

The background is a dark, deep blue space filled with numerous small, white, star-like specks. A series of bright, glowing cubes are arranged in a horizontal line across the upper half of the image. Below this line, a series of vibrant, streaky bands in shades of red, orange, and purple curve across the lower half, creating a sense of depth and movement. The overall effect is a futuristic, high-tech aesthetic.

Economic Complexity Index and Beyond

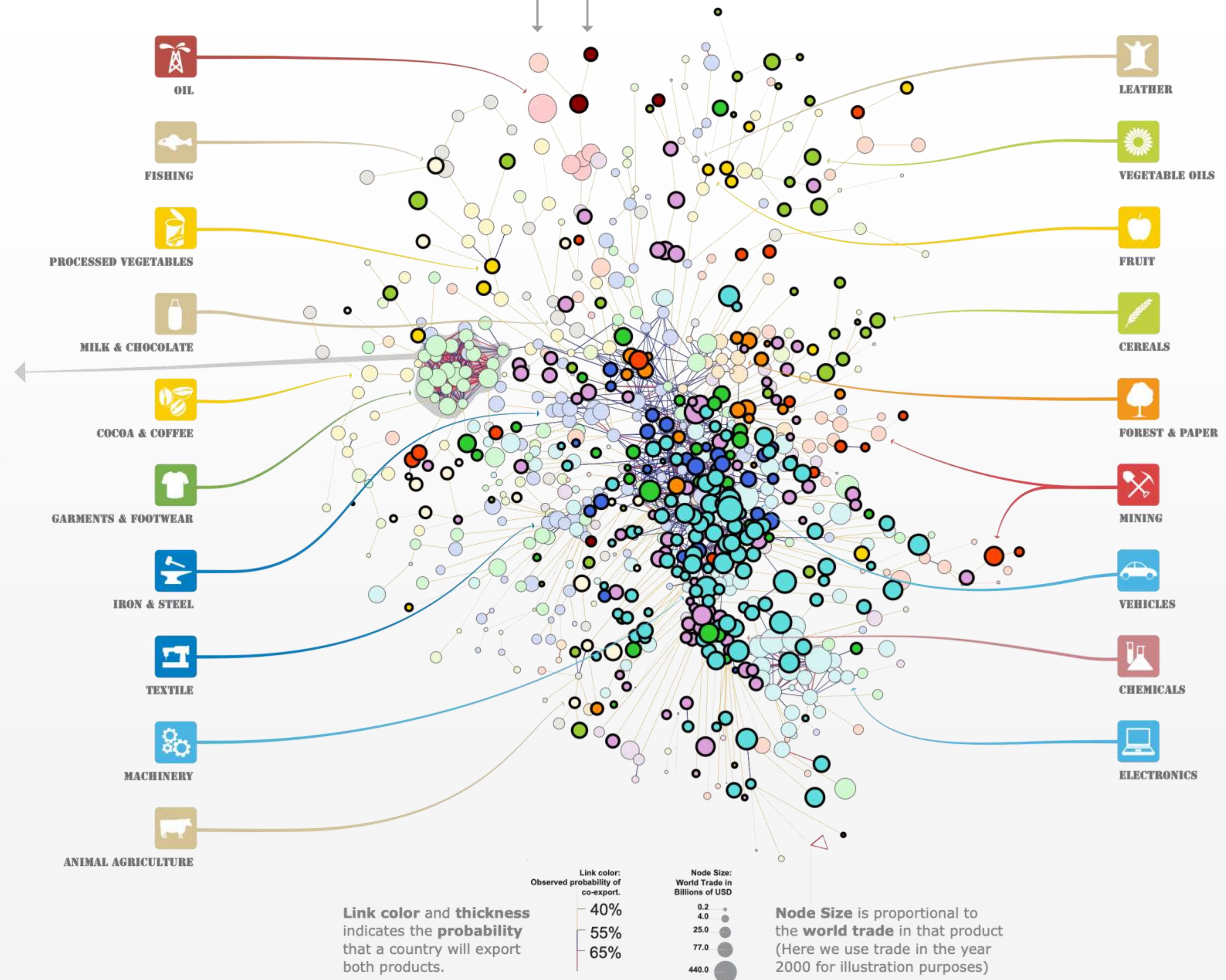
Alex Simoes, Datawheel

The Product Space

Pale nodes nodes are products for which country exports **less** than its expected share (Revealed Comparative Advantage <1)

Saturated nodes are products for which country exports **more** than its expected share (Revealed Comparative Advantage >1)

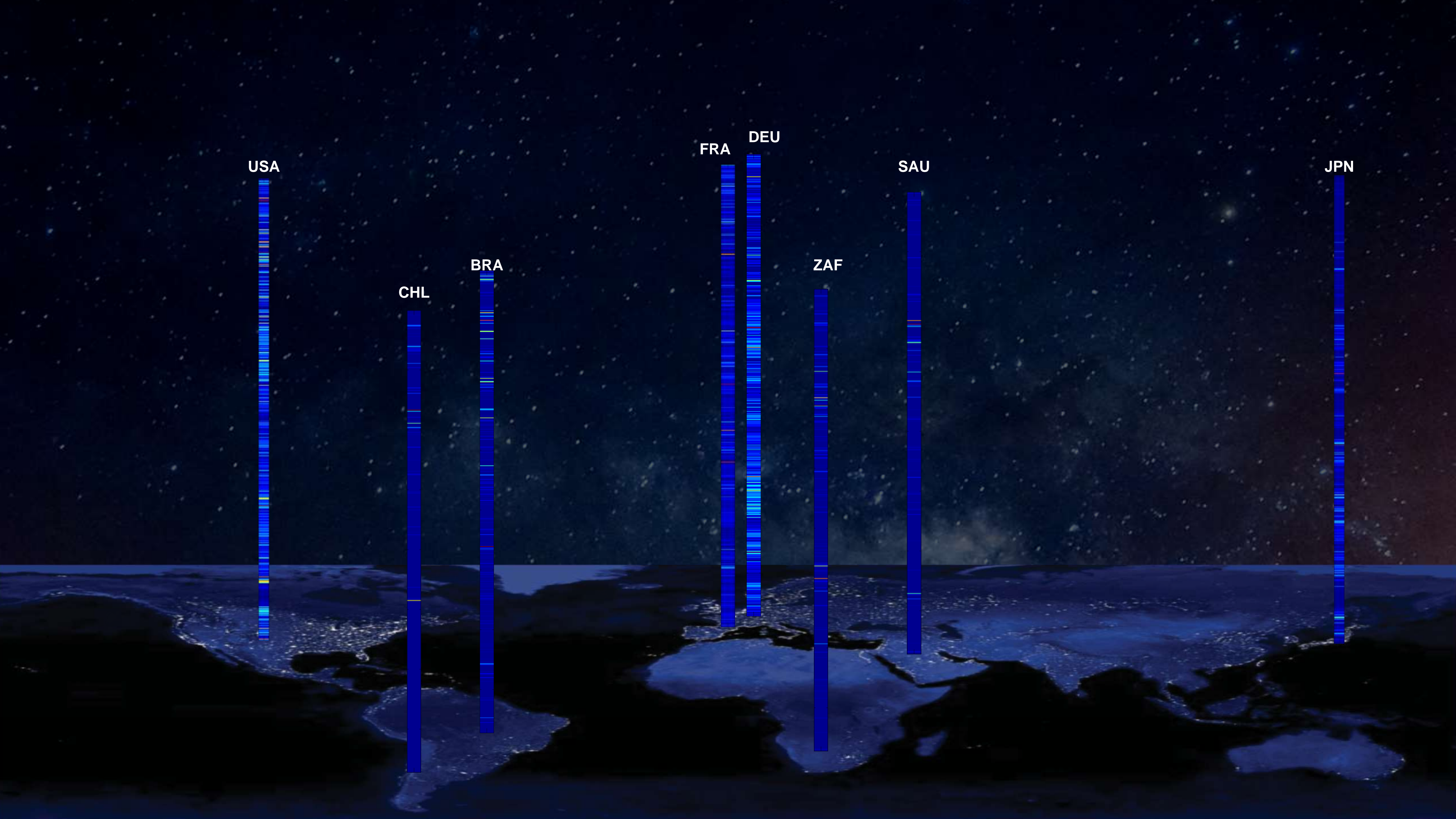
Clusters in the product space emerge naturally from the observed co-export patterns. Countries are significantly more likely to become competitive at exporting goods that are adjacent in the product space to the ones that they already export. This makes the structure of the product space predictive of the set of products that a country will export in the future.



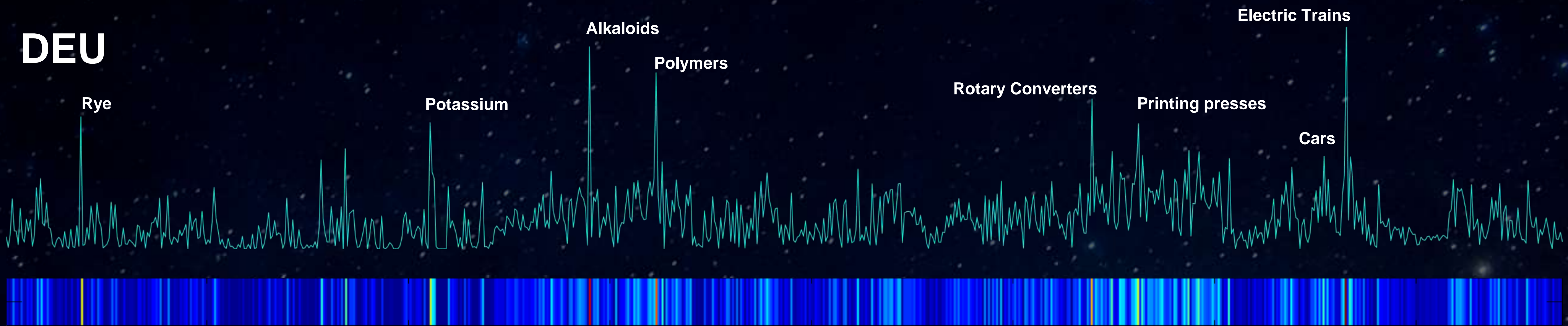
César Hidalgo



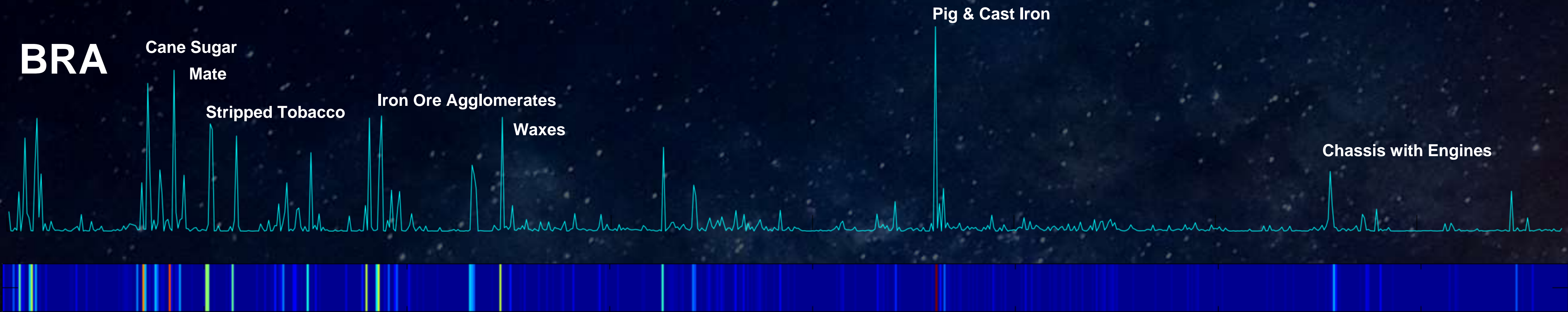


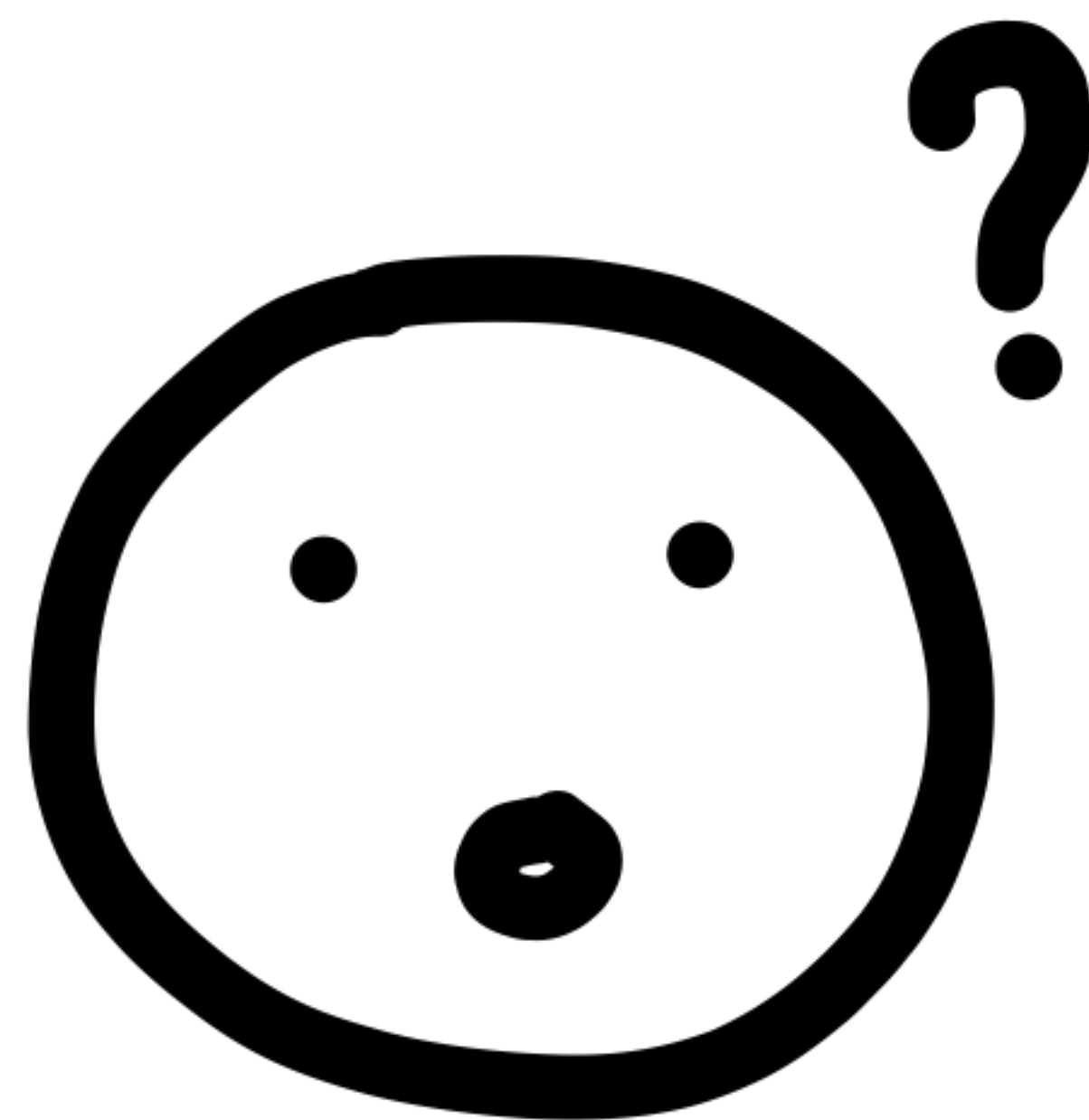


DEU



BRA







Matrix

Physics/Econometrics Approach

$$M_{cp} = \begin{cases} 1 & \text{if } RCA_{cp} \geq 1; \\ 0 & \text{otherwise.} \end{cases}$$



MATLAB files

Data Frame

Computer Science Approach

```
[(oec_etl) Alexanders-MacBook-Pro:Downloads alex$ ipython
Python 3.7.0 (default, Jul 17 2018, 16:48:09)
Type 'copyright', 'credits' or 'license' for more information
IPython 7.0.1 -- An enhanced Interactive Python. Type '?' for help.
```

```
[In [1]: import pandas as pd
```

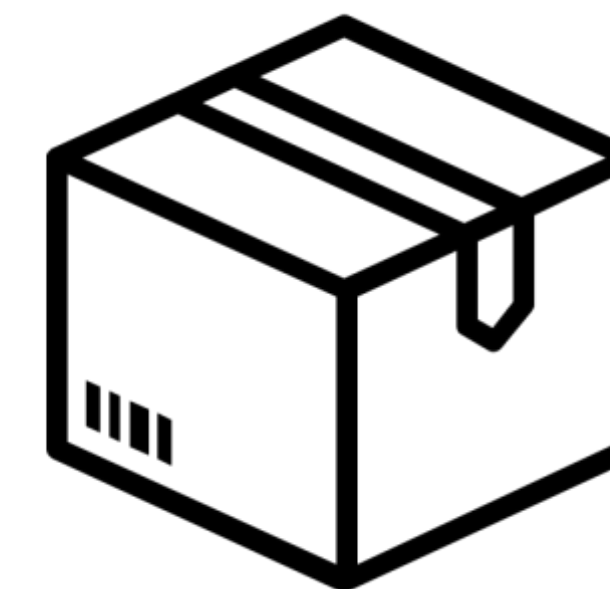
```
[In [2]: df = pd.read_csv("baci92_2017.csv")
```

```
[In [3]: df.head()
```

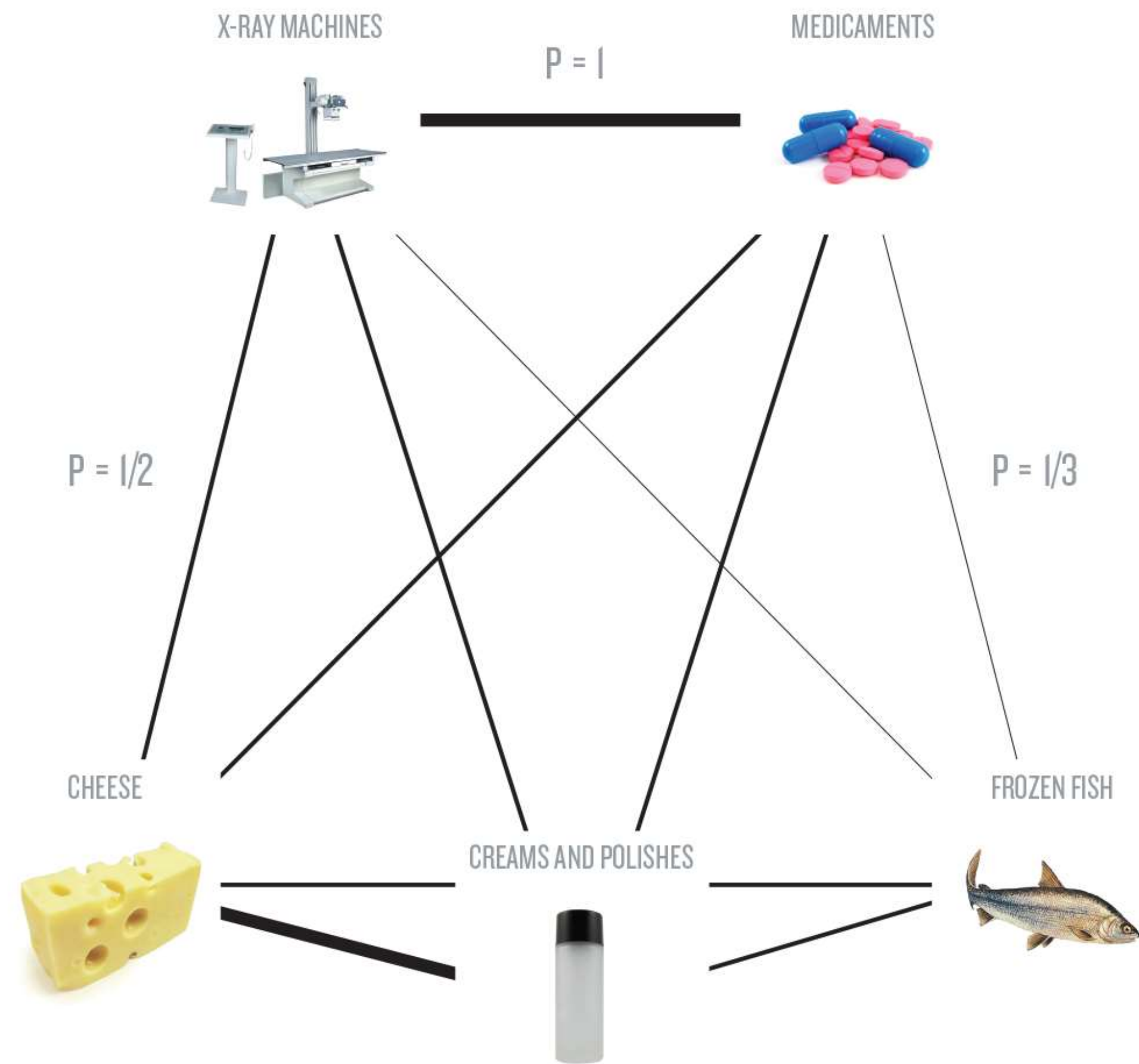
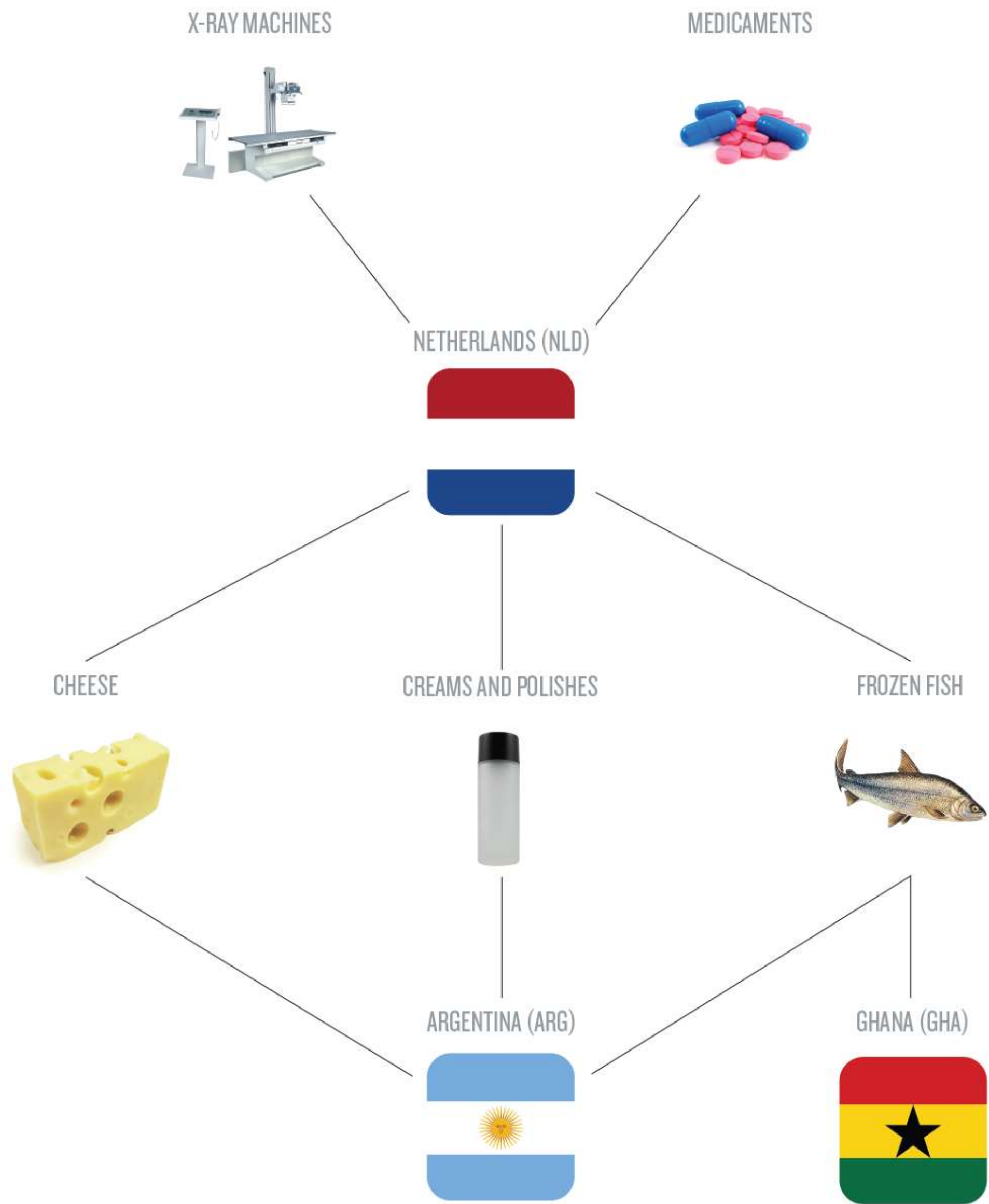
```
Out[3]:
```

	t	hs6	i	j	v	q
0	2017	30799	4	251	1.935000	0.798
1	2017	40110	4	586	1.898607	0.560
2	2017	40210	4	586	54.206000	23.319
3	2017	40221	4	586	11.852000	3.906
4	2017	40229	4	586	4.190000	1.564

```
In [4]: █
```

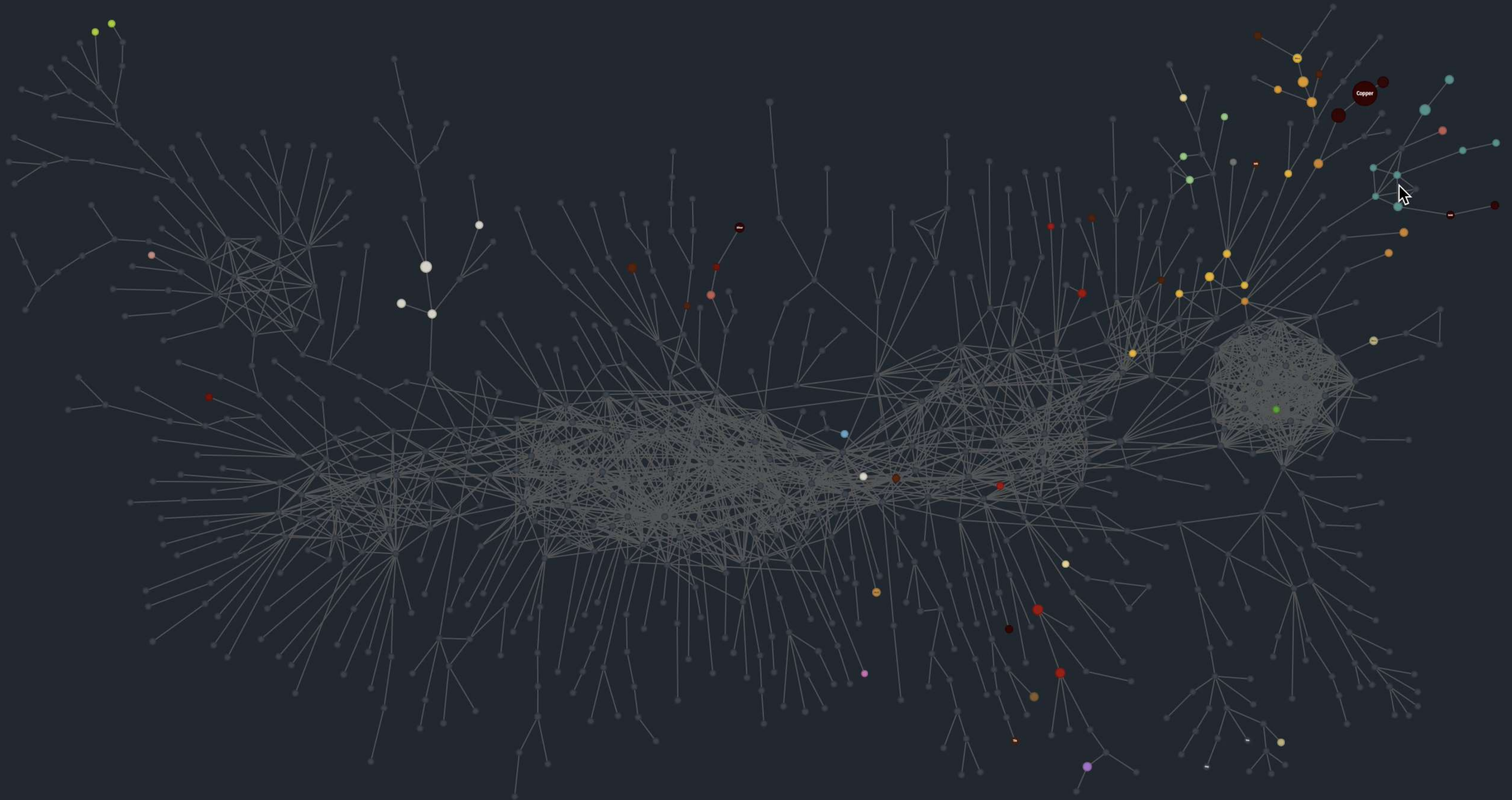


Installable Python Package



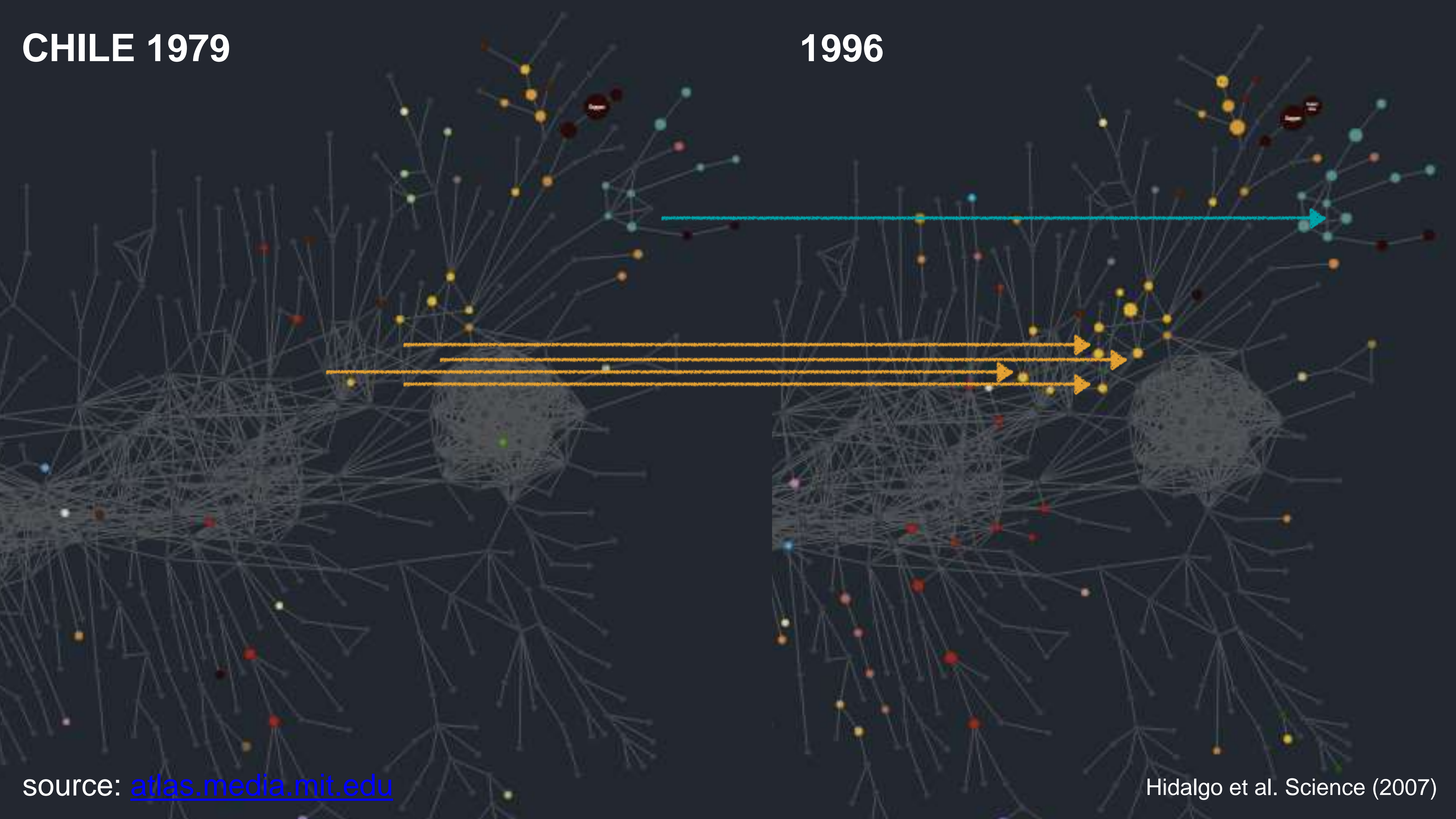
What are the export opportunities of Chile? (1979)

TOTAL: \$3.67B

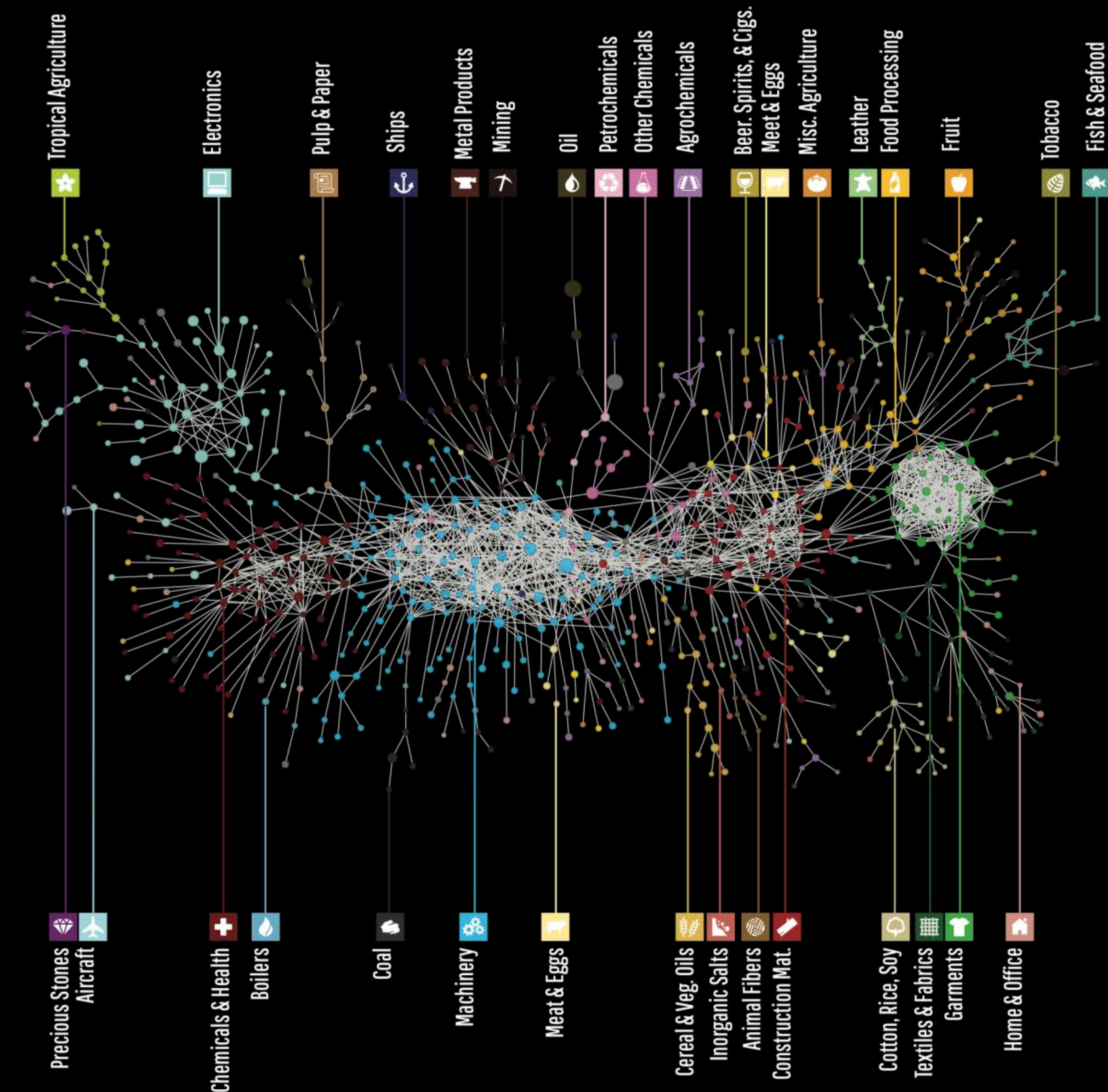


CHILE 1979

1996

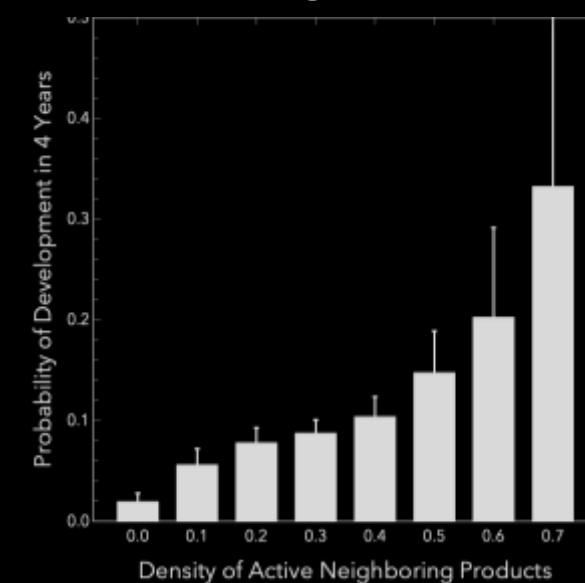


PRINCIPLE OF RELATEDNESS



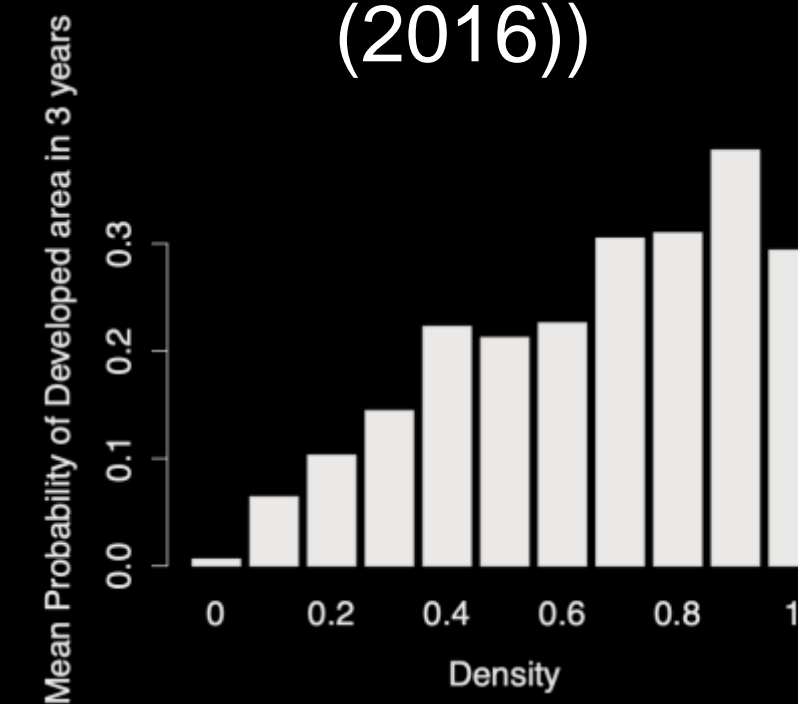
PRODUCTS

(Hidalgo et al 2007)



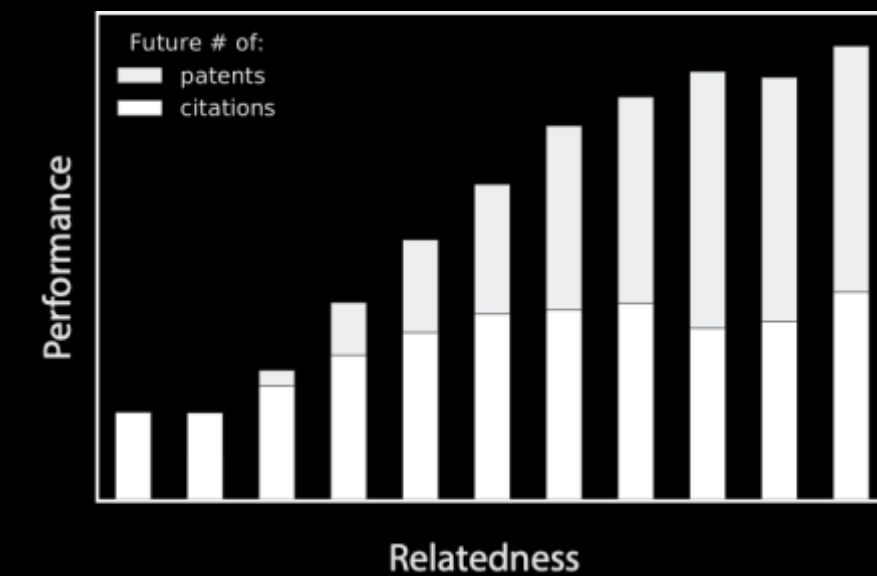
RESEARCH AREAS

(Guevara et al. (2016))



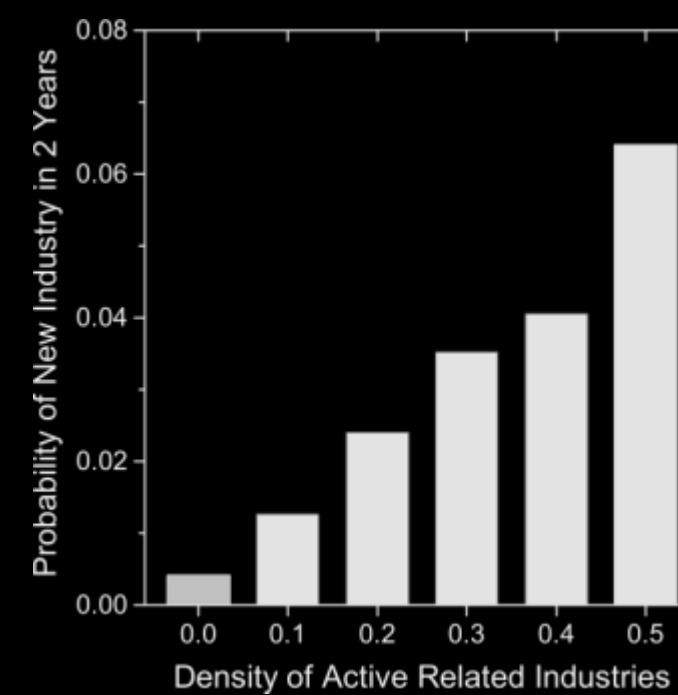
PATENTS

(Kogler et al. (2013), Boschma et al. (2015), Alstott et al. (2016))

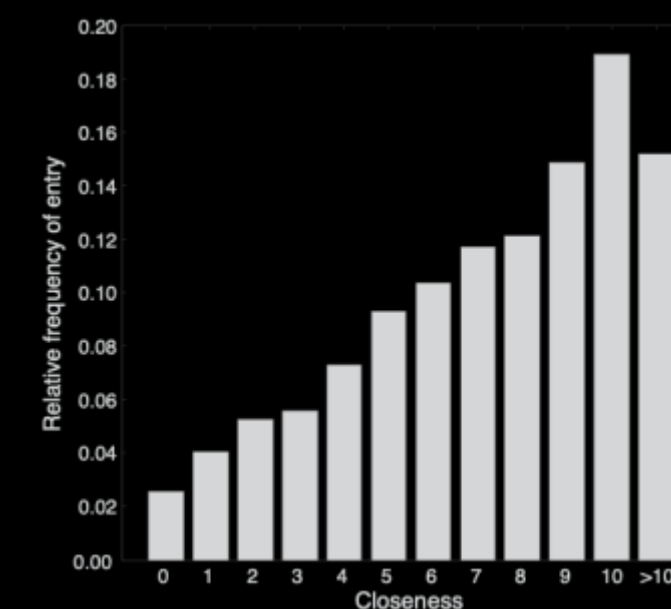


INDUSTRIES

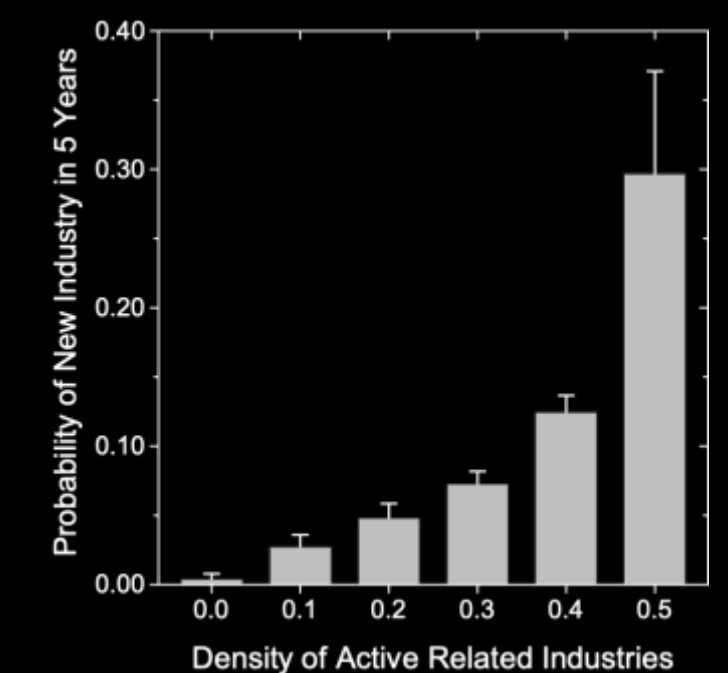
BRAZIL (Gao et al. 2017)



SWEDEN: (Neffke, Henning, Boschma 2011)



CHINA: (He et al. 2017 Gao et al. 2017)



Q: What is ECI?

- A. Economic Complexity Index
- B. A composite indicator used to indicate a country's concentration in various activities
- C. A measure of knowledge intensity
- D. An eigenvector problem

Answer: All of the above

Economic Complexity Ranking



COUNTRIES

PRODUCTS

VISUALIZATIONS

RANKINGS

PUBLICATIONS

ABOUT

API



	Country ↕	2013 ↕	2014 ↕	2015 ↕	2016 ↕	2017 ▲	
1	Japan	2.37352	2.31842	2.29751	2.27406	2.30938	
2	Switzerland	2.05181	1.99456	2.15805	2.22117	2.24386	
3	Germany	1.84608	1.81367	2.09809	2.08459	2.07537	
4	Singapore	1.71717	1.71171	1.746	1.79973	1.86534	
5	Sweden	1.75214	1.6459	1.92429	1.86277	1.80773	
6	South Korea	1.82762	1.90646	1.65462	1.69142	1.77613	
7	United States	1.43702	1.30167	1.8166	1.78168	1.75541	
8	Finland	1.57477	1.49895	1.77048	1.72464	1.70679	
9	Czech Republic	1.53381	1.52129	1.67011	1.66047	1.6431	
10	Austria	1.72767	1.64981	1.68354	1.63921	1.62894	

How is
it derived?



COMPLEXITY (knowledge intensity)

What is the aggregate stock of knowledge

Knowledge Intensive Economies are those... Involved in Knowledge Intense Activities

$$K_c = f(M_{cp}, K_p)$$

Knowledge Intensive Activities are those... Performed by Knowledge Intense Economies

$$K_p = g(M_{cp}, K_c)$$

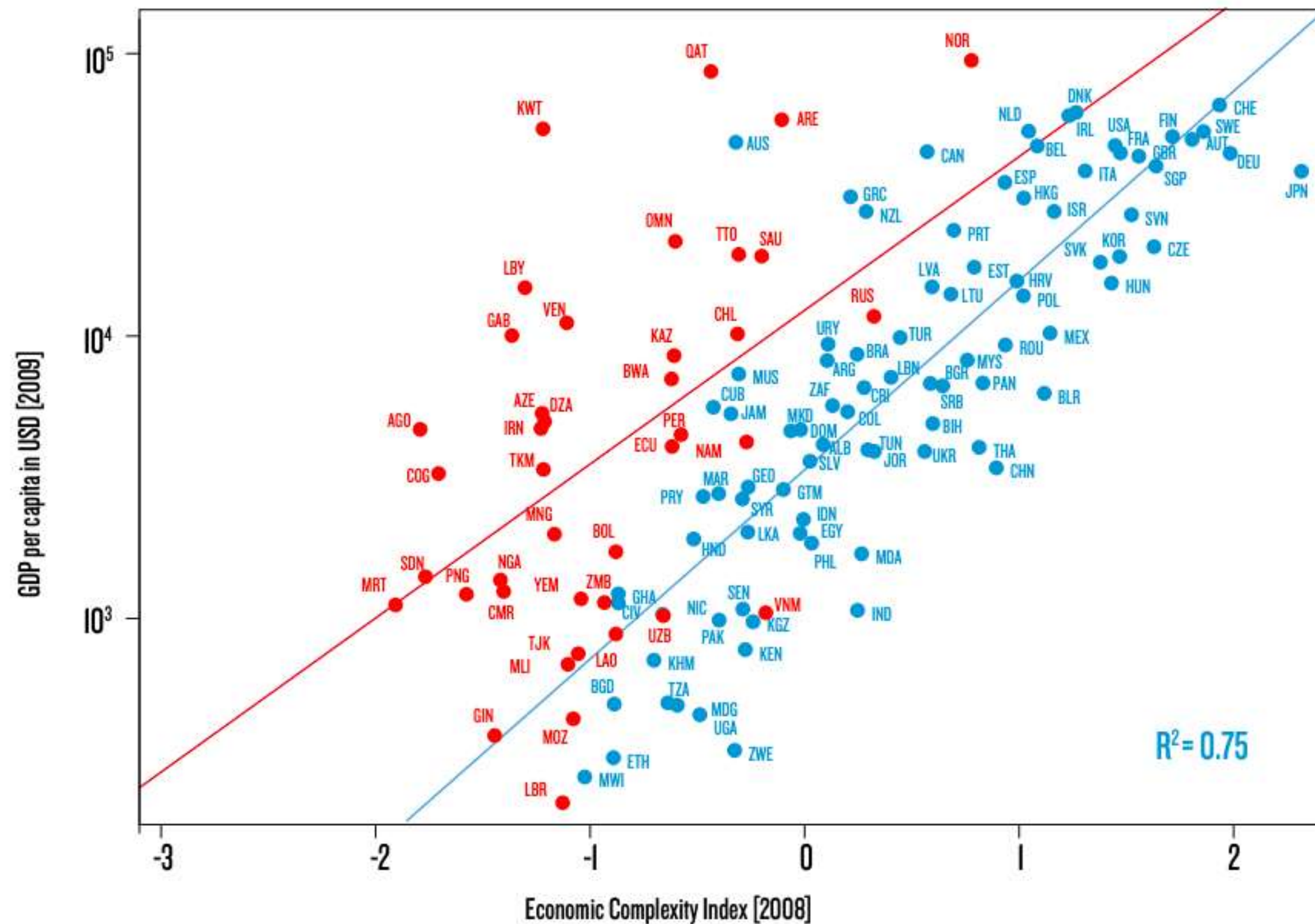
$$K_c = f(M_{cp}, g(M_{cp}, K_c))$$

$$K_c = \tilde{M}_{cc'} K_{c'}$$

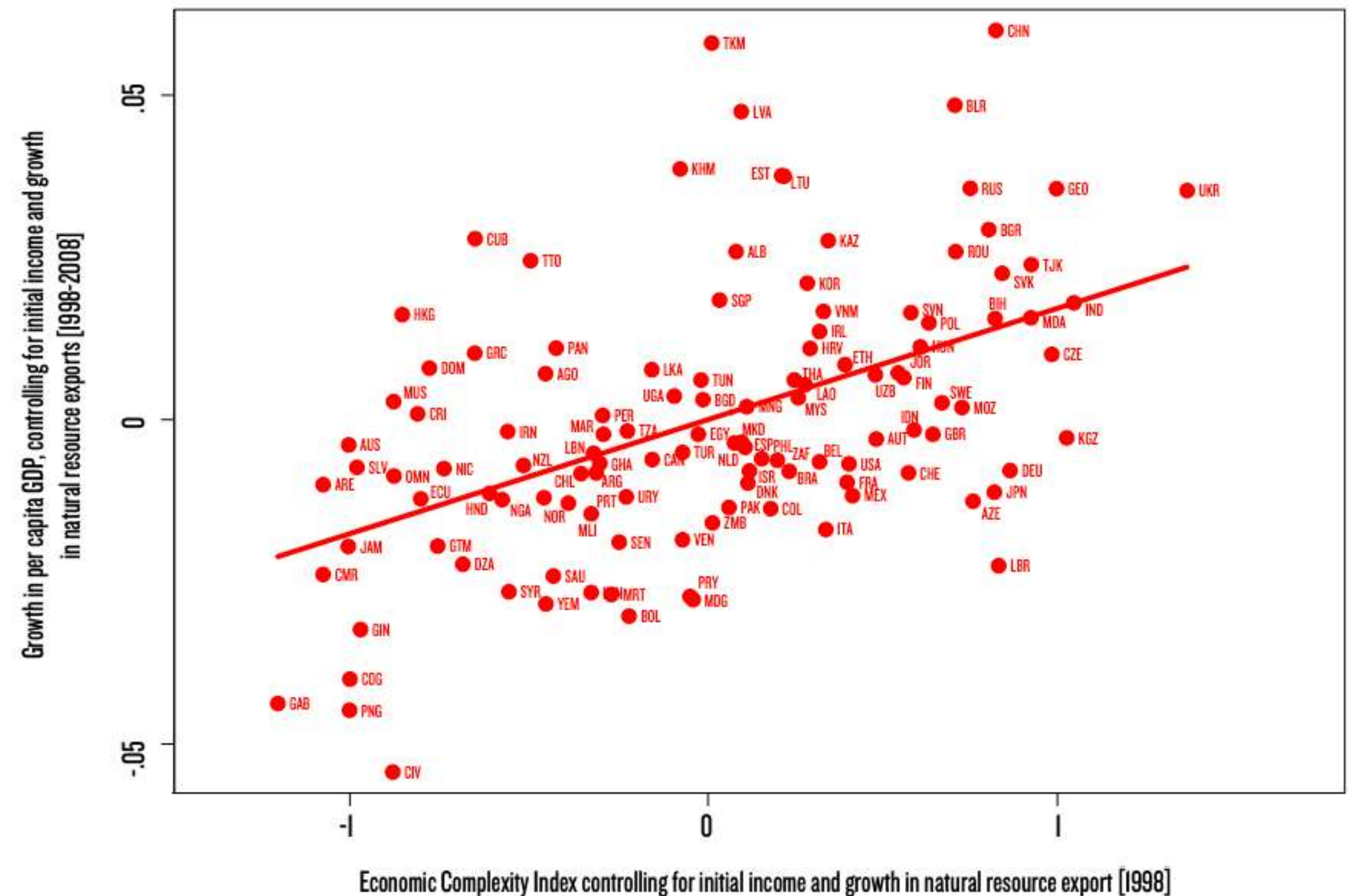
Hidalgo and Hausmann PNAS (2009)

This measure is technically a PCA of M_{cp} considering the product of row and column normalized M_{cp} 's.

Economic Complexity (Knowledge Intensity) Predicts Growth



Knowledge Intensity



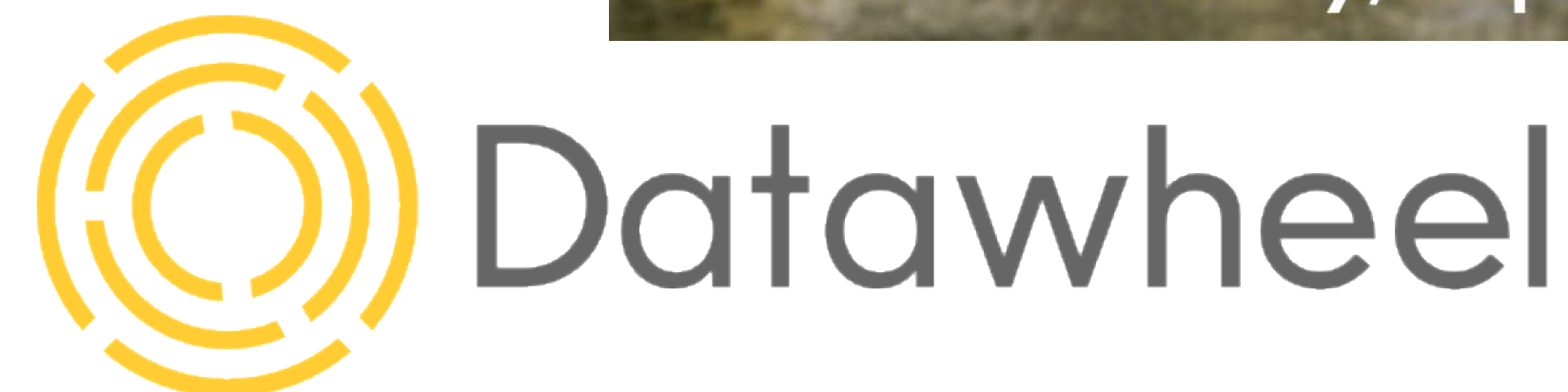
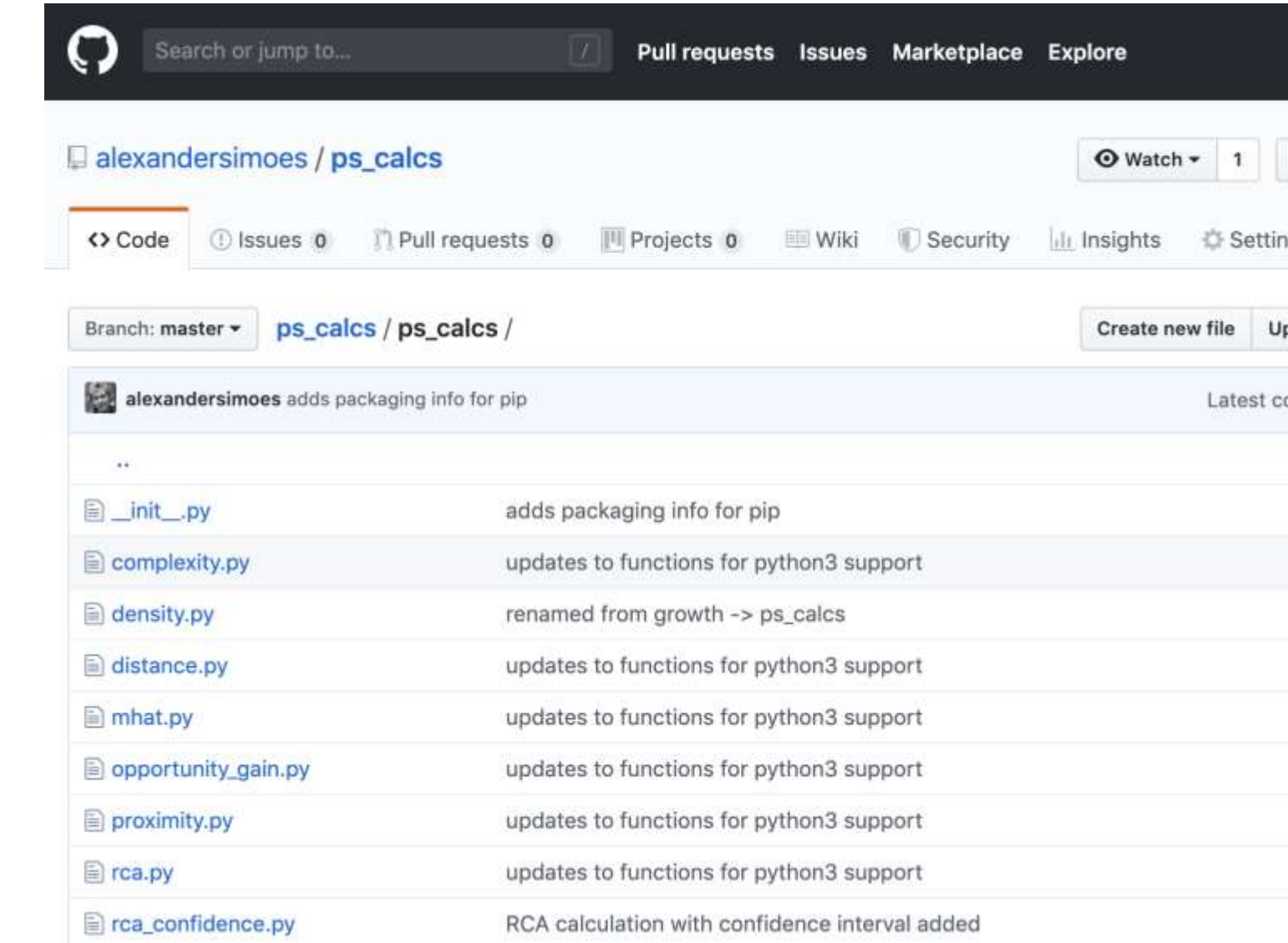
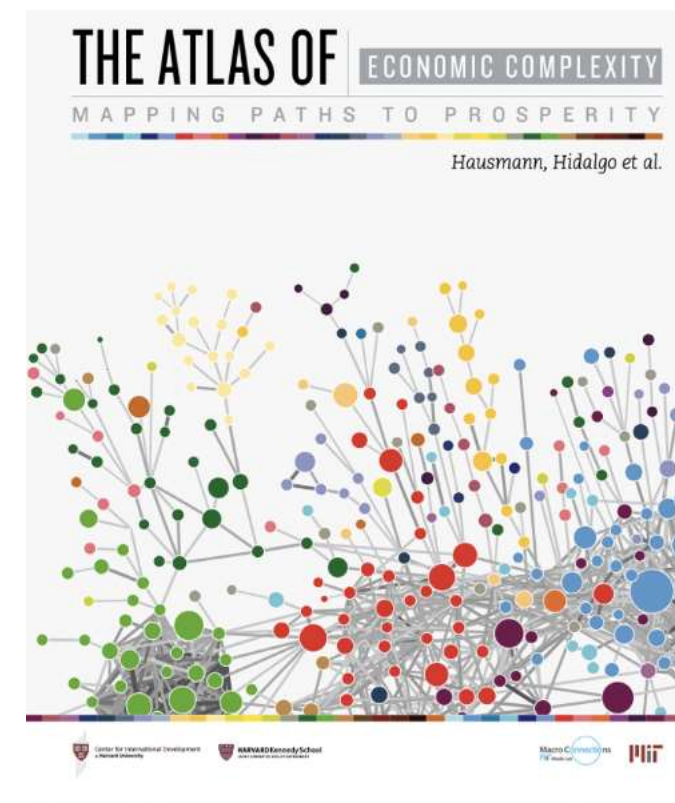
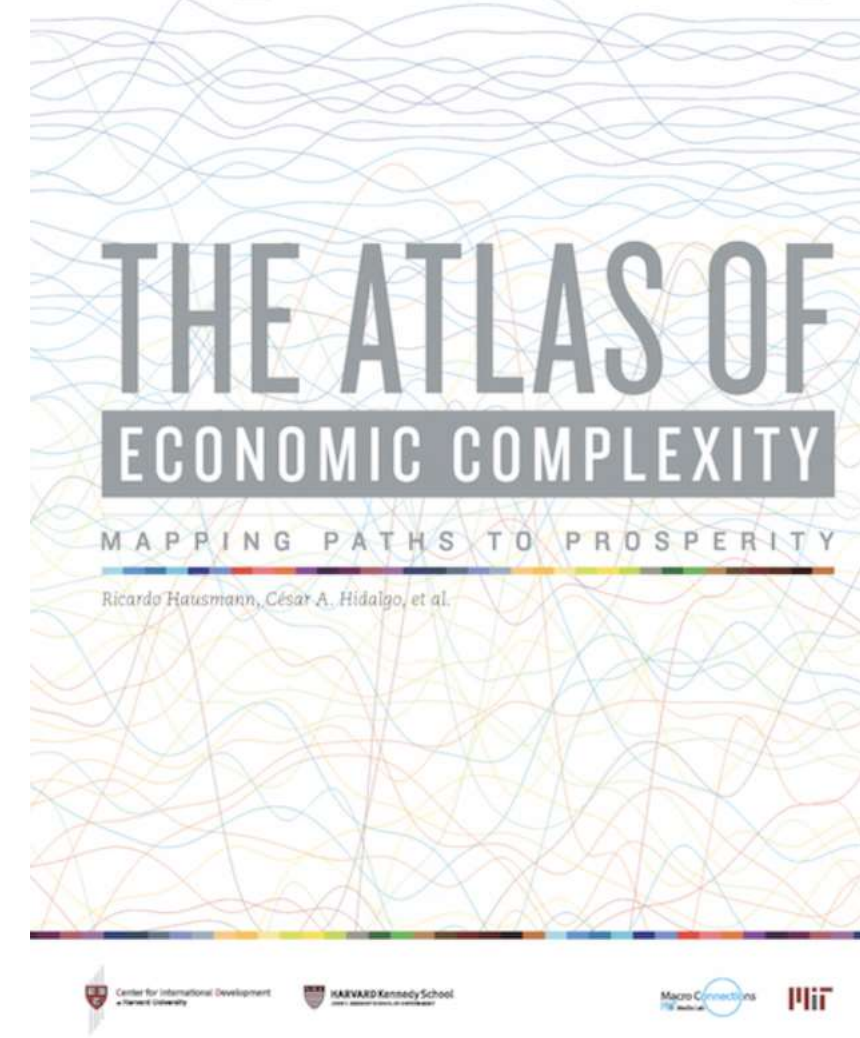
Excess of Knowledge Intensity

Biggest challenge in developing the ECI?

- Introducing a network based measure in a community where network measures were uncommon
- Thresholds! The exact ECI value is very sensitive to the specific thresholds used to create it
- Data standardization: needing to use symeterized data

Dissemination

- Open Source Toolkits
- OEC (Observatory of Economic Complexity)
- Publications
- Conference (Geography Of Innovation & Complexity)
- Private Sector





Google Search

I'm Feeling Lucky

Where's Waldo? [Find out on Google Maps](#)

Google offered in: [Español \(Latinoamérica\)](#)

Current state of the art

The home of the U.S. Government's open data

Here you will find data, tools, and resources to conduct research, develop web and mobile applications, design data visualizations, and [more](#).

GET STARTED

SEARCH OVER 197,575 DATASETS



BROWSE TOPICS



Agriculture



Climate



Consumer



Ecosystems



Education



Energy



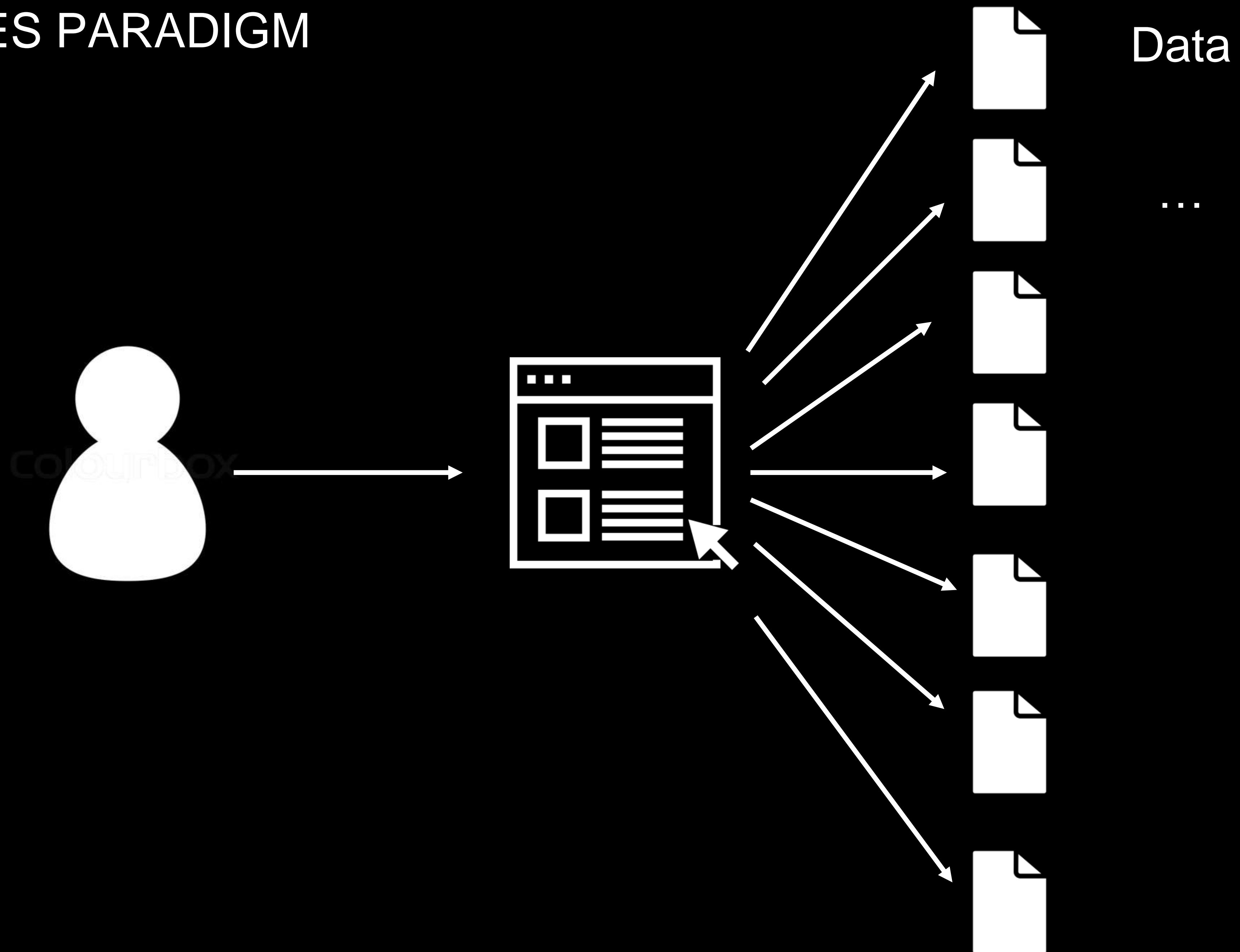
Finance





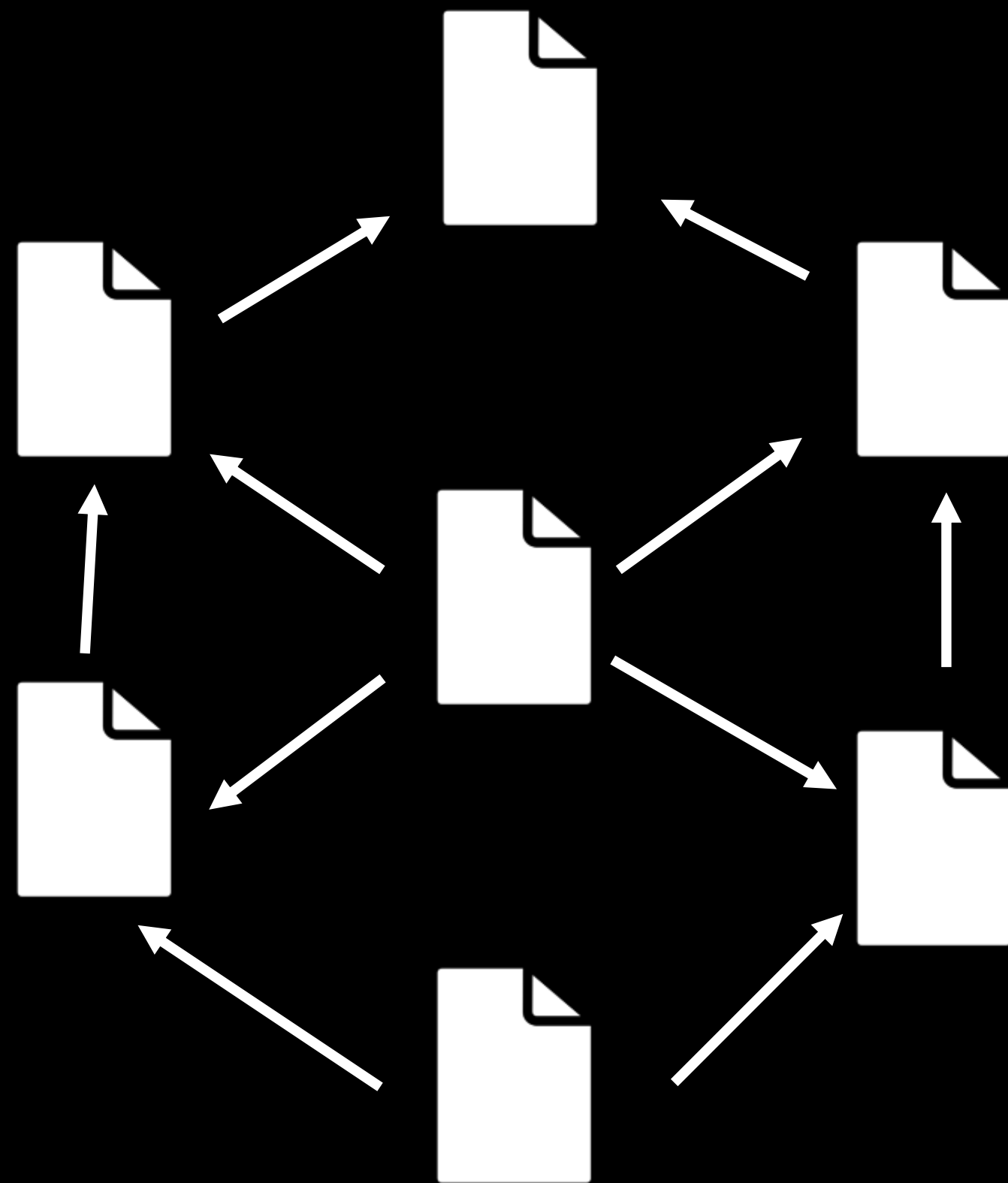


DATA AS FILES PARADIGM



DATA STORIES PARADIGM

Integrate Data



Extract and Match Entities and Indicators

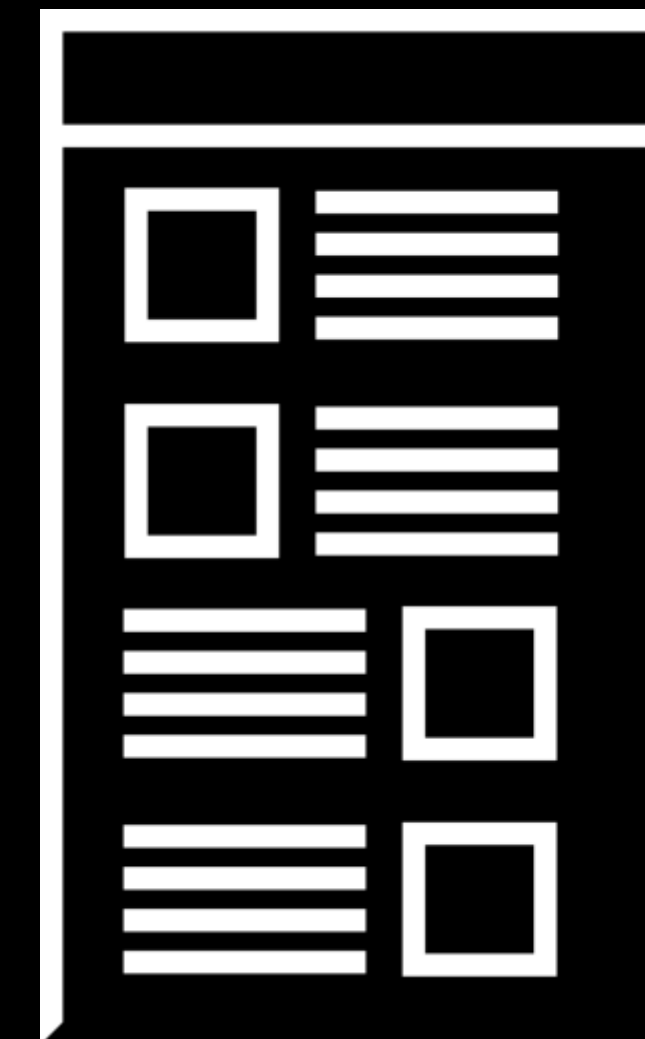
Entities

(Los Angeles,
Valparaiso,
Engineer, Coal
Mining, etc)

Variables

(Exports, Income,
Employment,
University Admission
Scores,
Health Insurance Cost &
Coverage)

Build Integrated Stories



Economy

- Trade
- Income
- Employment
- Industries
- Opportunities

Education

- Quality
- Enrollment
- Health

-Disability

-Insurance

-Conditions

-Causes of Death

Housing

-Size

-Materials

-Distance to Amer

Demographics

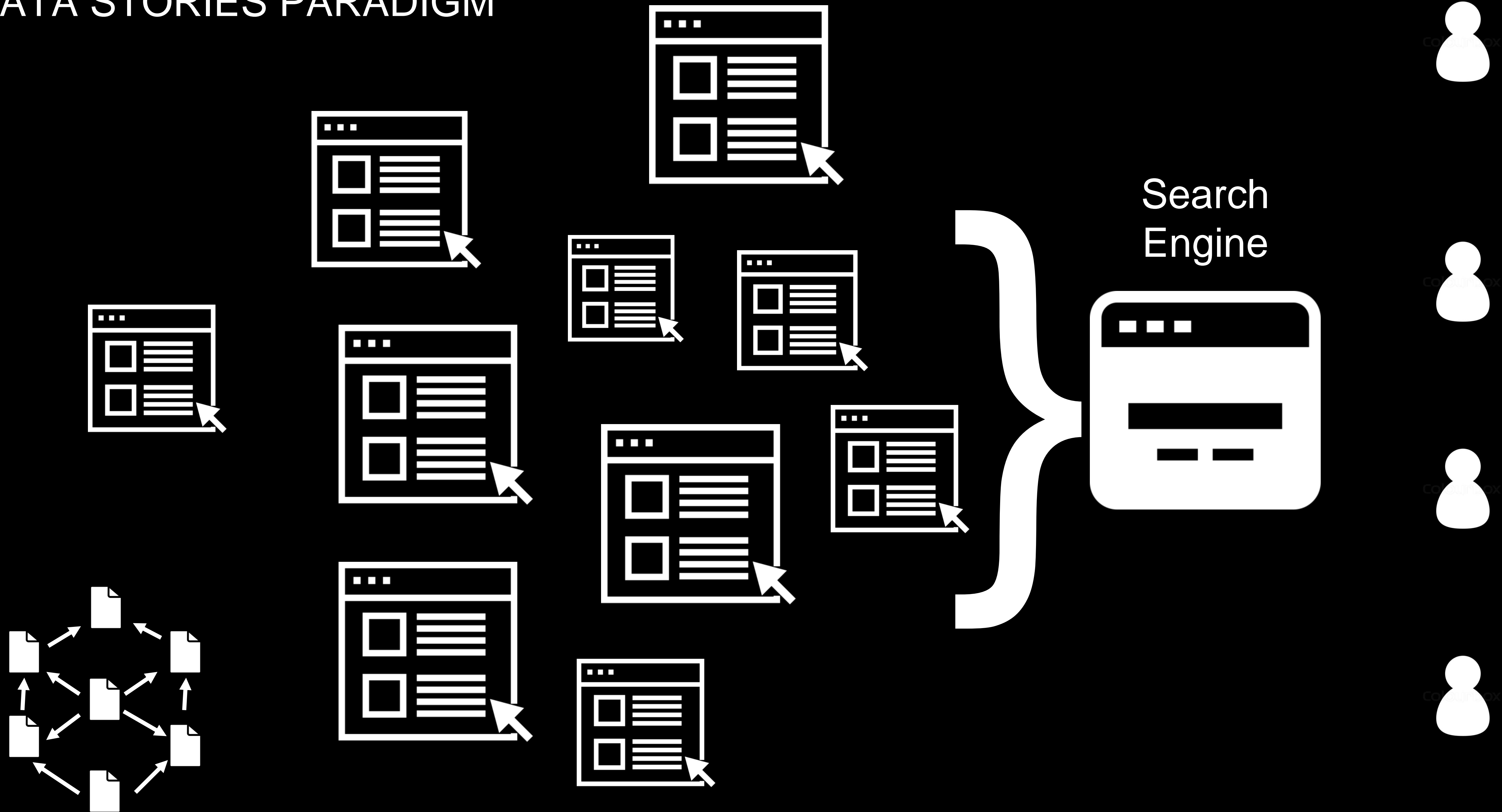
-Diversity

-Immigration

-Languages

...

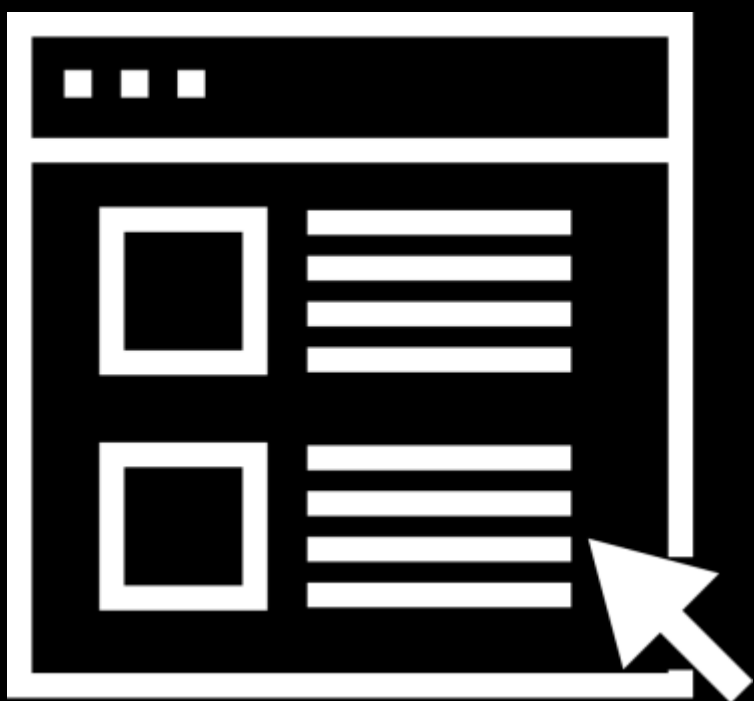
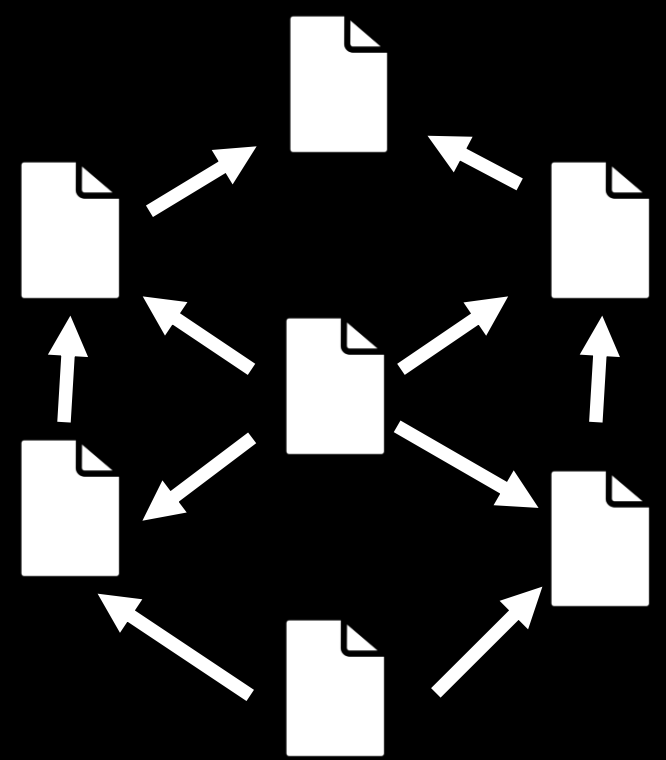
DATA STORIES PARADIGM



AUTONOMOUS GOVERNMENTS

- Customs
- Education
- Income
- ...
- Housing

DATA STORIES PARADIGM



Automated Reporting

AI Decision Making

Data Driven Management



Global Trade (2011)



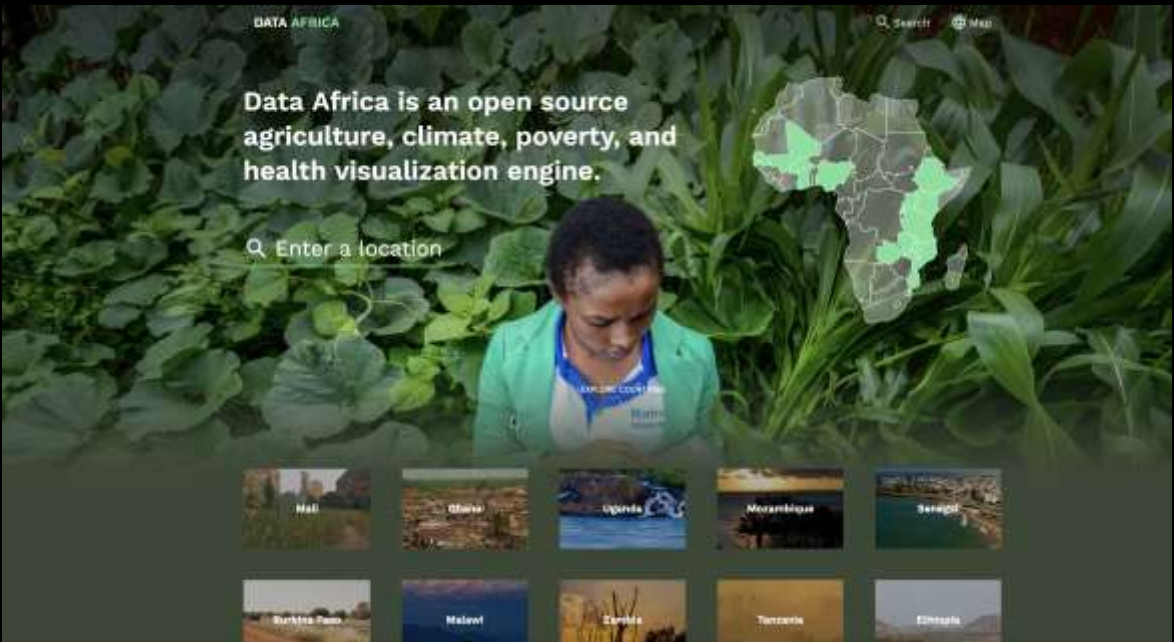
Brazil (2013)



Collective Memory (2014)



USA (2016)



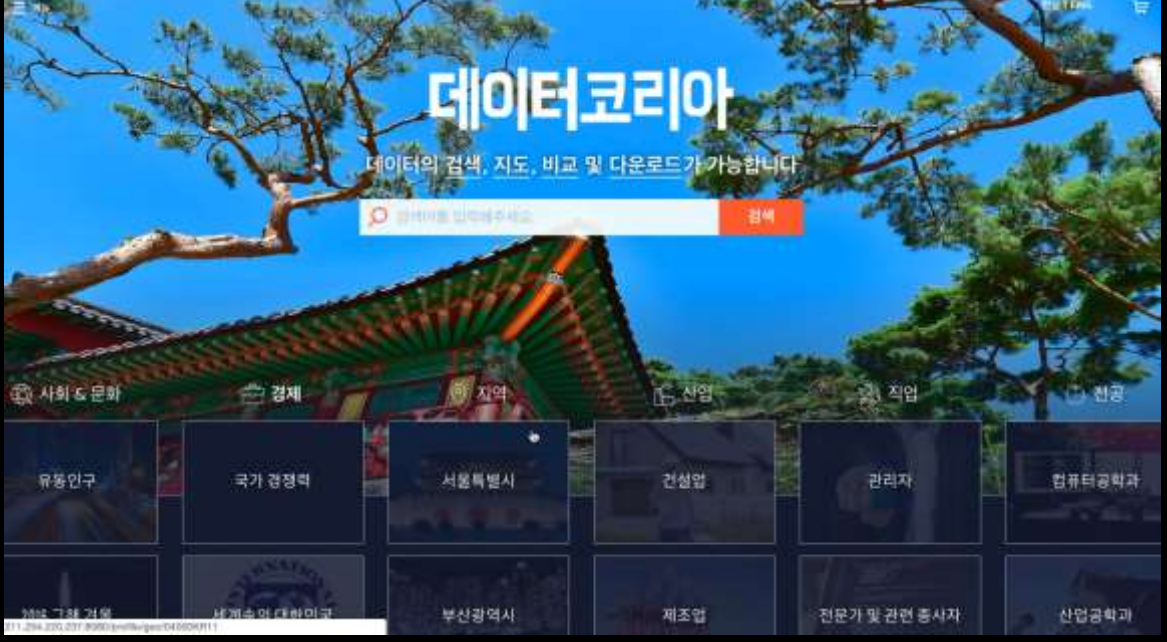
Africa (2017)



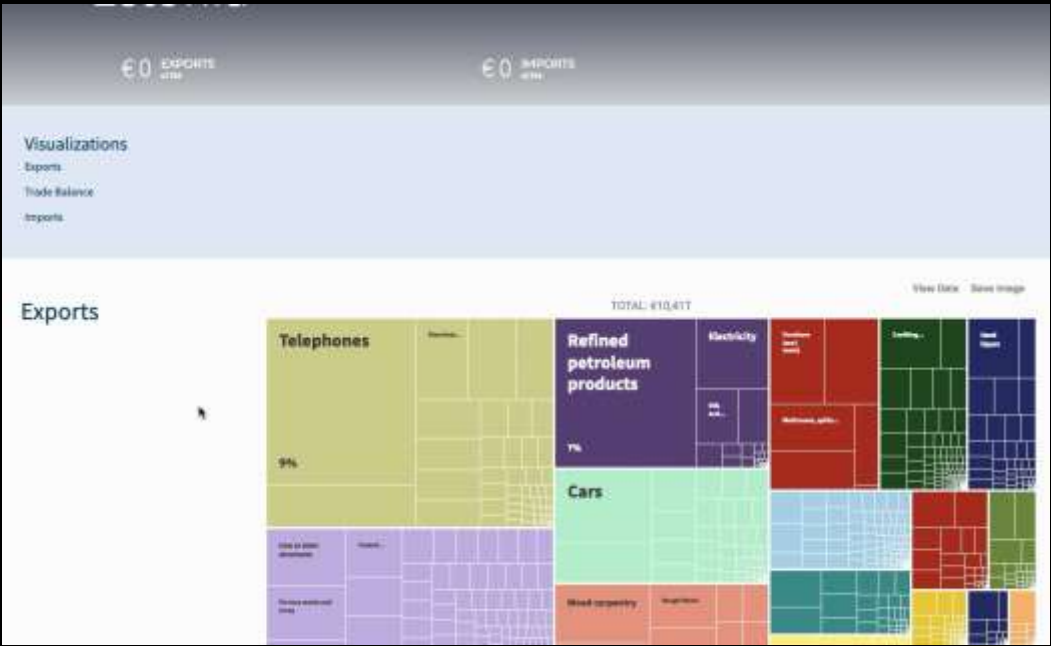
Saudi Arabia (2017)



Chile (2018)



South Korea (2018)



Estonia (2019)



Mexico (2019/2020)



Peru (2019/2020)

...

Thanks!



1299 Cambridge Street
Cambridge, MA 02139



alex@datawheel.us

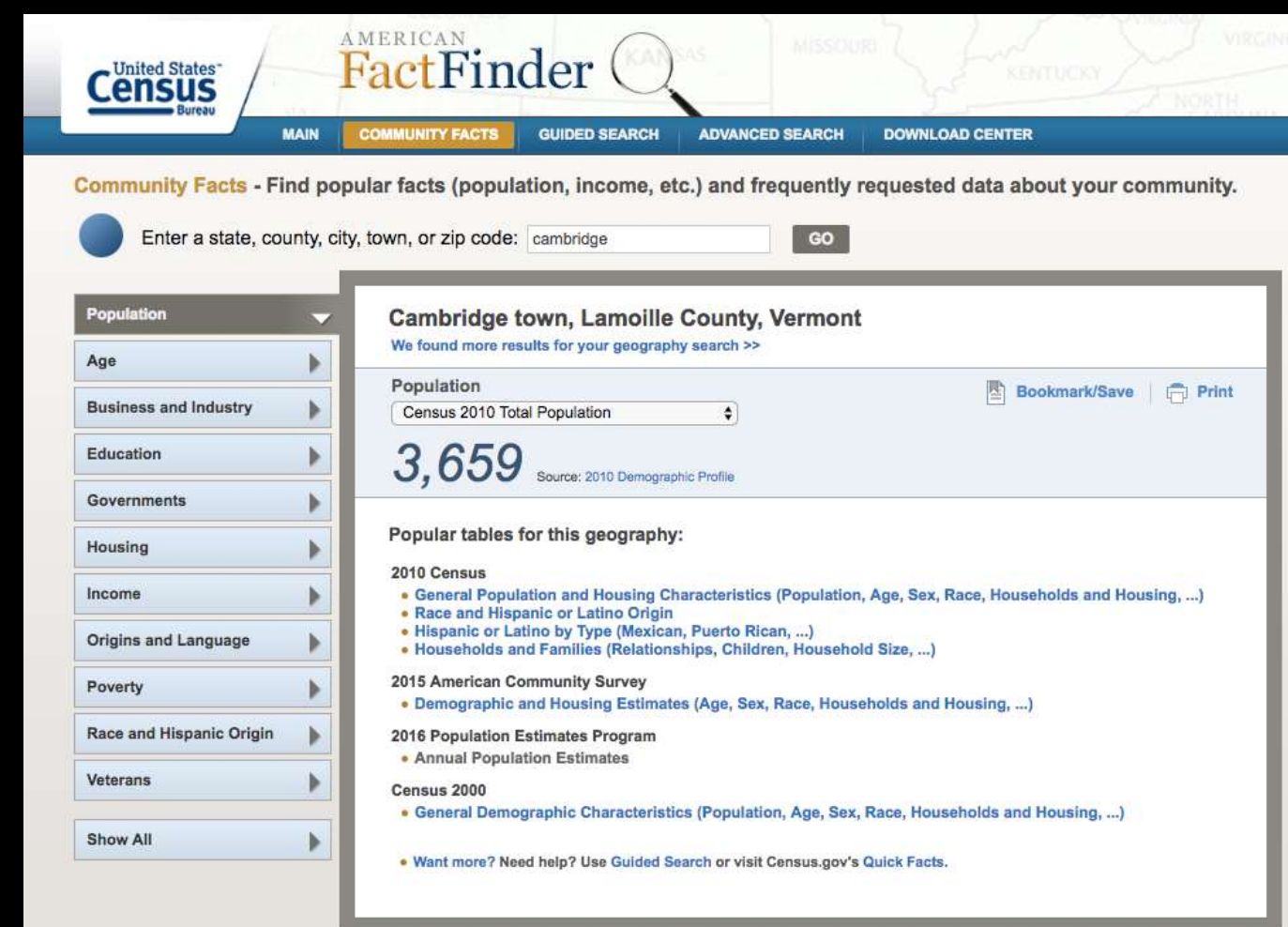
@ximoes

	Annualized growth in GDP pc (12 years)								
	1996-2008								
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Income per capita, logs	-0.00202*** (0.000)	-0.00127*** (0.000)	-0.00199*** (0.000)	-0.00213*** (0.000)	-0.00203*** (0.000)	-0.00196*** (0.000)	-0.00207*** (0.000)	-0.00201*** (0.000)	-0.00202*** (0.000)
Increase in natural resource exports - in constant dollars (as a share of initial GDP)	0.00228*** (0.000)	0.00255*** (0.000)	0.00226*** (0.000)	0.00233*** (0.000)	0.00228*** (0.000)	0.00227*** (0.000)	0.00233*** (0.000)	0.00232*** (0.000)	0.00235*** (0.000)
Initial NR exports to GDP	0.00361*** (0.001)	0.00314** (0.001)	0.00357*** (0.001)	0.00367*** (0.001)	0.00342*** (0.001)	0.00367*** (0.001)	0.00383*** (0.001)	0.00361*** (0.001)	0.00369*** (0.001)
Initial Economic Complexity Index [ECI]	0.00380** (0.002)		0.00371*** (0.001)	0.00436*** (0.001)	0.00405** (0.002)	0.00415*** (0.002)	0.00364** (0.001)	0.00392** (0.002)	0.00467*** (0.001)
[ECI] x [GDP per capita, log]	-0.00017 (0.000)		-0.00015 (0.000)	-0.00026 (0.000)	-0.00020 (0.000)	-0.00020 (0.000)	-0.00014 (0.000)	-0.00019 (0.000)	-0.00026** (0.000)
Initial Control of Corruption	0.00004 (0.001)	-0.00079 (0.001)		-0.00027 (0.001)	0.00001 (0.001)	0.00029 (0.001)	0.00005 (0.001)	-0.00003 (0.001)	
Initial Government Effectiveness	-0.00097 (0.001)	-0.00040 (0.001)	-0.00117 (0.001)		-0.00080 (0.001)	-0.00069 (0.001)	-0.00107 (0.001)	-0.00087 (0.001)	
Initial Political Stability	0.00065* (0.000)	0.00079* (0.000)	0.00054 (0.000)	0.00057* (0.000)		0.00078** (0.000)	0.00069* (0.000)	0.00059* (0.000)	
Initial Rule of Law	0.00103 (0.001)	0.00237*** (0.001)	0.00121* (0.001)	0.00073 (0.001)	0.00135* (0.001)		0.00087 (0.001)	0.00094 (0.001)	
Initial Regulatory Quality	-0.00040 (0.001)	-0.00125* (0.001)	-0.00036 (0.001)	-0.00051 (0.001)	-0.00051 (0.001)	-0.00024 (0.001)		-0.00053 (0.001)	
Initial Voice and Accountability	-0.00030 (0.000)	-0.00014 (0.001)	-0.00028 (0.000)	-0.00019 (0.000)	-0.00016 (0.000)	-0.00021 (0.000)	-0.00042 (0.000)		
Constant	0.01960*** (0.003)	0.01384*** (0.003)	0.01936*** (0.003)	0.02052*** (0.002)	0.01963*** (0.003)	0.01918*** (0.003)	0.01993*** (0.003)	0.01961*** (0.003)	0.01954*** (0.002)
Observations	118	118	118	118	118	118	118	118	118
Adjusted R ²	0.516	0.365	0.516	0.514	0.510	0.513	0.518	0.519	0.506
Difference in R ²		15.1%	0.0%	0.2%	0.6%	0.3%	0.2%	0.3%	1.0%

	Income per capita, log – Year 2000				
VARIABLES	(1)	(2)	(3)	(4)	(5)
Economic Complexity Index	0.998*** (0.204)		1.079*** (0.214)	1.042*** (0.160)	1.264*** (0.138)
Years of schooling	0.134* (0.077)	0.213** (0.085)		0.14750** (0.068)	
Cognitive ability	0.118 (0.263)	0.875*** (0.290)	0.344 (0.249)		
Constant	6.294*** (0.917)	2.861*** (0.995)	6.38972*** (0.977)	6.688*** (0.562)	7.826*** (0.183)
Observations	59	59	59	59	59
R ²	0.620	0.448	0.596	0.619	0.584

	Annualized growth in GDP pc (by decade)					
	(1978-1988, 1988-1998, 1998-2008)					
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Initial Income per capita, log	-0.009*** (0.001)	-0.006*** (0.001)	-0.008*** (0.001)	-0.009*** (0.001)	-0.009*** (0.001)	-0.007*** (0.001)
Increase in natural resource exports - in constant dollars (as a share of initial GDP)	0.055*** (0.018)	0.049** (0.021)	0.055*** (0.018)	0.055*** (0.018)	0.055*** (0.018)	0.061*** (0.017)
Initial Economic Complexity Index	0.044*** (0.011)		0.046*** (0.011)	0.044*** (0.011)	0.045*** (0.011)	0.052*** (0.011)
Initial Economic Complexity Index X Income per capita, log	-0.004*** (0.001)		-0.004*** (0.001)	-0.004*** (0.001)	-0.004*** (0.001)	-0.004*** (0.001)
Years of schooling (standardized)	0.006* (0.004)	0.013*** (0.004)		0.008*** (0.003)	0.005 (0.003)	
Secondary school enrollment (standardized)	0.000 (0.003)	0.001 (0.003)	0.005** (0.002)		0.002 (0.003)	
Tertiary school enrollment (standardized)	-0.003 (0.002)	-0.003 (0.002)	-0.000 (0.001)	-0.003 (0.002)		
Constant	0.097*** (0.012)	0.071*** (0.012)	0.091*** (0.011)	0.097*** (0.012)	0.099*** (0.012)	0.083*** (0.010)
Observations	263	263	263	263	263	263
R ²	0.409	0.288	0.401	0.409	0.406	0.383
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

US Census Site (2017)



DataUSA (2016)



Planned US Census Site (20XX)

