Digital Trade in North America

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Executive Summary

As Internet access and reliance grows, so does the potential for digital cross-border trade. Building on other work from the Department of Commerce's Office of the Chief Economist (OCE) and Bureau of Economic Analysis (BEA), this report, which serves to inform policymakers, business leaders, and others, summarizes estimates of U.S. digital trade with Canada and Mexico.

We cannot definitively identify the value of U.S. digital trade because official trade statistics do not contain information on the mode of delivery of services. However, the official international trade in services statistics, as well as other information published by BEA and other organizations, do provide insights on how digital trade impacts the U.S. economy. In particular, BEA produces estimates on the international trade of information and communications technology (ICT) services and "potentially" ICT-enabled (PICTE) services, which are services that can be traded remotely using the Internet or some other digital network.

This report shows that in 2016:

- PICTE services accounted for 54 percent of all U.S. services exports, 48 percent of all services imports, and 64 percent of the trade in services surplus.

- U.S. PICTE services exports to Canada totaled $27.8 billion, or 52 percent of all U.S. services exports to Canada and 7 percent of total U.S. PICTE exports to all trading partners. The United States imported $13.9 billion in PICTE services from Canada, equal to 46 percent of all services imports from Canada and 6 percent of total PICTE services imports.

- U.S. PICTE service exports to Mexico totaled $8.8 billion, or 27 percent of all U.S. services exports to Mexico and 2 percent of total U.S. PICTE exports to all trading partners. The United States imported $4.8 billion in PICTE from Mexico, equal to 19 percent of

all services imports from Mexico and 2 percent of total PICTE services imports.

- U.S. PICTE services exports to Canada increased at an average annual rate of 4.0 percent from 2006 to 2016. Growth of U.S. exports of these services to Mexico was even faster, at 5.5 percent.

Additionally, there is evidence that multinational firms are exchanging data and information across North America. Canadian and Mexican affiliates of U.S. multinationals rely on data flows to carry out business operations, as well as for a wide-variety of additional uses. While the Department of Commerce does not have specific data on the volume of these data flows, BEA does publish data that show the presence of U.S. affiliates in these countries, supporting the notion that data is flowing across borders.

Digital Trade

The term "digital trade" is used by many organizations to describe a range of activities that occur over a network, such as the Internet, and that cross geographical borders. The most explicit form of digital trade occurs when a business in one country sells a service to an entity in another country and delivers that service over the Internet. However, e-commerce, or the purchase and sale of goods through a network, is also considered by many to be digital trade. Others consider any digital transfer of information or services, whether or not there is a monetary transaction involved, to be part of this category. For example, this would include any digital transfer of information such as emails between friends, social media, personnel files, supply chain information, or even an e-mail from the headquarters of a multinational enterprise to one of its affiliates overseas.

Regardless of how digital trade is defined, statistical data available to measure data flows is relatively scarce. BEA publishes two datasets that can help shed light on the magnitude of digital trade between the United States and its closest neighbors: international services trade statistics and statistics on foreign direct investment and multinational enterprises.

Potentially ICT-Enabled Services

Unlike internationally traded goods, traded services do not pass through customs as they cross borders. So while there are extensive administrative records of the value of goods that are traded, and even some information on the method of transport (such as air or other vessel), the same is not true for services trade. BEA collects much of its data on international trade in services directly from businesses through surveys. While the data indicate the value and type of service provided, there is no information on whether the service was delivered digitally or in person. Additionally, BEA only captures trade with a monetary exchange. Thus, many cross-border zero-dollar data transactions, despite being valuable to businesses and consumers, do not show up in BEA estimates.

Even though the international trade in services data cannot provide a precise estimate of the value of U.S. digital trade, they do allow for estimation of the value of potentially-ICT enabled (PICTE) services trade. PICTE services are those that "can predominantly be delivered remotely over ICT networks, a subset of which are actually delivered via that method."[1] For example, the provision of insurance services, financial services, and engineering services do not require the provider and the customer to be in the same location, but instead could be provided over a digital network. PICTE services also include ICT services, which are services that facilitate information processing and communication. Unlike PICTE services, BEA can precisely measure ICT services because ICT services are defined as a group of service types, rather than by the mode of delivery.

Table 1 displays the value of U.S. services trade in 2016, by type, as estimated by BEA. The table shows the value of trade in PICTE services. In 2016, U.S. PICTE services trade consisted of $403.5 billion in exports and $244.0 billion in imports. As a portion of overall U.S. services trade, PICTE services

[1] Grimm, Alexis. "Trends in U.S. Trade in Information and Communications Technology (ICT) Services and ICT-Enabled Services." Bureau of Economic Analysis. Available at: https://www.bea.gov/scb/pdf/2016/05%20May/0516_trends_%20in_us_trade_in_ict_serivces2.pdf.

accounted for 54 percent of exports and 48 percent of imports. The PICTE trade surplus was $159.5 billion or 64 percent of the total U.S. services trade surplus in 2016.

Table 1. U.S. Trade in Services, including Potentially ICT-Enabled Categories, 2016 (millions of dollars)

	Exports	Imports	Balance
Total services	752,368	504,654	247,714
Potentially ICT-enabled (PICTE) services	403,540	244,012	159,528
ICT services	66,129	41,888	24,241
Other PICTE services	337,411	202,124	135,287
Non-PICTE services	348,828	260,642	88,186
Total services	752,368	504,654	247,714
Maintenance and repair services n.i.e.	25,628	8,810	16,818
Transport	84,318	96,827	-12,509
Tavel (for all purposes including education)	205,940	123,618	82,322
Insurance services	16,348	48,077	-31,729
Financial services	98,180	25,629	72,551
Charges for the use of intellectual property n.i.e.	124,453	44,392	80,061
Industrial processes	47,512	23,200	24,312
Computer software	36,621	7,423	29,198
Trademarks	14,601	3,567	11,034
Franchise fees	5,268	62	5,206
Audio-visual related products	20,369	10,023	10,346
Other intellectual property	83	118	-35
Telecommunications, computer, and information services	36,455	36,851	-396
Telecommunications services	12,225	5,476	6,749
Computer services	17,283	28,989	-11,706
Information services	6,947	2,386	4,561
Other business services	142,231	98,922	43,309
Research and development services	37,176	34,243	2,933
Professional and management consulting services	74,021	40,169	33,852
Technical, trade-related, and other business services	31,034	24,510	6,524
Architectural and engineering services	9,475	4,467	5,008
Construction	1,404	1,552	-148
Industrial engineering	2,181	2,690	-509
Mining	3,377	1,098	2,279
Operating leasing services	6,725	3,618	3,107
Trade-related services	1,508	1,568	-60
Sports and performing arts	802	1,322	-520
Training services	2,473	1,280	1,193
Other business services n.i.e.	3,090	6,913	-3,823
Included in PICTE services	2,777	6,214	-3,437
Not included in PICTE services	313	699	-386
Government goods and services n.i.e.	18,814	21,528	-2,714

Notes: ICT is information and communications technology. ICT services are shaded in gray and are a subset of PICTE services. PICTE services includes those services shaded in both gray and in yellow. n.i.e. is not included elsewhere.

Source: U.S. Department of Commerce Office of the Chief Economist update of Table A from Grimm, "Trends in U.S. Trade in Information and CommunicationsTechnology (ICT) Services and in ICT-Enabled Services." BEA. May 2016. https://www.bea.gov/scb/pdf/2016/05%20May/0516_trends_%20in_us_trade_in_ict_serivces2.pdf.

U.S. Services Trade with Canada and Mexico

Canada accounted for 7 percent of total U.S. services exports and imports and was the United States' second-largest services trading partner in 2016, behind only the United Kingdom. Mexico ranked seventh, accounting for 5 percent of the total volume of U.S. services trade. Table 2 displays the value of U.S. trade in selected services types, including ICT and PICTE services, with Canada and Mexico in 2016. In that year, the United States ran services trade surpluses with both countries, overall and in PICTE services trade. PICTE services accounted for 58 percent of the services trade surplus with Canada and 53 percent with Mexico.

Table 2. U.S. Trade in Services with Canada and Mexico, including Potentially ICT-Enabled Categories, 2016
(millions of dollars)

	Canada			Mexico		
	Exports	Imports	Balance	Exports	Imports	Balance
Total services	53,957	29,950	24,007	32,045	24,569	7,476
Potentially ICT-enabled (PICTE) services	27,814	13,862	13,952	8,768	4,788	3,979
ICT services	4,841	3,743	1,098	1,849	961	888
Other PICTE services	22,973	10,119	12,854	6,919	3,827	3,092
Non-PICTE services	26,143	16,088	10,055	23,277	19,781	3,497
Total services	53,957	29,950	247,714	32,045	24,569	7,476
Maintenance and repair services n.i.e.	2,075	1,465	610	717	254	463
Transport	6,271	5,356	915	3,886	3,077	809
Tavel (for all purposes including education)	15,936	7,856	8,080	17,459	16,152	1,307
Insurance services	1,892	485	1,407	413	29	384
Financial services	6,405	2,006	4,399	1,507	356	1,151
Charges for the use of intellectual property n.i.e.	7,977	1,378	6,599	3,748	746	3,002
Industrial processes	1,610	619	991	1,303	64	1,239
Computer software	2,183	167	2,016	870	2	868
Trademarks	1,071	72	999	691	8	683
Franchise fees	1,193	(*)	--	187	(*)	--
Audio-visual related products	1,879	498	1,381	692	661	31
Other intellectual property	41	21	20	6	10	-4
Telecommunications, computer, and information services	3,202	3,751	-549	1,086	978	108
Telecommunications services	561	327	234	337	427	-90
Computer services	2,097	3,249	-1,152	643	532	111
Information services	545	176	369	106	19	87
Other business services	9,789	7,398	2,391	2,734	2,848	-114
Research and development services	391	2,025	-1,634	89	695	-606
Professional and management consulting services	6,885	2,919	3,966	1,218	843	375
Technical, trade-related, and other business services	2,513	2,454	59	1,427	1,310	117
Architectural and engineering services	573	324	249	500	(D)	--
Construction	205	115	90	36	5	31
Industrial engineering	240	98	142	78	(D)	--
Operating leasing services	808	142	666	305	10	295
Other /1/	687	1,777	-1,090	507	664	-157
Included in PICTE services	249	876	-627	129	--	--
Not included in PICTE services	438	901	-463	378	--	--
Government goods and services n.i.e.	412	254	158	495	129	366

Notes: ICT is information and communications technology. ICT services are shaded in gray and are a subset of PICTE services. PICTE services includes those services shaded in both gray and in yellow.
n.i.e. is not included elsewhere.
(*) Transactions between zero and +/- $500,000.
-- not able to calculate because of data suppressions.
D Suppressed to avoid disclosure of individual companies.
/1/ This category includes mining, trade-related services, sports and performing arts, training services, and other business services n.i.e.
Source: U.S. Department of Commerce Office of the Chief Economist using data from BEA.

Exports

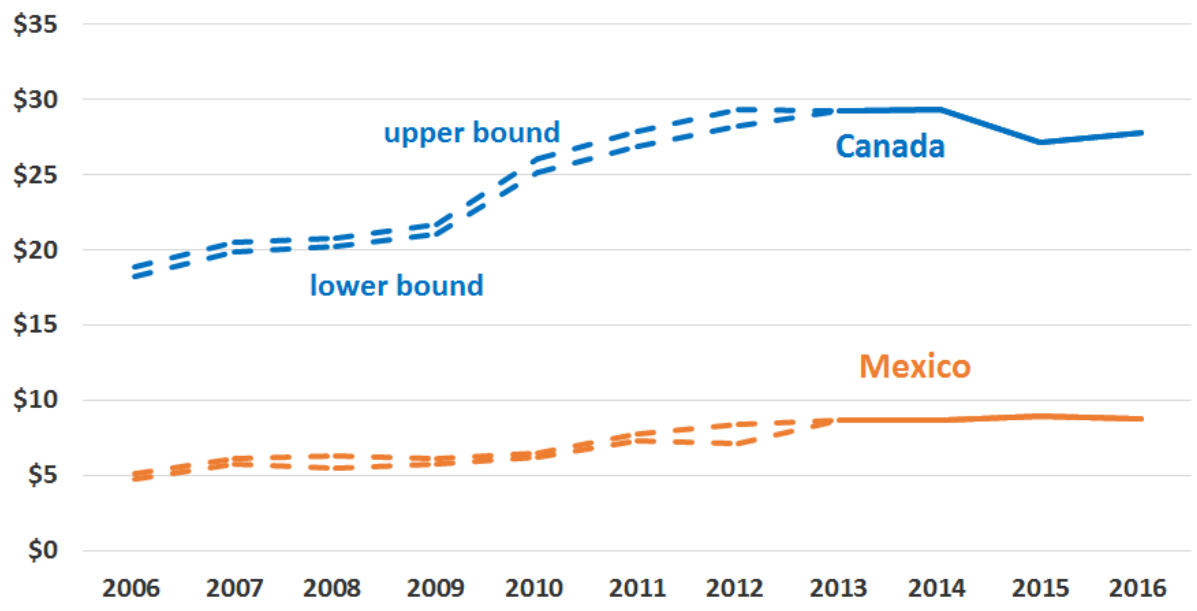
In 2016, the United States exported $54.0 billion in services to Canada of which $27.8 billion, or 52 percent, were PICTE services. Selected other business services, including services such as research and development, professional, management, and consulting, and architecture and engineering, accounted for $8.3 billion, or 30 percent, of the U.S. PICTE services exports to Canada. Charges for the use of intellectual property accounted for another $8.0 billion, or 29 percent.

With Mexico, charges for the use of intellectual property accounted for the largest share of PICTE exports at $3.7 billion, or 43 percent of the total, while selected other business services accounted for $2.0 billion, or 23 percent.

Figure 1 shows U.S. PICTE exports to Canada and Mexico over the past decade. Because of data limitations, U.S. PICTE exports to Canada and Mexico can only be estimated within a range from 2006 to 2012. Figure 2 presents the upper and lower bounds of these ranges. Regardless of where the true values of PICTE exports fall within these ranges, it is clear that U.S. PICTE exports to Canada and Mexico have grown considerably over the last decade.

Using the upper bound as the value for 2006 to be conservative, U.S. PICTE exports to Canada were 47 percent higher in 2016 than in 2006. This is equal to an annual growth rate of 4.0 percent. U.S. PICTE exports to Mexico increased even faster, at an annual rate of 5.5 percent, and the value of these exports was 70 percent higher in 2016 than in 2006.

Figure 1. U.S. Exports of Potentially ICT-Enabled Services
(billions of dollars)



Note: When the statistics for one or more components of potentially ICT-enabled services exports are suppressed to avoid the disclosure of the data of individual companies, a range of possible values is established by the lower bound and upper bound. The lower bound is equal to the sum of all unsuppressed services included in potentially ICT-enabled services. The upper bound is calculated as the sum of the unsuppressed services and higher-level aggregates that include the suppressed services less any other components of that aggregate that are not included in potentially ICT-enabled services.
Source: Department of Commerce Office of the Chief Economist using data from the Bureau of Economic Analysis.

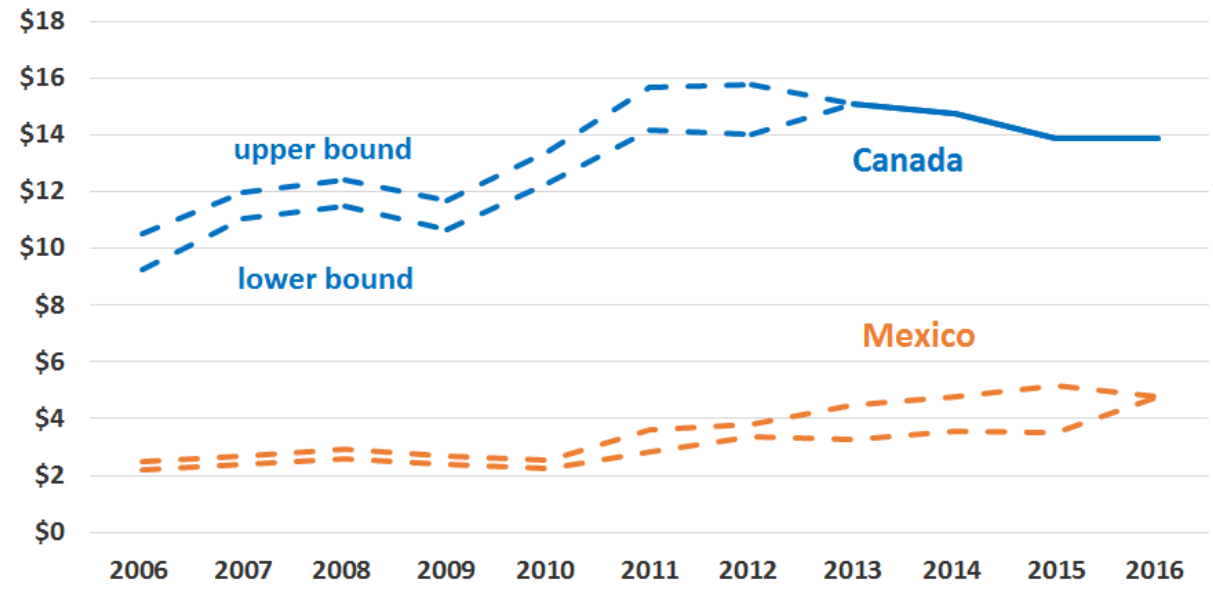
Imports

In 2016, the United States imported $30.0 billion in services from Canada of which $13.9 billion, or 46 percent, were PICTE services. Selected other business services imports from Canada were $6.2 billion and, as with exports, accounted for the largest share, 45 percent, of U.S. PICTE imports from Canada. Telecommunications, computer, and information services accounted for another $3.8 billion, or 27 percent of PICTE services imports from Canada.

These two services types also accounted for the largest shares of U.S. PICTE imports from Mexico. Imports of selected other business services were $2.7 billion, or 56 percent, while telecommunications, computer, and information services were $1.0 billion, or 20 percent of PICTE services imports from Mexico.

Figure 2 shows U.S. PICTE imports from Canada and Mexico over the past decade. As with Figure 1, Figure 2 presents the upper and lower bounds of the possible values of these imports from 2006 to 2012. Again, using the upper bound as the value for 2006 to be conservative, U.S. PICTE imports from Canada were 32 percent higher in 2016 than in 2006 after growing at an annual rate of 2.8 percent. U.S. PICTE imports from Mexico increased at an annual rate of 6.8 percent, with the 2016 level nearly double the 2006 level.

Figure 2. U.S. Imports of Potentially ICT-Enabled Services
(billions of dollars)



Note: When the statistics for one or more components of potentially ICT-enabled services exports are suppressed to avoid the disclosure of the data of individual companies, a range of possible values is established by the lower bound and upper bound. The lower bound is equal to the sum of all unsuppressed services included in potentially ICT-enabled services. The upper bound is calculated as the sum of the unsuppressed services and higher-level aggregates that include the suppressed services less any other components of that aggregate that are not included in potentially ICT-enabled services.
Source: Department of Commerce Office of the Chief Economist using data from the Bureau of Economic Analysis.

Foreign Direct Investment and Multinational Enterprises

In addition to international services trade data, BEA collects data on foreign direct investment in the United States, as well as data on U.S. direct investment overseas. These data include information on the financial structure and operations of U.S. multinational enterprises (MNEs) and their foreign affiliates, including those located in Canada and Mexico, as well as information about the activities of foreign MNEs in the United States. Like the international trade in services statistics, the data on direct investment does not provide any explicit information on the transfer of data across borders or the value of digital trade. However, the primary activities that MNEs engage in suggest that data flows are likely an important part of their operations.

In 2015, majority-owned foreign affiliates had total assets of $25.0 trillion and employed 14.1 million workers.[2] (See Table 3) Of the total assets, $1.4 trillion (6 percent) was held in Canada and $437.2 billion (2 percent) was in Mexico. Mexican affiliates employed 1.4 million workers (10 percent) while Canadian affiliates employed 1.2 million workers (8 percent). These affiliates and their employees were spread out across many different industries. In Canada, the retail trade and manufacturing industries were the largest affiliate employers. The most assets were held by enterprises engaged in management of nonbank companies. In Mexico, manufacturing enterprises employed more than half of all affiliated workers while finance and insurance enterprises held the most assets.

Table 3. Employment and Assets of Affiliates by Industry of Affiliate and by Country, 2015
(thousands of employees, billions of dollars)

Industry	Employment			Assets		
	All countries	Canada	Mexico	All countries	Canada	Mexico
All industries	14,124.1	1,171.8	1,376.8	24,991.9	1,411.8	437.3
Agriculture, forestry, fishing, and hunting	75.7	2.4	3.7	19.4	1.6	1.0
Construction	66.4	18.8	0.8	24.1	5.1	1.5
Utilities	39.4	8.7	0.2	131.7	52.3	--
Mining	249.0	25.8	14.8	1,051.6	176.5	13.8
Manufacturing	5,420.6	288.0	749.4	2,798.0	274.3	104.3
Wholesale trade	975.7	104.0	37.6	1,084.5	89.1	18.6
Retail trade	1,473.5	340.1	252.2	278.7	50.1	18.0
Information	624.8	25.8	23.0	523.9	18.2	4.5
Finance and insurance	713.5	35.9	61.1	9,253.7	263.5	165.4
Professional, scientific, and technical services	1,343.8	70.6	35.2	493.0	28.9	5.9
Transportation and warehousing	358.5	53.3	18.4	117.4	20.4	11.2
Real estate and rental and leasing	167.1	20.3	4.8	423.0	18.3	9.7
Management of nonbank companies and enterprises	25.4	1.1	9.0	8,411.3	387.2	69.7
Administration, support, and waste management	1,130.4	51.9	134.2	170.0	12.9	1.6
Health care and social assistance	65.8	12.1	A	22.0	5.1	--
Accommodation and food services	1,140.3	83.4	13.9	99.8	4.7	1.7
Miscellaneous services	254.5	29.5	B	89.7	3.6	--

Note: Data are for majority-owned foreign affiliates. Data are preliminary. Size ranges are given in employment cells that are suppressed. The size ranges are: A-1,000 and B-10,000 to 24,999. Data on assets is suppressed for certain industries to avoid disclosure of data of individual companies.
Source: Bureau of Economic Analysis, modified from original.

[2] Majority-owned foreign affiliates are affiliates of U.S. multinational enterprises where the U.S. parent has more than 50 percent ownership. Most foreign affiliates are majority-owned according to BEA data.

To manage these assets and workforce, U.S. parent companies undoubtedly rely on cross-border data flows. Measured in bits and bytes, total global data flows in 2014 were 45 times larger than in 2005.[3] While these flows represent more than just intracompany data traffic, multinational firms undoubtedly were a contributor. Some firms rely on in-house digital platforms to manage internal communication, data sharing, and other management tasks, while others rely on free digital media platforms and purchased software.[4] Digital tools and networks, such as the cloud, also provide firms with multiple locations the ability to centralize the administration of global employees, supply chain management, or other back-office operations.[5]

Table 4 shows the ways in which firms in all industries are identifying applications of digital technologies.[6] Cloud-computing is the basis for many digital trade activities and the United States is the dominant market for cloud services with $50.8 billion in revenues in 2016, 57 percent of global cloud services revenues that year.[7] The top U.S. cloud services providers all have operations in various locations around the world.[8] These activities all require the seamless flow of data across borders in North America, and beyond.

Table 4. Examples of firms' use of digital technologies across various industries and business functions

Business processes	Internet of Things	Robotics and automation	Cloud computing and data analysis
R&D and product development	Measure people for customized clothing	3-D printing of prototypes	Modeling of chemical properties
Production	Sensors on the assembly line	Unmanned aerial vehicles (UAVs) in agriculture surveys	Analyze production data to improve efficiency
Management and internal coordination	Supply chain monitoring systems	Warehouse robots	Enterprise resource management
Marketing, sales, and customer relationship management	Power utility interactive pricing	Airline kiosks	Automated customer service
Distribution and post-sales services	Fleet management services	Package delivery UAVs	Remote monitoring, maintenance, and updates of products

Source: United States International Trade Commission

[3] McKinsey Global Institute (MGI) (2016). Digital Globalization: The New Era of Global Flows. Page 31. Retrieved from http://www.mckinsey.com/business-functions/mckinseydigital/our-insights/digital-globalization-the-new-era-of-global-flows. (Last accessed December 6, 2017)
[4] MGI, page 34.
[5] MGI, page 32.
[6] United States International Trade Commission. (2017) Global Digital Trade 1: Market Opportunities and Key Foreign Trade Restrictions. Publication Number: 4716. Investigation Number: 332-561. Page 189. Retrieved from https://www.usitc.gov/publications/332/pub4716_0.pdf. (Last accessed December 6, 2017)
[7] USITC, pages 73, 217-219. Data on cloud services revenues from Marketline.
[8] USITC, page 75.

Conclusion

Digital trade, defined broadly, is changing the way that nations trade services and the way that firms do business. As evidenced by data from the BEA, around half of all services traded between the United States and Canada and the United States and Mexico are likely delivered through cross-border data flows over the Internet or some other data network. U.S. businesses also rely on digital trade to conduct business with their overseas affiliates.

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