

In The Name of God

**Economic Complexity Role on
Technology and Innovation**

**Presenter: Prof. Hassan Zamaniyan
Deputy Minister and Head of the
Iranian Research Organization for Science and Technology**

10 September 2024

Top three innovation economies by region

Latin America and the Caribbean

1. Brazil ↑
2. Chile ↓
3. Mexico

Sub-Saharan Africa*

1. South Africa
2. Botswana
3. Senegal ☆

Northern Africa and Western Asia†

1. Israel
2. United Arab Emirates
3. Türkiye

South East Asia, East Asia, and Oceania

1. Singapore ↑
2. Republic of Korea ↓
3. China

Northern America

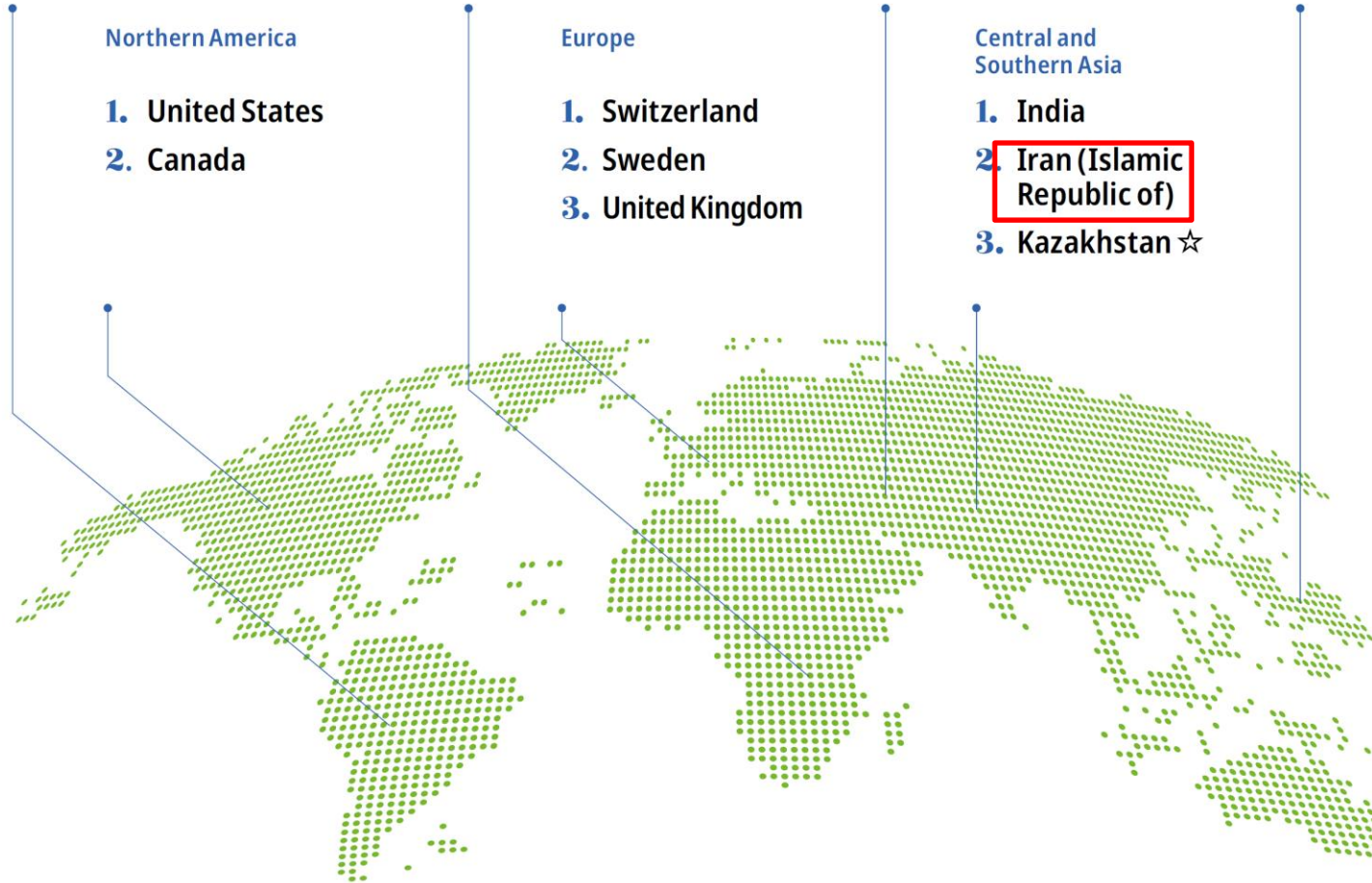
1. United States
2. Canada

Europe

1. Switzerland
2. Sweden
3. United Kingdom

Central and Southern Asia

1. India
2. Iran (Islamic Republic of)
3. Kazakhstan ☆



Economic Complexity Index (ECI).

- The economic complexity of a country is connected to the complexity of the products that it exports.
- Economic development requires the accumulation of productive knowledge and its use in both *more* and *more complex* industries.
- Harvard Growth Lab's Country Rankings assess the current state of a country's productive knowledge, through the Economic Complexity Index (ECI).
- Countries improve their ECI by increasing the number and complexity of the products they successfully export.

Multidimensional Economic Complexity Rankings

Traditional estimates of economic complexity rely on trade data. However, these estimates can be biased against geographically isolated economies.

Multidimensional approaches to economic complexity solve this problem by combining data on international trade, patents, and research papers. They combine to provide better estimates of economic complexity that have an improved ability to explain international variations in economic growth, income inequality, and greenhouse gas emissions. You can explore the latest multidimensional economic complexity rankings at the OEC.

ECI Trade	ECI Technology	ECI Research
Trade ECI estimates a country's ability to produce and export complex products that require a high level of knowledge and skills.	Tech ECI showcases a nation's ability to produce complex patentable innovations.	Research ECI estimates the sophistication of a country's academic research, and together with trade and tech ECI, helps explain the intensity of emissions.

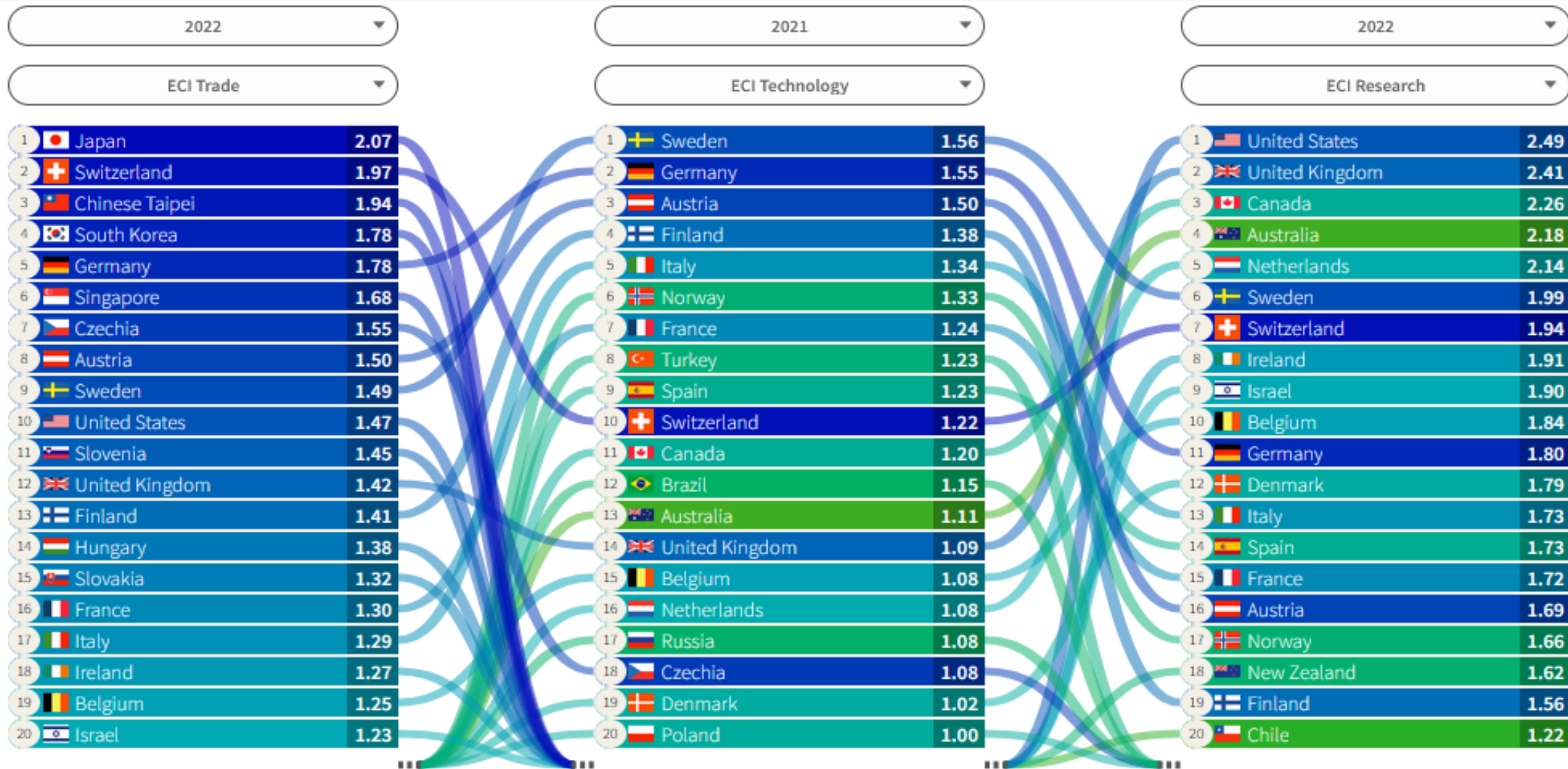
TOP 6 Products by Complexity

Row	Product Name	Product Community	Product Complexity Index (PCI)
1	Photographic plates and film, exposed and developed, other than motion-picture film	Chemicals	2.31
2	Colloidal precious metals; inorganic or organic compounds of precious metals, amalgams of precious metals	Machinery	2.24
3	Microscopes other than optical microscopes; diffraction apparatus; parts and accessories thereof	Machinery	2.09
4	Chemical element/compound wafers doped for electronic	Chemicals & Health	2.06
5	Machines and mechanical appliances have individual functions	Machinery	2.04
6	Machining centers, unit construction machines (single station), and multistation transfer machines, for working metal	Machinery	2.01

Bottom 6 Products by Complexity

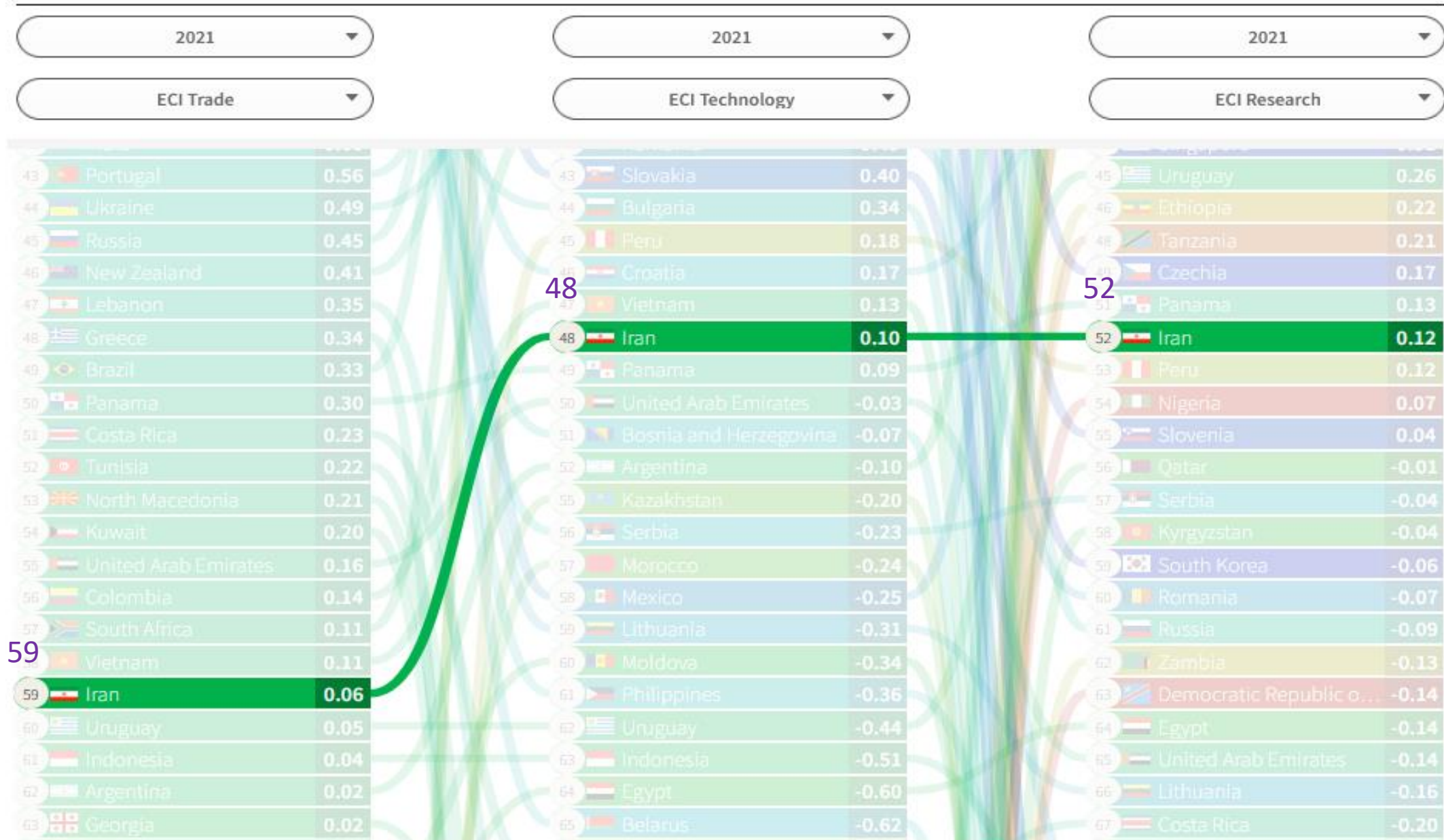
Row	Product Name	Product Community	Product Complexity Index (PCI)
1	Tin ores and concentrates	Mining	-3.37
2	Cocoa beans, whole or broken, raw or roasted	Tropical tree crops and flowers	-3.04
3	Unrefined copper; copper anodes for electrolytic refining	Mining	-2.52
4	Cotton, not carded or combed	Cotton, rice, soy, and others	-2.43
5	Petroleum oils and oils obtained from bituminous minerals, crude	Oil	-2.4
6	petroleum gases and other gaseous hydrocarbons	Chemicals & Health	-2.34

Multidimensional Economic Complexity Rankings

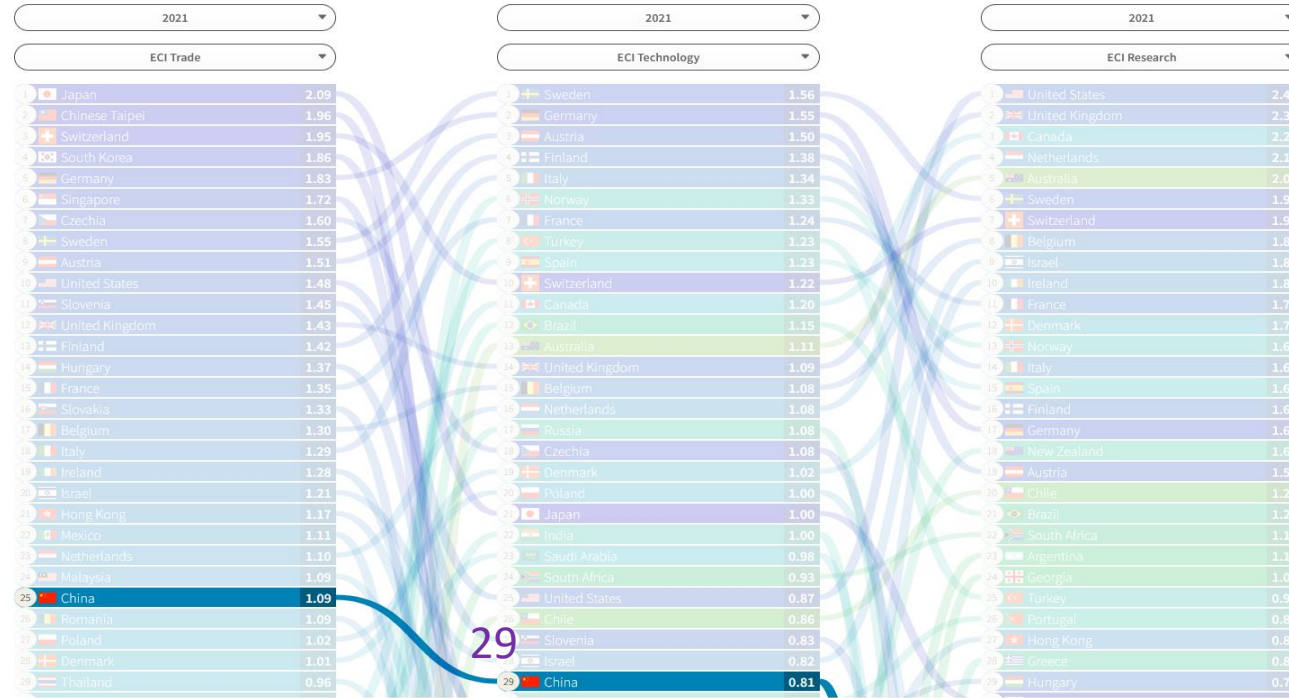


Link: 

Iran



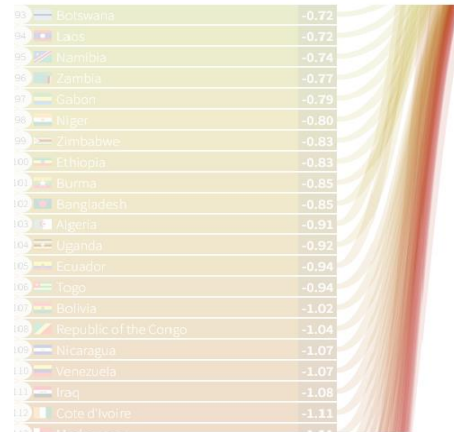
China



25

29

•
•
•

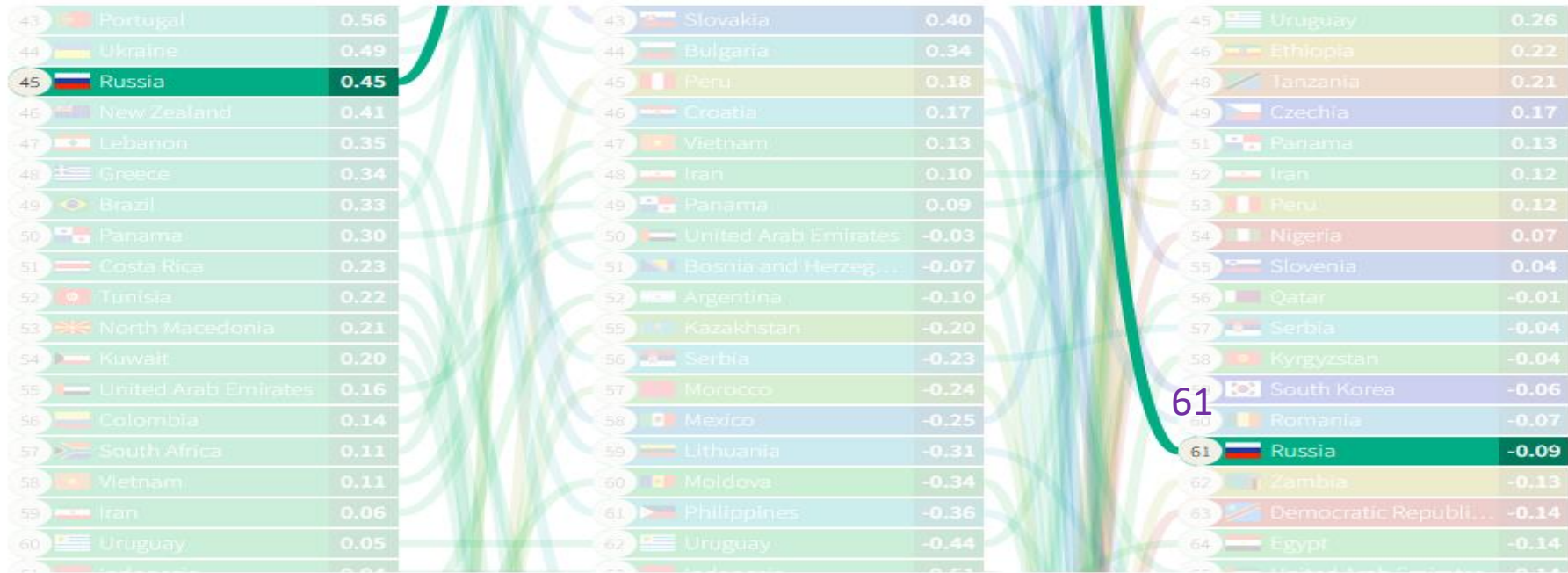


118

Russia



45



South Korea

4

ECI Trade		
1	Japan	2.09
2	Chinese Taipei	1.96
3	Switzerland	1.95
4	South Korea	1.86
5	Germany	1.83
6	Singapore	1.72
7	Czechia	1.60
8	Sweden	1.55
9	Austria	1.51
10	United States	1.48
11	Slovenia	1.45
12	United Kingdom	1.43
13	Finland	1.42
14	Hungary	1.37
15	France	1.35
16	Slovakia	1.33
17	Belgium	1.30
18	Italy	1.29
19	Ireland	1.28
20	Israel	1.21
21	Hong Kong	1.17
22	Mexico	1.11
23	Netherlands	1.10
24	Malaysia	1.09
25	China	1.09
26	Romania	1.09
27	Poland	1.02
28	Denmark	1.01
29	Thailand	0.96
30	Lithuania	0.92
31	Canada	0.91
32	Saudi Arabia	0.86
33	Belarus	0.84
34	Croatia	0.80
35	Spain	0.79
36	Serbia	0.74
37	Philippines	0.70
38	Bosnia and Herzegovina	0.66
39	Norway	0.65
40	Bulgaria	0.64
41	Turkey	0.61
42	India	0.60
43	Portugal	0.56
44	Ukraine	0.49
45	Russia	0.45
46	New Zealand	0.41
47	Lebanon	0.35
48	Greece	0.34
49	Brazil	0.33
50	Panama	0.30
51	Costa Rica	0.23
52	Tunisia	0.22
53	North Macedonia	0.21
54	Kuwait	0.20
55	United Arab Emirates	0.16
56	Colombia	0.14
57	South Africa	0.11
58	Vietnam	0.11

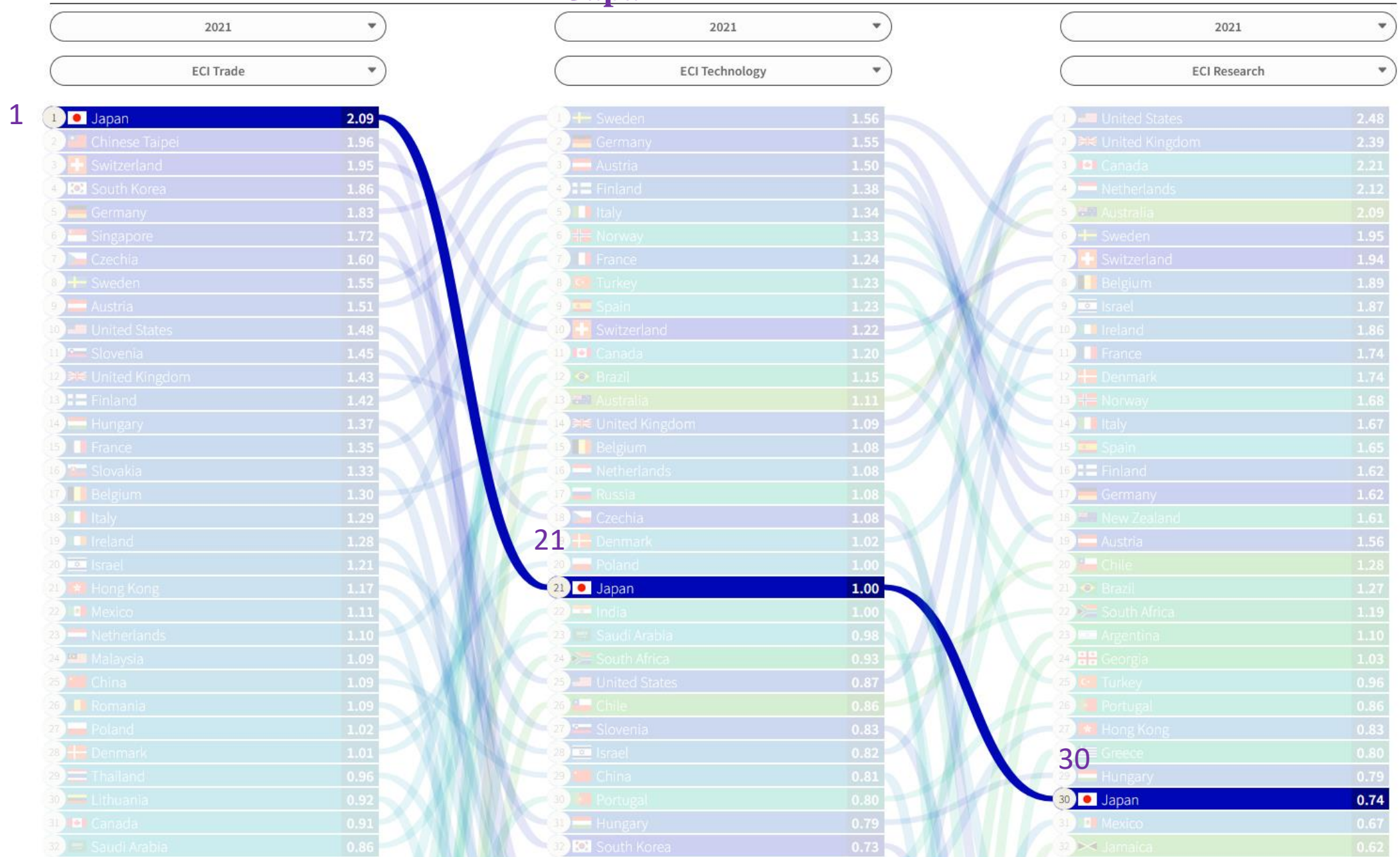
32

ECI Technology		
1	Sweden	1.56
2	Germany	1.55
3	Austria	1.50
4	Finland	1.38
5	Italy	1.34
6	Norway	1.33
7	France	1.24
8	Turkey	1.23
9	Spain	1.23
10	Switzerland	1.22
11	Canada	1.20
12	Brazil	1.15
13	Australia	1.11
14	United Kingdom	1.09
15	Belgium	1.08
16	Netherlands	1.08
17	Russia	1.08
18	Czechia	1.08
19	Denmark	1.02
20	Poland	1.00
21	Japan	1.00
22	India	1.00
23	Saudi Arabia	0.98
24	South Africa	0.93
25	United States	0.87
26	Chile	0.86
27	Slovenia	0.83
28	Israel	0.82
29	China	0.81
30	Portugal	0.80
31	Hungary	0.79
32	South Korea	0.73
33	New Zealand	0.73
34	Hong Kong	0.66
35	Chinese Taipei	0.66
36	Ireland	0.62
37	Singapore	0.60
38	Malaysia	0.59
39	Ukraine	0.58
40	Thailand	0.54
41	Colombia	0.53
42	Romania	0.49
43	Slovakia	0.40
44	Bulgaria	0.34
45	Peru	0.18
46	Croatia	0.17
47	Vietnam	0.13
48	Iran	0.10
49	Panama	0.09
50	United Arab Emirates	-0.03
51	Bosnia and Herzegovina	-0.07
52	Argentina	-0.10
53	Kazakhstan	-0.20
54	Serbia	-0.23
55	Morocco	-0.24
56	Mexico	-0.25
57	Lithuania	-0.31
58	Moldova	-0.34

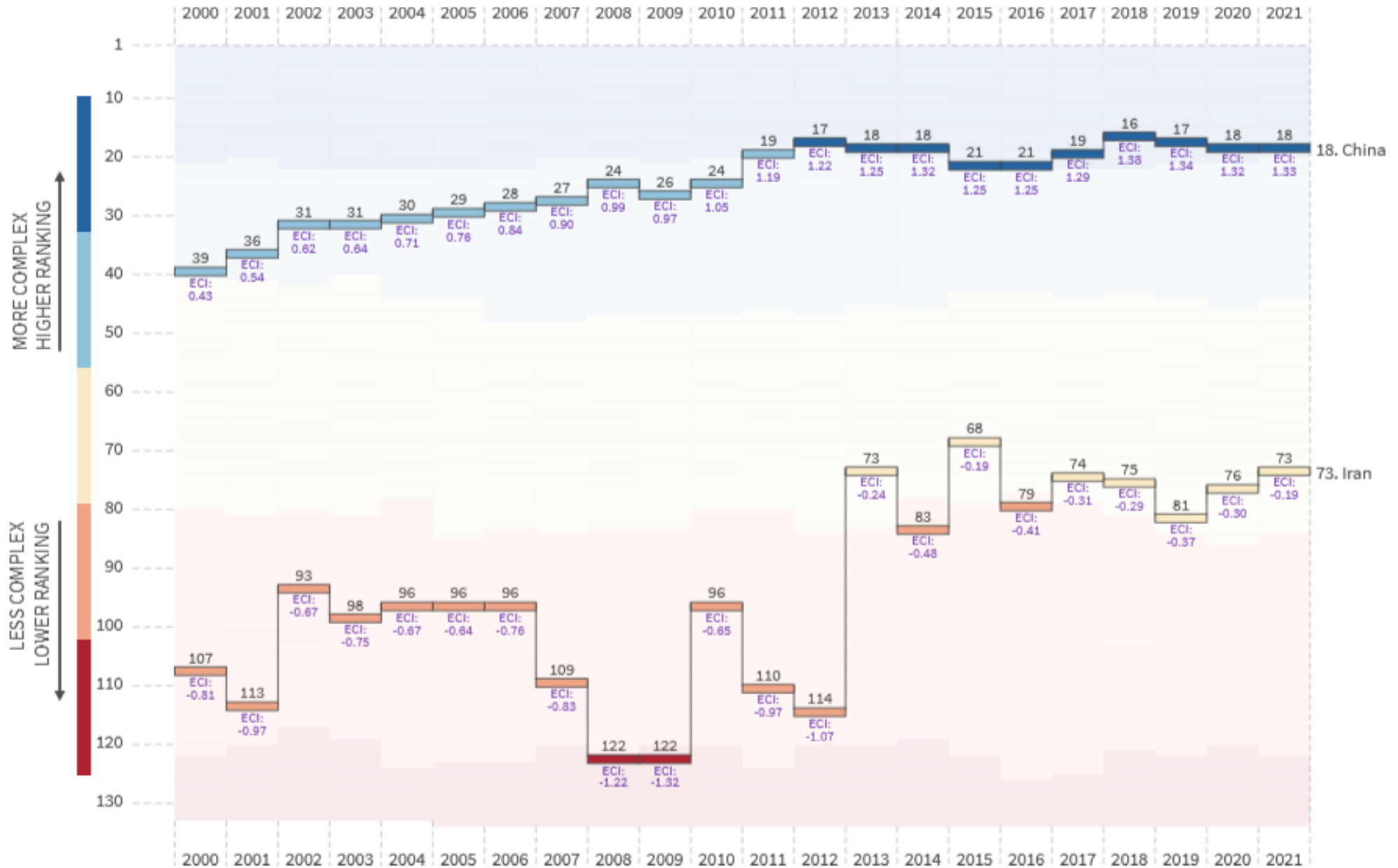
59

ECI Research		
1	United States	2.48
2	United Kingdom	2.39
3	Canada	2.21
4	Netherlands	2.12
5	Australia	2.09
6	Sweden	1.95
7	Switzerland	1.94
8	Belgium	1.89
9	Israel	1.87
10	Ireland	1.86
11	France	1.74
12	Denmark	1.74
13	Norway	1.68
14	Italy	1.67
15	Spain	1.65
16	Finland	1.62
17	Germany	1.62
18	New Zealand	1.61
19	Austria	1.56
20	Chile	1.28
21	Brazil	1.27
22	South Africa	1.19
23	Argentina	1.10
24	Georgia	1.03
25	Turkey	0.96
26	Portugal	0.86
27	Hong Kong	0.83
28	Greece	0.80
29	Hungary	0.79
30	Japan	0.74
31	Mexico	0.67
32	Jamaica	0.62
33	Colombia	0.59
34	Lebanon	0.57
35	Paraguay	0.55
36	Guatemala	0.49
37	Kenya	0.46
38	Ghana	0.45
39	Poland	0.41
40	Uganda	0.40
41	Croatia	0.35
42	Singapore	0.31
43	Uruguay	0.26
44	Ethiopia	0.22
45	Tanzania	0.21
46	Czechia	0.17
47	Panama	0.13
48	Iran	0.12
49	Peru	0.12
50	Nigeria	0.07
51	Slovenia	0.04
52	Qatar	-0.01
53	Serbia	-0.04
54	Kyrgyzstan	-0.04
55	South Korea	-0.06
56	Romania	-0.07
57	Russia	-0.09
58	Zambia	-0.13

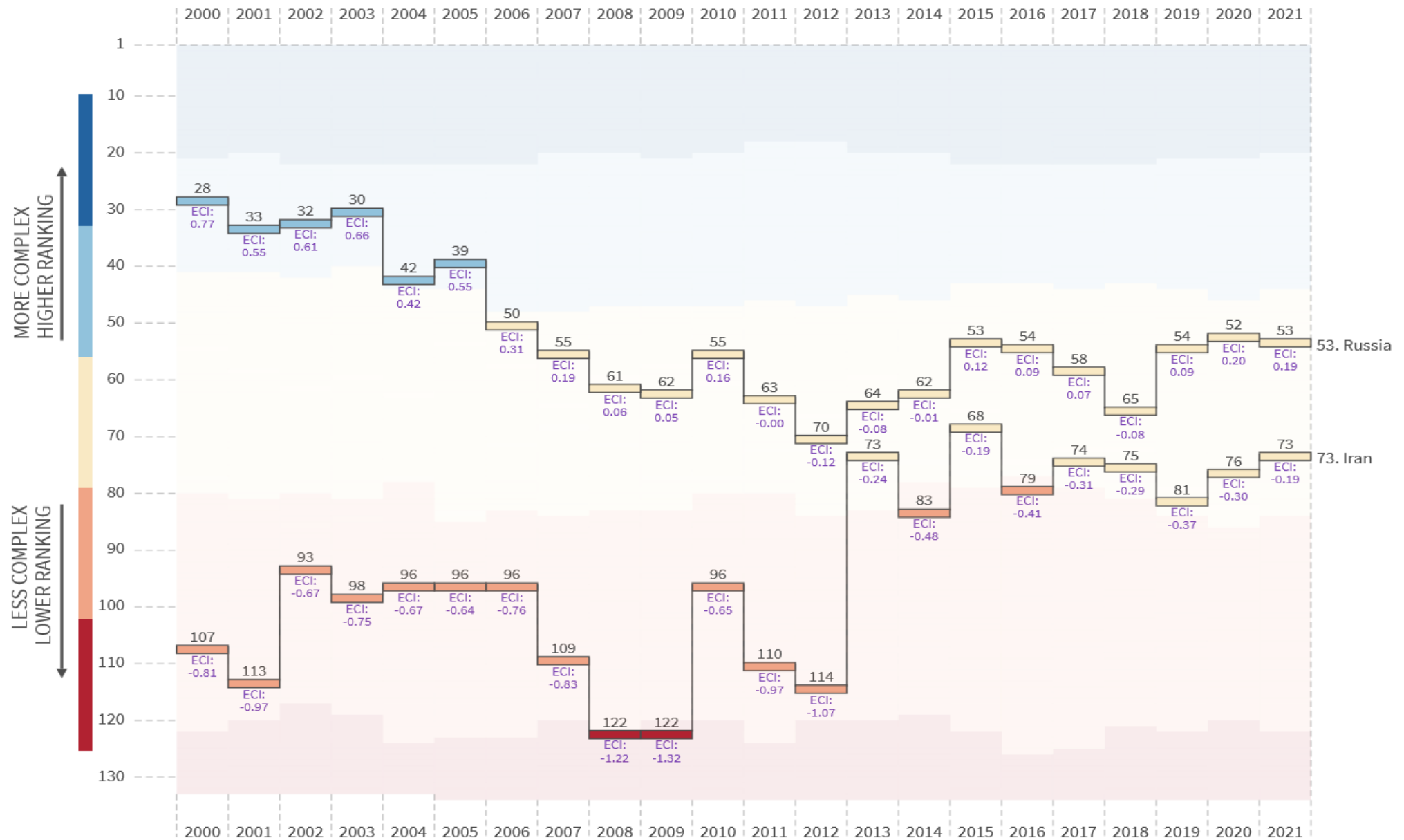
Japan



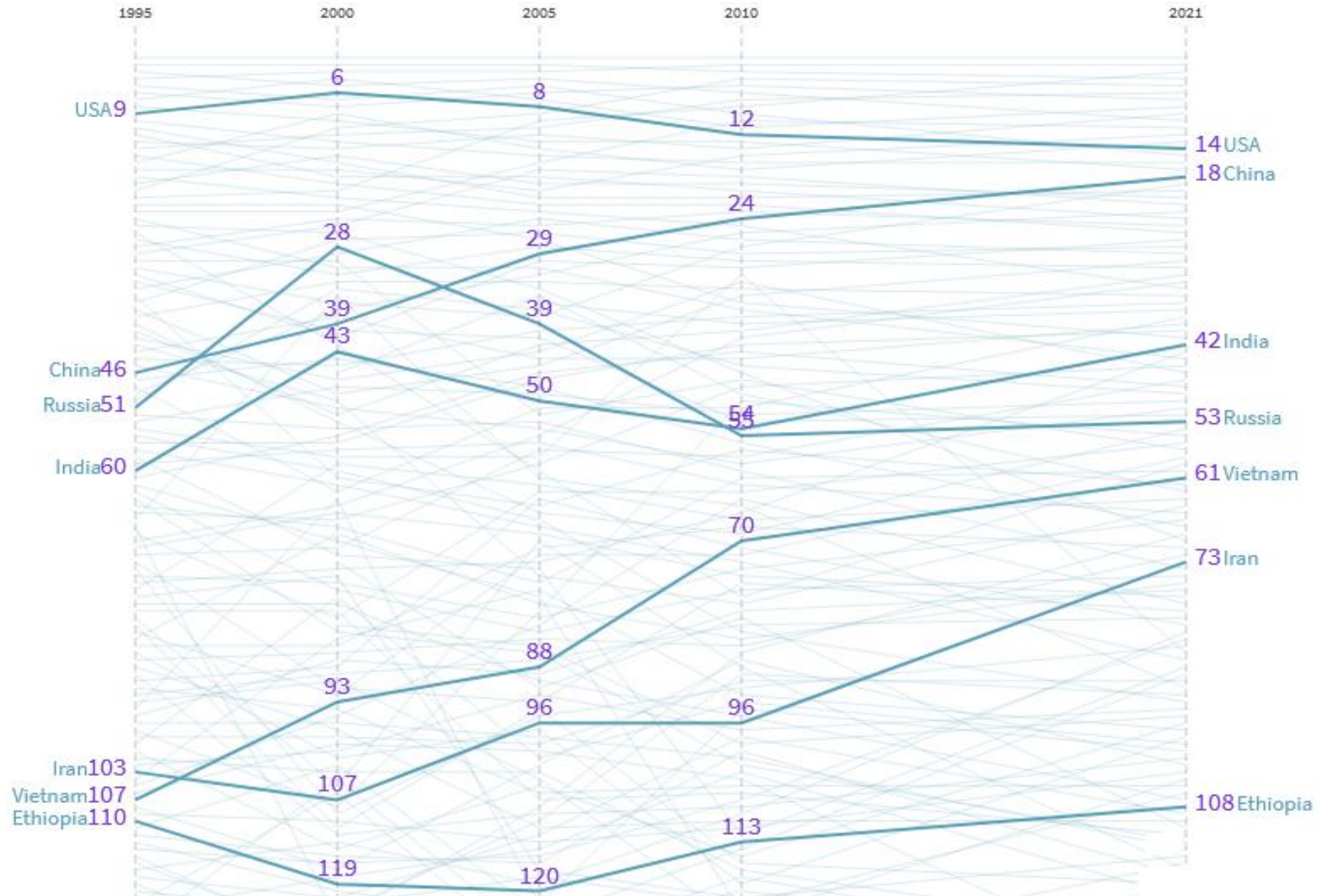
Iran and China ECI Ranking



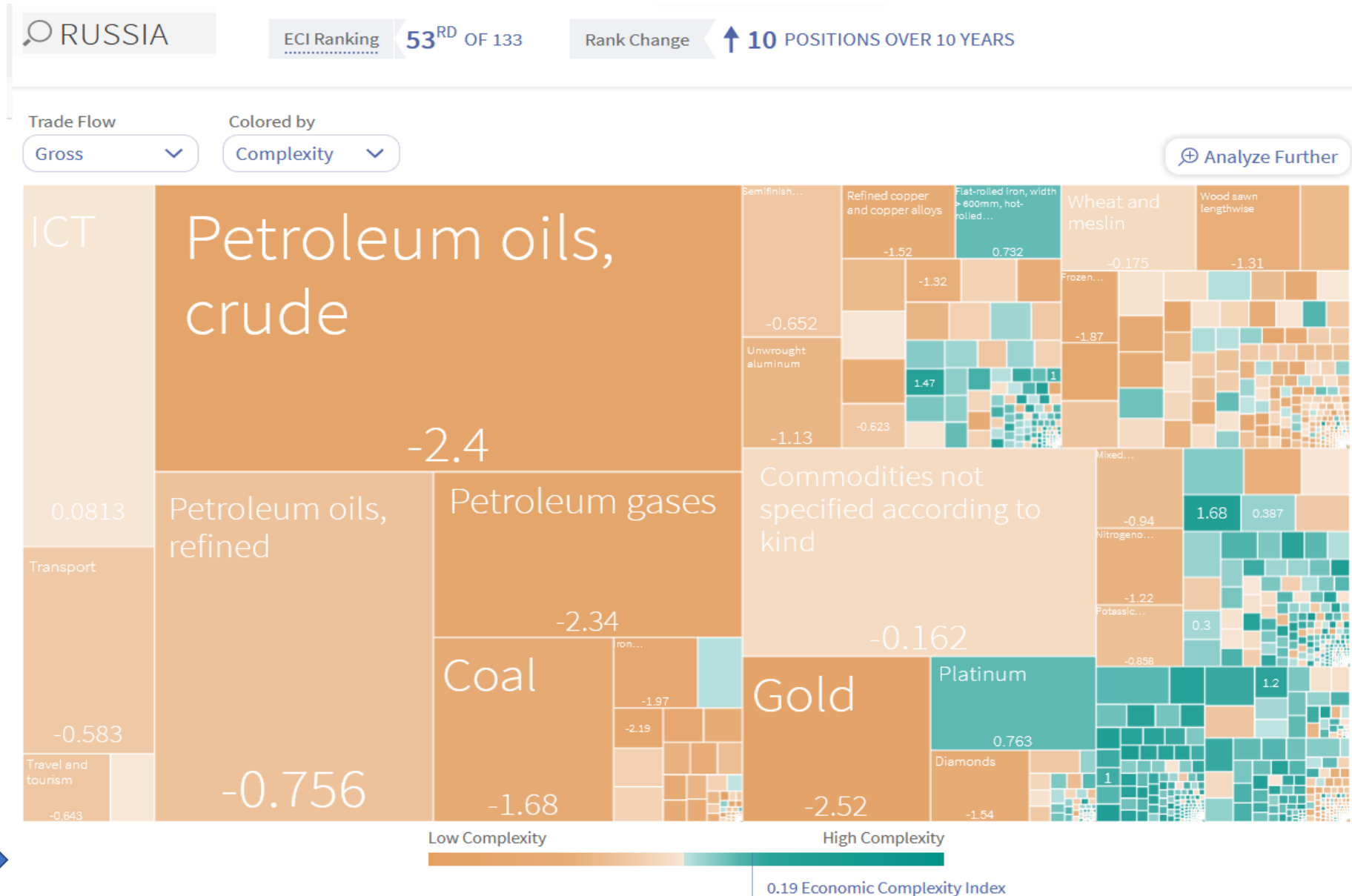
Iran and Russia ECI Ranking



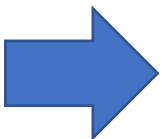
Some Country Economic Complexity Ranking



Russia's largest goods exports are in low and moderate complexity products, Minerals and Metals, respectively



Link:



Iran's largest goods exports are in high and moderate complexity products, Chemicals and Metals, respectively.

IRAN

ECI Ranking 73RD OF 133

Rank Change ↑ 37 POSITIONS OVER 10 YEARS

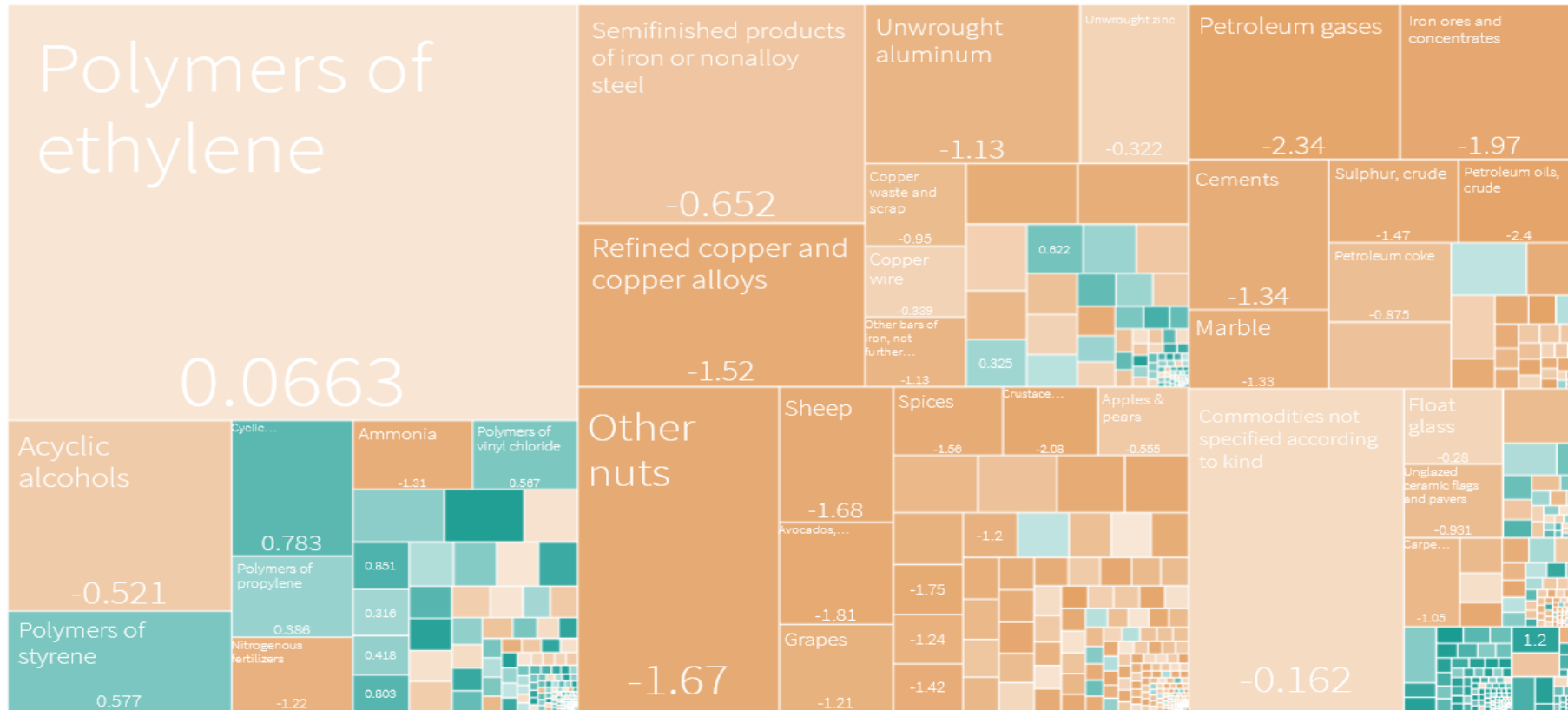
Trade Flow

Gross

Colored by

Complexity

Analyze Further



Low Complexity

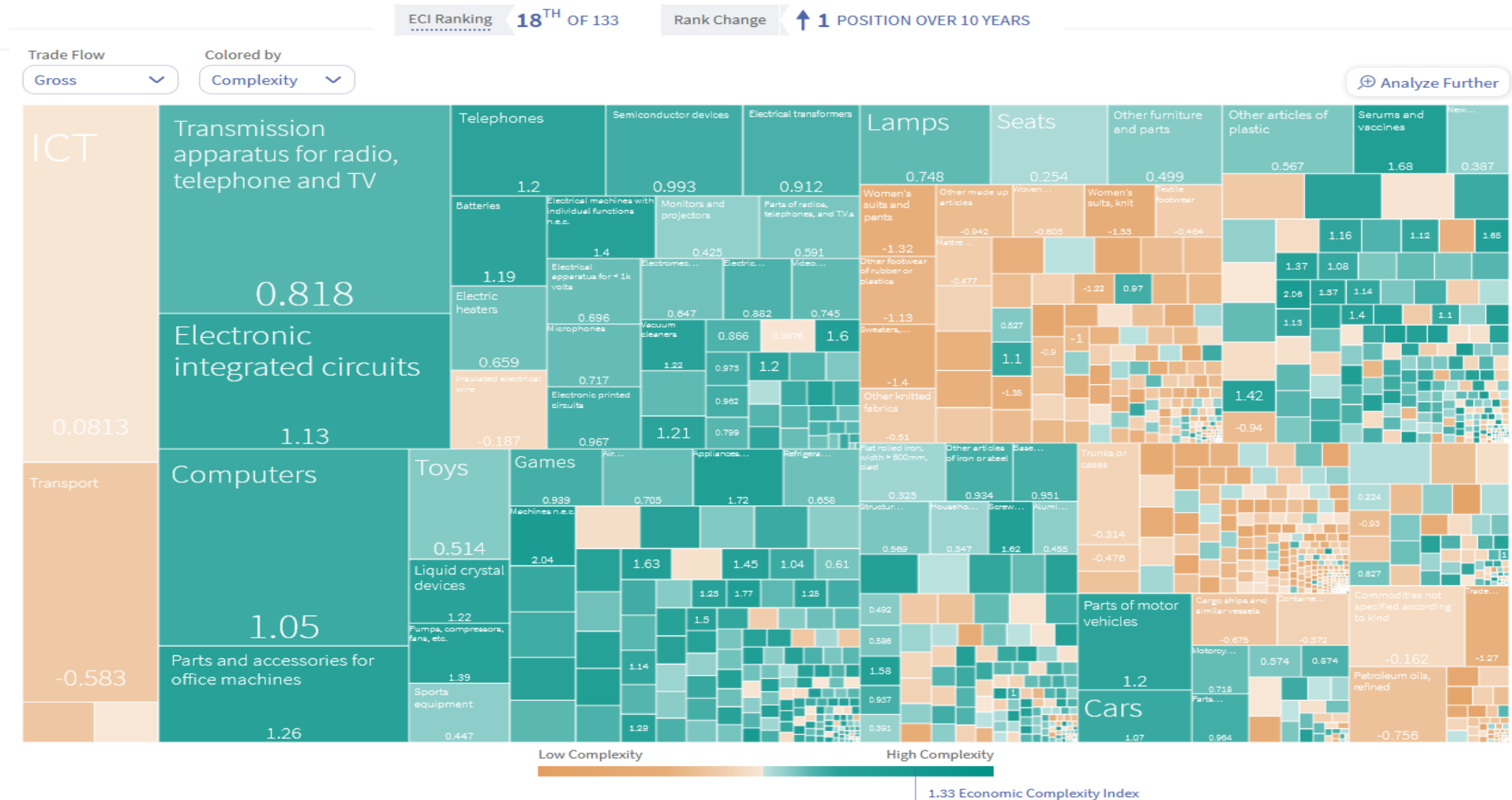
High Complexity

-0.19 Economic Complexity Index

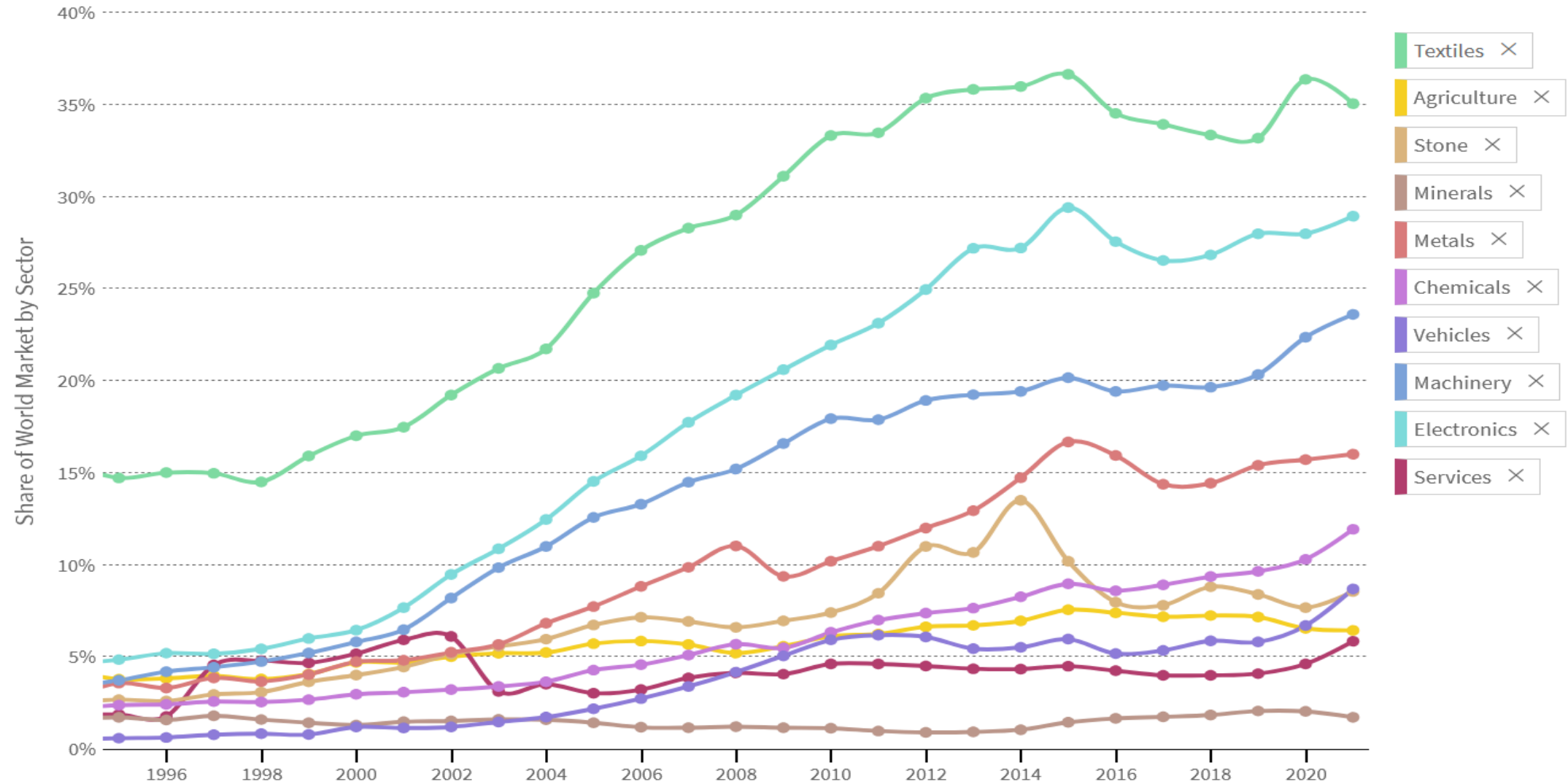
Link:



China's largest goods exports are in high complexity products, Electronics, and Machinery.



China's Global Market Share, 1995 – 2021



Conclusion

1. Considering the similarity of the economic complexity of the countries, it seems necessary to invest in common technologies.
2. To develop technologies with high economic complexity, the existence of joint science and technology parks can be useful.
3. Petrochemical products are a category of products that have high economic complexity, and it is possible to cooperate in the transfer of technology and products with high technology.
4. Petroleum and mineral products are amongst the products with high exports for most of the countries. We need to pursue the technology for both products at higher levels.
5. Selling and exporting materials such as oil and minerals which are the advantages of the countries, do not meet high ECI for countries so we have to change high to technology production.