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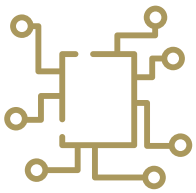
Seismic Shift: The Transatlantic Digital Economy

Florida


Spain



60%

of global GDP will be digitized by 2022

Jobs supported by the app economy

2.3 million in the U.S.

2.1 million in Europe

The digital revolution continues to shake and shape the way we live, learn, work and play. The numbers are astounding. More than 5.19 billion people now use mobile phones, 4.5 billion people are now online, and 3.8 billion use social media. Every minute they buy, sell and send $5.5 million in digital services across borders.[1] This year, they will generate 47 zettabytes of data – 534 million times the internet's size in 1997.[2] Over the next two years, 60% of global GDP will be digitized.[3] Over the next three years, companies are expected to spend $7.4 trillion on digital transformation.[4] In five years, digital ecosystems will account for more than 30% ($60 trillion) of global corporate revenue.[5] By that time, an average connected person is likely to interact with Internet-of-Things (IoT) devices nearly 4,900 times a day – the equivalent of one interaction every 18 seconds.[6]

This seismic shift holds untold promise for human health and wealth, for business efficiencies and simply for ease of life. It is connecting people and continents as never before. It raises profound ethical, moral and legal questions. And it is uprooting entire segments of the economy across the Atlantic and around the world.

Whole sectors are challenged as new business models rise. Human mobility is at a revolutionary inflection point due to a remarkable confluence of technological breakthroughs in autonomy, connectivity, electrification, and sharing.[7] The shift of computing to the cloud and the "edge" is creating new architectures of connectivity.[8] Blockchain and distributed ledger technologies offer great potential to reinforce digital trust through traceability, even as they disrupt banking, finance and many other industries.[9] In the next five years, artificial intelligence (AI) applications are projected to empower people with disabilities, power better city services, husband natural resources, and generate global revenues of $90 billion.[10] By that time, the 3D printing market is expected to be worth $550 billion; companies are already 3D printing car parts, prosthetic hands, surgical tools, entire houses, and even whole neighborhoods.[11]

The "app and bot" economy is emblematic of unrelenting digital disruption. Apps comprise one of the fastest-growing software markets ever: in 2019 consumers downloaded 204 billion apps and spent more than $120 billion on apps globally. People place more international calls via apps than over the networks of all of the world's telecommunications carriers combined. More Americans and many Europeans spend more time on apps than browsing the internet or watching television. The App Economy accounts for over 2.3 million jobs in the United States and 2.1 million in the EU28 (plus Norway and Switzerland), the top countries being the UK (366,000), France (350,000), Germany (296,000), the Netherlands (212,000), Spain (101,000) and Sweden (98,000). London is the top European city for App Economy jobs, followed by Paris, Amsterdam, Stockholm, and Berlin. Germany has a remarkable six cities and the Netherlands has four cities in the top 30.[12]

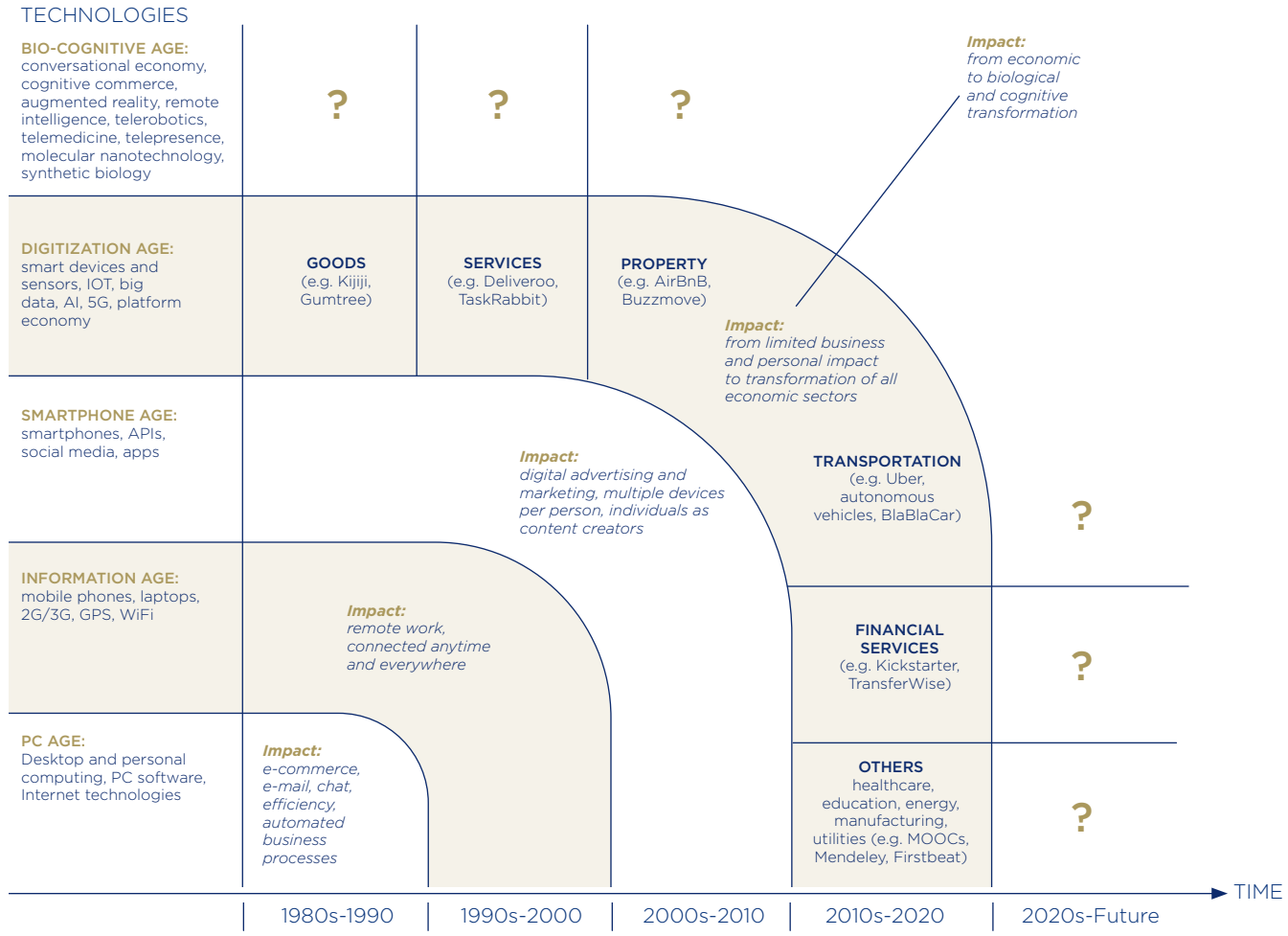
The App Economy has gone mainstream. Yet it is already being transcended by the "Bot Economy," which is hotter now than the App Economy was when it began. "Bots" – software that automates tasks – and "chatbots" – software that uses artificial intelligence to simulate conversation with humans on messaging platforms – are quickly becoming ubiquitous features of daily life in the transatlantic economy. They, in turn, have opened the door to the next seismic shift: cognitive commerce and the conversational economy, in which voice itself is an operating system.[13]

The Dawning Bio-Cognitive Age

Even as we grapple with the head-spinning advances and challenges of the "Digitization Age," some pathfinders are already charting the next frontier – a "Bio-Cognitive Age" in which revolutionary advances in digitization, biology, nanotechnology, behavioral and cognitive sciences are combining to affect not only our economic and social lives, but life itself.[14]

New technologies are augmenting human capabilities both physically and cognitively. Amazon is already planning checkout terminals where consumers can pay simply with a wave of their hand.[15] That's just the beginning. The genomic and gene-editing revolutions continue unabated. The cost of sequencing a human genome fell from $14 million in 2006 to about $1,000 a decade later. A target of less than $100 now appears achievable. As many as 2 billion people are forecast to have their genome sequenced by 2025.[16] Biohackers are creating cheap alternatives to expensive gene therapies.[17] This year the first humans will have Crispr deployed inside their bodies to fight disease, even as the advent of "prime editing" adds greater precision and flexibility to Crispr technologies.[18]

Table 1 The Expanding Digital Frontier



Sources: GSMA Intelligence; McKinsey Global Institute; Author's own estimates

Bioengineers are raising so-called organoids – mini-organs in the laboratory – for personal stem cell therapies and to test pharmaceuticals without animal testing. Researchers are combining robotics and synthetic biology to create new sorts of organisms called xenobots that could remove arterial plaque, repair organs, identify cancer, even digest toxic waste.[19] Bioprinters are using 3D printers and bio-inks drawn from living cells to fabricate three-dimensional structures of biological materials. Bioengineers have successfully created artificial bone matrices and printed complex vascular networks. They have even produced the first 3D-printed heart.[20] Xenotransplants – transferring animal organs into humans – are a near-future possibility.[21] Innovations in bioelectronics, including computer-to-brain communication, could treat a range of conditions such as paralysis or damage to the nervous system.[22] Implantable "artificial neurons" hold the promise of treating heart failure by reproducing the electrical properties of brain cells in silicon chips.[23] A drug molecule invented entirely by artificial intelligence entered human clinical trials for the first time in 2020.[24]

Telemedicine, telepresence, and telesurgery are transforming medical techniques and generating greater cross-border trade in healthcare services. The ability to diagnose and treat patients remotely through telemedicine is likely to migrate some healthcare services from hospitals to homes.[25] Telepresence technology, which enables expert surgeons to mentor others in operating surgeries remotely, is already used widely in hospitals. And despite some technical and legal challenges, telesurgery technologies are available that can even enable surgeons to operate on patients at a distance.[26] The use of AI could make drug discovery faster, cheaper and more effective for patients with a range of illnesses; the value of AI in medicine will grow by 2400% by 2025, from $719 million in 2017 to $18.2 billion in 2025.[27]

All of these innovations are likely to generate greater cross-border trade of healthcare services. And while bio-engineering and bio-electronics applications are currently focused on the health sector, they

could soon extend to the wider economy. Spider silk manufacturing, for instance, offers applications from aircraft and armor to clothes and cosmetics.[28] Spider-Man is no longer science fiction.

Changing the Very Nature of Trade

In all of these ways, digitalization is not just changing the scale, scope and speed of trade, it is changing its very nature. Many services sectors that were once non-tradable – because they had to be delivered face-to-face – have become highly tradable – because they can now be delivered over long distances.[29] Digitization even blurs the distinction between trade in goods and services. Automakers are now also services providers; online retailers are now also manufacturers. 3D-printing generates products that are a mix of goods and services.[30] Digitization increases the importance of data flows and intellectual property. It has boosted trade in software design over trade in final products.[31] It offers alternative means of payment and finance. It has lowered shipping and customs processing times and reduced radically the cost of creating, copying and accessing text, video content and music, while radically enhancing our ability to access goods and services without owning them. At the same time, by shortening supply chains and enabling more local production, digitization also generates countervailing effects that can dampen trade.[32]

Researchers and firms on each side of the Atlantic have been the vanguard of the digital economy. U.S. companies have been pioneers in social media, e-commerce, autonomous vehicles and platforms; UK companies are leading fintech innovators; Germany has been ranked the world's most innovative nation by Bloomberg for its ability to integrate digital innovations into such sectors as machine tools and manufacturing; Estonia leads the world in e-government innovations.[33]

Speed-of-light digital innovations, however, are often outpacing speed-of-law concerns about their ethical, moral, political and legal implications. Wherever one looks there is growing apprehension among policymakers about how digital innovations are affecting jobs, wages, inequality, privacy, safety, health and security. As each side of the Atlantic has addressed these concerns differently, frictions have arisen. Yet given the dense interlinkages binding the United States and Europe, we cannot afford to be disconnected. The global diffusion of economic power means the window is closing on the ability of the transatlantic partners to maintain a market-oriented democratic approach to data governance, unless they urgently act more effectively together.

Digital Globalization: Still Uneven

"Digital globalization" evokes the image of a seamless global marketplace in which unbridled data flows drive goods, services and money across national boundaries without friction. Reality is different. Four in ten individuals are still not connected to the digital economy. The digital revolution is global in its reach but uneven in its effects.

Digital connections are "thicker" between some continents and "thinner" between others – and they are "thickest" between the United States and Europe. The transatlantic theatre is the fulcrum of global digital connectivity. North America and Europe generate approximately 75% of digital content for internet users worldwide. U.S. and European cities (Frankfurt, London, Amsterdam, Paris, Stockholm, Miami, New York, Marseille, Los Angeles, San Francisco) represent the world's foremost hubs for international communication and data exchange.[34]

Our understanding of the full impact of the digital economy is limited by our inability to measure it. Not only is there is no widely accepted definition of the digital economy, governments simply don't have good data about data. In addition, while many digital services are considered "free," they clearly have value to both producer and consumer. This value is difficult to calculate and none of this is counted in official economic measures.[35] For instance, Erik Brynjolffson and Avinash Collis estimate that Facebook generates over $500 of consumer surplus per year for the average user in the United States and Europe. That does not account for potentially countervailing considerations such as the value such data might provide to Facebook. Nonetheless, none of this shows up in GDP.[36]

For these reasons, official estimates of the size of the digital economy as a share of GDP have remained at 4-5% for the past four decades while we can clearly see that the economy has become significantly more digital, and that digitally-enabled trade is growing faster than trade overall. BCG estimates that up to 70% of all global trade flows could eventually be meaningfully affected by digitization. One study coined the term "digital spillovers" to fully capture the digital economy and estimated the global digital economy, including such spillovers, was $11.5 trillion in 2016, or 15.5% of global GDP. Their analysis indicated that the long-term return on investment for digital technologies is 6.7 times that of non-digital investments.[37]

Failing standard measurements, we have devised five metrics through which we can see more clearly the importance of transatlantic digital connections.[38]

These metrics are not mutually exclusive; they are better understood as different lenses through which one can better understand the transatlantic digital economy.

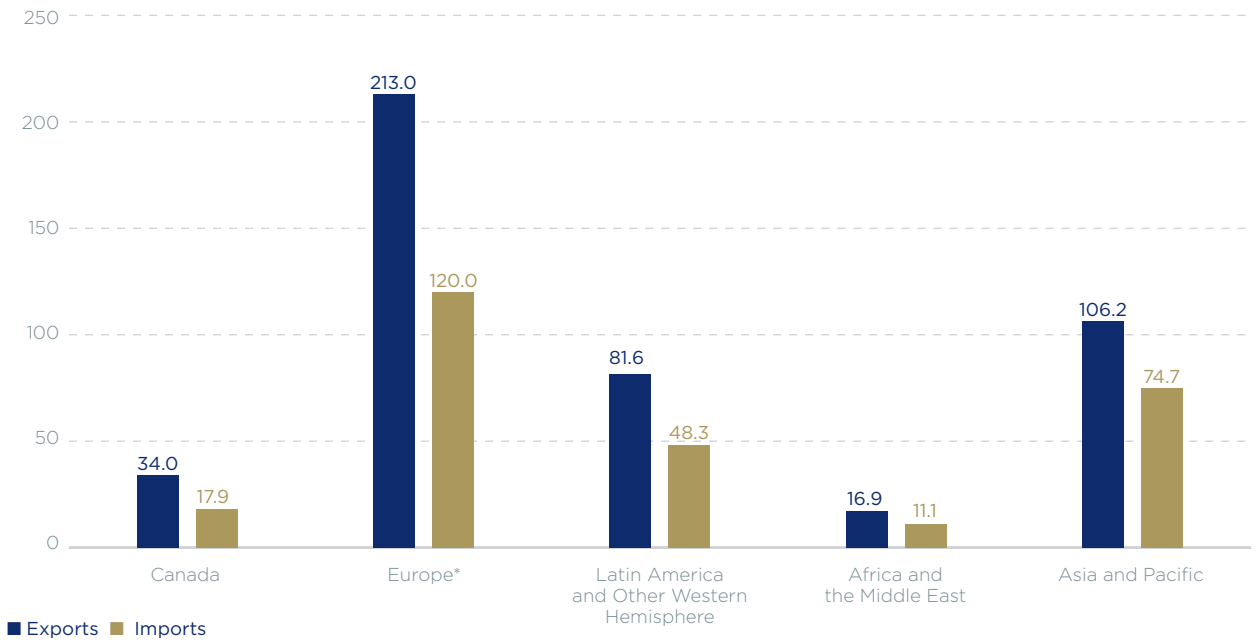
1. Digital Services and Digitally-Enabled Services

The digital economy is dominated by services, which accounted for 90.8% of total U.S. digital economy current-dollar value added in 2017.[39] Two metrics offer us a clearer picture of transatlantic connections in digital services. A narrow view can be had by looking at cross-border information and communications technology (ICT) services, or *digital services* as shorthand, which are services used to facilitate information processing and communication.[40] A broader view can be taken by looking at *digitally-enabled services*: services that can be, but not necessarily are, delivered remotely over ICT networks. These include digital services as well as "activities that can be specified, performed, delivered, evaluated and consumed electronically."[41] Identifying potentially ICT-enabled services does not tell us with certainty whether the services are *actually* traded digitally.[42] But the U.S. Commerce Department notes that "these service categories are the ones in which digital technologies present the most opportunity to transform the relationship between buyer and seller from the traditional in-person delivery mode to a digital one,"[43] which means a digital transaction is likely and thus can offer a rough indication of the potential for digital trade.[44] A new OECD/IMF/WTO Handbook defines digital trade as "trade that is digitally ordered and/or digitally delivered," yet data statistics have not yet been aligned to this definition. That leaves us with digitally-enabled services as the default metric.[45]

In 2018, digitally-enabled services exports amounted to $2.9 trillion, half of total global services exports. Business services exports are by far the largest category, with a global value of $1.2 trillion.[46]

The transformative impact of each of these types of digital services is not limited to just the services sector but extends to manufacturing and the traditional bricks-and-mortar economy as well. Digitally-enabled services such as consulting, engineering, software, design and finance are used in manufacturing industries such as transport equipment, electrical equipment and food products. In this regard, digitally-enabled services from the United States have become critical to the competitiveness of European manufacturing and retail operations, and vice versa. In fact, as the line blurs between digital consumers and digital producers, standard industrial classifications may tell us little about digitization's impact on particular sectors of the economy.[47]

Table 2 **U.S. Trade in Digitally-Enabled Services by Major Area, 2018** ($Billions)



**Europe imports of ICT are author's estimates. Actual data for Europe ICT imports in 2018 have been suppressed to avoid disclosure of individual company data.*
Source: Bureau of Economic Analysis, Trade in Potentially ICT-Enabled Services Database.
Data as of October 2019.

For instance, digitally-enabled services are not just exported directly, they are used in manufacturing and to produce goods and services for export. Over half of digitally-enabled services imported by the United States from the European Union is used to produce U.S. products for export, and vice versa, thus generating an additional value-added effect on trade that is not easily captured in standard metrics.[48]

In 2018, digitally-enabled services accounted for 55% of all U.S. services exports, 48% of all services imports, and 69% of the U.S. global surplus in trade in services (Table 6).

In 2018 the United States registered a $178 billion trade surplus in digitally-enabled services with the world. Its main commercial partner was Europe, to which it exported over $213 billion in digitally-enabled services and from which it imported $120 billion, generating a trade surplus with Europe in this area of $93 billion. U.S. exports of digitally-enabled services trade to Europe were about 2.6 times greater than U.S. digitally-enabled services exports to Latin America, and double U.S. digitally-enabled services exports to the entire Asia-Pacific region (Table 2).

In 2018 the 28 EU member states collectively exported $1.39 trillion and imported $1.17 trillion in digitally-enabled services to countries both inside and outside the EU (See Table 3 and Table 4). Excluding intra-EU trade, EU member states exported $657.34 billion and imported $523.67 billion in digitally-enabled services, resulting in a surplus of $133.67 billion for these services.

Digitally-enabled services represented 58% of all EU services exports to non-EU countries and 57% of all EU services imports from non-EU countries.

Table 3 Destination of EU Exports of Digitally-Enabled Services, 2018 ($Billions)

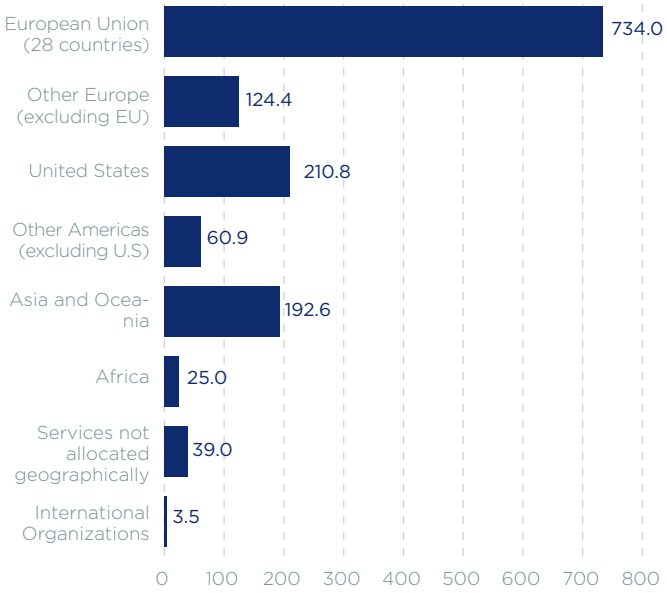
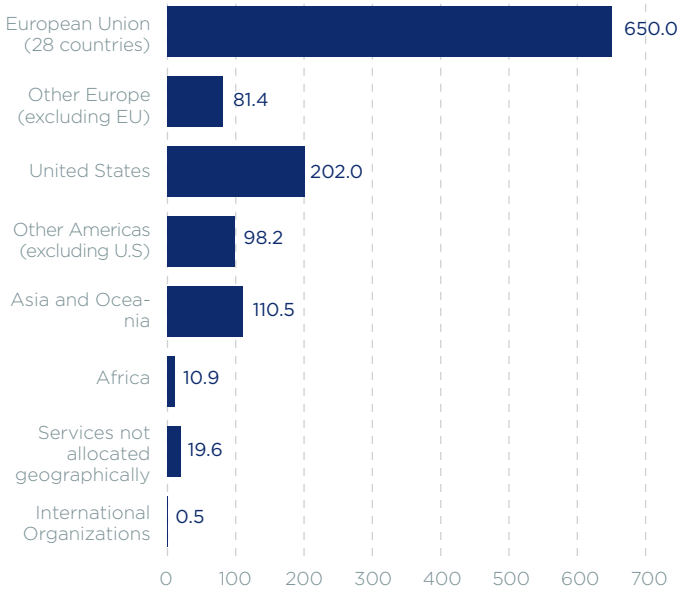


Table 4 Origin of EU Imports of Digitally-Enabled Services, 2018 ($Billions)



Note: Digitally-Enabled Services includes finance; insurance; IP charges; telecommunications, computer, information services; R&D services; professional and managemet services; architectural, engineering and other techhnical services; and other business services.
Source: Organization for Economic Cooperation and Development.

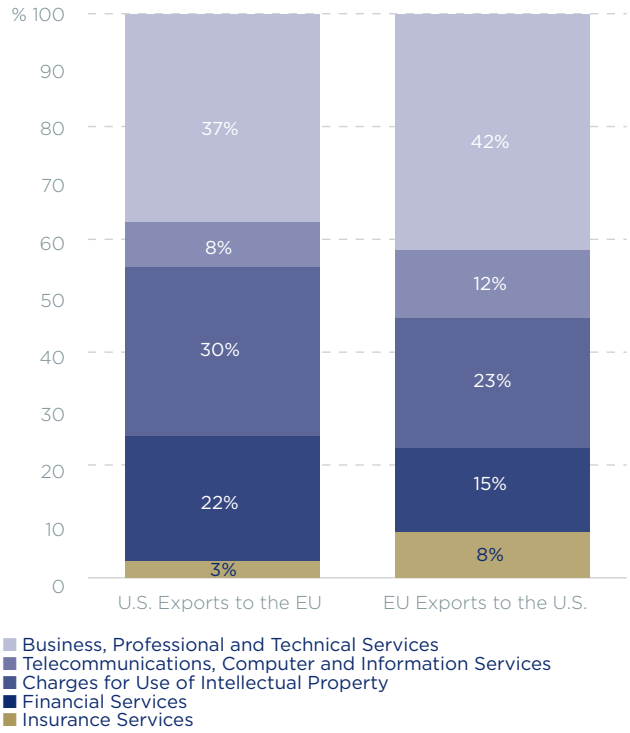
In 2018 the United States accounted for 32% of the EU's digitally-enabled services exports to non-EU countries, and 39% of EU digitally-enabled services imports from non-EU countries.[49] The United States purchased $210.77 billion, according to OECD data for 2018, making it the largest non-EU consumer of EU digitally-enabled services exports, accounting for more EU exports than the rest of non-EU Europe ($124.41 billion), and more than all digitally-enabled services exports from the EU to Asia and Oceania ($192.62 billion).[50]

EU member states with the largest estimated value of digitally-enabled services exports were Germany ($189.8 billion), Ireland ($171.9 billion), the United Kingdom ($161.0 billion), and the Netherlands ($154.0 billion).

In 2018, EU member states imported $1.17 trillion in digitally-enabled services, according to OECD data. 55% originated from other EU member states (See Table 4). Another 17% ($202.02 billion) came from the United States, making it the largest supplier of these services. The EU imported more of these services from the U.S. than from EU member states Germany ($107.0 billion) and the UK ($124.5 billion).

Table 5 categorizes U.S.-EU digitally-enabled services trade into five sectors. For both economies, the most important exports are represented by business, professional and technical services, which accounted for 42% of digitally-enabled services exports from the EU to the United States and 37% of digitally-enabled services exports from the United States to the EU in 2018. The second most important category consists of intellectual property, including royalties and license fees, most of which are paid on industrial processes and software, underscoring how integral such transatlantic inputs are to production processes in each economy. Strong European demand for U.S. digitally-enabled intellectual property is reflected in the fact that this category accounts for 30% of all U.S. exports of digitally-enabled services to the EU.[51] Financial services comprise the third largest digitally-enabled services export category.

Table 5 EU Digitally-Enabled Services Trade by Sector, 2018



Sources: U.S. Bureau of Economic Analysis.
Data as of October 2019.

Digitally-Enabled Services Supplied Through Foreign Affiliates

The digital economy has transformed the way trade in both goods and services is conducted across the Atlantic and around the world. Even more important, however, is the delivery of digital services by U.S. and European foreign affiliates – another indicator reinforcing the importance of foreign direct investment, rather than trade, as the major driver of transatlantic commerce. For instance, 49% of all services supplied by U.S. affiliates abroad were digitally-enabled (Table 6).

Digitally-enabled services supplied by affiliates (2017)

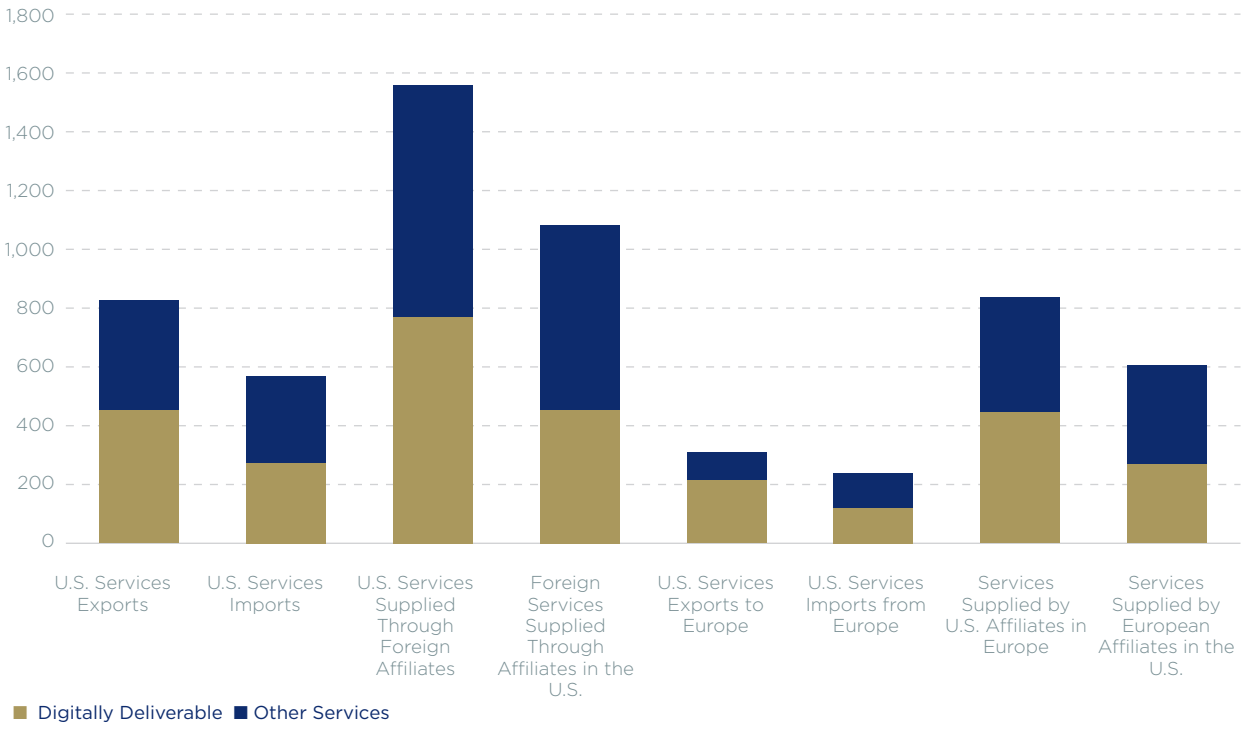
$444 billion
U.S. affiliates in Europe

$269 billion
European affiliates in the U.S.

Table 6 underscores the relative importance of digitally-enabled services supplied by affiliates of U.S. companies located in Europe and affiliates of European companies in the United States, versus U.S. and European exports of digitally-enabled services. 53% of the $838.86 billion in services provided in Europe by U.S. affiliates in 2017 was digitally-enabled. In 2017 U.S. affiliates in Europe supplied $444.33 billion in digitally-enabled services, whereas European affiliates in the United States supplied $268.54 billion in digitally-enabled services. Digitally-enabled services supplied by U.S. affiliates in Europe were more than double U.S. digitally-enabled exports to Europe, and digitally-enabled services supplied by European affiliates in the United States were 2.2 times greater than European digitally-enabled exports to the United States.

The significant presence of leading U.S. service and technology leaders in Europe underscores Europe's position as the major market for U.S. digital goods and services. Table 7 underscores this dynamic. In 2017, Europe accounted for 69% of the $259.6 billion in total global information services supplied abroad by U.S. multinational corporations through their majority-owned foreign affiliates. This is not surprising given the massive in-country presence of U.S. firms throughout Europe, with outward U.S. FDI stock in information overwhelmingly positioned in Europe. U.S. overseas direct investment in the "information" industry in the UK alone, for instance, was greater than such investment in the entire Western Hemisphere outside the U.S. or such investment combined in the Middle East, Africa and the entire Asia-Pacific region.[52]

Table 6 Digitally-Enabled Services Trade and Services Supplied through Affiliates* ($Billions)



**Trade data are for 2018. Affiliate data are for 2017, the latest available year.*
Source: U.S. Bureau of Economic Analysis.
Data as of October 2019.

73%

of U.S. overseas **direct investment in the "information" industry** is in Europe (2018)

Table 7 Information Services Supplied Abroad by U.S. Multinational Corporations Through Their MOFAs ($Millions)

Country	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Canada	3,595	4,140	3,971	5,996	6,316	7,135	7,595	7,401	8,487	8,342	9,161	9,105
Europe	67,270	76,156	85,450	84,117	96,310	110,525	119,123	120,796	157,811	162,409	175,105	179,146
France	4,045	3,794	4,475	4,713	4,582	5,013	4,768	5,258	6,085	5,894	5,927	6,084
Germany	5,260	6,031	6,104	6,456	7,143	7,798	7,970	10,599	12,018	11,191	11,394	12,247
Netherlands	5,925	8,152	9,980	8,674	8,719	9,313	10,196	9,117	12,686	13,590	13,938	17,175
Switzerland	2,871	2,527	3,197	3,747	4,034	4,419	5,243	4,778	(D)	5,452	5,435	6,390
United Kingdom	33,512	35,711	31,479	29,906	24,941	26,446	25,996	23,876	30,228	33,512	35,854	39,002
Latin America and Other Western Hemisphere	7,255	10,845	13,165	13,798	17,578	20,943	21,887	21,751	22,457	20,672	20,320	21,965
Australia	5,722	6,365	6,369	5,961	6,852	6,960	5,531	7,735	7,045	6,266	6,431	7,032
Japan	3,447	(D)	6,224	7,856	4,575	4,828	5,204	5,807	7,796	7,821	11,252	9,953
China	n/a	n/a	n/a	1,252	1,633	1,627	1,581	1,656	3,016	2,675	2,726	2,990
Other Asia-Pacific and MENA Countries	5,217	(D)	(D)	7,623	8,582	10,320	11,663	14,226	33,461	36,891	36,293	29,433
TOTAL	**92,507**	**(D)**	**(D)**	**126,603**	**141,846**	**162,338**	**172,583**	**179,372**	**240,073**	**245,076**	**261,288**	**259,624**

MOFA: Majority-owned foreign affiliate.
(D) indicates that the data in the cell have been suppressed to avoid disclosure of data of individual companies.
Source: Bureau of Economic Analysis.

2. E-Commerce

Electronic commerce offers a second window into transatlantic digital connections and complements our lens of digitally-enabled services, because most digital sales and purchases are delivered physically or in person – not digitally.[53] And while goods trade growth has been flattening worldwide, the share enabled by e-commerce has been registering double-digit growth in recent years.[54]

Here again we run into some definitional and data challenges. Most estimates of e-commerce do not distinguish whether such commerce is domestic or international. In addition, many metrics do not make it clear whether they cover all modes of e-commerce or only the leading indicators of business-to-business (B2B) and business-to-consumer (B2C) e-commerce. Finally, there are no official data on the value of cross-border e-commerce sales broken down by mode; official statistics on e-commerce are sparse and usually based on surveys rather than on real data.[55]

Nonetheless, we can evaluate and compare many different estimates and surveys that have been conducted. According to UNCTAD, global e-commerce was worth $29.37 trillion in 2017.[56]

When most people hear the term "e-commerce," they think of consumers buying things from businesses via websites, social networks, crowdsourcing platforms, or mobile apps. These business-to-consumer transactions (B2C), however, currently pale in comparison to business-to-business (B2B) e-commerce. In 2017 B2B e-commerce accounted for 88% ($25.47 trillion) of the total value of global e-commerce, more than six times larger than business-to-consumer (B2C) transactions ($3.9 trillion).[57]

Including all types of e-commerce, the United States is the top e-commerce market in the world; online sales there are three times higher than in Japan and more than four times higher than in China. Germany ranks as the fourth largest e-commerce market in the world, with a larger B2B market than China but a much smaller B2C market. North America and Europe account for six of the top 10 e-commerce countries (Table 8).

Table 8. Top 10 Countries by E-Commerce Sales

Rank	Economy	Total ($ billion)	As % of GDP	B2B ($ billion)	%) of all e-commerce	B2C ($ billion)	Annual average spend per online shopper ($)
1	United States	8,883	46	8,129	90	753	3,851
2	Japan	2,975	61	2,828	95	147	3,248
3	China	1,931	16	869	49	1,062	2,574
4	Germany	1,503	41	1,414	92	88	1,668
5	Korea (Rep.)	1,290	84	1,220	95	69	2,983
6	United Kingdom	755	29	548	74	206	4,658
7	France	734	28	642	87	92	2,577
8	Canada	512	31	452	90	60	3,130
9	India	400	15	369	91	31	1,130
10	Italy	333	17	310	93	23	1,493
	Top 10 Total	*19,315*	*36*	*16,782*	*87*	*2,533*	*2,904*
	World	**29,367**		**25,516**		**3,851**	

Source: UNCTAD. Data for 2017, latest available. B2B: Business-to-Business. B2C: Business-to-Consumer.

While cross-border sales are estimated to account for 30% of all e-commerce sales, current statistics do not break down e-commerce transactions by origin. As a result, domestic and cross-border transactions are not separately identifiable.[58] Forrester forecasts annual international e-commerce growth of 17% through 2022, and 12% for overall e-commerce (cross-border and domestic, B2B and B2C).[59]

While B2B e-commerce accounts for the bulk of global e-commerce, most B2B e-commerce does not cross a border. Most B2B e-commerce users are manufacturers or wholesalers who are dependent on physically moving goods, and often heavy freight; the lack of freight digitalization ultimately poses a barrier to cross-border B2B e-commerce. The sheer volume of B2B e-commerce, however, means it still is the most important component of cross-border e-commerce sales. By 2023 cross-border B2B e-commerce is expected to account for two-thirds ($1.78 trillion) and cross-border B2C e-commerce for one-third ($920 billion) of an overall global cross-border e-commerce market of $2.7 trillion.[60]

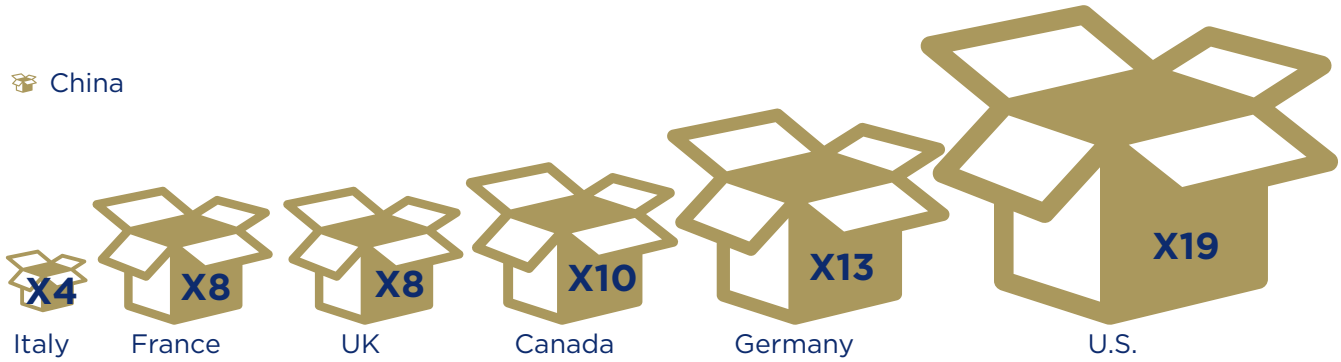
B2C cross-border e-commerce is expected to account for 16% of total global retail sales in 2020.[61] It is the fastest growing segment of international trade. 57% of global online shoppers are now cross-border shoppers.[62] The United States is the leader in cross-border B2C sales; North America and Europe accounted for seven of the top ten B2C merchandise exporters. Cross-border B2C sales as a share of total merchandise exports was highest in the UK, and cross-border B2C as a share of total B2C sales was highest in Germany.

Table 9. Cross-Border B2C Sales of Top Ten Merchandise Exporters

Rank	Economy	Total ($ billion)	As % of merchandise exports	% of B2C
1	United States	102	6.6	13.5
2	China	79	3.5	7.5
3	United Kingdom	31	7.0	15.0
4	Japan	18	2.6	12.2
5	Germany	15	1.0	17.1
6	France	10	1.8	10.6
7	Canada	8	1.8	12.7
8	Italy	4	0.7	16.2
9	Korea (Rep.)	3	0.5	3.8
10	Netherlands	1	0.2	5.0
	Top 10 Total	*270*	*3.0*	*10.7*
	World	**412**	**2.3**	**10.7**

Source: UNCTAD. Data for 2017, latest available B2C: Business-to-Consumer.

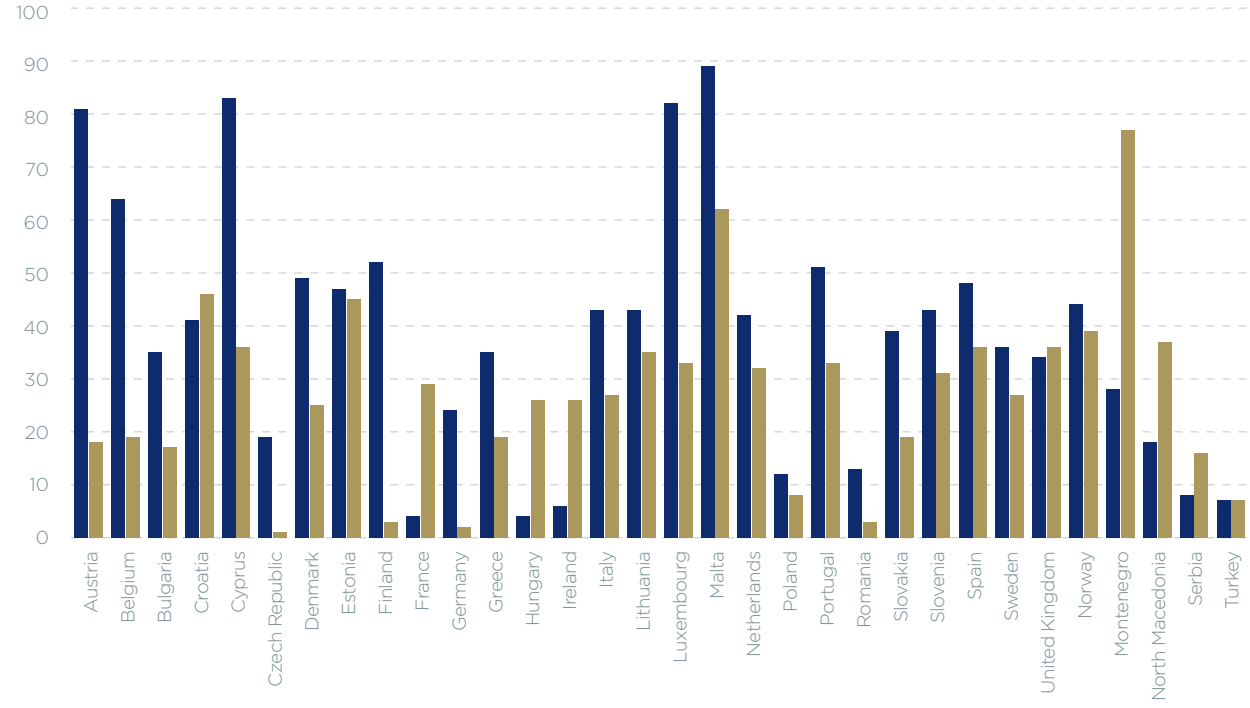
Per capita e-commerce consumption expenditure compared to China



China has the largest number of internet buyers at 440 million; its large B2C e-commerce market reflects its billion-plus population. Most of this e-commerce is national; 57% only ever purchase domestically. Interestingly, over half of Chinese cross-border e-purchases are for food.[63] China is underweight, however, when it comes to B2B e-commerce. All told, per capita e-commerce consumption is more than 19 times higher in the United States, 13 times higher in Germany, 10 times higher in Canada, 8 times higher in the UK, 8 times higher in France, and 4 times higher in Italy than in China.

UK consumers are the most likely to shop on the internet, with a whopping 87% making purchases online.[64] Online consumers in all EU countries, besides Croatia (and the UK, which was still in the EU when this data was recorded), buy more from online sellers within the EU than outside it (Table 10). Nonetheless, even though the European Single Market offers an opportunity for more vigorous cross-border e-commerce within the EU, European markets remain fragmented and the potential for cross-border e-commerce has not yet been fully exploited.

Table 10. European Cross-Border E-Commerce Purchases, by Country, 2018 (%)



Note: Percentage of consumer population that purchased online goods/services from each region; figures can exceed 100%.
Source: Ecommerce Europe, "European Ecommerce Report," 2019 edition, file:///C:/Users/Owner/Downloads/european_ecommerce_report_2019_free.pdf.

The nature of B2C e-commerce is changing quickly, however, driven by Asia-Pacific consumers who are increasingly paying for their online purchases via alternative payment vehicles such as e-wallets, biometric payments, tablets, smartphone and games consoles. In 2019, there were 2.1 billion mobile wallet users globally, a 30% increase from 2017. Whereas 65% of U.S. and European mobile users are still reluctant to use mobile payment, China boasts a 100% adoption rate.[65] A big reason for the rise of e-wallets in Asia is the success of Chinese e-payment giants Alipay and WeChat. Combined, the two have 1.7 billion users, 10 times more than Apple Pay. Chinese shoppers who used Alipay spent $1,403 in French stores during Golden Week, 15.5% more than the average U.S. shopper spent on gifts, travel and entertainment for the entire 2019 holiday season.[66]

Most reports do not separate out transatlantic e-commerce trade in goods, but a substantial portion of the global total is undoubtedly between the EU and the United States. Nearly half of all U.S. companies polled by the U.S. International Trade Commission indicated that they had an online trading relationship with the European Union, and almost half say that Europe is the region outside North America where they focus their cross-border strategy first, far ahead of other regions. Over half of European companies also focus first on North America as their primary e-commerce market outside of Europe, again far more than on other regions. The two sides also account for a significant portion of each other's e-commerce trade. It is estimated that 70% of UK e-shoppers and 48% of German e-shoppers purchase from U.S. e-commerce sites, and 49% of U.S. e-commerce purchases are from UK sites.[67]

3. The C2C Platform Economy

Platform companies that connect individuals and companies directly to each other to trade products and services are reshaping the U.S. and European economies, as well as the commercial connections between them. Platforms have swiftly become a dominant business model in the transatlantic digital economy, both by matching supply and demand in real time and at unprecedented scale, and by connecting code and content producers to develop applications and software such as operating systems or technology standards.[68]

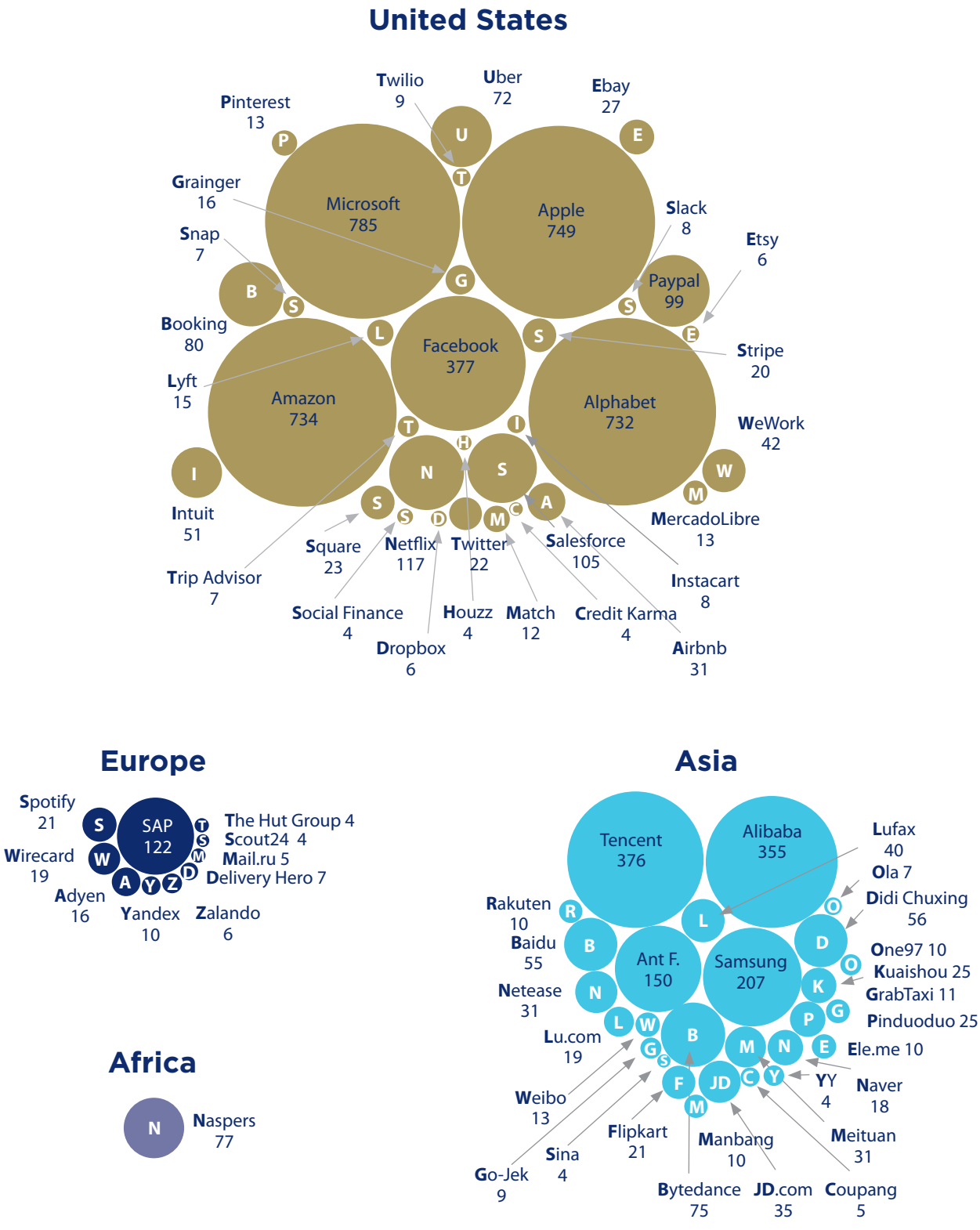
According to Forrester, these online marketplaces will account for 67% of global e-commerce sales by 2022.[69] While they have become important for business-to-consumer (B2C) e-commerce and are beginning to impact business-to-business (B2B) e-commerce, they have simply supercharged consumer-to-consumer (C2C) e-commerce (also known as peer-to-peer or P2P e-commerce) in ways that are potentially transformational.

The C2C platform economy model – with main sectors including lending and community financing, online distance work, home sharing, car sharing, online music and video streaming – is spreading quickly to new and more established sectors, such as medical equipment and healthcare, retail, legal services, human resources and food delivery.[70]

While C2C still commands a small share of the e-commerce market, the platform economy has supercharged its potential. Annual growth currently exceeds 25%, and some sectors are projected to even reach 63% by 2025.[71] PriceWaterhouseCoopers estimates that the revenue of C2C platform economy companies will grow 22-fold by 2025 and catch up to the B2C model, with each model achieving sales revenue in 2025 of $335 billion.[72]

The top 242 platform companies in the world now represent a market value of over $7 trillion.[73] Just seven so-called "super platforms" account for two-thirds of this total: U.S.-based Microsoft, Apple, Amazon, Google, Facebook and China-based Alibaba and Tencent. The platform economy is dominated by firms from the United States, which account for 70% of the market capitalization of the world's 70 highest valued digital platforms. According to UNCTAD, Google has some 90% of the market for internet searches. Facebook accounts for two thirds of the global social media market, and is the top social media platform in more than 90% of the world's economies. Amazon boasts an almost 40% share of the world's online retail activity, and its Amazon Web Services accounts for a similar share of the global cloud infrastructure services market. Next are firms from China at 22%. Alibaba accounts for close to 60% of the Chinese e-commerce market. WeChat (owned by Tencent) has more than one billion active users and, together with Alipay (Alibaba), its payment solution has captured virtually the entire Chinese market for mobile payments.[74]

Table 11 **Geographical Distribution of the Top Global Platforms**
(Market Capitalization $ Billions)



Source: Holger Schmidt, https://www.netzoekonom.de/vortraege/#tab-id-1.
Quoted in: UNCTAD. Data for 2019.

European companies account for only a marginal share of the market capitalization of the world's top digital platforms, and on average they are markedly smaller than their U.S. and Chinese counterparts. This is causing considerable anxiety in European capitals that Europe is missing the platform revolution. Despite the EU's effort to create a Digital Single Market, the European market remains relatively fragmented in terms of languages, consumer preferences and rules and regulations, which makes it much harder to achieve the kind of scale that platform companies have achieved in the large continental markets of the United States and China. There is also a more risk-averse culture that makes it generally harder to secure funding for potentially chancy bets on unproven technologies. More Chinese and U.S. platform companies operate multiple platforms than do their European counterparts, which means they can more easily use revenues from one platform to grow others.[75]

Nonetheless, Europe can look to some successes. Strong growth is expected for important cross-border marketplaces such as Fnac, CDiscount, Spartoo and Pixmania from France, Wirecard, Zalando, Mobil.de, Otto and Delivery Hero from Germany, Flubit, Fruugo, Farfetch and Asos from the UK, Allegro from Poland, Emag in Romania, Coolshop from Denmark and Bytbil from Norway. SAP, Germany's most valuable company, has reinvented itself with a strong focus on platform dynamics. And the largest driver of revenue to the music business today is Swedish company Spotify, which is worth $35 billion and accounts for over 38% of all recorded music revenue. Spotify is the most popular global audio streaming subscription service with 248 million users, including 113 million subscribers, across 79 markets. It is deeply tied to the transatlantic economy: North Americans and Europeans accounted for 68% of all active monthly users (32% and 36%, respectively) and 71% of all subscriptions (31% and 40%, respectively). Spotify and these other European platforms underscore that companies can achieve success even from relatively small home economies.[76]

There is certainly potential for European success in the platform economy. A study undertaken for the European Parliament estimates that the EU could gain €572 billion in annual consumption if it could harness the platform economy model to take more effective advantage of underutilized capacities across the Single Market. The study extends its analysis to include B2C transactions, so should be considered an expansive projection. Nonetheless, the potential is significant.[77]

In addition, while the United States and China lead the C2C platform economy, this sector of the UK economy is also robust. The UK is home to 10% of the businesses involved in the global C2C platform economy – more than France, Germany and Spain combined – and London is the C2C platform economy capital of Europe.[78]

Experts expect the platform economy to continue its rapid growth trajectory, and believe a next wave of platforms will transform the financial sector, the automotive industry, energy and construction services.[79] As the platform economy generates major economic opportunities, it is also creating new policy challenges across a wide spectrum of issues, ranging from tax and competition policy to privacy, insurance, finance and labor markets. Nonetheless, even with a more sober appreciation of the future possibilities, the potential is significant.[80]

4. Cross-Border Data Flows

Another way to understand the nature of transatlantic digital connections is to appreciate the role of cross-border data flows, which not only contribute more to global growth than global trade in goods, they underpin and enable virtually every other kind of cross-border flow. By the end of this year, cross-border bandwidth is slated to be 400 times what it was in 2005. By that time, Global Internet Protocol (IP) traffic, a proxy for data flows, is projected to reach 150,700 gigabytes (GB) per second, over 3 times more than three years ago.[81]

Transatlantic flows of data continue to be the fastest and largest in the world, accounting for over one-half of Europe's data flows and about half of U.S. flows.[82] Almost 40% of those flows are through business and research networks.[83]

Researchers are reluctant to use data flows as a proxy for commercial links, since data traffic is not always related to commercial transactions.[84] Knowing the volume of data flows does not necessarily provide insight on the economic value of their content. The Bureau of Economic Analysis puts it succinctly:

Global data flows now contribute more to global growth than global trade in goods

"Streaming a video might be of relatively little monetary value but use several gigabytes of data, while a financial transaction could be worth millions of dollars but use little data."[85]

In addition, commercial transactions do not always accompany data, and data do not always accompany commercial transactions. For instance, multinational companies often send valuable, but non-monetized, data to their affiliates.[86] User-generated content on blogs and on YouTube drives very high volumes of internet traffic both within countries and across borders, but consumers pay for very little of this content. Since it does not involve a monetary transaction, the significant value that this content generates does not show up in economic or trade statistics but instead reveals itself as "consumer surplus." McKinsey estimates that this "consumer surplus" from the United States and Europe alone is close to €250 billion ($266.4 billion) each year.[87]

In other words, data flows are commercially significant, yet their extent, as well as their commercial value, are hard to measure and are in constant flux. It is possible to get a better sense of their importance to the transatlantic economy, however, by literally taking a "deep dive" into the world of undersea cables.[88]

5. Making Waves: The Hardware of the Transatlantic Digital Economy

The digital economy evokes images of electrons speeding through the air or through "the cloud." Reality is different: when it comes to connecting continents, the cloud is actually under the ocean.[89] Subsea cables bring the internet to life. They transmit 99% of all intercontinental telecommunication traffic – data, content, financial payments, phone calls, tweets, texts, emails.[90] Just a few hundred cable systems transport almost all transoceanic traffic globally.[91] Every day they transmit close to $10 trillion in transactions around the world.[92] These cables serve as an additional proxy for the ties that bind continents. They show clearly that the transatlantic data seaway is the busiest oceanic data route in the world.[93]

In August 1858 the UK's Queen Victoria used the first transatlantic telegraph cable to send a message to U.S. President James Buchanan congratulating him on their historic achievement. The message, in Morse code, took over 17 hours to deliver. Twenty years later new cables were transmitting 6 to 8 words a minute. That rose to 40 words by the dawn of the 20th century. In 1956 the first underwater telephone cable was laid, and by 1988 transatlantic fiber optic cables could transmit 15 times the speed of an average U.S. household internet connection. Flash forward thirty years to 2018, when the Marea cable began operating between Bilbao, Spain, and the U.S. state of Virginia, with transmission speeds 16 million times faster than the average home internet connection. That's enough to stream nearly 5 million HD movies all at once.[94] In 2020 the Dunant cable will go into operation, linking Virginia Beach, Virginia and the French Atlantic Coast, with transmission speeds of 250 Tbs per second – enough to zap the entire contents of the Library of Congress 4,100 miles across the Atlantic three times a second.[95]

Digital ports like Virginia Beach, Bordeaux and Bilbao are charting the frontier of a new transatlantic digital age. They are joined by places like Lecanvey, Ireland, Kristiansand, Norway, Blaaberg, Denmark, and Wall Township, New Jersey. The latter two hamlets, together with cities such as Marseille, France, and Genoa, Italy, are among the planet's few unique Cable Landing Stations where multiple subsea and terrestrial cable routes come together. At these critical nodes, hundreds of millions of dollars' worth of subsea cable projects convert to terrestrial cables that then fan out to connect an entire continent.[96]

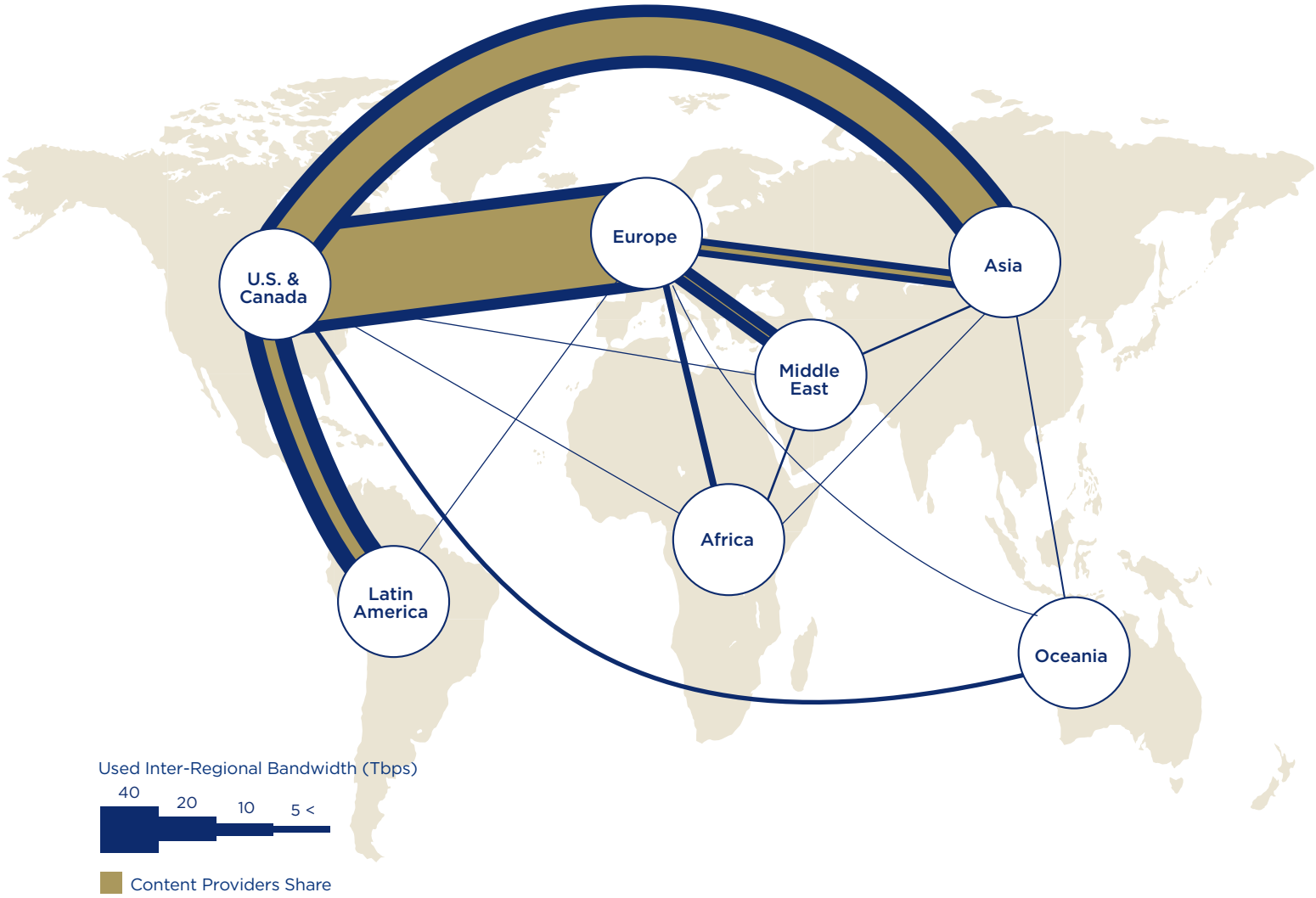
The new digital ports of the North Atlantic are emblematic of the fact that transatlantic cable connections represent the densest and highest capacity routes, with the highest traffic, in the world.[97] Submarine cables in the Atlantic already carry 55% more data than transpacific routes, and 40% more data than between the U.S. and Latin America.[98] Telegeography estimates a compound annual growth rate of 38% in transatlantic capacity until 2025.[99] Eight new transatlantic cables will be needed by 2027 just to keep up with demand, compared to 4 for intra-Asian routes, 3 for transpacific routes, and just one for U.S.-Latin American routes.[100] Military agencies also build submarine cables, yet those do not appear on public maps. Suffice it to say that if such connections are also considered, transatlantic submarine cables are even more dense than commonly depicted.[101]

Subsea cables bring the internet to life: they transmit **99%** of all intercontinental telecommunication traffic

The Dunant cable is notable not just because it is fast but because it heralds a major shift in the nature of transatlantic subsea connections.[102] Traditionally, transatlantic cables were laid and controlled by large consortia of national telecommunication carriers, also known as Internet Protocol "backbone" operators. This is now changing. The new surge in transatlantic capacity is being driven by private networks, mainly providers of content and cloud services, which have displaced backbone operators as the major investors in subsea cables and the largest source of used international bandwidth.[103] In 2006 backbone providers accounted for over 80% of international bandwidth. By 2018, content providers were accounting for 54% of used international bandwidth globally and a whopping 83% on transatlantic routes (Table 12). They are the sole drivers of new transatlantic cables planned through 2021.[104] The Dunant cable is but one of seven that Google plans to have come online in the next two years. Just those systems alone will more than double existing total transatlantic capacity.[105]

Content providers keen on getting closer to customers and achieving economies of scale are quickly pushing the digital frontier. Rather than rely on leasing arrangements with backbone providers, they see advantages in owning these cable networks themselves as they anticipate continuing massive growth in bandwidth needs. Their densest connections are between North America and Europe.[106]

Table 12 Used International Bandwidth Showing Content Provider Share, 2018



Source: Telegeography, https://www2.telegeography.com/hubfs/2019/Presentations/Kate-Reilly-Capacity-North-America-2019.pdf.

Bypassing the Internet

The rise of private content providers as drivers of submarine cable traffic is related to yet another significant yet little understood phenomenon shaping the transatlantic digital economy: more and more companies are working to bypass the public internet as a place to do business in favor of private channels that can facilitate the direct electronic exchange of data among companies. Businesses are moving their computing from centralized data centers to more distributed locations. IDC predicts that more than 50% of enterprise-generated data will be created and processed outside centralized data centers or cloud by 2022.[107]

This move is exponentially increasing demand for "interconnection" – private digital data exchange between businesses – and is another fundamental driver behind the proliferation of transatlantic cable systems.[108]

Private interconnection bandwidth is not only distinct from public internet traffic, it is slated to grow much more quickly and become much larger. Equinix projects that interconnection traffic – direct, private connections that bypass the public internet – will see a three-year compound annual growth rate (CAGR) of 51%. This far exceeds the expected CAGR of global internet traffic. By 2022, installed interconnection bandwidth capacity is expected to reach 13,300-plus Terabits per second (Tbps), which is equivalent to 53 zettabytes of data exchanged annually. This is enough to support every person on earth simultaneously downloading a complete season of *Game of Thrones* in ultra-high definition resolution in less than a day.[109]

The U.S./Canada leads globally, contributing to 38% of interconnection bandwidth, and is predicted to grow with a 46% CAGR. The top four metro areas – New York, Chicago, Washington, DC and Silicon Valley – are expected to represent 79% of interconnection bandwidth in 2022.

Europe contributes 22% of interconnection bandwidth globally and is predicted to grow at a 51% CAGR. The top four metros – London, Frankfurt, Amsterdam and Paris – will reach nearly 78% of European traffic by 2022, with London alone accounting for 34% of European traffic.

The Asia-Pacific region contributes more than 29% of interconnection bandwidth globally and is anticipated to grow at a 56% CAGR. The top five metros – Tokyo, Singapore, Shanghai, Sydney and Hong Kong – equate to 72% of overall Asia-Pacific interconnection bandwidth.

Latin America contributes 11% of interconnection bandwidth globally and is predicted to grow by 63% a CAGR. The top four metros – Sao Paulo, Rio de Janeiro, Buenos Aires, and Mexico City – are expected to equate to 77% of overall Latin American interconnection traffic.[110]

Another notable shift is that traditional business sectors are likely to surpass traditional services providers to become the largest consumers of interconnection bandwidth. Manufacturing, energy, banking & Insurance, retail, healthcare and government are expected to grow their interconnections by 7 times by 2022, whereas telecoms, IT services and content and digital media industries are expected to grow their interconnections by 4 times. And as traditional industries deepen their interconnections, they too will become digital services providers.[111]

It is unlikely that the public internet is doomed, since it is such a pervasive force in most people's lives and a key to digitally-delivered services, e-commerce and the platform economy. Yet private interconnection is rising alongside the public internet as a powerful vehicle for business. And as we have shown here, its deepest links are across the Atlantic.[112]

Hubs, Nodes and Trombones

The internet is structured as a hub-and-spoke system: the hubs are the internet exchanges located in cities around the world, and the spokes are the undersea fiber optic cables that run between these exchanges. This submarine cable system underscores the unevenness of the digital economy and the critical roles U.S. and European cities play as major cross-border hubs. Europe is the global leader, with tremendous connected international capacity. Frankfurt, London, Amsterdam and Paris substantially outpace North American and Asian cities (Table 13). Frankfurt's connected capacity, for instance, is over four times greater than that of New York and more than double that of Singapore, the Asian leader. Marseille, France has become a major hub for traffic between Europe, Africa and the Middle East.

Table 13 Highest Capacity International Internet Hub CitiesHubs

International Internet Bandwidth (Tbps)	CAGR 2014-2018
Frankfurt, Germany	86.2
London, UK	61.8
Amsterdam, Netherlands	55.6
Paris, France	54.5
Singapore, Singapore	37
Hong Kong, China	25.3
Miami, U.S.	25.1
Stockholm, Sweden	23.2
Marseille, France	21.9
New York, U.S.	21.3

Domestic routes omitted.
Source: Telegeography, The State of the Network 2020, https://www2.telegeography.com/hubfs/assets/Ebooks/state-of-the-network-2020.pdf.

The role of the United States and Europe as critical digital gateways is also underscored by looking at interregional connections and capacity. The need to store and move content between North America and Europe, the core hubs of the global digital economy, is higher than for secondary routes. Rising economies are becoming more integrated into the submarine cable network, yet few have data centers and so are reliant on content that is not stored locally. The United States accounts for about 40% and Europe for an additional 35% of so-called colocation data centers. Each hosts more data centers than Asia, Africa, the Middle East and Latin America combined.[113] This hub function is reinforced by price dynamics: local content providers in many emerging economies may in fact choose to host their content in Europe or North America because the cost to do so is much lower than at home. South Americans, for instance, rely almost exclusively on international connections routed through data centers in the United States. Similarly, 85% of international traffic emanating from the Middle East travels to centers in Europe. Africa is equally dependent: most traffic travels the trombone-like path from Africa through Europe and back to Africa, even if the African user is browsing a local website for a business just down the street. This "trombone" effect highlights why both the United States and Europe play such outsized roles in international digital traffic.[114]

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