Economic Complexity Index

EE482 Industrialization: Role of Public and Private Sectors (Section 046401)
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Faculty of Economics, Thammasat University

Economic Complexity Index: ECI

- Several studies have made the case for an **ongoing process of structural change** to foster **economic development in the long run**.
- These studies identify **connection**s between the **sectoral composition of production** and the rates of growth in **productivity, exports** and, ultimately, per **capita gross domestic product (GDP).**
- The debate surrounding the **dichotomy between the traditional and modern sectors** identified in classical and structuralist theories of economic development is rekindled.
- The **new literature** highlights the importance of accumulating capabilities to produce more sophisticated goods, arguing that it is a prerequisite for structural change.

Source: Directly quoted from Britto et al. (2019)

Economic Complexity Index: ECI

- Hidalgo and others (2007) and Hidalgo and Hausmann (2009) developed a **methodology** for the empirical analysis of the **process of economic development.**
- Instead of directly measuring capabilities, their methodology infers the **complexity of a country's productive structure** by using the **levels of complexity of each product and country to be calculated**.
- These indices are **strongly correlated** with **per capita GDP levels** and with faster rates of growth in countries that have managed to **move away** from **traditional, natural-resources-based sectors** towards **more modern, complex ones** (Hausmann,Hwang and Rodrik, 2007; McMillan and Rodrik, 2011)

Source: Directly quoted from Britto et al. (2019)

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- **This methodology** has been **used to investigate empirically** a wide variety of issues related to growth divergence as well as development paths in many other papers, ranging from **case studies and cross-country studies**, which show that **economic complexity** are **strongly correlated with technological capabilities**, to evaluations that use subnational data to highlight the importance of geographical location.
- A common thread that runs through the empirical studies is that **structural change is fundamental for economic development**, which has led analysts to **re-examine the structuralist ideas** put forward through the lenses of capability and complexity (Gala, Camargo and Freitas, 2017)

Source: Directly quoted from Britto et al. (2019)

Economic Complexity Index: ECI

- In its strict mathematical definition, the ECI is defined in terms of an **eigenvector of a matrix connecting countries to countries**, which is a projection of the **matrix connecting countries to the products they export**.
- Since the ECI considers information on the diversity of countries and the ubiquity of products, it is able to produce a **measure of economic complexity** containing information about both the **diversity of a country's export** and their **sophistication.**
- The indices shown above have been used to analyse a wide range of issues related to the **link between economic complexity** and **economic growth** in studies ranging from case studies to econometric investigations using national and subnational data.

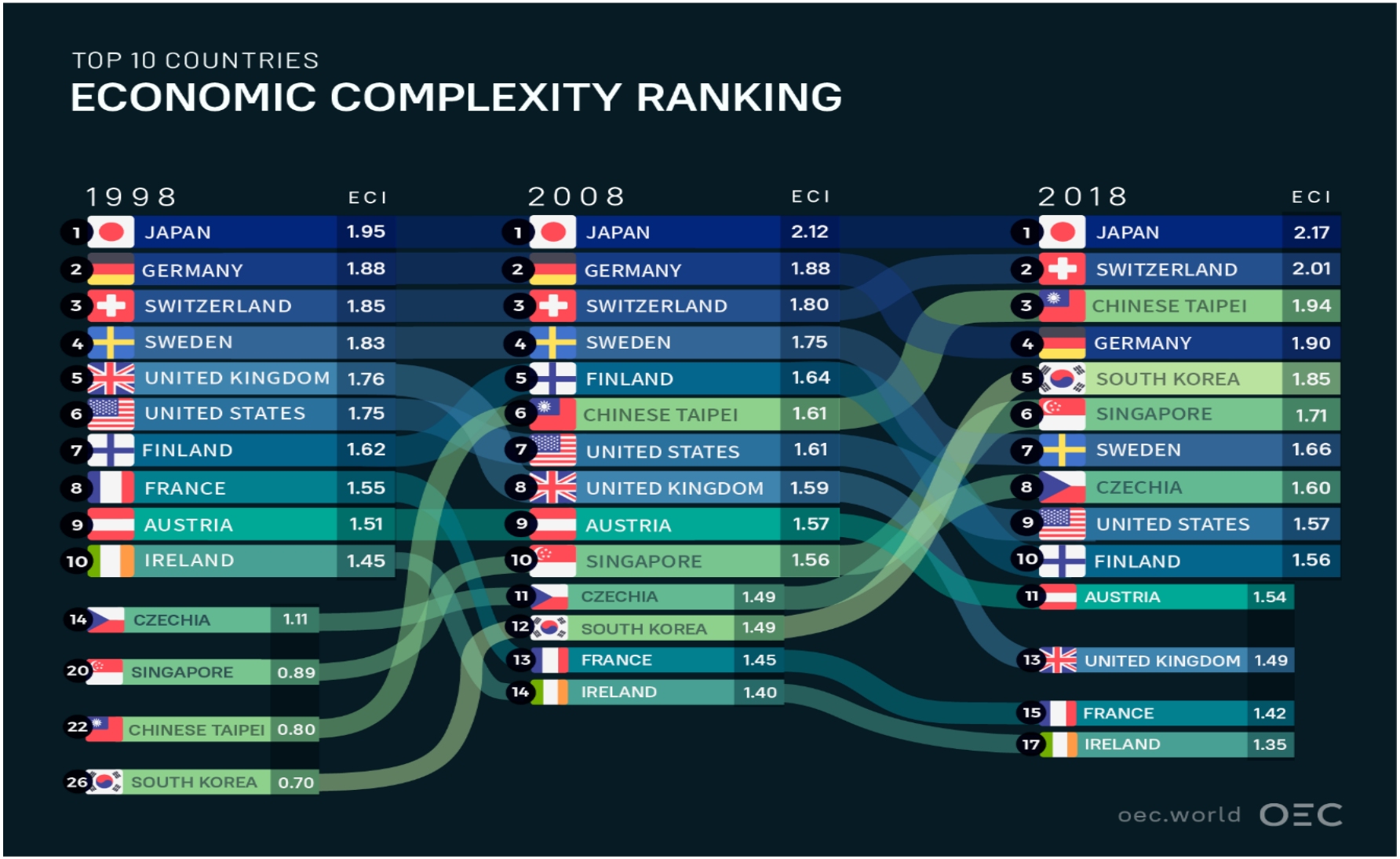
Source:https://en.wikipedia.org/wiki/Economic_Complexity_Index

Economic Complexity Index: ECI

- Felipe, McCombie and Naqvi (2010) argue that **Pakistan's inability** to produce **more sophisticated goods** has resulted in persistent **balance-of-payments problems**, **reducing its growth rates**.
- **China**, on the other hand, grew much faster because of **sustained increases in highly complex products** such as machinery and electronic goods (Felipe and others, 2013).
- Boschma, Balland and Kogler (2013), using patent data from the **United States Patent** and Trademark Office, show **that technological capabilities** are linked to **different trajectories of technological specialization** in cities across the United Sates.

Source: Directly quoted from Britto et al. (2019)

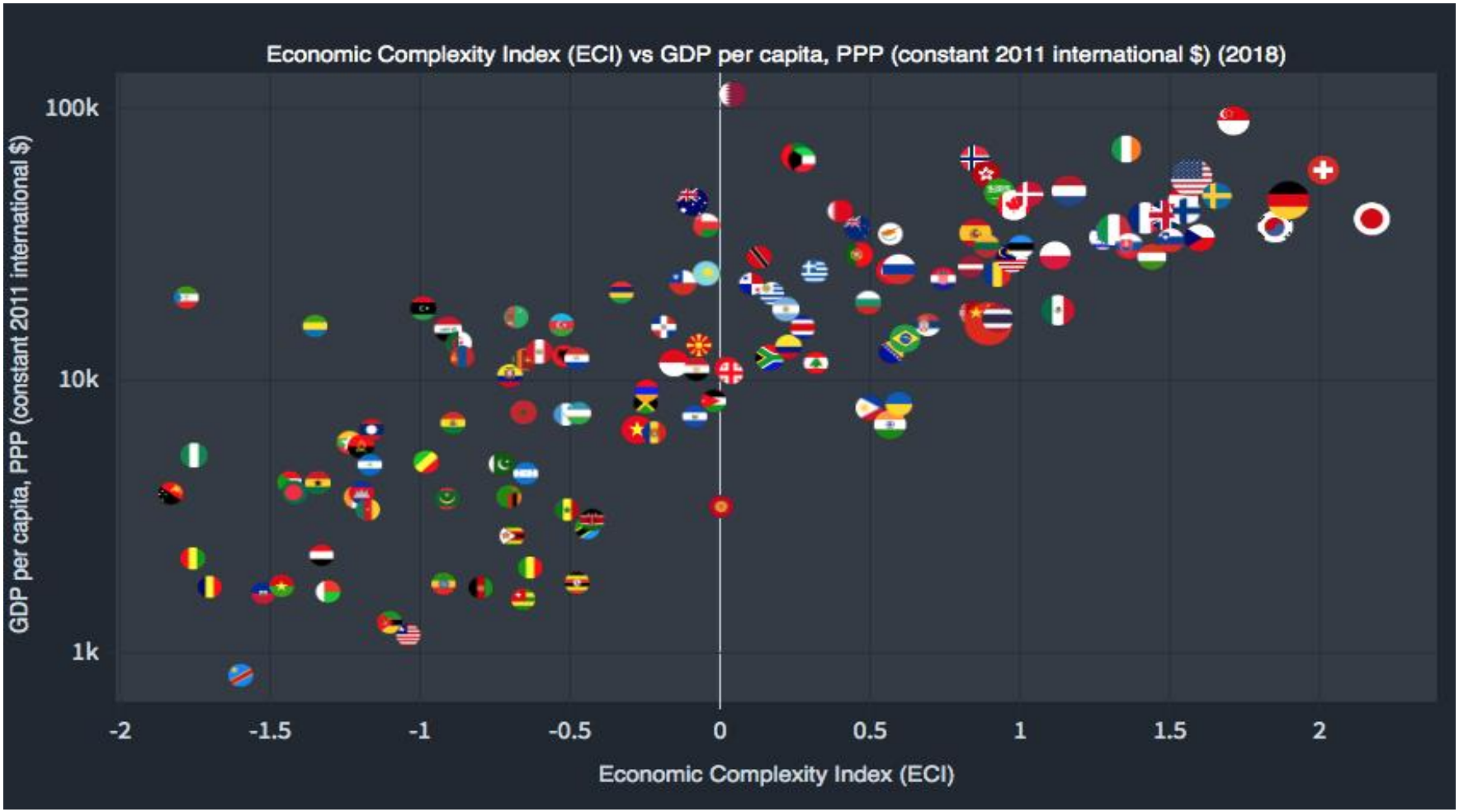
Economic Complexity Index: ECI



Source: https://oec.world/

Economic Complexity Index: ECI

GDP per capita (Thousands of constant 2010 US dollars) and ECI



Source: https://oec.world/

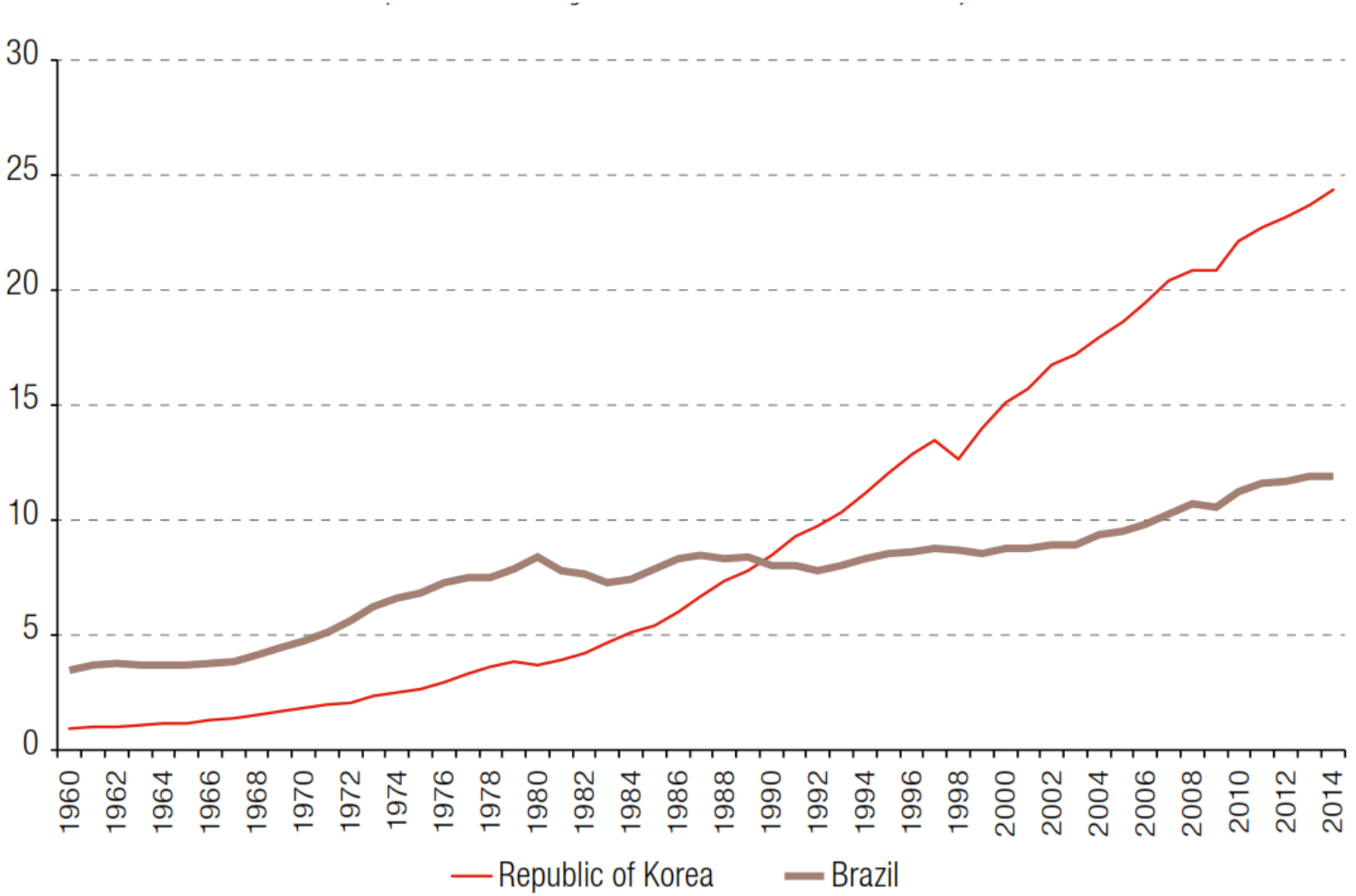
Economic Complexity Index: ECI

- ECI, together with the graphical analysis of the product space over time, are valuable tools to evaluate the **very distinct paths of economic development** in **Brazil** and the **Republic of Korea** over the **past 50 years.**
- Nevertheless, they shared a similar path of **per capita GPD until 1980**. Until then, **Brazil's per capita GDP** was considerably **higher than that of the Republic of Korea**, and both were growing at similar rates.
- However, after 1980, **Brazil followed** a path of **economic stagnation**, while the per capita GDP of the **Republic of Korea continued to grow**, reaching a level compatible with that of developed countries by 2010.

Source: Directly quoted from Britto et al. (2019)

Brazil and the Republic of Korea: per capita GDP, 1960–2014

(Thousands of constant 2010 US dollars)



Source: Directly quoted from Britto et al. (2019)

Economic Complexity Index: ECI

- During the period under consideration, **exported goods became increasingly diverse** and less developed countries began to account for a larger share of international trade.
- Meanwhile, product differentiation and complexity increased steadily, thanks to continuous technological developments in more advanced countries.
- As expected, the **product space changes accordingly**; the **network becomes more elongated** from one decade to the next, and goods are more clearly **grouped according to technological intensity**.

Source: Directly quoted from Britto et al. (2019)

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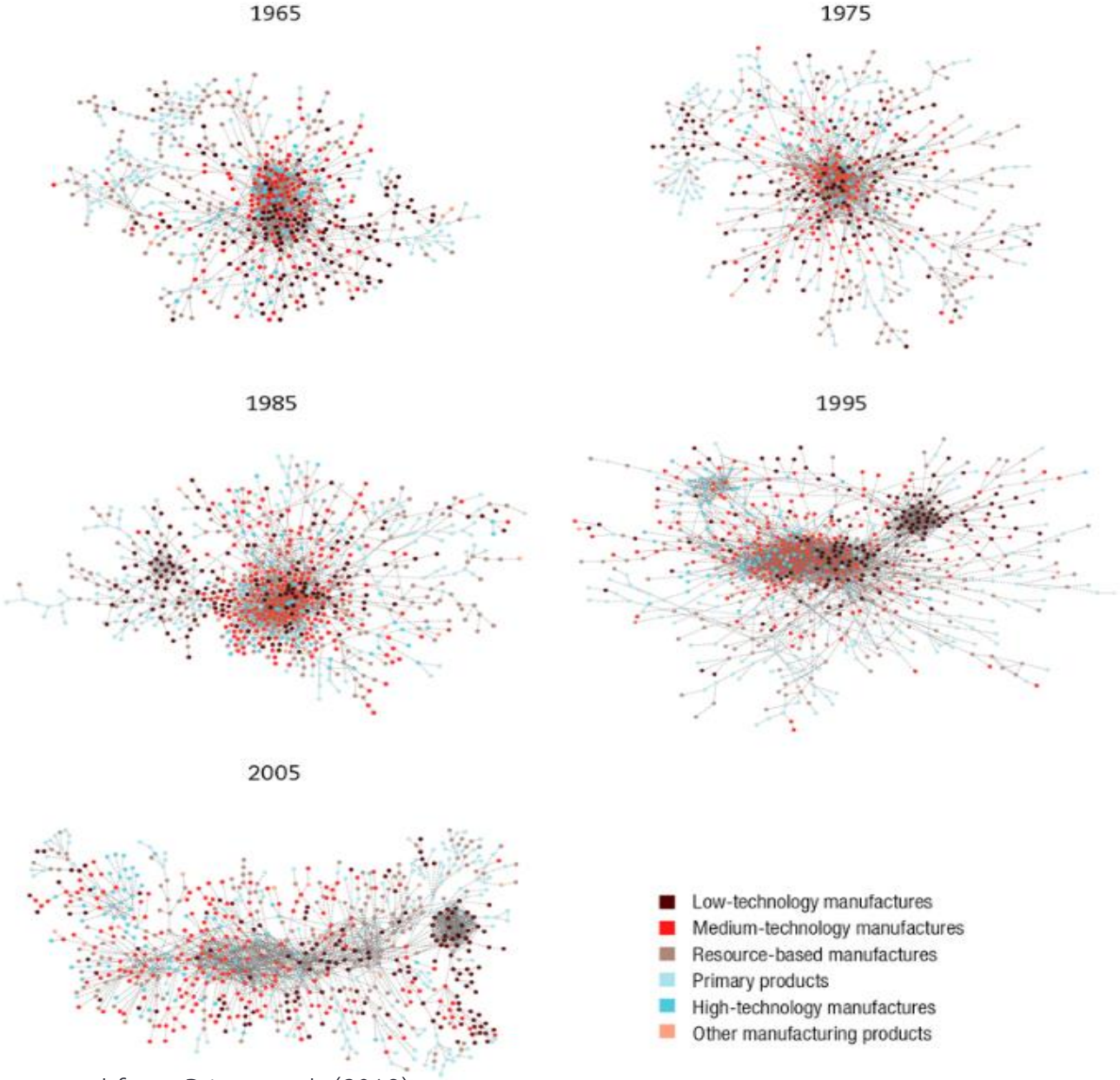
- The notional development path becomes a **long U-shaped curve**, as **complex products move further away from simpler ones**, suggesting a very distinct international division of labour and very low probabilities that such distinct products would be co-exported.
- The **changing shape of the network** shows the importance of considering products' **technological intensity** in addition to **more traditional resource-based classifications**.
- Exports have become increasingly segmented in terms of **technological intensity** over the course of the period under consideration, with a line leading from **low-technology goods**, on the **right-hand side**, though **medium-technology** ones in **the middle**, to **high-technology products** on the **left-hand side** in the network for 2005.

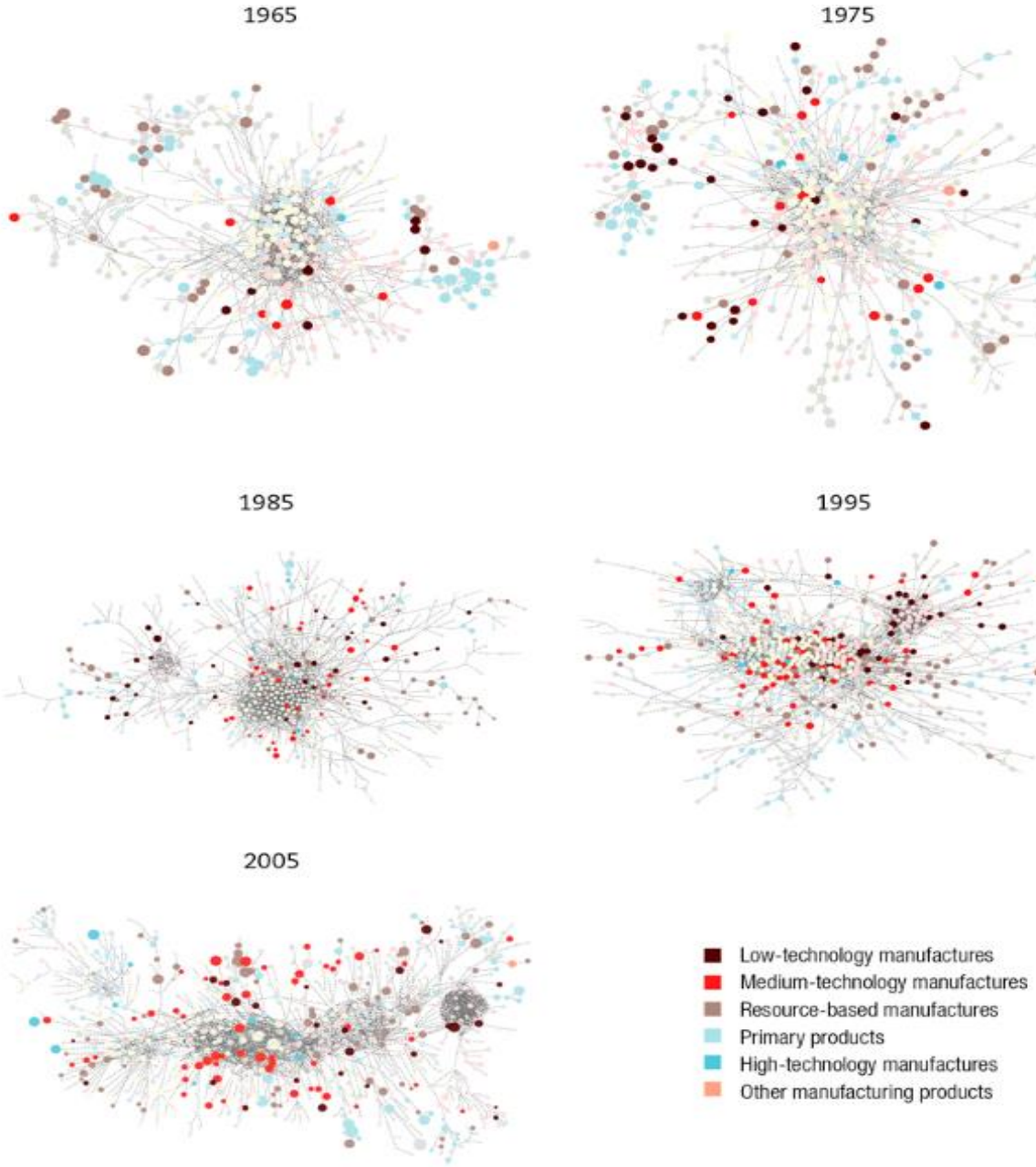
Source: Directly quoted from Britto et al. (2019)

World: product space by technological intensity, 1965–2005



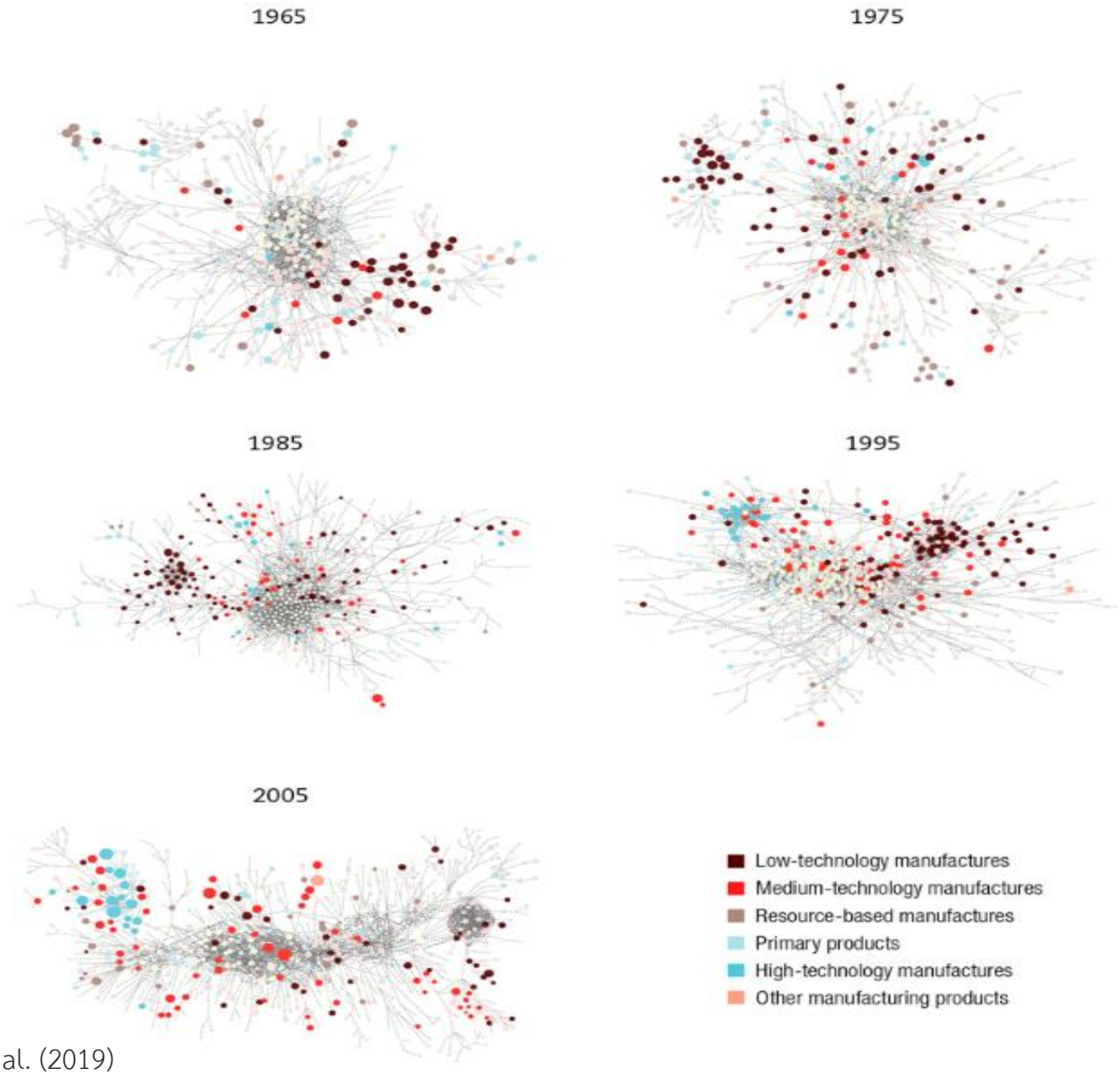
Source: Directly quoted from Britto et al. (2019)

Brazil: productive diversification by technological intensity, 1965–2005



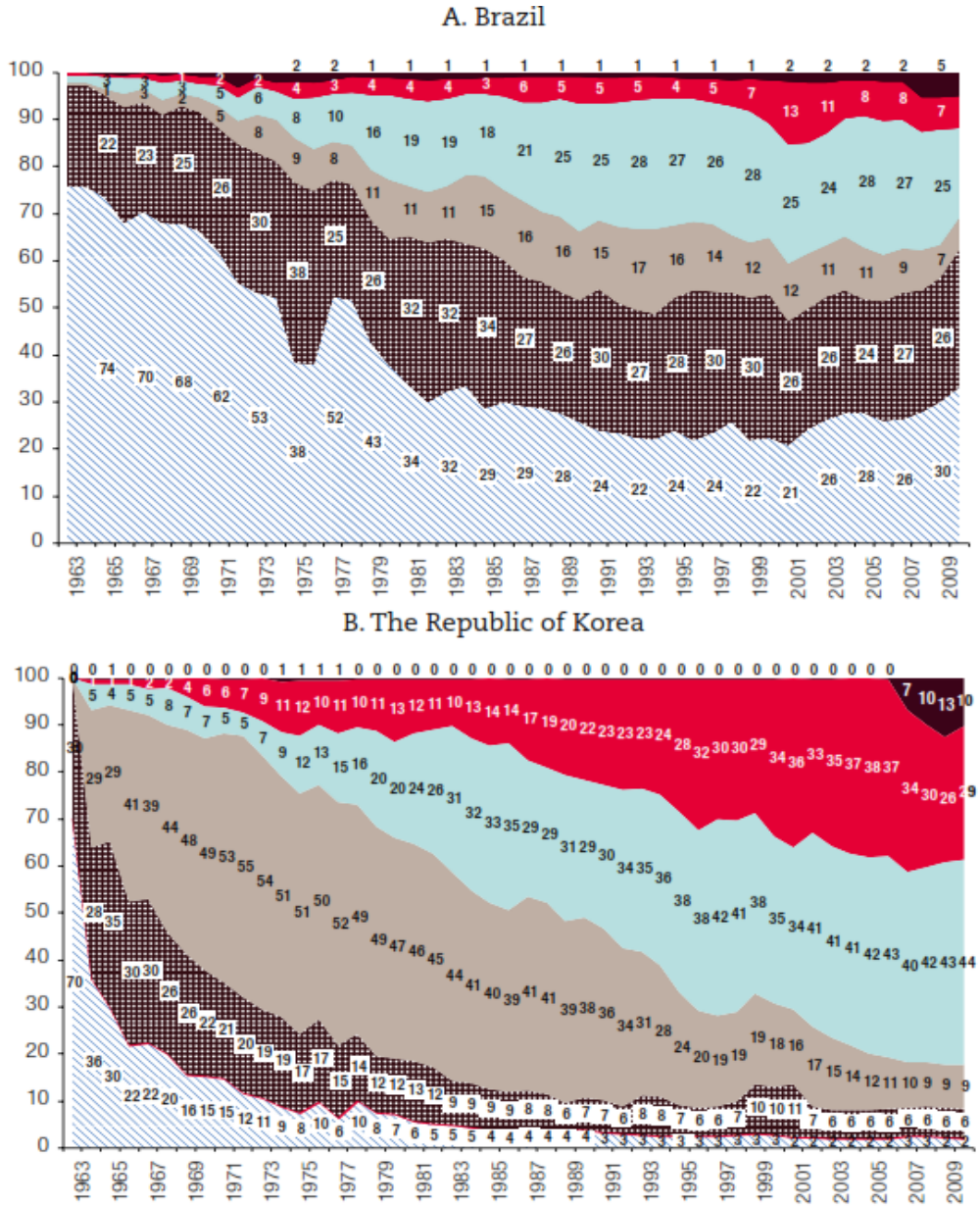
Source: Britto et al. (2019)

Republic of Korea: productive diversification by technological intensity, 1965–2005



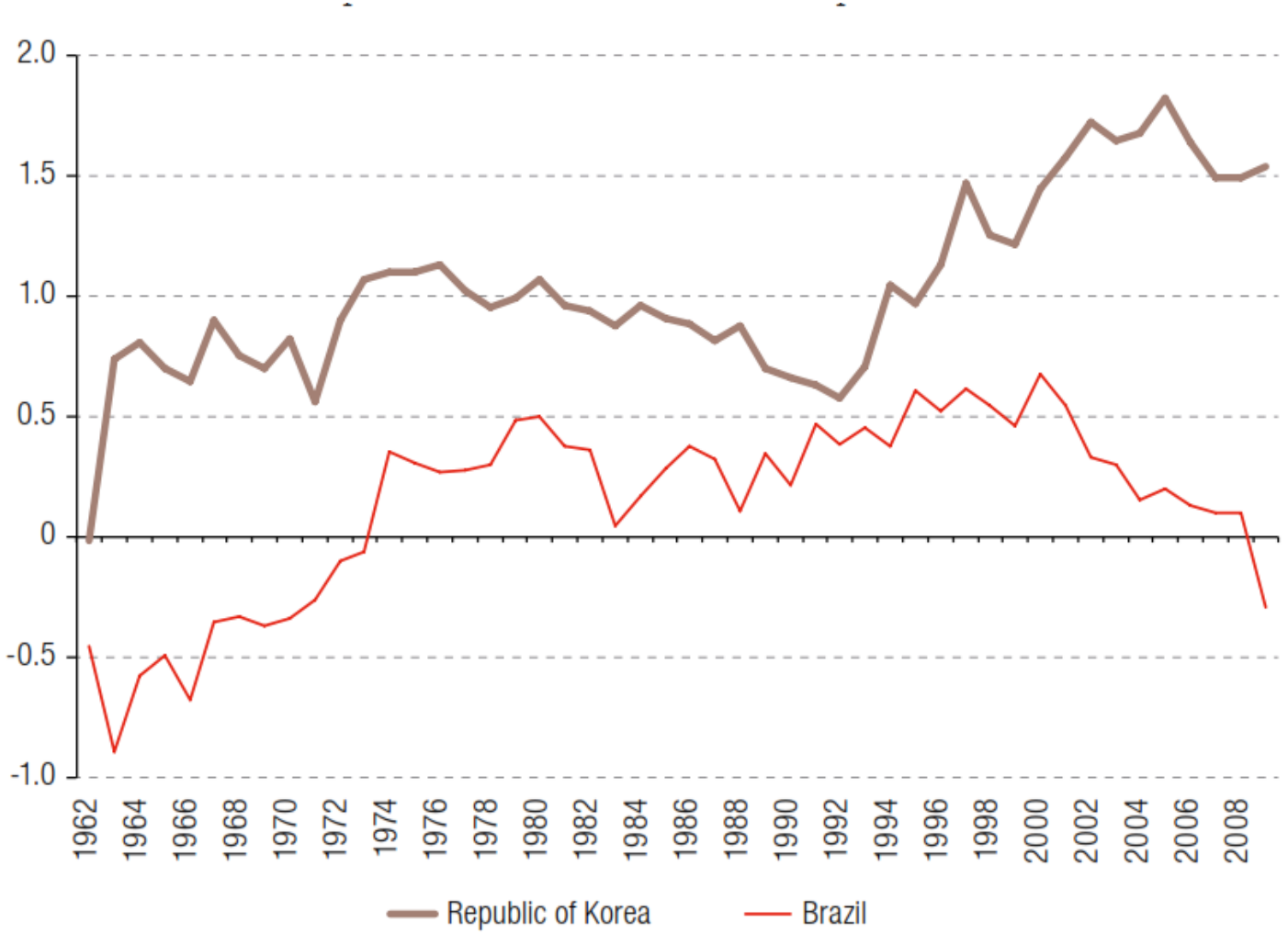
Source: Britto et al. (2019)

Share of exports by technological intensity, 1962–2009



Source: Britto et al. (2019)

Brazil and the Republic of Korea: economic sophistication, 1962–2008



Source: Britto et al. (2019)

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Taking the economic sophistication index as the main indicator of each country's product conditions, the empirical investigation presented here reveals that the development trajectories of Brazil and the Republic of Korea can be divided into three distinct periods

(i) From 1965 to 1975: the productive structure of the Republic of Korea underwent a **rapid transformation**, with a marked **increase in the production of low-technology goods**, while that of **Brazil only changed slightly.**

(ii) From 1975 to 1995: the **structural gap** between the **two countries narrowed**, as the economy of the Republic of Korea became **less diverse** while the number of **medium- and high-technology industries increased**, and that of **Brazil became more diverse** while also creating **more medium- and high-technology industries**.

Source: Directly quoted from Britto et al. (2019)

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(iii) From 1995 onwards: the Republic of Korea **consolidated its structural transformation** that fostered **high economic complexity** by **increasing the share of medium- and high-technology** manufactures in national exports, while structural changes foundered in **Brazil**, leading to the **reprimarization of the economy**, dramatically **reducing its complexity.**

- The indices discussed herein can be **important tools** for **designing more effective industrial** and technological policies.
- Using the product space to **identify industries with high product complexity** allows the authorities to see **where they should concentrate** their economic development efforts.

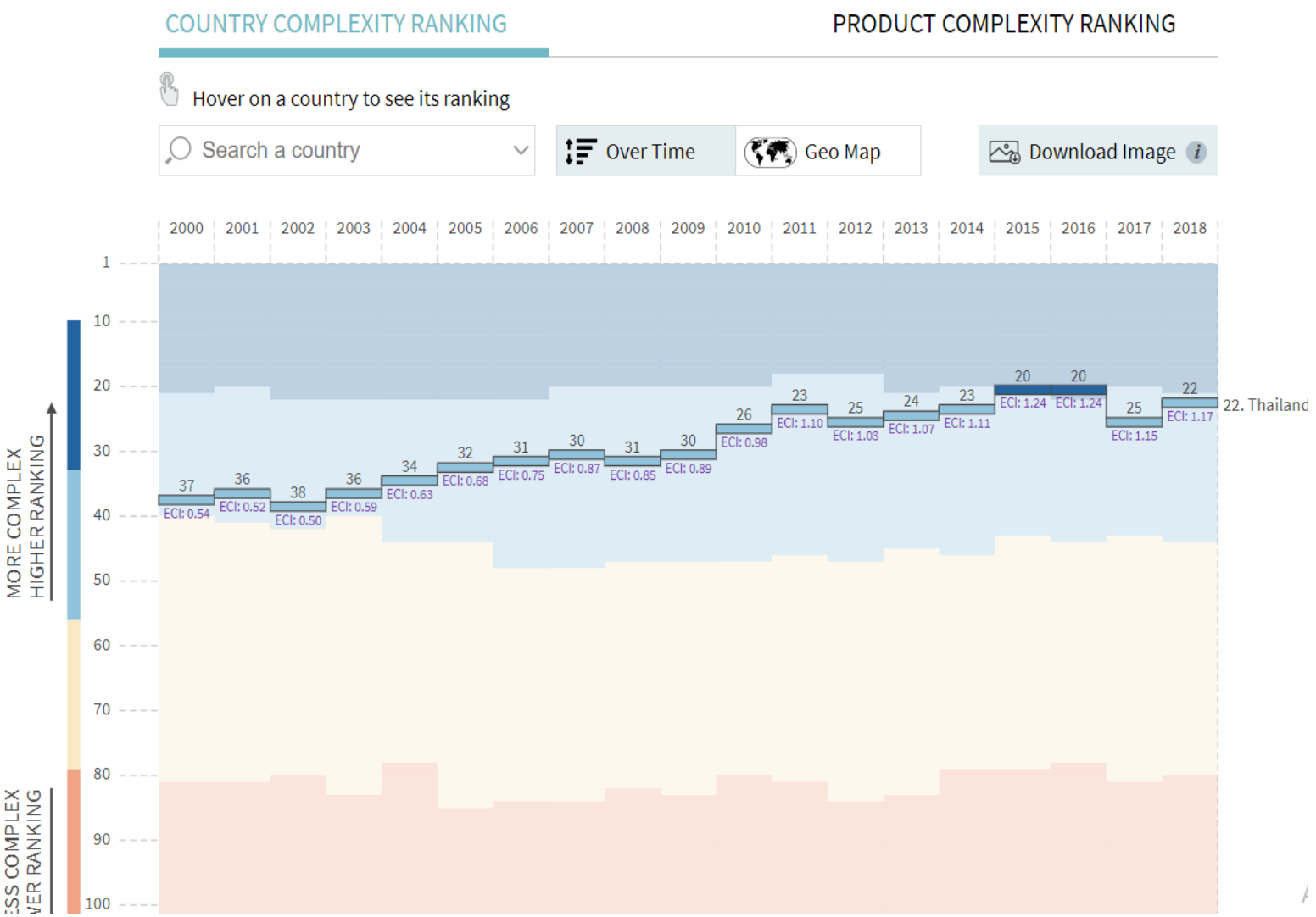
Source: Directly quoted from Britto et al. (2019)

Countries ranked by ECI

Rank	Country	Economic complexity index (2018)	Change in 5 years (2013-18)	Change in 10 years (2008-18)
1	Japan	2.43	–	–
2	Switzerland	2.17	▲ 1	▲ 1
3	South Korea	2.11	▲ 4	▲ 8
4	Germany	2.09	▼ 2	▼ 2
5	Singapore	1.85	–	▼ 1
6	Austria	1.81	▼ 2	▲ 1
7	Czech Republic	1.80	▼ 1	▲ 2
8	Sweden	1.70	–	▼ 3
9	Hungary	1.66	–	▲ 5
10	Slovenia	1.62	▲ 3	▲ 3
11	United States	1.55	▲ 1	▲ 1
12	Finland	1.55	▲ 2	▼ 1
13	United Kingdom	1.51	▼ 2	▼ 5
14	Italy	1.44	▼ 2	▲ 3
15	Slovakia	1.41	–	▲ 1
16	France	1.37	▼ 2	▼ 1
17	Ireland	1.36	–	▼ 7
18	China	1.34	–	▲ 6
19	Mexico	1.29	–	–
20	Israel	1.20	▲ 6	▲ 3
21	Belgium	1.18	▼ 1	▼ 1
22	Thailand	1.17	▲ 2	▲ 9
23	Poland	1.10	–	▼ 2
24	Denmark	1.09	▼ 3	▼ 6

Source: https://atlas.cid.harvard.edu/rankings

Thailand's ECI



Source: https://atlas.cid.harvard.edu/rankings