RISK&OPPORTUNITIES

Société Générale Economic and Sector Studies

Shifting specialisation patterns: A worldwide view

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In recent decades, technology changes, innovative corporate strategies and free trade policies led to a sharp increase in international flows of goods and services, as well as in revenues from cross border investments and in the stream of migrant remittances. Against this backdrop, countries' productive specialisations have shifted, as it did the relevance of countries in the world economic sphere.

Relying on balance of payments data and innovative trade metrics, this note presents the main changes over the past 25 years and offers an overview of countries' specialisation patterns at present. Some of the key findings are the following:

■ *China and other East Asian economies (Korea, Taiwan…) consolidated their leadership in the manufacturing industry. Central and Eastern European countries strengthened their industrial profile after joining the European Union.*

■ *Except for Germany, the old industrial powers (US, UK, Japan…) have lost market shares and competitive advantages in manufacturing. Yet, these "post-industrial" advanced economies continue to keep high levels of productivity by specialising in high value-added services (finance, transport, telecommunications, intellectual property) and benefiting from the revenues of their multinational enterprises. France appears as a diversified and modern economy but has also lost relevance in industry.*

■ *Despite the importance often attached to industrialisation in their development strategies, most countries in South America and in Africa have accentuated their primary goods export profile. This exposes them to the risks arising from the volatility of commodity prices.*

■ *The number of developing countries dependent on remittance flows has risen steeply.*

The changes on the horizon are perhaps even greater at a time when technological and environmental challenges, along with geopolitical tensions, are also pointing to a further reconfiguration in international economic relations.

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Globalisation changes its shape

In recent decades, world trade has soared. The drivers behind are well-known: the reduction of transport and communication costs, the deregulation of cross-border trade and financial flows, and the opening up of the economies of Central and Eastern Europe and that of China, not least since its accession to WTO in 2001. These developments made a rapid expansion of markets and factors of production possible.

It was not just more international trade. The new wave of globalisation saw companies massively reorganising their productive processes, splitting up value chains, offshoring production to developing countries, and often adopting tax planning strategies to offshore activities in countries offering tax or regulatory advantages. Financial markets increased interconnectedness with lower restrictions to cross-border financial transactions. Consumers gained access to a wider variety of goods and services and travelled more. Countries' economic specialisations had to adjust to such developments.

The changes on the horizon are perhaps even greater. Industrial policies supporting local content or limiting trade of critical raw materials are now becoming more frequent than free trade agreements, not least in countries involved in the technological race and supporting green transitions. The need to reduce greenhouse gas emissions and preserve biodiversity are indeed becoming a driver of global value chains reorganisation. Technology and society are also in movement: industrial robot deployment may trigger reshoring of production, with firms bringing the production of intermediate inputs closer to consumers. Opportunity for teleworking may further change the geographical localisation of services. Services, moreover, are likely to be further reshaped by AI and digitalisation.

Last, geopolitical tensions, especially after Russia's invasion of Ukraine, and related sanctions, are also factors behind a shift in economic relations, expected to bring further change in economic partnerships and trade.

Yet, a massive repatriation of production and a recentralisation of activities within national borders seem highly unlikely, as they would imply a large loss of economies of scale and income. That said, further changes in specialisation patterns are to be expected.

Section 1 explains why it is necessary to adjust the traditional trade metric tools to analyse country specialisation and proposes an enhanced version of the classical Balassa's "revealed comparative advantage" (RCA) to capture the growing importance of external flows beyond mere trade, such as rents from capital invested abroad and remittances from exported labour, which have also become critical to generating FX revenues.

Section 2 assesses the most important shifts in the productive patterns, highlighting trends in countries' market shares in global trade and changes in comparative advantages. The section shows in figures the emergence of China and other Asian countries as manufacturing powers, as well as of some Central European countries. It also describes the progressive deindustrialisation of some former powers, which are however gaining importance in the trade in services and perceiving rents from investments abroad.

Section 3 offers an overview of countries' specialisation patterns at present, identifying country groups with similar productive structures, including the "manufactured goods-based", the "post-industrial" rich countries, and the countries that based their FX revenues out of commodity exports or of remittances. The section also inquires on the macroeconomic features that are associated to these configurations.

1. Upgrading standard specialisation metrics

Together with the analysis of sector market shares by countries, the indicator of "revealed" comparative advantages (RCA) —first proposed by Balassa in 1965— has been among the most popular indicators for making cross-country comparisons on specialisations[2].

The RCA compares two magnitudes. The numerator shows, for a selected country, the share of the exports of a selected item in its total exports, and the denominator the share of world exports of the selected activity in aggregate world exports. The RCA indicator yields values ranging from zero —when the country does not export any of that item— upwards. Values higher than one (lower than one) indicate that the country in question exports a greater (smaller) proportion of the selected product than the world average. RCA can be estimated for large aggregates (as done in this article) or with a strong granularity for very specific activities.

In the original version, the RCA indicator was useful to measure the specialisation of production into industrial and primary sectors and suitable to assess the way countries integrated into the world economy in the post-WW2 and Bretton Woods period, when the exchange of final goods dominated cross-border flows and services, and other flows used to be secondary to a country's economic strength. Changes in the index showed progress in industrialisation, thought to be a condition to increase productivity and create jobs, and to sustain economic development.

Yet, services have now become decisive for productivity and competitiveness. Income from factors of production, be it foreign-generated corporate profits or remittances from expat workers, have also become a paramount source of FX

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[2] For reference, see Balassa (1965).

revenue for countries. These flows are also indicative of the international specialisation of countries and of their economic development and need to be properly assessed in the RCA formula (c.f. **Box 1**).

To see the relevance of the flows beyond merchandise trade, consider the case of France. Back in 1995, industrial goods represented 65% of total French exports of goods and services and 6% of the global market share. In 2020, manufactured goods made up only 51% of overseas sales and a bit over 3% of global manufactured goods exports[3], a clear de-industrialisation trend confirmed by a decline in RCAs in manufacturing. However, it is not clear that this drift should be associated with economic weakening. Indeed, over the same period, the value of income revenues from French capital ownership abroad (i.e., dividends, retained earnings or interests) increased from $42.5bn (comparable to 5% of total French exports of goods and services) to $141bn (nearing 20% of French exports of goods and services).

Now take Turkey, which saw a strong industry push in recent decades. The share of manufactured goods over total exports increased from 44% in 1995 to 64% in 2020, and the global market share of Turkish manufactured goods from 0.4% to 1.1%. However, property income revenues declined from 4% of total exports of goods and services to less than 3% in the same period[4]. Many other economies that succeeded in boosting industrial exports also failed to register any significant increase in such cross-border investment income flows.

Workers' remittances have also become paramount for some countries. In Pakistan, remittances constitute by far the most important external revenue, surpassing all industry or agriculture exported values. The value of remittances was equivalent to 17% of exports of goods and services in 1995, and 98% in 2020! Pakistan's main source of balance of payment income is now migrant labour, ahead of traditional textiles or cotton. At different degrees, a similar story can be told for many countries ranging from Central Asia and Sub-Saharan Africa to Central America.

As these examples illustrate, recent years have seen the emergence of income flows untethered from physical objects, such as manufactured goods, which for centuries were the main object of international trade.

Considering the relevance of all cross-border revenues at present, this note uses a new RCA indicator that includes i) services, and ii) property incomes, generated by internationalised corporates and by expat workers, now considered as if they were an economic sector in their own right. For simplicity, the estimations are based on

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[3] *Data drawn from the World Trade Organisation database (WTO Stats).*
[4] *When looking at net income flows, the contrast is even more startling: the French income balance surplus increased from 3.5% to 5.4% of GDP, while in Turkey, it declined from 1.1% to 0.8% taking 1995 and 2020 as reference years (IMF data).*

the main aggregates of the SITC groupings[5]: agricultural products, manufactured goods, fuels & mining resources, and total services.

Box 1 - The enhanced competitive advantage indicator

The Balassa's formula is enhanced by adding both income flows from exported capital and remittances. The RCA indicator then becomes:

$$RCA^{*S}_i = \frac{\left(\frac{X^{*S}_i}{X^*_i}\right)}{\left(\frac{X^{*W}_i}{X^*_W}\right)}$$

where "i" = country ("w" = world), "s" = sector (agricultural products, manufactured goods, fuels and mining products, services) or flow (remittances, income from capital invested abroad). X^{*S}_i = value of exports of the sector (or income flow "s") for the country "i"; X^*_i = value of exports of goods and services for country "i".

For a sector or flow "*s*", an RCA higher (lower) than *1* indicates that the country "*i*" exports proportionally more (less) than the average country, which reveals a comparative advantage (disadvantage) for the country in the sector "*s*"[6].

Note that $X^*_i = \sum_{S=1}^{S} X^{*S}$ covers most of the current account credit items recorded in the balance of payments, namely:

- The value of exports of **goods** and **services** credited in the "goods and services account".

- **Property income flows**, namely the interest from lending, the distributed income of corporations (dividends or share buybacks), the reinvested earnings, and the rents from land or fishing rights. The property income inflows are obtained by subtracting the inflows corresponding to the compensation of employees from "primary income" credits.

- **Remittances**, which include the compensation of employees (primary income)[7], and the personal transfers, consisting of all current transfers in cash or in kind made or received by resident households to or from non-resident households which are "secondary income" credits. Note also that remittances equally

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include "capital transfers" between households, which are recorded as a supplementary item in the capital account[8].

The following sections use such upgraded metrics.

2. Shifting specialisation patterns

The last decades have been a period of extraordinary expansion of international trade and investment, both of which grew faster than GDP until the Global Financial Crisis and at roughly the same pace thereafter (c.f. **Chart 1**).

As displayed in **Chart 2**, what grew the most in value terms (at current prices) was the trade of manufactured goods, which remain the most common form of cross-border trade. However, the acceleration in the trade of services (communications, transport, logistics, finance, tourism…) has been more astonishing. Total trade in services grew from USD 1.2 to 5.1 trillion between 1995 and 2020 (in 2019, it amounted to USD 6.2 trillion)[9]. The phasing out of capital controls also meant that international flows, whether equity or debt investments, expanded, which also meant that the income from these investments grew considerably, from $935bn in 1995 to $4trn in 2020. Labour migration also translated into an extraordinary increase in remittances, which were $594bn in 2020 versus only $90bn in 1995[10].

Chart 1. World – Selected BOP flows
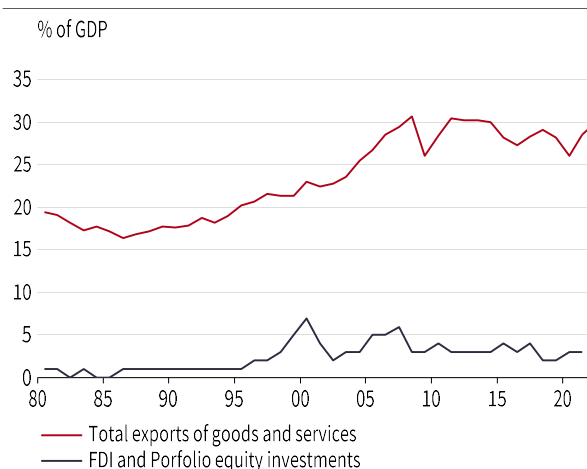
Source: World Bank- World Development Indicators

Chart 2. Change in flows by activity (value)
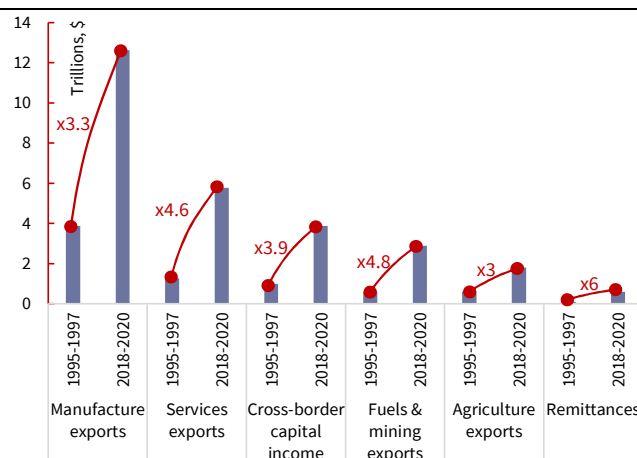
Source: Trade data from the WTO, BOP data from the IMF

This outstanding expansion of international flows did not occur homogeneously. To analyse changes in country's specialisations, a database is built out of 93 countries[11]

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[8] *For instance, when a migrant worker buys property in his home country for his family with own savings generated as expat. See IMF (2009).*

[9] *In value added terms, services account for about 50% of world trade (Roy, 2019).*

[10] *Unrecorded flows through informal channels are believed to be at least 50% larger than recorded flows (IMF, 2011).*

[11] *Covering 96% of the economy based on nominal GDP.*

for the period 1995-2021[12] with data drawn from WTO (trade in goods and services) and IMF (investment related earnings and remittances). This allows to explore the metrics on comparative advantages (the enhanced RCA) and market shares, and to see the most noticeable transformations on a country and sectoral basis.

Table 1. Contribution to the increase in global exports/income revenues

Average 2018-2020 vs. average 1995-1997, in pp.

Manufacture exports		Services exports		Agriculture exports		Fuels & mining exports		Cross-border capital income		Remittances		Total flows	
China	25%	US	13%	US	7.4%	US	8.8%	US	29%	India	15%	China	13%
Germany	9.5%	UK	7.0%	Brazil	6.3%	Russia	7.9%	Luxembourg	10%	Mexico	7.0%	US	11%
US	5.8%	China	5.7%	Netherlands	5.5%	UAE	7.2%	Netherlands	9.6%	Philippines	5.9%	Germany	6.9%
Korea	4.2%	Germany	5.6%	China	5.5%	Australia	6.7%	China	8.3%	Egypt	4.9%	Netherlands	4.9%
Netherlands	4.0%	Israel	5.5%	Germany	5.2%	S. Arabia	6.0%	Ireland	6.4%	Pakistan	4.4%	France	2.9%
Hong Kong	3.8%	Netherlands	4.5%	Spain	3.8%	Netherlands	4.0%	Hong Kong	5.6%	Nigeria	4.4%	UK	2.9%
Mexico	3.2%	France	4.5%	Indonesia	3.1%	Canada	3.8%	Germany	5.4%	France	4.0%	India	2.8%
Vietnam	2.5%	India	4.4%	Poland	3.0%	Iraq	2.9%	Switzerland	4.6%	China	3.7%	Hong Kong	2.8%
Italy	2.5%	Singapore	4.0%	Italy	2.9%	China	2.8%	France	4.5%	Bangladesh	3.5%	Korea	2.7%
Belgium	2.3%	Japan	2.7%	Canada	2.9%	Germany	2.7%	UK	3.5%	Singapore	3.4%	Singapore	2.6%

Source: Trade data from WTO Stats and balance-of-payment data from the IMF.

MANUFACTURING INDUSTRY

By far, the most extraordinary change of the past 25 years in the world economy has been the rise of **China** and the consolidation of its leadership in the manufacturing industry, boosted by cheap labour availability, sustained capital expenditures, and the country's accession to the WTO in 2001 that opened markets for Chinese exports. China not only climbed six places in the ranking of top manufactured goods exporters, but also reached the highest comparative advantages (**Chart 3a, Chart 4,** and **Tables A & B** in **Annex**). As it can be seen in **Table 1**, the country alone accounts for more than 25% of the increase in manufactured goods exports since 1995.

Germany, Hong Kong, Italy, and **Japan** have kept strong comparative advantages, but lost market shares (**Chart 3b**). **Korea, Mexico,** and **Vietnam** made significant gains in both metrics, also contributing to the expansion of international trade. **Poland** and **Czech Republic**, which successfully made their transition from planned to market economy, now play also in the league of big manufacturing powers. **Turkey** has also climbed positions in both market shares and RCAs.

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[12] *Although relative prices between manufacturing products, services and commodities differ between 1995 and 2020, so that calculations for specialisations may be affected by a "price effect", the differences are not as large as in other years. Note that 2020 was an exceptional year due to the pandemic. Both the market share and the comparative advantages in services of those countries that are international tourism destinations will be underestimated.*

The **US, the UK,** and **France** remain key players in the manufacturing scene but do no longer have comparative advantages and are losing market shares.

Argentina and **Brazil**, which in the post 2WW period aspired to develop their industry and boost economic development, lost ground. Most **African countries** that keep exhibiting very low levels of RCAs have remained at the bottom both in terms of market shares and RCAs (see statistics in the **Annex**). Two trends are worth noting in the manufacturing sphere. One is the strong correlation between market shares and RCAs (**Chart 4**). The other is the overall rigidity observed in the ranking of countries ordered by market share, as discussed later.

Chart 3a/b. Manufacturing exports: market shares. Increasing over 1995 to 2020 on the left, declining on the right
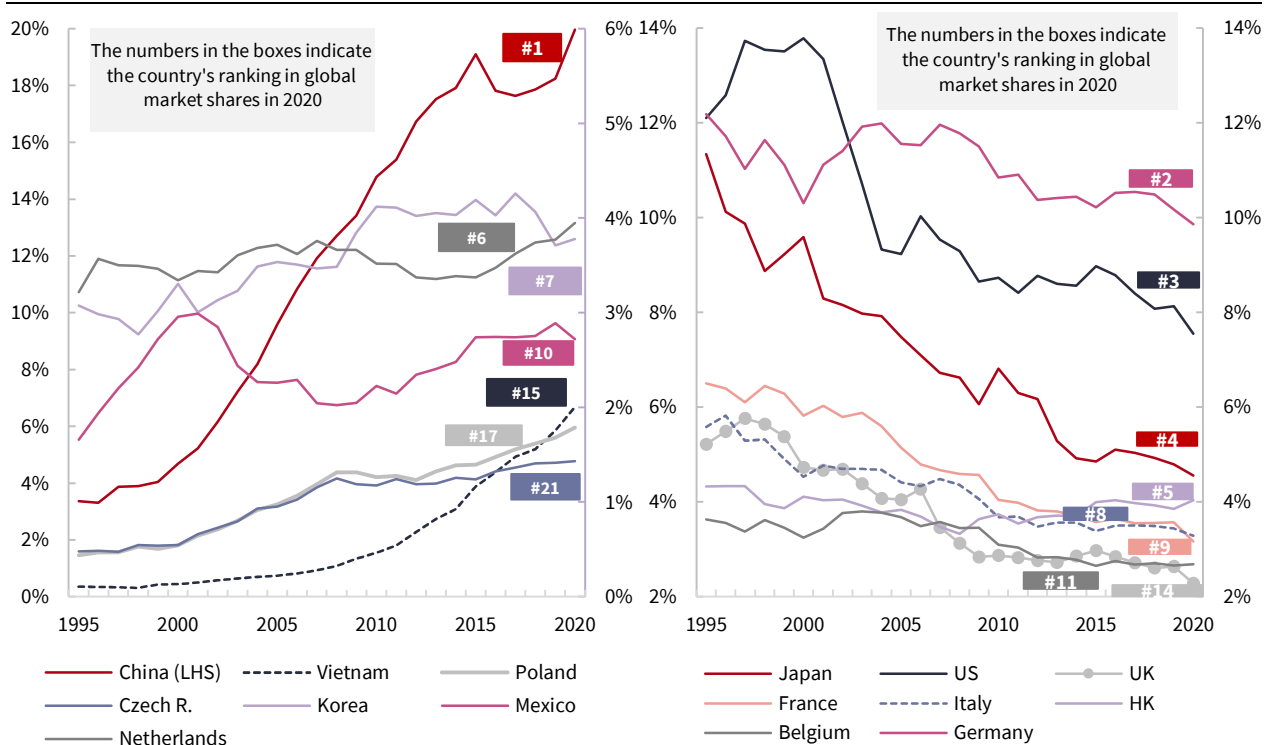
Source: WTO Stats, SG Economic and Sector Studies

Chart 4. Revealed comparative advantages (vertical axis) and market shares in manufactured goods (horizontal axis) – 2020
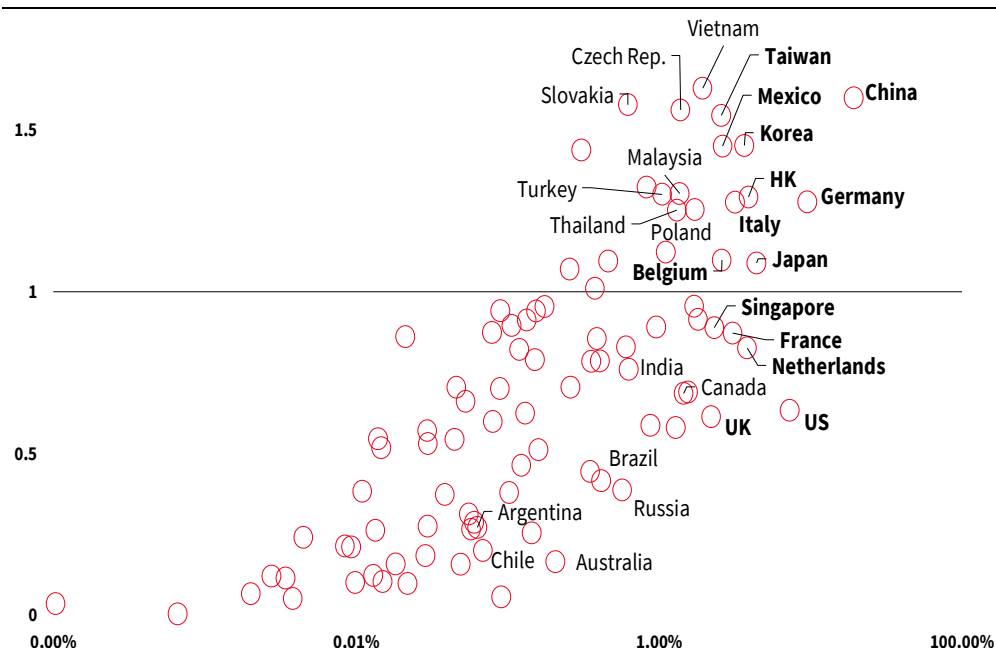
Source: Trade data from WTO Stats; balance-of-payments data from the IMF

FUELS & MINING

Following the adoption of shale oil and gas extraction technologies, the **US** has increased its importance in the fuels & mining segment of industry. The US is now ranking first in terms of global market shares compared to its fourth position in 1995 (see **Table B** in the **Annex**). It has also been the biggest contributor to the expansion of international trade in the field (**Table 1**).

With no surprise, **OPEC+ countries** have a large share of world production and appear hyper-specialised with RCAs well above 1, especially the **Gulf countries**. **Kazakhstan** has the highest RCA of 2020. Energy and minerals are also sourced from countries like **Norway, Australia, Brazil,** and **Canada,** with strong comparative advantages in the field. It is uncommon for countries to specialise in both manufacturing and fuels & mining, with **Malaysia** being the only exception in 2020 (**Chart 5**). The economic crisis in **Venezuela** and the progressive decline in the **Mexican** oil industry explain their fall in terms of markets shares and RCAs between 1995 and 2020.

Chart 5. Revealed comparative advantages in manufactured goods (vertical axis) and revealed comparative advantage in fuels & mining (horizontal axis) – 2020
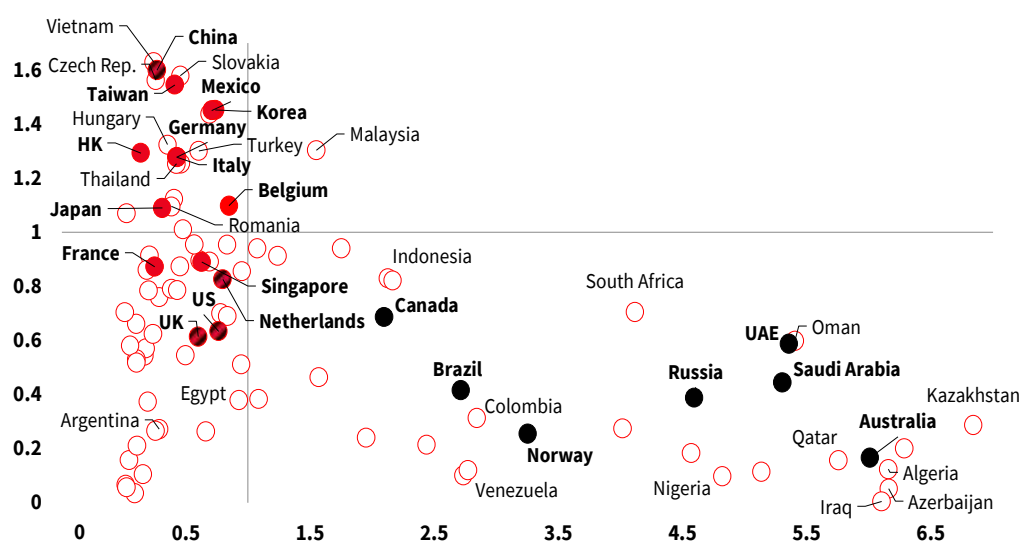
Source: Trade data from WTO Stats and balance of payment data from IMF.
Note: black and red dots (or both joint) show a market share higher than 2%

AGRICULTURE

The **US** is the largest exporter of food, accounting for more than 10% of total global exports in 2020, but has progressively lost ground to **Brazil, China,** and, to a much lower extent, to **Spain**. **Netherlands, Germany, France,** and **Canada** remain top food producers, but their comparative advantages are not so remarkable.

In 2020, **Argentina** (1st), **Paraguay** (2nd), **New Zealand** (3rd), **Ecuador** (4th) and **Uruguay** (5th) posted the highest RCAs figures. **Poland** has made significant gains in both market shares and RCAs. Sub-Saharan Africa and Central America also operate with large comparative advantages.

REMITTANCES

India, Mexico, **Philippines, Egypt,** and **Pakistan** are the countries receiving the highest amounts of remittances. All of them have also very high RCAs, as it is the case for most **Central American** countries, **Sub-Saharan Africa**, and countries in the **Caucasus** and the **Balkans**.

France has also high market shares in this segment, with strong remittances inflows from workers living in metropolitan France but employed in Switzerland and Luxembourg (Banque de France, 2018). For the same reason, **Germany** also ranks in the top ten in 2020. **Portugal, Turkey,** and **Greece,** once among the top recipients of these funds with large diasporas, are now far behind in the ranking.

Chart 6. Revealed comparative advantages in agriculture (vertical axis) and revealed comparative advantage in remittances (horizontal axis) – 2020
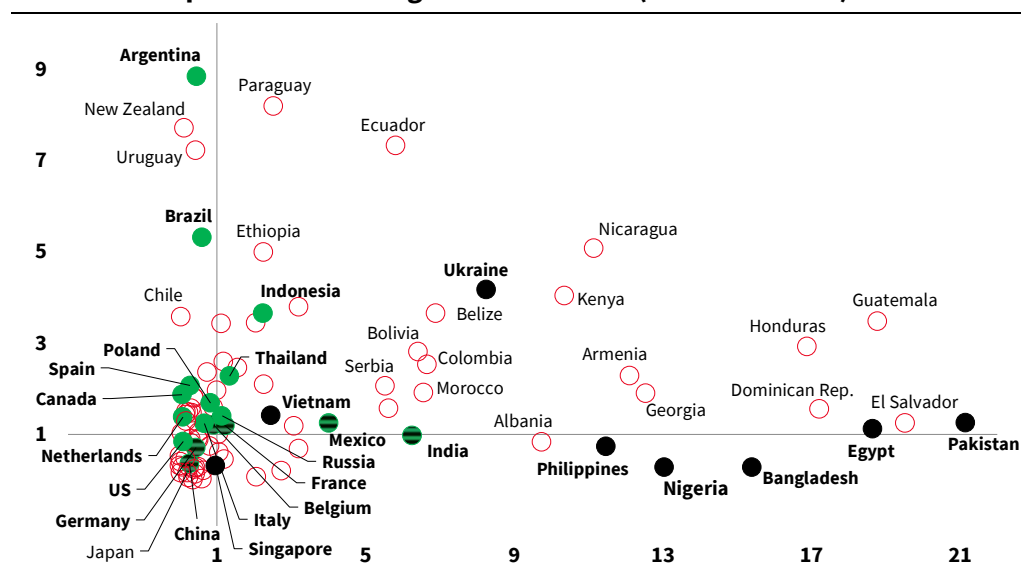
Source: Trade data from and WTO and balance-of-payment data from IMF.
Note: black and green dots (or both joint) show a market share higher than 2%

TRADABLE SERVICES

The **US** (1st) and the **UK** (2nd) are the largest exporters of services and major contributors to the astonishing increase in tradable services in the past 25 year, followed by **Germany** (3rd) and **China** (4th). **France (**6th) is losing market shares and positions in the ranking: it was the second largest exporter in 1995 while only the sixth in 2020. **Ireland** (5th)—the fifth in the ranking but well behind a couple of decades ago—and the **Netherlands** (7th) are also increasing their market shares. The growing role of services in **India** (9th) is well-known, with the country now being a prominent global exporter of ICT services, and in the global top ten in terms of market shares.

The highest RCAs are found in international financial centres (including **Hong Kong, Japan,** and **Switzerland**), and in IT and logistics hubs, as well as in major tourist destinations (**Spain**, **Italy**, France). Charges for the use of intellectual property are sources of revenues for most advanced countries, but undoubtedly for some countries this flow is proportionally very significant, including **Luxembourg**, **Israel**, **Finland** and Ireland.

Chart 7a/b. Services exports: market shares. Increasing over 1995 to 2020 on the left, declining on the right

The numbers in the boxes indicate the country's ranking in global market shares in 2020

Left chart legend: UK, Ireland, China, India, Singapore, UAE, Netherlands, Switzerland

Right chart legend: US (LHS), Italy, Japan, France, Hong Kong, Germany, Spain
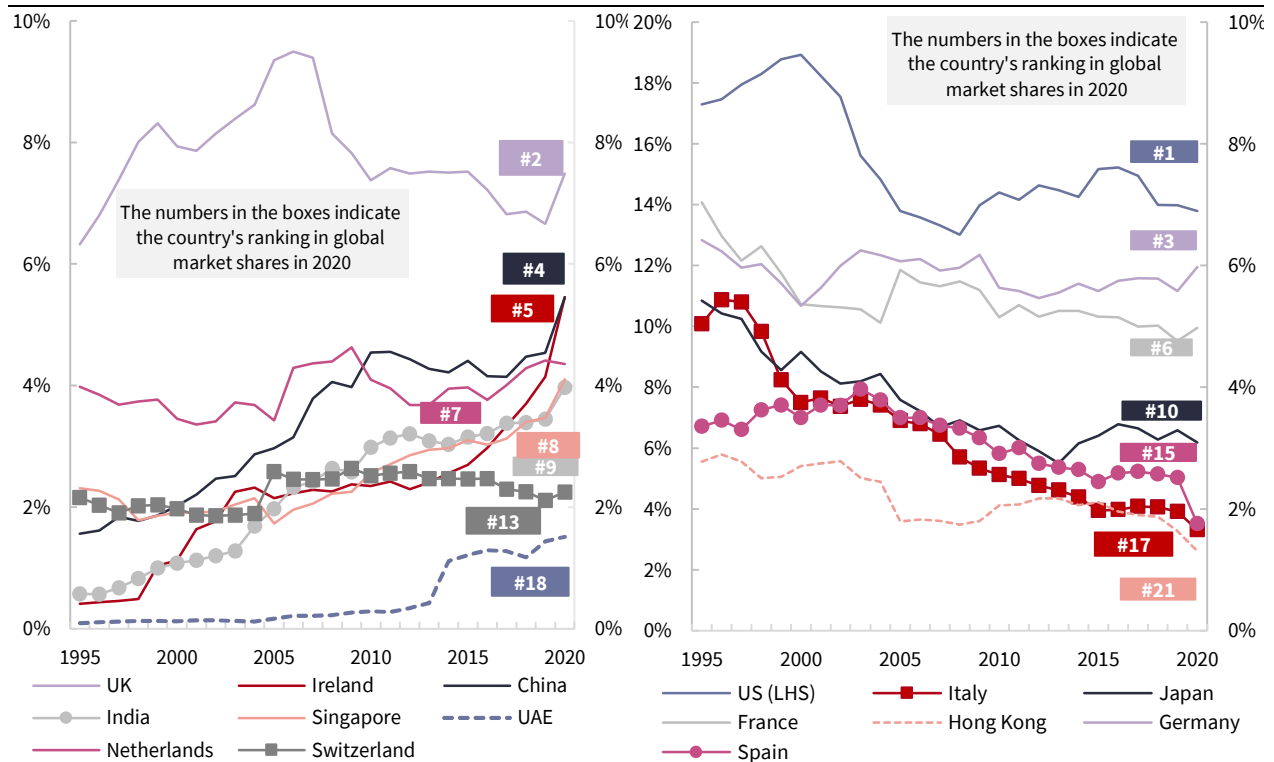
Source: WTO Stats, SG Economic and Sector Studies

REVENUES FROM CROSS-BORDER CAPITAL INVESTMENTS

As evidenced by the importance of flows originating from its cross-border investments, the **US** continues to show its economic strength. Revenues from its investments abroad represent 23.7% of worldwide investment incomes, up by 3pp in the past 25 years. The **UK** and **Germany** remain top ten, but have lost ground rapidly, while Japan is no longer among the best performers in the area. **The Netherlands, Ireland, Luxembourg,** and **Switzerland** have all climbed positions in the ranking, amid growing transactions between affiliated enterprises. **Hong Kong** and **China** have also gained importance. In terms of comparative advantages, only 16 countries, including small economies such as **Malta** and **Cyprus**, have RCAs above 1, a number that is nevertheless higher than in 1995, when there were only ten.

Chart 8. Revealed comparative advantages in property income (vertical axis) and services (horizontal axis) – 2020

Source: Trade data from WTO Stats and balance-of-payment data from IMF.
Note: black (services) and turquoise dots (property income) or both joint show a market share higher than 2%
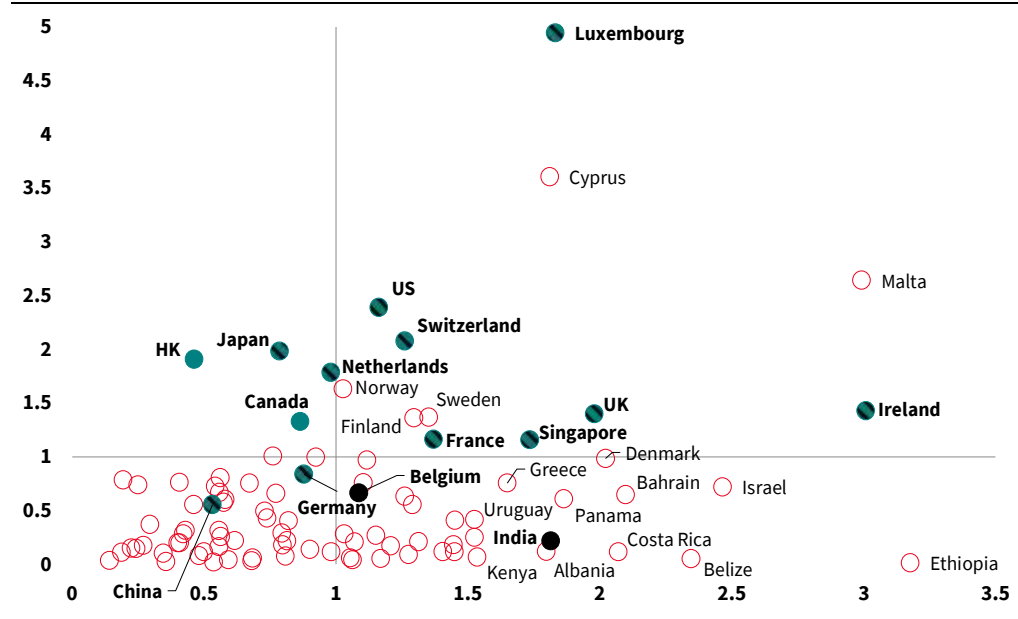
Chart 9a/b. Income from capital: market shares. Increasing on the left, declining on the right
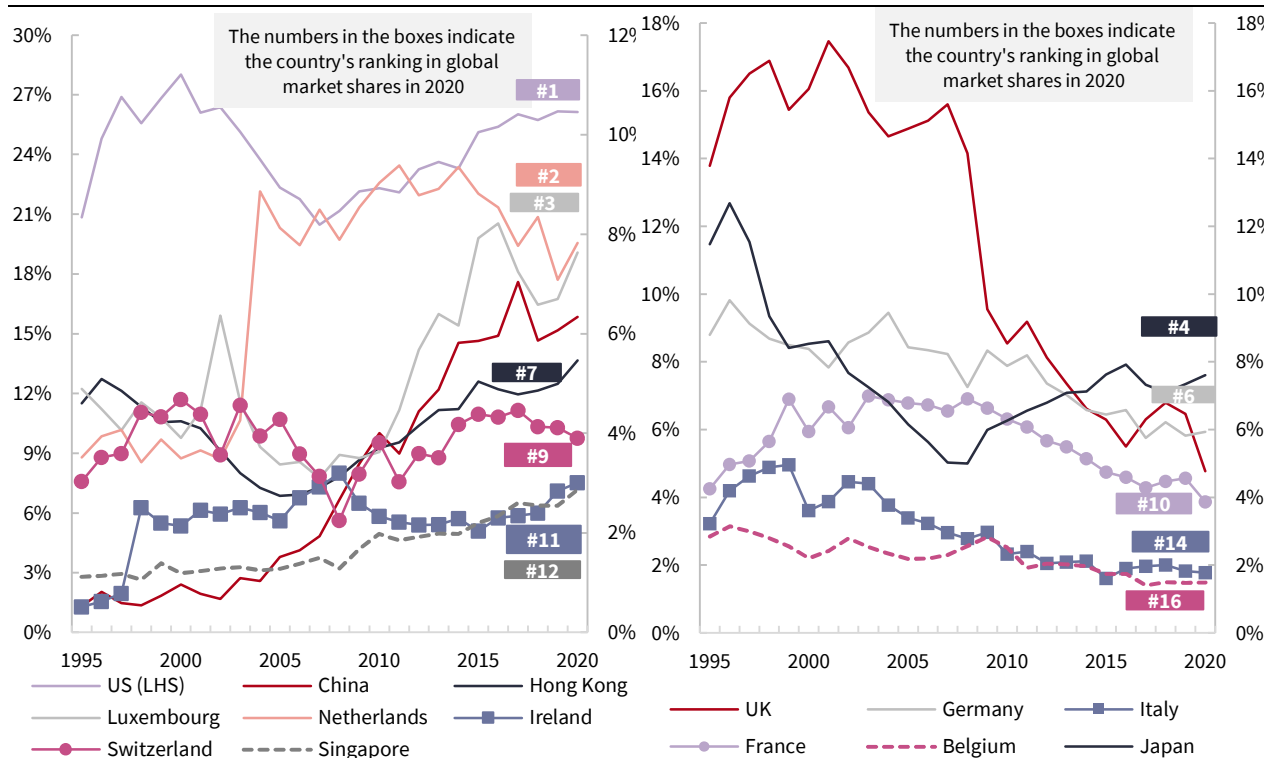
Source: IMF, SG Economic and Sector Studies

Note that low-tax jurisdictions may combine high RCAs and/or market shares in income property and services. If intercompany debt is used to shift profits (as shown in Beer & Devlin, 2021), the low-tax jurisdiction will record disproportionately high amounts of investment revenues in the primary account of the balance of payment, boosting its RCA value in property income[13]. A low-tax jurisdiction will often also have RCAs on tradable services. This occurs for example when multinational companies locate intangible assets, such as intellectual property (IP), in an affiliated company based in the low-tax jurisdiction. The host country will likely perceive royalty fees, which are recorded in the balance-of-payments as a credit for services. Note that the enhanced RCA is not an accurate identifier for low-tax jurisdictions, nor it has that purpose. From a balance-of-payments perspective, simultaneous and disproportionately large amounts of income receipts and payments would be an indicator of such hubs.

SPECIALISATIONS: SHIFTING OR NOT SHIFTING?

As seen, changes over the past three decades have been extraordinary, not least for China (manufacturing and services), India (services), or the economies of Central and Eastern Europe (manufacturing). But can it really be said that the other economies substantially changed their place in the world economy? What can be said on the overall picture and about productive specialisations as a whole?

Charts 10a/f suggest a very strong correlation in the relative importance of countries' market shares between 1995 and 2022, especially in manufacturing, agriculture, and fuels & mining, indicating a general stickiness to changes in productive structures. Of course, part of this rigidity stems from the fact that ranking positions in market shares are associated with the size of each economy, and that natural resource endowments also influence specialisations. But these factors certainly do not explain all.

The dispersion for instance is quite high in services (**chart 10f**), suggesting easier opportunities for growth of developing countries in this domain. It is also high for remittances and for investment incomes suggesting that country positioning is not necessary rigid.[14].

Back to manufacturing, and leaving aside the successful stories of East Asia and Central Europe, many developing countries seem to face a stalled industrialisation —and in some cases, premature deindustrialisation[15]— and greater dependence on commodities and remittances as a source of foreign exchange.

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[13] *Since gains from intellectual property increase dividends paid to the affiliate, the transactions are neutral in terms of the current account balance. As shown by Hebous, Klemm, and Wu (2021), low-tax jurisdictions typically post a negative net income account, although they may also show a simultaneous and disproportionate large amount of income receipts and payments.*

[14] *The Annex E shows the results from a Spearman's Rank-Order Correlation test that confirms lower dispersion in data for manufactured goods specialisation and raw material and higher for cross border investment revenues and remittances.*

[15] *See Sumner (2021).*

Charts 10a-f. Changes in market shares' ranks between 1995 and 2020

(a) - Agriculture exports

(b) - Manufactured goods exports

(c) - Remittances

(d) - Cross-border investement revenues

(e) - Fuel & mining exports

(f) - Service exports
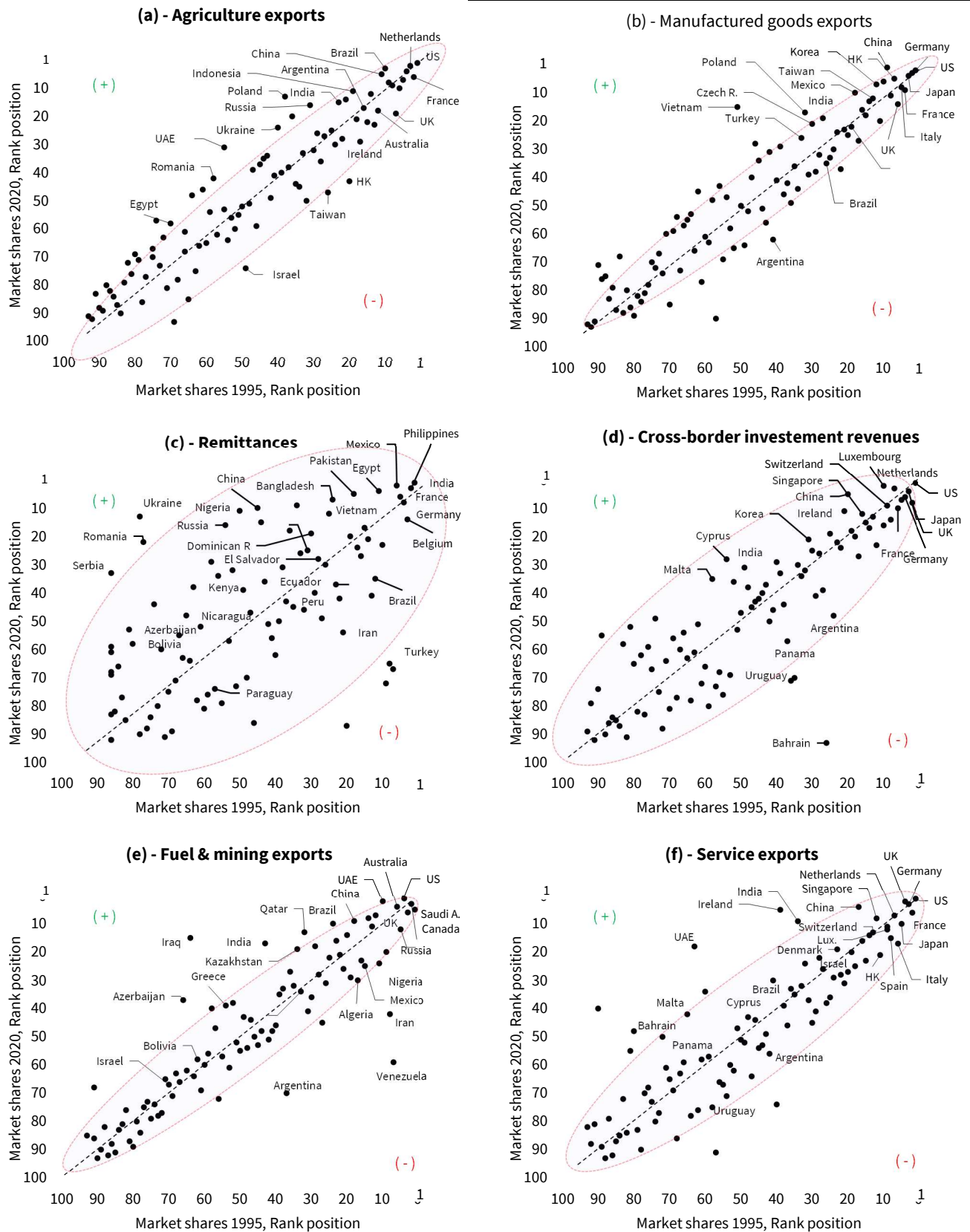
Source: WTO Stats, IMF, SG Economic and Sector Studies. Legend: (+) market shares increasing; (–) market shares decreasing

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3. Who looks like whom and why

Finding common patterns across countries implies accepting some degree of simplification. Grouping countries with similar productive specialisations based on their RCAs can certainly shed some light to find specialisation patterns.

A convenient way of doing so is to organise countries based on an agglomerative hierarchical clustering (AHC), a procedure to cluster the RCA data by similarity across economies. The AHC is based on a simple principle of aggregation by iteration: clusters are formed by grouping observations that minimise the distance to a reference point—the barycentre, or the most representative country of each class—and that maximise the distance between classes[16].

CLUSTERING COUNTRIES WITH MATCHING PRODUCTIVE SPECIALISATIONS

Based on similarities between RCA observations[17], the AHC protocol generates a dendrogram with three broad groups and several subdivisions within two of them (see **chart** in the Annex). For simplicity, six large groups are kept, derived from the clustering, with data as of 2020 (the most recent date for which detailed data are available for each country in the sample). **Table 3** shows the composition of each group. It is important to note that the groups were formed exclusively on the basis of the RCAs without consideration of market shares.

Table 4 shows the main descriptive statistics and gives a clarification of the groups composition as produced by the AHC protocol. Group 1 is formed by countries with very strong comparative advantages in fuels & mining and no other specialisation ("*Fuels & mining-intensive*"); Group 2 gathers countries combining high RCAs in fuels & mining and in agriculture ("*Commodities-driven*"); Group 3 are countries with strong remittances inflows ("*Remittances-driven*") which is generally accompanied by high RCAs in agriculture; Group 4 is composed by countries with a diversified productive structure ("*Diversified*"), typically with RCAs higher than one in agriculture and services and close to one for manufactured goods. Group 5 includes countries driven by services and rents from investment abroad ("*Post-Industrials*"), and Group 6 is represented by countries with strong RCAs in manufactured-goods ("*Manufactured goods-driven*").

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[16] *The AHC method is a "bottom-up" approach: each observation starts in its own cluster, and pairs of clusters are merged as one moves up the hierarchy and until all the objects are grouped in clusters. See Ward (1963).*
[17] *Similarities are obtained based on Pearson's correlations.*

Table 3. Economic specialisation (2020) - Clusters based on RCAs only (AHC protocol)

Group 1 **Fuel & mining intensive** Greece, Canada, Saudi Arabia, Iraq, Oman, Kazakhstan, UAE, Qatar, Russia, Australia, Norway, South Africa, Chile, Venezuela, Algeria, Azerbaidjan, Bahrain	Group 2 **Commodities driven** Paraguay, Brazil, Indonesia, Ecuador, Peru, Iran, Bulgaria, Malaysia	Group 3 **Remmitances driven** Georgia, Armenia, Honduras, Guatemala, Pakistan, El salvador, Dominican R., Egypt, Philippines, Bangladesh, India, Albania, Serbia, Moocco, Croatia, Ukraine, Nicaragua, Kenya, Romania, Belize, Tanzania, Vietnam, Mexico, Nigeria, Colombia, Bolivia	Group 4 **Diversified** Lithuania, Estonia, Belarus, Ethipia, Costa Rica, Thailand, Latvia, New Zealand, Argentina, Uruguay, Spain, Portugal, Denmark, Austria, Panama, Israel, Singapore, France	Group 5 **Post-industrials** Luxembourg, Cyprus, US, Japan, Hong Kong, Switzerland, Sweden, Finland, UK, Ireland, Malta, Netherlands	Group 6 **Manufactured goods- driven** Poland, Belgium, Turkey, Italy, Slovenia,Slo-vakia, Czech R, Hungary, Korea, Taiwan, Germany, China

Source: Authors' estimations based on trade data from WTO and balance-of-payment data from IMF.

Table 4. Summary statistics by group: RCAs

Group & Denomination	Agriculture exports		Manufacture exports		Remittances		Cross-border capital income		Fuels & mining exports		Services export	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
1. Fuels & mining-intensive	1.0	1.0	0.3	0.2	0.7	1.0	0.6	0.4	6.0	2.2	0.8	0.6
2. Commodities-driven	4.4	2.5	0.6	0.4	2.2	1.8	0.2	0.2	2.7	1.2	0.5	0.2
3. Remittances-driven	2.1	1.3	0.6	0.4	10.6	5.8	0.1	0.1	1.1	1.7	1.1	0.6
4. Diversified	3.0	2.7	0.8	0.3	0.9	0.6	0.5	0.3	0.4	0.3	1.5	0.6
5. Post-Industrials	0.5	0.4	0.7	0.4	0.2	0.2	2.0	1.0	0.4	0.3	1.5	0.7
6. Manufacture-driven	0.9	0.5	1.4	0.2	0.7	0.3	0.4	0.2	0.5	0.2	0.7	0.2
6 groups	1.9	1.4	0.7	0.3	3.6	1.6	0.6	0.4	1.8	1.0	1.1	0.5

Source: Trade data from WTO and balance-of-payment data from IMF. RCAs higher than the average across groups are highlighted in grey.

COMMON MACRO FEATURES BY CLUSTER

Once the different groups have been identified according to the export structure, it is convenient to explore what these groups might have in common *beyond* the similarity in their competitive advantages. The behaviour of a handful of macroeconomic variables is likely to be significantly different across groups, namely:

- the **volatility of the current account balance** in terms of GDP (*CAB vol*), expected to be higher in countries where exports depend on a few commodities, and for which price variations in global markets lead to large oscillations in total export values.

- the **expenditures on research and development** as percentage of GDP (*R&D expenditures*), arguably higher in countries producing high value-added manufactured goods or sophisticated services, requiring continuous technological innovation to stay in the race.

- the **level of tariff protection** (*Tariffs*), measured from tariffs on most favoured nation status, expected to be higher in countries that have not yet industrialised and that look to substitute imports with local production.

- and the **financial depth**, assessed through the market capitalisation of listed companies in stock markets (*Market cap*), likely to be higher in countries with more sophisticated productive structures.

Table 5. Summary statistics by group: Macro parameters and variables definition

Group & Denomination	CAB vol (pp of GDP)		R&D expenditures (% of GDP)		Tariffs (%)		Market cap (% of GDP)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
1. Fuels & mining-intensive	7.3	5.7	0.8	0.7	7.1	4.3	88.1	103.0
2. Commodities-driven	3.8	2.3	0.6	0.4	9.3	5.9	40.4	43.4
3. Remittances-driven	3.6	1.6	0.4	0.3	8.5	4.4	20.6	25.9
4. Diversified	3.6	1.6	1.5	1.3	5.4	4.6	50.5	57.0
5. Post-Industrials	2.9	1.5	2.1	1.1	3.1	1.3	256.1	484.6
6. Manufacture-driven	3.0	0.7	2.3	1.2	5.1	3.8	59.7	64.2
6 groups	4.1	2.2	1.2	0.8	6.6	4.0	75.9	129.7

CAB volatility = Current account balance (pp of GDP) volatility, standard deviation - IMF/IFS data, 1995-2019
R&D expenditures = Expenses in research and development as percentage of GDP - WB/WDI data, 2020 (or most recently available data)
Tariffs = Most Favored Nation clause (MFN), simple average duty (in percentage) - WTO data, 2020 (or most recently available data)
Market cap = Market capitalization of listed domestic companies (as % of GDP) - WB/WDI data, 2020 (or most recently available data)

Source: Trade data from WTO Stats and balance-of-payment data from IMF

Table 5 summarises the averages and standard deviations of each variable for each group. Mean values do suggest that the current account volatility is higher for the groups of "fuel & mining-intensive" and "commodities-driven" countries; that R&D expenditure is higher in the "post-industrials" and the "manufactured goods-driven countries"; that "commodity-driven' and "remittances-driven" countries tend to have higher trade tariffs; and that market capitalisation is higher in the group of the "post-industrials".

Note that GDP per capita (c.f. **Chart 12**) is higher in the "diversified" and the "post-industrials" groups, and lower in the "commodities-driven" and "remittances-driven" economies. "Manufactured goods-driven" countries have higher average income per capita compared to those producing primary products, but lower than the one of the "post-industrials" group. The "fuels & mining-intensive" and, to a lesser extent, the "diversified" clusters show intermediate values for revenues but with a large dispersion, with Norway or Qatar reaching very high values of per capita GDP, and Venezuela or Algeria with rather low values.

Chart 12. GDP per capita (current prices) for each specialisation group – 2020
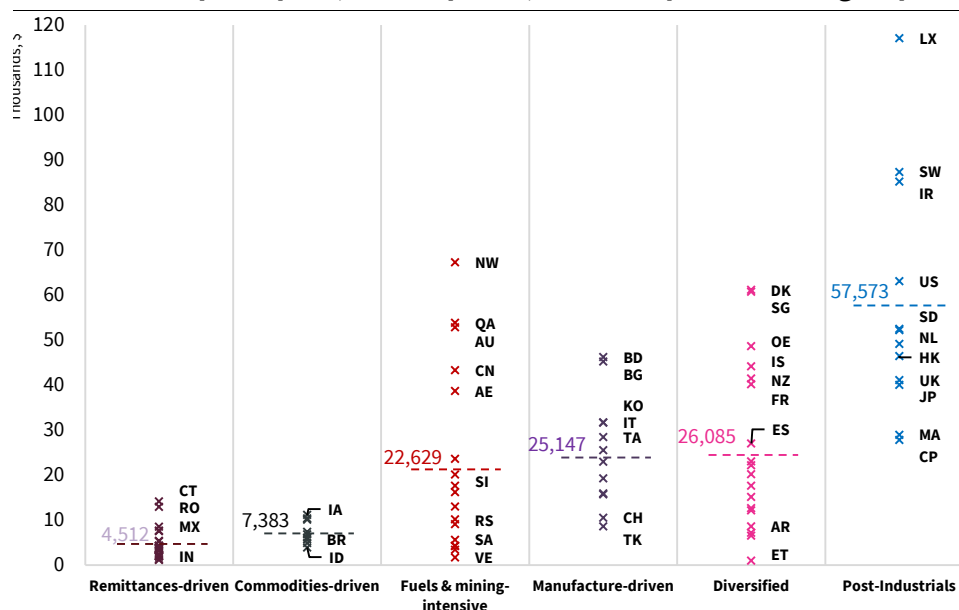
Source: IMF/WEO data, SG Economic and Sector Studies. Country codes are as follows: AE = United Arab Emirates, AR = Argentina, AU = Australia, BD = Germany, BG = Belgium, BR = Brazil, CH = China, CN = Canada, CP = Cyprus, CT = Croatia, DK = Denmark, ES = Spain, ET = Ethiopia, FR = France, HK = Hong Kong, IA = Iran, ID = Indonesia, IN = India, IR = Ireland, IS = Israel, IT = Italy, JP = Japan, KO = Korea, LX = Luxembourg, MA = Malta, MX = Mexico, NL = Netherlands, NW = Norway, NZ = New Zealand, OE = Austria, QA = Qatar, RM = Romania, RS = Russia, SA = South Africa, SD = Sweden, SG = Singapore, SI = Saudi Arabia, SW = Switzerland, TA = Taiwan, TK = Turkey, UK = United Kingdom, US = United States of America, VE = Venezuela. Averages of each group are indicated in the top left of the dotted line.

It is worth evaluating how the interaction of the macroeconomic variables can help explain that one country belongs to one specific group. A convenient approach is to run a discrete multinomial logistic regression that evaluates the change in the probability of being in a particular cluster *vis-à-vis* a control group following a marginal change in the value of an explanatory variable[18]. Note that, to avoid multicollinearity, the GDP per capita is excluded from the explanatory variables, as revenues are expected to be positively correlated with the financial depth of countries, and arguably negatively correlated for instance to the tariff level, often use as a way to support nascent industries in low stages of development.

The base category (or control group) is the "post-industrials", the group composed by the most advanced economies (see chart 12). The main results of the regression estimates are displayed in **Table 6**[19]. For clarity, only the statistically significant coefficients are included, with the respective stars reflecting the significance (*i.e.* their p-values), and their odds ratio[20].

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[18] *The values assigned to each outcome are categorical (not ordered), i.e., it is assumed that the levels of specialisation have no natural ordering The equation to estimate is:* $logit(p) = log\left(\frac{p}{(1-p)}\right) = \beta_0 + \beta_1 CABV + \beta_2 R\&D + \beta_3 MFN + \beta_4 MC.$

[19] *The complete table is found in the Annex (Table C4). All details on how we have constructed the model, its equations, and testing, see the Annex (Section C).*

[20] *The odds is the ratio of the probability that the event of interest occurs to the probability that it does not. The odds ratio is the odds of the event in the reference group divided by the odds of the event in the control group.*

Table 6. Multinomial Logit Estimates of specialisation groups and macro predictors (simplified table)

Dependent Variable: *specialisation group*
Control group: *Post-Industrials* (*group* 5)

Explanatory Variable:		Fuels & mining-intensive (*group* 1)	Commodities-driven (*group* 2)	Remittances-driven (*group* 3)	Diversified (*group* 4)	Manufacture-driven (*group* 6)
CAB volatility (pp of GDP)	Coefficient	0.584*				
	Odds ratio	1.794				
R&D expenditures (% of GDP)	Coefficient	-0.954*	-1.476**	-2.661**		1.269**
	Odds ratio	0.385	0.229	0.070		3.557
Tariffs (%)	Coefficient	0.523**	0.583**	0.536**	0.447*	0.435*
	Odds ratio	1.687	1.791	1.710	1.563	1.545
Market cap (% of GDP)	Coefficient				-0.023**	-0.033***
	Odds ratio				0.977	0.968

Number of observations	93
Percent correctly predicted	50
-2 Log(Likelihood)	228.2
Pseudo-*R*-squared	0.341

Odds ratio: <1 – collocation in control group more probable; >1 – collocation in intervention more probable

The following is a summary of key econometric results:

- The four variables together meaningfully contribute to the explanation of the response variable, as per the goodness-of-fit and the results of the log likelihood test. The results suggest however the possibility that other variables that might be relevant have been omitted. That said, the objective here is not to characterise the groups in a comprehensive way, but to evaluate the sensitivity (the sign of the coefficient) of the macroeconomic variables that seem relevant.

- Regarding the specific impact of each variable on the group membership, tariffs appear to be always an influential variable: the higher the tariffs, the weaker the probability of moving from any departure point to the "post-industrials" group.

- Lower R&D expenditures are an inherent feature of almost all modalities when comparing to the "post-industrials", except from the "manufactured goods-driven", for which the probability of staying in the group increases with higher R&D expenditures.

- The current account balance volatility is also significant for country membership in the "fuels & mining-intensive" cluster, for which a unit increase in its volatility makes it more probable for a country, *ceteris paribus*, to be found in such group.

- With regards to the "diversified" and the "manufactured goods-driven" clusters, a strong contributor to membership is the market capitalisation. The higher the market capitalisation, the higher the probability of leaving the group and moving to the "post-industrials".

SOCIETE GENERALE

4. A few final considerations

This article outlines the main changes in productive specialisation over the last 25 years.

In terms of industrialisation, countries in East Asia and Central and Eastern Europe have shown real progress and, outside these regions, only Mexico has managed to keep pace in manufacturing production. Except for Germany and the Netherlands, the old industrial powers (US, UK, Japan, France…) have lost market shares and competitive advantages in manufacturing.

It is not clear whether this drift should be associated with economic weakening. A distinguished feature of most advanced countries is that more and more they obtain external resources from high value-added services and from the profits and interests associated with their overseas investments, which grow often at a faster rate than their exports of manufactured goods. Despite losing market shares in manufacturing, these sophisticated "post-industrial" economies exhibit higher per capita incomes than the other groups.

It has also been pointed out that many countries —mainly in South America and in Africa— have accentuated their primary export profile and, despite the importance often attached to industrialisation in the development strategies or in policy orientations, have not been able to increase manufacturing exports.

A notable feature is the growth in remittance flows, which has sometimes become a major source of FX earnings. The number of developing countries relying on these flows has increased considerably, which arise the question on the sustainability of this economic profile. What will happen if future generations put down roots in the country where they work and send progressively less financial aid to their families?

Countries' productive profiles appear to be associated with several macroeconomic and policy features. Countries specialised in raw materials (especially fuel and mining) are more likely to suffer from large swings in their current-account balance. Also, trade tariffs are generally lower in mature "post-industrials" economies, which also have deeper financial markets and higher R&D. The manufactured goods-based countries have higher R&D expenditures than any other group.

Each of the relationships found between macro variables and group membership requires a lengthy explanation and a specific treatment of causality that goes beyond the objectives and possibilities of this article. Econometric results indicating a negative relationship between tariffs and sophistication of the productive structure may give the false idea that productivity can be boosted by simple decreasing tariffs. Here one can argue in two ways: customs protection removes competition from local production and discourage productivity gains —the negative bias of import substitution policies— or instead, that countries that already have

high productivity levels are in better place to decrease external tariffs and face competition in world markets. Causality can of course go in both ways.

The impact of the shifting productive patterns in labour markets and income inequality has also been left out, as it also requires a long exposition. The impact of specialisation shifts on jobs, especially "quality" jobs have important economic and social consequences. In the period studied here, blue-collar workers in rich countries have faced increased competition from workers abroad. An erosion in the bargaining power of workers may be one of the motivations for popular unrest in France in recent years, including from "yellow vest" protests, made up in part of lower middle-income workers who perceive a loss of social status. In the same vein, the large working-class vote for "Brexit" can be seen as a revolt against status quo.

The world economy may be entering a period of rapid change with consequences for country specialisation. Digital and AI technologies are moving fast and early adoption of new processes will have consequences for the relative positioning of the countries in the productive sphere. In a more challenging geopolitical landscape, countries are trying to achieve "strategic autonomy" to secure access to key areas of industrial and technological value chains, including for military and scientific equipment.

Disconnecting from globalisation can yet have a very high cost in terms of productivity and it is unlikely that countries will seek any form of autarky. Instead, a growing trend of "friend-shoring" of production could be ahead.

Value chains will also shift as societies increase efforts to respond to environmental challenges. The need to reduce greenhouse gas emissions and preserve biodiversity is likely to lead to a reconfiguration in trade. EU leaders have engaged in policies to discourage imports with a large CO_2 footprint or with impact on biodiversity, and as part of the "green deal", have agreed on a carbon border adjustment mechanism to prevent the risk of carbon leakage and support the EU's increased ambition on climate mitigation.

The magnitude of these challenges and the transformations that lie ahead imply far greater changes than those seen in recent decades and, beyond the uncertainty, will bring with them important business opportunities and, hopefully, positive changes for society.

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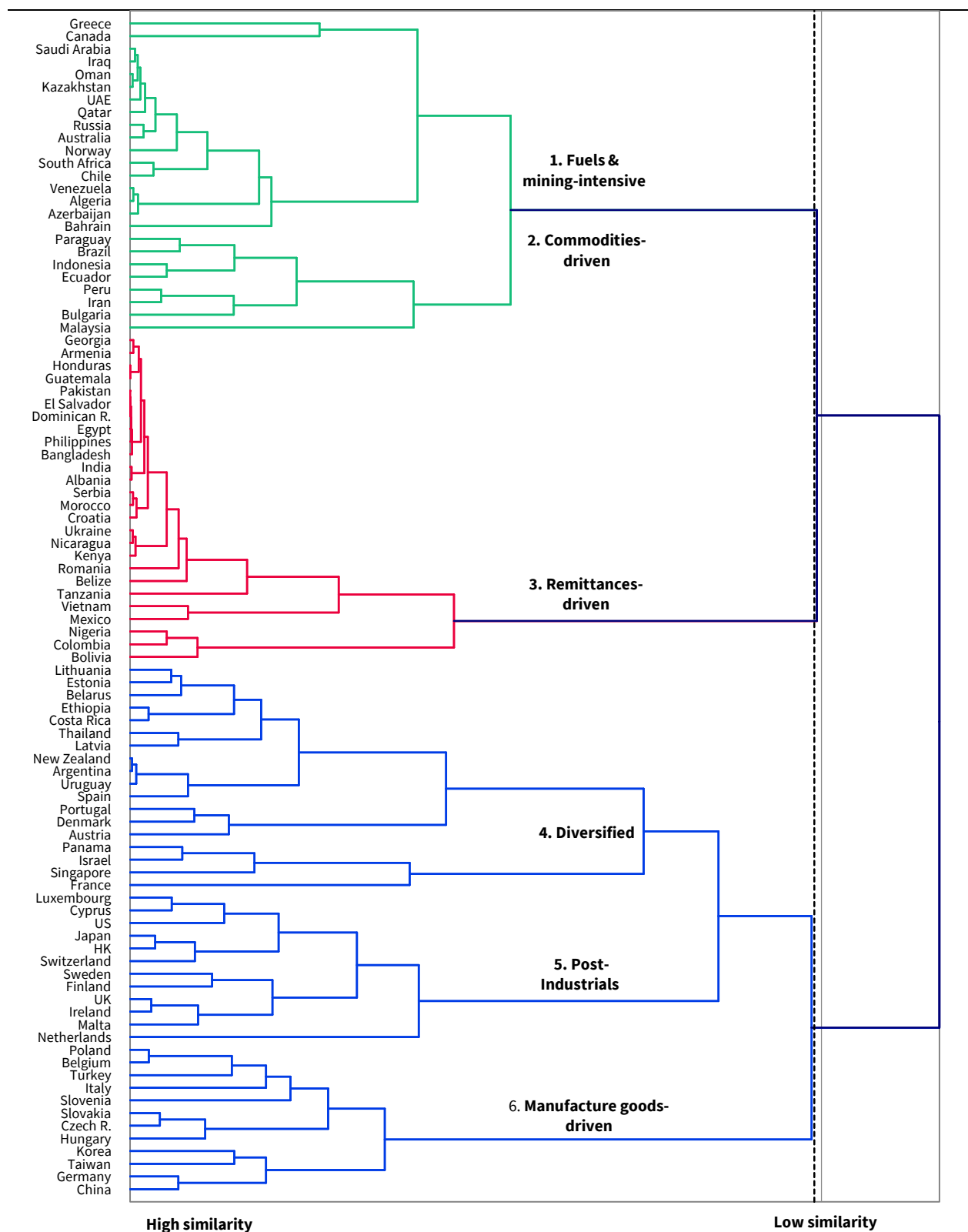
Appendix

A. Revealed comparative advantages (RCAs) per sector, selected countries – 1995 and 2020

	Agriculture		Manufactures		Remittances		Primary Income		Fuels & mining		Services	
	1995	2020	1995	2020	1995	2020	1995	2020	1995	2020	1995	2020
Albania	0.67 (67)	0.84 (64)	0.34 (67)	0.55 (56)	44.01 (1)	9.74 (14)	0.28 (51)	0.10 (70)	0.65 (50)	0.68 (44)	0.75 (68)	1.98 (11)
Algeria	0.13 (88)	0.21 (86)	0.05 (91)	0.13 (83)	7.29 (18)	2.77 (28)	0.04 (90)	0.18 (60)	13.03 (2)	8.64 (2)	0.33 (88)	0.57 (71)
Argentina	4.89 (11)	9.04 (1)	0.45 (60)	0.28 (71)	0.17 (71)	0.47 (61)	1.09 (10)	0.43 (41)	1.38 (35)	0.32 (67)	0.76 (66)	0.81 (54)
Armenia	1.35 (44)	2.34 (24)	0.70 (48)	0.25 (75)	18.24 (4)	12.25 (10)	0.03 (91)	0.10 (75)	3.03 (21)	2.38 (23)	0.55 (83)	1.19 (36)
Australia	2.62 (22)	1.46 (43)	0.38 (65)	0.17 (80)	0.49 (57)	0.16 (81)	0.58 (30)	0.88 (17)	4.35 (18)	6.28 (10)	1.36 (28)	0.80 (56)
Austria	0.66 (70)	1.08 (56)	1.03 (24)	1.15 (17)	0.88 (45)	0.52 (57)	0.72 (21)	0.49 (38)	0.24 (72)	0.42 (61)	1.56 (23)	1.32 (26)
Azerbaijan	1.24 (48)	0.70 (69)	0.28 (70)	0.05 (91)	0.29 (64)	3.24 (25)	0.06 (86)	0.53 (36)	8.44 (9)	7.57 (5)	1.23 (36)	0.71 (60)
Bahrain	0.14 (87)	0.35 (76)	0.14 (84)	0.31 (69)	0.00 (93)	0.00 (92)	3.36 (1)	0.00 (93)	6.08 (15)	4.48 (16)	0.45 (84)	2.34 (7)
Bangladesh	1.01 (59)	0.29 (81)	0.98 (28)	1.09 (21)	17.13 (5)	15.58 (7)	0.36 (44)	0.02 (91)	0.04 (90)	0.02 (90)	0.73 (70)	0.50 (74)
Belarus	1.30 (47)	2.65 (20)	1.25 (8)	0.93 (28)	0.37 (60)	1.19 (41)	0.00 (93)	0.05 (84)	2.35 (23)	1.28 (31)	0.44 (86)	1.20 (34)
Belgium	1.18 (50)	1.24 (52)	1.09 (20)	1.12 (18)	1.68 (37)	0.92 (47)	0.90 (15)	0.58 (31)	0.41 (56)	0.81 (38)	0.89 (58)	1.04 (43)
Belize	5.30 (8)	3.74 (12)	0.15 (83)	0.04 (92)	3.53 (29)	6.97 (16)	0.07 (85)	0.04 (85)	0.26 (69)	0.11 (84)	2.49 (8)	2.88 (2)
Bolivia	3.25 (17)	2.94 (19)	0.29 (69)	0.12 (85)	0.34 (62)	6.64 (18)	0.14 (70)	0.09 (77)	6.65 (12)	6.23 (11)	0.88 (59)	0.30 (90)
Brazil	3.40 (16)	5.44 (6)	0.79 (46)	0.42 (63)	4.02 (27)	0.61 (55)	0.43 (38)	0.51 (37)	1.44 (33)	2.73 (22)	0.62 (78)	0.58 (70)
Bulgaria	2.42 (24)	2.01 (29)	0.85 (40)	0.96 (25)	0.00 (86)	1.00 (46)	0.16 (67)	0.25 (50)	1.90 (27)	1.75 (28)	1.23 (37)	1.01 (45)
Canada	1.79 (35)	1.92 (32)	0.97 (29)	0.70 (47)	0.17 (72)	0.07 (86)	0.61 (29)	1.17 (14)	2.15 (26)	2.17 (25)	0.67 (74)	0.89 (50)
Chile	3.81 (14)	3.65 (14)	0.18 (80)	0.20 (78)	0.02 (84)	0.04 (89)	0.32 (46)	0.67 (24)	6.21 (14)	5.74 (12)	0.99 (50)	0.37 (86)
China	1.09 (54)	0.38 (75)	1.35 (3)	1.64 (2)	0.16 (73)	0.27 (74)	0.22 (58)	0.49 (40)	0.78 (46)	0.24 (72)	0.64 (75)	0.47 (79)
Colombia	3.52 (15)	2.59 (21)	0.49 (58)	0.32 (68)	4.86 (26)	6.73 (17)	0.37 (42)	0.64 (30)	3.46 (20)	3.50 (19)	0.75 (69)	0.66 (65)
Costa Rica	4.96 (10)	3.51 (16)	0.62 (53)	0.68 (48)	2.07 (32)	1.13 (43)	0.22 (59)	0.10 (72)	0.17 (79)	0.10 (87)	1.20 (38)	2.02 (10)
Croatia	1.15 (51)	1.62 (37)	0.82 (43)	0.72 (45)	5.51 (25)	5.71 (22)	0.15 (69)	0.22 (54)	1.03 (42)	0.84 (36)	1.83 (16)	1.62 (17)
Cyprus	1.56 (39)	0.22 (85)	0.20 (76)	0.11 (86)	0.76 (49)	0.64 (54)	0.57 (32)	3.18 (2)	0.19 (76)	0.18 (79)	3.89 (2)	2.15 (9)
Czech R.	0.89 (63)	0.76 (66)	1.13 (18)	1.60 (4)	0.51 (54)	0.81 (50)	0.25 (54)	0.19 (55)	0.84 (45)	0.25 (71)	1.34 (30)	0.59 (69)
Denmark	1.98 (33)	1.61 (38)	0.66 (49)	0.78 (42)	0.46 (58)	0.31 (70)	2.27 (5)	0.87 (19)	0.21 (74)	0.26 (69)	0.90 (57)	1.84 (13)
Dominican R.	0.97 (60)	1.56 (39)	0.88 (36)	0.54 (57)	10.28 (11)	17.06 (6)	0.09 (82)	0.12 (69)	0.02 (93)	0.19 (78)	1.76 (18)	1.10 (41)
Ecuador	5.49 (5)	7.49 (4)	0.11 (86)	0.10 (87)	5.56 (24)	5.88 (21)	0.13 (74)	0.02 (90)	4.54 (17)	2.86 (21)	0.77 (65)	0.37 (85)
Egypt	0.41 (80)	1.15 (55)	0.15 (82)	0.39 (66)	15.11 (7)	18.87 (4)	0.68 (23)	0.05 (82)	1.44 (34)	0.99 (33)	2.97 (3)	1.12 (38)
El Salvador	2.29 (26)	1.27 (50)	0.62 (52)	0.58 (54)	26.58 (3)	19.72 (2)	0.12 (75)	0.07 (80)	0.15 (84)	0.18 (80)	0.72 (71)	0.84 (53)
Estonia	2.14 (29)	1.63 (36)	0.79 (45)	0.96 (26)	0.04 (81)	0.91 (48)	0.16 (66)	0.36 (45)	1.08 (41)	1.03 (32)	1.83 (17)	1.38 (23)
Ethiopia	5.46 (6)	5.11 (8)	0.10 (87)	0.07 (89)	2.59 (30)	2.28 (32)	0.36 (43)	0.01 (92)	0.23 (73)	0.01 (92)	2.41 (9)	2.94 (1)
Finland	1.10 (53)	0.83 (65)	1.28 (6)	0.88 (34)	0.12 (76)	0.31 (71)	0.42 (39)	1.20 (13)	0.38 (60)	0.96 (34)	0.84 (63)	1.30 (27)
France	1.34 (46)	1.22 (53)	1.06 (21)	0.89 (32)	0.82 (47)	1.23 (39)	0.73 (19)	1.02 (15)	0.30 (62)	0.27 (68)	1.15 (40)	1.46 (20)
Georgia	1.19 (49)	1.94 (31)	0.22 (75)	0.39 (65)	32.60 (2)	12.68 (9)	0.06 (87)	0.36 (46)	1.24 (37)	1.48 (30)	1.68 (20)	1.11 (39)
Germany	0.61 (74)	0.73 (68)	1.26 (7)	1.31 (13)	0.53 (52)	0.45 (62)	0.96 (13)	0.74 (21)	0.26 (68)	0.42 (59)	0.71 (72)	0.84 (52)
Greece	1.71 (37)	1.84 (34)	0.38 (64)	0.47 (61)	9.54 (12)	0.40 (66)	0.27 (52)	0.67 (26)	0.53 (54)	1.88 (27)	2.72 (6)	1.96 (12)
Guatemala	5.61 (3)	3.56 (15)	0.34 (66)	0.38 (67)	9.38 (13)	19.03 (3)	0.11 (79)	0.22 (53)	0.26 (70)	0.18 (81)	1.29 (32)	0.50 (75)
Honduras	6.99 (1)	2.99 (18)	0.10 (88)	0.54 (58)	9.18 (14)	17.08 (5)	0.19 (63)	0.05 (83)	0.05 (89)	0.10 (85)	1.41 (25)	0.70 (61)
Hong Kong	0.37 (81)	0.17 (88)	1.19 (13)	1.32 (12)	0.05 (80)	0.02 (90)	1.33 (9)	1.68 (7)	0.29 (63)	0.13 (82)	0.76 (67)	0.45 (80)
Hungary	2.03 (32)	1.04 (58)	0.85 (39)	1.36 (9)	0.58 (50)	1.05 (45)	0.32 (48)	0.58 (33)	0.88 (44)	0.34 (65)	1.60 (22)	0.71 (59)
India	1.74 (36)	1.00 (59)	0.95 (31)	0.71 (46)	10.76 (10)	6.33 (20)	0.22 (56)	0.19 (57)	0.59 (51)	0.84 (37)	0.86 (61)	1.81 (14)
Indonesia	1.95 (34)	3.73 (13)	0.81 (44)	0.85 (36)	0.97 (44)	2.27 (33)	0.18 (65)	0.17 (61)	4.34 (19)	2.20 (24)	0.60 (79)	0.41 (84)
Iran	0.66 (68)	2.52 (22)	0.14 (85)	0.84 (38)	6.30 (21)	1.57 (36)	0.12 (77)	0.07 (79)	12.05 (4)	3.02 (20)	0.17 (91)	0.66 (67)
Iraq	0.00 (93)	0.03 (92)	0.00 (93)	0.00 (93)	0.00 (86)	0.60 (56)	0.13 (71)	0.13 (68)	1.33 (36)	10.51 (1)	5.23 (1)	0.42 (83)
Ireland	2.18 (28)	0.41 (74)	1.16 (17)	0.59 (53)	0.52 (53)	0.02 (91)	0.70 (22)	1.26 (10)	0.12 (86)	0.04 (88)	0.55 (82)	2.53 (5)
Israel	0.61 (73)	0.29 (82)	1.12 (14)	0.81 (39)	0.50 (55)	0.44 (63)	0.38 (41)	0.64 (29)	0.15 (82)	0.20 (76)	1.64 (21)	2.40 (6)
Italy	0.66 (69)	1.27 (51)	1.20 (10)	1.31 (14)	0.56 (51)	0.68 (53)	0.73 (20)	0.66 (27)	0.19 (77)	0.45 (55)	1.08 (44)	0.69 (63)
Japan	0.10 (91)	0.17 (87)	1.28 (5)	1.11 (20)	0.15 (74)	0.21 (76)	1.36 (8)	1.74 (6)	0.19 (78)	0.32 (66)	0.62 (77)	0.81 (55)
Kazakhstan	1.40 (41)	0.93 (61)	0.62 (51)	0.29 (70)	1.53 (39)	0.31 (72)	0.05 (89)	0.25 (51)	6.91 (11)	7.85 (3)	0.58 (81)	0.48 (77)
Kenya	4.07 (12)	4.16 (10)	0.26 (72)	0.27 (73)	1.93 (34)	10.56 (13)	0.11 (80)	0.06 (81)	0.73 (48)	0.66 (46)	2.62 (7)	1.48 (19)
Latvia	2.87 (20)	3.44 (17)	0.66 (50)	0.87 (35)	0.00 (86)	2.03 (35)	0.48 (35)	0.37 (43)	0.26 (67)	0.43 (58)	1.95 (13)	1.09 (42)
Lithuania	2.72 (21)	2.42 (23)	0.90 (35)	0.98 (24)	0.03 (83)	0.74 (52)	0.11 (78)	0.16 (62)	2.20 (25)	0.78 (41)	0.87 (60)	1.36 (25)
Luxembourg	0.12 (89)	0.05 (91)	0.17 (81)	0.05 (90)	0.80 (48)	0.21 (77)	2.88 (3)	4.54 (1)	0.03 (92)	0.02 (91)	2.86 (4)	1.38 (22)
Malaysia	1.67 (38)	1.52 (41)	1.18 (14)	1.33 (10)	0.10 (77)	0.24 (76)	0.21 (60)	0.28 (48)	1.14 (39)	1.54 (29)	0.78 (64)	0.42 (82)
Malta	0.16 (85)	0.14 (89)	1.05 (23)	0.16 (81)	0.37 (59)	0.42 (65)	0.62 (28)	2.33 (3)	0.20 (75)	0.04 (89)	1.87 (15)	2.80 (3)
Mexico	0.94 (62)	1.28 (49)	1.19 (12)	1.48 (7)	3.57 (28)	4.06 (24)	0.23 (55)	0.10 (76)	1.74 (29)	0.72 (43)	0.59 (80)	0.19 (92)
Morocco	2.27 (27)	1.95 (30)	0.50 (57)	0.81 (40)	17.04 (6)	6.64 (19)	0.20 (62)	0.10 (71)	1.15 (38)	0.40 (62)	1.39 (27)	1.45 (21)
Netherlands	2.08 (31)	1.42 (46)	0.86 (37)	0.85 (37)	0.20 (67)	0.09 (85)	0.99 (12)	1.57 (8)	0.74 (47)	0.80 (40)	1.09 (43)	0.98 (48)
New Zealand	5.12 (9)	7.89 (3)	0.38 (63)	0.27 (72)	6.38 (21)	0.12 (83)	0.32 (47)	0.67 (25)	0.69 (49)	0.26 (70)	1.28 (33)	1.11 (40)
Nicaragua	6.86 (2)	5.19 (7)	0.27 (71)	0.53 (59)	8.89 (15)	11.27 (12)	0.08 (84)	0.03 (89)	0.17 (80)	0.10 (86)	1.02 (46)	0.67 (64)
Nigeria	0.14 (86)	0.28 (83)	0.01 (92)	0.10 (88)	1.50 (40)	13.19 (8)	0.02 (92)	0.15 (64)	14.73 (1)	6.44 (9)	0.27 (90)	0.36 (87)
Norway	0.87 (65)	1.32 (60)	0.43 (61)	0.26 (74)	0.32 (63)	0.18 (78)	0.53 (33)	1.44 (9)	6.33 (13)	3.88 (18)	1.34 (29)	1.22 (33)
Oman	0.61 (72)	1.04 (57)	0.24 (73)	0.61 (52)	0.49 (56)	0.05 (88)	0.38 (40)	0.13 (67)	12.24 (3)	6.61 (7)	0.01 (93)	0.33 (89)
Pakistan	1.34 (45)	1.29 (48)	1.06 (22)	0.64 (50)	11.48 (9)	21.38 (1)	0.12 (76)	0.04 (87)	0.12 (85)	0.20 (75)	0.92 (54)	0.52 (73)
Panama	1.45 (40)	0.47 (73)	0.06 (90)	0.72 (44)	2.35 (31)	1.20 (40)	3.01 (2)	0.53 (35)	0.11 (87)	0.01 (93)	2.35 (10)	2.65 (4)
Paraguay	5.31 (7)	8.38 (2)	0.19 (77)	0.22 (76)	6.09 (23)	2.55 (29)	0.46 (36)	0.10 (74)	0.04 (91)	2.11 (26)	1.94 (14)	0.43 (81)
Peru	2.94 (19)	3.88 (11)	0.19 (78)	0.19 (79)	6.49 (19)	3.24 (26)	0.58 (31)	0.33 (47)	5.61 (16)	5.46 (13)	0.90 (56)	0.35 (88)
Philippines	1.09 (55)	0.75 (67)	0.90 (34)	0.80 (41)	14.87 (8)	11.61 (11)	0.29 (49)	0.15 (65)	0.57 (52)	0.44 (56)	0.96 (52)	1.24 (32)
Poland	1.08 (56)	1.73 (35)	0.86 (38)	1.28 (15)	1.62 (38)	0.84 (49)	0.22 (57)	0.18 (59)	1.61 (31)	0.42 (60)	1.76 (19)	0.97 (49)
Portugal	0.88 (64)	1.51 (42)	0.92 (33)	1.03 (22)	8.13 (16)	0.33 (69)	0.75 (18)	0.56 (34)	0.29 (64)	0.52 (53)	1.25 (34)	1.38 (24)
Qatar	0.05 (92)	0.01 (93)	0.30 (68)	0.16 (82)	0.00 (86)	0.36 (68)	0.88 (16)	0.85 (20)	11.08 (7)	6.46 (8)	0.14 (92)	1.25 (31)
Romania	1.05 (57)	1.21 (54)	1.21 (9)	1.12 (19)	0.08 (78)	3.11 (27)	0.06 (88)	0.18 (58)	1.55 (32)	0.38 (63)	0.93 (53)	1.29 (28)
Russia	0.61 (71)	1.44 (45)	0.60 (55)	0.40 (64)	0.15 (75)	1.15 (42)	0.33 (45)	0.71 (22)	7.42 (10)	5.38 (15)	0.70 (73)	0.66 (66)
Saudi Arabia	0.11 (90)	0.29 (80)	0.18 (79)	0.46 (62)	0.00 (86)	0.07 (87)	0.63 (26)	0.69 (23)	11.99 (5)	7.25 (6)	0.35 (87)	0.23 (91)
Serbia	2.62 (23)	2.11 (28)	0.59 (56)	0.92 (29)	0.00 (86)	5.59 (23)	0.90 (14)	0.08 (78)	1.77 (28)	0.58 (52)	1.41 (26)	1.20 (35)
Singapore	0.48 (79)	0.32 (77)	1.19 (11)	0.90 (31)	0.18 (69)	1.26 (38)	0.53 (34)	1.01 (16)	1.09 (40)	0.59 (51)	1.03 (45)	1.61 (18)
Slovakia	0.95 (61)	0.63 (70)	1.17 (15)	1.61 (3)	0.18 (68)	1.07 (44)	0.15 (68)	0.14 (66)	0.96 (43)	0.43 (57)	1.25 (35)	0.53 (72)
Slovenia	0.55 (76)	0.90 (62)	1.29 (4)	1.47 (8)	1.98 (33)	0.52 (58)	0.13 (72)	0.16 (63)	0.57 (53)	0.65 (49)	1.09 (42)	0.74 (57)
South Africa	1.14 (52)	1.86 (33)	0.95 (30)	0.72 (43)	0.25 (66)	0.38 (67)	0.29 (50)	0.49 (39)	2.91 (22)	4.23 (17)	1.02 (47)	0.47 (78)
South Korea	0.37 (82)	0.30 (78)	1.40 (2)	1.48 (6)	1.70 (36)	0.51 (59)	0.13 (73)	0.38 (42)	0.40 (58)	0.72 (42)	0.91 (55)	0.72 (58)
Spain	1.38 (43)	2.12 (27)	0.93 (32)	0.98 (23)	1.43 (41)	0.29 (73)	0.67 (24)	0.88 (18)	0.27 (66)	0.63 (50)	1.53 (24)	1.01 (44)
Sweden	0.80 (66)	0.93 (60)	1.17 (16)	0.91 (30)	0.19 (68)	0.49 (60)	1.01 (11)	1.21 (12)	0.36 (61)	0.66 (45)	0.85 (62)	1.28 (29)
Switzerland	0.27 (84)	0.30 (79)	1.02 (27)	0.93 (27)	0.83 (46)	0.26 (75)	1.59 (6)	1.83 (5)	0.25 (71)	0.20 (77)	1.10 (41)	1.19 (37)
Taiwan	0.52 (78)	0.24 (84)	1.41 (1)	1.57 (5)	1.33 (42)	0.81 (51)	0.43 (37)	0.58 (32)	0.28 (65)	0.36 (64)	0.64 (76)	0.49 (76)
Tanzania	5.49 (4)	2.15 (26)	0.10 (89)	0.88 (33)	0.05 (79)	2.29 (31)	0.19 (64)	0.10 (73)	0.05 (88)	0.23 (73)	2.81 (5)	1.79 (15)
Thailand	2.35 (25)	2.33 (25)	1.03 (25)	1.28 (16)	1.79 (35)	1.36 (37)	0.21 (61)	0.27 (49)	0.16 (81)	0.47 (54)	1.16 (39)	0.61 (68)
Turkey	1.39 (42)	1.53 (40)	0.73 (47)	1.33 (11)	6.40 (20)	0.17 (80)	0.27 (53)	0.19 (56)	0.39 (59)	0.66 (47)	2.07 (11)	0.88 (51)
UAE	0.58 (75)	0.52 (71)	0.49 (59)	0.58 (55)	0.00 (86)	0.00 (92)	0.63 (25)	0.25 (52)	8.96 (8)	5.43 (14)	0.29 (89)	1.01 (46)
UK	0.52 (77)	0.49 (72)	0.82 (42)	0.63 (51)	0.25 (65)	0.16 (82)	2.29 (4)	1.23 (11)	0.43 (55)	0.66 (48)	1.01 (49)	2.16 (8)
Ukraine	2.08 (30)	4.26 (9)	1.02 (26)	0.52 (60)	0.03 (82)	8.35 (15)	0.10 (81)	0.04 (86)	1.67 (30)	0.89 (35)	0.98 (51)	1.00 (47)
Uruguay	4.00 (13)	7.39 (5)	0.39 (62)	0.22 (77)	1.01 (43)	0.43 (64)	0.76 (17)	0.37 (44)	0.15 (83)	0.12 (83)	2.02 (12)	1.68 (16)
US	1.03 (58)	0.86 (63)	0.85 (41)	0.64 (49)	0.17 (70)	0.10 (84)	1.54 (7)	2.09 (4)	0.41 (57)	0.81 (39)	1.29 (31)	1.26 (30)
Venezuela	0.32 (83)	0.07 (90)	0.22 (74)	0.12 (84)	0.01 (85)	2.09 (34)	0.62 (27)	0.65 (28)	11.18 (6)	7.79 (4)	0.44 (85)	0.70 (62)
Vietnam	3.14 (18)	1.46 (44)	0.61 (54)	1.67 (1)	7.71 (17)	2.49 (30)	0.08 (83)	0.03 (88)	2.22 (24)	0.22 (74)	1.02 (48)	0.11 (93)

Source: Data from WTO Stats, IMF, and national institutes of statistics. Author's calculations, SG Economic and Sector Studies. Rankings for each year are indicated in brackets (1: highest relative RCA; 93: lowest relative RCA)

B. Market shares per sector, selected countries – 1995 and 2020

	Agriculture		Manufactures		Remittances		Primary Income		Fuels & mining		Services	
	1995	2020	1995	2020	1995	2020	1995	2020	1995	2020	1995	2020
Albania	0.01% (90)	0.02% (88)	0.00% (82)	0.01% (80)	0.47% (42)	0.25% (51)	0.00% (85)	0.00% (85)	0.01% (83)	0.02% (81)	0.01% (91)	0.05% (81)
Algeria	0.02% (85)	0.02% (87)	0.01% (79)	0.01% (82)	1.23% (27)	0.29% (49)	0.01% (75)	0.02% (67)	2.20% (17)	0.89% (30)	0.06% (73)	0.06% (77)
Argentina	1.99% (16)	2.06% (17)	0.18% (41)	0.06% (62)	0.07% (68)	0.11% (71)	0.44% (24)	0.10% (48)	0.56% (37)	0.07% (70)	0.31% (44)	0.19% (53)
Armenia	0.01% (91)	0.04% (83)	0.00% (85)	0.00% (87)	0.08% (67)	0.22% (55)	0.00% (93)	0.00% (89)	0.01% (76)	0.04% (73)	0.00% (92)	0.02% (88)
Australia	2.59% (12)	1.79% (18)	0.37% (34)	0.21% (44)	0.48% (41)	0.20% (56)	0.57% (19)	1.08% (18)	4.30% (6)	7.70% (4)	1.34% (18)	0.98% (25)
Austria	0.83% (27)	1.04% (27)	1.31% (20)	1.11% (25)	1.12% (29)	0.51% (40)	0.91% (17)	0.47% (27)	0.31% (47)	0.40% (44)	1.98% (15)	1.28% (23)
Azerbaijan	0.01% (87)	0.05% (82)	0.00% (83)	0.00% (88)	0.00% (81)	0.24% (53)	0.00% (89)	0.04% (55)	0.10% (66)	0.55% (37)	0.01% (87)	0.05% (79)
Bahrain	0.02% (86)	0.03% (84)	0.02% (74)	0.03% (72)	0.00% (86)	0.00% (92)	0.42% (26)	0.00% (93)	0.75% (31)	0.43% (41)	0.06% (72)	0.23% (50)
Bangladesh	0.08% (77)	0.07% (77)	0.08% (56)	0.26% (43)	1.32% (24)	3.66% (7)	0.03% (59)	0.00% (80)	0.00% (86)	0.01% (88)	0.06% (70)	0.12% (65)
Belarus	0.11% (64)	0.38% (48)	0.11% (50)	0.13% (50)	0.03% (72)	0.17% (60)	0.00% (92)	0.01% (79)	0.20% (55)	0.18% (57)	0.04% (81)	0.17% (55)
Belgium	3.81% (6)	2.87% (10)	3.51% (8)	2.60% (11)	5.44% (3)	2.14% (14)	2.90% (10)	1.35% (16)	1.34% (23)	1.88% (16)	2.88% (9)	2.40% (11)
Belize	0.02% (84)	0.01% (90)	0.00% (92)	0.00% (93)	0.02% (76)	0.02% (88)	0.00% (91)	0.00% (92)	0.00% (90)	0.00% (93)	0.01% (88)	0.01% (93)
Bolivia	0.06% (81)	0.08% (76)	0.01% (80)	0.00% (89)	0.01% (80)	0.19% (58)	0.00% (87)	0.00% (86)	0.12% (62)	0.18% (58)	0.02% (86)	0.01% (92)
Brazil	2.75% (10)	5.32% (3)	0.64% (26)	0.42% (35)	3.25% (12)	0.60% (35)	0.35% (28)	0.50% (26)	1.17% (24)	2.67% (10)	0.50% (36)	0.56% (33)
Bulgaria	0.23% (51)	0.32% (55)	0.08% (54)	0.15% (47)	0.00% (86)	0.16% (61)	0.02% (66)	0.04% (54)	0.18% (57)	0.28% (47)	0.12% (61)	0.16% (58)
Canada	5.66% (5)	3.99% (7)	3.08% (11)	1.46% (20)	0.54% (40)	0.14% (62)	1.94% (13)	2.43% (13)	6.79% (3)	4.51% (6)	2.12% (14)	1.85% (14)
Chile	1.04% (25)	1.23% (25)	0.05% (60)	0.07% (61)	0.01% (78)	0.01% (90)	0.09% (48)	0.23% (38)	1.69% (20)	1.93% (14)	0.27% (47)	0.12% (64)
China	2.63% (11)	4.46% (5)	3.25% (9)	19.35% (1)	0.39% (45)	3.18% (10)	0.53% (20)	5.76% (5)	1.89% (18)	2.79% (9)	1.55% (17)	5.53% (4)
Colombia	0.65% (34)	0.45% (45)	0.09% (52)	0.06% (65)	0.90% (31)	1.17% (25)	0.07% (50)	0.11% (47)	0.64% (33)	0.61% (34)	0.14% (56)	0.12% (66)
Costa Rica	0.32% (46)	0.27% (59)	0.04% (63)	0.05% (66)	0.14% (59)	0.09% (76)	0.01% (68)	0.01% (77)	0.01% (78)	0.01% (84)	0.08% (66)	0.16% (59)
Croatia	0.12% (60)	0.20% (65)	0.09% (53)	0.09% (58)	0.60% (38)	0.71% (31)	0.02% (65)	0.03% (63)	0.11% (63)	0.10% (64)	0.20% (49)	0.20% (52)
Cyprus	0.11% (65)	0.03% (85)	0.01% (76)	0.01% (78)	0.05% (70)	0.09% (75)	0.04% (54)	0.45% (28)	0.01% (75)	0.03% (79)	0.27% (46)	0.30% (44)
Czech R.	0.36% (45)	0.66% (37)	0.46% (30)	1.39% (21)	0.21% (52)	0.71% (32)	0.10% (46)	0.17% (43)	0.34% (45)	0.22% (53)	0.55% (35)	0.51% (35)
Denmark	2.48% (13)	1.31% (23)	0.83% (24)	0.63% (30)	0.58% (39)	0.25% (50)	2.85% (12)	0.71% (23)	0.26% (48)	0.21% (54)	1.13% (23)	1.50% (19)
Dominican R.	0.09% (73)	0.13% (73)	0.08% (55)	0.04% (69)	0.92% (30)	1.40% (19)	0.01% (73)	0.01% (75)	0.00% (88)	0.02% (82)	0.16% (54)	0.09% (71)
Ecuador	0.42% (43)	0.72% (34)	0.01% (78)	0.01% (84)	0.43% (43)	0.56% (36)	0.01% (72)	0.00% (88)	0.35% (44)	0.27% (48)	0.06% (68)	0.04% (86)
Egypt	0.10% (70)	0.30% (58)	0.04% (65)	0.10% (55)	3.55% (11)	4.99% (4)	0.16% (36)	0.01% (71)	0.34% (46)	0.26% (50)	0.70% (30)	0.30% (45)
El Salvador	0.10% (68)	0.06% (78)	0.03% (67)	0.03% (73)	1.17% (28)	1.00% (28)	0.01% (69)	0.00% (82)	0.01% (84)	0.01% (83)	0.03% (82)	0.04% (84)
Estonia	0.08% (75)	0.15% (70)	0.03% (66)	0.09% (57)	0.00% (83)	0.09% (77)	0.01% (76)	0.03% (59)	0.04% (71)	0.10% (65)	0.07% (67)	0.13% (63)
Ethiopia	0.06% (80)	0.15% (69)	0.00% (91)	0.00% (91)	0.03% (73)	0.07% (80)	0.00% (82)	0.00% (91)	0.00% (87)	0.00% (92)	0.03% (83)	0.09% (72)
Finland	0.76% (32)	0.37% (50)	0.88% (22)	0.39% (37)	0.08% (66)	0.14% (63)	0.29% (30)	0.53% (25)	0.26% (49)	0.43% (43)	0.58% (33)	0.58% (32)
France	7.94% (2)	4.20% (6)	6.29% (4)	3.07% (9)	4.88% (5)	4.23% (6)	4.34% (6)	3.51% (10)	1.79% (19)	0.92% (29)	6.83% (2)	5.02% (6)
Georgia	0.01% (88)	0.05% (80)	0.00% (87)	0.01% (83)	0.31% (47)	0.36% (47)	0.00% (90)	0.01% (74)	0.01% (77)	0.04% (75)	0.02% (85)	0.03% (87)
Germany	5.67% (4)	5.31% (4)	11.79% (1)	9.54% (2)	4.96% (4)	3.26% (8)	8.96% (4)	5.39% (6)	2.44% (14)	3.05% (8)	6.69% (3)	6.12% (3)
Greece	0.65% (35)	0.48% (44)	0.15% (48)	0.12% (52)	3.62% (9)	0.10% (72)	0.10% (45)	0.17% (42)	0.20% (54)	0.49% (39)	1.03% (25)	0.51% (36)
Guatemala	0.24% (50)	0.36% (52)	0.01% (75)	0.04% (70)	0.39% (44)	1.92% (16)	0.00% (88)	0.02% (65)	0.01% (79)	0.02% (80)	0.05% (74)	0.05% (80)
Honduras	0.10% (66)	0.16% (68)	0.00% (90)	0.03% (71)	0.14% (58)	0.94% (29)	0.00% (86)	0.00% (84)	0.00% (93)	0.01% (85)	0.02% (84)	0.04% (85)
Hong Kong	1.31% (20)	0.49% (43)	4.18% (7)	3.91% (5)	0.17% (55)	0.07% (79)	4.68% (5)	4.96% (7)	1.03% (27)	0.39% (45)	2.66% (11)	1.32% (21)
Hungary	0.54% (37)	0.63% (38)	0.23% (39)	0.83% (29)	0.15% (56)	0.64% (34)	0.08% (49)	0.36% (31)	0.23% (50)	0.20% (55)	0.42% (38)	0.43% (39)
India	1.11% (23)	2.22% (15)	0.60% (27)	1.56% (19)	6.85% (1)	14.00% (1)	0.14% (40)	0.42% (29)	0.37% (43)	1.85% (17)	0.55% (34)	4.00% (9)
Indonesia	1.44% (19)	2.67% (11)	0.60% (28)	0.61% (32)	0.72% (36)	1.63% (18)	0.13% (41)	0.12% (46)	3.20% (9)	1.58% (20)	0.44% (37)	0.30% (46)
Iran	0.19% (55)	0.36% (53)	0.04% (64)	0.12% (53)	1.76% (21)	0.22% (54)	0.03% (57)	0.01% (73)	3.37% (8)	0.43% (42)	0.05% (77)	0.09% (70)
Iraq	0.00% (93)	0.00% (91)	0.00% (93)	0.00% (92)	0.00% (86)	0.11% (69)	0.01% (71)	0.02% (64)	0.10% (64)	1.89% (15)	0.41% (40)	0.07% (74)
Ireland	1.61% (17)	0.89% (29)	0.86% (23)	1.29% (24)	0.38% (46)	0.05% (86)	0.52% (21)	2.73% (11)	0.09% (67)	0.09% (66)	0.41% (39)	5.49% (5)
Israel	0.24% (49)	0.13% (74)	0.44% (31)	0.36% (39)	0.20% (53)	0.19% (57)	0.15% (39)	0.28% (33)	0.06% (70)	0.09% (67)	0.65% (32)	1.06% (24)
Italy	2.97% (8)	3.09% (9)	5.40% (5)	3.18% (8)	2.51% (15)	1.64% (17)	3.29% (8)	1.62% (14)	0.86% (28)	1.08% (28)	4.86% (6)	1.69% (17)
Japan	0.82% (28)	0.66% (36)	10.97% (3)	4.41% (4)	1.27% (26)	0.82% (30)	11.68% (3)	6.91% (4)	1.61% (21)	1.26% (26)	5.30% (5)	3.19% (10)
Kazakhstan	0.12% (62)	0.19% (66)	0.05% (59)	0.06% (63)	0.13% (60)	0.06% (81)	0.00% (81)	0.05% (52)	0.58% (34)	1.62% (19)	0.05% (76)	0.10% (68)
Kenya	0.20% (54)	0.21% (64)	0.01% (77)	0.01% (81)	0.10% (63)	0.52% (38)	0.01% (77)	0.00% (83)	0.04% (72)	0.03% (77)	0.13% (58)	0.07% (75)
Latvia	0.09% (74)	0.31% (57)	0.02% (71)	0.08% (60)	0.00% (86)	0.18% (59)	0.01% (67)	0.03% (60)	0.01% (82)	0.04% (76)	0.06% (69)	0.10% (69)
Lithuania	0.12% (61)	0.44% (46)	0.04% (62)	0.18% (45)	0.00% (84)	0.13% (66)	0.01% (78)	0.03% (62)	0.10% (65)	0.14% (62)	0.04% (80)	0.24% (48)
Luxembourg	0.12% (63)	0.09% (75)	0.18% (43)	0.09% (56)	0.80% (32)	0.37% (46)	2.90% (11)	7.85% (2)	0.03% (73)	0.03% (78)	2.88% (9)	2.39% (12)
Malaysia	2.03% (15)	1.56% (22)	1.43% (19)	1.37% (22)	0.13% (61)	0.24% (52)	0.26% (32)	0.28% (32)	1.38% (22)	1.58% (21)	0.94% (26)	0.43% (38)
Malta	0.01% (89)	0.02% (89)	0.05% (61)	0.02% (77)	0.02% (75)	0.05% (84)	0.03% (58)	0.26% (35)	0.01% (80)	0.00% (89)	0.09% (65)	0.32% (42)
Mexico	1.26% (21)	2.27% (14)	1.60% (18)	2.64% (10)	4.81% (6)	7.22% (2)	0.31% (29)	0.18% (41)	2.35% (15)	1.27% (25)	0.79% (29)	0.34% (41)
Morocco	0.29% (48)	0.37% (51)	0.06% (58)	0.15% (48)	2.17% (17)	1.25% (24)	0.03% (60)	0.02% (66)	0.15% (61)	0.07% (69)	0.18% (51)	0.27% (47)
Netherlands	7.48% (3)	6.40% (2)	3.11% (10)	3.82% (6)	0.73% (35)	0.40% (45)	3.58% (7)	7.10% (3)	2.67% (12)	3.62% (7)	3.92% (7)	4.42% (7)
New Zealand	1.46% (18)	1.67% (21)	0.11% (49)	0.06% (64)	1.82% (20)	0.02% (87)	0.09% (47)	0.14% (45)	0.20% (56)	0.05% (72)	0.36% (43)	0.23% (49)
Nicaragua	0.06% (79)	0.14% (71)	0.00% (86)	0.01% (79)	0.08% (65)	0.31% (48)	0.00% (88)	0.00% (90)	0.00% (89)	0.00% (90)	0.01% (89)	0.02% (89)
Nigeria	0.03% (83)	0.06% (79)	0.00% (88)	0.02% (75)	0.28% (50)	2.90% (11)	0.00% (83)	0.03% (58)	2.71% (11)	1.42% (24)	0.05% (75)	0.08% (73)
Norway	0.72% (34)	0.74% (33)	0.36% (36)	0.14% (49)	0.26% (51)	0.10% (73)	0.44% (23)	0.80% (22)	5.26% (5)	2.16% (12)	1.11% (24)	0.68% (29)
Oman	0.05% (82)	0.14% (72)	0.02% (69)	0.08% (59)	0.04% (71)	0.01% (91)	0.03% (56)	0.02% (68)	1.07% (26)	0.88% (31)	0.00% (93)	0.04% (82)
Pakistan	0.22% (52)	0.26% (60)	0.17% (44)	0.13% (51)	1.89% (18)	4.39% (5)	0.02% (64)	0.01% (78)	0.02% (74)	0.04% (74)	0.15% (55)	0.11% (67)
Panama	0.08% (78)	0.03% (86)	0.00% (84)	0.05% (68)	0.12% (62)	0.08% (78)	0.16% (37)	0.03% (57)	0.01% (85)	0.00% (91)	0.12% (59)	0.17% (57)
Paraguay	0.13% (59)	0.32% (54)	0.00% (81)	0.01% (86)	0.15% (57)	0.10% (74)	0.01% (70)	0.00% (81)	0.00% (91)	0.08% (68)	0.05% (78)	0.02% (90)
Peru	0.30% (47)	0.59% (39)	0.02% (72)	0.03% (74)	0.66% (37)	0.49% (43)	0.06% (51)	0.05% (53)	0.57% (35)	0.83% (32)	0.09% (64)	0.05% (78)
Philippines	0.43% (42)	0.38% (49)	0.36% (35)	0.41% (36)	5.90% (2)	5.88% (3)	0.12% (42)	0.08% (50)	0.23% (51)	0.22% (52)	0.38% (41)	0.63% (30)
Poland	0.53% (38)	2.33% (13)	0.42% (32)	1.73% (17)	0.80% (33)	1.13% (26)	0.11% (43)	0.24% (37)	0.79% (30)	0.56% (36)	0.87% (28)	1.30% (22)
Portugal	0.47% (41)	0.55% (41)	0.49% (29)	0.38% (38)	4.35% (7)	0.12% (67)	0.40% (27)	0.20% (39)	0.64% (32)	0.19% (56)	0.67% (31)	0.50% (37)
Qatar	0.00% (92)	0.00% (92)	0.02% (73)	0.05% (67)	0.00% (86)	0.11% (68)	0.05% (52)	0.26% (36)	0.64% (32)	1.98% (13)	0.01% (90)	0.38% (40)
Romania	0.14% (58)	0.50% (42)	0.16% (45)	0.46% (34)	0.01% (77)	1.28% (22)	0.01% (74)	0.08% (49)	0.20% (53)	0.16% (61)	0.12% (60)	0.53% (34)
Russia	0.76% (31)	2.08% (16)	0.76% (25)	0.57% (33)	0.18% (54)	1.67% (14)	0.42% (25)	1.03% (19)	9.32% (2)	7.79% (3)	0.88% (27)	0.96% (26)
Saudi Arabia	0.09% (72)	0.23% (63)	0.15% (47)	0.35% (40)	0.00% (86)	0.05% (83)	0.51% (22)	0.53% (24)	9.63% (1)	5.59% (5)	0.28% (45)	0.18% (54)
Serbia	0.10% (66)	0.25% (61)	0.02% (68)	0.11% (54)	0.00% (86)	0.65% (33)	0.04% (55)	0.01% (76)	0.07% (69)	0.07% (71)	0.06% (71)	0.14% (61)
Singapore	1.05% (24)	0.83% (30)	2.58% (14)	2.32% (13)	0.76% (34)	3.22% (9)	1.14% (16)	2.60% (12)	2.34% (16)	1.50% (23)	2.22% (12)	4.13% (8)
Slovakia	0.15% (57)	0.24% (62)	0.18% (42)	0.62% (31)	0.03% (74)	0.41% (44)	0.02% (62)	0.06% (51)	0.15% (60)	0.17% (60)	0.19% (50)	0.20% (51)
Slovenia	0.08% (75)	0.19% (67)	0.19% (40)	0.31% (41)	0.30% (48)	0.11% (70)	0.02% (63)	0.03% (61)	0.09% (68)	0.14% (63)	0.16% (53)	0.16% (60)
South Africa	0.42% (44)	0.67% (35)	0.35% (37)	0.26% (42)	0.09% (64)	0.14% (64)	0.11% (44)	0.18% (40)	1.07% (25)	1.53% (22)	0.38% (42)	0.17% (56)
South Korea	0.78% (30)	0.74% (32)	2.98% (12)	3.66% (7)	3.61% (10)	1.25% (23)	0.27% (31)	0.93% (21)	0.84% (29)	1.77% (18)	1.93% (16)	1.78% (16)
Spain	2.93% (9)	3.71% (8)	1.98% (15)	1.71% (18)	3.04% (13)	0.50% (41)	1.43% (15)	1.53% (15)	0.57% (36)	1.10% (27)	3.26% (8)	1.78% (15)
Sweden	1.19% (22)	0.98% (28)	1.74% (16)	0.96% (27)	0.28% (49)	0.52% (39)	1.51% (14)	1.27% (17)	0.54% (38)	0.70% (33)	1.27% (19)	1.35% (20)
Switzerland	0.53% (39)	0.57% (40)	1.98% (16)	1.81% (16)	1.62% (22)	0.50% (42)	3.09% (9)	3.54% (9)	0.48% (40)	0.38% (46)	2.15% (13)	2.30% (13)
Taiwan	0.99% (26)	0.40% (47)	2.69% (13)	2.58% (12)	2.55% (14)	1.34% (21)	0.83% (18)	0.96% (20)	0.53% (39)	0.60% (35)	1.22% (20)	0.81% (27)
Tanzania	0.09% (71)	0.05% (81)	0.00% (89)	0.02% (76)	0.00% (85)	0.05% (82)	0.00% (84)	0.00% (87)	0.00% (91)	0.01% (86)	0.05% (79)	0.04% (83)
Thailand	2.44% (14)	2.38% (12)	1.07% (21)	1.31% (23)	1.87% (19)	1.39% (20)	0.21% (33)	0.28% (34)	0.17% (58)	0.48% (40)	1.21% (21)	0.62% (31)
Turkey	0.80% (29)	1.21% (26)	0.42% (33)	1.05% (26)	3.66% (8)	0.13% (65)	0.15% (38)	0.15% (44)	0.23% (52)	0.52% (38)	1.19% (22)	0.70% (28)
UAE	0.19% (55)	0.80% (31)	0.16% (46)	0.88% (28)	0.00% (86)	0.00% (92)	0.20% (34)	0.37% (30)	2.88% (10)	8.28% (2)	0.09% (63)	1.54% (18)
UK	3.20% (7)	1.72% (19)	5.05% (6)	2.21% (14)	1.54% (23)	0.55% (37)	14.03% (2)	4.34% (8)	2.66% (13)	2.31% (11)	6.21% (4)	7.60% (2)
Ukraine	0.51% (40)	1.31% (24)	0.25% (38)	0.16% (46)	0.01% (79)	2.56% (13)	0.03% (61)	0.01% (72)	0.41% (41)	0.27% (45)	0.24% (48)	0.31% (43)
Uruguay	0.22% (53)	0.32% (56)	0.02% (70)	0.01% (85)	0.06% (69)	0.02% (89)	0.04% (53)	0.02% (69)	0.01% (81)	0.01% (87)	0.11% (62)	0.07% (76)
US	14.14% (1)	9.73% (1)	11.71% (2)	7.31% (3)	2.40% (16)	1.09% (27)	21.22% (1)	23.73% (1)	5.65% (4)	9.17% (1)	17.81% (1)	14.32% (1)
Venezuela	0.10% (69)	0.00% (93)	0.07% (57)	0.00% (90)	0.00% (82)	0.05% (85)	0.19% (35)	0.01% (70)	3.44% (7)	0.18% (59)	0.14% (57)	0.02% (91)
Vietnam	0.54% (36)	1.69% (20)	0.11% (51)	1.94% (15)	1.32% (25)	2.90% (12)	0.01% (69)	0.04% (56)	0.38% (42)	0.26% (51)	0.17% (52)	0.13% (62)

Source: Data from WTO Stats, IMF, and national institutes of statistics. Author's calculations, SG Economic and Sector Studies. Rankings for each year are indicated in brackets (1: highest relative market share; 93: lowest relative market share)

C. Hierarchical clustering: A six-group typology – 2020

Source: Trade data from WTO Stats and balance-of-payment data from IMF, SG Economic and Sector Studies

D. The multinomial logistic regression

The multinomial logit model of **Section 3** can be expressed as follows:

$$logit(p) = \log\left(\frac{p}{(1-p)}\right) = \beta_0 + \beta_1\text{CABV} + \beta_2\text{R\&D} + \beta_3\text{MFN} + \beta_4\text{MC}.$$

Here below one can find the summary statistics and the correlation matrix (**Table D1**), the goodness-of-fit, the null hypothesis test and the classification results (**Table D2**), to assess the overall quality of the model.

Table D1. Summary statistics (left) and correlation matrix (right)

Group & Denomination	Frequencies	%		Variables	CABV	R&D	MFN	MC
1. Fuels & mining-intensive	17	18.3		**CABV**	1	-0.256	0.075	0.018
2. Commodities-driven	8	8.6						
3. Remittances-driven	26	28.0		**R&D**	-0.256	1	-0.309	0.161
4. Diversified	18	19.4						
5. Post-Industrials	12	12.9		**MFN**	0.075	-0.309	1	-0.218
6. Manufacture-driven	12	12.9		**MC**	0.018	0.161	-0.218	1

Table D2. Goodness-of-fit (left), null hypothesis test, VIF, and the correctness ratio

Statistic	DF	Chi-square	Pr > Chi²
-2 Log(Likelihood)	20	118.0	< 0,0001***
Score	20	100.1	< 0,0001***
Wald	20	45.8	0.001***

Statistic	Independent	Full
Observations	93	93
Sum of weights	93	93
DF	92	68
-2 Log(Likelihood)	346	228
R²(McFadden)	0.000	0.34
R²(Cox and Snell)	0.000	0.72
R²(Nagelkerke)	0.000	0.74
AIC	356	278
SBC	369	341
Iterations	0	18

Statistic	CAB	R&D	MFN	MC
R²	0.07	0.16	0.12	0.06
Tolerance	0.93	0.84	0.88	0.94
VIF	1.07	1.19	1.14	1.06

from Group \ to Group	1	2	3	4	5	6	Total	% correct
1	9	1	2	3	2	0	17	52.9%
2	2	2	4	0	0	0	8	25.0%
3	0	6	18	2	0	0	26	69.2%
4	1	1	5	5	4	2	18	27.8%
5	0	0	0	3	7	2	12	58.3%
6	0	1	0	2	1	8	12	66.7%
Total	12	11	29	15	14	12	93	**50.0%**

P-value stars are as follows: p ≤ 0.1 (*), p ≤ 0.05 (**), p ≤ 0.01 (***).

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Overall significance of the regression. Logistic regressions do not have solid equivalents to the R^2 of linear (OLS) regressions and therefore the goodness of fit requires a more detailed interpretation. The Nagelkerke pseudo-R^2 is 0.74, the Cox and Snell pseudo-R^2 is 0.72, and the McFadden pseudo-R^2 is 0.34. The overall classification results indicate that the model accurately classified 47 (50%) of the 93 countries, also reflecting fair predictive quality. In the test of the null hypothesis, the most important value of interest here is the Chi^2, associated to the –2 log likelihood ratio. This value can be deemed close to the Fisher's test of OLS regressions and permits to evaluate if the predictors bring information that is statistically significant in explaining the variability of the dependent variable. The small p-value (<0.0001), evaluated at the usual cut-off α=0.90, indicates that at least one of the coefficients in the model is not equal to zero.

Absence of multicollinearity. With regards to multicollinearity, the reference standard error for detecting inflated standard errors of the logit coefficients (a warning signal for potential multicollinearity) is 2 units (see El-Habil, 2012). In the model, all the parameters are below the threshold suggesting there is not multicollinearity. Also, the correlation matrix shows all the coefficients are lower than 0.31 (or higher than -0.31), with cases of negligible correlation (less than 0.10, more than -0.10). The VIF (variance inflation factor) that does not detect multicollinearity either: even assuming the most conservative VIF threshold ($\geq$ 2.5), all the coefficients are positioned well below. The tolerance output suggests the same: it is always above 0.20, a threshold commonly seen in the literature.

Table D3. Type II Analysis

P-value stars are as follows: p ≤ 0.1 (*), p ≤ 0.05 (**), p ≤ 0.01 (***). Source: SG Economic and Sectoral Studies

Source	DF	Chi-square (Wald)	Pr > Wald	Chi-square (LR)	Pr > LR
CABV	5	9.0	0.104*	14.3	0.014**
R&D	5	18.4	0.001***	36.3	< 0,0001***
MFN	5	6.2	0.219	11.6	0.041**
MC	5	16.7	0.029**	22.7	0.000***

Explanatory power of variables. The Type II analysis provides with specific details regarding the contribution of the conditioning variables to the explanation of the outcome variable (**Table D3**). According to the probability associated with the two Chi^2 tests, the variables that strongly influence the in-group selection are "R&D expenditures" and "market capitalisation". Taking into consideration the Chi^2 (LR) test, all the variables, are to be found statistically significant at p-values less than 0.05 the least. The Wald Chi^2 test that will be at the centre of the interpretation section of this contribution individuates R&D has having the strongest influence relatively to the other variables, followed by MC and CABV. It is interesting, at this point, to depart

from this collective testing of the variables to evaluate their influence on each of the groups *relatively to the control category*.

Sensitivity of explanatory variables. The coefficients for the intercept and the five explanatory variables with their standard errors are presented in **Table D4**. These coefficients represent the relative log-odds, which are the natural logs of the ratio between the probability of one of the four categories and the probability of the control group. Moving towards the right side of the figure, the Wald Chi^2 test appears again, which tests the null hypothesis that the estimate is equal to zero, calculated as the ratio of the coefficient to its standard error, and then squared. It is followed by its respective probability (p-value). To quickly retrieve the statistically significant coefficients paired to the predictors, stars have been indicated next to their values. Next to the p-values, the Wald lower and upper bounds indicate, as it was the case for the known confidence interval (C.I.) at 90%, the range where the actual parameter may lie: if it contains zero, it is not possible to reject the null hypothesis that the coefficient is zero. Finally, the odds ratio – which corresponds to the coefficients exponentiated – is the relative measure of odds as seen before: it indicates the probability of countries falling in their comparison group versus the probability of countries falling in the control group for the variable considered. A good rule of thumb is that for an odds ratio above 1, the intervention outcome is more likely (increased occurrence of an event); on the contrary, with an odds ratio below 1, it is the referent (or control) outcome that becomes more probable (decreased occurrence of an intervention). The p-value that was associated to the Wald Chi^2 test is also relevant for evaluating the significance of the odds ratios. These are once more accompanied by their respective lower and upper bounds.

Table D4. Multinomial Logit Estimates of Specialisation groups and Macro predictors

Dependent Variable: *specialisation group*
Control Variable: *Post-Industrials (group = 5)*

Specialisation group	Macro predictors	Coefficient	Wald Chi²	Pr > Chi²	Wald L.B. (90%)	Wald U.B. (90%)	Odds ratio	Odds ratio L.B. (90%)	Odds ratio U.B. (90%)
Fuels & mining-intensive (*group* = 1)	CABV	0.584* (0.309)	3.565	0.059	0.075	1.093	1.794	1.078	2.984
	R&D	-0.954* (0.557)	2.935	0.087	-1.871	-0.038	0.385	0.154	0.963
	MFN	0.523** (0.253)	4.290	0.038	0.108	0.939	1.687	1.114	2.557
	MC	-0.001 (0.002)	0.231	0.631	-0.004	0.002	0.999	0.996	1.002
	Constant	-3.080 (1.795)	2.945	0.086	-6.032	-0.128			
Commodities-driven (*group* = 2)	CABV	0.282 (0.317)	0.788	0.375	-0.240	0.803	1.325	0.787	2.233
	R&D	-1.476** (0.731)	4.075	0.044	-2.678	-0.273	0.229	0.069	0.761
	MFN	0.583** (0.251)	5.378	0.020	0.169	0.997	1.791	1.185	2.709
	MC	-0.006 (0.006)	0.976	0.323	-0.017	0.004	0.994	0.983	1.004
	Constant	-1.365 (1.780)	0.588	0.443	-4.292	1.563			
Remittances-driven (*group* = 3)	CABV	0.186 (0.332)	0.315	0.575	-0.360	0.733	1.205	0.698	2.081
	R&D	-2.661** (1.046)	6.473	0.011	-4.381	-0.940	0.070	0.013	0.390
	MFN	0.536** (0.254)	4.473	0.034	0.119	0.954	1.710	1.127	2.595
	MC	-0.018 (0.013)	1.896	0.169	-0.039	0.003	0.983	0.962	1.003
	Constant	0.296 (1.824)	0.026	0.871	-2.704	3.295			
Diversified (*group* = 4)	CABV	0.224 (0.313)	0.511	0.475	-0.291	0.739	1.251	0.747	2.093
	R&D	0.503 (0.580)	0.752	0.386	-0.451	1.458	1.654	0.637	4.298
	MFN	0.447* (0.249)	3.218	0.073	0.037	0.856	1.563	1.038	2.354
	MC	-0.023** (0.009)	6.436	0.011	-0.038	-0.008	0.977	0.963	0.992
	Constant	-1.372 (1.662)	0.681	0.409	-4.106	1.362			
Manufacture-driven (*group* = 6)	CABV	-0.057 (0.009)	0.025	0.873	-0.646	0.532	0.944	0.524	1.703
	R&D	1.269** (0.610)	4.328	0.037	0.266	2.272	3.557	1.304	9.703
	MFN	0.435* (0.251)	2.991	0.084	0.021	0.849	1.545	1.022	2.336
	MC	-0.033*** (0.010)	10.072	0.002	-0.050	-0.016	0.968	0.951	0.984
	Constant	-1.282 (1.798)	0.509	0.476	-4.239	1.675			

E. A rank order test to assess rigidities in specialisations

The strong correlation in ranks seen in charts 10a/f can be also observed through a classical rank-order correlation Spearman's test (**Table E**). Here, the rigidity in rank orders is tested for market shares but also for RCAs. the null hypothesis of similar ranking cannot be rejected for any variable, suggesting a strong correlation of ranks. However, for cross-border capital income the degree of association of the rankings is lower, and much lower for remittances. The country order for RCA in services are also less rigid.

Table E. Spearman's Rank-Order Correlation coefficient and summary statistics

The Spearman's Rank-Order Correlation yields a rank correlation coefficient (ρ), with $-1 \leq \rho \leq 1$. The closer to one of the two tails, the more monotonic the relationship.

P-value stars are as follows: $p \leq 0.1$ (*), $p \leq 0.05$ (**), $p \leq 0.01$ (***).

1995 over 2020, ranking, n = 93 for each relationship; data with no tied ranks.

	Market shares			Revealed comparative advantages (RCAs)		
	Spearman's ρ	p-value	Monotonic relationship	Spearman's ρ	p-value	Monotonic relationship
Agriculture exports	0.931	< 0.000	Positive, very strong	0.833	< 0.000	Positive, very strong
Manufacture exports	0.929	< 0.000	Positive, very strong	0.754	< 0.000	Positive, strong
Remittances	0.609	0.002	Positive, strong	0.557	< 0.000	Positive, moderate
Cross-border capital income	0.806	< 0.000	Positive, very strong	0.579	< 0.000	Positive, moderate
Fuels & mining exports	0.892	< 0.000	Positive, very strong	0.826	< 0.000	Positive, very strong
Services exports	0.871	< 0.000	Positive, very strong	0.407	< 0.000	Positive, moderate

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