EXPLORING **ASEM SUSTAINABLE CONNECTIVITY**

What brings **Asia and Europe together?**

European Commission

Asia-Europe Meeting
ASEM12 - BRUSSELS 2018

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Exploring ASEM Sustainable Connectivity – What brings Asia and Europe together?
The present report was produced on the initiative of the European Union with the aim of providing a scientific-based contribution to the policy discussions on connectivity in the framework of the Asia-Europe Meeting (ASEM). The key findings are: i) connectivity can help to achieve the Sustainable Development Goals, but challenges lie ahead; ii) political and institutional links can make a significant and cost-efficient contribution to enhanced connectivity outcomes; iii) every country has something to offer and to learn from each other, and; iv) ties within ASEM are stronger than with the rest of the world, but opportunities exist to further strengthen Asia-Europe cooperation. The analyses in the report are complemented by the ASEM Sustainable Connectivity Portal, an interactive online tool for exploring connectivity links and sustainability performance in ASEM.

EXPLORING **ASEM SUSTAINABLE CONNECTIVITY**

What brings **Asia and Europe together?**

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FOREWORD

In recent years, connectivity has been a real focus of debate in Euro-Asian relations. It has been a central issue of the Asia-Europe Meeting (ASEM), which is a major platform for dialogue and cooperation between Europe and Asia.

At the Foreign Ministers' Meeting in November 2017, 53 ASEM partners came together and agreed on a formal definition of connectivity within the ASEM framework. This definition now guides ASEM's work. Connectivity, all partners agreed, is fundamentally about bringing countries, people and societies closer together. It facilitates access and is a means to foster deeper economic and people-to-people ties. By the same token, we need to ensure that relevant international norms and standards are upheld and that projects are both environmentally and financially sustainable.

The EU will host the ASEM12 Summit in Brussels on 18-19 October and connectivity will feature prominently on the agenda. As an important and concrete contribution to the ASEM12 Summit, the Joint Research Centre (JRC) of the European Commission set out to develop the ASEM Sustainable Connectivity Portal and accompanying report.

In today's world, we have access to many sources of information that are often dispersed across multiple platforms. Information is therefore often incomplete and sometimes contested, making it is easy to get lost. For sound policymaking, we need rigorous and reliable data. To address these challenges, the JRC created the ASEM Sustainable Connectivity Portal. Scientifically based, the portal is a crucial tool to guide debates and discussions with the aim of showing policymakers and the general public the ways in which Europe and Asia are already connected – and what kinds of benefits that brings. In line with the ASEM definition, the portal also analyses the link between connectivity and sustainability.

We are convinced that the online platform will be a much-appreciated contribution to the success of the ASEM12 Summit and will be used by all engaged in the field of connectivity: policymakers, business leaders, academics and the wider public. And we hope we can make this a genuine joint Europe-Asian effort as we move forward towards the next ASEM Summit and beyond.

Vladimír Šucha:
Director-General of the Joint Research Centre

Helga Maria Schmid:
Secretary General of the European External Action Service

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All errors and omissions remain the responsibility of the authors.

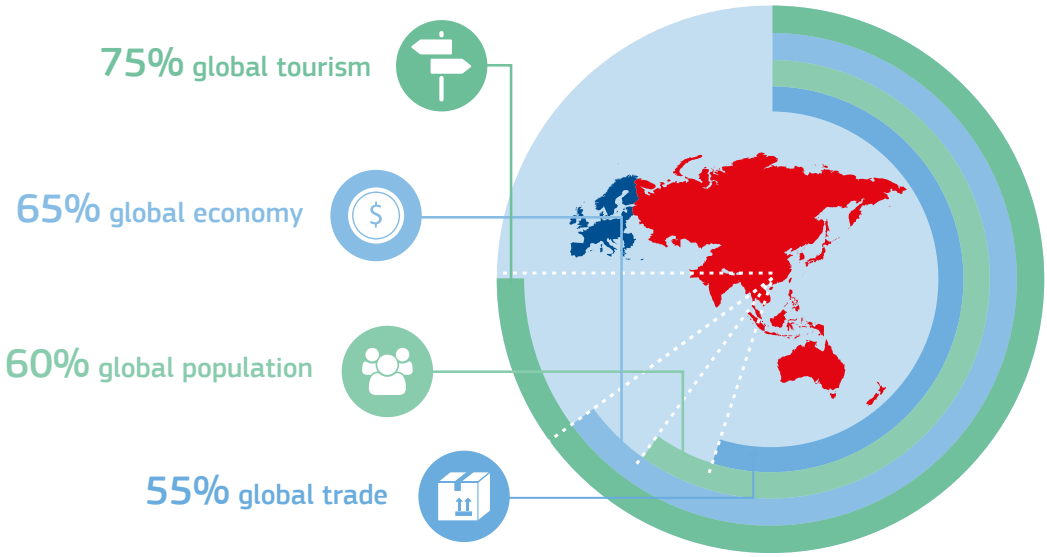
EXECUTIVE SUMMARY

The present work was produced on the initiative of the **European Union (EU) with the aim of providing a scientific-based contribution to the policy discussions in the framework of the Asia-Europe Meeting (ASEM) on connectivity**. In particular, this work is meant as a significant contribution from the EU to the 12th ASEM Summit, the biennial meeting of heads of state and government of the 53 ASEM partners that will take place in October 2018 in Brussels, Belgium.

This study presents an analysis of international sustainable connectivity between countries in the ASEM framework, to foster debate, identify areas for further cooperation, and enhance the visibility and strengths of ASEM. The analysis is built upon, and should be seen in tandem with, the **ASEM Sustainable Connectivity Portal**[1], which is a new interactive online tool accessing a wealth of connectivity-related data.

POLICY CONTEXT

The Asia-Europe Meeting was established in 1996 as an intergovernmental process to foster political dialogue and strengthen cooperation between Asia and Europe, and to tackle political, economic, social, cultural, and educational issues of common interest, on the basis of mutual respect and equal partnership. It currently comprises **51 partner countries** (30 European and 21 Asian countries) and two institutional partners: the European Union (EU) and the Association of Southeast Asia Nations (ASEAN) Secretariat, which **together represent around 55 % of global trade, 60 % of the global population, 65 % of the global economy and 75 % of global tourism**.



In recent years, within ASEM, **connectivity** has emerged as a **key area for cooperation**. The 11th ASEM Summit in Ulaanbaatar, Mongolia on 15-17 July 2016 outlined the decision "**to mainstream connectivity in all its dimensions, including political, economic, digital, institutional, socio-cultural and people-to-people, into all relevant ASEM activities**". Subsequently, the ASEM Pathfinder Group on Connectivity was established, which formulated a **definition of ASEM connectivity**, that includes, among others:

1 https://composite-indicators.jrc.ec.europa.eu/asem-sustainable-connectivity

- The economic, people-to-people, physical, institutional, social-cultural and political-security ties between Asia and Europe;
- All modes of transport, institutions, infrastructure, financial cooperation, information technologies (IT), digital links, energy, education and research, human resources development, tourism, cultural exchanges as well as customs, trade and investment facilitation;
- The notions of cooperation, inclusiveness, fairness, a level playing field, and mutual benefits;
- The contribution of connectivity to the materialisation of the goals of the 2030 Agenda for Sustainable Development.

ASEM SUSTAINABLE CONNECTIVITY APPROACH

The **multidimensional nature of ASEM Sustainable Connectivity** (Figure 1) means that it cannot be captured by a single indicator. Thus, the approach used here is to develop a framework of relevant indicators which can be combined into **composite indicators**—aggregations that make large and complex data set accessible by offering a 'big picture' overview. In addition, they serve as an access point to the underlying data, enabling users to drill down and explore the wealth of information presented in the indicator framework.

The indicator framework and underlying indicators are the result of a rigorous process involving an extensive literature review, two rounds of consultation in workshops with experts from countries across Europe and Asia, and a thorough statistical analysis.

The framework comprises a **total of 49 indicators grouped into two indexes**, one measuring purely cross-border **connectivity** via five pillars and the other measuring **sustainability** related to connectivity. The latter consists of three pillars which follow the so-called triple bottom line framework (environmental, social and economic domains) and build upon the Sustainable Development Goals (SDGs) and their direct links to connectivity. This arrangement allows for an exploration of how connectivity may impact sustainability, whether countries are successfully balancing connectivity with sustainability, and to guide discussions on how countries, and ASEM as a whole, may improve in either respect. Additional insights on ASEM connectivity are obtained through a detailed exploration of bilateral linkages between ASEM countries.

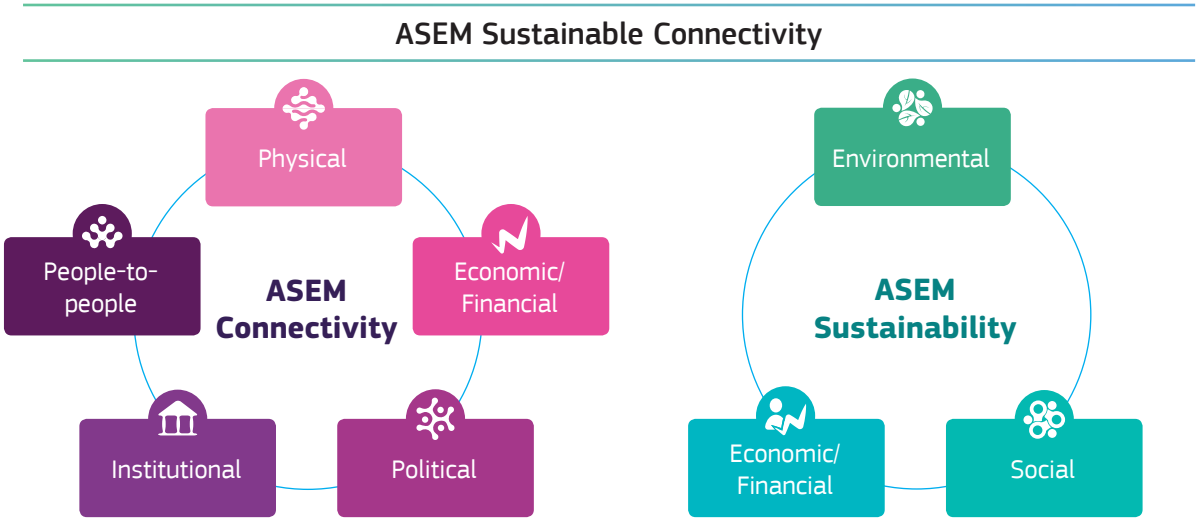


Figure 1. Multidimensional nature of ASEM Sustainable Connectivity

THE ASEM SUSTAINABLE CONNECTIVITY PORTAL

The findings in this report are supported by the **ASEM Sustainable Connectivity Portal**, an **interactive online tool** which contains a repository of data to help explore sustainable connectivity between ASEM countries. Among other features, the portal includes interactive connectivity maps and the ability to drill down from overall connectivity and sustainability scores into different aspects of connectivity and individual indicator values. It also features country profiles which detail the main findings for individual countries and enables users to draw inspiration for enhancing connectivity from countries in peer groups. The main objective is to provide a **one-stop shop on ASEM Sustainable Connectivity** for policymakers, researchers, businesses, citizens and other interest groups.

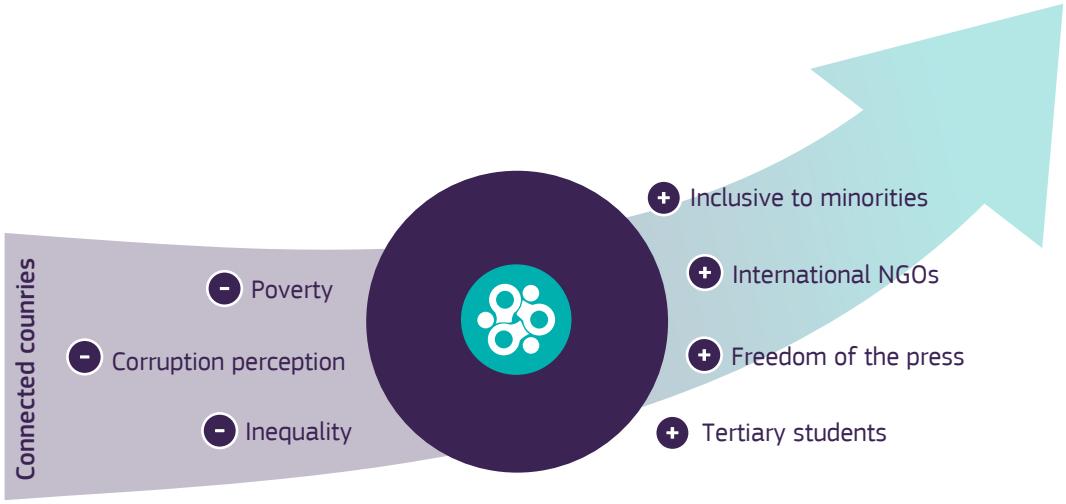
The ASEM Sustainable Connectivity Portal is intended to help ASEM partner countries to **identify tangible areas of cooperation** to strengthen connectivity between ASEM countries and in particular between Asia and Europe.

KEY FINDINGS

Connectivity can help to achieve the Sustainable Development Goals, but challenges lie ahead

Connectivity and sustainability have the potential to mutually reinforce each other: higher values of one are associated with higher values of the other. In particular, connectivity and the social pillar of sustainability have a strong positive association, thereby suggesting that better connected countries are associated with better performance in social sustainability and the related SDGs. Better connected countries have lower levels of poverty, less inequality, more students in tertiary education, more freedom of the press, are more inclusive to minorities, have a greater presence of non-governmental organisations (NGOs) and lower levels of corruption perception. On the other hand, there is no significant association between connectivity and environmental and economic/financial sustainability.

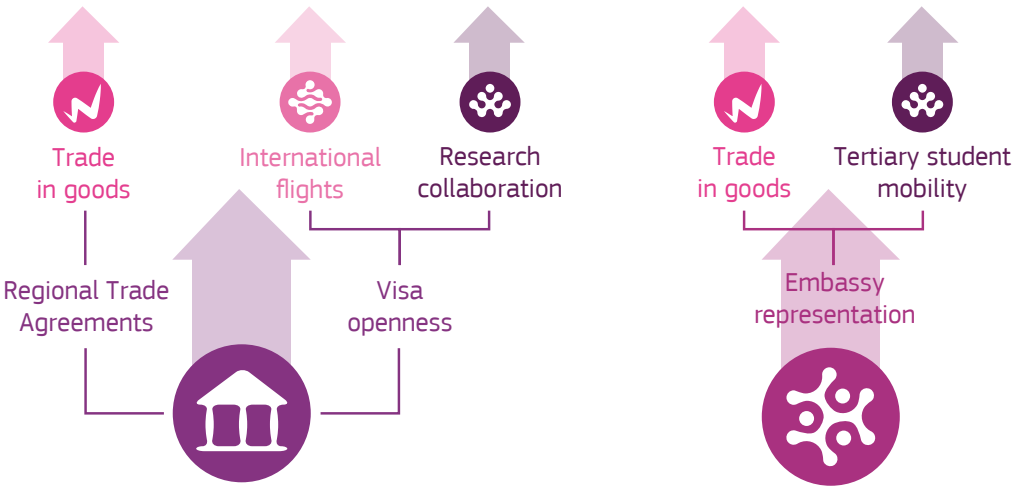
While connectivity is certainly a positive phenomenon overall, policymakers are faced with the challenge of how to improve connectivity and social sustainability without neglecting environmental and economic/financial sustainability. This could be an important topic for dialogue and exchange of ideas within ASEM.



Cost-effective connectivity through politics and institutions

The results show that extensive connectivity (measured in absolute terms) is strongly linked with GDP, and intensive connectivity (measured in relation to the country's size) with GDP per capita. Trade is strongly related to GDP, and the movement of people requires personal wealth, meaning that countries with lower income levels have fewer opportunities for mobility of people across borders. Despite these limitations, there is also encouraging evidence that strong institutional and political links have a big role in connectivity, and for the most part are not related to the size of a country's economy. For example, bilateral trade is not only positively associated with trade agreements, but also with embassy connections which, in turn, are associated with student mobility. And visa-free travel is associated with an increased volume of international flights and greater research collaboration.

The underlying message here is that institutional and political links, which are within the reach of policymakers, appear to be associated with greater tangible connectivity outcomes. Undoubtedly, this seems to be an opportunity for ASEM, which could step up its role as a platform for discussion and cooperation, for bridging the gaps, strengthening the links, sharing ideas, and learning from best practices.



Working together and learning from each other – everyone has something to offer

Connectivity does indeed bridge the gaps, and every country in ASEM has something to bring to the table. There are best practices in every ASEM country. To highlight just a few examples, large countries like China appear to be fully exploiting the potential of global shipping networks, while Germany offers the best performance in trade logistics. In relation to their respective GDP, small countries such as, for example, Cambodia, Mongolia, Myanmar and Vietnam, stand out as recipients of foreign direct investment (FDI). Norway and Switzerland are good examples of countries with a strong institutional framework. Singapore provides a visa policy which ensures that its citizens can travel to almost all ASEM countries. Countries like Laos, Brunei Darussalam and Mongolia have the lowest number of technical barriers to trade. And in terms of international mobility of tertiary students, the United Kingdom is one of the most popular destinations.

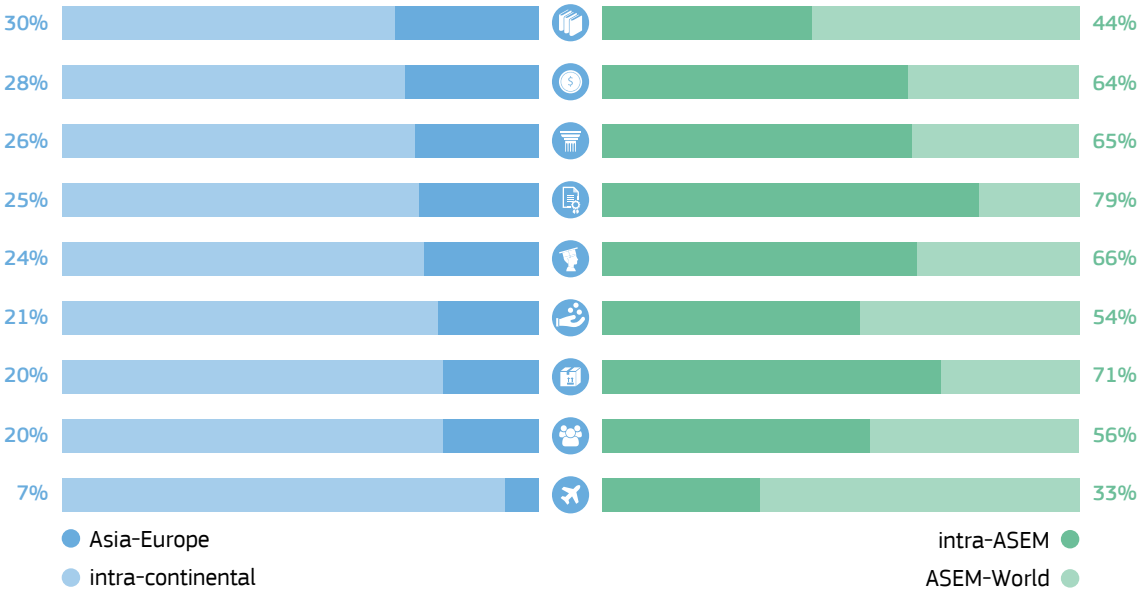
When shifting the focus towards sustainability, Croatia in Europe and Myanmar in Asia are among the most environmentally sustainable countries. Ireland sets an example for its inclusiveness towards minorities. Thailand is among the top countries in the fight against extreme poverty. Vietnam presents the lowest rates of youth who are neither in employment nor in education. And countries like Pakistan, Laos, Myanmar, Romania and Indonesia are among those with the lowest private debt.

From a broader regional perspective, success stories in Europe and Asia seem to be somewhat complementary. While European countries tend to do better in institutional connectivity, political connectivity and social sustainability pillars, policy success stories in Asian countries are generally found in the environmental and economic/financial sustainability pillars.

Ties within ASEM are stronger than with the rest of the world, but opportunities exist to further strengthen Asia-Europe cooperation

Cooperation between ASEM countries in different areas such as education, research, innovation, migration, economy and finance represents more than half of ASEM countries' international connections. Around 70% of the trade in goods of ASEM countries takes place with other ASEM members, over 60% of ASEM investors choose to invest in another ASEM country, over 60% of internationally mobile students in tertiary education move to another ASEM country, and 80% of international co-patents in ASEM result from collaborations between ASEM countries.

When turning to exchanges and cooperation between Asia and Europe, they represent on average around 20% of overall connections within the ASEM area. While this value is a genuinely positive outcome of Asia-Europe connectivity, it also gives an idea of the extent of the untapped potential for boosting tangible cooperation between the two regional blocs.



- Research outputs with international collaborations
- Foreign Direct Investment
- Trade of cultural goods
- Patents with foreign co-inventor
- International student mobility in tertiary education
- Personal remittances
- Trade of goods
- Migrant stock
- International direct flights passenger capacity

LOOKING AHEAD

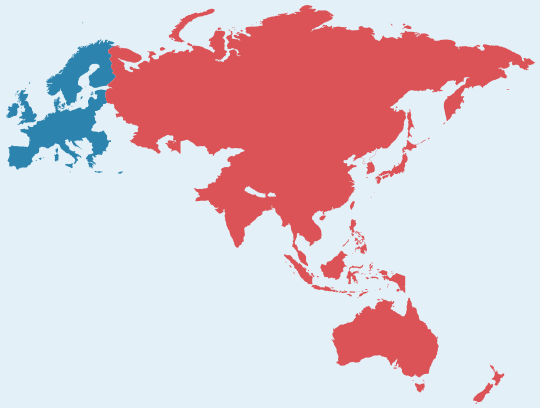
This first edition of the ASEM Sustainable Connectivity Portal is an initial attempt to define sound metrics to understand how ASEM countries are connected to each other and how ASEM connectivity can contribute to achieving the SDGs. It is intended to be an evolving effort based on ASEM community needs, expert feedback and greater data availability.

The ASEM Sustainable Connectivity Portal is expected to be updated at regular intervals, for both the existing indicators and the overall methodology. This will enable policymakers and other stakeholders to monitor progress over time and for the framework to evolve and improve based on the needs of ASEM.

1 INTRODUCTION

THE ASIA-EUROPE MEETING

The origins of the Asia-Europe Meeting (ASEM) process lie in the mutual recognition, in both Asia and Europe, that the relationship between the two regions needed to be strengthened to reflect the new global context of the 1990s and the new century's perspectives. In 1996, ASEM was established as an intergovernmental process to foster political dialogue and strengthen cooperation between Asia and Europe. It currently comprises **51 partner countries** (30 European and 21 Asian countries) and two institutional partners: the European Union (EU) and the Association of Southeast Asia Nations (ASEAN) Secretariat, which **together represent around 60% of global population, 55% of global trade, 65% of global economy and 75% of global tourism**.



European partners: Austria; Belgium; Bulgaria; Croatia; Cyprus; Czech Republic; Denmark; Estonia; Finland; France; Germany; Greece; Hungary; Ireland; Italy; Latvia; Lithuania; Luxembourg; Malta; Netherlands; Norway; Poland; Portugal; Romania; Slovakia; Slovenia; Spain; Sweden; Switzerland; United Kingdom.

Asian partners: Australia; Bangladesh; Brunei Darussalam; Cambodia; China; India; Indonesia; Japan; Kazakhstan; Korea; Lao PDR; Malaysia; Mongolia; Myanmar; New Zealand; Pakistan; Philippines; Russian Federation; Singapore; Thailand; Vietnam.

Figure 2. ASEM member countries

ASEM addresses political, economic, social, cultural and educational issues of common interest (Figure 3), on the basis of **mutual respect** and **equal partnership**. It aims to be a dialogue facilitator, a policymaking laboratory, and a process managing Asia-Europe relations. ASEM's added value lies in its flexibility and **informal policy-shaping discussions**.

Political	Economic and Financial	Social and Cultural
Discussing global issues, including the fight against terrorism, common responses to international security threats, managing migratory flows, human rights, welfare of women and children.	Promoting growth and employment, enhancing cooperation on global financial issues, dialogue in priority industrial sectors, fostering connectivity between the two regions.	Enhancing contacts and dialogue between the two regions on education, social protection and employment, and cooperation on the protection of cultural heritage.

Figure 3. ASEM key pillars (ASEM, 2018)

DEFINITION OF ASEM CONNECTIVITY

In recent years, within ASEM, **connectivity** has emerged as a **key area for cooperation**. At the 10th ASEM Summit held in Milan on 16-17 October 2014, it was agreed "to further study approaches for enhancing Europe-Asia connectivity in all relevant fields and to explore concrete steps, including the possible establishment of a working group on connectivity towards this end". The 11th ASEM Summit in Ulaanbaatar, Mongolia on 15-17 July 2016 outlined the decision "**to mainstream connectivity in all its dimensions, including political, economic, digital, institutional, socio-cultural and people-to-people, into all relevant ASEM activities**". The summit also included the decision to establish an ASEM Pathfinder Group on Connectivity (APGC), with the aim of exploring how ASEM could add value in the area of connectivity. The group prepared a definition of connectivity for the ASEM context (Box 1) which was endorsed by all ASEM partners in November 2017.

Box 1.

Definition of ASEM connectivity adopted by ASEM

Connectivity is about bringing countries, people and societies closer together. It facilitates access and is a means to foster deeper economic and people-to-people ties. It encompasses the hard and soft aspects, including the physical and institutional social-cultural linkages that are the fundamental supportive means to enhance the economic, political-security, and socio-cultural ties between Asia and Europe which also contribute to the narrowing of the varying levels of development and capacities.

Bearing in mind the Asia-Europe Cooperation Framework (AECF) 2000, ASEM connectivity aims to establish the sense of building ASEM partnership of shared interests. It upholds the spirit of peace, development, cooperation and mutual benefit. It will also adhere to and effectively implement relevant international norms and standards as mutually agreed by ASEM partners.

ASEM Connectivity covers all modes of transport (aviation, maritime, rail and road) and also includes, among others, institutions, infrastructure, financial cooperation, IT, digital links, energy, education and research, human resources development, tourism, cultural exchanges as well as customs, trade and investment facilitation.

ASEM connectivity covers all the three pillars of ASEM - economic, political and socio-cultural. It should be result-oriented, and in support of the following key principles: level playing field, free and open trade, market principles, multi-dimensionality, inclusiveness, fairness, openness, transparency, financial viability, cost-effectiveness and mutual benefits. It should also contribute to the materialisation of the principles, goals and targets of The 2030 Agenda for Sustainable Development. Sustainability is one of the important quality benchmarks for the connectivity initiatives in the ASEM context.

CONNECTIVITY INITIATIVES

Both Europe and Asia have a number of ongoing connectivity initiatives. Recently, a **mapping exercise of Euro-Asian connectivity** was carried out (European Commission, 2017a) which described existing policies, instruments and projects.

The **Global Strategy for the EU's Foreign and Security Policy** (European Union Global Strategy, 2016) proposes to strengthen Europe's relations with Asia, deepen economic diplomacy, and scale up the EU's security role in Asia. Connectivity is an important element among the European Commission's 10 political priorities. These include a connected Digital Single Market, an Energy Union, a Single Market, a trade policy to harness globalisation, and a European Agenda on Migration, among others (European Commission, 2017b). The **EU Strategy on Connecting Europe and Asia** is aiming to strengthen sustainable connectivity between the two continents. Connectivity can help countries meet the 2030 Agenda for Sustainable Development and its Sustainable Development Goals (SDGs) as well as the commitments of the Paris Agreement to combat climate change and adapt to its effects. Connectivity can also provide numerous opportunities for businesses and citizens (European Commission, 2018).

In Southeast Asia, the **ASEAN Master Plan for Connectivity**, first adopted in 2010 and updated in 2016, aims at enhancing ASEAN connectivity through improved physical, institutional and people-to-people linkages. The plan focuses on five strategic areas: sustainable infrastructure, digital innovation, seamless logistics, regulatory excellence, and people mobility (ASEAN Secretariat, 2016).

China's 'Belt and Road Initiative' (BRI) aims to propose full connectivity in policy coordination, facilities, unimpeded trade, financial integration and a people-to-people bond as its five cooperation priorities. The initiative covers almost all ASEM partners (Hongjian, 2016). Other examples of connectivity regional initiatives are **Japan's 'Free and Open Indo-Pacific Strategy'**, announced in 2016 (Thankachan, 2017) and **'India's Look East Policy'** (Haokip, 2014).

In 2016, the Economic Research Institute for ASEAN and East Asia (ERIA) carried out an extensive investigation to identify challenges and opportunities for improving ASEM connectivity (ERIA, 2016). The Asia-Europe Foundation (ASEF) Outlook Report 2016/2017 provides an exhaustive analysis of connectivity-related indicators as well as of different aspects of connectivity under five main areas: measurement, digital, economics, media and culture, and education. In fact, this report was the first to suggest the idea of developing an index to measure ASEM sustainable connectivity (ASEF, 2016).

THE GLOBAL AGENDA FOR SUSTAINABLE DEVELOPMENT

The concept of sustainable development dates back to the publication in 1987 of the Brundtland Commission Report, "Our Common Future", which defined the term as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs". Sustainable development is seen as "a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development and the institutional change are all in harmony and enhance both current and future potential to meet human needs and aspirations" (World Commission on Environment and Development, 1987).

In 2015, the United Nations (UN) adopted the 2030 Agenda for Sustainable Development with the 17 SDGs and 169 associated targets. All 193 UN member states have committed to achieve sustainable development across its three dimensions – **economic, social, and environmental** – in a **balanced and integrated manner**. They recognise that social and economic development depends on the sustainable management of natural resources. The SDGs are built on the Millennium Development Goals and seek to complete what they did not achieve. The SDGs are universal goals which involve the entire world, developed and developing countries alike (United Nations, 2015).

Both the SDGs and the 2015 Paris Agreement are examples of international cooperation in addressing global challenges. The Paris Agreement commits all signatories to a long-term target of keeping global temperature rise this century well below 2 degrees Celsius above pre-industrial levels (United Nations, 2016).

Connectivity, when supported by appropriate policies at the level of physical infrastructure, economic, political, institutional and social instruments, can be a powerful tool to work towards the achievement of SDGs.

OBJECTIVES

The EU developed the **ASEM Sustainable Connectivity Portal** as a tool **to support ASEM policy discussions on connectivity based on a scientifically and technically sound data framework**. Specifically, the European External Action Service (EEAS) commissioned the Joint Research Centre, the European Commission's science and knowledge service, to carry out this work as a key deliverable for the 12th ASEM Summit in Brussels in October 2018.

This work is built around the definition of connectivity agreed by the ASEM Pathfinder Group on Connectivity in November 2017 (see Box 1). It differs from other connectivity and globalisation indexes by focusing on the scope and intensity of connectivity within the ASEM regions and by bringing the sustainability component into the analysis of connectivity. This work followed four main objectives, as highlighted in Figure 4 below:

Measure	Debate	Communicate	Inspire
To provide a comprehensive and technically sound framework for measuring ASEM sustainable connectivity and to help monitor progress over time.	To support ASEM discussions on cross-border connectivity and its link to sustainable development, and to help underpin areas for cooperation and policy formulation.	To enhance the visibility of ASEM in its role as a platform for cooperation, networking and strategic dialogue between Asia and Europe.	To inspire further research in the still uncharted territory of ASEM sustainable connectivity.

Figure 4. Main objectives of the ASEM Sustainable Connectivity Portal

In addition, the work aims to be technically sound and impartial, using best practice from academic literature and reliable data sources, as well as being fully transparent. In view of the latter, the data and a complete description of the methodology can be found on the online ASEM Sustainable Connectivity Portal.

THE ASEM SUSTAINABLE CONNECTIVITY PORTAL

Complementary to this report, the **ASEM Sustainable Connectivity Portal**[2] offers an interactive online tool to explore sustainable connectivity between ASEM countries. The main objective is to provide a **one-stop shop on ASEM sustainable connectivity** for policymakers, researchers, businesses, citizens and other interest groups. The tool provides a set of features which enable users to discover in a user-friendly way the present situation regarding ASEM sustainable connectivity. The connectivity map allows them to explore the bilateral interdependencies between ASEM countries in over 15 indicators, understanding the strength of connections between countries and identifying which are ASEM's greatest connectivity links and bilateral corridors. The individual country profiles provide policymakers with a snapshot of each country, allowing them to carry out self-assessments in terms of the different areas addressed.

The ASEM Sustainable Connectivity Portal is intended to help ASEM partner countries to **identify tangible cooperation areas** to strengthen connectivity between ASEM countries and in particular between Asia and Europe.

This work is a first attempt to define metrics for ASEM sustainable connectivity. It is intended to be an evolving effort based on ASEM community needs and increased data availability. The ASEM Sustainable Connectivity Portal is also expected to have regular updates, subject to data availability, which will enable policymakers to monitor progress over time.

[2] https://composite-indicators.jrc.ec.europa.eu/asem-sustainable-connectivity

2 MEASURING ASEM SUSTAINABLE CONNECTIVITY

2.1 APPROACH

ASEM sustainable connectivity is a concept that is characterised by many different components (see Box 1). Given its multidimensional nature, it cannot be measured directly, or approximated by a single indicator. Thus, the approach used here is to construct a framework of relevant indicators which can be assembled into *composite indicators*: an aggregation of multiple indicators into a single number (see Box 2).

Composite indicators are very widely used in policymaking, advocacy and public debate. They make large and complex data sets accessible by summarising patterns across a number of indicators and by providing the 'big picture' overview (OECD/JRC, 2008). Composite indicators are easy to interpret and easy to communicate for the public. But a composite indicator alone does not tell the whole story. Instead, it serves as an entry point which encourages exploration of the underlying data. This is why, throughout this report, both aggregate pillars and indexes are discussed together with individual indicators to help the reader understand which elements of a country's system are driving sustainable connectivity. Specifically, a thorough analysis of bilateral links between countries is carried out in order to deepen the understanding of the state of connectivity in ASEM.

Box 2.
Composite indicators

Composite indicators are aggregations of observable variables which aim to quantify complex concepts that are not directly observable. The technical guidelines and statistical methods that can help compile individual indicators into conceptually sound and statistically robust measures are described in detail in the relevant literature (OECD/JRC 2008). The challenge is to make sure not to aggregate further than the data allow and to try to prevent any loss of information during the process. The resulting figures facilitate comparisons and benchmarking. They help to monitor progress over time and evaluate ex-ante policy options based on multi-criteria analysis.

Scoreboards of indicators have, to some extent, similar objectives to composite indicators, yet their final goal is not to reach a mathematical aggregation of data into a single number.

Given the aim of measuring connectivity, the data used to measure ASEM sustainable connectivity can be classified into two types: 1) country-level data, i.e. indicators where there is a single value for each country, such as 'average internet connection speed'; and 2) bilateral data, which has values for each country pair, such as the trade volume of goods between country a and country B. Both data sets complement each other in understanding ASEM sustainable connectivity. The former provides an overall picture at the country level, while the latter enables a detailed exploration of bilateral linkages between ASEM countries.

The overall development process is illustrated in Figure 5 and adopts the recommendations of the 'Handbook on Constructing Composite Indicators' (OECD/JRC, 2008), which is widely recognised as the standard reference on composite indicator construction. The results from each phase were used to refine the conceptual framework and the set of indicators in an iterative process.

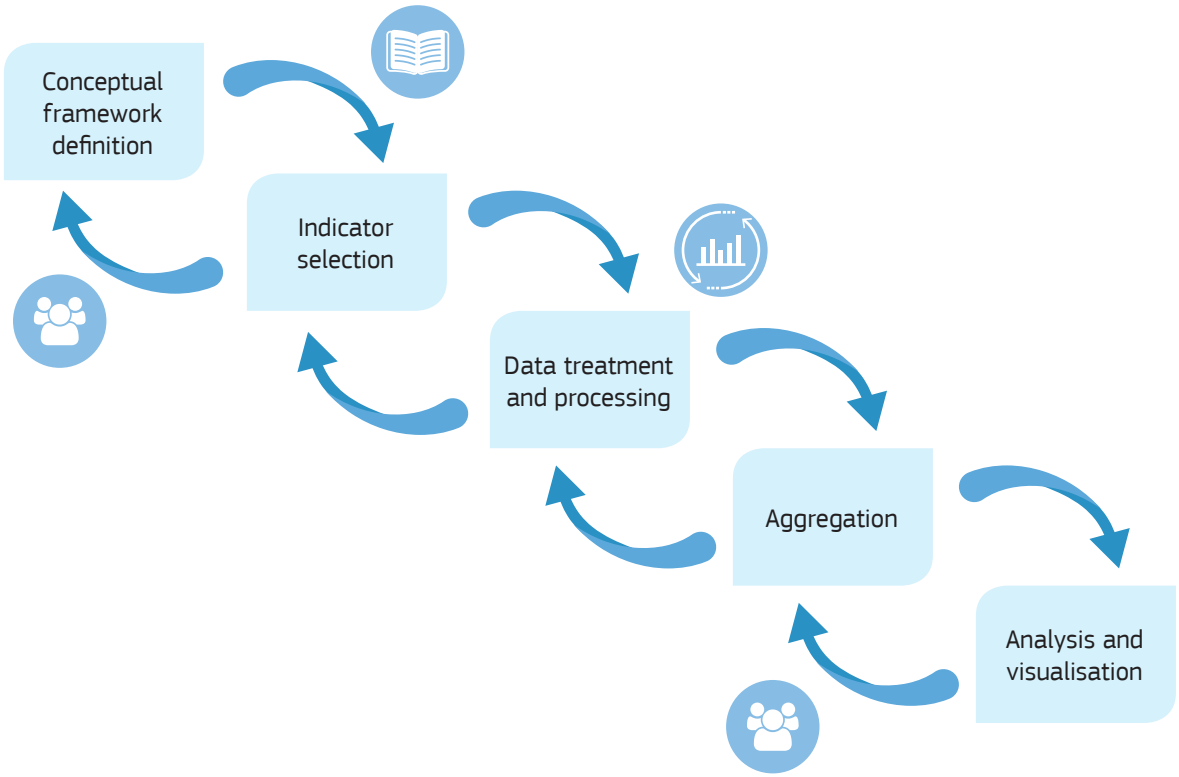


Figure 5. The ASEM sustainable connectivity development process

The basis for the indicator framework was to build a picture of the state of the art in measuring connectivity worldwide. An extensive literature review was performed which examined existing globalisation and connectivity indexes in order to understand which concepts, dimensions and indicators were relevant for ASEM sustainable connectivity. On examining the results, it became clear that the ASEM definition of sustainable connectivity was broader than the conceptual frameworks of existing indexes, which often tend to focus on economic links and information and communication technologies (ICT). As such, the initial literature review of 11 globalisation indices was extended to include 20 other 'thematic' indexes which do not aim to measure connectivity per se but focus on issues related to sustainability or components of connectivity. Drawing on these sources, and on original research, a first conceptual framework and selection of indicators (out of 200 related to connectivity and the list of 230 SDGs indicators) was prepared and submitted to the first expert consultation workshop which took place in Ispra, Italy on 9 March 2018. Feedback from this group of 19 experts (covering a wide range of fields relevant to sustainable connectivity and geographically balanced between Asia and Europe) was then taken into account in revamping the initial proposal for the conceptual framework.

Data treatment and processing refer to the use of statistical techniques. Following recommendations in the literature (OECD/JRC, 2008), the indicators included in the framework have been checked for the presence of outliers (i.e. extremely high or extremely low values) then normalised to render their values comparable. The "winsorisation" approach

(values distorting the indicators' distribution are assigned the next highest (lowest) value) has been used to treat the outliers. Once they have been treated, the resulting dataset has been normalised using linear min-max normalisation, which rescales variables on a range of 0-100. As a final step, the statistical coherence of the framework has been checked by analysing pairwise correlations across variables. Note that all the indicators included in the framework have also been selected based on data-availability criteria: a threshold of at least 80% data availability across ASEM countries was set at indicator level. Data coverage also reaches at least 80% at country level. Missing data have not been imputed.

The Connectivity and Sustainability Indexes are calculated by simply averaging the respective normalised indicators at pillar level and then averaging the pillars. This means that all components contribute the same weight to the overall score. The decision to use equal weighting both for the Connectivity and Sustainability Indexes was based on the results of an expert consultation workshop held in Brussels, Belgium on 10 July 2018. a group of nine experts was consulted on which weights to assign to the different pillars in the framework. On average, the final weights allocated by the experts were very close to an equal-weighting scheme, thereby supporting the idea that all the framework pillars should be placed on an equal footing.

Finally, a technique called the maximum likelihood approach or Kemeny median order (Kemeny, 1959) was used to analyse and compare how ASEM countries perform at the pillar level. The former approach is a multi-criteria non-compensatory technique that fully exploits the wealth of information in the bilateral comparisons of the eight pillar scores across countries. It is also considered in the relevant literature as the "best compromise" when it comes to ordering any given set of options (Munda 2007, OECD/JRC 2008). The Kemeny order can be used to provide insights into which policy areas (i.e. pillars) across ASEM countries offer a greater scope for improvement. This approach is used in section 3.5.

Box 3.

Correlation and causality

Throughout this study, correlations between indicators are frequently used to observe patterns and connections between different variables. *Correlation* is a statistical measure which measures the strength of the linear relationship between two variables. a high correlation value suggests that higher values of one variable are usually associated with higher values of the other, or vice versa. This implies that there is a relationship between the two variables.

It is important to be clear, however, that the existence of a relationship does not necessarily imply that one variable causes the other. Correlation may be evidence of such *causal links*, but it may also be due to the two variables causing or being caused by a third variable. Correlations may even arise by chance, even when there is no underlying relationship – these are known as *spurious correlations*.

In the analysis here, we strive not to overstep what may be concluded through correlations. Nevertheless, we take correlations to be hints that an underlying relationship may exist and leave a more detailed causal analysis for future work.

2.2 CONCEPTUAL FRAMEWORK

The conceptual framework is based on the ASEM connectivity definition. The difference between the ASEM connectivity definition with existing connectivity measures is that the former includes the notion of sustainability, specifically that connectivity "should contribute to the materialisation of the principles, goals and targets of the 2030 Agenda for Sustainable Development" and that "Sustainability is one of the important quality benchmarks for the connectivity initiatives in the ASEM context".

There were a number of conceivable approaches for measuring sustainable connectivity. One possibility was to only consider types of connectivity that are 'sustainable'. However, in practice, almost all types of connectivity can contribute to SDGs, on the one hand, but have negative impacts on the other. For example, international trade contributes to economic development but may have social and environmental costs. Movement of people promotes shared values and understanding, but results in greater emissions from air travel. The types of connectivity that are exclusively sustainable would be few in number. a second possibility was to try to measure connectivity in all its forms but then to quantify the positive and negative impacts of these links. Although this approach was appealing, quantifying the impacts of even one type of connectivity (e.g. international trade) is an extremely complex task, so to do this for all the types of connectivity considered here would not be feasible.

The final approach that has been adopted is closer to the second of these two options. It comprises two composite indicators: one which captures connectivity (of any type), and another which measures aspects of sustainability that may be related to connectivity:

- **Connectivity Index**: focuses exclusively on measuring connectivity and facilitators of connectivity. Connectivity is about the cross-border movements of goods and services as well as the exchanges between people in education, research, innovation, culture and tourism. The facilitators of connectivity refer to the policies, institutions, conventions and practices that enable connectivity across borders.

- **Sustainability Index**: focuses on the potential impacts of connectivity on domestic sustainability, focusing in particular on the SDGs linked to connectivity and to solving global problems. Indicators are organised along the three main pillars of sustainability following the *triple bottom line framework*.

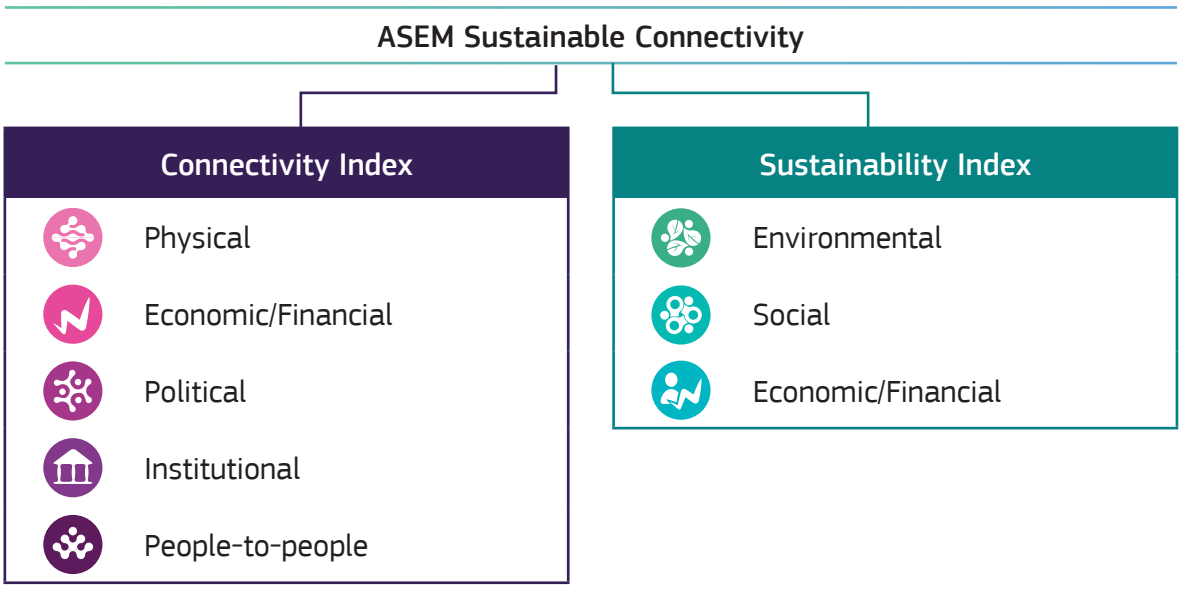


Figure 6. ASEM Sustainable Connectivity conceptual framework

This arrangement has the advantages of being able to assess at the country level how well connected a country is and the extent to which this may be reflected in relevant sustainability indicators. In other words, which countries are successfully balancing connectivity with sustainability, and to guide discussions on how countries, and the ASEM as a whole, may improve in either respect. Moreover, it allows for an assessment of how connectivity and sustainability are related to one another, both at the aggregate level and within each sub-dimension. To summarise, by separating the concepts of connectivity and sustainability, a more precise analysis can be performed which can result in better informed conclusions.

The Connectivity Index is the simple average of five pillars (Figure 7) addressing elements of the ASEM connectivity definition. The indicators were chosen after a thorough review of the literature on globalisation indicators and complemented by other sources (A. T. Kearney, 2017; A.T. Kearney and Carnegie Endowment for International Peace, 2006; Figge and Martens, 2014; Ghemawat and Altman, 2016; Gygli et al., 2018; Huawei Technologies Co., Ltd., 2017; Lockwood and Redoano, 2005; Manyika et al., 2014; The Economist Intelligence Unit Limited, 2014; Vujakovic, 2009; Waverman et al., 2011). It focuses specifically on cross-border connectivity.

Connectivity Index	
Physical	Measures physical infrastructure in terms of transport, energy and information and communications technology (ICT), mainly between countries rather than domestic infrastructure.
Economic/Financial	Measures the trade of goods and services and financial flows.
Political	Measures political relations with other countries.
Institutional	Measures the regulatory environment, namely measures to facilitate trade and investment as well as agreements to facilitate the mobility of people.
People-to-people	Measures the mobility of people in education, tourism and migration, the collaboration in research and innovation, the exchange of culture and communication.

Figure 7. Description of the ASEM Connectivity Index pillars

The Sustainability Index is the simple average of three pillars covering environmental, social, and economic/financial issues (Figure 8). The index focuses on measuring a country's domestic characteristics.

Sustainability Index	
Environmental	Measures the domestic environmental status of a country in terms of CO_2 emissions, domestic material consumption, forest loss, as well as the energy intensity of economy and renewable energies.
Social	Measures elements related to poverty, inequality, education, gender balance and inclusive and open societies.
Economic/Financial	Measures financial sustainability, economic growth, research expenditure and youth unemployment.

Figure 8. Description of the ASEM Sustainability Index pillars

The indicators were chosen after a review of the literature on globalisation and sustainability (EC, 2017c; OECD, 2017; UNDP, 1999; UNDP, 2016; United Nations Economic and Social Council, 2016) to identify interactions between SDGs and connectivity. As a result, the ASEM Sustainability Index framework incorporates indicators related to 11 out of 17 SDGs (Figure 9). The selection of indicators was also subjected to data availability and expert recommendations.

Correspondence between the SDGs and the ASEM Sustainability Index	
Environmental	
Social	
Economic/Financial	

Figure 9. SDGs addressed in the ASEM Sustainability Index

The indicators for each index are presented in Figure 10:

ASEM Connectivity Index framework of indicators	
Physical	1. Logistics Performance Index 2. ⇄ International flights passenger capacity 3. Liner Shipping Connectivity Index 4. Border crossings 5. ⇄ Trade in electricity 6. ⇄ Trade in gas 7. Average connection speed 8. Population covered by at least a 4G mobile network
Economic/Financial	9. ⇄ Trade in goods 10. Trade in services 11. ⇄ Foreign direct investment 12. ⇄ Personal remittances (received and paid) 13. Foreign portfolio investment liabilities and assets
Political	14. ⇄ Embassies network 15. Participation in international intergovernmental organisations 16. ⇄ UN voting alignment
Institutional	17. Cost to export/import 18. Mean tariff rate 19. Technical barriers to trade 20. Signatory of TIR Convention 21. ⇄ Regional trade agreements 22. ⇄ Visa-free or visa-on-arrival
People- to-people	23. ⇄ International student mobility in tertiary education 24. ⇄ Research outputs with international collaborations 25. ⇄ Patents with foreign co-inventor 26. Trade in cultural and creative services 27. ⇄ Trade in cultural goods 28. Tourist arrivals at national borders 29. ⇄ Migrant stock 30. ⇄ Common language users
ASEM Sustainability Index framework of indicators	
Environmental	31. Renewable energy in total final energy consumption 32. Primary energy use per capita 33. CO_2 emissions per capita 34. Domestic material consumption per capita 35. Net forest loss
Social	36. Population living below the international poverty line 37. Palma Index 38. Tertiary graduates 39. Freedom of the press 40. Tolerance for minorities 41. Presence of international non-governmental organisations 42. Corruption Perceptions Index 43. Female labour-force participation 44. Women's participation in national parliaments
Economic/Financial	45. Public debt as a percentage of GDP 46. Private debt, loans and debt securities as a percentage of GDP 47. GDP per capita growth 48. R&D expenditure as a percentage of GDP 49. Proportion of youth not in education, employment or training

Figure 10. The ASEM sustainable connectivity framework of indicators

Please note that in the Connectivity Index, some indicators are marked with a ⇄ sign which denotes that bilateral data within ASEM is available for these indicators. For example, with migrant stock, data are available on how many people have migrated from country a to country B, i.e. the information reflects the source and destination, not just the magnitude. The ASEM Sustainable Connectivity Portal is unique in this respect in that it aims to provide a detailed bilateral analysis, in addition to overall measurements of connectivity and sustainability.

A full description of the indicators for each index can be found in Annex 1.

2.3 INTENSIVE AND EXTENSIVE CONNECTIVITY

Measuring connectivity across ASEM countries introduces an issue of scale. ASEM countries have gross domestic product (GDP) and population sizes that span more than three orders of magnitude. In measuring connectivity, it is not necessarily meaningful to compare, for example, the movement of people from a country such as Malta (population around 430 000) with China (population around 1.4 billion, which is more than 3 000 times greater). In order to compare the connectivity of countries with different scales in a meaningful way, it is often appropriate to divide flows by other variables such as population size or GDP. This allows us to answer the question: "*Given its size*, how well connected is country X"?

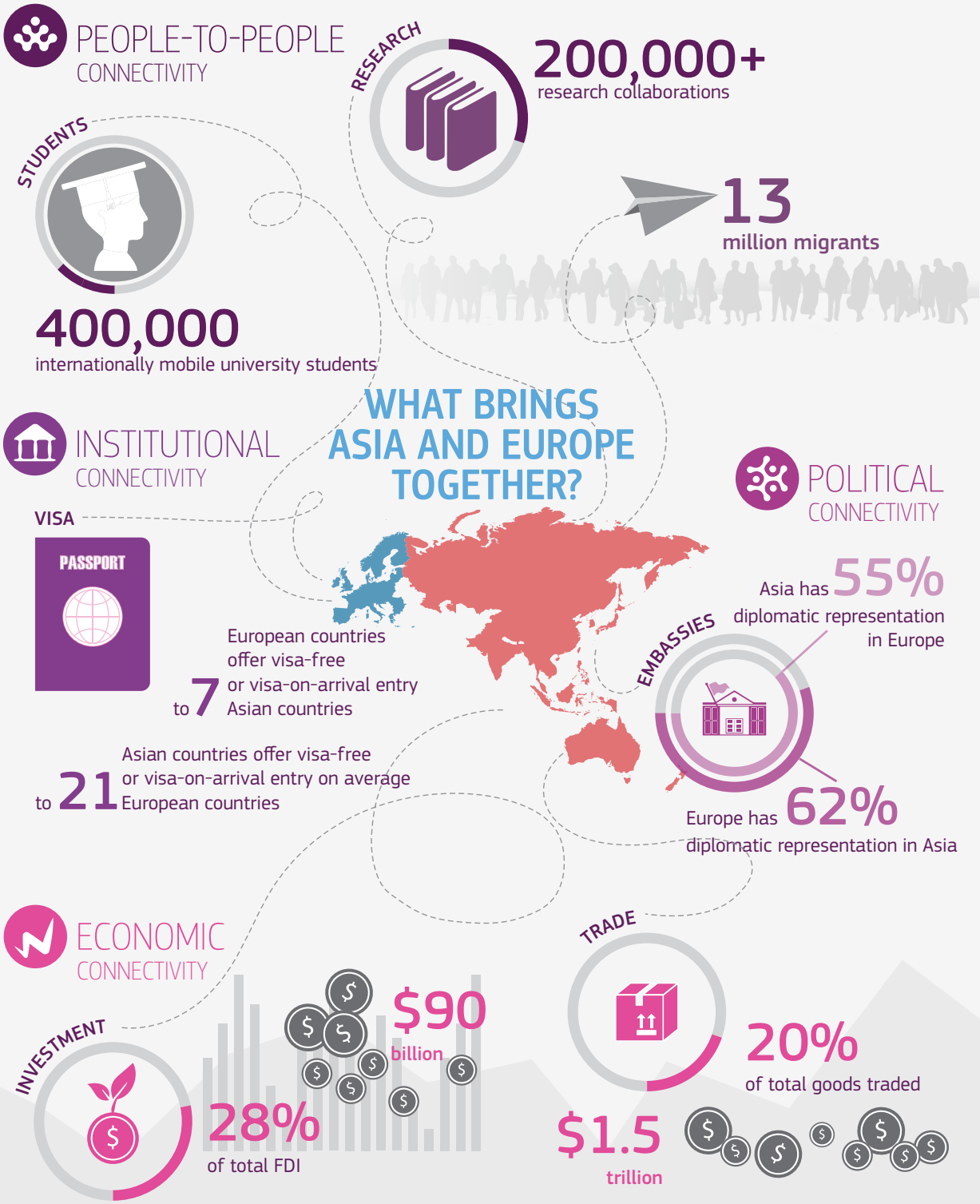
Connectivity can therefore be measured by using either the so-called *intensive* or *extensive* approaches. Intensive connectivity measures a country's connectivity in relation to its size, while extensive connectivity measures a country's connectivity in absolute terms. For instance, a country's trade in goods can either be measured in absolute terms by simply considering its imports and exports with other countries (extensive approach), or by accounting for its size by dividing these flows by its GDP (intensive approach).

The distinction between intensive and extensive properties (variables) is well known in the fields of thermodynamics and materials science. Intensive properties are those that do not change with the size of the system (e.g. density), whilst extensive properties do (e.g. mass) (Giampietro, 2014). Referring to composite indicators, the literature states that in order to have an objective comparison across small and large countries, the scaling of variables according to an appropriate size measure, e.g. population, income, etc., is usually required (OECD/JRC, 2008).

For the purpose of this study, it was decided to use both approaches as they are both considered complementary to interpreting connectivity. Intensive connectivity shows how a country is connected given its size, while extensive connectivity shows which countries are responsible for the largest flows within ASEM. The use of the intensive connectivity approach requires that relevant scaling variables (or denominators) are identified for each indicator. The choice of those variables must be made carefully since combining them into a ratio affects the interpretation of the indicator. Annex 2 presents the list of indicators for which scaling variables were adopted in order to build the intensive Connectivity Index. Note that 16 out of 49 indicators differ between the extensive and intensive framework, in that they are explicitly scaled by a variable such as GDP or population, most of which are in the economic/financial connectivity pillar or in the people-to-people connectivity pillar. However, many of the remaining indicators can be considered as already being intensive, examples being the Logistics Performance Index, United Nations voting patterns, and trade agreements, all of which are independent of country size.

3 THE FINDINGS

3.1 AN INTERCONNECTED ASEM



Figures refer to flows and connections between Asian and European ASEM partners

This section analyses 16 connectivity indicators which focus exclusively on the connections among the 51 ASEM countries. By concentrating on the analysis of these indicators, it is possible to understand interdependencies and to identify key areas of cooperation between ASEM countries and in particular between Asian and European countries.

Box 4.

A note on normalisation

Throughout this section, in some cases, data are *normalised* (divided) by another variable, and in some cases not. These choices have been made to extract the most meaningful conclusions from the data. As discussed elsewhere, when comparing countries of different sizes, it is usually necessary to divide figures by a third variable to measure the intensity of a variable rather than its absolute size.

For example, consider international flights: on the one hand, it is interesting to know where the greatest volumes of flights are between countries. However, clearly the volume of flights between two small countries will be less than that between two large countries – the former being limited by the size of the two populations. In this bilateral analysis, it is therefore often meaningful to normalise bilateral connections between the *combined size* of the two countries – in the case of flights, this would be the sum of the two populations, for each country pair. This now gives a picture of the intensity of flight connections, given the country size.

In other cases, it may be more relevant to scale by the size of only one country in each pair. For example, with foreign direct investment, it could be interesting to know which countries receive the most, relative to the size of their economies. In that case, each bilateral connection is scaled by the recipient's GDP. The point here is that scaling by different variables gives different results, with different meanings. In this section, the most appropriate normalisation approach is used on a case-by-case basis to bring out the most interesting patterns.

3.1.1 POLITICAL TIES

Diplomatic networks are a foundation for connectivity

Embassies are the result of diplomatic relations between countries. They are established to strengthen bilateral relations and provide assistance to citizens living abroad. They represent a type of political connectivity with a significant impact on international economic flows (Moons and Bergeijk, 2017).

The size of diplomatic networks varies widely within ASEM. France, Germany, the United Kingdom and China are the only countries that have both established an embassy in every other ASEM country and host an embassy from all other ASEM countries. Maintaining a diplomatic network incurs a significant cost to a country – if the number of embassies maintained by each country is divided by GDP, countries such as Mongolia, Brunei Darussalam and Malta appear to have relatively large networks given the size of their economy. However, it may also happen that smaller countries, like Bulgaria and Greece, have the same or greater diplomatic representation than larger countries like Australia. Singapore has the same number of embassies as countries with a lower GDP, such as Brunei Darussalam and Cambodia.

Diplomatic networks are more closely knit within Europe and Asia, respectively. Asian countries are 86% on the way to full diplomatic representation in other Asian countries, while European countries' embassy networks cover 83% in Europe. Between Europe and Asia, Asian countries have 55% diplomatic representation in Europe, while European countries have 62% in Asia.

Bilateral diplomatic links are associated with higher bilateral trade and movement of people, i.e. tangible connectivity outcomes – see Figure 11. Here, each bilateral trade connection is normalised by the combined GDP of the country pair (to measure the intensity of trade flows relative to economy size); then the average is taken over all country pairs. The same approach is applied for student mobility but with the combined population (see Box 3 for more on bilateral normalisation). These patterns suggest that political connectivity may provide a relevant basis for other forms of connectivity.

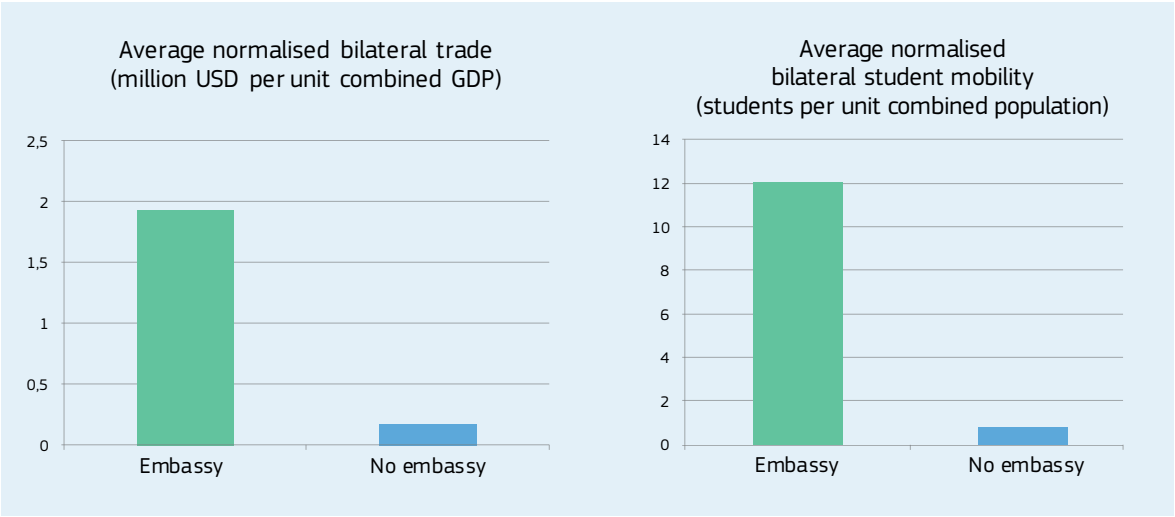


Figure 11. **Average bilateral trade volume and student mobility for country pairs with and without embassy links; figures normalised by combined bilateral GDP and population, respectively**

UN voting alignment

The United Nations (UN) member state voting alignment compares the similarity between the voting patterns of pairs of countries for all final plenary votes that occurred in the UN General Assembly during 2017 (Department of State, 2018). The UN General Assembly offers a unique context to study voting patterns, geographic divisions and alignments inherent in the voting patterns (Kim and Russett, 1996). Countries with a high UN voting coincidence score are expected to be politically closer and more prone to act cooperatively on global issues.

The average UN voting coincidence rate between ASEM partner countries is over 80%, indicating a general political alignment on UN General Assembly issues. When turning to the regional blocs, the voting coincidence between Asian and European countries reaches 70%.

Despite the overall similarities, UN voting patterns can still reveal two clusters within ASEM: one formed by European countries plus Australia, Japan, Korea and New Zealand, and another composed of ASEAN countries plus Bangladesh, China, India, Kazakhstan and Pakistan (see Figure 12). Russia has a slight tendency to vote more closely with Asian countries. Despite these clusters, UN voting patterns among all ASEM countries are still more similar than dissimilar.

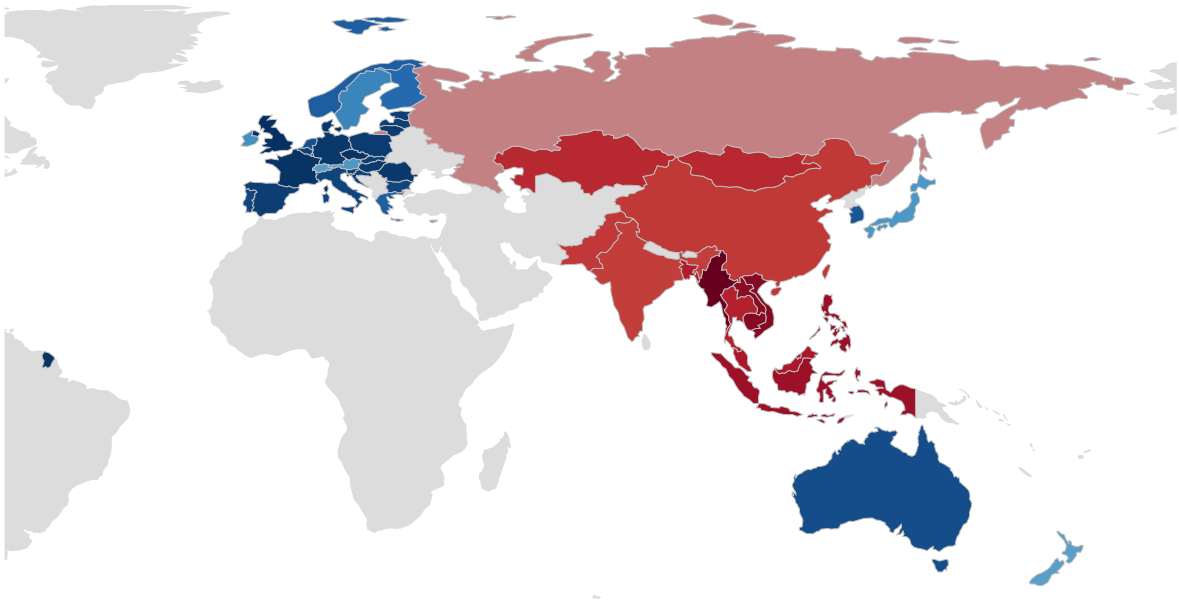


Figure 12. Average UN voting coincidence with other ASEM countries in 2017: red indicates a tendency to vote more with Asian countries, blue indicates a tendency to vote more with European countries

3.1.2 INTERNATIONAL TRADE

Trade agreements work, and opportunities exist

Regional Trade Agreements (RTAs) refer to any reciprocal trade agreement between two or more partners. Trade agreements are instrumental in facilitating global trade. RTAs might also contribute to a wide range of political and strategic considerations (Whalley, 1998), such as the promotion of sustainable development (Reynaud, 2017).

RTAs exist very largely within Europe and within Asia, respectively. The only agreements that bridge the European-Asian gap are the EU-Korea Free Trade Agreement; the European Free Trade Association (EFTA) (which includes Norway and Switzerland) and Korea; the EFTA-Singapore; and bilateral agreements between Switzerland and China, Switzerland and Japan, and Switzerland and Singapore.

The Association of Southeast Asian Nations (ASEAN) is a key regional trade bloc in Asia, having concluded a number of free trade agreements with other Asian nations, such as Australia, New Zealand, China, India, Korea and Japan.

Of all the ASEM countries, Korea has the most connections in terms of trade agreements, since it has links through trade agreements with 46 partners. European countries have a moderately high number of bilateral connections since they are connected with each other through the EU treaties and EFTA, but very little outside of their own trading bloc.

Trade agreements are associated with higher bilateral trade in ASEM. Figure 13 shows that, on average, country pairs that are connected via a trade agreement have considerably higher bilateral trade than pairs where there is no trade agreement.

Further efforts are being made to increase the network of trade agreements between Europe and Asia. For instance, the EU and Japan signed an Economic Partnership Agreement in July 2018 which is foreseen to enter into force in 2019. Other upcoming free trade agreements are between the EU and Vietnam and the EU and Singapore. These free trade agreements include provisions on trade and sustainable development (European Commission, 2018).

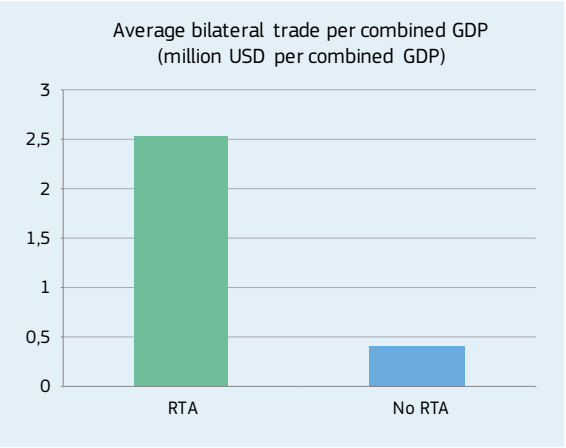


Figure 13. Average bilateral trade within ASEM for country pairs with and without bilateral or regional trade agreements

Trade in goods: a tale of two hubs

Regional Trade Agreements (RTAs) refer to any reciprocal trade agreement between two or more partners. Trade agreements are instrumental in facilitating global trade. RTAs might also contribute to a wide range of political and strategic considerations (Whalley, 1998), such as the promotion of sustainable development (Reynaud, 2017).

The trade in goods involving ASEM countries amounts to roughly half of the ASEM's GDP. Of this, 70% of the overall trade in goods occurs exclusively among ASEM members.

Figure 14 shows the network of main bilateral trading flows for goods inside ASEM (bilateral flows which are above the 99th percentile in value within ASEM). Two countries emerge as the major hubs in ASEM: Germany and China. Network analysis also reveals that the biggest trade flows are confined within Europe and within Asia, respectively. However, there are major cross-bloc flows between China and Germany (both ways), China to the United Kingdom, and China to the Netherlands. China is shown as Europe's main trading counterpart in this regard, although it is also worth noting that the bulk of China's exports (two-thirds) go to Asia, rather than Europe (Figure 15). On the European side, Germany's exports follow a similar pattern to those of China, with most of the goods (over three-quarters) being dispatched to countries in the same regional bloc (Figure 15).

Box 5.
Network graphs

To better understand the networks of bilateral connections, *force directed network diagrams* are used for certain bilateral indicators. These are a tool for visualising complex interactions between nodes (in this case, countries), which displays connections, strength of connections, and gives an indication of those countries at the centre of the network and those which are not.

Between the 51 ASEM countries, there are more than 2 500 possible bilateral connections; plotting them all on a network diagram would become very complex and would obscure rather than reveal patterns. For this reason, diagrams are plotted only using the top X% of connections. However, because the data vary considerably from one indicator to another, the choice of X is different for different indicators. In the analysis here, X is chosen to strike a balance between revealing key patterns and over-complicating the diagram.

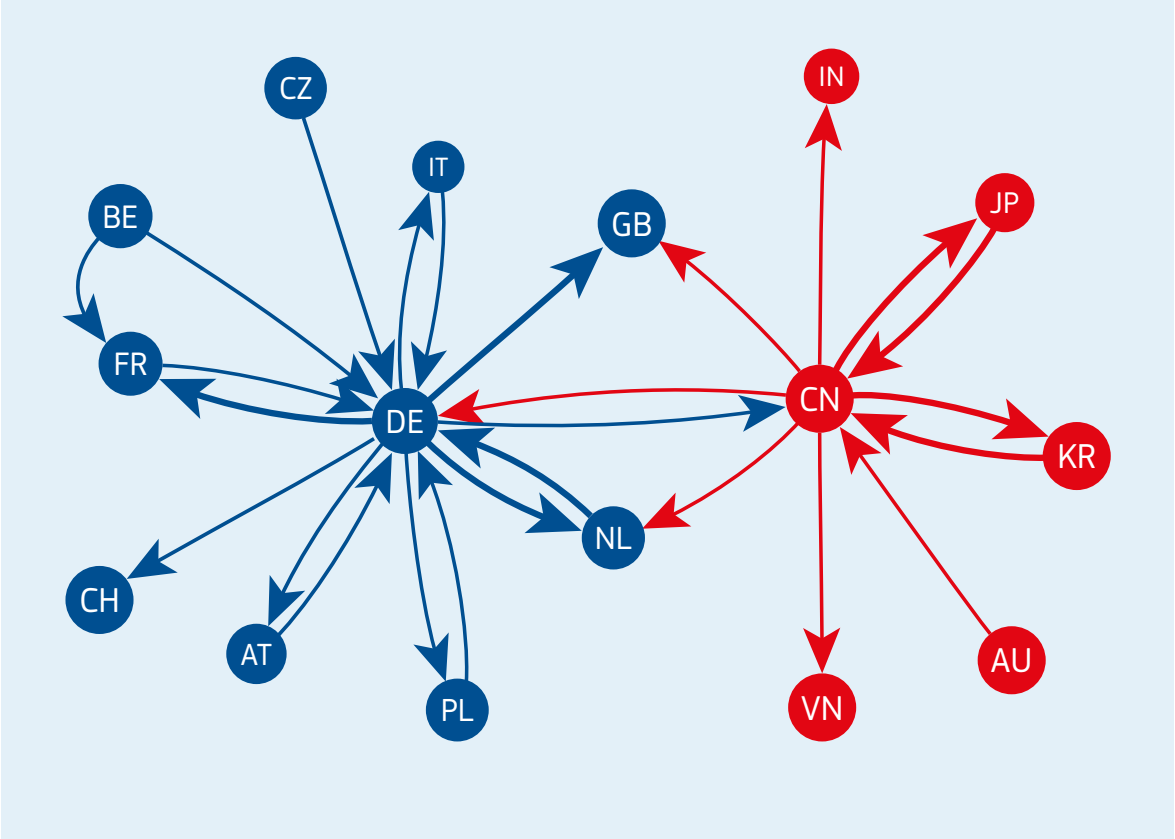


Figure 14. Network diagram of the top 1 % of bilateral flows of goods in total USD value (see Annex 4 for country names)

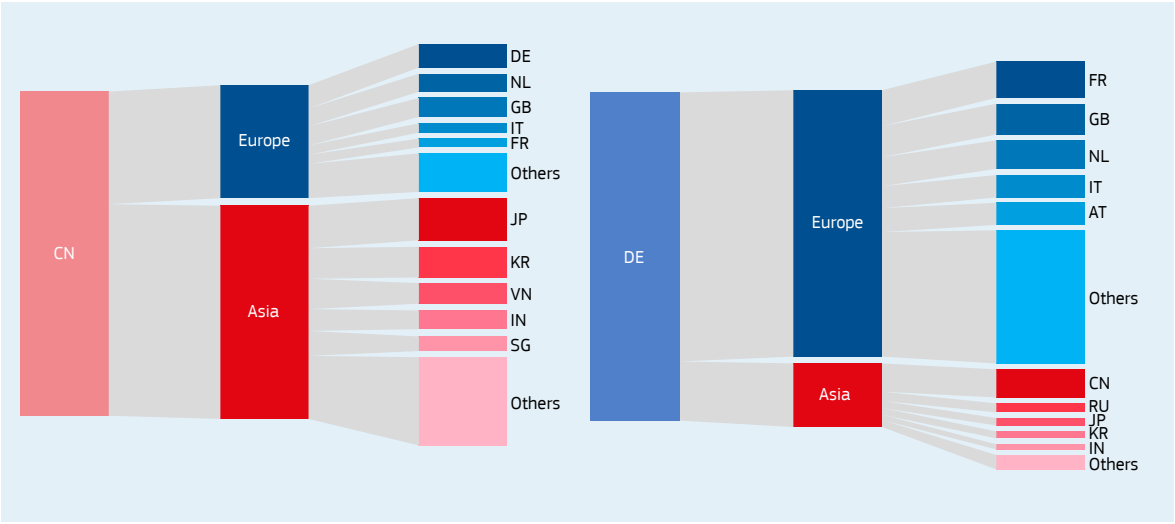


Figure 15. Chinese exports (left) and German exports (right) of goods to ASEM countries (areas represent USD value)

To put this into context, Figure 16 shows that some large Asian countries, such as China and India, have more than half their trade network outside ASEM. Other smaller countries, particularly in Europe, such as Cyprus, Estonia and Latvia, have almost no trade outside ASEM[3].

Figure 16 also shows that the proportion of each country's trade with countries in the opposite regional group (i.e. an Asian country with European countries and vice versa), varies considerably across countries. Most countries conduct a large proportion of their trade within their bloc, but some countries such as Russia and Kazakhstan have roughly half of their trade in both blocs, which is probably connected to the fact that they are located around the geographical centre of ASEM countries. Notably, Malta also has significant trade ties with Asia even though it is not centrally located.

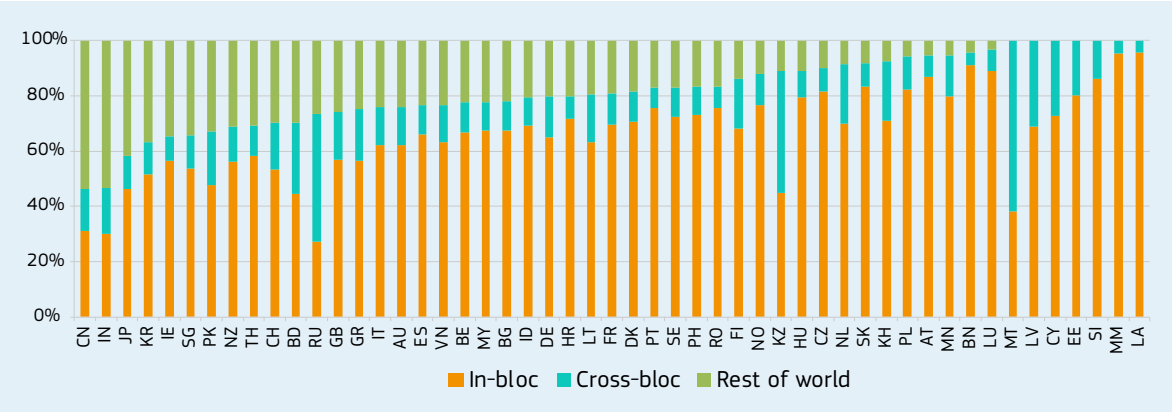


Figure 16. **Proportion of trade in goods of ASEM countries (dollar value of total imports plus exports) within resident bloc (in-bloc), with opposite ASEM bloc (cross-bloc), and with the rest of the world**

[3] Note that UN Comtrade data may have some inconsistencies due to differences in reported values of trade between exporting and importing partners. However, the overall trend should be considered valid.

3.1.3 INTERNATIONAL FINANCE

Investment knows no borders

Foreign direct investment (FDI) is a category of cross-border investment associated with a resident in one economy having control or significant influence on the management of an enterprise that is resident in another economy. It is essentially different from foreign portfolio investment which involves purchasing stocks, securities and other financial assets, but not having direct control over the securities or businesses. FDI can have a significant impact on technology and productivity levels in host-country firms (Ha and Giroud, 2015), as well as on local employment and skills levels (Bajo-Rubio and Díaz-Mora, 2015).

The network of the main bilateral flows of FDI within ASEM, in absolute terms, is shown in Figure 17. The United Kingdom is among the main actors in Europe, receiving FDI from many different sources, but also investing large amounts of money in Asia, specifically in India. India is a main recipient of FDI, attracting investment from both Europe (France and Germany) and Asia. China is also a major player in FDI, investing heavily in India, but also in Pakistan and Kazakhstan. Vietnam is also a major recipient of FDI, in particular from Korea and Japan.

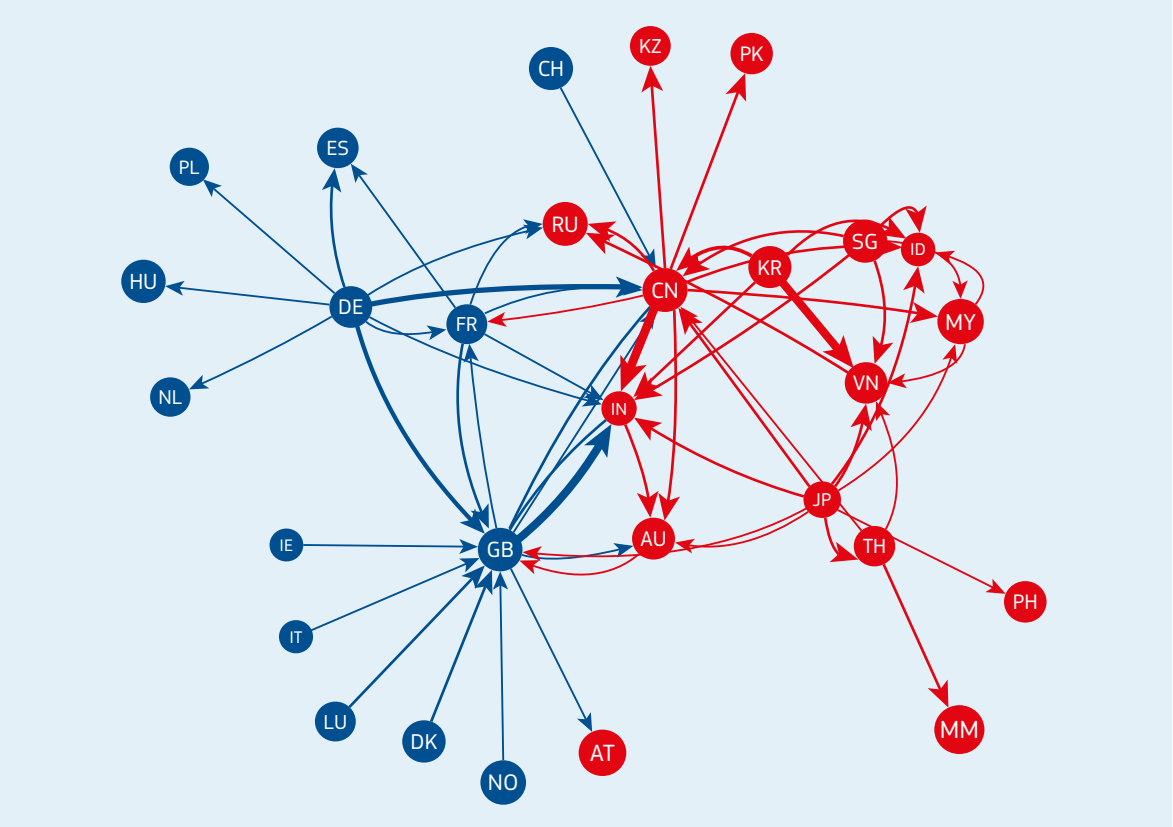


Figure 17. Top 5 % of FDI flows within ASEM – absolute values (measured in USD)

Overall, the picture is more mixed than with many other connectivity indicators considered here: FDI seems relatively fluid between Asia and Europe. Indeed, FDI is virtually unconnected to distance (in terms of statistical correlation between country pairs) and, although around 70% of total ASEM FDI flows occur inside Asia and inside Europe, the average size of investments between Europe and Asia is similar to the average size of investments within regional groups.

Further interesting patterns are obtained by scaling FDI flows by recipient GDP – this shows the FDI flows which are of the most significant size for the receiving country (Figure 18). When using this intensive approach, Cambodia, Myanmar and Vietnam are now at the centre of the network of FDI investment as main recipients. There is also a relatively significant bilateral flow of direct investment from the United Kingdom into Mongolia. This suggests that development in these countries may be more driven by FDI than other countries in ASEM.

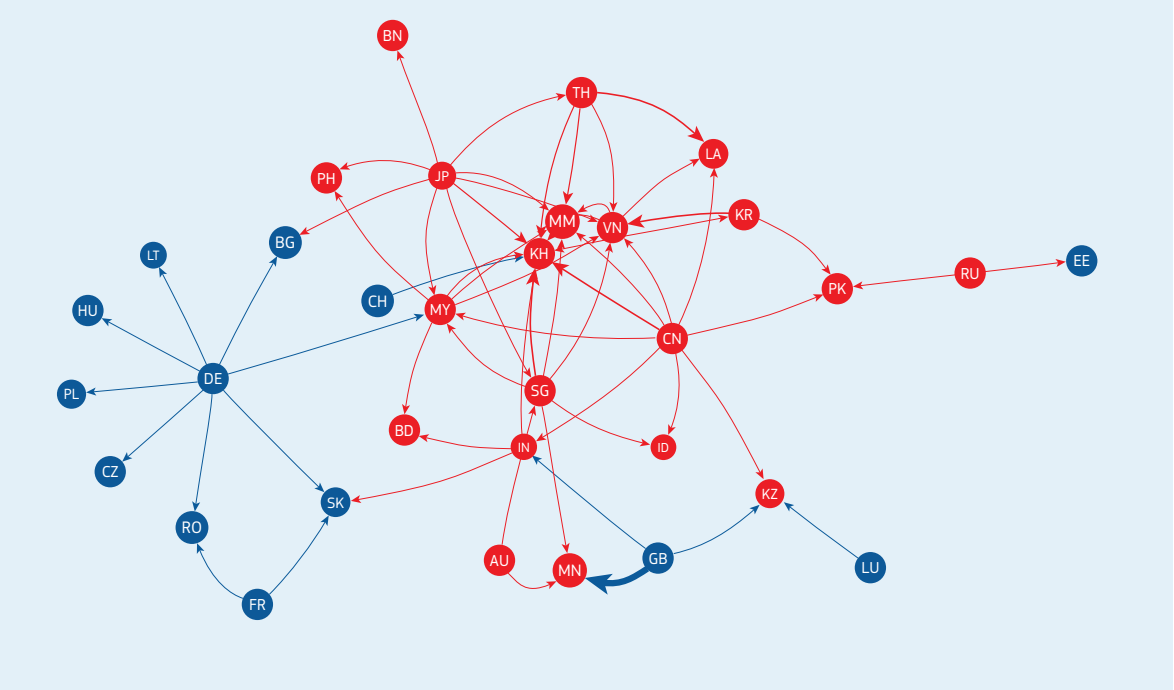


Figure 18. Top 5% of FDI flows within ASEM scaled by GDP of receiving country (measured in USD)

Finally, when zooming in on a country like India, it is possible to see that India is receiving fairly similar volumes of investment from Europe and Asia, with the United Kingdom being the main European investor, and China, Japan and Singapore being the principle Asian investors (Figure 19).

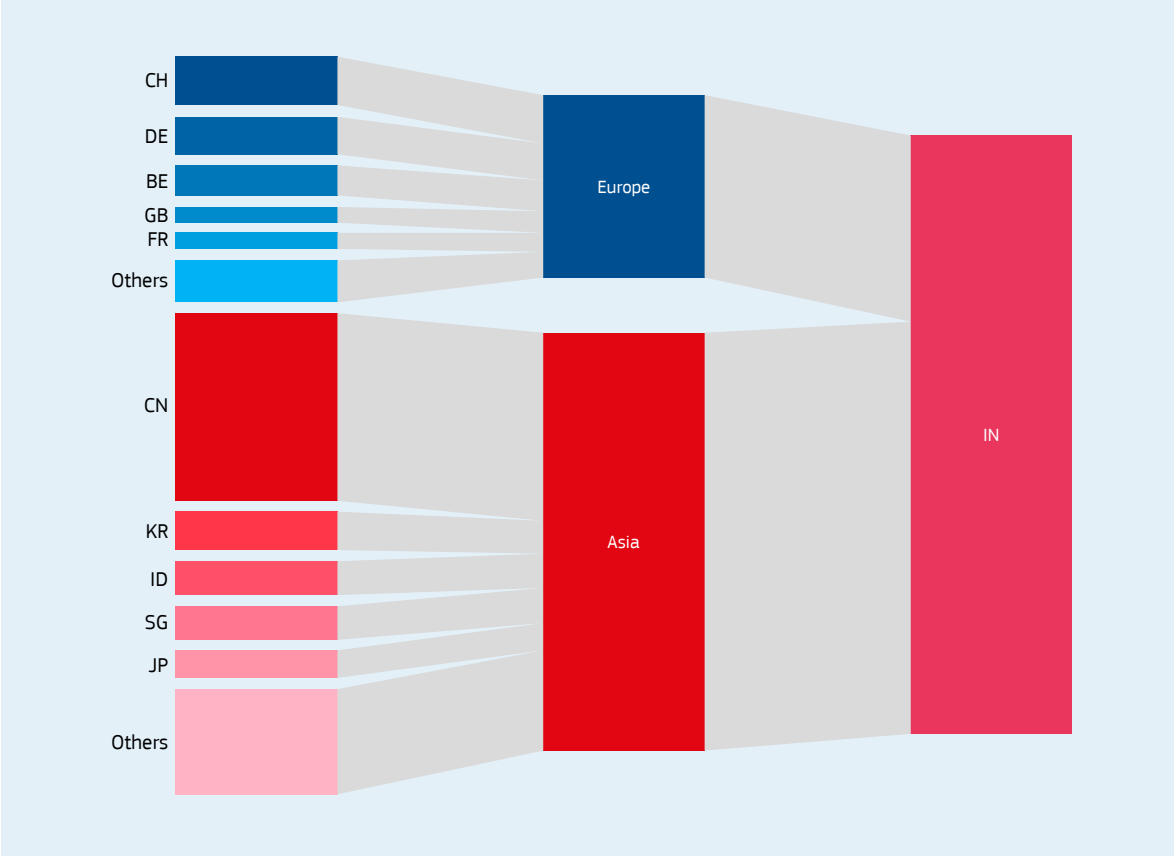


Figure 19. FDI inward investment into India – absolute USD values

Personal remittances

Personal remittances constitute an important source of household income in the countries of origin, helping to improve the quality of life of families in terms of education, health, sanitation, housing and infrastructure (United Nations, 2017).

Similar to the international migrant stock (see section 3.1.4), the largest flows of personal remittances occur within Europe and within Asia, representing around 80% of remittance flows within ASEM countries. Large flows within Asia include around USD 4 billion sent from both Japan and South Korea to China, as well as a similar number from India to Bangladesh. Inside Europe, France is the largest recipient of personal remittances, with a total of USD 16 billion received from European sources, mainly Spain, Germany and Belgium. The largest source of personal remittances in Europe is Germany (around USD 14 billion). Figure 20 shows the main flows of personal remittances within ASEM.

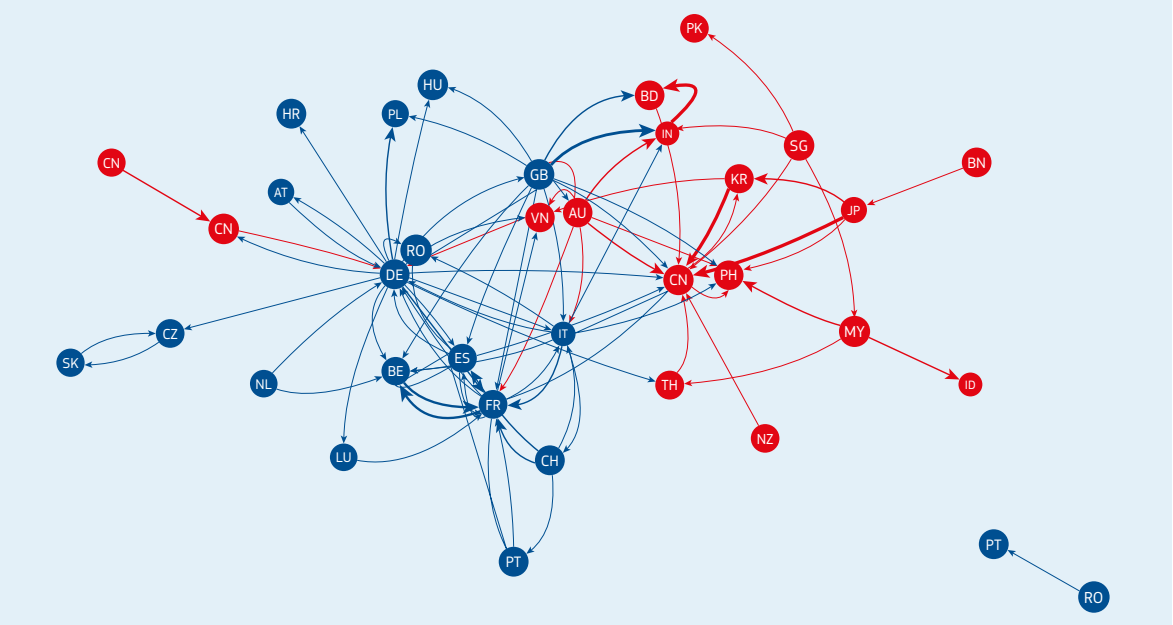


Figure 20. **Network diagram of top 5% of personal remittance flows in ASEM (measured in USD)**

The main bilateral remittance flows between Europe and Asia are from the United Kingdom to India (nearly USD 4 billion), followed by the United Kingdom to Pakistan, Italy to China, Spain to China, and Australia to the United Kingdom (flows of around USD 1 billion). The net direction of personal remittance flows is from Europe to Asia, with around USD 27 billion, as opposed to around USD 9 billion flowing in the other direction.

The total amount of remittance flows between Europe and Asia is about USD 36 billion, close to the size of Lithuania's GDP, while the total amount of remittance flows in ASEM is around USD 167 billion, similar in size to New Zealand's GDP.

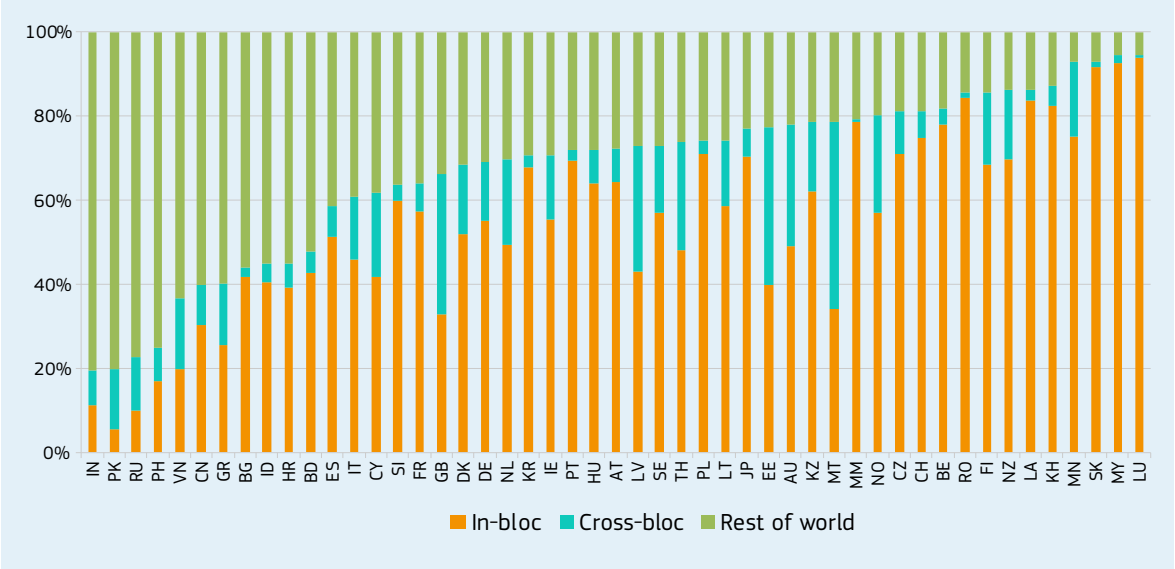


Figure 21. **Shares of personal remittance flows (received + sent) for ASEM countries: blue shows flows inside bloc (i.e. either Europe or Asia), red shows flows across blocs (between Europe and Asia), green is the rest of the world**

On average, more than half of the personal remittances flows involving ASEM countries occur with other ASEM countries. However, this varies greatly between countries: see Figure 21. For example, only around a fifth of personal remittance flows involving India and Pakistan also involve other ASEM countries, because both receive very sizeable personal remittance flows from migrant workers in the Middle East and the USA. On the European side, Bulgaria and Croatia exchange around half of total remittances with Turkey and Serbia, respectively. At the other end of the scale, over 90% of the personal remittance flows of Luxembourg and Malaysia take place between other ASEM countries. All remittances from Cambodia, Laos, Myanmar, Mongolia and Singapore are sent to ASEM countries.

The largest remittance sources within ASEM are the United Kingdom and Germany (over USD 18 billion each), followed by Australia and France. China is the largest remittance receiver in ASEM (USD 24 billion), followed by France, Germany and India. However, while in France and Germany the remittances received from ASEM countries account for over 60% of the total received, they only represent 15% in India and 38% in China.

As with the FDI, it is also helpful to scale remittance flows according to the GDP of the receiving country – this illustrates the relative importance of personal remittances to the receiving economy. Within Europe, personal remittances from Germany to Croatia represent about 1.2% of Croatian GDP, and from Czech Republic to Slovakia about 1.1% of Slovakian GDP. Within Asia, Bangladesh receives remittances equivalent to 1.8% of its GDP from India (the highest percentage in ASEM), and Cambodia receives 1.2% from Thailand.

Across Europe-Asia, the remittances are slightly less significant, but the main flows are Russia to Latvia, and Australia to Malta (1% and 0.9% of recipient GDP, respectively).

3.1.4 MOVEMENT OF PEOPLE

Opening borders encourages travel and innovation

Visa policies are the major instrument for regulating and controlling the global flow of people (Mau et al., 2017). a more visa-open country provides easier travel for visitors, such that they do not need a visa when they enter the country or can get one on arrival. Visa agreements between countries result in reciprocal benefits and improved mobility for their citizens, in an increasingly connected world.

Holders of a Singapore passport have entry into most ASEM countries and can either travel visa-free or apply for one on arrival in 48 countries. Citizens from Japan, Brunei Darussalam, Germany, Korea and Malaysia can travel to over 90% of ASEM countries without applying for a visa in advance.

The most visa-open countries are Cambodia, which offers a visa-on-arrival policy for nationalities of all 50 ASEM partner countries, and Indonesia, which provides visa-free access to 49 nationalities (see Figure 22). Laos, Thailand, India, the Philippines and Malaysia are also among the most visa-open countries as they allow entry to nationals of over 45 ASEM countries. However, there is still some disparity in the levels of visa openness within ASEM. Some countries like Pakistan, China, Russia, Myanmar and Mongolia are more visa-restrictive.

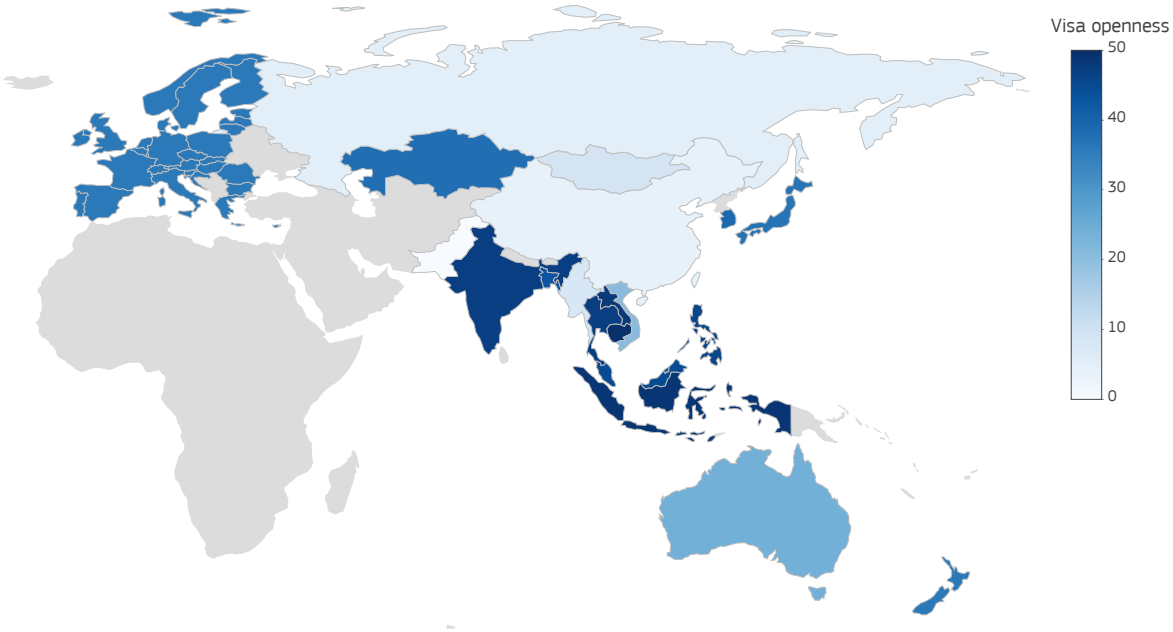


Figure 22. Visa openness of ASEM countries: shading represents the number of ASEM countries whose citizens can enter visa-free or with visa-on-arrival

European citizens benefit from a common open visa policy which provides access to all 30 European countries, while in Asia the access is more dispersed.

Visas have a clear association with several types of connectivity, in particular on bilateral flight capacity (Figure 23, left) and on bilateral innovation (Figure 23, right), as evidenced by the considerably higher research outputs of country pairs that have visa connections.

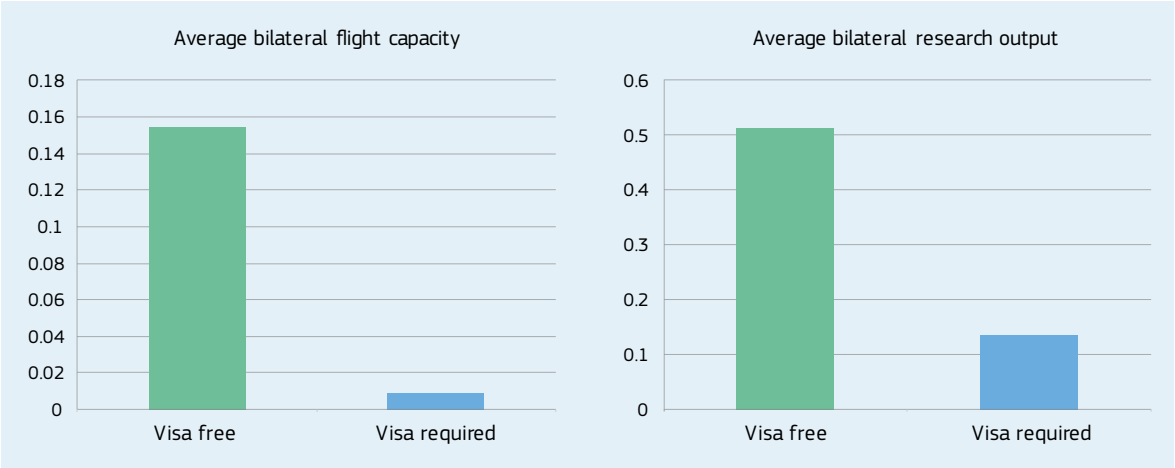


Figure 23. Effect of visas on bilateral flight capacity (per 1 000 combined bilateral population) and research output (per USD billion combined GDP)

International flights: bridging the gap

International flight passenger capacity measures the average number of seats (over the year) on direct flights[4] between pairs of countries. Air-passenger transport is essential to the long-distance movement of people, encourages tourism and business, and is positively associated with economic growth (Profillidis and Botzoris, 2015). The number of seats available on flights to and from a country is a combination of geographic and socio-economic factors, such as population, income level in the country, attractiveness as a tourist destination, remoteness and infrastructure (airports), among other things.

International direct flights are constrained by distance – this is evident in the network diagram in Figure 24 which shows that the greatest international flight capacity occurs within Europe and Asia, respectively. Inside Europe, the most significant connections are between the United Kingdom and Spain, where annually about 25 million people move along this route, totalling around 22% of the combined population of these countries. Indeed, the United Kingdom can be seen as one of the major hubs inside Europe, along with Germany, France, Spain and the Netherlands. When considering the population of source and destination countries, the route between Norway and Denmark also stands out as particularly well-travelled, with an annual capacity of about 16% of the countries' combined population.

Within Asia, the major hubs are China, followed by Singapore, Malaysia and Thailand. The most prominent routes in absolute terms are between Korea and Japan, and between Thailand and China (around 10 million passengers per year each way in both cases). If the population size of country pairs is accounted for, the routes between New Zealand and Australia, and between Singapore and Malaysia stand out as particularly intensive, with annual capacities of 18% and 11% of combined population, respectively. In fact, despite the small size of the country, Singapore has become a major hub of connectivity in South-East Asia.

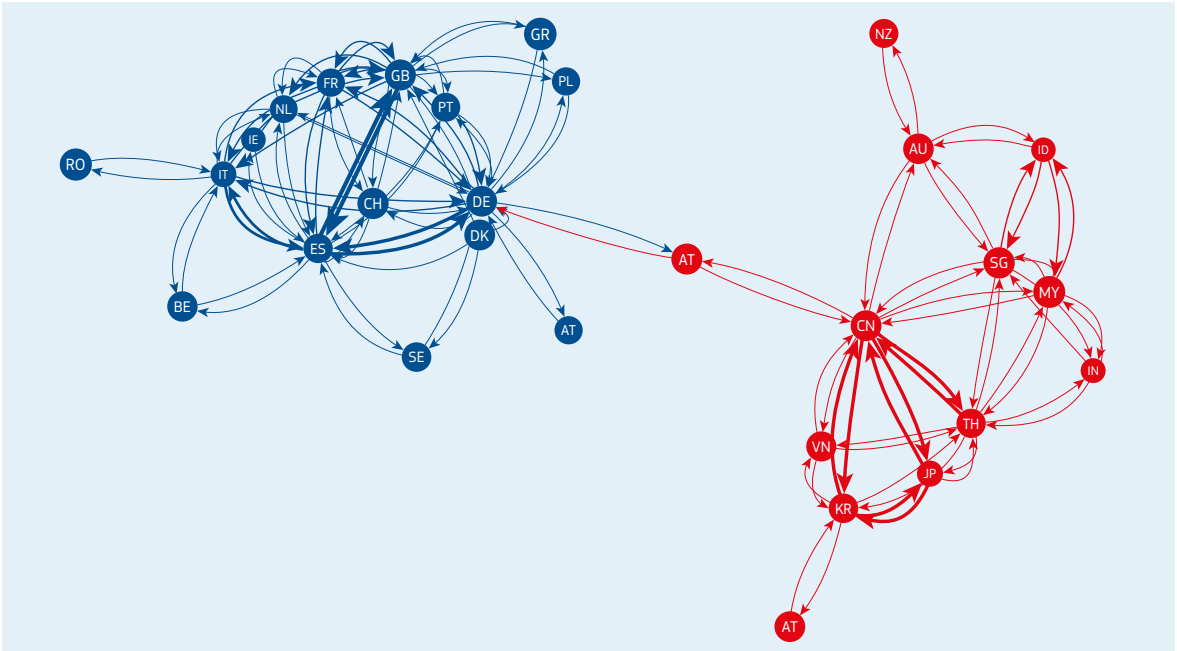


Figure 24. **International direct flight passenger capacity – top 10% of flight connections in ASEM (measured by the number of seats)**

[4] Direct flights are used in this edition because reliable data is available. Furthermore, connecting flights are have not been considered because this would introduce an issue of where to draw the line in terms of number of connections. In future versions of this study, non-direct flights may be considered.

Between Asia and Europe, the passenger capacity is significantly less, at around 7 % of the total within-ASEM flights. By examining these direct connections in Figure 25, it is evident that Russia is the main 'bridge', providing direct flight connections to all European countries except Luxembourg. Its strongest connections are with Germany and Italy. Many European countries also have direct links with China, India, Japan, Korea and Thailand. On the European side, the main connections come from Germany, France, Italy, the Netherlands and the United Kingdom. Per population, Switzerland and Singapore share the most significant connection between Asia and Europe, with an annual capacity of around 2 % of the combined population.

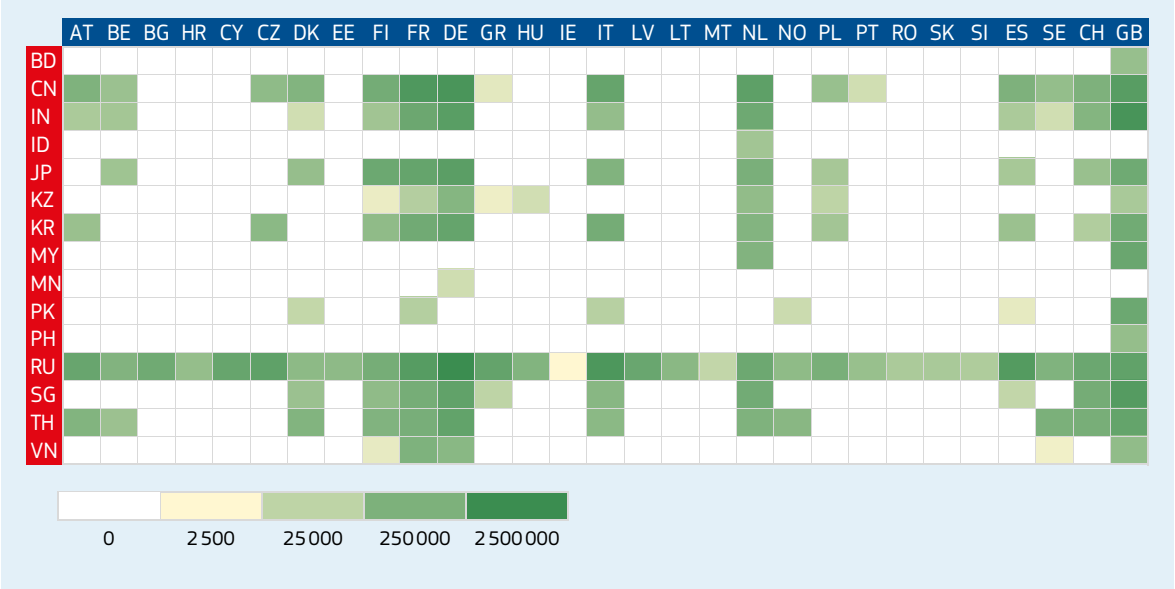


Figure 25. Heatmap of cross Asia-Europe direct flights; log scale used for clarity; numbers represent annual seat capacity in each direction; countries with no direct Asia-Europe connections are not included

Flights have an association with other forms of connectivity. For example, Figure 26 shows that flight passenger capacity is positively associated with migrant stock, personal remittances and student mobility – overall it is related to the movement of people. Flights are also positively related to research outputs and with trade in goods. This reiterates that physical connectivity is a cornerstone for (and may also be the result of) movement of people, business and trade.

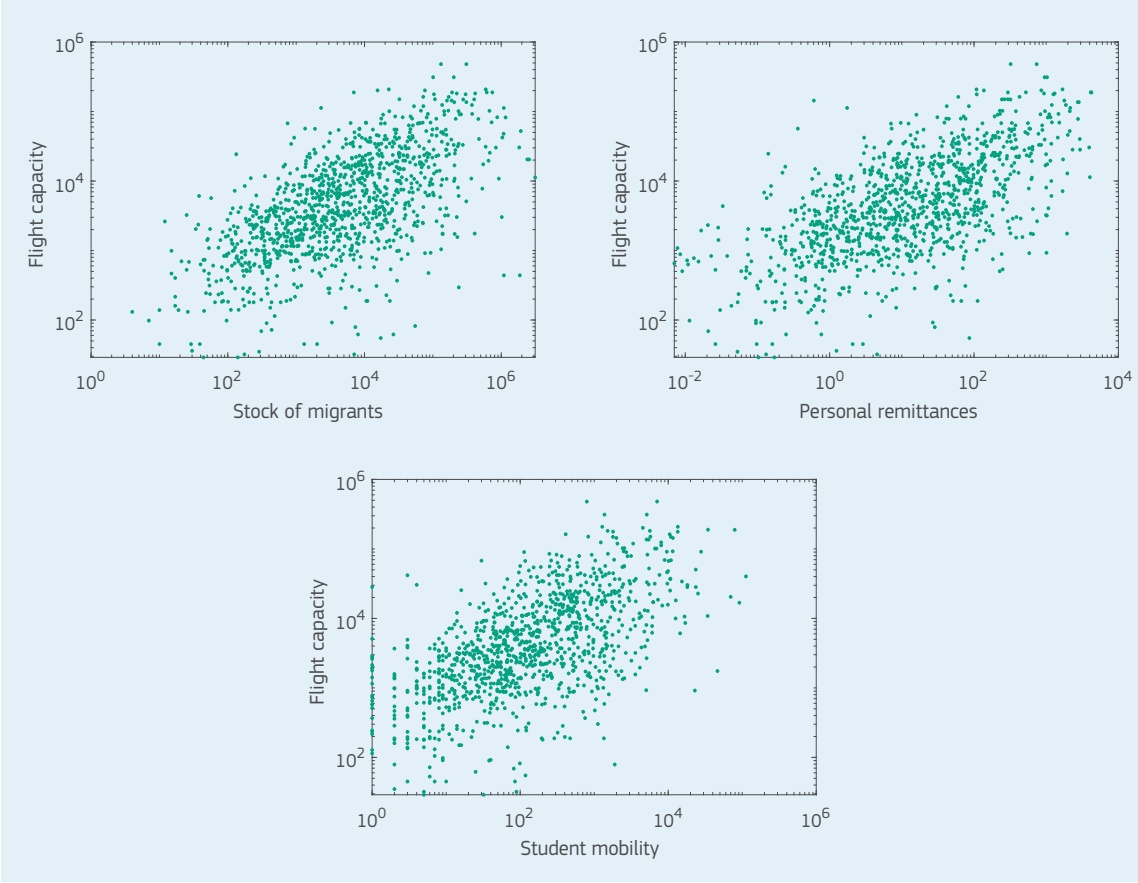


Figure 26. **Bilateral flight capacity of country pairs against migrant stock, personal remittances, and tertiary student mobility; log scales used for clarity**

Migration: distance is no object

The international migrant stock corresponds to the total number of international migrants present in a given country in 2017. Migration can contribute to inclusive and sustainable economic development in both home and host countries. Destination countries benefit from migrants as they fill important labour gaps, spur entrepreneurship, pay taxes and improve cultural diversity (United Nations, 2017). For origin countries, migration reduces unemployment, contributes to poverty alleviation and brings in remittances and diaspora investments (World Bank Group, 2017).

More than half of the ASEM's migrants choose another ASEM country to live in. However, in some Asian nations, such as the Philippines and India, three quarters of their migrants move to non-ASEM countries, while other countries have almost all their migrants within ASEM: Mongolia, Luxembourg, Slovakia, Malaysia and New Zealand.

The overall number of migrants within ASEM countries is around 63 million people, which is approximately the population of France. However, this accounts for only 1% of the total ASEM population. The combined migrant stock that has moved between Asian and European countries is around 13 million people, equivalent to the population of Belgium. This equates to about 20% of all migration with the ASEM group, showing that the largest movement of migrants occurs within the European and Asian continents.

The distance between countries does not seem to determine the migration flow, and the average number of migrants between country pairs where the distance between the countries is relatively small is similar to that where the distance is much larger (Figure 27).

The main 'bilateral corridors' between Europe and Asia are from the United Kingdom to Australia (1.4 million), Russia to Germany (1.1 million) and Kazakhstan to Germany (1.0 million).

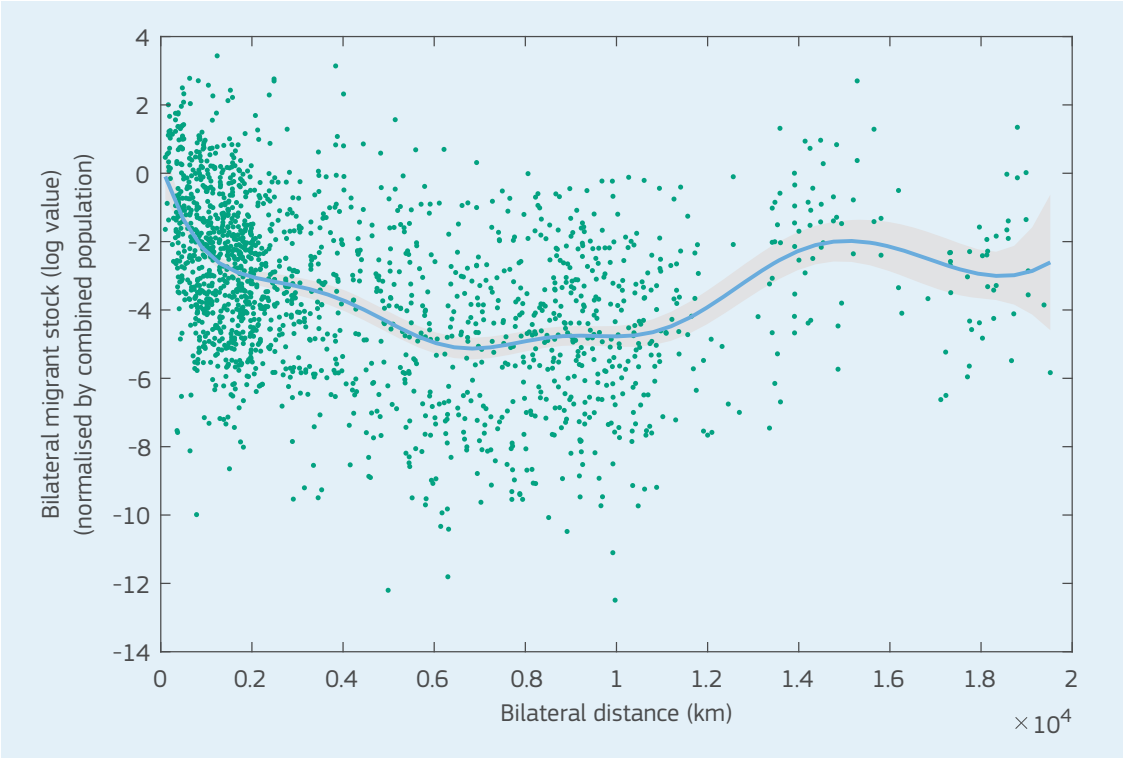


Figure 27. Migrant stock between country pairs versus distance between country centroids; migrant stock is plotted on a log scale for clarity

Russia is the largest country of origin for migrants in ASEM (4.5 million), with one quarter of its migrants going to Germany. Other major countries of origin are Poland, Bangladesh, China, India and Kazakhstan. Germany is the country which hosts the largest number of migrants in ASEM (2.7 million), mainly coming from Poland, Russia and Kazakhstan. Luxembourg and Singapore have the largest proportion of ASEM migrants in the total population, accounting for 40 %.

Students follow migration

International student mobility provides an opportunity for students to access quality education, acquire skills that may not be found in their home countries, improve language skills and explore different cultures and societies. Studying abroad is also a way to improve employment opportunities (OECD, 2017).

International mobile students in ASEM account for 1.6 million, roughly 5% of all students in tertiary education in ASEM countries. Of these, a quarter of student flows are between European and Asian countries.

The United Kingdom, Germany, France and Italy are the preferred destinations for Asian students in Europe, while European students opt for Australia, Japan, Russia and New Zealand.

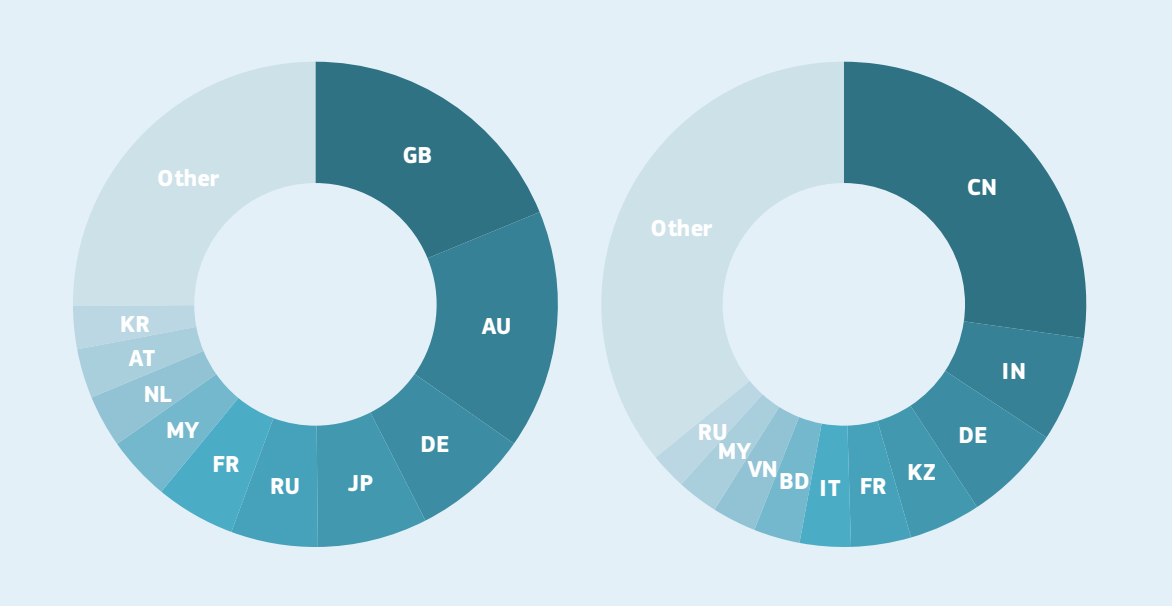


Figure 28. **Movement of students in tertiary education within ASEM: inbound students (left), outbound students (right)**[5]

5 Note: no data are available for inbound internationally mobile students in Bangladesh, Cambodia, China, Indonesia, Pakistan, Philippines and Singapore.

English-speaking countries like the United Kingdom and Australia emerge as the most popular destinations for students in tertiary education, together hosting more than one third of the total ASEM students. Other major destination hubs are Germany, Japan, Russia, France and Malaysia.

The largest sending countries are China followed by India and Germany. However, in relation to national tertiary students, Luxembourg, Cyprus and Brunei Darussalam have the greatest percentage of students studying abroad.

On average, close to 80% of ASEM mobile tertiary students choose to study in another ASEM country. Exceptions include countries like China, India, Japan, Korea and Croatia where half of their students are also enrolled in tertiary education in non-ASEM countries.

International student flows are linked to a number of other bilateral variables, including international scientific cooperation, which may illustrate that student mobility is an important factor in fostering scientific cooperation. In fact, student mobility is even more strongly linked to migration stocks (with a correlation of 0.79 between the two variables at the bilateral level). This may be due to established cultural ties, language, or links between universities that are established as a result of links through migration.

3.1.5 RESEARCH AND INNOVATION

Scientific cooperation

International collaboration is regarded as an important driver of science dynamics around the world (Leite and Pinho, 2017). International research collaborative efforts are translated into research outputs which can be measured by the number of scientific publications co-authored by researchers affiliated to institutions from multiple ASEM countries. International co-authorship publications are used as an indicator of research collaboration in ASEM.

In terms of research, ASEM represents a major network of international collaboration. Figure 29 shows the research output involving international collaborations between ASEM countries as a percentage of their total research output (regardless of whether it is international or not). ASEM international collaborations account for more than a third of total scientific output in ASEM countries. Moreover, Europe-Asia collaborations account for 12% of total output.

In absolute numbers, the main research bridges between Asia and Europe are China, Australia, Japan and Russia on the Asian side, and the United Kingdom, Germany and France on the European side. Of these, the most intense intercontinental collaborations on research articles are between the United Kingdom and China and the United Kingdom and Australia, followed by Germany and China.

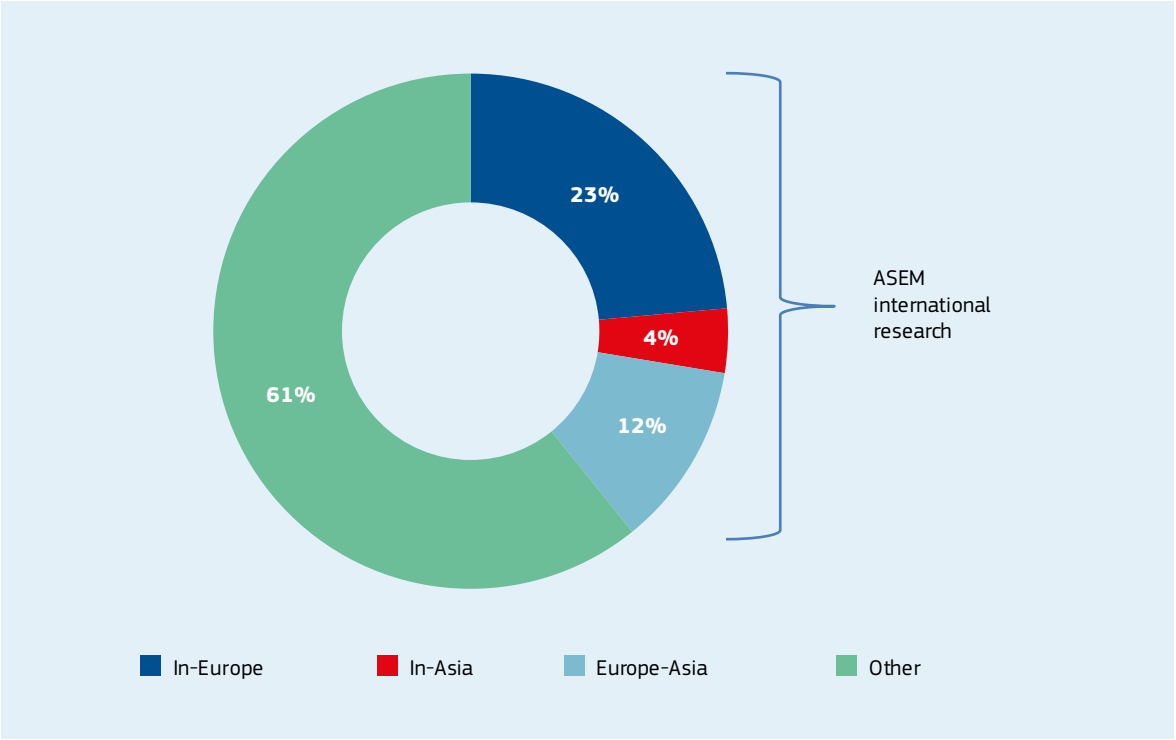


Figure 29. ASEM international research collaborations as a percentage of total research output in ASEM countries

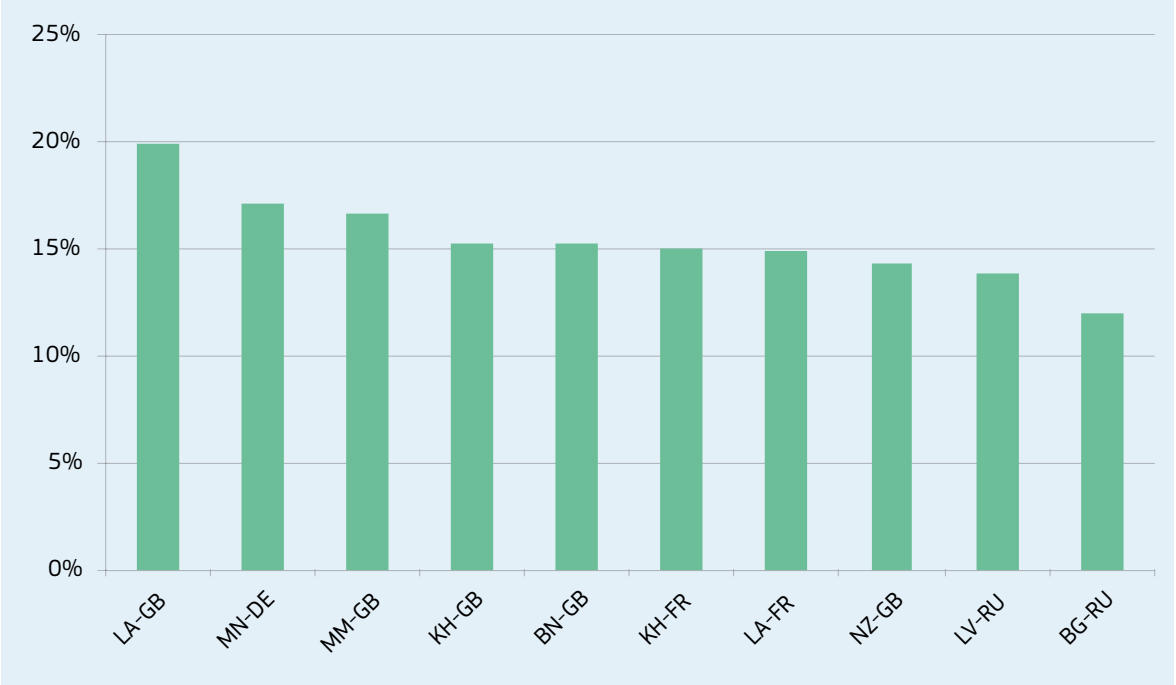


Figure 30. Top 10 Asia-Europe research collaborations, as percentage of total research output of first country in country pair

From another perspective, Figure 30 shows the top bilateral collaborations as a share of each country's total research output. For example, it shows that research collaborations between Laos and the United Kingdom account for around 20% of the total research output of Laos; in other words, the UK is a key research partner for Laos. Other strong relationships of this type include Mongolia-Germany and Cambodia-UK. France also emerges as a key partner in Asian collaborations, as does Russia, having significant partnerships with Latvia (14% of Latvian research) and Bulgaria (12% of Bulgarian research).

Research collaboration is also one of the strongest single indicators of connectivity, having relatively high correlations with all other indicators, in particular with co-patents.

International co-patents

Patents reflect countries' innovation performance. Patent-based indicators and network relationship analysis can be used to track the level of knowledge diffusion across technology areas and the level of internationalisation of innovative activities (Bai and Liu, 2016). Patents with foreign co-inventors are an indicator of collaboration between researchers residing in different ASEM countries.

ASEM international collaboration in co-patents represents nearly 80% of the total patents with a foreign co-inventor from ASEM countries. Asia-Europe collaborations account for 25% of patents with a foreign co-inventor within the ASEM area.

Figure 31 shows the shares of co-patents with an international partner within ASEM and the rest of the world. Countries with a significant proportion of co-patents with partners outside of ASEM are largely Asian, with China, the Philippines and Russia having the highest ratio of non-ASEM partners. On the other hand, a number of European countries have very little or no international collaboration outside of ASEM[6] with mostly European partners. New Zealand, Malaysia and Singapore stand out as countries with large ratios of Asia-Europe collaboration.

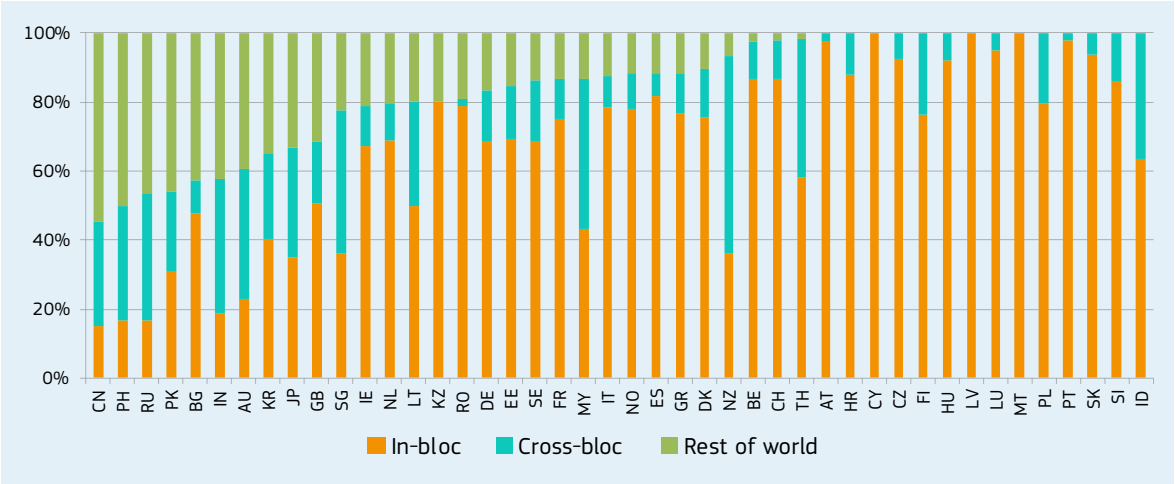


Figure 31. Shares of total co-patents with an international partner in collaboration with the resident bloc, opposite regional bloc and the rest of the world

[6] International co-patents data fluctuate considerably from year to year. The latest available data (2014) is used here but ratios may change if other years are used.

At the bilateral level, the strongest intercontinental collaborations in the inventive process are between France and Germany on the European side, and countries like China, India, Japan and Singapore on the Asian side. China also has significant collaborations with the United Kingdom, Sweden and Finland.

Figure 32 shows there is a strong link between bilateral co-patents and research collaboration (correlation coefficient of 0.79), which supports the idea that research underpins innovation.

Co-patents are also associated with trade in goods and student mobility at the bilateral level. Movement of students seems to be associated with bilateral innovation connectivity, although innovation outputs are founded on research links.

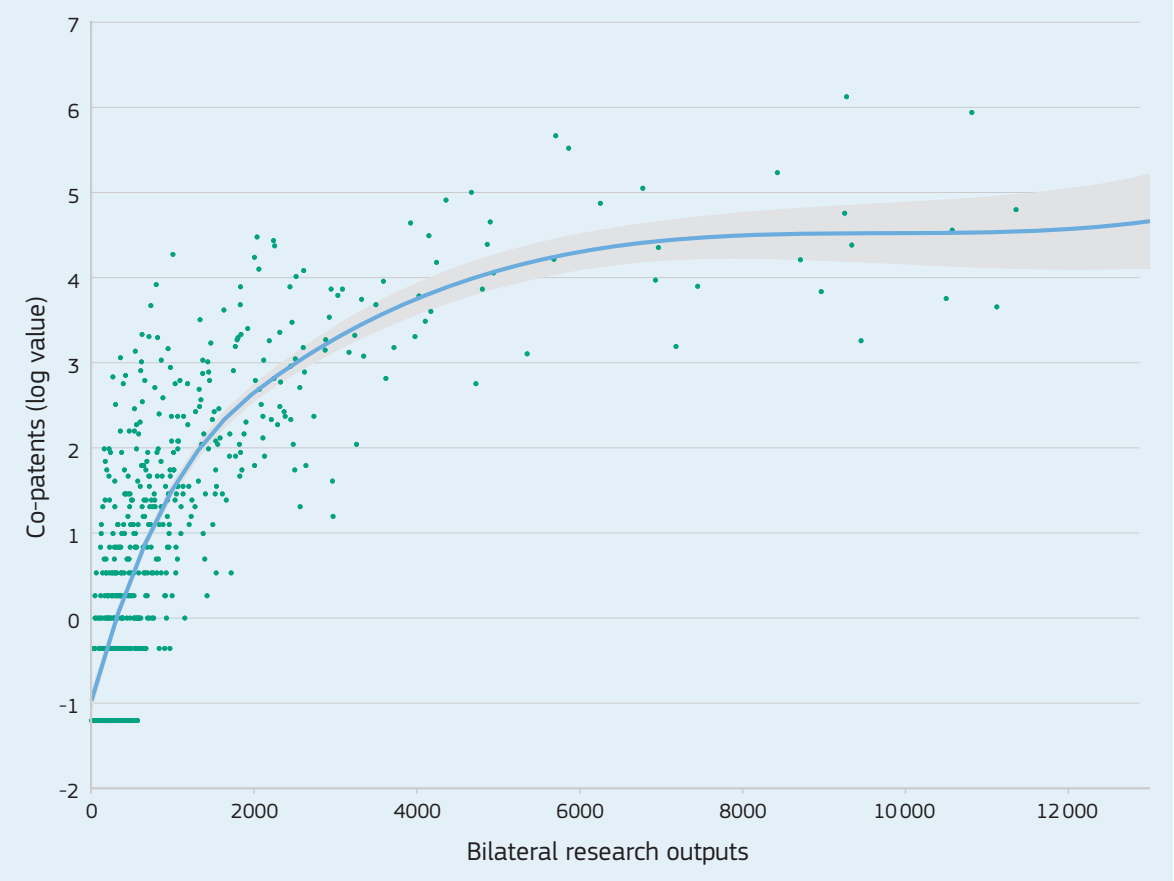


Figure 32. Bilateral co-patents and research collaboration

3.1.6 ENERGY FLOWS

Exports and imports of electricity

Trade in electricity reflects cross-border electricity interconnection It can also indicate the underlying infrastructure and can thus be used as an indicator of physical connectivity. The electricity trade is instrumental in building resilient and complementary energy networks and in increasing competition (Abrell and Rausch, 2016; Timilsina and Toman, 2016).

The primary flows of electricity[7] within ASEM are shown in Figure 33. Clearly, trade in electricity is dependent on physical infrastructure and is not feasible over very long distances due to power loss. Therefore, the trade is mainly limited to neighbouring countries. Bilateral flows of electricity in Europe are larger than in Asia, with Germany emerging as the major hub in electricity trade inside Europe, due in part to its geographically central location. Germany both imports and exports electricity, and overall is the biggest importer and exporter of electricity among ASEM countries. However, the largest single bilateral flow in Europe is from Switzerland to Italy. In fact, Italy imports more electricity than any other country in ASEM (over 40 GWh annually).

Trade in electricity is also relevant among Nordic countries (Sweden, Finland and Norway). Significant connections between Europe and Asia can be found in Russia exporting to Finland and Latvia. The main electricity flows in Asia take place between Russia and Kazakhstan and from Russia into China.

Within Asia, electricity is also exported from India to Bangladesh, Thailand to Laos and from China to Mongolia and Vietnam.

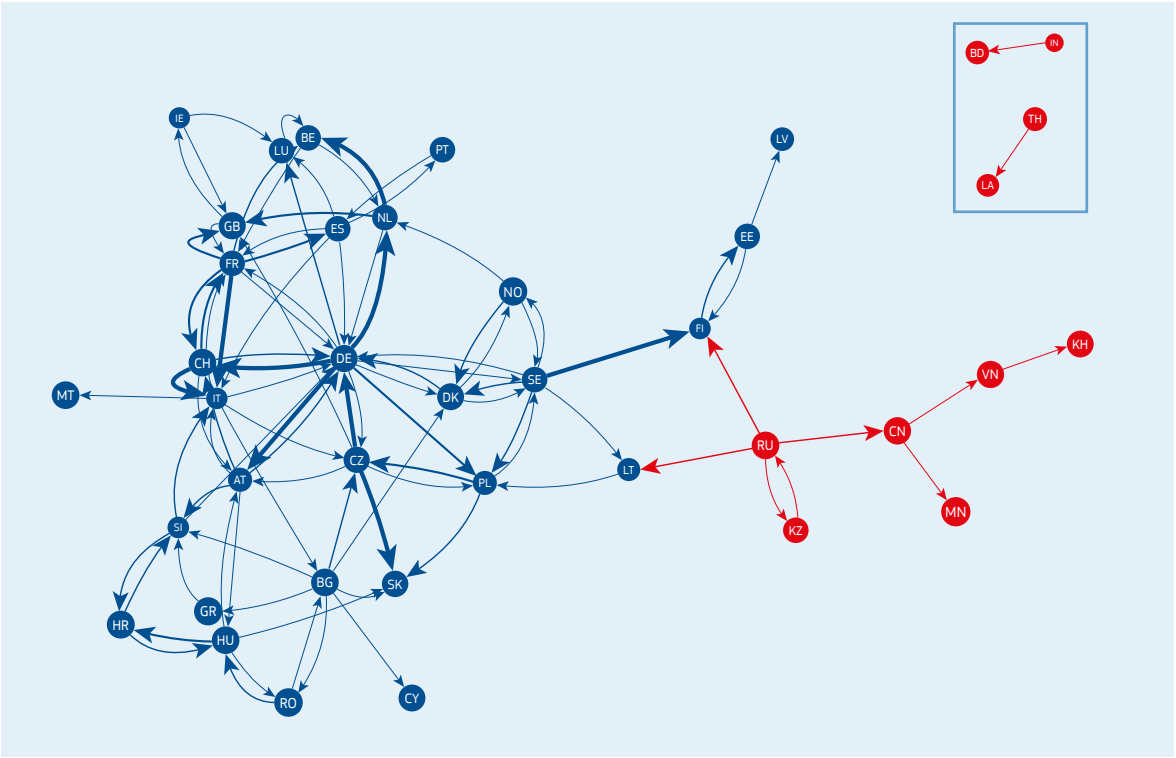


Figure 33. Top 50% of bilateral connections in the electricity trade (measured in kWh)

[7] Note: no data are available for Cyprus, Australia, Bangladesh, Cambodia, Japan, New Zealand and the Philippines.

Exports and imports of gas

Trade in gas is essential for many countries, which may have little or no natural resources of their own to draw on. It is frequently a central topic in energy interdependency and international politics. The gas trade includes gas exported via pipelines, as well as in liquid forms via other means of transport.

In the initial stages of this study, data from UN Comtrade was used to study the flows of gas between ASEM countries. However, it was found that (most likely for reasons of political sensitivity and/or energy trading via third countries) the data contained some major discrepancies. This is a recognised issue in energy statistics[8], which is why we have omitted the study on gas networks in this edition until it is possible to assemble a more reliable data set.

3.1.7 CULTURAL TRADE

Cultural goods are defined as "consumer goods conveying ideas, symbols and ways of life, some of which may be subject to copyrights, i.e. books, magazines, multimedia products, software, recordings, films, videos, audio-visual programmes, crafts and fashion" (UNESCO-UIS, 2009). The international trade in cultural goods provides insight into the dynamism of cultural industries, the country's interest regarding such goods and can also be a measure of countries' cultural proximity (UNESCO, 2016; Disdier et al. 2009).

Around 65% of overall ASEM countries' trade in cultural goods takes place with other ASEM countries. However, this figure is much higher for many individual countries: 42 ASEM countries import over 80% of their cultural goods from other countries. In this respect, the outlier is China, which is also the largest exporter of cultural goods in ASEM by a considerable margin, only 41% of which are exported to other ASEM countries.

The centrality of China as a cultural exporter is clear in Figure 34, where it can be seen as exporting significant amounts to most other Asian countries as well as to European countries – the main countries importing from China are the United Kingdom, Germany, the Netherlands, France and Italy[9].

Over a quarter of cultural goods traded within ASEM take place between Europe and Asia.

[8] See for example a recent Eurostat report: http://ec.europa.eu/eurostat/statistics-explained/index.php/EU_imports_of_energy_products_-_recent_developments

[9] Note: no data are available for Bangladesh, Cambodia, Korea, Laos, Myanmar and Vietnam.

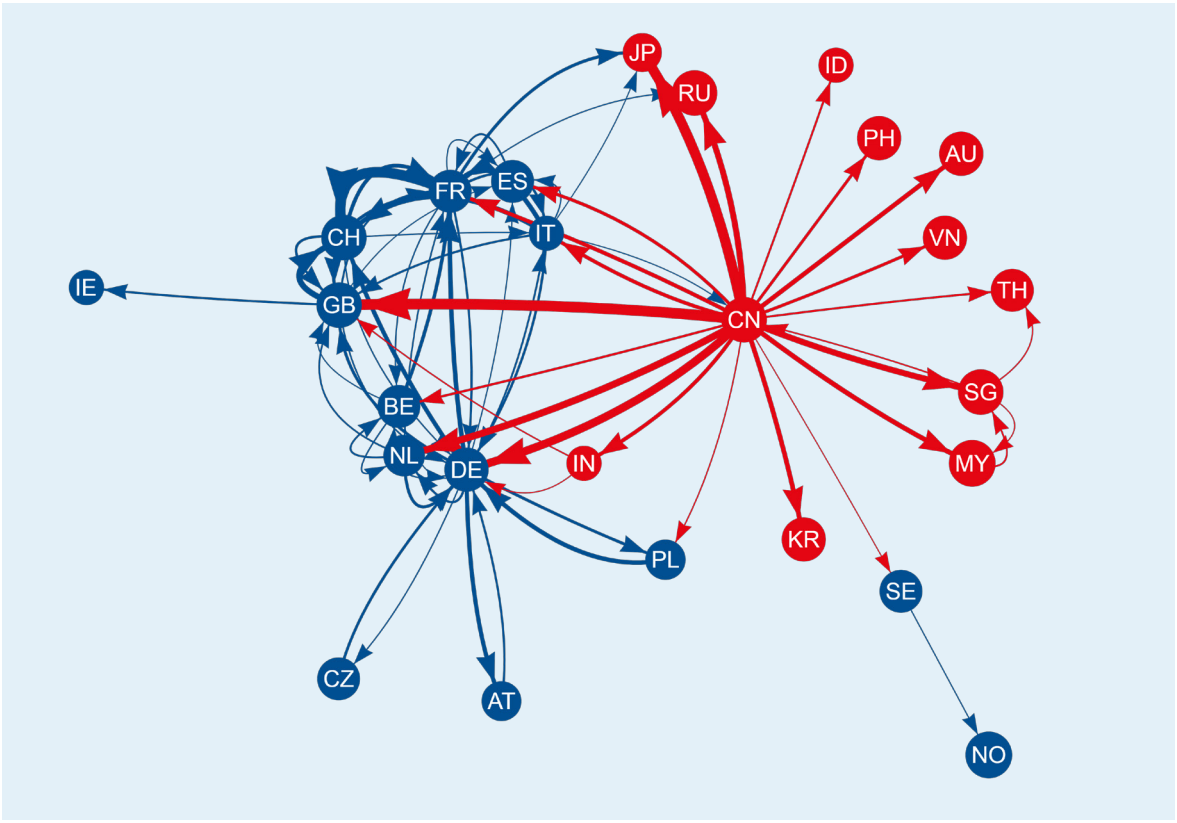


Figure 34. Top 5% of flows of cultural goods between ASEM countries (measured in USD)

Despite the prominent role of China as an exporter of cultural goods, there are other important connections between Europe and Asia which are not necessarily visible in Figure 34: France to Japan and Russia; Italy to China, Japan and Russia; Switzerland to Singapore and Japan; India to the United Kingdom and Germany; Thailand to Germany and; Japan to Switzerland.

The leading importers of cultural goods are essentially European countries: Germany, the United Kingdom, France and Switzerland. In Asia, Japan stands out followed by China and Singapore.

It is also informative to examine the patterns when scaling by GDP of the exporting country: in this case, the Czech Republic and Singapore emerge as the two highest exporters of cultural goods per unit GDP, and overall as having the highest flows of cultural goods with other ASEM countries – see Figure 35. In this respect, it becomes clear that although China is the biggest player in exporting cultural goods in absolute terms, its overall flows are relatively small compared to its GDP; it imports relatively little compared to most ASEM countries.

Cultural trade between European countries is strong, which can be explained by the close proximity between countries and knowledge of common languages. Research by Disdier et al., 2009, on bilateral trade of cultural goods, concludes that cultural goods are traded over shorter distances than non-cultural ones.

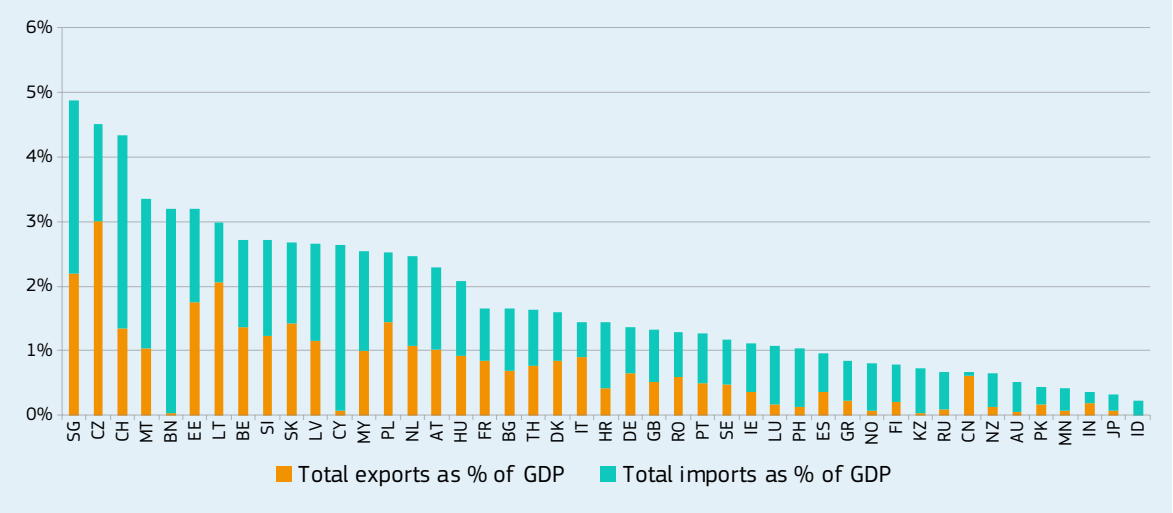


Figure 35. **Imports and exports of cultural goods with ASEM partners as a percentage of GDP**

3.1.8 LANGUAGE NETWORK

Global linguistic diversity and language education have become key policy challenges (Edwards, 2012; Kramsch, 2014; Wright, 2016). Knowledge of languages is important to facilitate communication between people of different countries as well as tourism, trade and business, among others. By analysing the users of common languages, both native users and those who use a second language, it is possible to gather insights on language proximity in ASEM countries. For each country pair, the number of people who can speak a language that is common to both countries is calculated (both official and unofficial languages). This provides an estimate of the likelihood of a person from a country being able to communicate with a person from another country by using a common language, and an overall "ease of communication" score between the two countries.

The overall picture of language connectivity is that, inside ASEM, Europe is better connected in terms of languages than Asia. Figure 36 shows a measure of the language connectivity with other ASEM countries. This is due to a number of reasons, but major factors are likely to be the greater prevalence of English speakers in Europe as well as speakers of other global languages such as French and Spanish. For historical reasons, some countries in Asia are linguistically well connected with Europe through the use of English. This is the case in Australia and New Zealand as well as Pakistan, Philippines, Singapore and India.

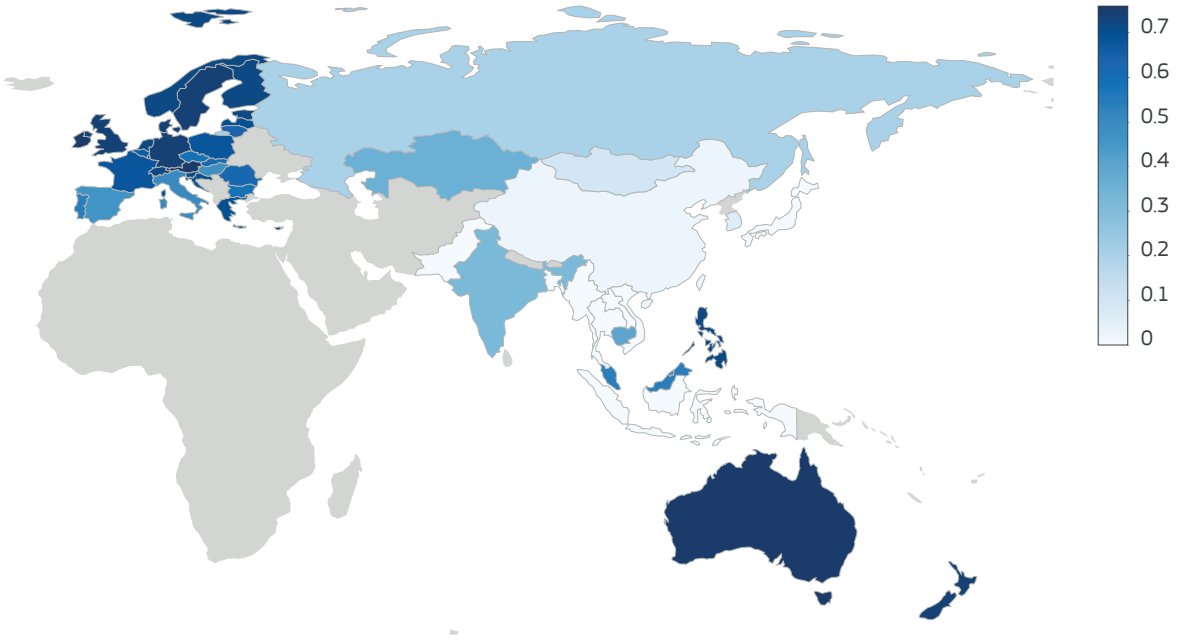


Figure 36. Average language connectivity with other ASEM countries

Another reason is simply the diversity of languages in Asian countries. Figure 37 shows that many Asian countries have a very large number of spoken languages, with Indonesia being recorded as having 697, of which 667 are not spoken in any other ASEM country[10].

Common language is a contributing factor for connectivity particularly in terms of people-to-people ties, as shown by the strong relation between common language users and the people-to-people pillar. At the bilateral level, language connectivity shows significant correlations with migration and student mobility, but also with co-patents and research. In other words, country pairs that have stronger language connections tend to have better connections in these respects, when normalised by combined population or GDP.

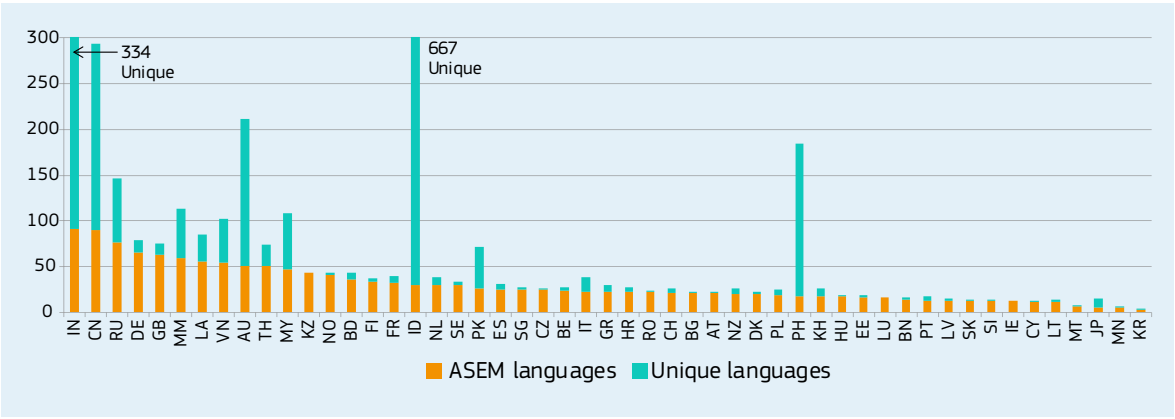


Figure 37. Number of languages spoken by at least one other ASEM country (orange), and number of languages not spoken by any other ASEM country (green)

[10] Source: Ethnologue Global Dataset https://www.ethnologue.com/product/ethnologue-global-dataset-0

3.2 HOW CONNECTIVITY RELATES TO SUSTAINABILITY

According to the ASEM definition, connectivity should contribute to the materialisation of the Sustainable Development Goals. Thus, this section explores the relationship between the Connectivity Index and the Sustainability Index to determine whether connectivity contributes positively to sustainability. The latter is structured along the three main pillars of sustainability: environmental, social and economic (see Figure 10, section 2.2).

In general, connectivity and sustainability mutually reinforce each other. Countries with higher levels of connectivity are usually coupled with higher levels of sustainability, as shown by the linear pattern in Figure 38. Yet, some countries with similar connectivity scores can have substantially different sustainability scores. For instance, within the same GDP per capita group, Kazakhstan and Vietnam are close in terms of their connectivity scores but far apart when it comes to their sustainability scores. The same situation is true for Greece and Romania. Hence, there is scope for effective policies to address sustainability goals in Vietnam or Romania to inspire action in Kazakhstan or Greece.

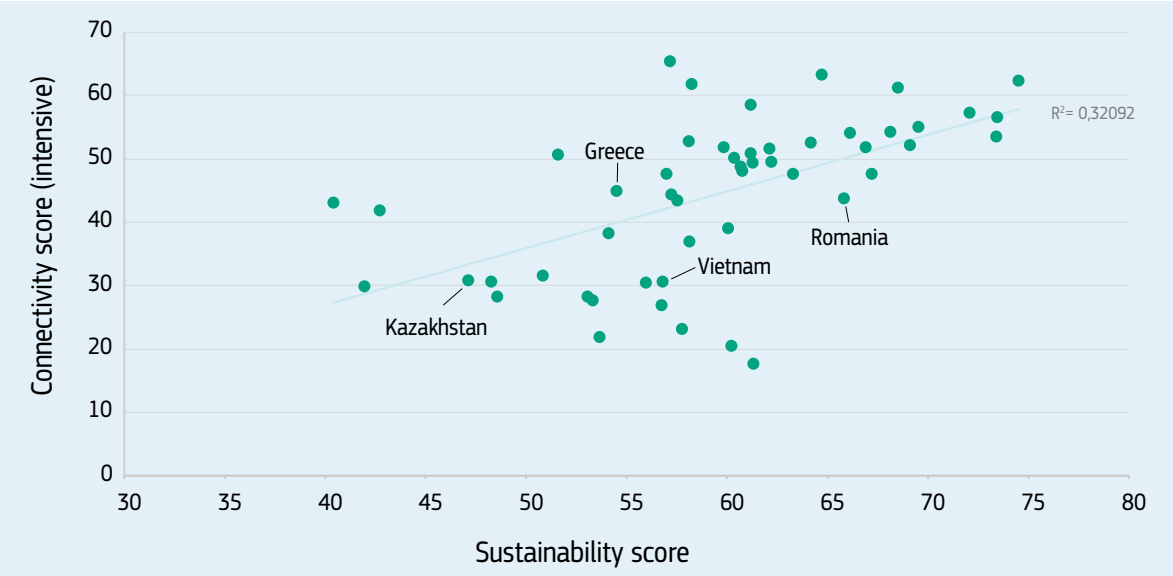


Figure 38. Intensive connectivity scores and sustainability scores

Further insights can be obtained when breaking down sustainability into its three pillars. Social sustainability and connectivity tend to go hand in hand, meaning that the positive association between connectivity and sustainability is largely driven by the social pillar of sustainability. On average, more connected countries perform better on social sustainability – see Figure 39 which shows a strong association between the two scores.

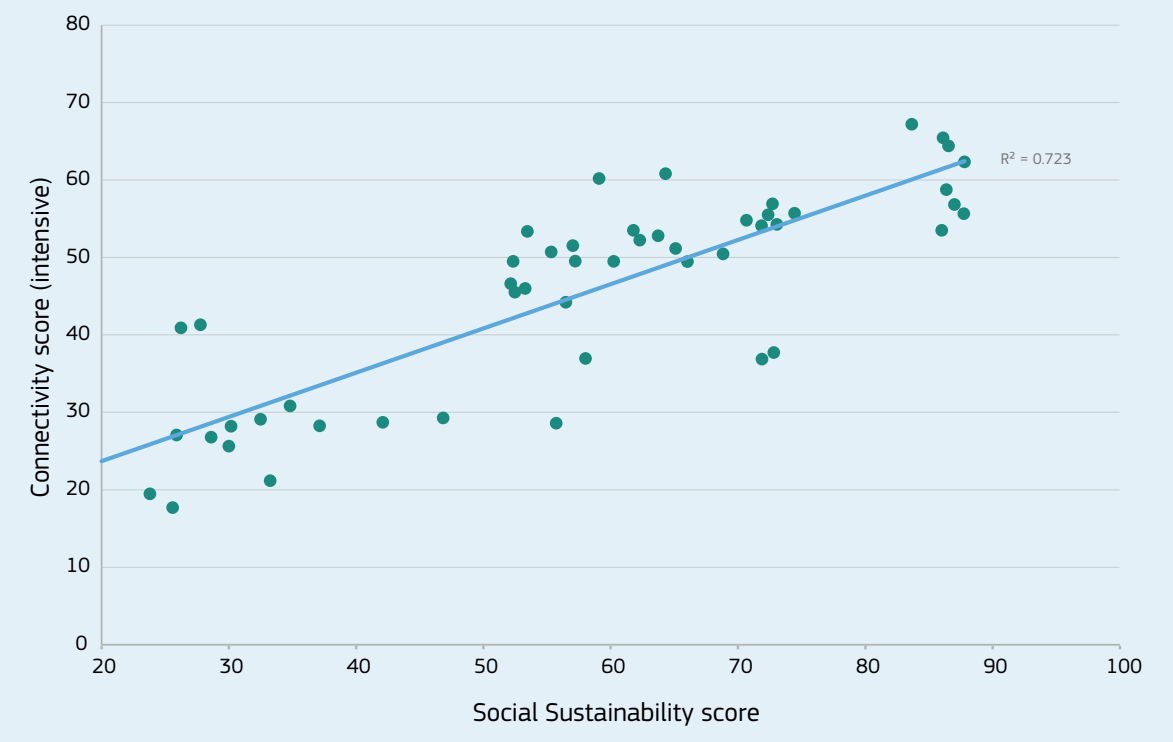


Figure 39. Intensive connectivity scores and social sustainability scores

On the other hand, environmental and economic/financial pillars of sustainability are not significant determinants of a country's connectivity performance, since there is no significant association between those and connectivity (Figures 40 and 41).

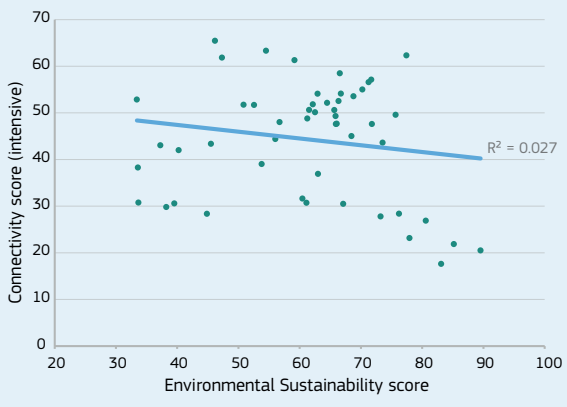


Figure 40. Intensive connectivity and environmental sustainability scores

Figure 41. Intensive connectivity and economic/financial sustainability scores

Why is ASEM connectivity not associated with environmental and economic/financial sustainability? In the case of the former, connectivity is a phenomenon which goes hand in hand with economic development and higher standards of living, which result in mixed environmental impacts. For instance, ASEM countries with higher GDP per capita tend to have higher CO_2 emissions per capita and a larger domestic material footprint, but also tend to have lower levels of energy intensity in the economy. In the case of economic and financial sustainability, while more connected countries have in general greater R&D expenditure and lower rates of youth not in education or unemployed, they also typically have higher rates of private debt and a lower rate of GDP growth. Again, this is more likely to be due to differing levels of economic development, although there is a clear challenge regarding how countries can be well connected but still maintain high levels of environmental and economic/financial sustainability.

Turning to the indicators of the social sustainability pillar, more connected countries have a lower perception of corruption, higher presence of international NGOs, fewer people living below the poverty line, and more freedom of the press.

When exploring the individual components of connectivity, Table 1 shows that there is a closer relationship between the political, physical and institutional pillars of connectivity and the Sustainability Index. In other words, countries achieving higher levels of political, physical and institutional connectivity tend simultaneously to achieve higher levels of sustainability, which is essentially driven by its social pillar. Overall, there is no significant relation between countries achieving lower or higher levels of economic/financial connectivity and sustainability.

Table 1. **Strength of association (correlation coefficients) for Connectivity and Sustainability Indexes**
Note: Grey cells indicate no significant association.

		Sustainability pillars			Sustainability
		Environmental	Social	Economic/ Financial	
	Connectivity		0.85		0.57
Connectivity pillars	Physical		0.73		0.52
	Economic/ Financial				
	Political		0.66		0.56
	Institutional		0.72		0.47
	People-to-people		0.71		0.39

3.3 HOW CONNECTIVITY RELATES TO GDP, GDP PER CAPITA AND POPULATION SIZE

This section explores how connectivity may relate to country characteristics such as GDP, GDP per capita and population size. To this end, countries are grouped into peer groups (see Annex 4) for each variable, and connectivity is compared across groups. It is also helpful to note that GDP and population are extensive quantities, so it is more meaningful to compare them to extensive connectivity, while GDP per capita is an intensive quantity and should therefore be compared with intensive connectivity (see section 2.3).

In terms of GDP per capita, there is a clear positive association with intensive connectivity – see Figure 42. As a result, connectivity scores for low-income countries are much lower than those for higher-income countries. This positive association is somewhat weaker when focusing on the lower-middle and upper-middle income countries. Here there are countries, like Romania and Korea, with similar levels of connectivity but quite different levels of GDP per capita. Many aspects of connectivity are related to personal wealth—for example, foreign travel costs money. Indeed, GDP per capita has fairly strong correlations with people-to-people connectivity (correlation 0.67), as well as with physical connectivity (correlation 0.73). These aspects of connectivity are clearly more prevalent in high-income countries.

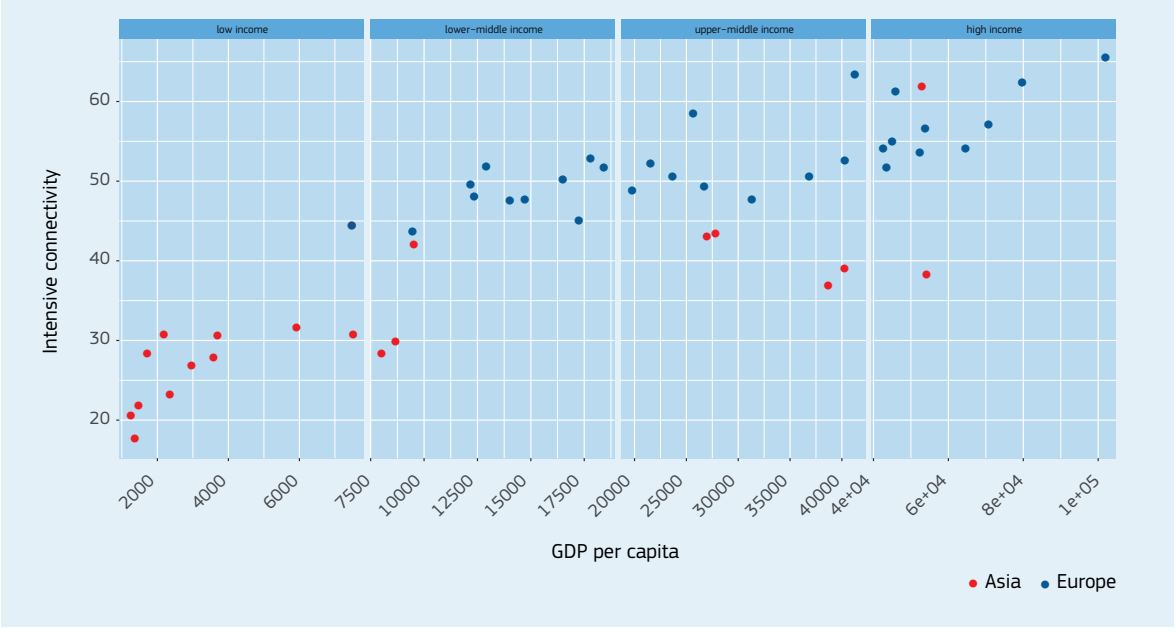


Figure 42. Intensive connectivity versus GDP per capita; countries are grouped with respect to GDP per capita

Figure 43 shows in the first place that there is a positive association between extensive connectivity and GDP, a trend that is observed both for Asian and European countries. In addition, for a given GDP group, European countries tend to have slightly higher connectivity than Asian countries.

What causes this consistent difference? When looking at the pillars within extensive connectivity, political and institutional connectivity are the least related to GDP. Moreover, due to the close integration of most European countries through the European Union, European countries tend to score better in these aspects. Figure 43 also shows that if connectivity scores are recalculated excluding these two pillars, the gap between Asian and European countries with similar GDPs effectively disappears.

Figure 43. Extensive connectivity scores versus GDP; countries are grouped with respect to GDP per capita: full scores (above); scores excluding political and institutional dimensions (below)

Connectivity costs money and the size of a country's economy is a big factor in determining the size of its connections with other countries. But political and institutional connectivity is much less limited by GDP and might turn out to be efficient pathways for countries to advance in connectivity performance. As noted earlier, these forms of connectivity may have significant knock-on benefits in terms of economic and people-to-people links.

Finally, when looking at extensive connectivity and population, no general linear pattern emerges from the data. However, when zooming in on the two regional blocs separately, the data suggest the presence of an upward trend but only within the European region. In the light of this, larger countries tend to be more highly connected than smaller countries in Europe, but not necessarily in Asia.

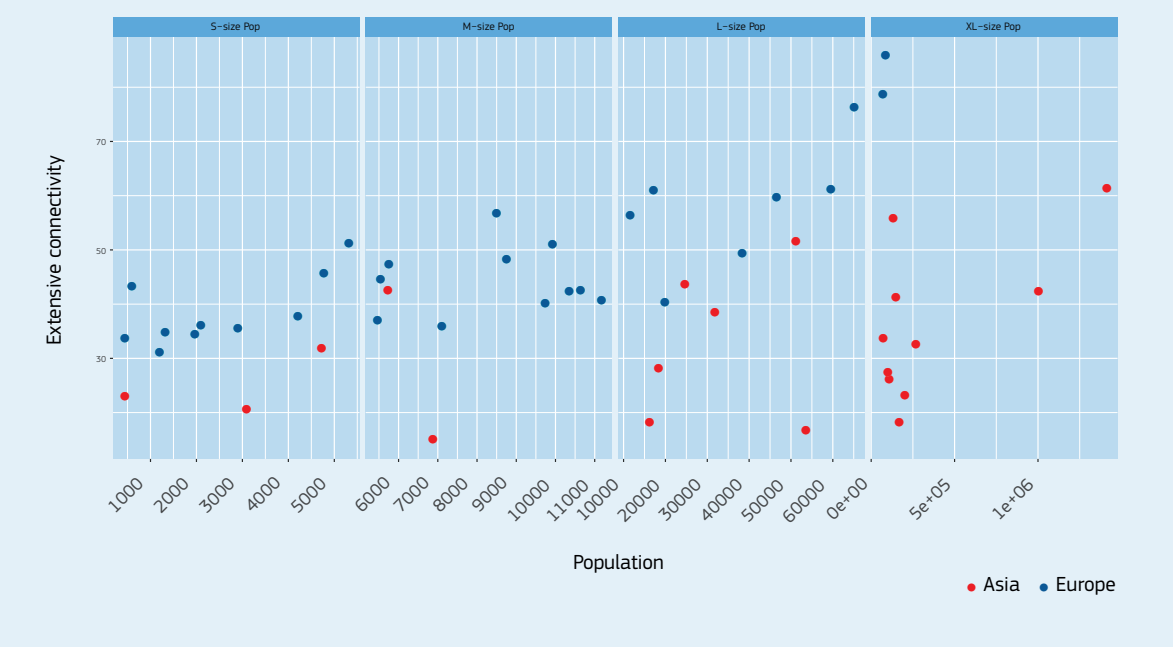


Figure 44. Extensive connectivity versus population

3.4 ASEM SUSTAINABLE CONNECTIVITY AND OTHER INDICES

In recent years, several indices have been proposed to measure multidimensional phenomena such as globalisation and sustainability. Two of the most relevant examples are the KOF Globalisation Index, developed by the ETH Zurich-KOF Swiss Economic Institute, and the Sustainable Development Goals Index, developed by Bertelsmann Stiftung and Sustainable Development Solutions Network. In this section we compare the rankings resulting from both indices with those from the ASEM connectivity and sustainability framework.

3.4.1 ASEM SUSTAINABLE CONNECTIVITY AND THE KOF GLOBALISATION INDEX

The KOF Globalisation Index aims to measure globalisation, a multifaceted concept characterised by the creation of networks of connections, and mediated through a variety of flows including people, information and ideas, capital and goods (Gygli et al., 2018). The first thing to notice when comparing the ASEM Connectivity Index and the KOF Globalisation Index is that there is a positive and significant association between the two (Figure 45), both in intensive and extensive forms. This result suggests that both indices are relatively aligned and share many aspects in common. In a similar vein, the share of ASEM countries that differ by more than 10 positions in ASEM intensive connectivity with the KOF Globalisation index is only moderate, reaching 14 %.

This similarity does not imply redundancy; on the contrary, it contributes to validating the ASEM Connectivity Index against an external benchmark. Moreover, the key difference with the ASEM Connectivity Index is that it focuses on ASEM countries and provides an unprecedented analysis of bilateral connectivity.

Figure 45. **Relation between ASEM Connectivity Index and KOF Globalisation Index in terms of countries' positions**

3.4.2 ASEM CONNECTIVITY AND THE 'SUSTAINABLE DEVELOPMENT INDEX AND DASHBOARDS'

The 'Sustainable Development Index and Dashboards' (SDG Index) provides an assessment of 193 countries' performance on the 17 SDGs (Sachs et al., 2018). The SDG Index score reflects the countries' distance from achieving the SDGs and varies between 0 (worst performer) to 100 (best performer).

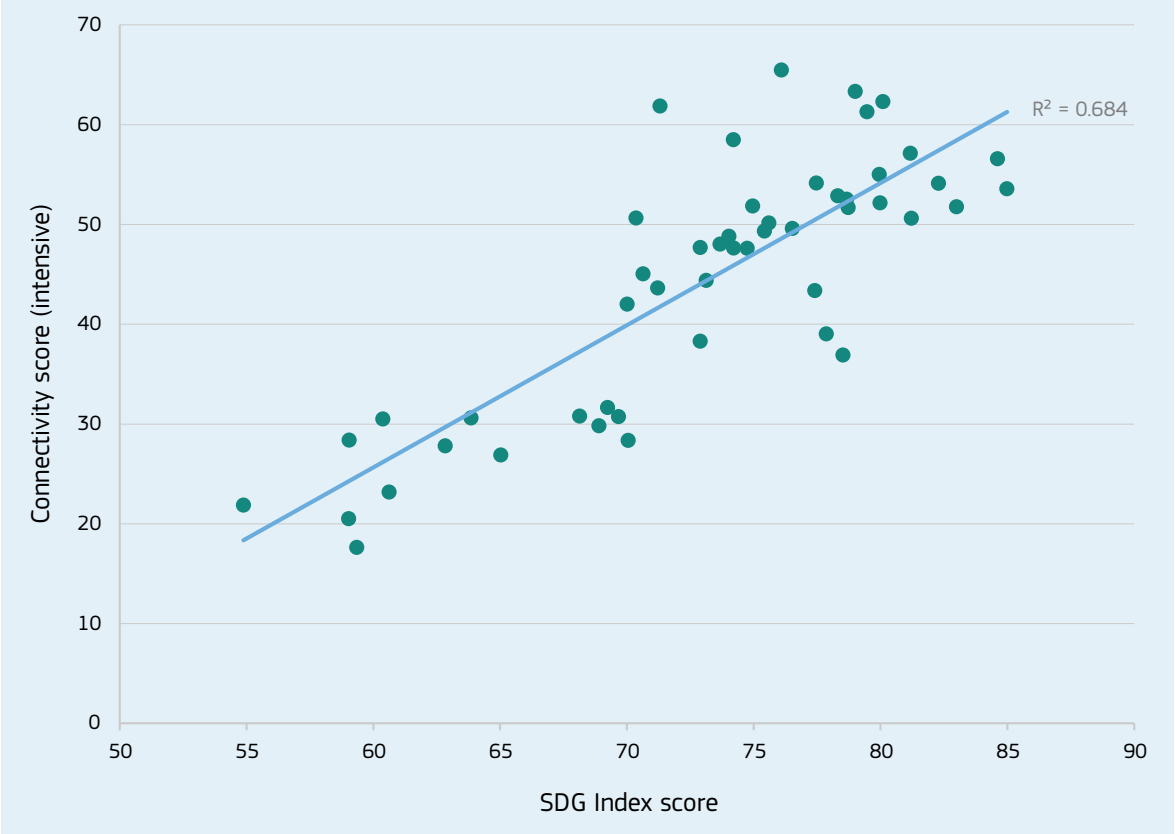


Figure 46. Relationship between ASEM Connectivity Index and the 'Sustainable Development Index and Dashboards' scores.
Note: data is not available for Brunei Darussalam

When analysing the relationship between ASEM connectivity and the SDG Index (Figure 46) there is a clear and positive association between connectivity and the SDG Index. The scatterplot shows a similar trend to that in Figure 38 (section 3.2) using the ASEM Sustainability Index.

By considering all the 17 SDGs, the SDG Index enables the relationship between connectivity and individual SDGs to be explored. Table 2 shows that 11 out of 17 SDGs have a positive association with connectivity. Of those, three SDGs are very strongly related to connectivity. This is the case for Goal 3: Good Health and Well-being, which means that better connected countries have better health conditions. As for Goal 9: Industry, Innovation and Infrastructure, there are some overlaps of indicators considered on both the Connectivity Index and on this particular SDG (Logistics Performance Index, ICT-related infrastructure and scientific articles), which then leads to this high correlation. With respect to Goal 11: Sustainable Cities and Communities, the indicators considered on the SDG relate to air pollution, drinking water, public transport and household rent overburden, which leads to the observation that more connected countries have better urban living conditions.

There is a negative association between connectivity and Goal 12: Responsible Consumption and Production, which means that more connected countries make greater impacts on the environment due to their consumption and production patterns. In particular, this SDG includes indicators related to waste, wastewater and emissions (SO_2 and nitrogen). This conclusion is supported by earlier observations in this report, as well as by Figge, Oebels and Offermans (2017) who carried out research on analysing the relationship between the Maastricht Globalisation Index and the Ecological Footprint. The authors conclude that globalisation contributes to greater pressure on the environment. Apart from the political dimension of the Maastricht Globalisation Index, all dimensions (economic, social and cultural, and technological) drive human pressures and demands on the environment.

Table 2. **Strength of association (correlation coefficients) between the ASEM Connectivity Index and Sustainable Development Goals**
Note: Grey cells represent no significant association

Sustainable Development Goals	Connectivity
Goal 1: No Poverty	0.5
Goal 2: Zero Hunger	0.7
Goal 3: Good Health and Well-being	0.9
Goal 4: Quality Education	0.7
Goal 5: Gender Equality	0.6
Goal 6: Clean Water and Sanitation	
Goal 7: Affordable and Clean Energy	0.7
Goal 8: Decent Work and Economic Growth	0.7
Goal 9: Industry, Innovation and Infrastructure	0.8
Goal 10: Reduced Inequality	0.5
Goal 11: Sustainable Cities and Communities	0.8
Goal 12: Responsible Consumption and Production	-0.8
Goal 13: Climate Action	
Goal 14: Life Below Water	
Goal 15: Life on Land	0.4
Goal 16: Peace, Justice and Strong Institutions	0.7
Goal 17: Partnerships to achieve the Goal	

When comparing ASEM Sustainability Index with the SDG Index, there is also a positive and significant association at the level of countries' positions. However, the share of ASEM countries that shift in more than 10 positions when comparing the ASEM Sustainability Index and the SDG Index is around two thirds. Notwithstanding, the scope of ASEM Sustainability is by definition narrower than that of the SDG Index: it does not aim to cover the whole range of SDGs, but rather to focus only on the closer links between connectivity and sustainability. The results above suggest that the SDG Index and ASEM sustainability offer complementary insights on the relationship between connectivity and sustainability.

3.5 LEADING POLICY AREAS AND CHALLENGES AHEAD

The ASEM Sustainable Connectivity heatmap (Figure 47) allows for the key pillars where ASEM countries are doing better to be highlighted. In order to achieve this, the columns corresponding to the pillars have been ordered (from left to right) according to countries' performance scores in both the connectivity and sustainability pillars. The columns to the left of the ordered heatmap correspond to areas in which ASEM countries tend to perform comparatively better. The areas in which ASEM countries are facing the most pressing challenges in terms of policy intervention, when compared with all eight pillars, are placed at the right-hand end of the dashboard. The Kemeny median order (Kemeny, 1959; see section 2.1) technique has been used to arrive at the final order presented in Figure 47.

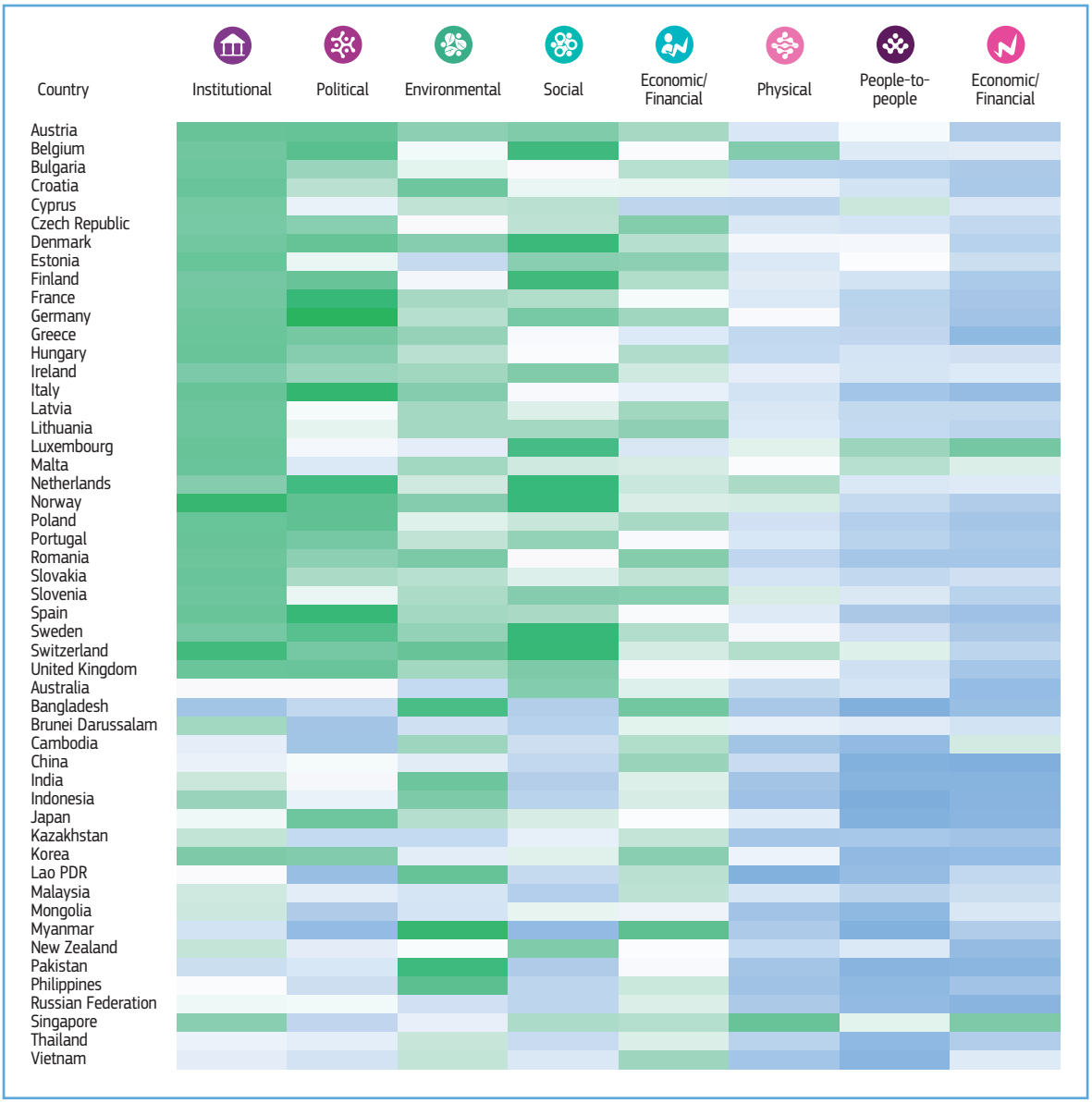


Figure 47. The ASEM Sustainable Connectivity heatmap.

The pillars are reordered based on overall scores (from the left - leading policy areas to the right - challenges ahead); performance is coded using a colour scale (from darker green - top performance to darker blue - bottom performance)

Top performance — *Bottom performance*

The results[11] above show that, compared to other pillars, ASEM countries are doing relatively well in soft aspects such as institutional and political connectivity. This outcome reflects positively on ASEM's past and present endeavours to enhance connectivity, since institutional and political aspects are precisely those more responsive to policy interventions. Besides soft connectivity, ASEM countries are also doing better in sustainability dimensions. According to the Kemeny ordering technique, the greatest achievements in sustainability so far correspond to environmental sustainability, followed by social and economic sustainability. Conversely, economic/financial connectivity, together with people-to-people and physical connectivity, are the areas in which in general there is greater scope for improvement across ASEM countries.

The Kemeny ordering technique has also been applied to each of the regional ASEM groups separately. The results obtained provide additional insights into the similarities and differences across regional groups in terms of successful areas and challenges. On the one hand, success stories in Europe and Asia seem to complement each other: European countries tend to do better in institutional connectivity, political connectivity and social sustainability, whilst the main strengths of Asian countries lie elsewhere, namely, in the environmental and economic/financial sustainability pillars. On the other hand, the main challenges in both regions overlap, being related mainly to economic and people-to-people connectivity (Figure 48).

Region	Success areas	Challenges
Europe	Institutional connectivity Political connectivity Social sustainability	Economic/financial connectivity People-to-people connectivity
Asia	Environmental sustainability Economic/financial sustainability	People-to-people connectivity Economic/financial connectivity

Figure 48. **Successful areas and challenges by geographical region**

[11] In comparing the eight pillars, the Kemeny order represents the best compromise among all 40 320 possible permutations (orderings) of the eight options (Saisana et al., 2017). The heatmap is based on intensive variables. No major qualitative change occurs when the analysis is based on extensive measures – only economic sustainability and social sustainability swap positions in the final ordering.

4 CONCLUSIONS

This report has presented a detailed analysis of connectivity following the ASEM definition, and its links with sustainable development. The main objective is to provide ASEM policymakers with a scientifically and technically sound data framework as a basis for ASEM discussions on the subject of connectivity. a more in-depth and tailored exploration can be found on the ASEM Sustainable Connectivity Portal, where users can explore specific aspects of connectivity and focus on individual countries or peer groups. This work is expected to be part of an evolving effort based on ASEM community needs, expert feedback, and on increased data availability. It is proposed that the existing indicators (subject to data availability) and the overall methodology will be updated regularly. This will enable policymakers and other stakeholders to monitor progress over time and for the framework to evolve and improve according to ASEM's needs.

The main key messages are summarised as follows:

Connectivity can help to achieve the Sustainable Development Goals, but challenges lie ahead

Connectivity and the SDGs have the potential to mutually reinforce one another: higher values of one are associated with higher values of the other. In particular, connectivity and the social pillar of sustainability linked to SDG 1 (no poverty), SDG 4 (quality education), SDG 5 (gender equality), SDG 10 (reduced inequalities), SDG 16 (peace, justice and strong institutions) have a strong positive association, thereby suggesting that more connected countries have higher levels of social sustainability.

More connected countries are also associated with lower levels of poverty, less inequality, more students in tertiary education, more freedom of the press, are more inclusive to minorities, have a greater presence of NGOs, and lower levels of corruption perception. On the contrary, there is no significant association between connectivity and the domains of environmental and economic/financial sustainability.

While connectivity is undoubtedly a positive phenomenon overall, policymakers face the challenge of how to improve connectivity and social sustainability without neglecting environmental and economic sustainability. This could be an important topic of dialogue and exchange of ideas within ASEM.

Cost-effective connectivity through politics and institutions

The results show that extensive connectivity is strongly linked to GDP, and intensive connectivity to GDP per capita. Trade is strongly related to GDP, and movement of people requires personal wealth, meaning that countries with lower income levels have fewer opportunities for people mobility across borders.

Despite these limitations, this study shows encouraging evidence that strong institutional and political links also play a big part in connectivity and are mainly not related to the size of a country's economy. Some particular findings, at the bilateral level, include:

- Regional trade agreements are associated with increased trade;
- Embassy connections are associated with increased trade and student mobility;
- Visa-free travel is associated with a larger volume of international flights, and more research collaborations.

While these are associations which do not necessarily imply causal links, there seems to be an underlying message that institutional and political links, which are within the reach of policymakers, seem to be associated with greater tangible connectivity outcomes.

This would appear to be an opportunity for ASEM to step up its role as a platform for discussion and cooperation, bridging the gaps, strengthening the links, sharing ideas and learning from best practices.

Working together and learning from each other – everyone has something to offer

Connectivity does indeed bridge the gaps, and every country in ASEM has something to bring to the table. From Portugal to New Zealand, a myriad of successes in the different domains of connectivity and sustainability can be found.

In the physical connectivity domain, the forerunners are small countries like Belgium, Singapore and the Netherlands which, given their size, are the most connected countries. China is the most integrated country in global liner shipping networks, measured by the Liner Shipping Connectivity Index, while Germany offers the best trade logistics measured by the Logistics Performance Index. Korea has the fastest internet connection speed.

When turning to economic/financial connectivity, the largest players in terms of flows of money within ASEM are Germany, the United Kingdom, China, France and Japan. However, in relation to country size, i.e. as a share of a country's GDP, once again it is small countries like Luxembourg and Singapore which stand out. For example, in terms of foreign direct investment, Cambodia, Mongolia, Myanmar and Vietnam are the main recipients in ASEM in relation to their respective GDP. With respect to personal remittances, Brunei Darussalam, Luxembourg and Latvia present the largest flows in relation to their respective GDP.

As regards political ties, Germany and Italy are at the forefront in Europe, while Japan and Korea stand out in Asia. Portugal, Spain, Slovakia, Slovenia, Norway and Bulgaria are among the countries with the highest voting coincidence in UN General Assembly issues with other ASEM countries. Norway and Switzerland are good examples of countries with a strong institutional framework. Cambodia, Laos, Thailand, India and the Philippines are the most visa-open countries, while Singapore has the most powerful passport which permits entry to almost all ASEM countries. Countries like Laos, Brunei Darussalam and Mongolia have the lowest number of technical barriers to trade.

Given the size of a country, people from Luxembourg, Malta, Cyprus and Singapore benefit the most from people-to-people connectivity. But when looking at this in terms of absolute volumes, it is usually large countries and countries with historical ties which stand out. This is the case for the United Kingdom, France, Germany, China and Australia. Russia is the largest country of origin of migrants in ASEM, followed by Poland, Bangladesh, China, India and Kazakhstan. The most popular destinations for tertiary students are the United Kingdom, Australia, Germany, Japan, Russia, France and Malaysia. Luxembourg, Cyprus and Brunei Darussalam have the largest percentage of students studying abroad in relation to their student population. Switzerland and Finland stand out in the number of patents with foreign co-inventors and Estonia in terms of research collaborations, when measured against each country's GDP. In relation to a country's population, Malta, Croatia, Austria, Cyprus, Estonia and Greece receive the biggest flow of tourists. Turning to culture, the largest trade in cultural and creative services in relation to GDP occurs in Hungary, Luxembourg and Malta, while Singapore, Czech Republic and Switzerland have the largest trade in cultural goods in relation to GDP.

Croatia in Europe and Myanmar in Asia are among the most environmentally sustainable countries. Cambodia makes most use of renewable energies to supply its energy consumption. In Asia, Laos has the lowest CO_2 emissions per capita, while Latvia has the lowest in Europe. Domestic material consumption registers the lowest values in countries like Bangladesh, Myanmar, Philippines and Pakistan, while the United Kingdom has the lowest consumption rate among European countries.

When considering social sustainability, Switzerland and Sweden are leading examples in Europe, and New Zealand and Australia in the Asian region. Thailand is among the leading countries in the fight against extreme poverty, while Slovakia, Slovenia and Norway are the societies with the lowest levels of income inequality. Laos has the greatest ratio of women to men in the labour force. Ireland sets an example for its inclusiveness towards minorities.

The lowest levels of the Corruption Perception Index are found in New Zealand and Denmark. As for economic sustainability, the Czech Republic stands out in Europe, while Myanmar takes first place in Asia. Brunei Darussalam has the lowest public debt, followed by Estonia and Russia. The countries with the lowest private debt are Pakistan, Laos, Myanmar, Romania and Indonesia. Romania stands out for its performance in terms of GDP growth per capita. Korea, Japan, Sweden and Austria are investing the most in R&D in relation to their GDP. Vietnam has the lowest rates of youth without employment or not in education.

From a broader regional perspective, success stories in Europe and Asia seem to be somewhat complementary. While European countries tend to do better in the institutional connectivity, political connectivity and social sustainability pillars, success stories in Asian countries are generally found in the environmental and economic/financial sustainability pillars.

To summarise, it is clear that best practice and inspiration can be found in every member country.

Ties within ASEM are stronger than with the rest of the world, but opportunities exist to further strengthen Asia-Europe cooperation

Cooperation between ASEM countries in different areas, such as education, research, innovation, migration, economy and finance, represents more than half of ASEM countries' international connections. Around 70% of the trade in goods takes place between ASEM members, over 60% of ASEM investors choose to invest in another ASEM country, over 60% of international mobile students in tertiary education move to another ASEM country, and 80% of international co-patents in ASEM result from collaborations between ASEM countries.

When turning to exchanges and cooperation between Asia and Europe, they represent on average around 20% of overall connections within the ASEM area. While this value is a genuinely positive outcome of Asia-Europe connectivity, it also gives an idea of the extent of the untapped potential for boosting tangible cooperation between the two regional blocs. It is evident that for some domains shorter distances facilitate trade and cooperation. For instance, trade in electricity occurs mainly between neighbouring countries, while cross-border trade in electricity between Asia and Europe is not expected to increase as it is constrained by distance. Nevertheless, sharing knowledge between Europe and Asia on how to improve grid interconnections is seen a fundamental area for cooperation. Collaboration between European and Asian countries on producing scientific articles is the most prominent example of cooperation within the ASEM network, accounting for one third of total collaboration between ASEM countries.

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ANNEXES

ANNEX 1: LIST OF INDICATORS

Description of the 49 indicators used in the ASEM Connectivity and Sustainability indexes. The 16 indicators used only for the ASEM connectivity bilateral analysis are indicated by 'ASEM' marked in the 'Geographic coverage' column. Data are available in full on the ASEM Sustainable Connectivity Portal online.

Indicator	Description	Unit	Source	Year	Geographic coverage	Type of data	Data availability
Index	Connectivity						
Pillar	Physical						
1. Logistics Performance Index	Logistics Performance Index overall score reflects perceptions of a country's logistics based on efficiency of customs clearance process, quality of trade- and transport-related infrastructure, ease of arranging competitively priced shipments, quality of logistics services, ability to track and trace consignments, and frequency with which shipments reach the consignee within the scheduled time. The index ranges from 1 to 5, with a higher score representing better performance.	None (1-5 score)	The World Bank	2016	National	Soft	100%
2. International flights passenger capacity	Number of seats sold on international direct flights in ASEM countries.	Number of seats	OAG	2017	ASEM	Hard	100%
3. Liner Shipping Connectivity Index	Measures how well countries are connected to global shipping networks. It is computed based on five components: number of ships, container-carrying capacity, maximum vessel size, number of services, and number of companies that deploy container ships in a country's ports.	None (score)	UNCTAD	2016	Global	Hard	100%
4. Border crossings	Total number of crossings of major roads with international borders.	Number of crossings	Own elaboration (ESRI)	2018	Global	Hard	100%
5. Trade in electricity	Exports and imports of electricity measured in kWh among ASEM countries.	Thousands of KWh	Comtrade	2015-2017 average	ASEM	Hard	100%
6. Trade in gas	Exports and imports of petroleum gases and other gaseous hydrocarbons measured in million tonnes among ASEM countries.	Million tonnes	Comtrade	2015-2017 average	ASEM	Hard	100%
7. Average connection speed	Average speeds that users can probably expect from their internet connections. Mobile network data has been removed from the dataset used to calculate the average connection speed.	Mbps	Akamai	2017	National	Hard	84%
8. Population covered by at least a 4G mobile network	Percentage of inhabitants living within range of a mobile cellular signal, irrespective of whether they are mobile phone subscribers or users.	Percentage	UN	2015	National	Hard	100%

Indicator	Description	Unit	Source	Year	Geographic coverage	Type of data	Data availability
Pillar	Economic/Financial						
9. Trade in goods	Exports and imports of goods among ASEM countries measured in USD.	Bn USD	Comtrade	2016	ASEM	Hard	100%
10. Trade in services	Exports and imports of commercial services worldwide measured in USD.	Million USD	WTO	2016	Global	Hard	100%
11. Foreign direct investment	Foreign direct investment (FDI) made and received in each ASEM country. FDI is a category of cross-border investment associated with a resident in one country having control or significant influence on the management of an enterprise that is resident in another economy.	Million USD	fDiMarkets	2015-2017 average	ASEM	Hard	100%
12. Personal remittances (received and paid)	Bilateral flows of personal transfers and compensation of employees received and paid per country. Personal transfers comprise all current transfers in cash or in kind made or received by resident households to or from non-resident households. Personal transfers thus include all current transfers between residents and non-residents. Compensation for employees refers to the income of border, seasonal, and other short-term workers who are employed in an economy where they are not resident, and of residents employed by non-resident entities.	Current USD (millions)	The World Bank	2017	Global	Hard	100%
13. Foreign portfolio investment liabilities and assets	Cross-border transactions and positions involving debt or equity securities, other than those included in direct investment or reserve assets. It involves purchasing stocks, securities and other financial assets, but not having direct control over the securities or businesses.	Million USD	IMF	2017	Global	Hard	94%
Pillar	Political						
14. Embassies network	Number of embassies a country has in another ASEM country and hosts in its own country.	Number	Lowy Global Diplomacy Index / Europa World Plus	2017	ASEM	Hard	100%
15. Participation in international in-tergovernmental organisations	Number of international intergovernmental organisations of which a country or territory is a member.	Number	UIA	2016	National	Hard	100%
16. UN voting alignment	Sum of coincidence scores with other ASEM countries. The coincidence score reflects the number of times countries voted in agreement, or partial agreement, in United Nations (UN) resolutions over the calendar year of 2017.	None (score)	UN	2017	ASEM	Hard	100%

Indicator	Description	Unit	Source	Year	Geographic coverage	Type of data	Data availability
Pillar	Institutional						
17. Cost to export/ import	Documentary compliance captures the time and cost associated with compliance with the documentary requirements of all government agencies of the origin economy, the destination economy and any transit economies. The aim is to measure the total burden of preparing the bundle of documents that will enable completion of the international trade for the product and partner pair assumed in the case study. For the purpose of this study, we aggregate the figures corresponding to the cost to export and the cost to import.	Current USD	The World Bank	2017	National	Hard	100%
18. Mean tariff rate	Average of effectively applied rates weighted by the product import shares corresponding to each partner country.	Percentage	The World Bank	2016	National	Hard	94%
19. Technical barriers to trade	Number of technical barriers to trade (TBTs) the country imposes. TBTs are a category of non-tariff measures (NTMs), which are policy measures other than ordinary customs tariffs that can have an economic effect on international trade. TBTs refer to mandatory technical regulations and voluntary standards which define specific characteristics that a product should have, such as its size, shape, design, labelling / marking / packaging, functionality or performance.	Number of measures (initiated, in force)	WTO	2017	National	Hard	98%
20. Signatory of TIR Convention	Signatory of the TIR Convention which establishes an international customs transit system with maximum facility to move goods. The TIR Convention facilitates the international carriage of goods from one or more customs offices of departure to one or more customs offices of destination (up to a total of four customs offices departure and destination) and through as many countries as necessary. As a rule, the vehicle remains sealed throughout the TIR transport which means goods are generally not inspected at border crossings.	1 (yes)/0 (no)	UNECE	2018	National	Hard	100%
21. Regional trade agreements	Number of bilateral connections with other ASEM countries created under regional trade agreements currently in force within ASEM. A regional trade agreement is a treaty between two or more governments that defines the rules of trade for all signatories.	Number of billateral connections	WTO	2018	ASEM	Hard	100%
22. Visa-free or visa-on-arrival	Number of ASEM countries, whose nationals can enter a specific ASEM country without a visa or with a visa-on-arrival plus the number of ASEM countries whose nationals can enter on the same terms in the country.	Number of countries	Passport Index	2017	ASEM	Hard	100%

Indicator	Description	Unit	Source	Year	Geographic coverage	Type of data	Data availability
Pillar	People-to-people						
23. International student mobility in tertiary education	Students who have crossed a national border for education and are enrolled outside their country of origin in tertiary education within ASEM countries. This means the total number of students from the country studying in another ASEM country, plus the total number of students from any other ASEM country studying in the country.	Number of inter-national students	UNESCO	2016	ASEM	Hard	100%
24. Research outputs with international collaborations	Number of scientific publications co-authored by authors located in more than one ASEM country.	Number of research outputs	Clarivate Analytics	2017	ASEM	Hard	100%
25. Patents with foreign co-inventor	Patents with at least a foreign ASEM country co-inventor filed under the Patent Co-operation Treaty (PCT). Refers to the number of patents invented by a resident of ASEM country x with at least one foreign inventor from ASEM country y.	Number of patents	OECD	2012-2014 average	ASEM	Hard	88%
26. Trade in cultural services	Exports and imports of personal, cultural, and recreational services.	Million USD	WTO	2016	Global	Hard	92%
27. Trade in cultural goods	Exports and imports of creative goods (books, audiovisuals, art crafts, etc.).	Million USD	UNCTAD	2015	ASEM	Hard	86%
28. Tourist arrivals at national borders	Number of tourists who travel to a country other than that in which they have their usual residence, but outside their usual environment, for a period not exceeding 12 months, and whose main purpose in visiting is other than an activity remunerated from within the country visited. When data on the number of tourists are not available, the number of visitors, which includes tourists, same-day visitors, cruise passengers and crew members, is used.	Number of people	The World Bank	2016	Global	Hard	100%
29. Migrant stock	The total stock of migrants from the country living in any other ASEM country, plus the total stock of migrants from any other ASEM country living in the country.	Number of people	UN-DESA	2017	ASEM	Hard	100%
30. Common languages users	A score which reflects the linguistic link between pairs of countries, taking into account all common languages and the proportion of speakers of each. Roughly interpreted as the likelihood of two randomly chosen people from each country being able to communicate in a common language.	None (score)	Ethnologue	2017	ASEM	Soft	100%

Indicator	Description	Unit	Source	Year	Geographic coverage	Type of data	Data availability
Index	Sustainability						
Pillar	Environmental						
31. Renewable energy in total final energy consumption	Share of renewable energy in total final energy consumption.	Percentage	The World Bank	2015	National	Hard	100%
32. Primary energy use per GDP	Ratio between primary energy use in kilogramme of oil equivalent and GDP. This refers to the use of primary energy before transformation to other end-use fuels, which is equal to indigenous production plus imports and stock changes, minus exports and fuels supplied to ships and aircraft engaged in international transport. PPP GDP is gross domestic product converted to 2011 constant international dollars using purchasing power parity rates. An international dollar has the same purchasing power over GDP as a USD has in the USA.	kg of oil equivalent per $1000 GDP (constant 2011 PPP)	The World Bank	2014	National	Hard	98%
33. CO_2 emissions per capita	Carbon dioxide emissions stem from the burning of fossil fuels and the manufacture of cement. They include carbon dioxide produced during consumption of solid, liquid, and gas fuels and gas flaring in each country's territory. It excludes emissions from land use such as deforestation.	Tonnes per capita	The World Bank	2014	National	Hard	100%
34. Domestic material consumption per capita	Domestic material consumption (DMC) measures the total amount of materials directly used by an economy and is defined as the annual quantity of raw materials extracted from the domestic territory, plus all physical imports minus all physical exports.	Tonnes per capita	UN Environment	2015	National	Hard	100%
35. Net forest loss	Tree cover loss from 2013 to 2017 in areas with a minimum 30% canopy cover in relation to a country's tree cover extent in 2013.	Percentage	Global Forest Watch	2013-2017	National	Hard	100%
Pillar	Social						
36. Population living below the international poverty line	Poverty headcount ratio at USD 1.90 a day is the percentage of the population living on less than USD 1.90 a day at 2011 international prices.	Percentage	The World Bank	2014	National	Hard	86%
37. Palma Index	Ratio of the richest 10% of the population's share of gross national income (GNI) divided by the share of the poorest 40%.	None (ratio)	UNDP	2010-2015	National	Hard	88%
38. Tertiary graduates	Percentage of population aged 25 years and above with minimum completed level of education (cumulative): at least a Bachelor's or equivalent (ISCED 6 or higher). The highest ISCED level of education an individual has successfully completed. This is usually measured with respect to the highest educational programme successfully completed which is typically certified by a recognised qualification. Recognised intermediate qualifications are classified at a lower level than the programme itself.	Percentage	UNESCO	2015	National	Hard	86%
39. Freedom of the press	Degree of print, broadcast and digital media freedom in countries (0 is the most free and 100 is the least free country).	None (score)	Freedom House	2017	National	Soft	100%

Indicator	Description	Unit	Source	Year	Geographic coverage	Type of data	Data availability
40. Tolerance for minorities	Divisions and schisms between different groups in society – particularly divisions based on social or political characteristics – and their role in access to services or resources, and inclusion in the political process. It is based on a comprehensive social science approach: data from three main streams – pre-existing quantitative datasets, content analysis, and qualitative expert analysis – is triangulated and subjected to critical review to obtain final scores for the Index.	None (score)	Fund for Peace	2018	National	Soft	100%
41. Presence of international non-governmental organisations	Number of secretariats, either principal (headquarters, main office) or secondary (regional, specialised) of non-governmental organisations (NGOs) in a country, per one thousand inhabitants.	Number of secretariats	UIA	2016	National	Hard	100%
42. Corruption Perceptions Index	Perceived levels of public sector corruption according to experts and business people, using a scale of 0 to 100, where 0 is highly corrupt and 100 is very clean.	None (score)	Transparency International	2016	National	Soft	100%
43. Female labour-force participation	Ratio of women to men participating in the labour force aged 15-64 years.	None (ratio)	ILO	2015	National	Hard	96%
44. Women's participation in national parliaments	Proportion of seats held by women members in single or lower chambers of national parliaments, expressed as a percentage of all occupied seats. It measures the degree to which women have equal access to parliamentary decision-making.	Percentage	UN	2017	National	Hard	100%
Pillar	Economic/Financial						
45. Public debt as percentage of GDP	Public debt as percentage of the country's GDP.	Percentage	IMF	2015	National	Hard	98%
46. Private debt, loans and debt securities as a percentage of GDP	Total stock of loans and debt securities issued by households and non-financial corporations as a share of GDP.	Percentage	IMF	2016	National	Hard	98%
47. GDP per capita growth	Annual percentage growth rate of GDP per capita based on constant local currency.	Percentage	The World Bank	2017	National	Hard	100%
48. R&D expenditure as a percentage of GDP	Gross domestic expenditures on research and development (R&D), expressed as a percentage of GDP. They include both capital and current expenditures in the four main sectors: business enterprise, government, higher education and private non-profit. R&D covers basic research, applied research, and experimental development. Expenditure on R&D is a key indicator of government and private-sector efforts to obtain competitive advantage in science and technology.	Percentage	The World Bank	2015	National	Hard	92%
49. Proportion of youth not in education, employment or training	The share of youth (15-24 years) not in education, employment or training (also known as "the NEET rate") indicates the number of young people not in education, employment or training as a percentage of the total youth population. It provides a measure of youth who are outside the educational system, not in training and not in employment, and thus serves as a broader measure of potential youth labour market entrants than youth unemployment, since it also includes young people outside the labour force and not in education or training.	Percentage	ILO	2016	National	Hard	96%

ANNEX 2: LIST OF INDICATORS WITH SCALING VARIABLES USED FOR THE INTENSIVE CONNECTIVITY APPROACH

Indicator	Denominator
Pillar	Physical
1. Logistics Performance Index	-
2. International flights passenger capacity	Population
3. Liner Shipping Connectivity Index	-
4. Border crossings	Country area
5. Trade in electricity	Final energy use
6. Trade in gas	Final energy use
7. Average connection speed	-
8. Population covered by at least a 4G mobile network	-
Pillar	Economic/Financial
9. Trade in goods	GDP
10. Trade in services	GDP
11. Foreign direct investment	GDP
12. Personal remittances (received and paid)	GDP
13. Foreign portfolio investment liabilities and assets	GDP
Pillar	Political
14. Embassies network	-
15. Participation in international intergovernmental organisations	-
16. UN voting alignment	-
Pillar	Institutional
17. Cost to export/import	-
18. Mean tariff rate	-
19. Technical barriers to trade	-
20. Signatory of TIR Convention	-
21. Regional trade agreements	-
22. Visa-free or visa-on-arrival	-
Pillar	People-to-people
23. International student mobility in tertiary education	Population
24. Research outputs with international collaborations	GDP
25. Patents with foreign co-inventor	GDP
26. Trade in cultural and creative services	GDP
27. Trade in cultural goods	GDP
28. Tourist arrivals at national borders	Population
29. Migrant stock	Population
30. Common languages users	-

ANNEX 3: COUNTRY SCORES

Intensive connectivity

Country	Connec-tivity Index	Connectivity pillars					Sustain-ability Index	Sustainability pillars		
		Physical	Economic/ Financial	Political	Institu-tional	People-to-people		Environ-mental	Social	Economic/ Financial
Australia	38.3	34.7	12.3	52.5	52.4	39.5	54.1	33.6	71.9	56.8
Austria	55.0	41.1	24.4	78.0	77.6	54.0	69.5	70.2	72.7	65.7
Bangladesh	17.6	21.5	13.2	32.2	18.1	3.1	61.3	83.1	25.6	75.3
Belgium	63.3	72.0	45.1	80.8	75.5	43.3	64.7	54.5	86.1	53.5
Brunei Darussalam	43.0	46.7	38.8	18.6	66.5	44.6	40.4	37.3	27.8	56.2
Bulgaria	44.4	28.4	23.1	67.6	75.9	27.0	57.3	56.0	53.3	62.5
Cambodia	30.5	18.4	58.6	18.1	46.3	11.0	56.0	67.1	37.1	63.7
China	28.4	34.8	1.6	54.2	47.9	3.4	48.5	44.9	32.5	68.2
Croatia	49.6	47.5	22.3	62.3	76.8	39.0	62.2	75.7	55.3	55.5
Cyprus	50.6	29.5	41.0	48.4	74.6	59.8	51.6	61.5	62.3	31.0
Czech Republic	51.7	41.4	32.4	70.8	74.3	39.5	62.1	52.5	61.8	72.0
Denmark	56.6	50.5	28.0	78.1	75.4	51.0	73.4	71.3	86.4	62.7
Estonia	52.9	42.4	35.9	55.4	77.3	53.4	58.1	33.4	70.7	70.1
Finland	51.8	44.4	22.8	77.6	75.0	39.0	66.9	50.8	86.0	63.7
France	50.6	42.4	19.5	87.4	75.4	28.4	61.2	65.7	63.7	54.2
Germany	54.1	52.3	17.8	94.6	76.5	29.3	68.1	62.9	74.4	66.9
Greece	45.0	32.6	9.3	74.6	76.7	31.9	54.5	68.5	52.1	42.9
Hungary	51.8	33.6	37.7	71.3	77.1	39.6	59.8	62.1	53.5	63.8
India	28.4	18.7	5.7	51.6	59.8	6.1	53.1	76.2	25.9	57.1
Indonesia	27.8	16.1	6.2	48.4	67.9	0.4	53.3	73.2	28.6	58.0
Ireland	54.1	46.5	42.9	67.6	73.3	40.3	66.1	66.7	72.4	59.2
Italy	47.6	38.8	12.6	90.3	77.4	18.9	57.0	71.8	52.3	46.9
Japan	36.9	43.8	6.4	75.9	54.9	3.6	58.1	63.0	58.0	53.3
Kazakhstan	30.8	20.1	17.9	33.5	61.1	21.3	47.1	33.7	46.8	60.9
Korea	43.4	49.0	12.2	72.1	73.0	10.6	57.5	45.5	56.5	70.6
Lao PDR	23.2	3.4	32.4	14.1	53.2	12.7	57.8	77.9	33.3	62.2
Latvia	47.6	41.7	33.1	54.1	76.1	33.1	63.2	65.9	57.2	66.6
Lithuania	47.7	42.9	29.8	55.8	76.3	33.6	67.2	66.0	66.0	69.6
Luxembourg	65.5	56.3	74.8	51.2	77.6	67.5	57.2	46.2	83.7	41.7
Malaysia	42.0	40.2	35.8	45.4	59.2	29.3	42.7	40.2	26.2	61.7
Malta	58.5	53.5	57.4	42.4	76.8	62.4	61.2	66.5	59.1	57.9
Mongolia	30.6	17.9	41.7	23.8	59.4	10.2	48.3	39.5	55.7	49.6
Myanmar	20.5	23.4	24.5	11.8	38.9	4.0	60.2	89.5	11.3	79.9
Netherlands	61.3	64.8	43.6	84.5	71.7	41.9	68.5	59.2	86.5	59.8
New Zealand	39.0	33.6	12.1	45.7	61.0	42.7	60.1	53.8	72.8	53.6
Norway	57.1	58.1	24.3	79.9	89.5	33.8	72.0	71.7	87.0	57.4

Country	Connectivity Index	Connectivity pillars					Sustainability Index	Sustainability pillars		
		Physical	Economic/ Financial	Political	Institutional	People-to-people		Environmental	Social	Economic/ Financial
Pakistan	21.9	19.0	7.3	40.9	36.0	6.2	53.6	85.2	23.8	52.0
Philippines	26.9	16.8	17.7	36.4	53.5	10.0	56.7	80.6	30.0	59.6
Poland	48.0	38.2	19.3	79.0	77.3	26.3	60.8	56.7	60.2	65.5
Portugal	48.8	40.9	22.3	74.5	77.6	28.8	60.7	61.3	68.8	51.9
Romania	43.6	31.5	19.8	70.2	76.5	20.1	65.8	73.5	52.5	71.5
Russian Federation	29.8	22.9	6.2	54.5	54.9	10.7	41.9	38.2	30.2	57.3
Singapore	61.9	77.4	73.0	31.9	70.6	56.2	58.3	47.3	64.3	63.2
Slovakia	50.1	39.5	37.6	64.7	76.9	32.1	60.3	62.5	57.0	61.5
Slovenia	52.2	58.0	28.8	55.3	76.3	42.3	69.1	64.5	71.8	71.0
Spain	49.3	43.7	16.1	87.8	77.1	21.9	61.2	65.9	65.1	52.8
Sweden	53.6	51.5	22.2	81.1	74.5	38.5	73.4	68.8	87.7	63.6
Switzerland	62.3	63.4	30.8	74.5	85.9	56.9	74.5	77.4	87.8	58.3
Thailand	31.6	28.9	24.9	46.1	48.6	9.6	50.9	60.5	34.8	57.3
United Kingdom	52.5	51.7	20.0	76.9	76.6	37.4	64.1	66.3	73.1	53.0
Vietnam	30.7	18.8	43.5	39.3	45.9	6.3	56.8	61.1	42.1	67.2

Extensive connectivity

Country	Connectivity Index	Connectivity pillars					Sustainability Index	Sustainability pillars		
		Physical	Economic/ Financial	Political	Institutional	People-to-people		Environmental	Social	Economic/ Financial
Australia	43.6	35.8	31.3	52.5	52.4	46.1	54.1	33.6	71.9	56.8
Austria	48.3	40.3	16.2	78.0	77.6	29.3	69.5	70.2	72.7	65.7
Bangladesh	18.2	22.1	7.3	32.2	18.1	11.3	61.3	83.1	25.6	75.3
Belgium	56.3	63.5	34.4	80.8	75.5	27.2	64.7	54.5	86.1	53.5
Brunei Darussalam	22.9	23.6	0.5	18.6	66.5	5.2	40.4	37.3	27.8	56.2
Bulgaria	35.9	25.8	2.3	67.6	75.9	7.8	57.3	56.0	53.3	62.5
Cambodia	18.2	17.7	2.8	18.1	46.3	6.0	56.0	67.1	37.1	63.7
China	61.4	58.7	80.5	54.2	47.9	65.7	48.5	44.9	32.5	68.2
Croatia	37.7	36.0	2.0	62.3	76.8	11.1	62.2	75.7	55.3	55.5
Cyprus	31.0	21.2	1.1	48.4	74.6	9.7	51.6	61.5	62.3	31.0
Czech Republic	42.6	40.9	12.2	70.8	74.3	14.7	62.1	52.5	61.8	72.0
Denmark	47.3	44.6	13.3	78.1	75.4	25.0	73.4	71.3	86.4	62.7
Estonia	34.7	30.7	1.2	55.4	77.3	8.8	58.1	33.4	70.7	70.1
Finland	44.5	44.3	8.3	77.6	75.0	17.2	66.9	50.8	86.0	63.7
France	76.3	70.9	78.2	87.4	75.4	69.5	61.2	65.7	63.7	54.2
Germany	85.8	88.2	85.6	94.6	76.5	84.3	68.1	62.9	74.4	66.9
Greece	40.6	31.7	3.3	74.6	76.7	16.5	54.5	68.5	52.1	42.9
Hungary	40.2	32.4	9.0	71.3	77.1	11.0	59.8	62.1	53.5	63.8
India	42.3	24.7	40.8	51.6	59.8	34.7	53.1	76.2	25.9	57.1
Indonesia	32.6	22.2	17.0	48.4	67.9	7.3	53.3	73.2	28.6	58.0
Ireland	45.6	37.5	29.8	67.6	73.3	19.6	66.1	66.7	72.4	59.2
Italy	61.1	53.6	42.1	90.3	77.4	42.2	57.0	71.8	52.3	46.9
Japan	55.8	55.3	62.2	75.9	54.9	30.7	58.1	63.0	58.0	53.3
Kazakhstan	28.2	24.4	5.1	33.5	61.1	16.9	47.1	33.7	46.8	60.9
Korea	51.6	54.6	37.0	72.1	73.0	21.5	57.5	45.5	56.5	70.6
Lao PDR	15.0	3.6	0.8	14.1	53.2	3.3	57.8	77.9	33.3	62.2
Latvia	34.5	32.3	1.4	54.1	76.1	8.4	63.2	65.9	57.2	66.6
Lithuania	35.5	34.9	2.2	55.8	76.3	8.2	67.2	66.0	66.0	69.6
Luxembourg	43.2	30.3	30.2	51.2	77.6	26.8	57.2	46.2	83.7	41.7
Malaysia	38.5	42.0	21.8	45.4	59.2	24.0	42.7	40.2	26.2	61.7
Malta	33.6	32.9	1.0	42.4	76.8	14.7	61.2	66.5	59.1	57.9
Mongolia	20.5	16.9	0.9	23.8	59.4	1.7	48.3	39.5	55.7	49.6
Myanmar	16.7	24.3	3.6	11.8	38.9	5.0	60.2	89.5	11.3	79.9
Netherlands	60.9	64.2	45.7	84.5	71.7	38.3	68.5	59.2	86.5	59.8
New Zealand	31.8	31.5	4.3	45.7	61.0	16.6	60.1	53.8	72.8	53.6

Country	Connectivity Index	Connectivity pillars					Sustainability Index	Sustainability pillars		
		Physical	Economic/ Financial	Political	Institutional	People-to-people		Environmental	Social	Economic/ Financial
Norway	51.2	56.5	11.8	79.9	89.5	18.4	72.0	71.7	87.0	57.4
Pakistan	23.1	24.0	6.2	40.9	36.0	8.6	53.6	85.2	23.8	52.0
Philippines	26.1	17.8	12.1	36.4	53.5	10.9	56.7	80.6	30.0	59.6
Poland	49.4	47.7	19.0	79.0	77.3	23.9	60.8	56.7	60.2	65.5
Portugal	42.2	38.7	8.3	74.5	77.6	12.1	60.7	61.3	68.8	51.9
Romania	40.2	33.3	8.0	70.2	76.5	13.1	65.8	73.5	52.5	71.5
Russian Federation	41.3	44.1	22.0	54.5	54.9	31.1	41.9	38.2	30.2	57.3
Singapore	42.5	51.7	35.4	31.9	70.6	22.6	58.3	47.3	64.3	63.2
Slovakia	36.9	27.7	6.3	64.7	76.9	9.0	60.3	62.5	57.0	61.5
Slovenia	36.1	36.7	2.0	55.3	76.3	10.2	69.1	64.5	71.8	71.0
Spain	59.7	57.6	37.5	87.8	77.1	38.7	61.2	65.9	65.1	52.8
Sweden	50.9	54.5	18.0	81.1	74.5	26.6	73.4	68.8	87.7	63.6
Switzerland	56.7	52.2	31.2	74.5	85.9	39.8	74.5	77.4	87.8	58.3
Thailand	33.6	37.4	21.1	46.1	48.6	14.7	50.9	60.5	34.8	57.3
United Kingdom	78.6	71.0	83.3	76.9	76.6	85.3	64.1	66.3	73.1	53.0
Vietnam	27.3	22.6	19.3	39.3	45.9	9.4	56.8	61.1	42.1	67.2

ANNEX 4: LIST OF COUNTRIES AND PEER GROUPS

Country name	ISO Alpha-2 Country code	GDP group	GDP/capita group	Population group	Geographical group
Australia	AU	XL	XL	L	Asia
Austria	AT	L	XL	M	Europe
Bangladesh	BD	M	S	XL	Asia
Belgium	BE	L	L	L	Europe
Brunei Darussalam	BN	S	L	S	Asia
Bulgaria	BG	S	S	M	Europe
Cambodia	KH	S	S	L	Asia
China	CN	XL	M	XL	Asia
Croatia	HR	S	M	S	Europe
Cyprus	CY	S	L	S	Europe
Czech Republic	CZ	M	L	M	Europe
Denmark	DK	L	XL	M	Europe
Estonia	EE	S	M	S	Europe
Finland	FI	M	XL	M	Europe
France	FR	XL	L	L	Europe
Germany	DE	XL	XL	XL	Europe
Greece	GR	M	M	M	Europe
Hungary	HU	M	M	M	Europe
India	IN	XL	S	XL	Asia
Indonesia	ID	XL	S	XL	Asia
Ireland	IE	L	XL	S	Europe
Italy	IT	XL	L	L	Europe
Japan	JP	XL	L	XL	Asia
Kazakhstan	KZ	M	S	L	Asia
Korea	KR	XL	M	L	Asia
Lao PDR	LA	S	S	M	Asia
Latvia	LV	S	M	S	Europe
Lithuania	LT	S	M	S	Europe
Luxembourg	LU	S	XL	S	Europe
Malaysia	MY	L	M	L	Asia
Malta	MT	S	L	S	Europe
Mongolia	MN	S	S	S	Asia

Country name	ISO Alpha-2 Country code	GDP group	GDP/capita group	Population group	Geographical group
Myanmar	MM	M	S	L	Asia
Netherlands	NL	L	XL	L	Europe
New Zealand	NZ	M	L	S	Asia
Norway	NO	L	XL	S	Europe
Pakistan	PK	M	S	XL	Asia
Philippines	PH	L	S	XL	Asia
Poland	PL	L	M	L	Europe
Portugal	PT	M	L	M	Europe
Romania	RO	M	M	L	Europe
Russian Federation	RU	XL	M	XL	Asia
Singapore	SG	L	XL	M	Asia
Slovakia	SK	M	M	M	Europe
Slovenia	SI	S	L	S	Europe
Spain	ES	XL	L	L	Europe
Sweden	SE	L	XL	M	Europe
Switzerland	CH	L	XL	M	Europe
Thailand	TH	L	S	XL	Asia
United Kingdom	GB	XL	L	XL	Europe
Vietnam	VN	M	S	XL	Asia

GDP (current USD bn) thresholds: S < 59 | M 60-283 | L 284-777 | XL > 778
GDP per capita (current USD) thresholds: S < 7 505 | M 7 506-18 406 | L 18 407 – 41 199 | XL > 41 200
Population (thousands of inhabitants) thresholds: S >5 305 | M 5 306-11 160 | L 11 161-64 980 | XL > 64 981

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