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REGULATING FOR A DIGITAL ECONOMY

UNDERSTANDING THE IMPORTANCE OF CROSS-BORDER DATA FLOWS IN ASIA

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B | Global Economy and Development
at BROOKINGS

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EXECUTIVE SUMMARY

Global data flows and connectivity are creating new economic and trade opportunities

The world is experiencing unprecedented increases in connectivity and global data flows. This is underpinning the so-called fourth industrial revolution, which is characterized by end-to-end digitization of all assets and integration into a digital ecosystem.[1] It heralds the fourth major upheaval in modern manufacturing after the lean revolution of the 1970s, outsourcing in the 1990s, and automation in the 2000s.[2]

The Asia Pacific continues to be one of the fastest growing regions in the world, both economically, and in terms of connectivity. By 2017, Asia had the largest number of internet users in the world, with 1.9 billion people online.

Cross-border data access, usage, and exchange are essential to economic growth in the digital age. Every sector—including manufacturing, services, agriculture, and retail—relies on data and on the global flow of that data. Whether directly, or by indirectly taking advantage of global-scale data infrastructure such as cloud computing, global connectivity has enabled cross-border economic activity, allowing individuals, startups, and small businesses to participate in global markets.

At its core, the digitization of economies and international trade should improve efficiency and increase productivity.[3] By increasing access to information, the internet increases productivity and enables markets to function more efficiently. The free flow of data reduces transaction costs and the constraints of distance, and increases organizational efficiencies. Increases in connectivity accelerate the spread of ideas and allow users worldwide to make use of new research and technologies, leading to the emergence of new enterprises.[4] Extending internet access can also increase market efficiency by reducing barriers to market entry, and allowing small and medium-size enterprises to reach vastly broader markets.[5]

Global data flows are also transforming the nature of international trade, creating new opportunities for businesses to participate in the global economy by selling goods and services directly to customers and plugging into global value chains. McKinsey & Company estimates that global data flows raised global GDP by approximately 3.5 percent over what would have occurred without such flows, equivalent to $2.8 trillion dollars in 2014.[6]

Global Data are transforming international trade

Data flows are transforming international trade in the following ways:

- Businesses can use the internet (i.e., digital platforms) to export goods.
- Services can be purchased *and* consumed online.
- Data collection and analysis is allowing new services (often also provided online) to add value to goods exports.
- Global data flows underpin global value chains, creating new opportunities for participation.[7]

[1] Schwab 2016.
[2] Germany Trade and Invest 2017.
[3] World Bank 2016; Bernard et al 2007, 105-130.
[4] Deloitte 2014.
[5] Deloitte 2014.
[6] Manyika et al 2016.
[7] Baldwin 2016.

Global data flows also create economic and trade opportunities for small businesses

The internet and global data flows are a particular opportunity for small businesses to participate in international trade. This is particularly significant for East Asia, where small businesses comprise 60-99 percent of all businesses, are responsible for 50-98 percent of all employment, and contribute 35-70 percent of GDP.[8] Using digital platforms such as eBay or Alibaba, small businesses can reach customers globally. Access to digital inputs such as cloud computing provides on-demand access to computing power and software that was previously reserved for large companies. Such digital services can be used to reduce fixed information technology costs and increase business competitiveness.

Measuring the economic and trade impacts of cross-border data flows

A number of studies have been published that highlight the scale and importance of cross-border data flows. These studies point to the growing economic significance of data flows, and are beginning to provide useful benchmarks and indicators of the extent of the impact.[9] Key findings of the studies include:

- In 2014, the free flow of data was estimated to have contributed $2.8 trillion to the global economy,[10] a figure that could reach $11 trillion by 2025.[11] Around 12 percent of international trade in goods has been estimated to occur through global e-commerce platforms such as Alibaba and Amazon.[12]
- In the United States, digital trade has raised GDP by 3.4–4.8 percent by increasing productivity and lowering the costs of trade; it has also increased wages and likely contributed to creating as many as 2.4 million new jobs.[13]
- A 2016 World Bank study found that a 10 percent increase in internet penetration in the exporting country leads to a 1.9 percent increase in exports along the extensive margin (the quantity of goods), and a 10 percent increase in internet penetration in the importing country leads to a 0.6 percent increase exports along the intensive margin (the average value of goods).[14]

Because of limitations in the data, each of these pictures are still incomplete and, in almost all cases, provide only rough estimates of the impact of data on growth and jobs.

Governments are increasingly restricting cross-border data flows

While the economic and trade opportunity from connectivity and data flows are significant, governments are increasingly introducing measures which restrict data flows—data localization measures.

Such measures will have economic and trade costs. According to a study by Bauer et al, the cost of proposed

[8] Asia Cloud Computing Association 2015, 4.
[9] U.S. Department of Commerce 2016, iii.
[10] Manyika et al 2016.
[11] McKinsey & Company 2015.
[12] Manyika et al 2016.
[13] Castro and McQuinn 2015, 11.
[14] Osnago and Tan 2016.

and enacted data localization measures in India, Indonesia, and Vietnam would reduce GDP in India (-0.1 percent), Indonesia (-0.5 percent), and Vietnam (-1.7 percent).[15]

Cross-border data flow restrictions can take one of several forms. From most restrictive to least, examples include:

- The data cannot be transferred outside national borders.
- The data can be transferred outside national borders, but a copy must be maintained domestically.
- Prior consent is required before global transfers are allowed.

There are different goals being pursued by data flow restrictions

Governments restrict cross-border data flows with several goals in mind, with the main ones being to:

1. Protect or improve citizens' personal privacy
2. Ensure rapid access to data by law enforcement officials.
3. Protect or ensure national security
4. Improve economic growth or economic competitiveness
5. Level the regulatory playing field

The key focus for all governments when designing regulation to achieve legitimate goals should be to manage risk—whether to privacy, from cyberattack or the impact of delays to law enforcement agencies—to an acceptable level relative to the economic and social benefits, including innovation, expected from these activities.[16]

While it is up to each government to determine its acceptable level of risk, in most cases, data localization is suboptimal in that there are ways to achieve legitimate regulatory goals with less impact on economic growth and trade.

The impact of data localization requirements on overall domestic investments has been shown to be considerable, causing lower economic growth and reduced exports.[17]

Restrictions on cross-border data flows harm both the competitiveness of the country implementing the policies *and* other countries. Every time one country erects barriers to data flows, another country that relies on these data flows is also affected.[18]

Regulating for a digital economy that maximizes the economic and trade opportunities

Privacy and data localization

The capacity to move large quantities of data seamlessly and rapidly across borders can undermine domestic regulatory standards in areas such as privacy, consumer protection, and health care. For example, cross-border data flows to a jurisdiction with lower levels of privacy protection can undermine domestic privacy protection. This creates an incentive for regu-

[15] The study uses a computable general equilibrium model called GTAP8. The effect on productivity is created using a so-called augmented product market-regulatory index for all regulatory barriers on data, including data localization, to calculate domestic price increases or total factor productivity losses. Bauer et al 2013.
[16] OECD 2015, Principle 5.
[17] Castro and McQuinn 2015, 9-10.
[18] Castro and McQuinn 2015, 10-13.

lators to restrict cross-border transfers of personal information. For instance, the European Union's General Data Protection Regulation (GDPR) prevents transfers of personal data to another jurisdiction that has not been deemed by the EU to have adequate privacy protection and the European Court of Justice has found that a finding of adequacy requires the other country to provide privacy protection that is "essentially equivalent" to that found in the EU.

Yet, different countries are developing privacy laws that reflect their own sense of how to reap the opportunities of data flows for growth and trade and minimize the risks to privacy. For example, the U.S. while pursuing high levels of privacy protection, relies on companies to keep personal data private with mechanisms for sanction in cases of breach. India is currently considering its own privacy law, which will reflect its own cultural, historical, and legal tradition as well as its development needs.

The challenge is finding ways for data to flow freely between countries with different approaches to privacy. This will require a principles-based approach to privacy, which prioritizes agreement on common privacy outcomes and gives each country the flexibility to achieve these goals.

Data localization not only fails to achieve this—it also creates economic and trade costs.

One way forward is being developed by the Asia-Pacific Economic Cooperation (APEC) forum through Cross-Border Privacy Rules (CBPR) system, serving as a mechanism that fosters trust and facilitate data flows amongst participants. A key benefit of the APEC regime is that it enables personal data to flow freely even in the absence of two governments having agreed to formally recognize each other's privacy laws as equivalent. Instead, APEC relies on businesses to ensure that data collected and then sent to third parties either domestically or overseas continues to protect the data consistent with APEC privacy principles. The APEC CBPR regime also requires independent entities who can monitor and hold businesses accountable for privacy breaches.

The U.S.-EU Privacy Shield is another example of how interoperability between the EU approach to privacy and the U.S. accountability-approach might be achieved. In this regard, Privacy Shield avoids countries (in this case the U.S.) having to adopt a top-down privacy regime akin to the EU's GDPR. Instead, Privacy Shield allows a subset of businesses in a given country to agree to a particular privacy regime in order to be deemed equivalent by the EU. This enables the free flow of personal data between the EU and the business participating in Privacy Shield.

For those countries party to the Comprehensive and Progressive Trans-Pacific Partnership (CPTPP), the commitments on privacy in the e-commerce chapter provide another framework for integrating privacy, trade, and cross-border data flows.

Cybersecurity

Security is not necessarily strengthened when data is kept locally, and may well be weakened.

Security is a function of a number of elements—technical, financial, physical, and personnel.

Moreover, increasingly large amounts of data are stored using cloud computing. For instance, in 2015, 70 percent

of all internet traffic was going through cloud data centers, up from roughly 30 percent in 2011.[19] As a result, it is the security of the cloud that is often relevant when assessing the exposure of data to cyberattack.

The experience, technical, and financial capacity of cloud providers is an increasingly important determinant of data security. Specifically, resilience, data recovery, and business continuity are key elements of security that are best addressed by maintaining rapidly accessible redundant sets of data at multiple data centers. Where those data centers are in different geographic locations, or in different countries, resilience is further enhanced. These considerations are at variance with data localization.

In addition, improving security from attack requires collaboration among governments and experts in the private sector. Data localization often short-circuits any chance of developing a collective response to security threats.

Data localization for law enforcement purposes

The globalization of the internet and the rise in the use of cloud computing mean that a person's data is often held in a separate jurisdiction. Currently, where data is held in another jurisdiction, officials need to rely on the processes under mutual legal assistance treaties (MLATs) to obtain access.

A MLAT provides a process whereby one country's law enforcement personnel can request information held by a communication service provider in another country. MLATs were originally designed to facilitate sharing evidence in exceptional circumstances and have proved to be ill-suited when responding to regular requests for access to electronic data.[20]

A key limit with MLATs is the time taken to respond to a request for data. For example, to obtain data from a U.S.-based company takes approximately 10 months.[21] This is too long in cases where law enforcement needs to respond to international terrorism or cybercrime.

Data localization is a second-best option when responding to the challenges facing local law enforcement and in countering the inadequacies of the MLAT process. As outlined above, data localization creates a range of economic and trade costs and can degrade data security.

Instead, two reforms should be considered. The most immediate is reform of the MLAT process to better accommodate requests for electronic data. The second longer term reform is to consider negotiating data sharing agreements—bilaterally or multilaterally.

Digital protectionism

Governments also restrict data flows to protect domestic companies from online competition. This type of protection has various negative consequences. Data flow restrictions may be inconsistent with a country's commitments under the World Trade Organization.[22] Protectionist data restrictions can lead to retaliation

[19] USITC estimates based on data from Cisco Global Cloud Index, 2016; Cisco Global Cloud Index, 2012; Cisco Visual Networking Index, 2016; and Cisco Visual Networking Index, 2012.
[20] Mohanty and Srikumar 2017.
[21] Report and Recommendations of the President's Review Group on Intelligence and Communications Technologies 2013, 227.
[22] WTO Council for Trade in Services 2017.

by other countries, which increases the costs for local companies that want to use data to operate globally.

As outlined above, the internet and global data flows can provide significant economy-wide opportunities. Governments need to ensure their countries are digitally ready and have a strategy for making the most of the new digital trade opportunities. This means avoiding narrow protectionist responses such as data localization.

Instead, governments should undertake the reforms needed to ensure that their regulations are designed to maximize the opportunities of digital technologies. In addition, government should use data to better tailor government services and to ensure that the education system is preparing workers for the jobs that a digital economy will produce.

Leveling the regulatory playing field

Another driver of cross-border data flows has been based on the need to apply existing regulation to new digital entrants. The concern is that over-the-top (OTT) service providers that use telecommunications infrastructure do not pay license fees and are not subject to similar regulations governing their operations or their content. Evidence suggests that, contrary to the fears of many communications ministers, the impact of OTT entry is a positive one in terms of infrastructure investment. As OTT providers such as Google, Facebook, and Netflix invest in infrastructure to bring content to the edge of the internet to improve services delivery and reduce latency, consumers are prepared to pay to upgrade their internet connection, thus creating what the OECD has described as “a virtuous cycle” between OTT access, consumer use, and infrastructure investment.

This underscores the broad point when it comes to regulating in a digital economy. Regulators need to be careful about knee-jerk regulatory responses to the impact of digital providers and to focus instead on regulation that can enable these new technologies and business models to thrive. For instance, this case it could include reforming licensing regimes in a manner similar to what has been done in India. The country was the first to introduce unified licensing in 2013—which recognized that convergence of fixed and mobile, voice, text, and video offered opportunities to attract new investment into the information and communications and media sector.[23]

[23] ITU 2013.

REGULATING FOR A DIGITAL ECONOMY
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1. THE ISSUES OF DATA LOCALIZATION AND DATA RESIDENCY

Cross-Border Data Flows: Critical to Economic Development and Trade

In the modern age of global trade, cross-border data flows play a central role in the management and security of the movement of goods and services. No longer is the digital economy distinct from the general economy; data and the digital economy are inextricable aspects of a nation's economic growth and development. Every industry—whether manufacturing, services, agriculture or retail—relies on the global internet and cross-border data flows that are fundamental enablers of digital technologies such as "big data" and cloud computing.

Currently, approximately half of the world is online. Between 2005 and 2021, global internet traffic will increase 127-fold. However, there is a digital divide as internet penetration in the developing world averages around 41 percent compared with 81 percent in the developed world.[24]

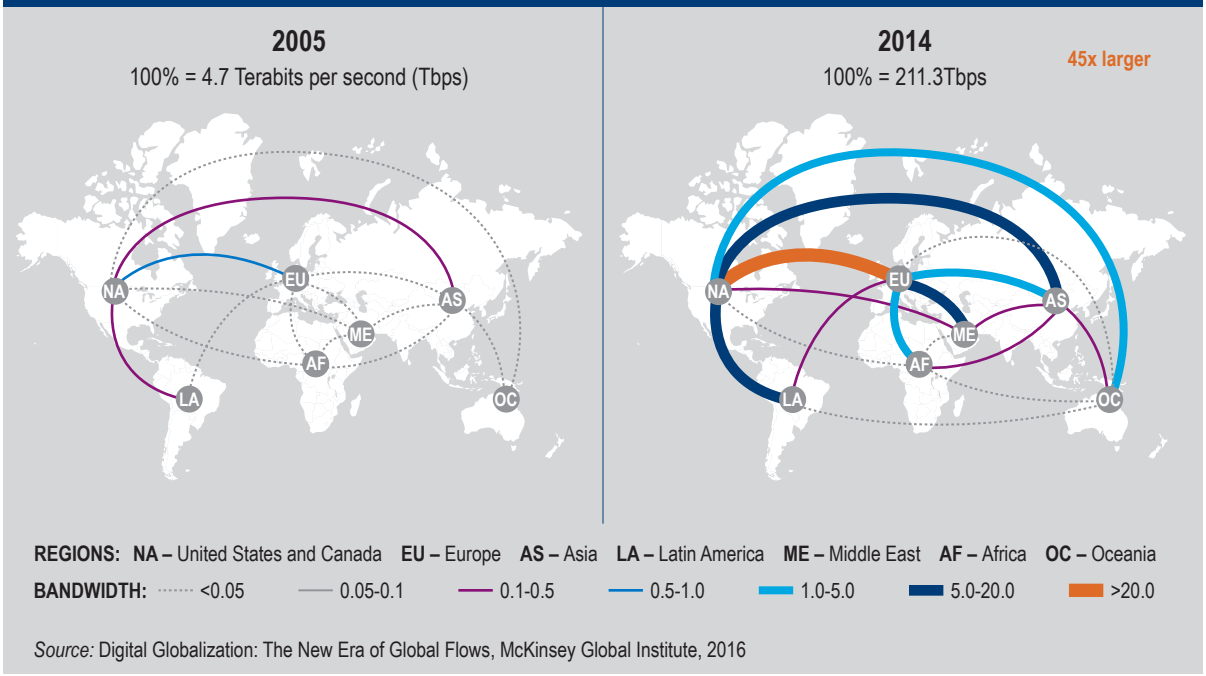
Internet access is also increasingly happening using mobile devices. By 2021, devices connected to the internet will triple the global population.[25]

Such global connectivity underpins the expansion of cross-border data flows and growth in global trade and opportunity.[26] The following table shows growth in data flows of 45 times between 2004 and 2014.

At its core, the digitization of economies and trade should improve efficiency and increase productivity.[27] Indeed, much of the strong productivity growth in the United States in the mid-1990s through the mid-2000s is attributed to strong investment in information and communications technology (ICT).[28] Fast forward 20 years, and the economic opportunities are data driven.

[24] ITU 2017.
[25] Cisco 2017.
[26] Manyika et al 2016.
[27] World Bank 2016; Bernard et al 2007, 105-130.
[28] McKinsey Global Institute 2018.

Figure 1. Growth of global cross-border data flows 2005 vs. 2014



Source: Digital Globalization: The New Era of Global Flows, McKinsey Global Institute, 2016

By increasing access to information, the internet increases productivity and enables markets to function more efficiently. The free flow of data reduces transaction costs and the constraints of distance, and increases organizational efficiencies. Increases in connectivity accelerate the spread of ideas and allow users worldwide to make use of new research and technologies, leading to the emergence of new enterprises.[29] Extending internet access can also increase market efficiency, by reducing barriers to market entry, and allowing small and medium-sized enterprises to reach vastly broader markets.[30]

In addition, data and the global internet are important in driving commercial and international trade opportunities more broadly than in the information technology (IT) sector. Data and the internet are being used in increasingly intensive and creative ways in industries such as manufacturing, mining, and agriculture. Take the finance industry, which relies on the ability to transfer data across borders to complete credit card transactions and make money transfers.[31] Or the insurance industry, which collects data globally to better assess risk and thereby offer more cost-effective and targeted insurance services. And of course, mobile telecommunications companies also collect data, including geolocation data, to provide their services.[32]

The significance of data for manufacturing was underscored in a May 2017 speech by Jeff Immelt, CEO of

[29] Deloitte 2014.
[30] Deloitte 2014.
[31] Gozman et al 2015.
[32] Calabrese et al 2014, 1–23.

Box 1. Data Use in Asia

Indonesians, Filipinos, Malaysians, Singaporeans, Thais, and Vietnamese had the highest global social network penetration in 2015, with an average of 77.4 percent of users visiting a social platform at least once a month.[33] The Philippines in particular is known as a global social media capital, with users spending the most time per day—an average of 4 hours and 17 minutes—on social media, including U.S.-based Facebook, Snapchat, Twitter, and Instagram. Indonesia is ranked seventh globally, with users spending 3 hours and 16 minutes per day on social media.[34] Platform services such as shopping, transportation, locational, and productivity services are also popular with users in Asia. For example, in Indonesia in 2017, 41 percent of the population purchased a product or service online,[35] and e-commerce sites such as German-based Lazada and Indonesia-based Tokopedia experienced high volumes of traffic: 58.3 million and 50.7 million average visits per month, respectively.[36] Furthermore, ride-hailing services doubled their gross merchandise value between 2015 and 2017, and these services reached $5.1 billion gross merchandise value in 2017.[37]

General Electric (GE), in which he observed that GE's competitive advantage is derived from digital productivity—not low-wage manufacturing—and described GE's future in manufacturing as being driven by use of new materials, additive techniques, and digitized plants.[38]

Even in sectors such as mining and agriculture, data is becoming increasingly important. Take Caterpillar which sells large mining equipment, it has developed CAT MineStar to collect real-time data analytics on grading accuracy, load quantities, and quality of work to help customers minimize fuel costs and downtime and improve the productivity of CAT mining equipment.[39] In the agricultural sector, sensors combined with data aggregation are being used to trace the origin of a product from the farm to the market, giving consumers information on the farmer, data and time the product was harvested.

According to a report by the Organisation for Economic Co-operation and Development (OECD), big data also has the potential to be a key driver of innovation, productivity growth, and economic competitiveness.[40] Big data refers to data sets with sizes that are beyond the ability of commonly used software tools to capture, curate, manage and process within a tolerably elapsed time.[41] With data being continuously generated by people and businesses and increasingly from sensors embedded in products, from cars to mobile devices, and other machine-to-machine connected devices, this is only going to grow substantially for the foreseeable future. According to one estimate in 2013, 90% of all the data in the world had been created in the previous two years.[42] By 2015, 2.5 quintillion bytes were being produced every day.[43]

[33] Glenday 2015.
[34] We Are Social and Hootsuite 2017, 47.
[35] We Are Social and Hootsuite 2017, 53.
[36] iPrice 2017.
[37] Google and Temasek 2017, 4.
[38] Muray 2016.
[39] Caterpillar 2018.
[40] OECD 2015.
[41] Snijders, Matzat, and Reips 2012, 1-5.
[42] SINTEF 2013.
[43] IBM 2017.

One driver of large data sets is the collection globally of discrete local data, which requires cross-border data flows. From big data, new insights are being derived. Some of the economic and trade opportunities from big data come from analysing the data to better understand the business environment, and thereby create new products and respond to changes in usage patterns as they occur.[44]

Another development is the use of open online innovation platforms to source ideas and determine their commercial viability before moving to physical production—all of which relies on the collection of data (often globally) and its analysis. For instance, the automotive manufacturer BMW has created an "idea management system" to evaluate ideas submitted through its "virtual innovation agency." This has reduced by 50 percent the company's time spent on identifying high-potential ideas, and led it to annually incorporate two to three ideas from the open innovation effort into new car models.[45]

Cloud computing uses internet access and the ability to move data across borders to provide cheaper on-demand computing capacity that can be scaled and paid for as needed.[46] This includes basic cloud services such as email, software through to giving users direct access to processing, storage, and other computing resources in the cloud. This reduces the need for upfront investment in IT and the associated costs of maintaining often underused computing power.[47] In effect, cloud computing turns a fixed IT cost into a variable operating cost.[48]

By providing computing capacity on demand, cloud computing enables business to avoid the often large upfront capital costs of IT investments. This is of particular value for small and medium-sized enterprises and startups, whose costs of capital will otherwise tend to be a far higher percentage of total expenditure.[49]

As such, cloud computing helps level the playing field by giving small businesses access to the type of computational power, and the associated range of services, that was previously available only to large corporations. Importantly, computing in the cloud from sophisticated cloud providers such as Amazon, Google, and Microsoft is often much safer than relying on in-house IT.[50]

The internet of things (IoT) refers to the ability of everyday objects—such as vehicles and home appliances—to connect to the internet and to send and receive data.[51] The deployment of sensors, such as in radio-frequency identification (RFID) tags and through IoT technologies, is bringing new efficiencies to logistics and supply chain management.[52] Delivery company DHL has estimated that IoT technologies such as asset tracking solutions will have an impact of more than $1.9 trillion in the supply chain and logistics sector,[53] and will directly improve the competitiveness of participating countries' logistics industries.

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[44] Davenport et al 2012, 44.
[45] Manyika et al 2011, 69.
[46] Yoo 2015.
[47] Etro 2009.
[48] Etro 2009.
[49] IOSC 2015.
[50] Graf et al 2016.
[51] USFTC 2015.
[52] Davenport et al 2012.
[53] DHL Trend Research and Cisco Consulting Services 2015.

The IoT also generates large amounts of data, and collecting this data and turning it into knowledge is a major benefit.[54] Again, maximizing the opportunities of the IoT requires the ability to move data across borders—to collect data in one country, aggregate it with data from other countries, and analyze it in a third country (another driver of big data).

The digital economy and trade opportunities facilitated by the free flow of data stand to substantially boost and expand economic growth and employment opportunities and contribute to development outcomes. For instance, financial technology (Fintech) is enabling payment services and access to credit to people without bank accounts in developing countries, while online platforms have the potential to capture and agglomerate informal employment, provision employment to idle parts of the population, and therefore reduce unemployment.

Innovations in features, services and devices, along with the explosive growth of cloud computing and data analytics, are opening opportunities, for small and medium-sized enterprises to be able to compete—locally, domestically, or globally. For example, cloud computing services, facilitated by the free flow of data, enable businesses to perform activities at scale, in a more agile and cost-effective manner, and in an environment geared to ensuring security.

Digital Trade Opportunities

Global data flows are also transforming the nature of international trade, creating new opportunities for small and medium-sized enterprises to participate in the global economy and for business to plug into global value chains. Furthermore, the data flows are increasing the opportunity for and the value of exports of digital services. McKinsey & Company estimates that in the decade prior to 2016, global data flows raised global gross domestic product (GDP) by approximately 3.5 percent, compared with what would have occurred without such flows—the equivalent of $2.8 trillion dollars in 2014.[55]

Defining Digital Trade

There is no specific definition of what is digital trade. The WTO Work Program on Electronic Commerce limited its consideration to "the production, distribution, marketing, sale or delivery of goods and services by electronic means."[56] The USITC developed a broader definition of digital trade as "U.S. domestic commerce and international trade in which the internet and internet-based technologies play a particularly significant role in ordering, producing, or delivering products and services."[57] An even broader definition includes how cross-border data flows enable digital trade, either through the cross-border movement of data flows themselves as a form of trade or through productivity gains from using digital services that make firms more competitive domestically and overseas.[58]

As noted, the globalization of the internet and the role of data in economic growth is affecting the nature and scope of international trade. The key developments in digital trade will be in the following areas.

[54] Tsai et al 2014.
[55] Manyika et al 2016.
[56] WTO 1998.
[57] USITC 2014, 29.
[58] Meltzer 2016.

- **Businesses can use the internet (i.e., digital platforms) to export goods.** This is often about purchasing online and having the good delivered offline, and presents a particular opportunity for small and medium-sized enterprises to be able to use digital platforms to reach customers globally. The ancillary services platforms provide, such as consumer ratings and online payments, build trust and enable the international transaction. Already, around 12 percent of global goods trade is via international e-commerce.[59]

- **Services can be purchased *and* consumed online.** This is particularly true for IT, professional, financial, retail, and education services. New digital services, such as cloud computing, are also becoming crucial business inputs. Moreover, some *goods*, previously able to be counted as imports, are now being consumed as digital products (e.g., software, books, movies), confusing their capture within national accounts. Platforms are also expanding the range of services that can be traded.

- **Data collection and analysis is allowing new services (often also provided online) to add value to exports of goods.** For example, data collected from sensors on mining and farm equipment allows business to improve the operation, and thereby the value, of these goods.

- **Global data flows underpin global value chains, creating new opportunities for participation.**[60] The global internet and data flows extend the ability of businesses of all sizes to plug into global value chains, offering a specific task or service. Notably, digital technologies such as 3-D printing could also lead to some relocation of production.[61]

In large part because of the ubiquity of mobile (and particularly smart) devices, it is estimated that more than 45 percent of the world was engaging in online commerce in 2017.[62] According to the U.N. Conference on Trade and Development (UNCTAD), e-commerce sales were more than $25 trillion in 2015, with 90 percent of that business-to-business sales. Business-to-consumer cross-border e-commerce sales were estimated at $189 billion in 2015.

This is only one aspect of digital trade. However, it demonstrates how global connectivity has underpinned the development of large online marketplaces such as Alibaba, eBay, and MercadoLibre.

Digital Trade Opportunities for Small and Medium-Sized Enterprises

The internet and global data flows enable small and medium-sized enterprises to participate in international trade in several ways. First, having a website gives these small businesses an instant international presence without having to establish a physical presence abroad—often not an economic option for a small enterprise. Second, access to cost-effective, data-based services—including online advertising and communications services, cloud computing, and access to critical knowledge and information about foreign markets—nourishes the growth of small businesses in important ways.[63] For example, challenges in accessing information about for-

[59] Manyika et al 2016.
[60] Baldwin 2016.
[61] De Bacher and Flaig 2017.
[62] ITIC 2016.
[63] OECD 2009.

eign markets and regulations is a known impediment to small businesses engaging in international trade.[64]

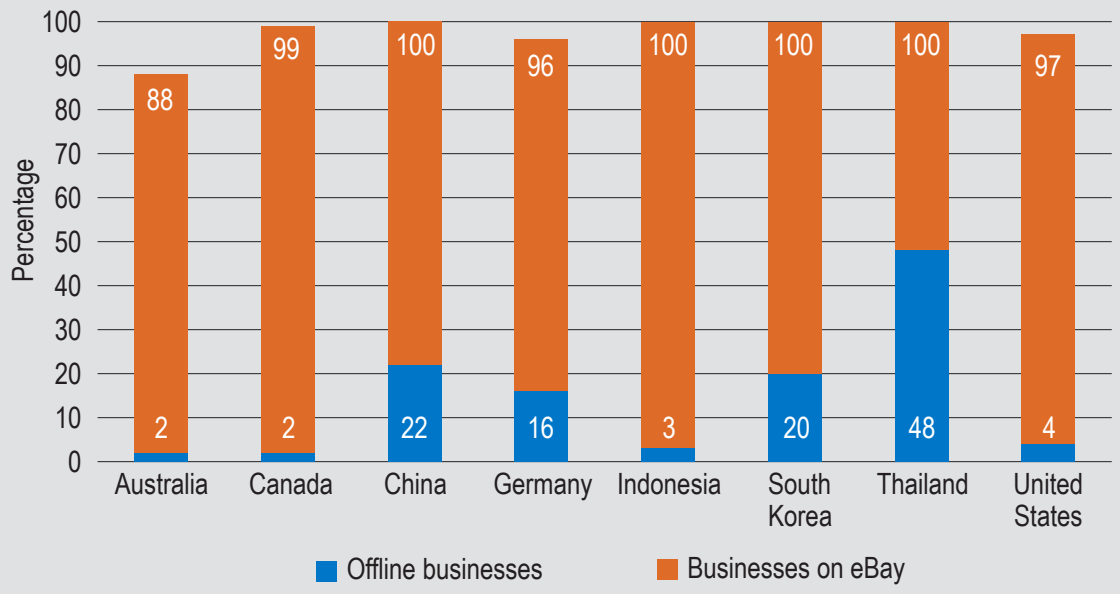
According to a report, small businesses in Asia comprise between 60-99 percent of all businesses, employing 50-98 percent of all employment in any given economy, and contributing between 35-70 percent of GDP.[65] Therefore, encouraging the development of digital trade is vitally important to that region's economy.

Perhaps the most immediate trade opportunity for small businesses is using internet platforms such as eBay or Alibaba to reach consumers. For instance, in Indonesia, only 20 percent of offline small businesses export, whereas 100 percent of small businesses using eBay are exporters. There are similar numbers for all countries where eBay operates.

Measuring the Impacts of Cross-Border Data Flows

A number of studies have been published that highlight the scale and importance of cross-border data flows. These studies point to the growing economic significance of data flows, and are beginning to provide useful benchmarks and indicators of the extent of the impact.[67] The approaches used include estimating the contribution of cross-border data flows to GDP, employment growth and productivity, the value of international trade in digital services, e-commerce, and

Figure 2. Share of eBay-Enabled Small Businesses that Export



Source: Small Online Business Growth Report, eBay, 2016

[64] Schoonjans et al 2013, 169-181.
[65] Asia Cloud Computing Association 2015, 4.
[66] U.S. Department of Commerce 2016, iii.

Box 2. The Importance of Small Businesses in Asia

India. *Officially,* more than 33.2 million small and medium-sized enterprises employ more than 101 million people and represent 40 percent of Indian export revenues.[66] Unofficially, the figure is likely much higher.

Indonesia. 56.3 million micro, small, and medium-sized enterprises, accounting for 99.9 percent of total businesses, employ 107.7 million people (97.2 percent of the total workforce) and represent approximately 57.1 percent of GDP.[67]

Japan. 4.2 million small and medium-sized enterprises, comprising some 99.7 percent of all enterprises, employ 70 percent of the workforce and represent 53 percent of GDP.

Philippines. Approximately 816,759 micro, small, and medium-sized enterprises, accounting for 99.6 percent of all businesses, employ 3.87 million people and represent 35 percent of GDP.[68]

Vietnam. Approximately 303,729 micro, small, and medium-sized enterprises, comprising more than 97 percent of all enterprises, employ 18.3 million people and represent 40 percent of GDP.[69]

consumption of data-related products and data traffic.[71] Key findings of the studies include:

- Using 1995-1999 data, a study found that a 10 percent point increase in internet use increases export growth by 0.2 percent.[72] A study using 2001 data found that increases in internet adoption in developing countries can increase exports to developed countries.[73]
- In 2014, the free flow of data was estimated to have contributed $2.8 trillion to the global economy,[74] a figure that could reach $11 trillion by 2025.[75]
- In 2014, the OECD measured the digital economy—defined as the ICT sector—as accounting "for 6 percent of total value added, 4 percent of employment, and 12 percent of total fixed investment in the OECD area."[76]
- A 2011 study by McKinsey Global Institute estimated that the internet accounted for 3.4 percent of overall GDP in 13 developed countries studied, and 21 percent of the growth in GDP in these countries (for five years). The study further estimated that the internet created 2.4 jobs for every job destroyed.[77]
- In the United States, it has been estimated that digital trade has raised GDP by 3.4–4.8 percent by increasing productivity and lowering the costs of trade;

[67] Asia Cloud Computing Association 2015, 54.
[68] Asia Cloud Computing Association 2015, 69.
[69] Asia Cloud Computing Association 2015, 131.
[70] Asia Cloud Computing Association 2015, 204-205.
[71] U.S. Department of Commerce 2016, 11.
[72] Freund and Weinhold 2004, 171.
[73] Clark and Wallsten 2006, 465-484.
[74] Manyika et al 2016.
[75] McKinsey & Company 2015.
[76] OECD 2014.
[77] McKinsey Global Institute 2011.

it has also been estimated to have increased wages and contributed to creating as many as 2.4 million new jobs.[78] Based on 2014 estimates, decreasing barriers to cross-border data flows could increase GDP in the United States by 0.1–0.3 percent, and wages by 0.7–1.4 percent in seven digitally intensive sectors.[79]

- A 2016 World Bank study using 2001-2013 data focused on the impact of the internet on bilateral trade found that a 10 percent increase in internet penetration in the exporting country leads to a 1.9 percent increase in exports along the extensive margin (the quantity of goods), and a 10 percent increase in internet penetration in the importing country leads to a 0.6 percent increase in exports along the intensive margin (the average value of goods).[80]

However, because of limitations in the data, each of these pictures are still incomplete and, in almost all cases, represent rough estimates of the impact of data flows on growth and jobs. For instance, data on digitally deliverable services estimates what services *could* be provided online, and is therefore a high estimate. In addition, digitally deliverable services only capture one aspect of the importance of cross-border data flows for international trade. With this in mind, UNCTAD illustrated just how much of the impact may not be being captured in current statistical approaches, finding that some 50 percent of all traded services are enabled by the technology sector, including cross-border data flows.[81] Similarly, the U.S. International Trade Commission estimated that by the early part of this decade, U.S. global exports of digitally deliverable services were already 61 percent of total U.S. services exports and 53 percent of services imports.[82] EU exports and imports of digitally deliverable services were at similar levels.[83]

E-commerce is another common measure of the digital economy, illustrating the importance of data flows for digital trade, but again highlighting the lack of comprehensive or consistent indicators. Around 12 percent of international trade in goods has been estimated to occur through global e-commerce platforms such as Alibaba and Amazon.[84] In 2014, approximately $30 trillion worth of goods, services, and finance was transferred across borders. Related data important to shedding light on the impact of data flows includes the growth in digital payment mechanisms. In China, for instance, Alipay and Wechat Pay increased digital payments more than 20 times, to $2.9 trillion, between 2013 and 2016.[85] Similarly, McKinsey & Company has estimated that the shift from cash to digital payments could increase GDP across developing economies by 6 percent before 2025, adding $3.7 trillion and some 95 million jobs.[86] To effectively measure the impact on economic growth and development will require such data to be captured consistently.

At an even more fundamental level, the increased use of internet and data traffic provides additional insight into the extent and growth of data flows. Cross-border band-

[78] Castro 2013 *in* Castro and McQuinn 2015, 11.
[79] U.S. International Trade Commission 2014 *in* Castro and McQuinn 2015, 10.
[80] Osnago and Tan 2016.
[81] U.N. Conference on Trade and Development 2009 *in* Castro and McQuinn 2015, 1.
[82] U.S. International Trade Commission 2014 *in* Castro and McQuinn 2015, 1.
[83] Meltzer 2014; Information Technology Industry Council 2016.
[84] Manyika et al 2016.
[85] Better Than Cash Alliance 2017, 6.
[86] McKinsey Global Institute 2016, 9.

width usage increased 45-fold between 2005 and 2015, projected to grow another nine-fold by 2020,[87] while global internet traffic is estimated to increase 127-fold by 2021.[88] In stark contrast to global trade growth, which rose at an average 2.5 percent annually between 2013 and 2017, the international demand for broadband grew at more than 21 percent and the international demand for bandwidth grew at more than 30 percent.[89]

When considering total data traffic, the share of data that passes through cloud data centers has surpassed that of traditional data centers. The traffic passing through cloud data centers rose from roughly 30 percent of all internet Protocol (IP) traffic in 2011 to 70 percent in 2015.[90] In fact, the capacity of cloud centers has surpassed traditional data centers, with cloud data center workloads growing at an average rate of more than 50 percent annually.[91]

These are all useful data points that together illustrate the growing importance of cross-border data flows for growth, trade, and jobs. However, there are numerous limitations that constrain their usefulness for policymakers in Asia. First, the vast majority of these studies are either U.S.-centric or Euro-centric and don't necessarily correlate to less-developed markets or markets with substantially different economic foundations. Second, given the cross-sectoral and cross-jurisdictional impact of data flows, using proxies such as e-commerce to estimate the impact of digital trade (including the benefits from Web searches, the added value from e-logistics, and so on) provides only a very conservative and partial snapshot. Third, the data is difficult to compare across countries, because reports use specific assumptions and tend to focus on particular countries or regions.

The Costs of Cross-Border Data Restrictions

Data localization and data residency requirements lead to poor economic outcomes.[92] Policies that constrain the flow of data across borders directly and negatively affect information access and therefore business growth, the capacity for innovation and productivity gains, and the scope for engaging in international trade.[93]

The harm of constraining cross-border data flows far outweighs any marginal gains from data protectionism, in terms of both economic growth and social development. For example, consider the following:[94]

- Data localization requirements limit access to digital commerce networks and online resources and opportunities for consumers and businesses in the affected nation.
- Constrained access to the free flow of data limits the ability of businesses to synthesize large data sets. This deprives local businesses and consumers of improved products and services that perhaps offer lower costs.
- Data protectionism creates trade barriers and affects business models, reducing the productivity, innovation, and competitiveness of businesses.

[87] Manyika et al 2016, 45 *in* U.S. Department of Commerce 2016, 32.
[88] Cisco 2016.
[89] ITU 2017; TeleGeography 2017.
[90] U.S. International Trade Commission 2017, 68.
[91] U.S. International Trade Commission 2017, 68-69.
[92] Castro 2013, 10.
[93] Castro 2013, 1.
[94] Deloitte 2016, 18.

- Constrained data flows require businesses to invest in what are frequently lower quality facilities. This reduces overall levels of efficiency and raises the costs of doing business for enterprises that the local data providers serve, and therefore inhibits the growth of local small and medium-sized enterprises.

Data localization may close off opportunities for a business to go global. McKinsey & Company found that 86 percent of tech startups were "born global" and used some type of cross-border activity.[95] In fact, operating internationally is increasingly underpinned and being transformed by cross-border data flows.

Given the stakes, several studies have begun to estimate the economic costs of data localization requirements:

- The European Centre for International Political Economy (ECIPE) studied the impact of proposed and enacted data localization measures in Brazil, China, the European Union, India, Indonesia, South Korea, and Vietnam, finding that proposed or enacted data restrictions would reduce GDP in India (-0.1 percent), Indonesia (-0.5 percent), and Vietnam (-1.7 percent).[96] The study further noted that if data localization requirements were applied across all sectors of the economy, GDP losses would be even higher in India (-0.8 percent) and Indonesia (-0.7 percent).[97] Such regulations were estimated to already cost residents of the European Union $193 billion annually, attributable in part to higher prices.[98]
- The Information Technology Industry Council (ITI) analyzed the impact on European trade if international data flows were seriously disrupted or stopped, and found that it would decrease EU GDP by 0.8–1.3 percent.[99]

Data localization requirements also negatively impact investment. For instance, data localization has been estimated to lead to declining investment in India, -1.4 percent; in Indonesia, -2.3 percent; and in Vietnam, -3.1 percent. Exports from China and Indonesia would decrease by 1.7 percent as a consequence of direct loss of competitiveness.[100]

Moreover, restrictions on cross-border data flows harm both the competitiveness of the country implementing the policies *and* other jurisdictions in the global economy. Barriers to data flows negatively impacts exports to that country which rely on use of data. For instance, the impact of EU restrictions on cross-border data flow of personal information between the EU and the US was estimated to lead to an 11 percent decline in US manufactured exports to the EU.[101]

One of the channels by which cross-border data flow restrictions raise costs and reduce competitiveness is by raising the cost of access to key business tools such as computing and data processing power. One study estimated that forced data localization would lead European companies to pay 30–60 percent more for their computing needs alone.[102] With an increasing

[95] McKinsey Global Institute 2016, 56-57.
[96] The study uses a computable general equilibrium model called GTAP8. The effect on productivity is created using a so-called augmented product market-regulatory index for all regulatory barriers on data, including data localization, to calculate domestic price increases or total factor productivity losses. Bauer et al 2013.
[97] Bauer et al 2013, 2.
[98] Bauer et al 2013.
[99] Information Technology Industry Council 2016.
[100] ECIPE 2013 *in* Castro and McQuinn 2015, 10.
[101] ECIPE 2013 *in* Castro and McQuinn 2015, 10.
[102] Leviathan Security Group 2015.

number of Asian economies either already implementing such restrictions, or actively contemplating them, it is imperative to clearly understand the impact. (**Appendix 1** summarizes data localization laws in the five economies under review in this paper: India, Indonesia, Japan, the Philippines, and Vietnam.)

2. CLARIFYING CROSS-BORDER DATA FLOW RESTRICTIONS: A TYPOLOGY OF DATA LOCALIZATION

Data localization is not a single issue, but encompasses a wide array of government actions and objectives.

Cross-border data flow restrictions can take one of several forms. From most restrictive to least, examples include the following requirements:

- The data cannot be transferred outside national borders
- The data can be transferred outside national borders, but a copy must be maintained domestically.
- Prior consent is required before global transfers are allowed.

Generally, when a government restricts cross-border data flows by imposing data localization or data residency requirements, it seeks to achieve identifiable objectives. These objectives can be segmented into five types:

1. **Data privacy.** The assumption is that if data is stored within national borders, the government and industry can better safeguard citizens' personal privacy. Governments also often require all public data to remain local, partly because of privacy concerns.
2. **Cybersecurity.** Data security (particularly with an awareness of cybersecurity risks) is also a key driver for governments to require data to remain within national borders. Governments often assume, incorrectly, that data security is enhanced if the data resides locally.
3. **Law enforcement purposes.** Governments may need to keep data local to ensure rapid access by law enforcement officials.
4. **Protectionism.** Governments can be motivated by the goal of protecting domestic businesses from foreign competition.
5. **Levelling the playing field.** This objective is also economically motivated, but involves applying existing regulations to digital competitors as to match the compliance of non-digital players.

In almost all cases, restricting the location of the data to within national borders is a suboptimal means of addressing the objective.[103] In fact, data restrictions can undermine the ability to achieve legitimate policy objectives, *and* have unintended impacts on other policy and regulatory goals, such as economic growth and social inclusion.

In each case, there are alternative approaches that impose fewer restrictions on trade and are more effective at achieving the identified objective. The remainder of this chapter examines each of these rationales in greater detail and offers alternative approaches that address the particular concerns.

Protecting Privacy and Other Regulatory Goals

The capacity to move large quantities of data seamlessly and rapidly across borders can undermine existing domestic regulatory enforcement in areas such as privacy, consumer protection, and health care. And, as such,

[103] Chander and Le 2014.

privacy regulation provides a good example of how data flows create incentives for regulators to respond by restricting cross-border transfers of personal information.

Access to and use of data (including personal data) has become an important driver of innovation, new business models, jobs, and growth. For instance, access to data allows companies to better assess consumer preferences and to target products and advertising. Providing online services, for example in the areas of health and education, also relies on collecting personal data. The economic value derived from the collection of personal data is often the basis on which "free" services such as email, search, and social networking are provided. The challenge is to achieve privacy protection while avoiding unnecessary restrictions on cross-border data flows.

In this context, the lack of data privacy protection in one country can negatively affect another country's data privacy goals. This was recognized by the 1980 OECD Guidelines, which allowed countries to restrict cross-border data flows to another country to avoid circumventing its domestic privacy legislation. The 2013 update to the OECD Guidelines specifically recognizes the impact of cross-border data flows on privacy, as well as their economic and social benefits, and calls on OECD Members to "support the development of international arrangements that promote interoperability among privacy frameworks that give practical effect to these Guidelines."[104]

Despite such calls for regulatory alignment, governments, both individually and regionally, are adopting different approaches to regulating personal data collected by private enterprises.

The EU General Data Protection Regulation

The European Union initially implemented the world's most legally comprehensive data protection system, the Data Privacy Directive, which will be replaced in April by the General Data Protection Regulation (GDPR).[105] Like the EU Data Directive, the GDPR GDPR makes it illegal to transfer personal data outside the European Union unless the importing country provides an adequate protection of privacy. In the absence of such protection, the European Union does allow transfers to entities in "non-adequate territories," provided the transfer is conducted according to binding corporate rules or -"standard contractual clauses" approved by a Data Protection Authority.

So far, only a handful of countries have received an adequacy determination from the European Union.[106] The need for an adequacy decision from the European Union in order to transfer personal data creates an economic incentive for other countries to seek such a finding. EU practice shows that successful adequacy determinations are granted to countries with privacy regimes very similar to the EU approach. Moreover, the European Court of Justice observed that a finding of adequacy requires the third country privacy regime in practice to ensure protection of personal information that is 'essentially equivalent' to the EU system.[107]

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[104] OECD 2013.
[105] Regulation (EU) 2016/679.
[106] Countries with an adequacy finding as of February 2018: Andorra, Argentina, Canada (commercial organizations), Faroe Islands, Guernsey, Israel, Isle of Man, Jersey, New Zealand, Switzerland, Uruguay and the US under the Privacy Shield.
[107] *Schrems v. Data Protection Commissioner* 2015, para 94.

When it comes to smaller economies, the economic incentives to adopt that countries privacy regime are more limited. For instance, Vietnam, requiring an adequacy finding is unlikely, on its own, to lead to other countries changing their privacy laws. In this case, the company operating in Vietnam would need to rely on other available mechanisms to transfer personal data (i.e. contracts if allowed), the absence of which would effectively be restrictions on cross-border data flows.

The U.S. Approach

While there is no specific protection of privacy in the U.S. constitution, there is a long history in the U.S. of concern for privacy protection and the development of privacy principles by U.S. courts. For instance, in the 19th century Samuel Warren and Louis Brandeis, concerned about the potential for media to intrude on personal lives wrote about a "right to be left alone" (Warren and Brandeis 1890).

The U.S. Code of Fair Information Practices based on Fair Information Practices Principles (FIPPS) developed in the 1970s become the basis for a range of U.S. laws governing the collection and use of personal information by the Federal government, as well as the OECD privacy principles 1980.

The current U.S. privacy framework is based on a broad set of privacy laws applicable to the federal government, such as the Privacy Act, 1974, the Electronic Communications Privacy Act, 1986; and the Right to Financial Privacy Act, 1978.

Protection of personal data by the private sector is based on sector specific legislation such as The Financial Services Modernization Act, the Health Insurance Portability and Accountability act and the Children's Online Privacy Protection Act. Privacy protection is centered on the role of notice and consent and reliance on the Federal Trade Commission .to police compliance by companies with their privacy policies. U.S. States also have data protection laws.

This U.S. approach avoids specific cross-border data restrictions and instead relies on the application of domestic laws to companies for breach of their privacy notices. This makes individual companies responsible for ensuring the privacy of personal data in the United States and abroad.

The U.S.-EU Privacy Shield

The existence of different approaches to protecting privacy in the European Union and the United States has not prevented agreement on interoperability, in the form of the U.S.-EU Privacy Shield.

The U.S.-EU Privacy Shield has been deemed adequate by the European Commission.[108] As a result, the U.S.-EU Privacy Shield allows for the free flow of personal data between the European Union and participating businesses in the United States. Under the Privacy Shield, U.S. companies self-certify to the U.S. Department of Commerce that they will protect personal data consistent with the Privacy Framework, which includes the Privacy Shield Principles.[109] U.S. businesses are required to publish their privacy policies, and the Privacy Shield gives the U.S. Federal Trade Commission jurisdiction over such businesses should they breach their own policy. In addition, the United States provides various means of redress for people whose personal

[108] EC 2018.
[109] Privacy Shield Overview 2018.

data has been compromised, including a direct complaint to the business or a complaint to the Department of Commerce. Also under the Privacy Shield, the United States has established an ombudsperson to address complaints about government agency requests for information transferred to the US from the EU or Switzerland on the basis of national security.

Asia Pacific Economic Cooperation Rules

The Cross-Border Privacy Rules of the Asia Pacific Economic Cooperation (APEC) regional economic forum provides that the personal information controller—i.e., the entity that collects or uses the data —is accountable for ensuring the personal privacy is protected consistent with the principles in the APEC Privacy Framework. Such responsibility extends to any transfers of data to a third person, whether located domestically or overseas.

The APEC Privacy Framework includes a set of information-privacy principles similar to those found in the OECD Guidelines:

- Personal information protection should prevent misuse of such information, taking into account risks of harm that may result from misuse

- A personal information controller should provide a statement as to its personal information practice and policies, including with regard to the fact that personal information is being collected, the purposes for its collection, the organizations to which the data might be disclosed, and how they can limit the use and disclosure of the data, including the chance to access and correct it.

- Data subjects must be notified that their personal information is being collected. Data collection should be limited to information that is consistent with the purposes of the collection.

- The personal information controller is accountable and when transferring such information to another person, domestic or international, should obtain consent or take reasonable steps to ensure the person receiving the personal information will protect it consistent with these principles.

APEC Cross-Border Privacy Rules

The APEC Cross-Border Privacy Rules (CBPRs), endorsed by APEC in 2014 is a mechanism to facilitate the transfer of personal information amongst APEC members. The CBPRs require business to develop privacy policies based on the APEC privacy principles and which meet the CBPR program requirements.[110] APEC Accountability Agents assess consistency of businesses privacy policies and practices with the APEC CBPR requirements. A precondition to participation in the APEC Cross-Border Privacy Rules is that the government must have at least one privacy or data-protection enforcement authority participating in the APEC Cross-Border Privacy Enforcement Arrangement, a framework for regional cooperation in enforcement of privacy and data-protection laws among APEC member economies.[111]

Participation in the Cross-Border Privacy Rules is growing, with Canada, Japan, Mexico, Singapore, South Korea, and the United States participating; Australia, and the Philippines committed to participate; and other APEC governments considering doing so.

[110] CBPRs 2015.
[111] APEC CBPRs 2017.

Businesses that meet the CBPR requirements and are subject to the laws of an APEC CBPR participating economy can be certified as compliant. APEC Accountability Agents and Privacy Enforcement

Box 3. Providing 'Similar' Protection: Under Law, the Accountability Principle, or by Contract

A number of data privacy systems allow transfers of personal information to countries that have laws that provide similar or "adequate" levels of protection to that of the source country. These countries provide examples:

- **Australia** requires an Australian entity that intends to disclose personal information to an offshore entity to "take such steps as are reasonable in the circumstances to ensure" that the offshore entity complies with the Australia Privacy Principles. When the offshore entity does not comply with these principles, the Australian entity is *accountable* and liable as if it had not complied itself, regardless of whether it had taken reasonable steps to ensure that the offshore entity complied with Australia's Privacy Act.[1]

- **Canada** requires the receiving country to have laws that provide *similar protection* to the domestic law.

- **Japan** establishes a general rule that the subject of the personal information must specifically consent to the transfer of data to an entity outside of Japan unless
    - the receiving party is in a country that has been recognized by Japan's regulator to have standards for the protection of personal information that are *equivalent* to those required by Japan's Personal Information Protection Act;
    - the transferring party and receiving party have ensured that the receiving party will handle the personal information appropriately and reasonably based on the intent of the privacy law (i.e., executing a data transfer agreement similar to the Standard Contractual Clauses approved by the European Commission for transfers of personal data outside the European Union); or
    - the receiving party has a certification recognized by the regulator based on an international framework for handling personal information, such as a certification from the APEC forum's Cross-Border Privacy Rules system.

- **The Philippines** holds the Philippine entity liable for compliance, but provides that data may be transferred to another country if there is a contract between the Philippine entity and the entity receiving the data that the receiving entity is required by law or other reasonable means that ensure that the receiving entity will provide a *comparable level of protection*.

- **Singapore** provides that the transferring entity is required to take appropriate steps to determine that the entity receiving the data is bound by a legally enforceable obligation to provide the transferred data with a *comparable standard of protection*.

Authorities are responsible for enforcing compliance by business with APEC CBPR requirements.[112]

In contrast to the rights-based nature of the EU General Data Protection Regulation, the APEC Privacy Framework and the CBPRs are principles based and allow governments greater flexibility in designing domestic privacy systems, provided that the data protection comports with the APEC privacy principles.

These challenges underscore the need for countries to develop domestic privacy systems that are interoperable. However, interoperable privacy approaches do not require identical approaches to privacy, but rather a process for recognizing that different approaches can still achieve similar standards of protection.

Recommended Approach

Governments should develop robust privacy laws that take into account the importance of access to data for economic growth and engagement in digital trade. In this respect, the U.S. approach has provided privacy and an enabling environment for innovation and growth in its digital economy.

Governments in the region should participate in the APEC Cross-Border Privacy Rules as a mechanism that can enable trust and data flows among participants. A key benefit of the APEC approach is that it enables data to flow freely even in the absence of two governments having agreed to formally recognize each other's privacy laws as equivalent. Instead, APEC relies on businesses to protect data, and holds these businesses accountable for any breaches.

The focus of APEC Cross-Border Privacy Rules on contract as a tool for business to maintain privacy standards is similar to the use of contracts by the EU General Data Protection Regulation. There has already been work between APEC and the EU Article 29 Working Party on the interoperability of the two systems, and more should be done here to find mechanisms for interoperability. The U.S.-EU Privacy Shield is illustrative of the cooperation by which this might be achieved.

For countries that are party to the Comprehensive and Progressive Agreement for Trans-Pacific Partnership, the commitments on privacy in the e-commerce chapter provide a step towards using trade agreements to provide a framework for addressing the need for privacy, digital trade, and cross-border data flows. The agreement includes:

- a commitment to adopt or maintain a legal framework that provides for the protection of the personal information of IoT commerce users;
- recognition that a privacy framework may take various forms, including a comprehensive privacy approach, sector-specific laws, and laws that provide for enforcement of voluntary undertakings; and
- best endeavors commitment to promote compatibility between the countries' data protection systems.[113]

The agreement's e-commerce chapter also sets forth the first binding multilateral rules in a trade agreement addressing restrictions on cross-border data flows and data localization.

[112] APEC CBPRs: Policies, Rules and Guidelines, 10.
[113] CPTPP 2018, Article 14.8.

Addressing Cybersecurity

Among the most significant issues motivating governments to adopt data localization requirements is that of data security, particularly issues involving cybersecurity, or the protection of data from unauthorized access by others—whether rogue individuals or other governments. The rise of cyberterrorism and cyberespionage by governments has heightened the concern for the security of data stored outside a country's borders.

Addressing security risk is not necessarily about eliminating risk. Instead, it requires managing the risk while also maximizing the opportunities of connectivity and data flows.[114] As the OECD has recommended, the treatment of digital risks "should aim to reduce the risk to an acceptable level relative to the economic and social benefits expected from these activities."[115]

Data Localization Does Not Equal Greater Security

There are multiple aspects to security, including the physical and digital environs, the people or organizational risk as well as broader macro risk factors arising from political insecurity and natural disasters.

Security is not enhanced simply because data resides within a particular jurisdiction. Security is a function of the technical, organizational, and financial capacity of an entity to protect the data and provide physical protection for a data center.[116]

For instance, the economic size of an entity will play a role in its ability to respond to and recover from a cyberattack. According to a Symantec report, email malware hit businesses of all sizes in 2016, but small and medium-sized businesses (less than 500 employees) were the most affected.[117]

Increasingly large amounts of data are being stored using cloud computing. For instance, in 2015 70 percent of all internet traffics was going through cloud data centers, up from roughly 30 percent in 2011.[118] As a result, it is the security of the cloud that is often relevant when assessing the exposure of data to cyberattack.

Major multinational companies, such as the major cloud service providers, typically have far greater resources and expertise to dedicate to ensuring the highest possible levels of security. They also have a greater capacity to recover and respond. Moreover, response to security threats increasingly requires rapid awareness, response, and coordination among private sector companies and law enforcement, often across borders. Smaller companies are less likely to be able to cope with fast-evolving, transnational cyber threats.

Reliability, resilience, and redundancy in local infrastructure are also relevant here. In some developing countries for instance, stability of the electricity supply and the availability of bandwidth are not always guaranteed. Localizing data can compound these vulnerabilities, by forcing all data into insecure facilities.

Technical capacity is another major component of cybersecurity, and yet data localization requirements lead naturally to a rise in the number of local data centers—most often managed and operated by entrepreneurs or companies

[114] OECD 2015.
[115] OECD 2015, Principle 5.
[116] Google Cloud 2017.
[117] Symantec 2017.
[118] USITC estimates based on data from Cisco Global Cloud Index 2016; Cisco Global Cloud Index 2012; Cisco Visual Networking Index 2016; and Cisco Visual Networking Index 2012.

looking to expand into a promising sector, but who may lack the capacities or expertise to effectively safeguard data. They may, for instance, not be adequately equipped to screen and train employees, or lack the resources to quickly deploy critical security and audit mechanisms.

In Asia, rapid market growth and regulatory shifts have created a range of vulnerabilities. A recent *World Payments Report* found that emerging Asian economies are some of the world's fastest growing non-cash-transactions markets,[119] and a Standard Chartered Bank study pointed out that online payments are among the riskiest because they have yet to implement online systems for regulatory processes, electronic tax filing and payment, and customs systems, leading to higher operational risk.[120]

In a similar vein, governments risk security when they require data to be centralized in-country. This leads to a single point of attack which can be avoided by using cutting-edge cloud data centers that, for example, might shard data globally and regularly back-up copies of data across globally located data centers.

By contrast to such an approach, Indonesia has developed a National Payment Gateway system, mandating that all domestic transactions (and possibly all international transactions) be routed through it.[121] The consolidation of payment processing into one central system heightens security risks instead of distributing the risk across payment processors, thereby introducing and amplifying the same vulnerabilities ascribed to local data center operators.

Key Aspects of Good Security

At a minimum, regulations aimed at improving data security should not assume that data localization is the best response.

To take greatest advantage of existing and emerging capabilities, governments and the private sector must cooperate. Collaboration among governments and experts in the private sector are needed, whereas data localization often short circuits such opportunity for developing a collective response.

That said, public-private collaboration is already underway in many sectors, including banking, health care, IT, telecommunications, energy, and other critical infrastructure sectors. International organizations have developed globally accepted standards and industry codes of conduct through open, multi-stakeholder processes. There are many commonly referenced security frameworks, best practices, audit standards and certifications, and standardized controls.[122]

The modern threat environment requires a sophisticated and multifaceted approach to data security. The threat may be a rogue employee or an electronically transmitted threat, such as a phishing attack or a distributed denial-of-service attack.

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[119] Capgemini 2017.

[120] Standard Chartered Bank 2016.

[121] Bank of Indonesia 2017.

[122] Service Organization Controls SOC: 1/Statement on Standards for Attestation Engagements, 16/International Standard on Assurance Engagements, 3402, SOC 2, and SOC 3 (for a discussion of the SOC standards, see Bourke 2012); ISO standards 27001, 27017, 27018, and 9001 (see ISO 27000 Family and ISO 9000 Family); U.S. Federal Information Security Management Act (see Department of Homeland Security); U.S. Federal Risk and Authorization Management Program (see FedRAMP), U.S. Department of Defense Risk Management Framework (see DoD RMF and Cloud Security Model); Payment Card Industry Data Security Standard (see PCI DSS); and U.S. Federal Information Processing Standard 140-2 (see NIST 2001).

Security certainly begins with the physical security of a facility, but does not end there. Physical security will include barriers, fences, guards, intrusion detection and facility access controls, but also encompasses employee screening and other activities to reduce the risk of an insider attack, such as developing and installing secure software and hardware.

Electronic data protection is also multifaceted. Strong encryption (at rest and in transit) is an essential component of protecting data from unauthorized access. Deletion of data when no longer necessary reduces security risks. Maintaining up-to-date security software to protect from viruses and other assaults on data is a major security element that requires constant diligence in software administration and rapid-response software deployment. Resilience to distributed denial-of-service attacks requires both technical capacity and data traffic-management capabilities.

Data also may be protected by fragmentation and segregation; either physically, across many data centers (often in different countries, if via a large cloud service provider), or through the use of access management procedures and software.

Resilience, data recovery, and business continuity are also key aspects of security. These are best addressed by maintaining rapidly accessible redundant sets of data at multiple data centers. Resilience is further enhanced when those data centers are in different geographic locations or in different countries. These considerations are additional arguments against data localization, and should be taken into account by governments that are developing privacy and data security laws.

Access to Data for Law Enforcement Purposes

Another motive for data localization requirements is to ensure ready access to data for law enforcement purposes. Currently, when data is held in another jurisdiction, officials need to rely on the processes under mutual legal assistance treaties to obtain access.

A mutual legal assistance treaty provides a process under which one country can request information held by a communications service provider in another country. These treaties were originally designed to facilitate sharing evidence in exceptional circumstances, and have proved poorly designed to respond to regular requests for access to electronic data.[123]

The globalization of the internet and increasing use of cloud computing means that a person's data is often held in a separate jurisdiction. In most cases, this happens to be in the United States, as U.S.-based companies provide the majority of digital services, including cloud computing, and host that data within the United States.

Another reason for the increasing use of mutual legal assistance treaties is that the use of encryption devices such as smartphones makes wiretaps ineffective.

Obtaining data from a U.S.-based company requires contacting the U.S. Department of Justice Office of International Affairs. The department must then determine whether there is a legal basis for a court order, and have a prosecutor seek such an order from a U.S. federal court by showing probable cause. Once granted, the company would produce the required electronic record, and these records would be reviewed by the Office of International Affairs for

[123] Mohanty and Srikumar 2017.

compliance with U.S. law, to ensure no violation of the First Amendment to the U.S. Constitution. Only then could the data be provided to the law enforcement agents in the other country. Such a process requires approximately 10 months.[124] For law enforcement agencies, this timing is out of step with the need to respond rapidly to international terrorism or cybercrime.

In addition to these delays on the U.S. side, the Office of International Affairs may either refuse a request or require changes to the request, thereby further delaying the process.

Recommended Approach

Data localization is a second-best response to the challenges for local law enforcement and the inadequacies of the mutual legal assistance treaty process. As outlined above, data localization creates a range of economic costs.

Instead, two reforms should be considered. The most immediate is reform of the mutual legal assistance treaty process, to better accommodate requests for electronic data. The second, longer- term reform is to consider negotiating data-sharing agreements, either bilaterally or multilaterally. The proposed U.S.-U.K. data-sharing agreement provides a framework for how this could be done.[125]

Mutual Legal Assistance Treaty Reform

Given the central role of the United States in hosting electronic data, mutual legal assistance treaty reform must start with improving how the United States responds to requests. This was already considered under President Obama, in a report by the President's Review Group on Intelligence and Communications Technologies.[126] The report's key recommendations were the following:

- Increase the resources of the Office of International Affairs.
- Create an online submission form for mutual legal assistance treaties.
- Streamline the number of steps in the process.
- Streamline the process of sending records back to the other country by allowing the holder of the electronic records to send them directly to the requesting country, rather than through the Department of Justice.
- Promote the use of mutual legal assistance treaties globally.

These recommendations should also guide how other countries assess their response to mutual legal assistance treaty requests, and their scope to reduce both costs and time associated with satisfying the requests. This would improve the functioning of these treaties globally.

In addition, successful reform of the mutual legal assistance treaty process would avoid governments seeking backdoors or other access to encrypted devices.[127] Government interference with encryption by companies would likely erode trust in the internet by both businesses and consumers, and result in associated economic losses.

[124] White House 2013.
[125] Lin and Fidler 2017.
[126] White House 2013.
[127] Swire and Hemmings 2015.

International Data-Sharing Agreement

An international agreement is needed that provides mechanisms for governments to gain access to data held in another jurisdiction.[128] Such an agreement would require member countries to have similar standards of privacy and human rights protection, to avoid situations in which fulfillment of these requests by one government would undermine its own domestic privacy and human rights standards.

An international approach should ultimately provide an incentive for countries to move toward similarly high standards of privacy and human rights protection, as well as due process norms (i.e., showing probable cause) that would need to be satisfied before the data was provided.

In this regard, the proposed U.S.-UK. data-sharing agreement gives U.S. law enforcement access to data held in the United Kingdom concerning U.S. citizens, and vice versa. The agreement would allow U.K. companies to hand over data on U.S. citizens to U.S. law enforcement officials, upon presentation by the U.S. officials of a domestic (U.S.) warrant.

Digital Protectionism

Governments also restrict data flows to protect domestic companies from online competition. This can include preventing or degrading access to the websites of competing companies, establishing unnecessarily restrictive licensing requirements to provide data services, or requiring a local data center or disclosure of source code as a condition of market access. China, for instance, blocks access to an estimated 3,000 foreign websites, including 11 of the top 25 global sites.[129]

This type of protection can have various negative consequences. Data flows restrictions may be inconsistent with a country's commitments under the World Trade Organization.[130] In addition, protectionist data restrictions can lead to retaliation by other countries, which increases the costs for local companies that want to use data to operate globally.

Recommended Approach

As outlined above, the internet and global data flows can provide significant economy-wide opportunity. Over the next decades, these technologies will affect how goods are produced and consumed, how governments govern and how businesses engage in international trade. To make the most of these opportunities requires a system-wide approach that prepares the country, business and its people. Here is not the place to analyze in detail what is required, and there is already work on how countries can go digital and engage in trade. [131]

Suffice to note that as a general matter, governments need to ensure their countries are digitally ready and they have a strategy for making the most of the new digital trade opportunities. This means avoiding narrow protectionist responses such as data localization to force the building of a local data center. Instead, the following steps should, as a minimum, be adopted. First, assessing all relevant regulation to determine whether it is fit-for-purpose – that is it is appropriately calibrated to enable updates for digital opportunities. This should be in areas such as privacy, consumer protection, intellectual property, and financial regulation and competition laws. In addition, frameworks that

[128] Smith 2017.
[129] USTR 2017.
[130] WTO 2009.
[131] Meltzer 2014.

enable the sharing and use of data amongst the private and public sectors are needed. Second, governments themselves need to 'go digital,' which includes delivering digital services and supporting digital start-ups. Third, government and interested parties need to ensure that the education system is preparing students for the jobs that a digital economy will produce.

Levelling the Regulatory Playing Field

Another prominent argument for restricting cross-border data flows has been that existing regulation should be applied to new digital entrants, particularly those that are able to service customers in a country without physically being present in the country. This argument is often made by national telecommunications and cable companies (but has also been made by transport companies, hospitality groups and healthcare providers), who argue that over-the-top (OTT) service providers that use the local communications infrastructure do not pay license fees and are not subject to similar regulations governing their operations or their content. The complaint is that there is an uneven playing field that gives OTT providers a competitive edge. Therefore, the argument goes, OTT providers' unfair advantage leads to reduced market share and revenues for traditional, or domestic, incumbents, which has a negative impact on investment in domestic infrastructure, by reducing the finance available and the rates of return on investment.[132]

While the relationship between the impact of OTT providers on local revenues and the resulting propensity to invest in infrastructure, is complex, it is not at all clear that OTT providers are having a negative impact and as outlined below, market developments point to a virtuous cycle of investment between OTT providers and infrastructure development.

Networks in the era of digital and IP convergence involve data centers and servers, as well as cables, radio, and routers. A growing component of the national infrastructure is content distribution networks, which cache content at the edge of the network in data centers that house internet exchange points, to reduce network latency and maximize video quality for end users.[133] Social media and other OTT provided services have become an integral, often leading, part of the digital economy and society. Investment in content distribution networks will sometimes be by a third party, but the trend for major OTT players—such as Facebook, Google, Netflix, and Comcast – is to invest in their own networks, including the cables, satellites, and increasingly more innovative alternatives such as balloons and drones.[134] By 2016, Netflix was distributing 90 percent of its traffic over its Open Connect content distribution network to internet service provider on the edge of the networks, in countries receiving its services.[135]

These global OTT players have a commercial interest in creating their own interconnecting networks. Facebook and Google, for example, have begun investing heavily in submarine optical fiber cables to guarantee fast and secure delivery of data traffic.[136] The capacity requirements of these OTT players are

[132] In one scenario by McKinsey & Company, by 2018 in terms of revenues, OTT players could account for 60% of messaging, 50% of fixed voice calls, and 25% of mobile voice calls, up from 9%, 11%, and 2% in recent years. Meffert and Mohr 2017.
[133] The point is made, for example, in Commonwealth Telecommunications Organisation 2016.
[134] C., Michael 2016.
[135] Clancy 2016.
[136] Including the Pacific Light Cable Network, with a designed capacity of 120 terabytes per second, which will directly connect the United States and Hong Kong starting in 2018; the first of its kind.

now exceeding those of the largest carriers. By 2016, private networks already accounted for around 50 percent of the intra-Asia and trans-Pacific traffic.[137] As importantly as the investment in 'traditional' infrastructure, however, has been the investment in alternative distribution modes such as the use of unused or unlicensed spectrum, by the likes of Microsoft and Google. Innovative technologies such as TV White Spaces are being used to extend network access in countries such as Indonesia, the Philippines, East Timor, and even New Zealand, at fractional cost across remote or challenging territories. The populations being connected by such innovations, and delivering services such as remote health care or education, are precisely those that have been deemed 'uneconomic' by incumbent service providers who have refused to invest in such access.

An industry report noted that "consumers who use OTT services (such as online video), who generate online content, are increasingly likely to upgrade their internet connection, and are more willing to pay more for [the] faster connection."[138] The OECD, in a 2016 report, noted the positive impact of the trend on investment in broadband networks, referring to it as a "virtuous cycle." The U.S. Federal Communications Commission, in its 2015 Open internet Order, reaffirmed policies that promote the virtuous circle, "in which innovations at the edges of the network enhance consumer demand, leading to expanded investments in broadband infrastructure that, in turn, spark new innovations at the edge." Policies promoting the virtuous circle are said to be responsible for increased investment by broadband providers totaling $212 billion between 2011 and 2013, more than in any three-year period since 2000.[139]

In other words, contrary to the fears of many national ministers, the evidence suggests that OTT providers, and access to a wider, richer set of data services, have a positive impact on infrastructure investment. However, traditional service providers are still financially challenged by the entry of OTT providers. Increasingly this has proven to be true beyond the communications sector, including in the transportation, healthcare and other sectors, as the digital economy expands.

Under these changing circumstances, traditional providers will need to respond with new investment to extend local access to their networks, and to rejuvenate their services and content.

Recommended Approach

This situation calls for a reform of licensing to turn the challenge of OTT providers into an opportunity. India provides a good example, when in 2013 it became the first country to introduce unified licensing for traditional and OTT service providers. This development was a recognition that convergence of fixed and mobile, voice, and text and video offered opportunities to attract new investment into the information, communications, and media sector.[140]

[137] TeleGeography 2016.
[138] Asia Internet Coalition 2015.
[139] OECD 2016.
[140] ITU 2013.

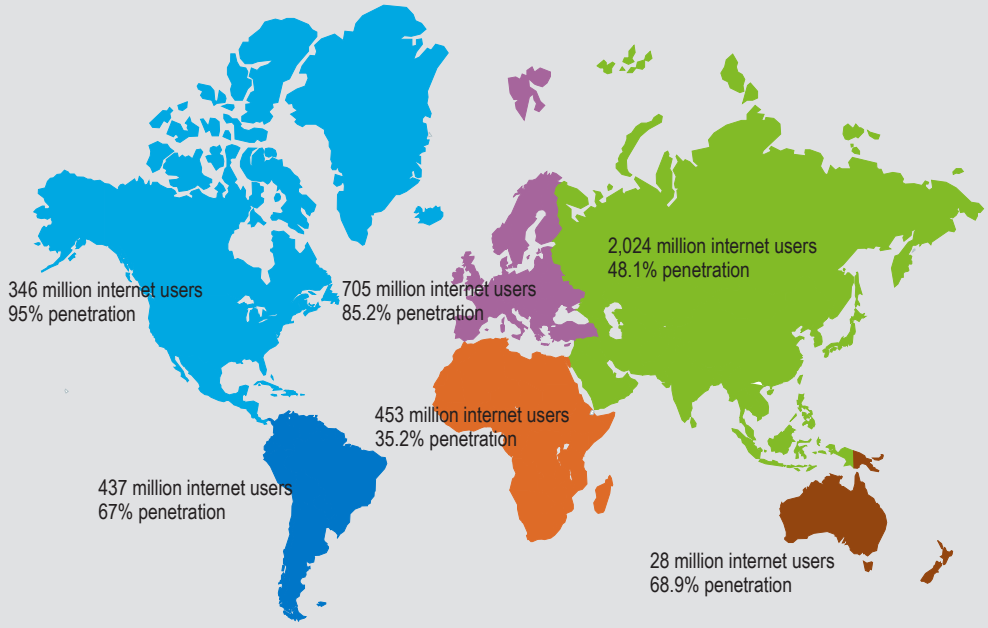
3. THE IMPACTS OF CROSS-BORDER DATA FLOWS IN ASIA

Asia Pacific continues to be one of the fastest growing regions in the world, both economically and in terms of connectivity. By 2017, Asia had the world's largest number of internet users, with 1.9 billion people online (**Figure 3 and 4**).[141]

The region's number of internet users grew at a compound annual growth rate (CAGR) of 11.52 percent between 2009 and 2015 (**Figure 5**).[142] More than half of Southeast Asia's population now uses the internet—339.2 million active internet users, or 53 percent of the population—an increase of more than 30 percent since 2016.[143] Data consumption is also growing exponentially, with Asian internet traffic expected to grow at a CAGR of 22 percent, from 361.7 exabytes in 2016 to 814.2 exabytes in 2020.[144]

In 2014, Asia Pacific surpassed North America as the largest regional e-commerce market, with $525.2 billion in business-to-consumer e-commerce sales, compared with $482.6 billion in North America.[145] Moreover, Asia Pacific's share of e-commerce could increase to two-thirds of all global e-commerce by 2021.[146]

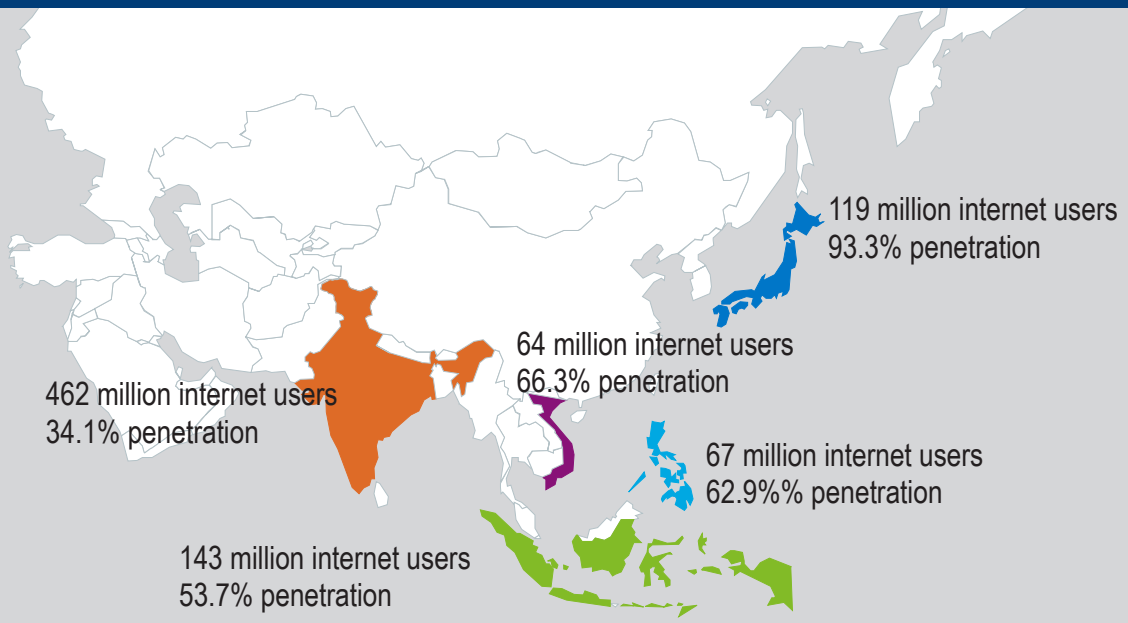
Figure 3. Global Internet Users and Penetration



Source: Connectivity, Innovation and Growth: Fostering an Open Internet in Asia, TRPC, 2017

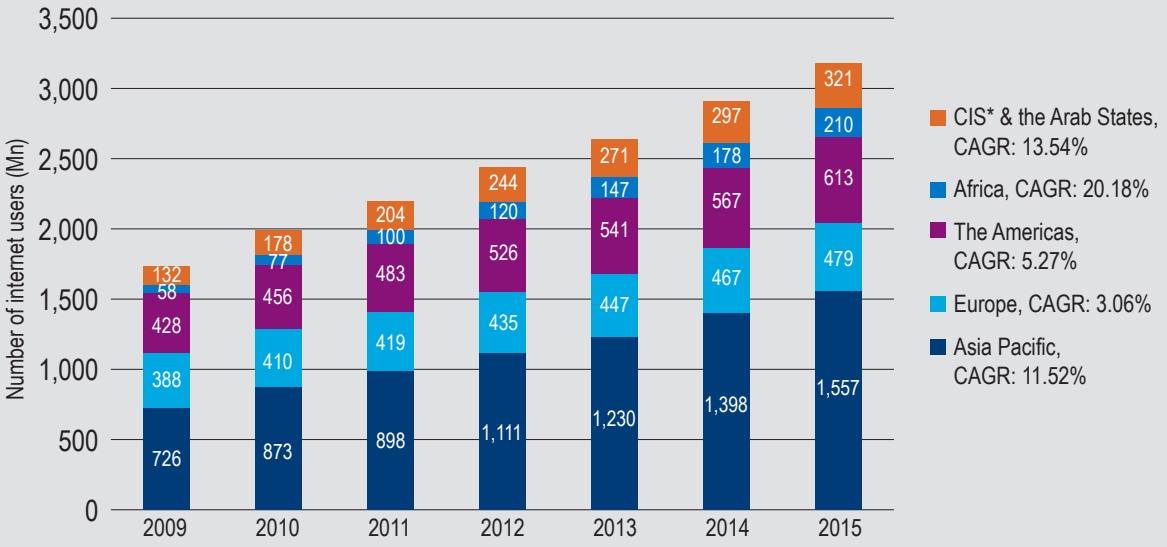
[141] Internet World Stats 2017.
[142] TRPC 2017, 8.
[143] We Are Social and Hootsuite 2017, 5.
[144] Cisco 2016.
[145] eMarketer 2014 *in* Information Integrity Solutions 2015, 8.
[146] eMarketer 2017.

Figure 4. Internet Users and Penetration for Five Asian Economies



Source: Connectivity, Innovation and Growth: Fostering an Open Internet in Asia, TRPC, 2017

Figure 5. Global Internet Users and Growth Rates (2009–2015)



*Commonwealth of Independent States is a loose confederation of 11 former Soviet Republics that are located in Eurasia.

Source: Connectivity, Innovation and Growth: Fostering an Open Internet in Asia, TRPC, 2017

By 2015, the digital economy of the 10 Association of Southeast Asian Nations (ASEAN) economies (Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam) was estimated to generate $150 billion in revenues annually, with the potential to add an incremental $1 trillion in GDP by 2025.[147] Google and Temasek further estimated that the Southeast Asian internet economy was expected to reach $50 billion in 2017, and growing at a CAGR rate of 27 percent, was expected to exceed $200 billion by 2025.[148] This has been driven predominantly by the growth of e-commerce (32 percent CAGR

Table 1. Top 10 Manufacturers of Computer, Electronic, and Optical Products (2014)

	Economy	Value added ($ bn)	Share in GDP (percent)	"Revenue ($ bn)"	Ratio of revenue to value added	International Standard Industrial Classification of All Economic Activities [ISIC] Rev.4
1	**China**	558*	5.4	1,372		Communications equipment, computers, and other electronic equipment
2	**United States**	267	1.5	619	2.3	Computer and electronic products
3	**European Union**	135	0.7	386	2.9	Computer, electronic, and optical products
4	**South Korea**	107	7.6	233	2.2	Manufacture of electronic components and computer, radio, television, and communications equipment and apparatuses
5	**Japan**	21	0.4	82	4	Information and communications electronics equipment
6	**Taiwan**	17	3.4	25	1.4	Computers, electronic, and optical products manufacturing
7	**Malaysia**	17	5	10	0.6	Information and communications electronics equipment
8	**Singapore**	16	5.1	66	4.2	Computer, electronic, and optical products
9	**Mexico**	9	0.7	9	1	Computer, communications, measurement, and other equipment, components and electronic accessories
10	**Brazil**	7	0.3	37	5.3	Computer, electronic, and optical products
	Total for top 10 economies	1,154	2.2	2,691	2.5	
	World	1,725		4,024	2.3	

*Estimated based on the average ratio of revenue to value added. World estimates were derived from the share of the laeading 10 producers of ICT goods in global GDP.

Source: Digitalization, Trade, and Development, UNCTAD, 2017

[147] A.T. Kearney 2015, 12.
[148] Google and Temasek 2017, 3.

for 10 years), online media (18 percent CAGR), and online travel (15 percent CAGR).[149]

Asia also does well across a number of other metrics for the digital economy. Table 1 shows that In Asia, China, Japan, Malaysia, Singapore, South Korea, and Taiwan are among the top 10 manufacturers of computer and other ICT products.

Moreover, table 2 shows that India, Indonesia, and South Korea are some of the largest employers in the ICT sector.

Table 3 captures the top economies with high levels of value added from ICT services. In Asia, they are China, India, Indonesia, Japan, and South Korea.

These tables collectively reinforce the global leadership position that many countries have already staked out with their digital economies, and points to the potential economic opportunities going forward. In particular, the widespread use of digital technologies—including social media and e-commerce—has the potential for significant economic impact in Asia, if leveraged effectively. Figure 6 shows five country-based targets.

Table 2. Employment in Information and Communications Services (selected economies, 2015 or latest year available)

	Information and communication services					
	Total employment in information and communications services (thousands)	Share in total employment (percent)	Telecom (thousands)	Computer software and services (thousands)	Telecom and computer services (thousands)	Share in total employment
European Union	6,614	3	1,119	3,505	4,624	2.0
United States	4,701	3.3	807	2,497	3,304	2.3
Australia	628	1.8	91	196	287	0.8
China					3,366	1.8
India	3,201	0.8	298	1,740	2,038	
Japan	2,090	3.3	200			
Brazil	1,237	1.3	187	588	775	0.8
South Korea	772	3				
Indonesia	541	0.5	328			
Russia			534			
Nigeria	470	1				
World (estimate)	100,000	1.5				

Note: Available statistics for China cover number of employed persons in urban units, information transmission, computer services, and software. Data for India are for 2012 and those for Nigeria are for 2010. Data for telecoms in Brazil and China are for 2014. The estimates are based on ILO data, as well as on national data for 116 countries that together account for 29 percent of global employment.

Source: Digitalization, Trade, and Development, UNCTAD, 2017

[149] Google and Temasek 2016, 4.

Table 3. Top 10 Economies by Value Added of ICT Services (2015)

	Economy	Value added ($ bn)	Share in top 10 (percent)	Share in GDP (percent)
1	**United States**	1,106	42	6.2
2	**European Union**	697	26	4.3
3	**China**	284	11	2.6
4	**Japan**	223	8	5.4
5	**India**	92	3	4.5
6	**Canada**	65	2	4.2
7	**Brazil**	54	2	3
8	**South Korea**	48	2	3.5
9	**Australia**	32	1	2.4
10	**Indonesia**	30	1	3.5
	Total for top 10	2,657	100	4.5

Note: Data refer to ISIC Rev. 4 section J, Information and Communication. Data are in current prices and converted to U.S. dollars using annual average exchange rates from mostly national services.

Source: Digitalization, Trade, and Development, UNCTAD, 2017

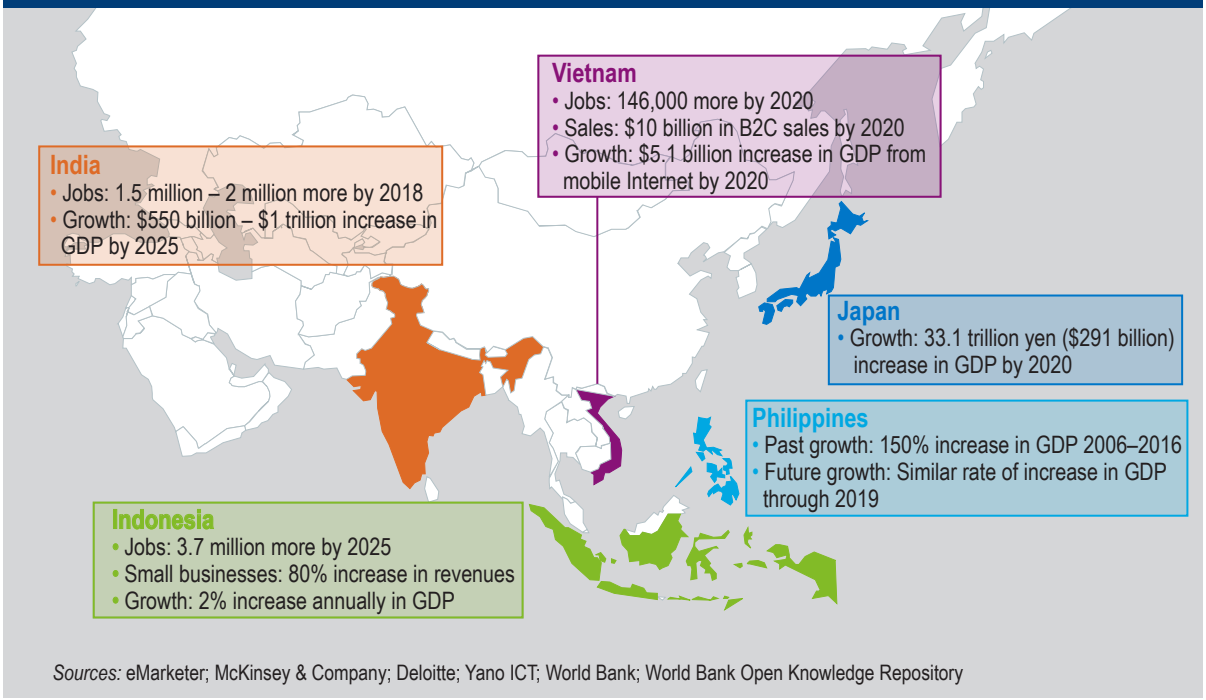
The capacity of the internet and data flows to drive economic growth and social development will be further strengthened as countries in Asia expand broadband connectivity. To date, constraints on the flow of information have limited these communities' access to wider markets and to a variety of employment opportunities. Therefore, increasing access to mobile and internet-based applications can extend the range of business services that become available in these communities. Improvements in connectivity also play an important role in overcoming the urban-rural divide and stimulating economic growth in rural areas.[150]

Major developments include the following:

- **Indonesia** launched a 278 trillion rupiah ($19.5 billion) National Broadband Plan 2014-2019 to provide ICT connectivity to all of its islands and districts,[151] and plans to complete a 75,000-kilometer fiber-optic digital ring around the archipelago—called the Palapa Ring—by 2019.[152]
- **Malaysia** initiated a Nationwide Fiberization Plan (2017-2019) to expand its fixed broadband infrastructure.[153]
- **The Philippines** launched a new National Broadband Plan, earmarked to cost 77-200 billion pesos ($1.5 billion to $4 billion) in 2017.[154]
- **Thailand's** new Digital Economy and Society Ministry is spending more than 20 billion baht ($614 million) to roll out a national broadband network connecting all of its 74,965 villages by the end of 2018.[155]

[150] Deloitte 2014.
[151] Indonesia Ministry of National Development Planning 2015.
[152] Okeleke et al 2016.
[153] Malaysia Ministry of Domestic Trade, Co-operatives and Consumerism 2017.
[154] Cordero 2016.
[155] Boonnoon 2017.

Figure 6. Potential Significant Economic Impact of the Digital Economy



Sources: eMarketer; McKinsey & Company; Deloitte; Yano ICT; World Bank; World Bank Open Knowledge Repository

- **Vietnam's** Broadband Development Plan aims by 2020 to increase nationwide fixed broadband penetration to 40 percent, and share of users with a minimum downstream connection speed of 25 megabits per second to at least 60 percent.[156]

Given what is at stake, unnecessary constraints upon cross-border data flows, particularly regional cross-border data flows, would appear to jeopardize both the opportunity and much of the investment being considered and deployed.

Data-Intensive Sectors in Asia

New technologies are driving down costs and enabling traditional industry to become more efficient, as well as opening up new markets and international trade to all types and sizes of domestic businesses in Asia. Technology is also improving access to education and providing better health care. These changes are affecting economies at different rates, depending on the maturity of the economy, the levels of connectivity and digitalization, and the relative readiness and competitiveness of different sectors within each economy.

For some economies, maximizing opportunity is about making use of the latest innovations, such as big data analytics, cloud computing, smart technologies and the IoT, or digital transactions, fintech, and blockchain. For other countries, progress involves improved access to markets, reducing costs, or addressing existing gaps in the market. In almost all cases, governments are

[156] TeleGeography 2016.

looking at how to expand and accelerate leading sectors (or leading opportunities) to increase their economy's competitive positioning. By definition, this will mean promoting cross-border data flows for use in that sector. Here we highlight the five economies of India, Indonesia, Japan, the Philippines, and Vietnam, where there are favourable circumstances in sectors that

- are a major part of the existing economy, such as outsourcing in India and the Philippines;
- stand to benefit economically from leveraging innovative tools and platforms, such as e-commerce in Indonesia and tourism in Vietnam; or
- can use digital tools to solve existing social issues, such as health care in Japan and Vietnam.

To continue these trends, governments need to enable global data flows and maximize the use of digital technologies.

India

Digitization is central to economic growth forecasts in India, which put nominal GDP on track to compound by more than 10 percent annually in the next decade. Digital India, a government campaign to ensure that government services are made available to citizens electronically, is estimated to boost India's GDP between $550 billion and $1 trillion by 2025. This large amount is not a complete surprise, because India has a lot of ground to make up: if in the last decade, India had accelerated its participation in all types of global data flows, to match leading countries, its GDP is estimated to have been $1.2 trillion higher.[157]

Digital transformation in India is represented by government efforts on Digital India;[158] GI Cloud (MeghRaj), a unified cloud computing initiative;[159] demonetization to drive cashless transactions;[160]; IndiaStack, a project to create a unified software platform for the country;[161] Make in India, a program to encourage companies to manufacture their products in India;[162] and Aadhaar, a resident unique identity number program.[163] Likewise, the private sector is transforming digitally in e-commerce and the outsourcing services sector, using mobile technologies, and leveraging cloud platforms.[164]

India has promising conditions to take advantage of new technologies in several sectors:

- **Outsourcing.** Analytics outsourcing in India is witnessing huge investment and leveraging data analytics tools to provide customized offerings. As a result, the analytics services industry is growing at a CAGR of 25 percent and poised to reach $2.3 billion in 2018.[165] Globally, a vast number of industries rely on data being disseminated from India and a handful of other locations around the world to make routine decisions in a cost-efficient and cost-effective manner. To facilitate this decision-making process and

[157] Manyika et al 2016.
[158] Government of India 2015.
[159] India Ministry of Electronics and Information Technology 2013.
[160] Reserve Bank of India 2016.
[161] Government of India 2017.
[162] Government of India 2014.
[163] Government of India 2016.
[164] Big data analytics, blockchain, Internet of Things, and artificial intelligence.
[165] Imarticus Learning 2017.

provide added value to consumers, data must flow freely across international borders.[166]

- **Manufacturing.** With the increased use of the IoT and sensors in consumer technology, India's manufacturing sector has begun planning to implement networks of sensors and actuators for data collection, monitoring, decision-making, and process optimization. At the same time, the government's Smart Cities Mission program aims to make 100 cities across the country people-friendly and sustainable, with the goal of changing the way India manufactures, designs, and develops products.[167] This will be achieved in the first instance by a standardization of supply chain management and logistics processes utilizing the Industrial internet of Things (IIoT) across the targeted cities. These evolutions are leading to the creation of new services, such as remote factory management, which would scale up transfer of data across borders.

- **Financial services.** A recent government demonetization program to eliminate high-value currency from the financial system has played an important role in reducing the country's dependency on cash and boosting digital payments. In the first quarter of 2017, smartphone and internet users drove mobile wallet transactions in India, which amounted to $3.6 billion—a 60 percent increase from the previous quarter. Domestic digital payment companies have benefited enormously from this changing fintech ecosystem, and have been moving rapidly to capitalize on the opportunities to offer cross-border inward remittances and outward-oriented e-commerce.

- **Health care.** The presence of world-class hospitals and skilled medical professionals has strengthened India's position as a preferred destination for medical tourism. As of 2017, the medical tourism market size was worth $3 billion, and expected to double to $6 billion in 2018.[168]

India's regulations on cross-border data flows are primarily controlled by its Information Technology Rules, 2011.[169] These rules limit the transfer abroad of "sensitive personal data" to two restrictive cases—when "necessary," or when the subject consents to the transfer. Because it is difficult to establish that a transfer of data abroad is "necessary," this provision effectively prohibits cross-border data flows except when individuals consent.

Empirical evidence shows that data localization and other barriers to data flows impose significant costs, reducing India's GDP by 0.1-0.7 percent.[170]

Indonesia

The Government of Indonesia aims to become the largest digital economy in Southeast Asia by 2020, with a target of multiplying the value of its e-commerce by 36, to a total of $130 billion.[171] Growth opportunities stretch across the economy. For example, in agriculture, the data analytics platform HARA, developed by CI-Agriculture, provides timely reminders on when to use fertilizers and pest control, which results in higher crop yield and productivity.

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[166] Castro and McQuinn 2015.
[167] Make in India n.d.
[168] India Brand Equity Foundation 2017.
[169] India Ministry of Electronics & Information Technology 2000.
[170] Nigel 2017.
[171] The benchmark for the largest digital economy is $130 billion in online transactions in 2020. Indonesia Ministry of Communication and Information Technology 2016.

Expected benefits from digitalizing processes and using cross-border data flows include in manufacturing, an additional $34.4 billion contribution to GDP, and in retail, an additional $24.5 billion contribution to GDP.[172] In addition, considering the following developments:

- **E-commerce.** The sector is already home to one of Southeast Asia's first "unicorns," Tokopedia, a leading consumer-to-consumer marketplace that drew more than 90 million visitors to its site as of September 2017. Tokopedia's use of cloud technology to process and analyze data has enabled rapid scalability to manage online traffic flows regionally, and also reduced costs.[173]

- **Agriculture.** Indonesia is one of the top producers in the world for crops such as palm oil, rubber, coffee, tea, and cocoa. However, it is more labor intensive than other industries, as it employs 33 percent of the labor force but accounts for only 14 percent of GDP.[174] Stakeholders stand to gain from higher levels of productivity and crop yield when certain processes can be automated through technological innovation.

However, digitally restrictive policies such as the government's data sovereignty law, Government Regulation 82, and sector-specific rules that manage banks' IT risks, require data centers and disaster recovery centers to be located in Indonesia.[175] These policies are an impediment to cross-border data flows, but more importantly, they are an obstacle to the government reaching its goal of becoming the largest digital economy in Southeast Asia.

Indonesian policies restricting access to data and the ability to use cross-border service providers such as cloud computing and data platforms, stand to reduce the country's GDP significantly—by as much as 0.5 percent annually, according to some estimates.[176]

Japan

Cross-border data flows are viewed as crucial to the achievement of Japan's socio-economic objectives, and have the potential to revitalize its economy. For example, rising demand for Japanese products and services from other countries is driving Japan's cross-border e-commerce sector, with Chinese consumers spending $6.6 billion on purchases from Japan in 2015. Full use of artificial intelligence and the IoT are projected to boost Japan's 2030 GDP estimate by 40 percent. Japanese companies' growing appetite for public cloud services could potentially create positive spillover effects on adoption of telework, which would help reverse the country's slowing economic growth by including more underemployed citizens in Japan's shrinking formal workforce.

Prime Minister Shinzo Abe's 2017 Growth Strategy specifically identified health care and financial services as industries in which innovation and the adoption of advanced technologies that leverage the free flow of data can address Japan's most pressing social issues:

- **Health care**. The digitalization of Japan's health care industry is paramount to the sustainability of the country's public health insurance plan, which is forecasting escalating costs as the 65-plus age group grows to

[172] McKinsey & Company 2016.
[173] Alibaba Cloud n.d.
[174] Quincieu 2015.
[175] Regulation by the Indonesia Financial Services Authority No.38/POJK.03/2016 on implementation of risk management in the use of IT by commercial banks.
[176] Bauer et al 2014.

account for 40 percent of the country's population by 2050. Telemedicine can reduce the burden of the aging society on the nation's health care infrastructure, as well as enable the export of Japan's health care expertise. Indeed, the Japan 2035 health care plan was drafted with the goal of exporting health care services to a global market, to ease the economy's fiscal deficits.[177] Success will depend heavily on the cross-border exchange of information and data, and any restriction to data flows would threaten its potential.

- **Payments**. Cash is still the primary method of payment in Japan, and accounts for 70 percent of all retail payments.[178] The government has been taking steps to reduce the country's cash dependency and encourage the development of digital currency, with the aim of boosting adoption of digital payments in the runup to the 2020 Summer Olympics in Tokyo. Cashless payments are targeted to more than double, from 19 percent (in 2017) to 40 percent by 2027.[179] Japan's Financial Services Agency amended the Banking Act in 2017 to recognize digital currencies as a viable payment method, giving rise to companies such as Japan Net Bank, which operates purely online, leveraging the use of cloud to host critical information.[180]

Japan has committed to bilateral and multilateral agreements to preserve the free flow of data across borders. Its recognition of the vital role of cross-border data flows to socio-economic development has led the government to take concrete measures to remove barriers to the free flow of data, such as amending the country's Personal Information Protection Act to allow the transfer of personal information outside Japan.

To increase business confidence, Japan can further clarify its regulations governing the prerequisites for such cross-border transfers, for example by publishing a list of white-listed jurisdictions with data protection laws that are similar to those in Japan. With these policy enhancements, organizations will be better equipped to evaluate their business activities involving cross-border transfers of personal information, and create the appropriate safeguards to comply with the Personal Information Protection Act and other related data transfer regulations.

Philippines

The adoption of cloud computing is seen as essential to the Philippines' development of core economic services such as finance and banking, as well as enabling the growth of e-commerce and emerging new services such as in the sharing economy in the country. Cross-border data transfers are a key component of these activities, directly as services and indirectly for administrative support.

Most of the Philippines' digital economy developments have been made either at the level of sectors, both state and private, such as in education and health, or through the country's leading international revenue earners—remittances, business process outsourcing, and tourism, including health tourism, which is a rapid growth area. It is in these areas that cross-border data flows are most significant.

- **Remittances and financial flows.** Remittances are the country's biggest source of foreign exchange income, growing by more than 5 percent annually in

[177] Japan aims to achieve a fiscal surplus by FY 2020. Japan Ministry of Health, Labour and Welfare 2015.
[178] PYMNTS 2017.
[179] Government of Japan 2017.
[180] Parker 2017.

2017, with more than $2 billion monthly being remitted by about 12 million expatriate Filipinos, accounting for about 10 percent of GDP.[181]

- **Business process outsourcing**. The Philippines is one of the world's top business process outsourcing locations. The sector generates close to $25.5 billion annually, employs 1.4 million people, and is built on low-cost and efficient cross-border data flows across all its vertical sectors.[182]

- **Tourism and health care**. Health tourism to the Philippines brings an average 100,000 visitors annually. As a result, both government and the private sector in the Philippines are actively promoting health care and health tourism. For example, the Health Research and Development Information Network has more than 40,000 records of health research resources, while the Philippine Health Research Registry is a publicly available database of ongoing health and health-related researches from 2012 onwards.[183]

The absence of any specific data localization measures in the Philippines is an advantage for the country in its drive toward cloud computing. However, the Philippines must ensure that it does not inadvertently restrict the free flow of data. For example, under the country's Circular No. 889,[184] offshore outsourcing of a bank's domestic operations is only permitted when the service provider operates in jurisdictions that uphold confidentiality.[185]

Vietnam

Vietnam stands to grow its GDP by 1 percent for every 20 percent spent on ICT, with mobile internet accounting for 6.2 percent of GDP and 3.2 percent of total employment between 2015 and 2020. The government has set a goal of growth in e-commerce spending to $350 million annually, with business-to-consumer revenue rising to $10 billion and accounting for 5 percent of all retail spending.

Businesses in Vietnam are leveraging ICT to improve their operations and participate in cross-border trade. Many companies use cloud computing, social media, e-payments, and smart technologies. Many such technologies are provided by international entities that are not hosted in Vietnam, and therefore require the free flow of data into the country to provide their services and tools.

Leading sectors in Vietnam that would benefit from the free flow of data across borders include the following:

- **Tourism**. Tourism is one of the fastest growing sectors in Vietnam, contributing 9.1 percent to GDP and 7.3 percent of total employment in 2016.[186] Recognizing its potential, Vietnam has been targeting the use of innovative new operations to improve return tourism. Local company Triip was founded upon the idea that unique activities and experiences in Vietnam could be crowdsourced from locals who were experts in their own backyards, and for travelers seeking unique local experiences that they would not normally get from traditional tours and travel guides.

[181] De Vera 2017.
[182] Philippine Daily Inquirer 2016.
[183] eHealth PH 2018.
[184] Philippines Resolution No. 2115 2015.
[185] Ferracane 2017, 23.
[186] World Travel & Tourism Council 2017.

- **Health care.** Health care in Vietnam is underfunded,[187] and in major cities, hospitals are overcrowded, medical equipment is outdated, and staff strength remains low.[188] Away from the larger cities, there are significantly fewer doctors, health care services, and health facilities. Vietnamese patients often need to travel long distances to receive treatment.[189]

- **Transportation**. As Vietnam's e-commerce industry continues to increase, its transportation services must keep pace to ensure e-commerce transactions are fulfilled in a timely and efficient manner. With the government aspiring for cross-border e-commerce to grow to 15 percent of export turnover, it needs to ensure continued investments in transportation networks to support the envisioned growth.[190]

However, some implementation of forced data localization regulations and onerous cybersecurity requirements in Vietnam may inadvertently restrict and constrain its digital economy growth. For example, Vietnam's Decree No. 72[191] imposes requirements on IT companies to establish at least one server inside the country "serving the inspection, storage, and provision of information at the request of competent state management agencies." Under Circular No. 38,[192] each provider of cross-border public information that (a) has more than 1 million visits from Vietnam per month or (b) leases a data center to store digital information in Vietnam, are required to provide contact information to the Ministry of Information and Communications.[193]

Forced data localization requirements that constrict the free flow of data in Vietnam could lead to losses in GDP, domestic investment, and consumer welfare, because uncertain cybersecurity requirements, particularly those related to protection of data privacy, could undermine both user and organizational privacy in the country.

[187] WHO 2017.
[188] USITA 2017.
[189] Gaskill and Luong Hien 2014.
[190] Hanoi Times 2015.
[191] Government of Vietnam 2013.
[192] Circular No. 38/2016/TT-BTTTT is one of the implementing circulars of Decree No. 72.
[193] Baker McKenzie 2017.

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APPENDIX I. RESTRICTIONS OF CROSS-BORDER DATA FLOW MEASURES IN FIVE ASIAN ECONOMIES

Country	Summary	Detail of Restrictions of Cross-Border Data Flow Measures
India	There is no overarching data protection legislation in India.[195] Therefore, there are a number of laws and regulations that require aspects of economy-wide and sector-specific data localization offshore	■ The Information Technology Act 2000[196] is complemented by the Information Technology (Reasonable Security Practices and Procedures and Sensitive Personal Data or Information) Rules 2011.[197] Under these IT Rules, data transfer is only permitted if it is necessary to fulfill the terms of a contract, or when the subject has consented to the transfer. Sensitive data can only be transferred when the jurisdiction provides the same level of data protection as in India. ■ Section 4 of the Public Records Act 1993 prohibits public records from being transferred out of India except for official public purposes.[198] ■ In 2012, India enacted the "National Data Sharing and Accessibility Policy," which effectively means that government data must be stored in local data centers.[199] ■ In 2014, the Indian National Security Council proposed a policy that would institutionalize data localization by requiring all email providers to set up local servers for their India operations, and mandating that all data related to communication between two users in India should remain within the country.[200] ■ In 2015, India released a National Telecom Machine-to-Machine (M2M) road map that requires all relevant gateways and application servers that serve Indian customers be located domestically.[201] ■ In 2017, the Ministry of Electronics and Information Technology released Guidelines for Government Departments on Contractual Terms Related to Cloud Services. The guidelines require that any government contracts contain a localization clause mandating that all government data residing in cloud storage networks is located on servers in India.[202] **Sector Specific** ■ In 2014, India enacted the Companies (Accounts) Rules law, which said if financial information is primarily stored abroad, its backups must be stored in India.[10]

[195] The Ministry of Electronics and Information Technology appointed an expert committee, headed by former Supreme Court Judge B. N. Srikrishna, to "identify key data protection issues" and suggest a draft Data Protection Bill. Government of India 2017.
[196] Information Technology Act 2000.
[197] Information Technology Rules 2011.
[198] Section 4 provides, "No person shall take or cause to be taken out of India any public records without prior approval of the Central Government: provided that no such prior approval shall be required if any public records are taken or sent out of India for any official purpose." The Public Records Act 1993.
[199] India Department of Science and Technology 2012.
[200] Thomas 2014.
[201] U.S. Trade Representative 2017.
[202] India Ministry of Electronics and Information Technology 2017.
[203] Mathias and Kazia 2017; India Companies (Accounts) Rules 2014 (to be published in the Gazette of India, Government of India Ministry of Corporate Affairs).

Country	Summary	Detail of Restrictions of Cross-Border Data Flow Measures
Indonesia	Indonesia has a range of economy-wide and sector-specific data localization laws. The expansion of Indonesia's data protection strategy is evident in current and draft regulations.	■ In 2012, the Ministry of Communication and Informatics issued Government Regulation No. 82 of 2012 (GR82)[204] (under the umbrella of the Electronic Information and Transactions Law[205]). Article 17(2) of GR82 requires data centers that have information about public services and also information about disaster recovery centers to be located in Indonesia. ■ In 2016, the Ministry of Communication and Informatics issued Ministerial Regulation No. 20 of 2016.[206] This regulation on personal data protection reiterates data residency requirements in GR82 and also requires electronic system providers[207] to have both data centers and disaster recovery centers located in Indonesia. **Sector Specific** ■ In 2016, the Financial Services Authority (OJK) issued a regulation, POJK No. 38 of 2016[208] that requires banks to use data centers and disaster recovery centers in Indonesia. There are exceptions to this rule, under which banks can host specific information outside of Indonesia, with OJK's approval, provided that the data does not contain identifiable customer information. ■ In 2016, OJK issued POJK 69,[209] which requires insurance and reinsurance companies, both common and Syariah (Islamic law), to use data centers and disaster recovery centers in Indonesia. The regulation further specifies that personally identifiable information and transaction-related information must be located within Indonesia. ■ In 2017, the Bank of Indonesia issued a regulation, BI No. 19 of 2017,[210] which requires all domestic transactions to be processed through the national payment gateway.
Japan	Japan has taken active measures to facilitate the free flow of data. There are no economy-wide or sector-specific data localization requirements. The Act on the Protection of Personal Information facilitates cross-border data transfers in prescribed circumstances.	■ In 2017, Japan approved amendments to the Act on the Protection of Personal Information[211] that prescribed requirements for transfers of personal information to a third party in a foreign country, including: the destination country must be deemed as having an acceptable level of data protection, the third party ensures the same level of data protection as in Japan, or the data subject has given consent.

[204] Government Regulation No. 82 of 2012 regarding Provisions of Electronic Systems and Transactions (GR82).
[205] Law No. 11 of 2008 regarding Electronic Information and Transactions (EIT Law), as amended by Law No. 19 of 2016 regarding the Amendment of EIT Law (EIT Law Amendment).
[206] Minister of Communications & Informatics Regulation No. 20 of 2016 regarding the Protection of Personal Data in an Electronic System. This regulation implements one of the provisions of Government Regulation No. 82 of 2012.
[207] Minister of Communications & Informatics Regulation No. 20 of 2016 regarding the Protection of Personal Data in an Electronic System defines electronic system organizers as every person, state official, business entity, and/or society that provides, manages, and/or operates an electronic system individually or jointly to use for their purposes or the purposes of another party.
[208] Regulation by the Financial Services Authority No.38/POJK.03/2016 on implementation of risk management in the use of information technology by commercial banks.
[209] Regulation by the Financial Services Authority No.69/POJK.05/2016 on business operations of insurance companies, Syariah insurance companies, reinsurance companies, and Syariah reinsurance companies.
[210] Bank of Indonesia Regulation No.19/10/PADG/2017 on the national payment gateway.
[211] Personal Information Protection Commission, Japan 2016.

Country	Summary	Detail of Restrictions of Cross-Border Data Flow Measures
Philippines	There are no economy-wide data localization requirements in the Philippines. The guidelines on outsourcing only require similar protection, rather than restricting the flow of information.	**Sector Specific** ■ In 2015, the Philippines issued Circular No. 889,[212] under which offshore outsourcing of a bank's domestic operations is only permitted when the service provider operates in jurisdictions that uphold confidentiality.[213]
Vietnam	Vietnam's digital economy is at a relatively early stage of development. However, for both political and commercial purposes, Vietnam has begun to implement economy-wide data localization policies.[214]	■ In 2013, Vietnam's Decree No. 72[215] entered into force, which requires IT companies to establish at least one server inside the country "serving the inspection, storage, and provision of information at the request of competent state management agencies." ■ In 2016, the Ministry of Information and Communications issued Circular No. 38,[216] under which providers of cross-border public information that (a) have more than 1 million visits from Vietnam per month or (b) lease a data center to store digital information in Vietnam are required to provide contact information to the ministry.[217]

[212] Resolution No. 2115 of 2015—Amendments in the Manual of Regulations for Banks and Manual of Regulations for Non-Bank Financial Institutions on the guidelines on outsourcing.
[213] Ferracane 2017, 23.
[214] Cory 2017, 30.
[215] Government of Vietnam 2013.
[216] Circular No. 38/2016/TT-BTTTT is one of the implementing circulars of Decree 72.
[217] Baker McKenzie 2017.

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