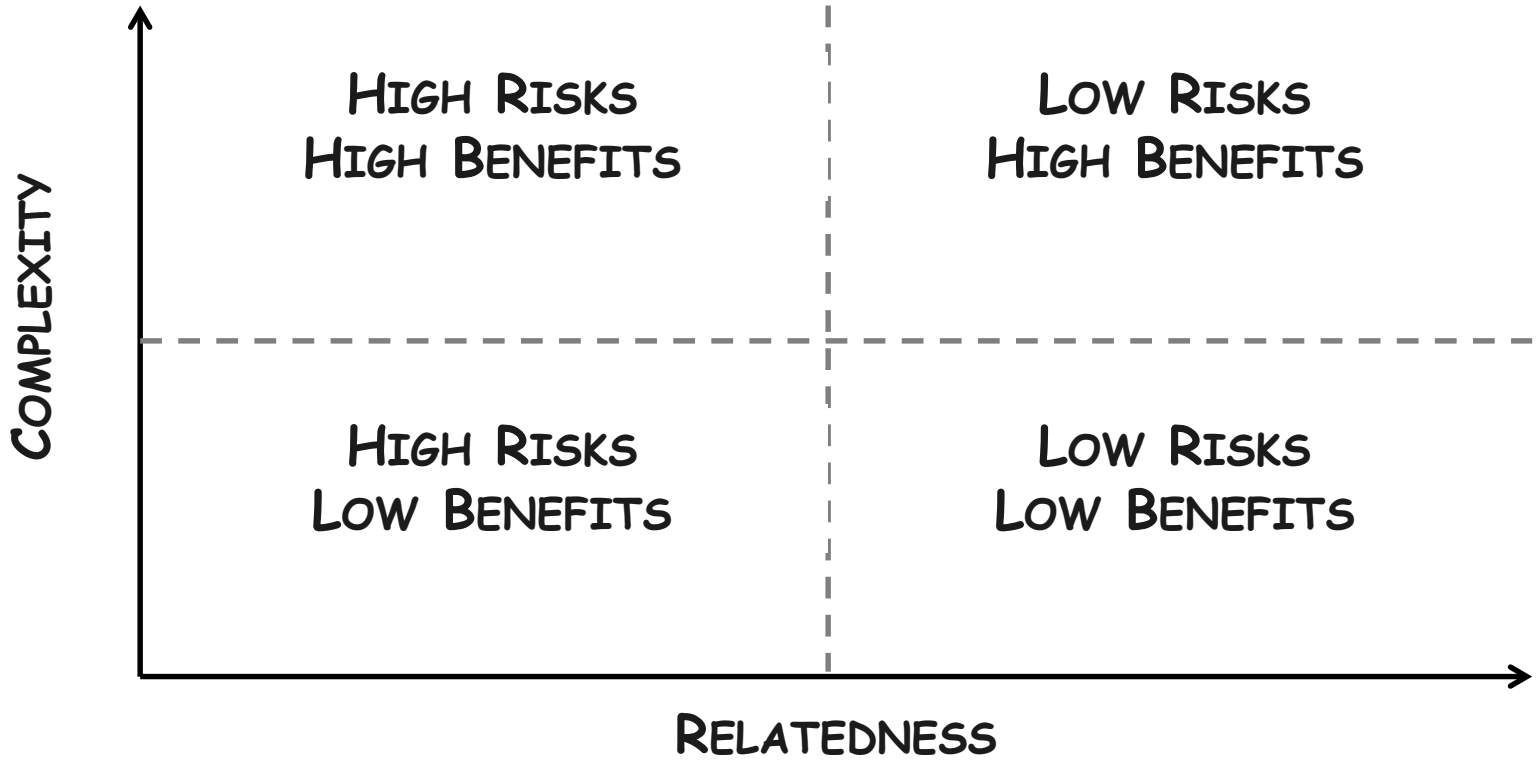
A smart specialisation strategy needs to be built on a sound analysis of regional assets and technology. It should also include an analysis of potential partners in other regions and avoid unnecessary duplication. Smart specialisation needs to be based on a strong partnership between businesses, public entities and knowledge institutions – such partnerships are recognised as essential for success.

To push forward the smart specialisation concept, the Commission announced the setting up of the S³Platform in a 2010 Communication entitled 'Regional Policy contributing to smart growth in Europe 2020'. This platform aims to assist regions and Member States in developing, implementing and reviewing regional smart specialisation strategies, and help regions identify high-value added activities which offer the best chances of strengthening their competitiveness.


Rate of technological progress
New technological paradigm
Technological lock-in
Technological transition
Current technological paradigm
Time

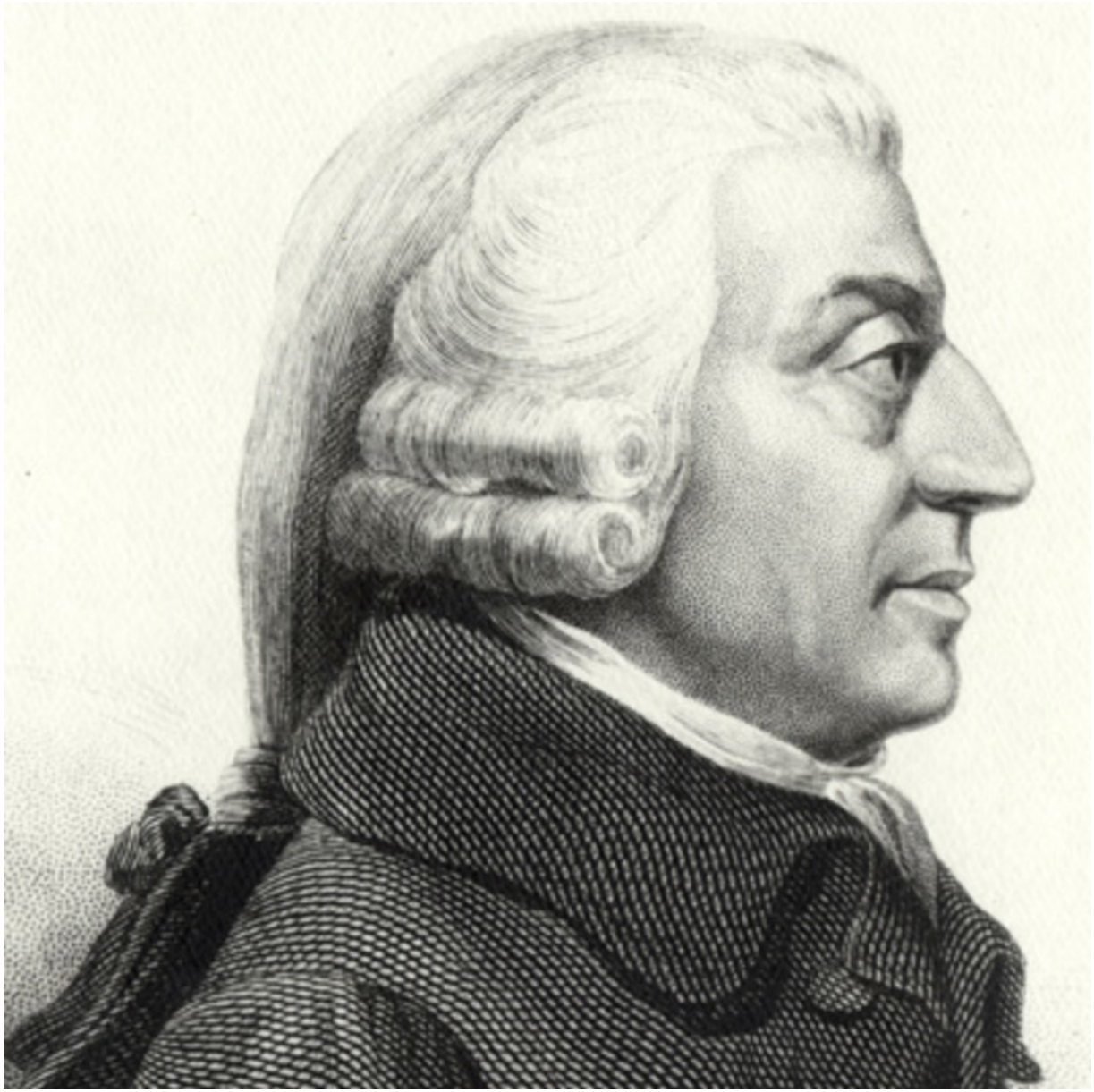

Rate of technological progress
New technological paradigm
Technological lock-in
Technological transition
Current technological paradigm
POLICY SUPPORT
Time

Smart Specialization

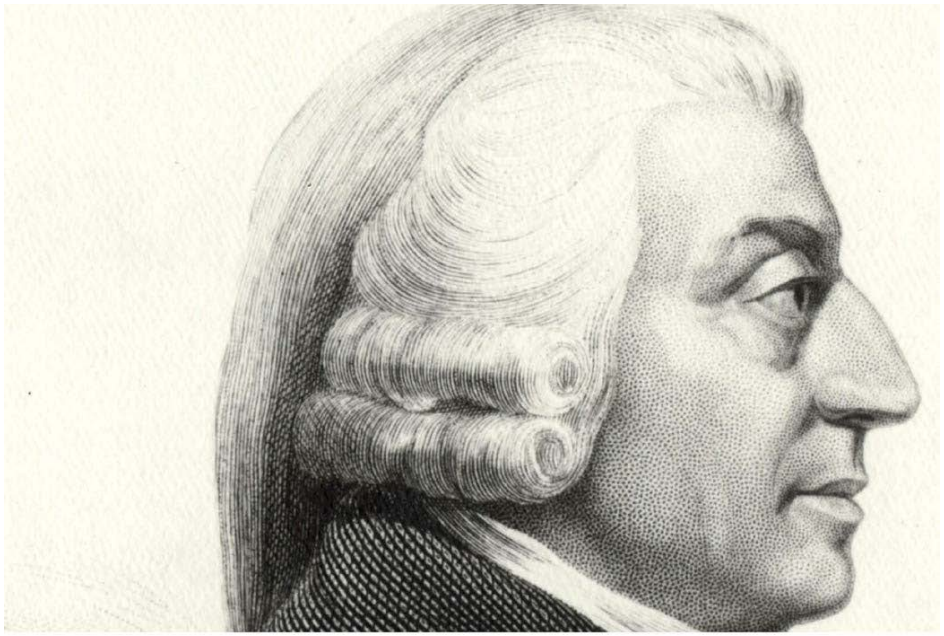


Balland et al. (2019)

The first economic complexity scholar



Division of labor



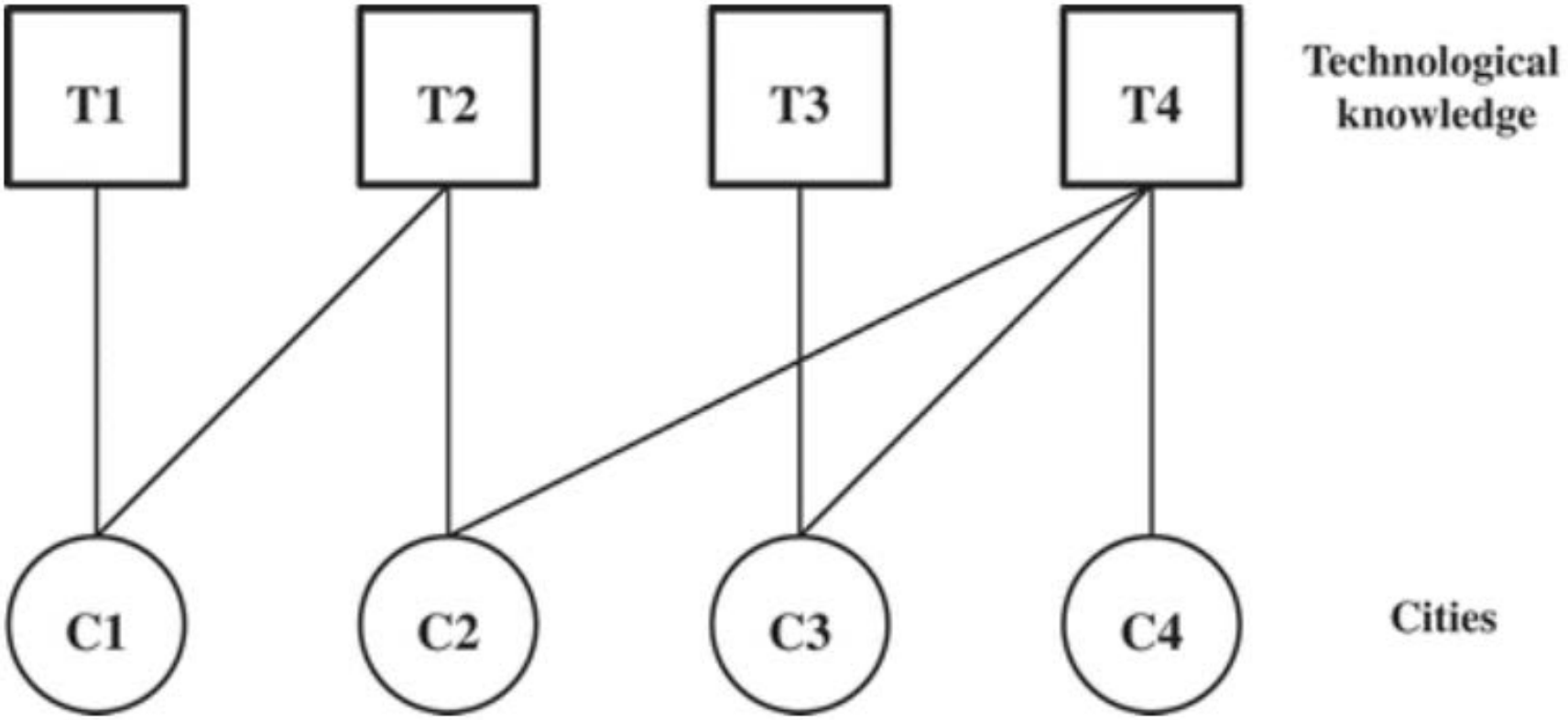
THE WEALTH OF NATIONS

ADAM SMITH

Division of labor

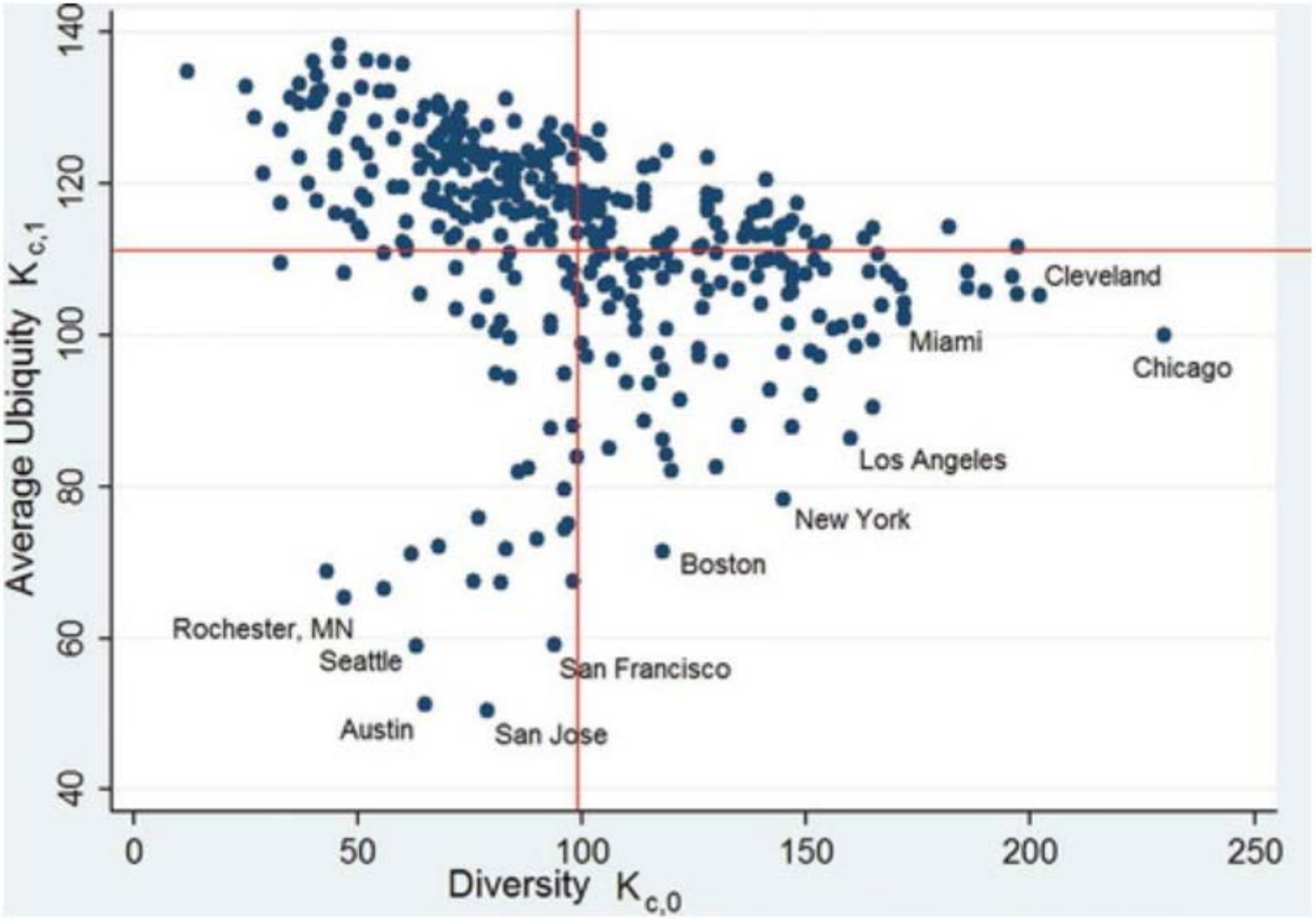
Division of knowledge

KCI/TCI (Hidalgo & Hausmann)



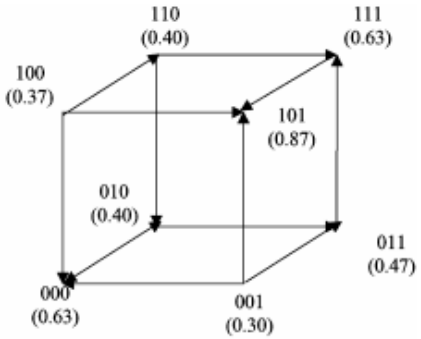
$$KCI_{cities} = K_{c,n} = \frac{1}{K_{c,0}} \sum_i M_{c,i} K_{i,n-1} \quad (3)$$

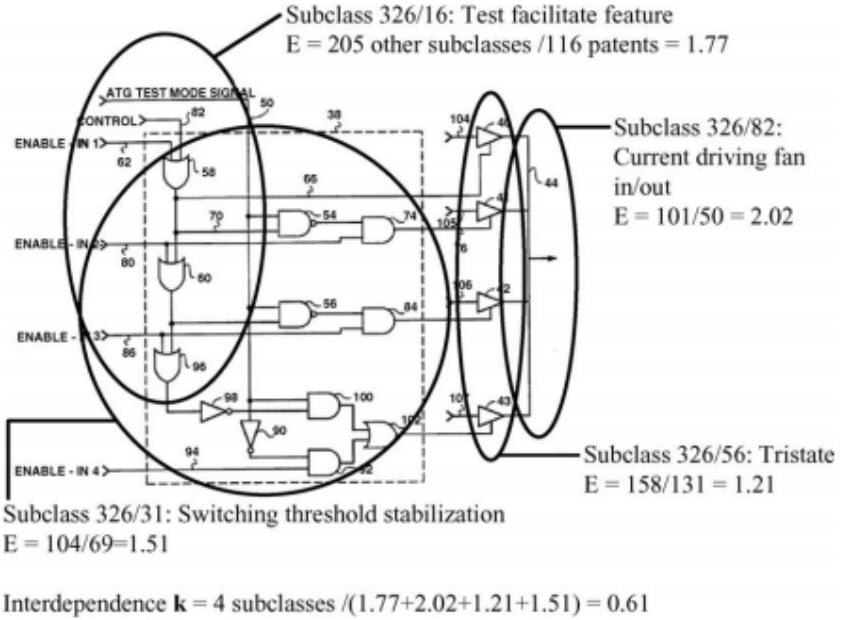
$$KCI_{tech} = K_{i,n} = \frac{1}{K_{i,0}} \sum_i M_{c,i} K_{c,n-1} \quad (4)$$


Average Ubiquity $K_{c,1}$
140
120
100
80
60
40
0
50
100
150
200
250
Diversity $K_{c,0}$
Cleveland
Miami
Chicago
Los Angeles
New York
Boston
Rochester, MN
Seattle
San Francisco
Austin
San Jose

NK model

123	w_1	w_2	w_3	$W = \frac{\sum_{i=1}^{N} w_i}{N}$
000	.5	.8	.6	.63
001	.6	.2	.1	.30
010	.2	.7	.3	.40
011	.8	.6	.5	.47
100	.4	.5	.2	.37
101	.9	.8	.9	.87
110	.7	.4	.1	.40
111	.9	.7	.3	.63

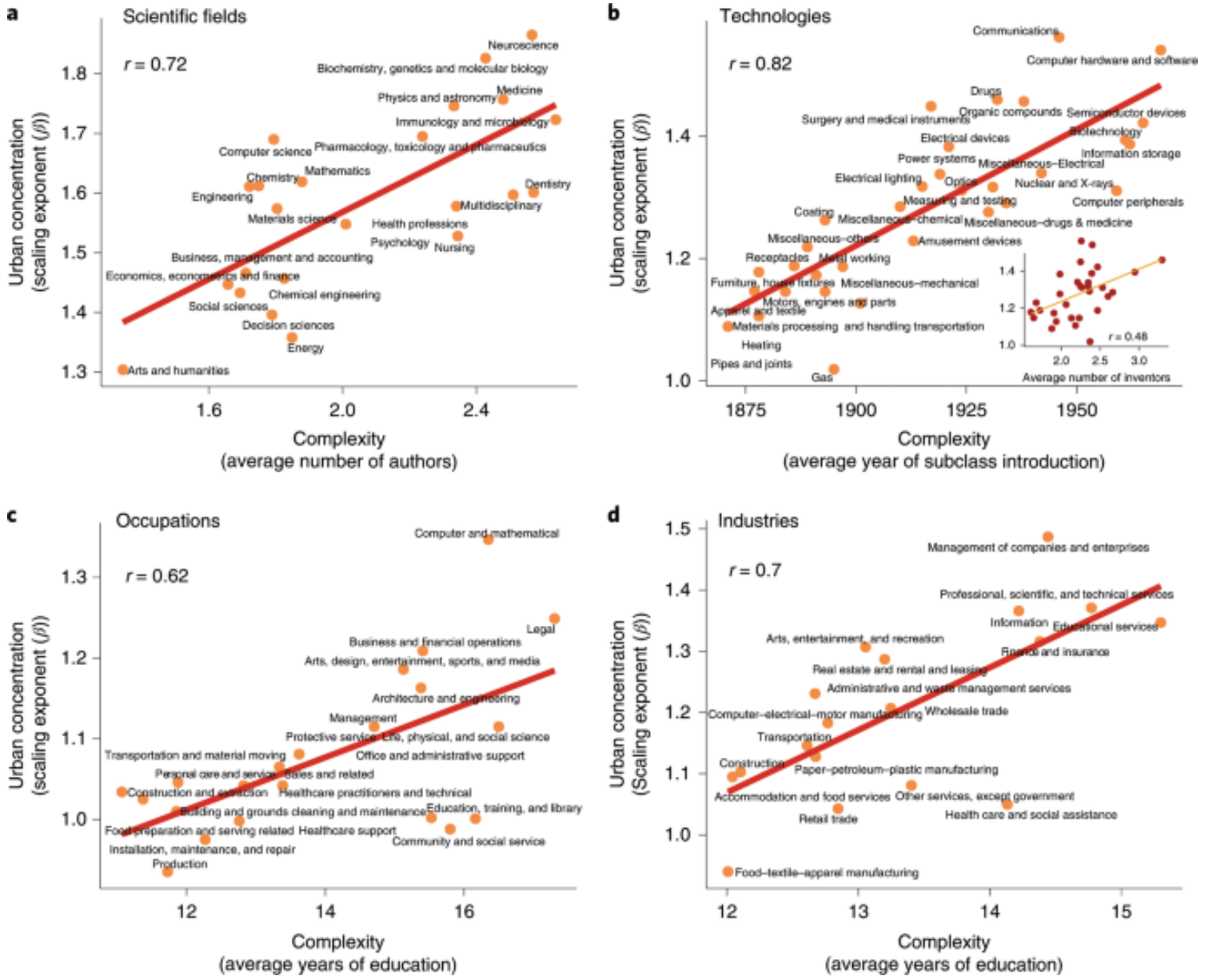




Interdependence **k** = 4 subclasses /(1.77+2.02+1.21+1.51) = 0.61

Fig. 1. Calculation of interdependence for patent #5,136,185.

L. Fleming, O. Sorenson / Research Policy 30 (2001) 1019–1039



Balland et al. 2020: https://www.nature.com/articles/s41562-019-0803-3

Q&A