



May 2019

INTERNATIONAL TRADE

Foreign Sourcing in Government Procurement

GAO Highlights

Highlights of [GAO-19-414](#), a report to congressional requesters

Why GAO Did This Study

Globally, government procurement constitutes about a \$4 trillion market for international trade. However, little is known about foreign sourcing in government procurement—how much governments procure from foreign-located suppliers or how much they acquire in foreign-made goods. GAO was asked to review the extent of foreign sourcing in government procurement across countries. GAO focused on the United States and the other six main parties to the GPA and NAFTA, selected international agreements that open procurement markets on a reciprocal basis. This report, the fourth of a related series, (1) provides broad estimates of foreign sourcing by the U.S. government and central governments of the other six main parties, and (2) assesses foreign sourcing as a share of estimated central government procurement and of estimated procurement by all levels of government, and the extent to which central government contracts that are covered under selected international procurement agreements are foreign-sourced.

GAO analyzed the most recent comparable data available from two sources: (1) government procurement databases used in Canada, the European Union, South Korea, Mexico, Norway, and the United States, for 2015, and (2) 2014 trade data merged with data on the types of goods and services purchased by the public sector. Since Japan does not have a government procurement database, data for Japan were based on its 2015 GPA submission of 2013 data. GAO also interviewed cognizant government officials in Washington, D.C.; Ottawa, Canada; Mexico City, Mexico; Seoul, South Korea; and Tokyo, Japan.

View [GAO-19-414](#). For more information, contact Kimberly Gianopoulos at (202) 512-8612 or gianopoulosk@gao.gov.

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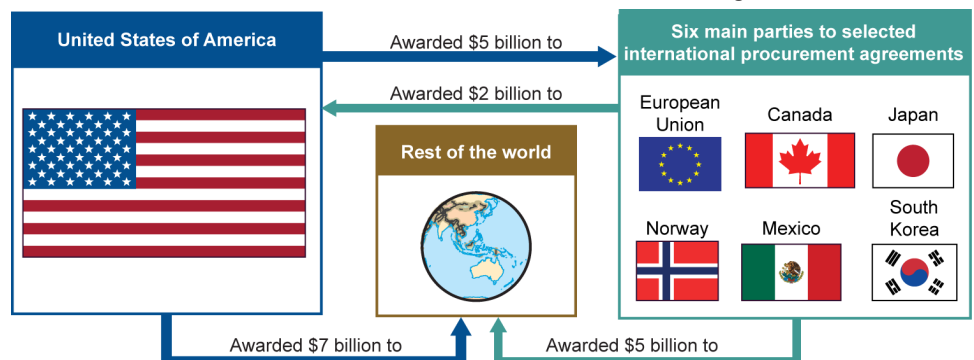
INTERNATIONAL TRADE

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What GAO Found

The U.S. government awarded contracts valued at about \$12 billion to foreign-located firms, of which about \$5 billion went to firms with reported locations in the other six main parties to the World Trade Organization Agreement on Government Procurement (GPA) and the North American Free Trade Agreement (NAFTA) (see figure). Conversely, government procurement databases indicated the central governments of these parties awarded an estimated \$7 billion to foreign sources, out of which about \$2 billion was U.S.-sourced. Canada and Mexico awarded most of the U.S.-sourced contracts. GAO was able to determine that the U.S. government awarded more, by contract value, to foreign-owned firms located abroad than to foreign-owned, U.S.-located firms. Moreover, more than 80 percent of U.S. government contracts awarded to foreign-owned firms located abroad were Department of Defense contracts performed abroad. Overall, while available contract data enable broad cross-country comparisons, they do not necessarily show where the goods are produced, where the services are delivered, or where the profits go, among other economic effects.

Estimated Bilateral Procurement Flows between Central Governments of the United States and the Other Six Main Parties to Selected International Procurement Agreements, 2015



Source: GAO analysis of U.S. and foreign government procurement data. | GAO-19-414

Foreign sourcing by the seven GPA and NAFTA parties within the scope of the study, using two alternative methods, is less than 20 percent of overall central government procurement. Foreign sourcing by central governments, estimated from government procurement databases of the United States and the other six main parties, varied in value by party from about 2 to 19 percent of overall central government procurement. Foreign sourcing by all levels of government, estimated from data on trade and public sector purchases, showed that the governments' imports likely ranged from about 7 to 18 percent of the goods and services the governments purchased. In addition, contract data show that U.S., South Korean, and Mexican central government foreign sourcing was greater in value under contracts covered by GPA and NAFTA than under noncovered contracts, but the opposite was true for Canada and Norway. For the European Union and Japan, GAO found little difference or could not calculate an estimate.

Contents

Letter		1
	Background	5
	The USG Likely Procured More Than Twice as Much from the Other Six Main Parties to the GPA and NAFTA as Vice Versa, but Exact Comparisons Are Not Possible	12
	Foreign Sourcing Is a Minor Share of Government Procurement, and Our Analysis Did Not Find a Consistent Relationship with Coverage under the GPA and NAFTA	28
	Agency Comments	40
Appendix I	Objectives, Scope and Methodology	41
Appendix II	Characteristics of Central Government Procurement Databases	56
Appendix III	Additional Results Related to Foreign Sourcing by the U.S. Federal Government	63
Appendix IV	Methodology for Addressing Missing Contract Award Values in the Tenders Electronic Daily Database	68
Appendix V	GAO Contact and Staff Acknowledgments	75
Tables		
	Table 1: Available Data Fields for Estimating Foreign Sourcing in the Central Government Procurement Databases of the United States and the Other Six Main Parties to the GPA and NAFTA	10
	Table 2: U.S. Government Foreign Source Procurement, Estimated by Firm Location or Country of Product and Service Origin	13

Table 3: Estimated Domestic and Foreign Sourcing by All Levels of Government Based Only on the Public Administration Industry for the United States and the Other Six Main Parties to the GPA and NAFTA	33
Table 4: Foreign Sourcing in Central Government Contracts Awarded by the United States and the Other Six Main Parties to the GPA and NAFTA, Estimated by Value and Whether Covered by One of Those Two Agreements	38
Table 5: Characteristics of the Central Government Procurement Database of the United States	57
Table 6: Characteristics of the Central Government Procurement Database of the European Union and Norway	58
Table 7: Characteristics of the Central Government Procurement Database of Canada	59
Table 8: Characteristics of the Central Government Procurement Database of Mexico	60
Table 9: Characteristics of the Central Government Procurement Data of Japan	61
Table 10: Characteristics of the Central Government Procurement Database of South Korea	62
Table 11: Value of Contracts Awarded by the U.S. Federal Government for the Procurement of Domestic and Foreign Goods to Domestic and Foreign Firms, Fiscal Year 2015	63
Table 12: Number of Central Government Contracts Awarded by the U.S. Federal Government for the Procurement of Domestic and Foreign Goods to Domestic and Foreign Firms, Fiscal Year 2015	64
Table 13: Top 20 Recipients of US Federal Procurement Contracts by Country and Contract Value, Fiscal Year 2015	65
Table 14: Top 20 recipients of US Federal Procurement Contracts by Country and Number of Contracts, Fiscal Year 2015	66
Table 15: Breakdown of U.S. Federal Government Contracts Performed Outside the United States and Awarded to Foreign-Owned and –Located Firms by Agency, Fiscal Year 2015	67
Table 16: Country Breakdown of Department of Defense (DOD) Contracts Performed Outside the United States and Awarded to Foreign-Owned and –Located Firms, Fiscal Year 2015	67
Table 17: Post Imputation Diagnostic Table for European Union (EU) TED Data: Foreign Status	72

Table 18: Post Imputation Diagnostic Table for European Union (EU) TED Data: GPA Coverage, Type of Contract, and Foreign Status	72
Table 19: Post-stratification Sampling Diagnostic Table for Norway: Foreign Status	74
Table 20: Post-stratification Sampling Diagnostic Table for Norway: Type of Contract and Foreign Status	74
Table 21: Post-stratification Sampling Diagnostic Table for Norway: GPA Coverage and Foreign Status	74

Figures

Figure 1: U.S. Government Foreign Source Procurement Measured by Country of Firm Location, Country Firm Ownership, and Country of Contract Performance	19
Figure 2: Estimated Bilateral Foreign Sourcing Totals for Central Government Procurement by the United States and the Other Six Main Parties to the GPA and NAFTA	21
Figure 3: Four Alternative Approaches for Defining Foreign Sourcing of Government Procurement Contracts	26
Figure 4: Estimated Value and Share of Central Government Contracts Awarded to Domestic and Foreign-Located Firms by the United States and Four Other Main Parties to the GPA and NAFTA	29
Figure 5: Estimated Value and Share of Central Government Contracts Awarded for Foreign Source Goods and Services by the United States and Two Other Main Parties to the GPA	30
Figure 6: Total Estimated Government Procurement of the United States and the Other Six Main Parties to the GPA and NAFTA under Different Definitions of Government	34
Figure 7: Percentages of Government Sector Purchases That Are Imported, under Different Definitions of Government, for the United States and the Other Six Main Parties to the GPA and NAFTA	35

Abbreviations

CA	Contract Awards
CAN	Contract Award Notices
CompraNet	Government of Mexico e-Procurement System
DOD	U.S. Department of Defense
EU	European Union
FAR	Federal Acquisition Regulation
FPDS-NG	Federal Procurement Data System-Next Generation
FTA	Free Trade Agreement
GPA	Agreement on Government Procurement
GSA	General Services Administration
IDVs	indefinite delivery vehicles
KONEPS	South Korea ON-line E-Procurement System
NAFTA	North American Free Trade Agreement
OMB	Office of Management and Budget
PMM	predictive mean matching
TAR	Trade Agreement Report
TED	Tenders Electronic Daily
UN	United Nations
USMCA	United States Mexico-Canada Agreement
USTR	Office of the United States Trade Representative
WIOD	World Input-Output Database
WTO	World Trade Organization

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May 30, 2019

The Honorable Jeffrey A. Merkley
Ranking Member
Subcommittee on Multilateral International Development, Multilateral
Institutions, and International Economic, Energy, and Environmental
Policy
Committee on Foreign Relations
United States Senate

The Honorable Tammy Baldwin
United States Senate

Government procurement, which typically accounts for 10 to 15 percent of a country's gross domestic product, constitutes a significant potential market for international trade, according to the World Trade Organization (WTO). Over the past four decades, the United States has played a key role in developing trade agreements that open government procurement to international competition, including the WTO Agreement on Government Procurement (GPA)¹ as well as numerous U.S. free trade agreements (FTA). In addition, the GPA and the North American Free Trade Agreement (NAFTA)² require that parties to the agreements submit annual statistical notifications of government procurement covered by these provisions (covered government procurement).³ These data are

¹World Trade Organization Agreement on Government Procurement, 1868 UNTS 194 (1994), available at https://www.wto.org/english/tratop_e/gproc_e/gpa_1994_e.htm (accessed February 21, 2019) [hereinafter "the 1994 GPA"]; Revised Agreement on Government Procurement, Annex to the Protocol Amending the Agreement on Government Procurement (March 30, 2012), available at https://www.wto.org/english/docs_e/legal_e/rev-gpr-94_01_e.htm (accessed February 21, 2019) [hereinafter "the revised GPA"]. In this report, "the GPA" refers to elements common to both the 1994 GPA and the revised GPA unless otherwise specified.

²North American Free Trade Agreement (entered into force January 1, 1994), available at <https://www.nafta-sec-alena.org/Home/Legal-Texts/North-American-Free-Trade-Agreement> (accessed February 21, 2019) [hereinafter NAFTA].

³Under the agreements we reviewed, each party's covered procurement is defined in part through coverage schedules in annexes to international procurement agreements. These annexes identify the procuring entities covered at different levels of government; specify, by entity, the goods and services and construction services covered; and delineate threshold values for coverage—the contract award amounts that trigger coverage. See GAO, *Government Procurement: United States Reported Opening More Opportunities to Foreign Firms Than Other Countries, but Better Data Are Needed*, GAO-17-168 (Washington, D.C.: Feb. 9, 2017).

important for providing transparency about the extent to which the GPA and NAFTA parties have opened government procurement covered by the agreements to foreign suppliers and for demonstrating the agreements' financial benefits. However, while data on covered government procurement are available for the GPA parties, the feasibility of calculating the actual levels of foreign source government procurement that occur—how much governments procure from foreign-located suppliers and how much they acquire in foreign-made goods and services—has not been extensively explored.⁴ As a result, U.S. trade policy is being made and international procurement negotiations conducted with limited empirical data available about the country of origin of the goods and services purchased by the U.S. federal government or our trading partners' central governments.⁵

In response to your request for information on U.S. participation in international government procurement agreements, we reviewed the extent of foreign sourcing by the United States and the other six main parties to selected international procurement agreements. Specifically, in this report, we

- provide alternative broad estimates of foreign sourcing by the U.S. government (USG) and the central governments of the other six main parties to the GPA and NAFTA, and
- assess foreign sourcing as a share of estimated central government procurement and of estimated procurement by all levels of government, and the extent to which central government contracts that are covered under the GPA and NAFTA are foreign-sourced.

To address these two objectives, we examined the extent of foreign sourcing in government procurement across countries. We focused on the United States and the other six main parties to selected international procurement agreements, as we did in previous related reports: the

⁴Although NAFTA requires its parties to exchange annual statistics on government procurement, parties did not exchange this information from 2005 to 2017. See [GAO-17-168](#). According to USTR, the United States and Mexico exchanged statistics in 2018 as part of the United States-Mexico-Canada Agreement (USMCA) negotiations. However, the data are not publicly available.

⁵In this report, “central government” refers to government entities at the federal or national level.

European Union (EU),⁶ Japan, Canada, South Korea, and Norway under the GPA; and Mexico and Canada under NAFTA.⁷ We analyzed data from two sources: (1) government procurement databases in Canada, the EU, South Korea, Mexico, Norway, and the United States, for 2015;⁸ and (2) 2014 trade data merged with data on the types of goods and services purchased by the public sector. We limited our scope to 2015 for the government procurement databases because that was the year for which the most recent data were available in all six of the databases we analyzed. Several of the government procurement databases include data on procurement at all levels of government—national, state, and local; however, since not all of the databases within our scope included such data, we limited our analysis to central government procurement.⁹ We analyzed data from the government procurement databases to estimate direct cross-border procurement.¹⁰ Since Japan does not have a government procurement database, data for Japan were based on its

⁶We treated the EU collectively, as it existed in 2015, composed of the following 28 countries: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain, Sweden, and the United Kingdom. In this report, we do not examine trade or procurement between EU member states.

⁷The European Union, Japan, Canada, South Korea, and Norway together represent over 90 percent of the GPA countries' total government procurement. Canada, South Korea, and Mexico represent about 80 percent of U.S. FTA partner countries' total government procurement. See GAO, *International Trade: The United States and the European Union Are the Two Largest Markets Covered by Key Procurement-Related Agreements*, [GAO-15-717](#) (Washington, D.C.: July 29, 2015).

⁸For the United States, we used the federal government's fiscal year; for the rest of the countries, we used a calendar year.

⁹Therefore, for the United States, we limited our analysis to procurement by the U.S. federal government (USG).

¹⁰Government procurement transacted across international borders can be direct or indirect cross-border government procurement. In direct cross-border government procurement, the successful bidder is not located in the same country as the contracting authority, according to the address of the successful bidder in the relevant procurement databases. In indirect cross-border government procurement, the successful bidder is based in the same country as the contracting authority but is a subsidiary of a foreign company according to information reported in the relevant procurement databases.

WTO GPA submission for 2013, which is the last submission that contains information on its foreign sourcing in government procurement.¹¹

We did not analyze any individual contracts to verify data in countries' government procurement databases, including data such as contract value. In addition, we did not make any independent legal determinations with respect to individual contract coverage under the GPA and NAFTA. Since there is no single internationally accepted definition of foreign sourcing and there is no comparable unique field across the countries' databases, we used alternative proxy measures. We identified some data limitations in the countries' databases, but these limitations were not an impediment to using the data for broad comparisons, by orders of magnitude, of government procurement based on firm location and country of product and service origin, as available, for the countries included in this report. For trade data, we relied on a dataset of linked input-output tables from the World Input-Output Database (WIOD), which were produced under a grant awarded by the European Commission. The WIOD input-output tables contain yearly data from national statistical agencies. We analyzed the data for 2000 through 2014, the most recent year for which data were available in the WIOD. Despite certain assumptions and limitations in the WIOD data, we determined that the data were sufficiently reliable for the purposes of our reporting objectives.

We also interviewed cognizant government officials in Washington, D.C.; Ottawa, Canada; Mexico City, Mexico; Seoul, South Korea; and Tokyo, Japan, and reviewed available research literature to identify potential methods, sources, and data limitations. (See app. I for more information on our scope and methodology.)

We conducted this performance audit from March 2017 to May 2019 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

¹¹We used Japan's 2015 WTO GPA submission of data on 2013 procurement provided in response to the agreement's statistical requirements, which contains information on the "nationality of the winning tenderer". While Japan submitted its notification on 2016 procurement, the submission no longer contains data on the "nationality of the winning tenderer".

Background

U.S. international trade agreements that cover USG procurement include the GPA¹² and bilateral and regional FTAs. The revised GPA has 20 parties (including the EU) covering 48 WTO member countries (including the 28 EU member countries).¹³ Another 33 WTO members are observers; of these, 10 are in the process of acceding to the agreement. In addition to the GPA, the United States has 14 FTAs with 20 countries, four of which (Canada, Israel, Singapore, and South Korea) are also parties to the GPA. Almost all of the FTAs to which the United States is a party include provisions covering government procurement.¹⁴

The GPA aims to mutually open government procurement markets for goods, services, and construction services among its parties, according to the WTO.¹⁵ Under the GPA, foreign suppliers are able to compete alongside with U.S. suppliers for USG contracts covered by the agreement, and U.S. suppliers are able to compete for covered foreign government contracts in accordance with the framework established by the GPA. According to the office of the United States Trade Representative (USTR), to implement U.S. obligations under the international agreements that cover government procurement, the United States—generally (and not always) — waives preferential purchasing requirements for goods and suppliers from other countries that are parties

¹²Two versions of the GPA currently coexist: the 1994 GPA, which was signed on April 15, 1994, and a revision of the agreement, which entered into force on April 6, 2014, because Switzerland is still in the process of adopting the revised GPA.

¹³The 28 EU member countries include the United Kingdom. On February 27, 2019, parties to the GPA gave their final approval to the United Kingdom's accession to the GPA once it leaves the European Union.

¹⁴According to Commerce officials, the only government commitment in the Jordan-FTA is to “enter into negotiations with regard to Jordan’s accession” to the GPA. Therefore, they noted, the Jordan-FTA government procurement commitment does not include any specific procedural or market access commitments. In addition, according to USTR, unlike provisions under NAFTA, USMCA provisions covering government procurement are only between the United States and Mexico.

¹⁵According to the WTO, the GPA is a plurilateral agreement; that is, it has a narrower group of signatories than most WTO agreements, which have all WTO members as signatories. As of July 26, 2016, WTO had 164 members.

to the agreements in covered procurements over a certain threshold.¹⁶ For example, USTR has waived the Buy American Act¹⁷ and other preferential provisions for eligible products in acquisitions covered by various trade agreements.¹⁸ However, Commerce officials noted that small business set-aside requirements are not waived nor are the provisions of the Berry Amendment.¹⁹

¹⁶The Trade Agreements Act of 1979, as amended, authorizes the President to waive any law, regulation, procedure, or practice for eligible products from certain countries that results in less favorable treatment than that accorded to domestic products and suppliers or than that accorded to eligible products or suppliers of a party to the GPA. 19 U.S.C. § 2511. Such countries include those that have signed an international trade agreement with the United States or that meet certain other criteria such as being a least-developed country. 19 U.S.C. § 2511. The act also defines a least-developed country to be any country on the United Nations (UN) General Assembly list of least-developed countries. 19 U.S.C. § 2518. According to the UN, least-developed countries are defined as low-income countries suffering from structural impediments to sustainable development. For identifying least-developed countries, three criteria are used by the UN's Committee for Development Policy: gross national income per capita, the Human Assets Index, and the Economic Vulnerability Index.

¹⁷The President has delegated this waiver authority to the U.S. Trade Representative. 48 C.F.R. § 25.402(a)(1). The Buy American Act is an example of domestic preference legislation that places conditions on federal government purchases to require that federal agencies procure unmanufactured articles, materials, and supplies that have been domestically produced or mined, and manufactured articles, supplies, and materials that have been manufactured in the United States substantially all from articles, materials, or supplies mined, produced, or manufactured in the United States for use in the United States, subject to a number of exceptions. 41 U.S.C. §§ 8301–8305. The Buy American Act was enacted in 1933 and applies to direct purchases by the federal government of more than a statutorily established level (currently \$10,000). Congress has enacted other forms of domestic preference legislation in the years following that can impose a higher domestic content requirement or apply to indirect purchases.

¹⁸Federal Acquisition Regulation (FAR) Part 25.

¹⁹10 U.S.C. § 2553a.

Government Procurement Markets and the Procurement Opportunities That Parties to the GPA and FTAs Have Reported Opening to Foreign Firms

As part of our body of work on international government procurement, we have previously reported the following:

- The U.S. and EU government procurement markets are comparable in size, and each is larger than those of all other GPA and U.S. FTA partner countries combined. Some other parties to the agreements also have large government procurement markets, including Japan, South Korea, Canada, Mexico, and Norway.²⁰
- The government procurement chapters of the GPA and selected U.S. FTAs that we reviewed generally have similarities in text and commitments, possibly because key parties negotiated multiple agreements concurrently.²¹ However, the revised GPA generally provides more comprehensive market access than the selected FTAs we reviewed.
- The United States reported opening more procurement opportunities covered by the GPA to foreign firms than had other parties to the agreement.²² Data for 2010 showed that the United States reported \$837 billion in GPA covered procurement.²³ This amount is about twice as large as the approximately \$381 billion reported by the next five largest GPA parties combined—the EU, Japan, South Korea, Norway, and Canada—even though total U.S. procurement is less than that of the other five parties combined.

Previously, we reported on the opportunities available to U.S. and foreign firms seeking to compete for covered government procurement contracts in the countries that are parties to the agreements.²⁴ In the current report, we analyze the value and number of actual contract awards, reported in

²⁰See [GAO-15-717](#).

²¹See GAO, *International Trade: Government Procurement Agreements Contain Similar Provisions, but Market Access Commitments Vary*, [GAO-16-727](#) (Washington, D.C.: Sept. 27, 2016). As part of this analysis we reviewed the 1994 GPA, the revised GPA, NAFTA, and the U.S. free trade agreements with Australia, Colombia, and South Korea.

²²See [GAO-17-168](#).

²³According to the latest U.S. submission to the WTO, the value of reported state procurement reflects estimated total state procurement and does not estimate GPA covered sub-central procurement. U.S. agencies have not developed a methodology for reporting states' covered government procurement, as the GPA requires. Instead, the United States reports total state-level procurement, which GAO estimated may exceed covered procurement.

²⁴See [GAO-17-168](#).

procurement databases, including contracts covered under the GPA and NAFTA and those not covered. Covered contracts can be awarded to domestic firms, to firms from countries that are parties to the GPA and U.S. FTAs, or to other non-U.S. firms. Additionally, the Buy American Act does not apply to products that are purchased for use outside the United States, nor to the acquisition of services.²⁵ Therefore, such contracts can be awarded without the application of Buy American Act domestic preference conditions to bids from any firm, including firms from non-GPA and non-FTA countries.

Two Types of Data Sources Used to Estimate Foreign Sourcing in Government Procurement

To estimate foreign source procurement, we looked for information about where the goods and services that governments purchase are produced and the characteristics of the firms supplying those goods and services. We identified two types of primary data sources that could be analyzed to estimate foreign sourcing in government procurement: (1) government procurement databases to estimate direct cross-border central government procurement and (2) input-output tables merged with international trade data to estimate total procurement by all levels of government and the portion comprising imported goods and services.

Data from Government Procurement Databases on Contracts Awarded by Central Governments

Government procurement databases collect information on contracts awarded by government entities to firms supplying goods and services. Except for Japan, all the countries in our analysis maintain online government procurement databases that can serve as a primary data source to generate statistics on their foreign source central government procurement. The USG and the other six main parties to the GPA and NAFTA use these databases to report to the WTO their required procurement statistics under the GPA.²⁶ While Japan does not have a government procurement database, Japan's central government collects procurement data from various ministry sources and reports the aggregated data to the WTO. As table 1 shows, the U.S. Federal Procurement Data System-Next Generation (FPDS-NG) provides more data fields that can be used as proxies for measuring foreign source procurement than the non-U.S. databases provide. FPDS-NG contains data on four potential proxy measures of foreign sourcing—firm location,

²⁵The Buy American Act does not apply to the acquisition of services but can apply to supplies purchased through a services contract.

²⁶See the 1994 GPA, Art. XIX.5 and the revised GPA, Art. XVI.4 for reporting requirements.

firm ownership, product and service origin, and place of performance.²⁷ The database for the EU and Norway and the databases for Canada and Mexico all contain contract award data related to firm location. South Korea's database and Japan's WTO submission on its 2013 procurement contain data on source country of goods and services. Therefore, two data fields, one reflecting firm location and the other reflecting country of product and service origin, appear to provide reasonable proxy measures of foreign source procurement, although neither is available across all data sources. (For more information on the characteristics of each government procurement database, see app. II.)

²⁷ FPDS-NG has six fields that could be used as alternative proxy measures of foreign source procurement. One field relates to firm location, two fields relate to firm ownership, and two fields relate to the country of product and service origin. In addition, FPDS-NG contains a field on the place of contract performance.

Table 1: Available Data Fields for Estimating Foreign Sourcing in the Central Government Procurement Databases of the United States and the Other Six Main Parties to the GPA and NAFTA

	Government procurement data source ^a	Data field on firm location ^b	Data field(s) on firm ownership ^c	Data field(s) on product and service origin ^d	Data field on place of performance ^e	Data field on procurement agreement coverage ^f
United States	FPDS-NG	Yes	Yes	Yes	Yes	Yes
EU	TED	Yes	No	No	No	Yes
Norway	TED	Yes	No	No	No	Yes
Canada	Contract History	Yes	No	No	No	Yes
Mexico	CompraNet	Yes	No	No	No	Yes
Japan^g	Not available	Not applicable	Not applicable	Yes	No	Not applicable
South Korea	KONEPS	Not available	Not available	Yes	No	No

Source: GAO analysis of information on the procurement databases listed. | GAO-19-414

Note: The European Union (EU) and countries listed are the six main parties to the World Trade Organization (WTO) Agreement on Government Procurement (GPA) and the North American Free Trade Agreement (NAFTA).

^aFPDS-NG is the U.S. Federal Procurement Data System-Next Generation, TED is the European Union (EU) Tenders Electronic Daily database, CompraNet is the Government of Mexico e-Procurement System, Contract History contains data on contracts awarded by Public Works and Government Services Canada on behalf of federal departments and agencies, and KONEPS is the South Korea ON-line E-Procurement System. Some databases cover all levels of government, while others include data only on central government procurement.

^bLocation is based on the address of the firm awarded contract as reported in the database.

^cOwnership is based on what is reported in the database as the firm ownership in terms of a U.S. or foreign business incorporated or not in the United States. FPDS-NG has two fields related to firm ownership.

^dCountry of product and service origin is based on the source country of the goods or services procured under the contract. FPDS-NG has two fields related to country of product and service origin. In KONEPS, the data on foreign procurement include goods contracts only; it is unclear whether (a) no contracts for services and construction works were foreign sourced or (b) no data on foreign sourcing of those types of contracts were collected and available.

^ePlace of performance is the location of the principal plant or place of business where the items will be produced, supplied from stock, or where the service will be performed.

^fProcurement agreement coverage is based on information as available in each database for each contract, which can be covered by multiple domestic or international agreements.

^gData for Japan are based on Japan's 2015 WTO GPA submission of data on 2013 procurement provided to meet the GPA's statistical requirements, and included information on the "nationality of the winning tenderer".

Trade Data Linked to Data on the Goods and Services Purchased by the Public Sector

Information about how much goods and services a country imports provides the basis for another approach to estimating what portion of all government procurement in that country is imported. The WIOD provides such information, giving us a second type of data and an alternative analytical approach for estimating foreign source government

procurement.²⁸ The WIOD links data on an economy's supply chain interdependencies to data on its import and export flows, thus providing a proxy estimate of the share of imports in procurement by all levels of government. We based our method for analyzing linked input-output tables on an approach used by the European Commission which examines import penetration of government procurement within Europe.²⁹

Unlike the contract data we analyzed from government procurement databases, the WIOD data capture procurement by all levels of government. However, the input-output tables are organized by industry, which requires a decision as to which industries make up the government sector in any given country's economy. Some industries, like "public administration", can safely be assumed to be part of the governmental sector in every country. Other industries, like education or health care, vary across countries in the degree to which they are part of the government sector, if at all.

While this analytical method based on input-output tables can provide broad estimates of how much governments are purchasing imported goods and services, it relies on some important assumptions that may affect the reliability of the results. For example, it assumes that the goods and services purchased by all levels of government are imported to the same extent as they are when purchased by other industries in the same country. This assumption, known as the "proportionality assumption", recognizes that results from this method may overestimate the share of imports in government procurement to the extent that the analysis does not capture attempts by the government sector to limit foreign sourcing in its procurement. On the other hand, other aspects of this method may underestimate the share of imports in government procurement. For example, the input-output data include intermediate inputs but do not include purchases for investment, such as some government assets because, according to the authors of the European Commission study,

²⁸Economists use input-output tables to quantify interdependencies between sectors of an economy in terms of data on supply chain inputs and outputs. As a hypothetical example, the ship-building industry requires steel from the steel industry and supplies ships to the transportation industry. Linked input-output tables are based on trade flows between countries in products and services, like steel.

²⁹European Commission, *Measurement of Impact of Cross-Border Penetration in Public Procurement* (February 2017), accessed December 13, 2018, <https://publications.europa.eu/en/publication-detail/-/publication/5c148423-39e2-11e7-a08e-01aa75ed71a1/language-en>.

input-output tables do not have the data to distinguish between investments by the private and public sectors. Thus, the input-output data could exclude investment made through construction services like those purchased to build highways, schools, or other assets that have long-term use, services that are included in covered procurement under both the GPA and NAFTA.

The USG Likely Procured More Than Twice as Much from the Other Six Main Parties to the GPA and NAFTA as Vice Versa, but Exact Comparisons Are Not Possible

The value of U.S. government (USG) contracts awarded to firms located in the other six main parties to the GPA and NAFTA likely exceeds twice the estimated value of contracts from those parties to U.S. firms, but exact comparisons are not possible.³⁰ The USG awarded contracts valued at about \$12 billion to foreign-located firms in fiscal year 2015, of which less than half went to firms located in the other six main parties. Conversely, the government procurement data we analyzed indicated the central governments of these parties awarded almost \$7 billion to foreign sources, of which less than a third were awarded to firms located in the United States or for goods or services from the United States. Over three-quarters of these U.S.-sourced contracts were awarded by Canada and Mexico. Only the USG's procurement database contains data on firm ownership. Analyzing these data, we found that the USG awarded more, by reported contract value, to foreign-owned firms located abroad, than it awarded to U.S.-based subsidiaries of foreign-owned firms. This was mostly U.S. Department of Defense (DOD) contracts in support of the U.S. military presence in those countries. Overall, while available contract data enable broad cross-country comparisons, these data allow only limited insight into the effects on the U.S. economy of foreign sourcing of USG procurement. This is principally because the contract data do not capture the economic roles of firms awarded contracts and thus do not allow for a definitive assessment of the economic implications of foreign sourcing, as we discuss later in this report.

³⁰Contract award values presented in this report were derived from data reported in the government procurement databases and Japan's 2015 GPA submission for 2013 procurement.

USG Contracts Valued at About \$5 Billion Went to Firms Located in the Six Main Parties, out of About \$12 Billion Awarded to All Foreign-Located Firms

In 2015 the USG awarded about 511,000 contracts valued at about \$290.9 billion.³¹ Out of this total, about 47,000 contracts valued at about \$12.1 billion were awarded to firms located outside the United States (as shown in the data by firm location). Similarly, the USG awarded about 50,000 contracts valued at about \$16.5 billion for foreign goods and services (as shown by country of product and service origin). See table 2.

Table 2: U.S. Government Foreign Source Procurement, Estimated by Firm Location or Country of Product and Service Origin

Dollars in millions

	By firm location				By product and service origin			
	Value	Percent of total	Number	Percent of total	Value	Percent of total	Number	Percent of total
European Union (EU)	\$2,792.1	23	4,938	11	\$4,031.5	24	10,813	22
Norway	7.6	0	55	0	14.1	0	190	0
Canada	623.6	5	2,864	6	673.9	4	3,090	6
Mexico	1.4	0	21	0	147.2	1	1,056	2
Japan	1,072.3	9	1,529	3	1,322.6	8	2,472	5
South Korea	754.5	6	616	1	873.4	5	882	2
Subtotal for six main parties^a	5,251.4	43	10,023	22	7,062.8	43	18,503	37
Subtotal for other non-U.S. sources^b	6,872.8	57	36,484	78	9,482.4	57	31,356	63
Overall total	\$12,124.3	100	46,507	100	\$16,545.1	100	49,859	100

Source: GAO analysis of fiscal year 2015 data from the U.S. Federal Procurement Data System-Next Generation. | GAO-19-414

Note: Percentages may not sum exactly due to rounding.

^aThe EU and countries listed are the six main parties to the World Trade Organization Agreement on Government Procurement (GPA) and the North American Free Trade Agreement (NAFTA). The value and number of contract awards includes both covered and non-covered procurement under the GPA and NAFTA.

^bThe other non-U.S. sources include both countries that are parties and countries that are not parties to the GPA and NAFTA.

Of the USG foreign source procurement awarded to firms in the other six main parties to the GPA and NAFTA, firms located in the EU received

³¹These data provide a measure of the total contract value awarded in fiscal year 2015 and are based on the (1) base and all options value of new contracts awarded in fiscal year 2015 and (2) for multiple-award contracts, base awards in fiscal year 2015 and task orders awarded under the base award in fiscal years 2015 through July 2018.

more than half in terms of contract value and slightly less than half by number. In 2015 the USG awarded about 10,000 contracts valued at about \$5.3 billion to firms located in the other six main parties to the GPA and NAFTA (see table 2 above). This \$5.3 billion is about 40 percent of the total value of USG contracts awarded to foreign-located firms.³² Firms located in the EU received almost 5,000 USG contracts valued at \$2.8 billion. Firms located in Japan, South Korea, and Canada were awarded most of the remaining aggregate USG contract value (\$1.1, \$0.8, and \$0.6 billion, respectively) and number of contracts (about 1,500, 600, and 2,900, respectively) awarded to firms in the other six main parties to the GPA and NAFTA. Firms located in Mexico and Norway received less than 1 percent of the aggregate USG contract value and number of contracts awarded to firms in the other six main parties.

However, as table 2 also shows, the majority of foreign-sourced USG procurement, in terms of both value and number of contracts, went to firms located in countries that are not among the other six main parties to the GPA and NAFTA. Germany, Japan, and South Korea are among the top five countries whose firms received the most USG contract value in fiscal year 2015. However, countries in the Middle East, including Afghanistan, United Arab Emirates, and Saudi Arabia, were also among the countries whose firms were main recipients of USG procurement in terms of aggregate contract value (see app. III for additional information on USG foreign source procurement by country).

Finally, table 2 shows that FPDS-NG data are similar when we use, instead of firm location, the alternative measure of foreign sourcing based on country of product and service origin.³³ For example, the aggregate value of contracts awarded by the USG for goods and services originating in countries of the other six main parties was about 43 percent of the overall value of USG foreign source procurement—the same proportion

³²For GPA covered contracts, the USG awarded about 17,000 contracts with an aggregate value of about \$135.4 billion (see table 4 later in this report). About 1,600 of these GPA covered contracts, valued at about \$8.8 billion, were awarded to foreign-located firms. In particular, foreign-located firms from the other six main parties to selected international procurement agreements received about 830 GPA covered contracts valued at about \$3.9 billion. The amount of GPA covered procurement for fiscal year 2015 that we estimate is approximately the same as the value of \$134.7 billion reported for that year as of April 2019 in the U.S. Trade Agreements Report, which USTR uses to generate the WTO GPA notifications for federal level procurement.

³³The results for the United States were similar across all six fields, which could be used as alternative proxy measures of foreign source procurement in FPDS-NG data.

we found when using firm location as proxy measure of foreign sourcing. In addition, as with the results based on firm location, most of the USG's foreign source procurement as measured by country of product and service origin went to countries outside the other six main parties to international procurement agreements.

USG Awarded Less by Contract Value to U.S.-based Subsidiaries of Foreign-Owned Firms Than to Foreign-Owned, Foreign-Located Firms, Which Mainly Support DOD Operations Abroad

Foreign-located firms can be either foreign-owned or U.S.-owned, just as U.S.-located firms can be either foreign-owned or U.S.-owned. Among the government procurement databases we used, only the FPDS-NG includes data on firm ownership. Some research on foreign sourcing in government procurement differentiates between direct and indirect cross-border procurement based on knowledge about both the location and ownership of the successful bidder.³⁴

- In direct cross-border procurement, the successful bidder is both foreign-owned and foreign-located.
- In indirect cross-border procurement, the successful bidder is a U.S.-based domestic subsidiary of a foreign-owned firm.³⁵

According to a recent EU Commission study, between 2009 and 2015, the EU's indirect cross-border government procurement was more than 5 times greater in terms of both value and number of contract awards than

³⁴European Commission, *Measurement of Impact of Cross-Border Penetration in Public Procurement* (February 2017), accessed December 13, 2018, <https://publications.europa.eu/en/publication-detail/-/publication/5c148423-39e2-11e7-a08e-01aa75ed71a1/language-en>, and *Cross-Border Procurement above EU Thresholds* (March 2011), accessed November 15, 2018, <https://publications.europa.eu/en/publication-detail/-/publication/0e081ac5-8929-458d-b078-a20676009324/language-en>.

³⁵According to the June 2017 U.S. submission to the WTO Work Program on the Collection and Reporting of Statistical Data, for the purposes of determining country of origin in the U.S. federal procurement system, the nationality of the supplier does not determine the country of origin of a good. According to the submission, for contracts of goods covered by the Trade Agreements Act, the determining factor is the location of the last substantial transformation, regardless of whether the supplier performed the transformation or not. As explained by the submission, if the place of performance or country in which the end product was last substantially transformed is the United States, then the product would be treated as a domestic product, regardless of whether the supplier is foreign-owned or domestically owned.

its direct cross-border government procurement.³⁶ The study notes that indirect cross-border procurement is often high when direct cross-border procurement is low and suggests that may reflect actual or perceived barriers to cross-border bidding, which lead firms to rely on their locally based subsidiaries for cross-border sales. The study reported that indirect cross-border government procurement (foreign-owned, domestically located vendor) accounted for 21.9 percent of the number and 20.4 percent of the value of certain contract awards in the EU's 28 countries, while direct cross-border government procurement (foreign-owned, foreign-located vendor) accounted for 1.7 percent of the number of contracts and 3 percent of contract value.

In contrast to the findings of that EU Commission study, our analysis of FPDS-NG data shows that indirect cross-border procurement by the USG was smaller in terms of total award value and number of contracts than direct cross-border procurement. This indicates that foreign firms selling to the USG generally do not establish a local presence in the United States. Specifically, foreign-owned firms located in the United States (indirect cross-border procurement) received contracts valued at about \$3.6 billion, or less than 1 percent of the value of all USG contracts. By contrast, firms that were both foreign-owned and foreign-located (direct cross-border procurement) received contracts valued at about \$11.8 billion, or about 4 percent of the value of all USG contracts (\$290.9 billion). Therefore, USG direct cross-border procurement was about three times greater than indirect cross border procurement for contracts awarded in fiscal year 2015.

A possible explanation for this finding could be that foreign-owned and foreign-located firms are awarded more USG contracts in terms of value and number than U.S. subsidiaries of foreign-owned firms because those contracts are covered by international procurement agreements. Foreign-owned and foreign-located firms are awarded more USG contracts

³⁶The EU study developed its estimates of indirect cross-border procurement in the EU using a firm-matching methodology using a procurement database and a database with information on firm ownership. See European Commission, *Measurement of Impact of Cross-Border Penetration in Public Procurement* (Brussels, Belgium: February 2017), accessed December 13, 2018, <https://publications.europa.eu/en/publication-detail/-/publication/5c148423-39e2-11e7-a08e-01aa75ed71a1/language-en>. Similarly, according to Canadian officials, direct cross-border procurement may be less than indirect cross-border procurement because vendor location does not necessarily reflect the location of the parent company and foreign suppliers with a Canadian subsidiary may have provided their Canadian address in the Canadian database.

because they may bid for large-value GPA covered USG contracts at a higher rate than their U.S.-located counterparts, or they may generally be more competitive for such contracts. However, for contracts not covered under the GPA and NAFTA, the relative difference between the two groups of foreign-owned firms becomes smaller in terms of aggregate contract value. Therefore, the difference between direct and indirect cross-border procurement is likely not due to agreement coverage as one might expect. To better understand why the USG's direct cross-border procurement was larger than its indirect cross-border procurement, we further analyzed the FPDS-NG data on firm location, firm ownership, and place of performance—where the services were performed or where the goods were produced.

Based on firm location, as stated earlier, foreign-located firms were awarded about \$12.1 billion in USG contracts. Measured by aggregate contract value, almost all of the USG contracts awarded to those firms were performed abroad (i.e., outside the United States)—\$11.9 out of \$12.1 billion or 98 percent. USG contracts performed abroad are commonly awarded to U.S.-located as well as to foreign-located firms.³⁷ In 2015, the USG awarded contracts performed abroad valued at about \$23.3 billion, of which about half was awarded to U.S.-located firms.

In particular, as figure 1 suggests, while U.S.-located firms received contracts performed abroad valued at \$11.4 billion, foreign-located firms were awarded USG contracts valued at \$11.9 billion. Almost all of those USG contracts—\$11.7 out of \$11.9 billion or 98 percent—were awarded to firms that were foreign-owned as well as foreign-located (i.e., direct cross-border government procurement).³⁸ The vast majority of the value of these USG contracts to foreign-owned, foreign-located firms was for DOD contracts performed abroad. In particular, DOD awarded about 84 percent of the value of USG contracts—\$9.8 billion out of \$11.7 billion—that were performed abroad and awarded to foreign-owned, foreign-

³⁷Conversely, almost all contracts performed in the United States (\$267.5 out of \$267.7 billion, or 99.9 percent) were awarded to U.S.-located firms. Of the \$267.5 billion awarded to U.S.-located firms, about \$3 billion was awarded to foreign-owned firms and performed in the United States. By agency, DOD and the Department of Homeland Security account for most of the domestically performed U.S. contracts awarded to foreign-owned firms (78 percent and 10 percent, respectively). The vast majority of those contracts, \$2.1 out of \$3 billion, or almost three quarters, are not GPA covered contracts.

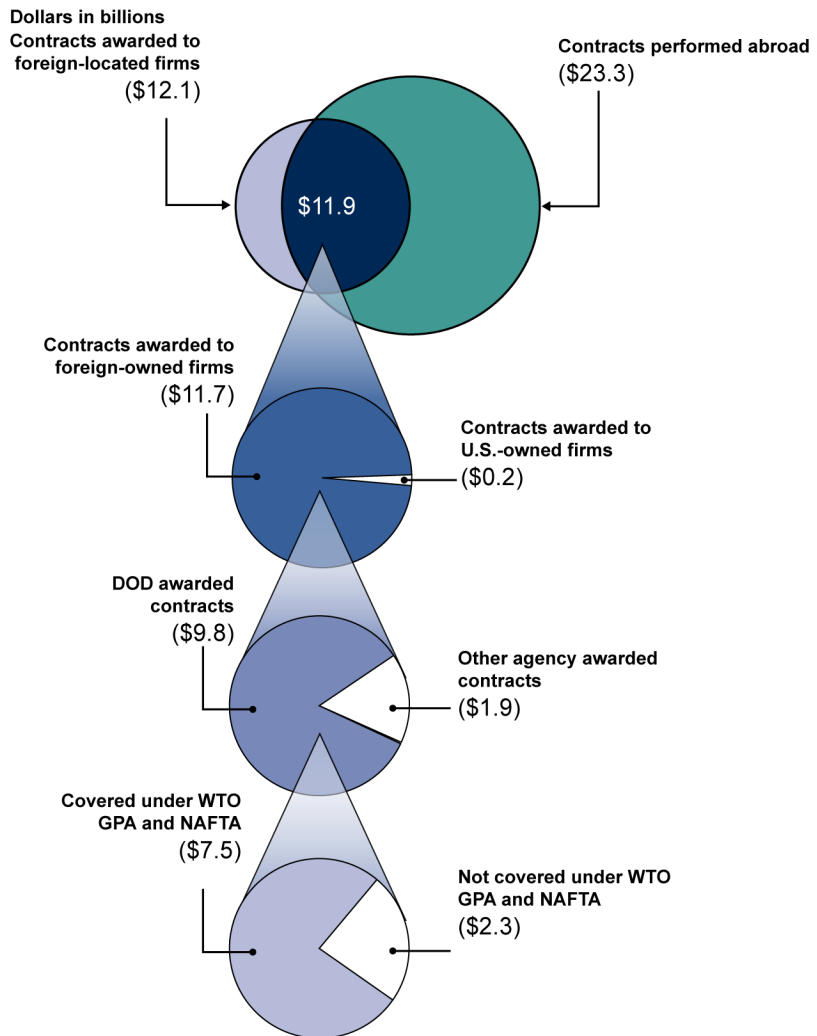
³⁸Similarly, almost all of the USG contracts performed abroad and awarded to U.S. located firms—\$10.7 out of \$11.4 billion or 94 percent—were awarded to firms that were both U.S.-owned as well as U.S.-located.

located firms.³⁹ The vast majority of those contracts (\$7.5 billion or 77 percent) were covered under the GPA and NAFTA. (See app. III for a breakdown by agency of all USG contracts performed abroad and awarded in fiscal year 2015 to foreign-owned, foreign-located firms.)

Foreign-owned firms located in six countries received the majority (57 percent) of DOD's \$9.8 billion in aggregate award value of contracts performed abroad. Specifically, firms located in three countries in the Middle East—Afghanistan, Saudi Arabia, and United Arab Emirates— together received 28 percent of that award value; firms in Japan and South Korea together received 18 percent; and firms in Germany received 11 percent. About a quarter of DOD's \$9.8 billion in aggregate award value were for purchases of fuel, oil, lubricant, and wax. About 9 percent were for education and training services, and about 7 to 8 percent each were for construction of buildings and housekeeping services. For example, fuel was the main product procured by DOD in United Arab Emirates, while in Saudi Arabia most DOD procurement was for education and training services. (See app. III for a breakdown of DOD contracts performed abroad and awarded to foreign-owned and foreign-located firms, by country.)

³⁹DOD awarded 61 percent of the value of all new contracts in fiscal year 2015 and 49 percent of the value of all new GPA covered contracts.

Figure 1: U.S. Government Foreign Source Procurement Measured by Country of Firm Location, Country of Firm Ownership, and Country of Contract Performance



Source: GAO analysis of fiscal year 2015 data from the U.S. Federal Procurement Data System-Next Generation. | GAO-19-414

Note: GAO's analysis focused on the United States and the other six main parties to selected international procurement agreements: the European Union (EU), Japan, Canada, South Korea, and Norway under the World Trade Organization Agreement on Government Procurement (GPA); and Mexico and Canada under the North American Free Trade Agreement (NAFTA).

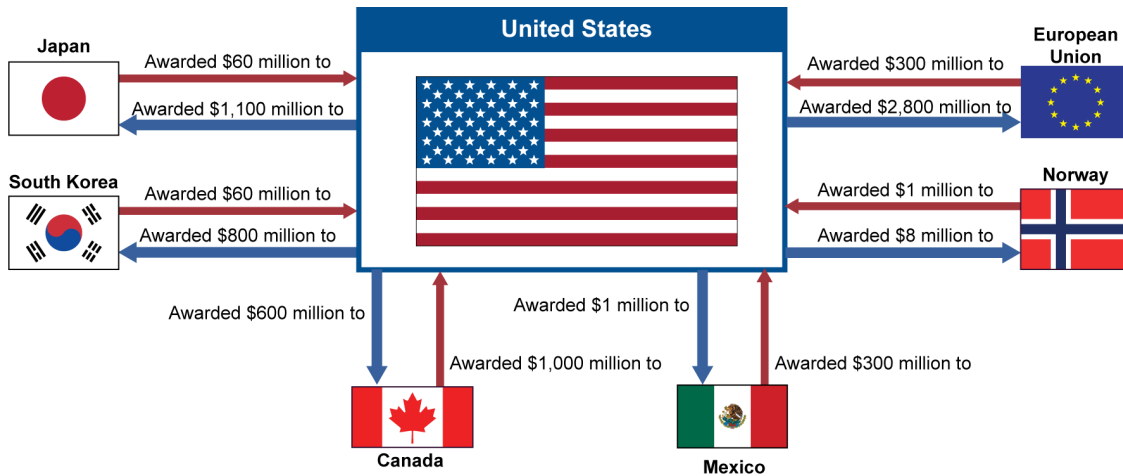
Central Governments of the Other Six Main Parties Awarded Almost \$2 Billion to U.S.-Located Firms or for U.S.-Made Products out of About \$6.5 Billion in Foreign-Awarded Contracts

Our analysis of available procurement contract data from 2015 shows that the central governments of the other six main parties to the GPA and NAFTA, apart from the USG, awarded contracts valued at about \$170.5 billion. About 4,000 out of a total of 245,000 of these contracts with an estimated total value of about \$6.5 billion were awarded to foreign sources, that is, to foreign-located firms or for imported products and services. Some of these contracts awarded by the other six main parties were covered by the GPA and NAFTA, while others were not.

Furthermore, the central governments of the other six main parties awarded about 2,000 U.S.-sourced contracts worth about \$1.8 billion (see fig. 2).⁴⁰ U.S.-sourced contracts are contracts awarded to U.S.-located firms or for products made in the United States. Canada and Mexico awarded most of the U.S.-sourced contracts. Specifically, central government contracts awarded to U.S.-located firms by Canada and Mexico accounted for almost 80 percent of the value and number of all U.S.-sourced contracts.

⁴⁰For GPA covered procurement, the central governments of the other six main parties besides the USG awarded about 69,000 contracts worth about \$118 billion. Out of those contracts, about 2,500 contracts valued at about \$2.4 billion were awarded to foreign-located firms or for the procurement of imported goods or services. About 1,400 of those contracts valued at about \$765 million were awarded to U.S.-located firms or for goods manufactured in the United States.

Figure 2: Estimated Bilateral Foreign Sourcing Totals for Central Government Procurement by the United States and the Other Six Main Parties to the GPA and NAFTA



Source: : GAO analysis of 2015 U.S. and foreign government procurement data. | GAO-19-414

Notes: GAO’s analysis focused on the United States and the other six main parties to selected international procurement agreements: the European Union (EU), Japan, Canada, South Korea, and Norway under the World Trade Organization Agreement on Government Procurement (GPA); and Mexico and Canada under the North American Free Trade Agreement (NAFTA).

Award values were rounded to the nearest hundred million dollars based on data reported in specific data sources as follows: for the United States, Federal Procurement Data System-Next Generation (FPDS-NG); for Canada, Contract History; for Mexico, COMPRANET; for the EU and Norway, Tenders Electronic Daily (TED); for South Korea, the South Korea ON-line E-Procurement System (KONEPS); and for Japan, Japan’s 2015 submission on 2013 covered procurement to the WTO GPA.

For the EU, estimates of above-threshold award values in TED were derived using methods that accounted for about 15 percent of missing award values. These estimates have a relative error of +/- 2 percent or less. See app. IV for more details. Below-threshold procurement in TED is excluded, since about 70 percent of the contracts awarded to U.S.-located firms had missing award values. Once those values are estimated, the amount of procurement awarded by the EU to U.S.- located firms increases by less than 10 percent, but we do not consider the estimate sufficiently reliable to be included in our aggregate analysis.

For Japan, amounts awarded indicate contracts awarded for goods and services of the other country, but for South Korea, goods only. For South Korea, it is unclear whether (a) no contracts for services and construction works were foreign sourced or (b) no data on foreign sourcing of those types of contracts were collected and available. For the EU, Norway, Canada, and Mexico, amounts awarded indicate contracts awarded to firms located in the other country.

Over 60 percent of the value and number of U.S.-sourced contracts awarded by the central governments of the other six main parties were for the procurement of goods. In particular, Canada awarded more than 20 times more in contract value to purchase goods than it did to purchase services from U.S.-located firms. However, for contracts covered under trade agreements, the other six main parties collectively awarded more U.S.-sourced contracts for services than for goods; these contracts were awarded primarily by the EU and Mexico. U.S.-located firms were

awarded virtually no construction services contracts. This result is consistent with our findings for procurement flows among all countries among the other six main parties to GPA and NAFTA and may be explained by the proxy measure used—firm location, which accounts only for direct cross-border procurement. For example, the EU commission paper cited previously finds that for construction works the share of direct cross-border procurement in the total value of awards was 1.7 percent compared with 12.3 percent for indirect cross-border procurement.⁴¹

While Available Contract Data Enable Broad Cross-Country Comparisons of Foreign Sourcing by Central Governments, They Allow Limited Assessment of Economic Implications

Select Data Elements Available in Government Procurement Databases Allow for Broad Cross-Country Comparisons, but Not Precise Estimates

The data available from the government procurement databases we analyzed provide relevant and useful information for assessing foreign sourcing in government procurement, but these data do not allow for precise cross-country comparisons based on the GPA provisions on rules of origin. Data and reporting on country of origin for goods and services is limited for a number of reasons. Most of the databases we analyzed contain fields on contract award value and type of contract, as well as fields on firm location or country of product or service origin—proxy measures of foreign sourcing that, as we have found, allow for broad cross-country comparisons. However, precise estimates from the available data are not possible because no single internationally accepted definition exists to distinguish procured goods and services that are “foreign” from those that are “domestic” and the information in government procurement databases is not uniform. There is no agreed-upon definition of the country of origin for goods and services for statistical reporting purposes in the GPA even though a similar term—country of production—is used in the 1994 GPA’s general principles on

⁴¹European Commission, *Measurement of Impact of Cross-Border Penetration in Public Procurement* (Brussels, Belgium: February 2017), accessed December 13, 2018, <https://publications.europa.eu/en/publication-detail/-/publication/5c148423-39e2-11e7-a08e-01aa75ed71a1/language-en>.

nondiscrimination. Instead, the GPA generally expresses that a party shall apply the rules of origin that it applies in the normal course of trade when determining the country of origin for goods and services in covered procurement.

Another factor that limits cross-country comparisons of country of origin data by parties to the GPA is the recent revision to the GPA itself, which no longer requires the parties to provide country of origin statistics, as we previously reported.⁴² According to the 1994 GPA, parties were to provide statistics on the country of origin for products and services purchased by its entities, to the extent that such information is available.⁴³ However, the revised GPA, which went into effect in 2014, does not require parties to report available information on the country of origin of purchased products or services.⁴⁴ While all the GPA members included in our scope reported the amount of covered procurement to the WTO, only Japan (until 2013) reported statistics on the “nationality of the winning tenderer”.⁴⁵ The WTO Committee on Government Procurement’s Work Programme on the Collection and Reporting of Statistical Data is currently examining the issues surrounding how countries define country of origin for the procurement of goods and services.

Finally, while the United States collects a variety of relevant data on foreign sourcing, those data have certain limitations for cross-country comparisons since the data are collected for different purposes. While U.S. agencies collect country data on successful bidders and the country of origin of goods and services in response to the Buy American Act and report these in FPDS-NG, the agencies do not collect data on country of origin determinations in response to relevant provisions of the GPA or NAFTA.⁴⁶ For example, the U.S. Federal Acquisitions Regulation (FAR), in implementing statutes including the Buy American Act, applies different tests to determine the country of origin of an end product and defines end

⁴²[GAO-17-168](#).

⁴³See the 1994 GPA, Art. XIX.

⁴⁴See the revised GPA, Art. XVI.4.

⁴⁵This is the name of the data field as reported by Japan.

⁴⁶According to Commerce, U.S. agencies are not required to collect data on country of origin in response to relevant provisions of the GPA and NAFTA.

Available Procurement
Contract Data Allow Limited
Assessment of the Economic
Implications of Foreign
Sourcing

products to include “domestic”, “foreign”, or “U.S.-made”.⁴⁷ The test to determine country of origin for an end product under the Buy American Act is different from the test to determine country of origin in the procurement of an end product under trade agreements.

According to the FAR, for manufactured products, the Buy American Act uses a two-part test to define a domestic end product: (1) the article must be manufactured in the United States, and (2) the cost of domestic components must exceed 50 percent of the cost of all the components.⁴⁸ According to the FAR, for procurement under trade agreements, the test to determine “country of origin” is “substantial transformation”, (i.e., transforming an article into a new and different article of commerce, with a name, character, or use distinct from the original article).⁴⁹ The substantial transformation test can also be used to determine whether a product is a U.S.-made end product.⁵⁰ The FAR also defines a foreign end product as an end product other than a domestic end product.⁵¹ Therefore, under the FAR, contracting officers use different tests and different descriptors to designate country of origin. Since corresponding data fields for these descriptors are not available in FPDS-NG, the data do not allow for exact cross-country comparisons of foreign sourcing under the GPA and NAFTA.

In all countries included in this report, available contract data do not allow for a definitive assessment of the economic implications of foreign sourcing in government procurement, such as impacts on wages and profits. As figure 3 shows, using the United States for illustrative purposes, foreign versus domestic sourcing in government procurement could be viewed in four different ways —firm location, firm ownership,

⁴⁷FAR 25.001(c). See also, FAR 25.003 for definitions of “domestic end product”, “foreign end product”, and “U.S.-made end product”.

⁴⁸FAR 25.101. This FAR provision also explains that the component test of the Buy American Act has been waived for acquisitions of commercially available off-the-shelf items.

⁴⁹FAR 25.001(c).

⁵⁰FAR 25.003.

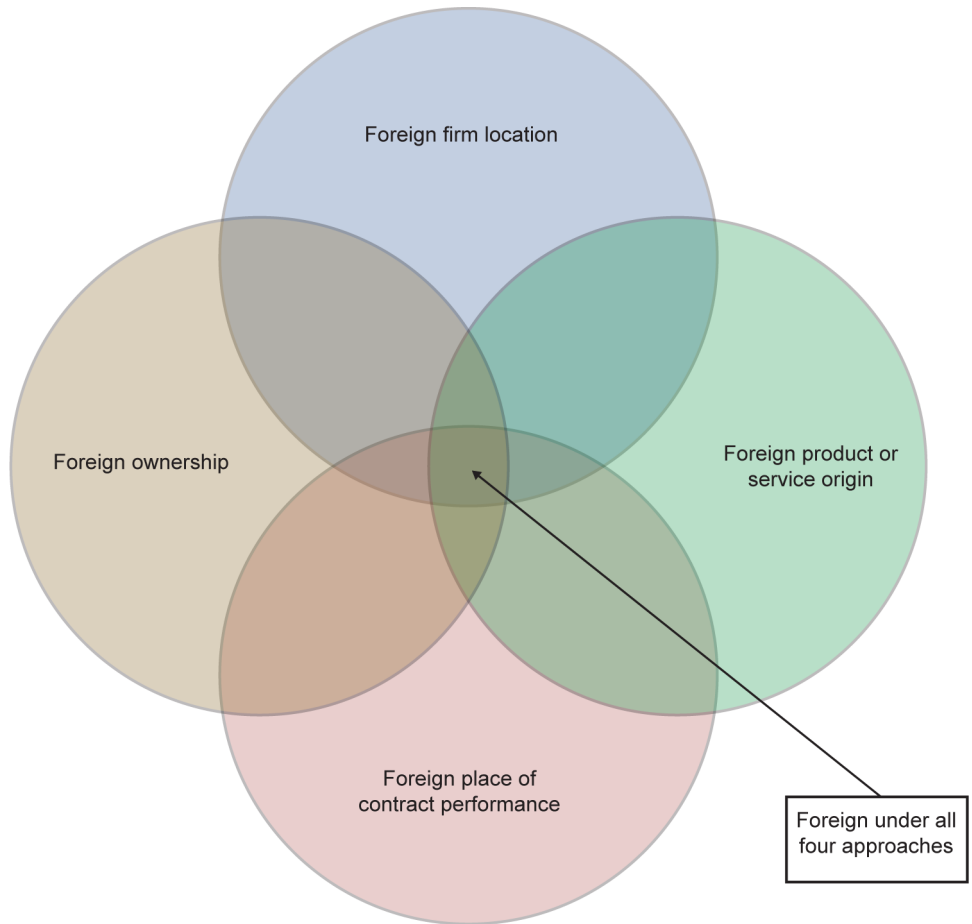
⁵¹FAR 25.003. This characterization is based on the origin of the end product—that is, where the product is manufactured or produced—and not the firm’s location or ownership. Further, the Buy American Act does not apply to products that are purchased for use outside the United States, i.e., performed abroad, nor to the acquisition of services but can apply to supplies purchased through a services contract.

product and service origin, and place of contract performance.⁵² For example, FPDS-NG data shows that a task order⁵³ under a DOD contract for facilities support performed in Iraq reports the United Arab Emirates as the country of product and service origin for safety and rescue equipment, while also reporting the firm location and ownership as the United States. FPDS-NG data showed that another task order under the same contract, for housekeeping services, reports the place of performance as Kuwait but reports the United States as the country of product and service origin, the firm location, and the country of firm ownership. As another example from FPDS-NG data, a contract awarded by the U.S. Agency for International Development for internet services performed in Malawi and awarded to a foreign-owned business reports the United States as the country of service origin but the United Kingdom as the firm location. Each of the various different ways relevant to the sourcing of USG contracts can be viewed on a continuum based on the extent of foreign involvement associated with the production and service delivery processes.

⁵²As stated earlier, the FAR defines a foreign end product as an end product other than a domestic end product. This characterization is based on the origin of the end product and not the firm's location or ownership. Further, the Buy American Act does not apply to products that are purchased for use outside the United States. The Buy American Act also does not apply to the acquisition of services but can apply to supplies purchased through a services contract.

⁵³"Task order" means an order for services placed against an established contract or with government sources. FAR 2.101.

Figure 3: Four Alternative Approaches for Defining Foreign Sourcing of Government Procurement Contracts



Source: GAO analysis. | GAO-19-414

Note: Area outside the four circles represents a contract that is not foreign under any approach.

- **Country of firm location.** As found in the procurement databases, suppliers can be located, for example, domestically in the United States or abroad. However, the economic effects related to the country of firm location depend on what is produced in the country relative to what is produced elsewhere. For example, the supplier may be an end product manufacturer doing less skill-intensive assembly and packaging, a high technology and skill-intensive manufacturing firm that substantially transforms a product that is subsequently used as an input in the production process, or a broker providing unskilled labor for product distribution. In each of these examples, the country

of firm location could experience different economic effects from the awarded contract.

- *Country of firm ownership.* Suppliers could be domestically or foreign owned, and who owns the firm determines who accrues the firm's profits. However, determining ownership is challenging because a supplier awarded a contract may have various ownership structures. For example, the supplier may be a sole proprietor or a corporation with shareholdings, subsidiaries, ultimate owners, or may be a participant in a corporate group. The supplier may have established a presence in the United States through a foreign-owned subsidiary or may participate in a partnership such as a joint venture with a U.S. firm.⁵⁴
- *Country of product or service origin.* Goods and services purchased under government procurement contracts may be domestically produced or imported. In this case, the effects can be analyzed in the same way as trade flows in general. However, the country of product or service origin is more challenging to determine for government procurement contracts compared with general trade in goods and services, since government contracts typically cover more than one good or service. Therefore, the country of origin for certain goods included in a contract may be different from the country of origin for other goods under the same contract.
- *Country of contract performance.* USG contracts can be executed within the United States or outside the United States. For example, the country of contract performance may determine where the service is delivered as opposed to the location or ownership of the firm that delivers the service. The place of performance may lead to benefits and costs accruing to the location where the contract is performed. For example, if a service is delivered or the products are produced outside the United States, the contract likely employs local labor and therefore benefits the local labor market.

Because available data in government procurement databases do not specify the supplier firm's economic role, the economic effects of the awarded contract remain uncertain. The potential effects of the awarded contract on other firms, workers, the government, or consumers in the

⁵⁴According to foreign officials we spoke to, establishing a local presence could provide better market access and knowledge of local conditions, particularly when bidding on large and complex government contracts in public works. In addition, a domestic firm awarded a government contract may choose to use a foreign-owned subcontractor.

domestic and foreign economies may vary depending on the supplier firm's economic role.

Foreign Sourcing Is a Minor Share of Government Procurement, and Our Analysis Did Not Find a Consistent Relationship with Coverage under the GPA and NAFTA

We estimate that foreign sourcing is generally a small share of government procurement for the United States and the other six parties to the GPA and NAFTA. Foreign sourcing by the USG and the other parties' central governments, estimated by government procurement databases, varied in value from about 2 to 19 percent of overall central government procurement. Foreign sourcing by all levels of government, estimated by data on trade and public sector purchases by the United States and the other six main parties, shows that government imports ranged from about 7 to 18 percent of the goods and services purchased by these countries' governments. In addition, our analysis of central government contract data found that foreign sourcing is sometimes but not always greater, in terms of value and number of contracts, for contracts covered by procurement agreements than for contracts not covered by those agreements.

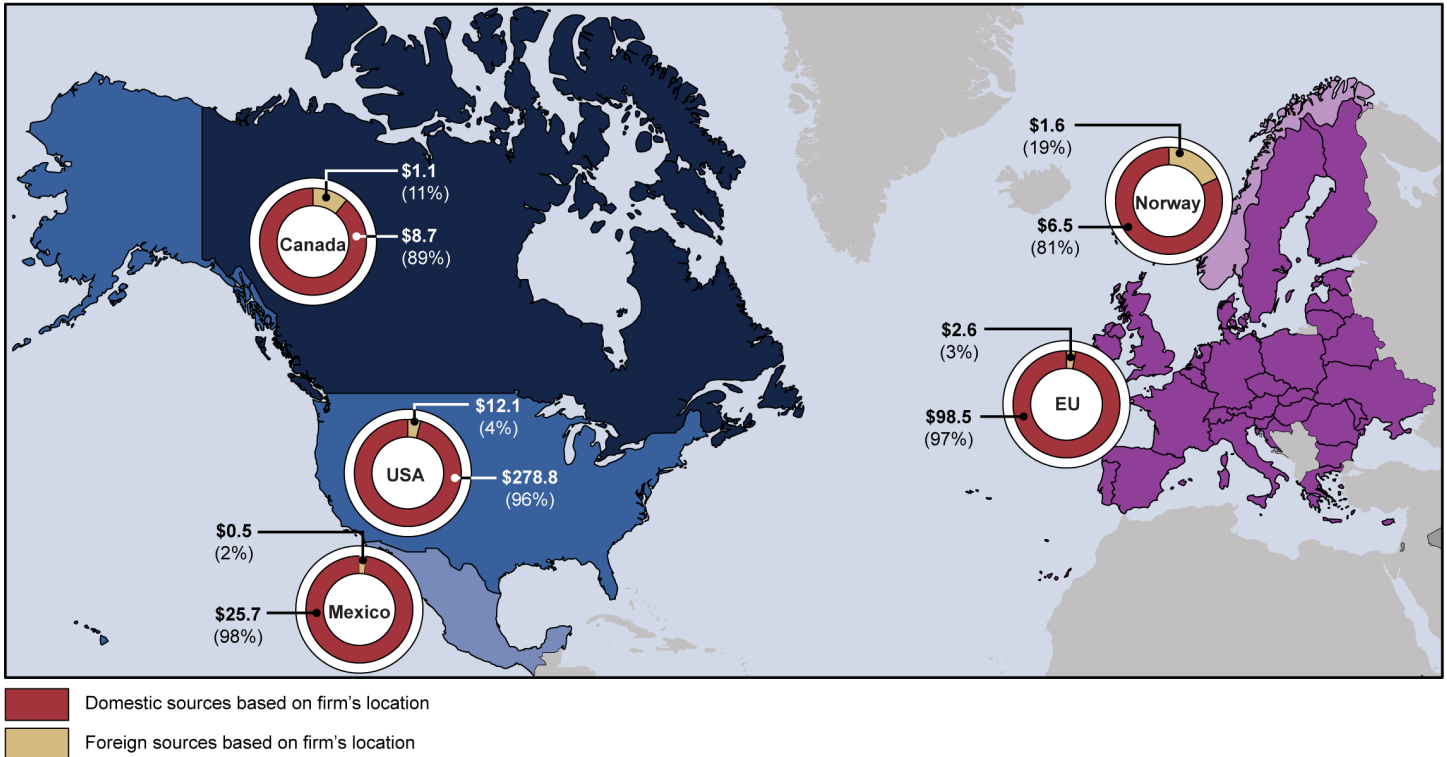
Foreign Source Procurement by Central Governments Estimated from Country Databases Varied in Value from 2 to 19 Percent of Overall Central Government Procurement

Our analysis of available data on firm location from government procurement databases shows that foreign sourcing in 2015 ranged in value from 2 to 19 percent of overall central government procurement (see fig. 4). The central governments of the EU, Mexico, and the United States awarded less than 5 percent of the aggregate value of their procurement contracts to foreign-located firms. The proportions for Canada and Norway were about 11 and 19 percent, respectively. Both Canada and Norway can be characterized as small, open economies bordering much larger, open trading partners, which may contribute to their relatively larger shares of foreign sourcing in central government procurement.⁵⁵ Canada's central government awarded about 10 percent of the value of all its contracts to firms located in the United States. Similarly, Norway's central government awarded about 19 percent of the value of all its contracts to firms located in the EU.

⁵⁵A small, open economy is an economy that cannot affect the international price of goods or the foreign interest rate.

Figure 4: Estimated Value and Share of Central Government Contracts Awarded to Domestic and Foreign-Located Firms by the United States and Four Other Main Parties to the GPA and NAFTA

Dollars in billions



Source: GAO analysis of 2015 U.S. and foreign government procurement data. | GAO-19-414

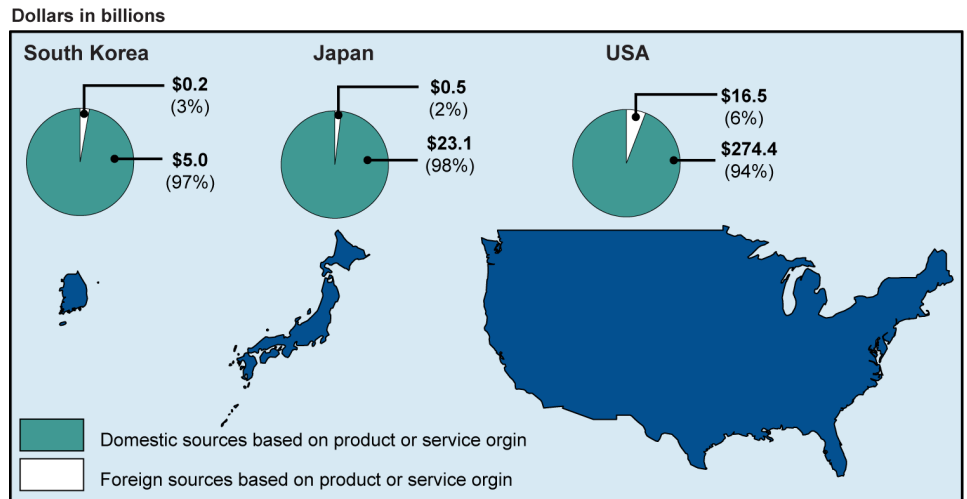
Notes: GAO's analysis for the data shown focused on the United States and four other main parties to selected international procurement agreements: the European Union (EU), Canada, and Norway under the World Trade Organization Agreement on Government Procurement (GPA); and Mexico and Canada under the North American Free Trade Agreement (NAFTA).

Award values were derived from data reported in sources as follows: for the United States, Federal Procurement Data System-Next Generation (FPDS-NG); for Canada, Contract History; for Mexico, COMPRANET; and for the European Union (EU) and Norway, Tenders Electronic Daily (TED).

For EU and Norway, estimates of above-threshold award values were derived using methods that accounted for missing contract award values. These estimates have a relative error of +/- 1 percent or less for the EU and +/- 5 percent or less for Norway. See app. IV for more details. Below-threshold procurement in TED is excluded, since it is reported on a voluntary basis and the majority of those contract award values are missing or implausibly small.

Our analysis of available data on country of product and service origin shows that Japan procured less from foreign sources (2 percent) than both the United States (6 percent) and South Korea (3 percent). See figure 5.

Figure 5: Estimated Value and Share of Central Government Contracts Awarded for Foreign Source Goods and Services by the United States and Two Other Main Parties to the GPA



Source: GAO analysis of 2015 U.S. and foreign government procurement data. | GAO-19-414

Note: Estimated award values were rounded to the nearest hundred million dollars based on data reported in specific data sources as follows: for the United States, Federal Procurement Data System-Next Generation (FPDS-NG); for South Korea, the South Korea ON-line E-Procurement System (KONEPS); and for Japan, Japan's 2015 submission on 2013 covered procurement to the World Trade Organization Agreement on Government Procurement (GPA). In KONEPS, the data on foreign procurement include goods contracts only; it is unclear whether (a) no contracts for services and construction works were foreign sourced or (b) no data on foreign sourcing of those types of contracts were collected and available.

We obtained similar results in terms of number of foreign-sourced contracts. Less than 5 percent of the number of central government contracts was sourced from abroad in the EU, Japan, South Korea, and Mexico. For the United States, Norway, and Canada, the numbers of foreign-sourced contracts based on firm location comprise higher percentages (9, 8, and 13 percent, respectively). Canada's central government awarded about 9 percent of the total number of contracts it awarded to firms located in the United States. Similarly, Norway's central government awarded about 7 percent of the total number of contracts it awarded to firms located in the EU.

Except for the United States, most of the central governments of the other six main parties to the GPA and NAFTA awarded few construction services contracts to foreign-located firms. One possible explanation is that, given the higher dollar value threshold of contracts in this sector, foreign-owned firms may have a greater incentive to establish a local presence through subsidiaries in the host countries. The data in the non-

U.S. databases do not provide enough information to explore that hypothesis. However, FPDS-NG data show that construction services contracts are the main contract type awarded to foreign-located firms by the USG, which awarded about 3,090 construction services contracts worth \$1.8 billion (or about 20 percent and 8 percent of all construction services contracts, respectively) to foreign-located firms. Less than 1 percent of these contracts' award value was for contracts performed in the United States and over 70 percent of these contracts' award value was for contracts covered by the GPA and NAFTA.

In addition, the USG awarded a roughly equal share (about 4 percent of all contracts in terms of value) of goods and services contracts to the other six parties to the GPA and NAFTA. Canada, on the other hand, awarded a relatively large percentage of the value of all goods contracts (30 percent) to firms located abroad.

Foreign Source Procurement Estimated by an Alternative Method Shows Import Percentages by All Levels of Government Range from 7 to 18 Percent of All Government Purchases

We also assessed the degree of foreign sourcing in terms of government import percentages to identify patterns in government procurement that may differ from those based on the location of the supplier and origin of goods and services. Using linked input-output tables and an alternative analytical approach, we were able to broadly estimate the domestic and foreign sources of inputs to the government sector for the United States and the six main parties to the GPA and NAFTA. This alternative approach to estimating foreign source government procurement is based on macroeconomic data on trade flows of goods and services between countries and the types of goods and services purchased by the public sector.⁵⁶ Unlike the approach above based on government procurement contract data, this approach allows us to calculate broad estimates of domestic and foreign sourcing in procurement by all levels of government—central, state, and local.

Table 3 shows our broad estimates based on a narrow definition of the government sector, which includes only “public administration”.⁵⁷ In the

⁵⁶See the Background section for a brief discussion of this approach and app. I for more detailed information.

⁵⁷Public administration is defined as activities that are intrinsically governmental in nature. The narrow definition is the most conservative definition of government—since the public administration sector can reasonably be assumed to be public in any country. For countries with a larger government sector, government can be defined more broadly by including additional industries, such as education and health care.

table, the columns are the purchasing countries or the EU. The rows indicate where the goods or services are being purchased from. As the table shows, for all the countries and the EU, foreign sourcing generally accounts for a small portion of all governmental purchases. For example:

- Out of the estimated \$1.2 trillion that the central, state, and local governments in the United States purchased, \$100 billion was imported from outside the United States—a total foreign source percentage of about 9 percent, including \$26 billion (2 percent) from the EU.
- Out of the \$460 billion that the EU governments at every level purchased, \$36 billion was imported from outside the EU—a total foreign source percentage of about 8 percent, including \$10 billion (2 percent) from the United States.
- Out of the \$178 billion that governments in Japan purchased, \$12 billion was imported from outside Japan—a total foreign source percentage of about 7 percent.

In general, the smaller economies in terms of government purchases—Canada, South Korea, Mexico, and Norway—imported a relatively larger percentage of such purchases than the United States, EU, and Japan. Specifically, Canada, South Korea, and Norway imported about 9 to 13 percent of their governments' purchases. Mexico imported a notably large share of about 18 percent. Of the estimated \$24 billion in purchases by Mexico's government sector, about 6 percent was from the United States and about 3 percent from the EU. This inverse relationship between the size of an economy and the relative percentage import share of government purchases has been noted by others that have used the input-output methodology.⁵⁸

⁵⁸See "How Open are Public Procurement Markets" by Patrick Messerlin in *The Internationalization of Government Procurement Regulation*, 2013.

Table 3: Estimated Domestic and Foreign Sourcing by All Levels of Government Based Only on the Public Administration Industry for the United States and the Other Six Main Parties to the GPA and NAFTA

Dollars in billions

Source	Purchasing governments													
	United States		European Union		Norway		Canada		Mexico		Japan		South Korea	
	\$	%	\$	%	\$	%	\$	%	\$	%	\$	%	\$	%
United States	1,056	91.12	10	2.23	0	0.91	7	5.56	2	6.39	2	1.32	0	1.31
European Union	26	2.22	424	92.33	1	7.81	4	2.94	1	2.81	2	0.91	1	1.38
Norway	0	0.04	1	0.16	13	88.44	0	0.04	0	0.04	0	0.03	0	0.05
Canada	15	1.26	1	0.2	0	0.13	110	87.32	0	0.64	0	0.08	0	0.06
Mexico	8	0.67	0	0.04	0	0.01	0	0.23	20	81.72	0	0.04	0	0.03
Japan	5	0.4	1	0.19	0	0.07	0	0.18	0	0.87	166	93.19	0	0.62
South Korea	4	0.33	1	0.16	0	0.12	0	0.1	0	1.1	1	0.52	34	91.06
Other	46	3.95	22	4.69	0	2.25	5	3.54	2	6.43	7	3.91	2	5.5
Total	1,159	100	460	100	15	100	126	100	24	100	178	100	37	100

Source: GAO Analysis of 2014 data from the World Input-Output Database. | GAO-19-414

Notes: GAO's analysis focused on the United States and the other six main parties to selected international procurement agreements: the European Union (EU), Japan, Canada, South Korea, and Norway under the World Trade Organization Agreement on Government Procurement (GPA); and Mexico and Canada under the North American Free Trade Agreement (NAFTA).

Shaded cells represent estimated domestic source government purchasing.

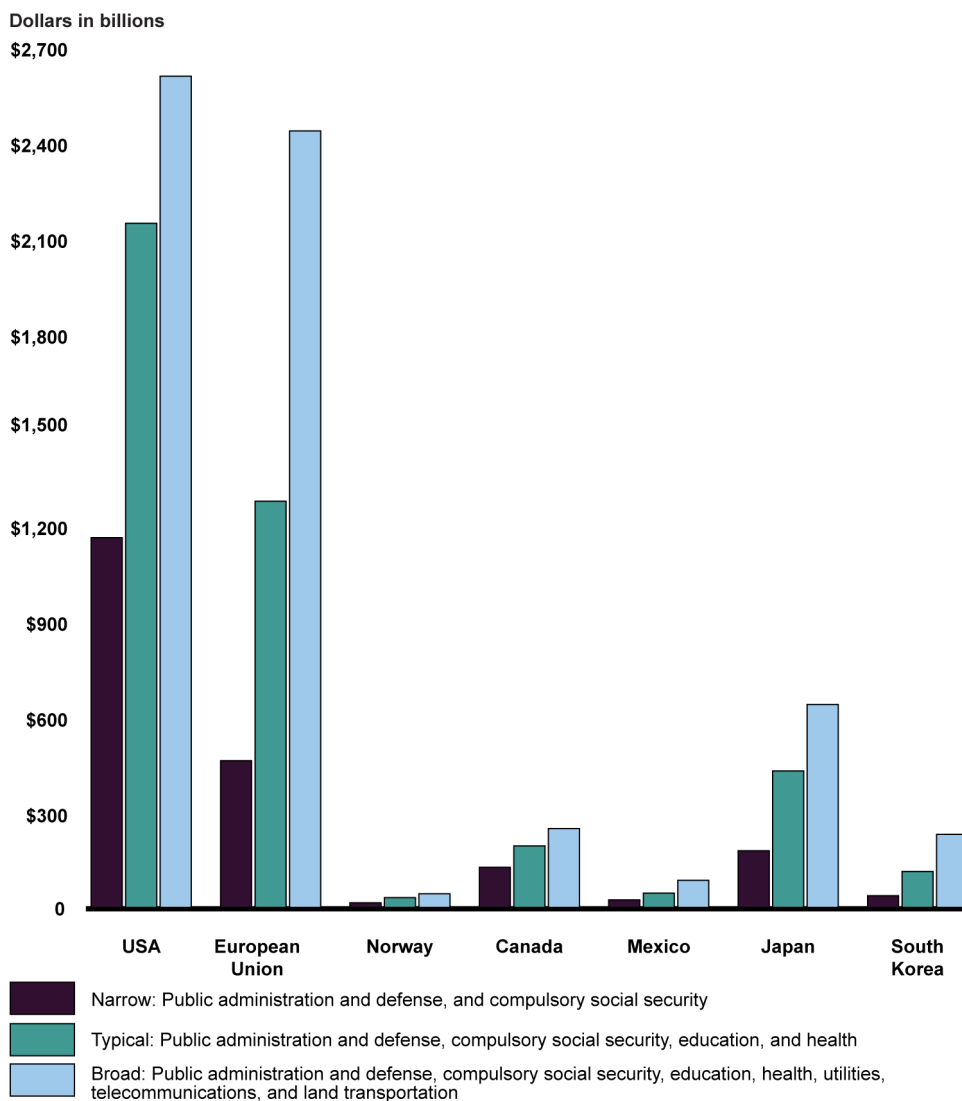
Some columns do not add to totals because of rounding.

Basing estimates of foreign source government procurement on the narrow definition of the government sector may not be as appropriate in countries where the government plays a large role in various additional sectors. Figure 6 shows the size of the government sector under the narrow definition as well as two broader definitions which add additional industries. The "typical definition" as defined in the EU study also includes the education and health care sectors. The "broad definition" also includes a portion of the energy and the telecommunications sectors.⁵⁹ The relative sizes of the parties change under the different definitions, as shown in the figure. For example, while the EU government sector is less than half the size of the U.S. government sector under the narrow definition (\$460 billion for the EU compared with \$1,159 billion for the

⁵⁹See app. I for more detailed information.

United States), under the broad definition they are comparable in size (\$2.4 trillion for the EU and \$2.6 trillion for the United States).

Figure 6: Total Estimated Government Procurement of the United States and the Other Six Main Parties to the GPA and NAFTA under Different Definitions of Government

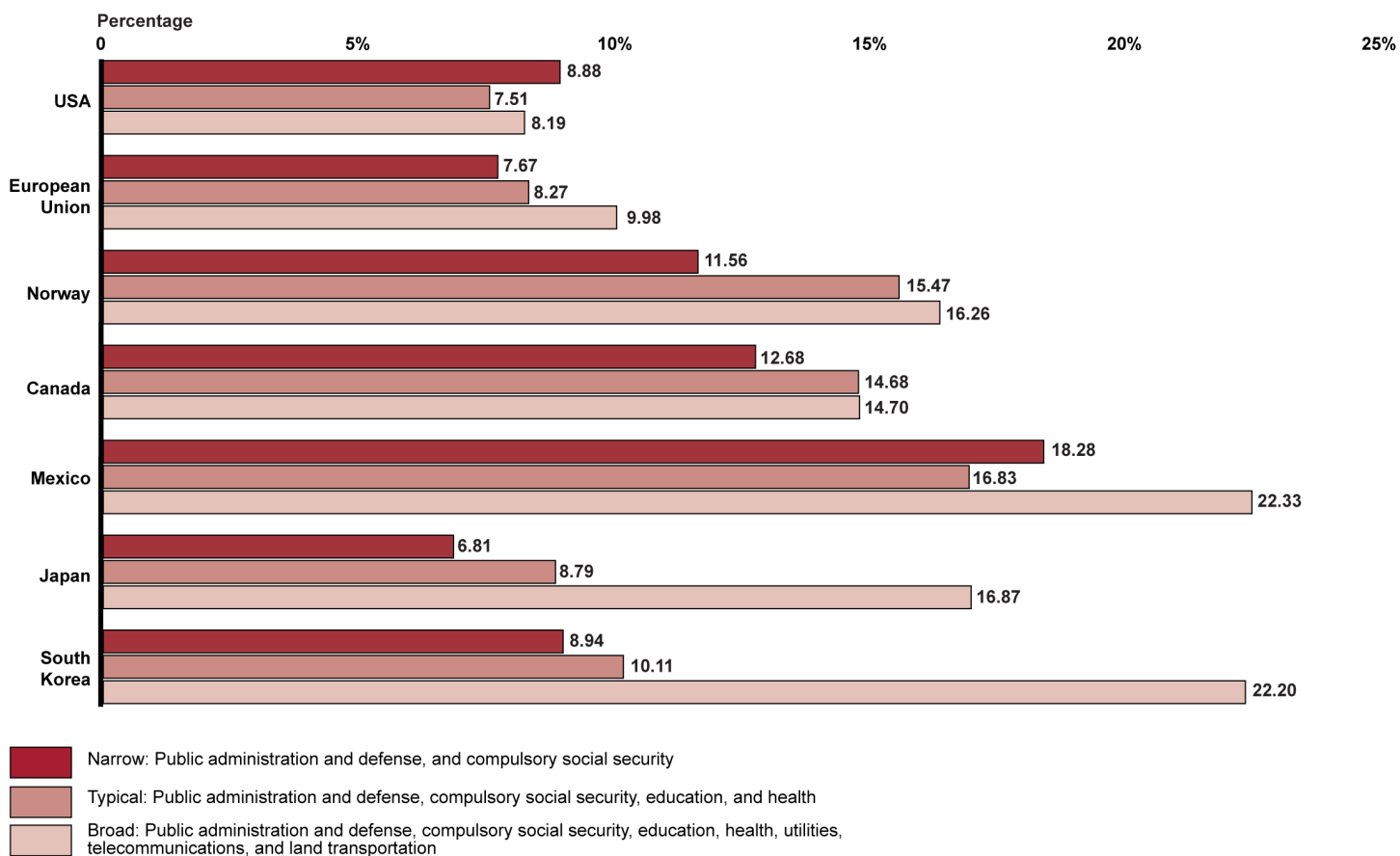


Source: GAO analysis of 2014 data from the World Input-Output Database. | GAO-19-414

Notes: GAO's analysis focused on the United States and the other six main parties to selected international procurement agreements: the European Union (EU), Japan, Canada, South Korea, and Norway under the World Trade Organization Agreement on Government Procurement (GPA); and Mexico and Canada under the North American Free Trade Agreement (NAFTA).

Figure 7 shows the estimated percentages of each country's and the EU's government sector purchases that are imported under the narrow, typical, and broad definitions as described above. Under all three definitions, the United States and EU have some of the smallest percentages of imported government purchases, between 8 and 10 percent. Mexico has one of the largest percentages, between 17 and 22 percent. Canada and Norway are in the middle, from about 12 to 16 percent. For South Korea and Japan, the estimated percentages of government sector purchases that are imported increased under the broad definition—from 7 percent to 17 percent for Japan, and from 9 percent to 22 percent for South Korea.

Figure 7: Percentages of Government Sector Purchases That Are Imported, under Different Definitions of Government, for the United States and the Other Six Main Parties to the GPA and NAFTA



Source: GAO analysis of 2014 data from the World Input-Output Database. | GAO-19-414

Notes: GAO's analysis focused on the United States and the other six main parties to selected international procurement agreements: the European Union (EU), Japan, Canada, South Korea, and

Norway under the World Trade Organization Agreement on Government Procurement (GPA); and Mexico and Canada under the North American Free Trade Agreement (NAFTA).

Available Contract Data Indicate Foreign Sourcing Is Not Always Greater for Contracts Covered by the GPA and NAFTA Than for Other Contracts

Our analysis of 2015 data from central government procurement databases finds evidence that foreign sourcing was sometimes, but not always, greater for contracts covered by the GPA and NAFTA than for contracts not covered by those agreements.⁶⁰ Given the goals promoted by the GPA and NAFTA, one might expect that procurement covered by such agreements would likely result in a higher number or larger aggregate value of contracts awarded to foreign-located firms or for the purchase of foreign goods and services. For the United States and two of the other six main parties to the GPA and NAFTA—Mexico and South Korea—the results bore out that expectation: for all three, more central government foreign sourcing in terms of contract value occurred when procurement was covered by the agreements. However, our analysis also shows that for two other parties, Canada and Norway, the opposite was true; for the remaining two parties, the EU and Japan, we found little difference or could not calculate an estimate.⁶¹ Our previous work showed that only about a third of the estimated average annual government procurement at all levels of government from 2008 through 2012 was covered by the GPA and NAFTA (\$1.5 out of \$4.4 trillion).⁶²

The available data from the government procurement databases that we analyzed show that the USG and the central governments of Mexico and South Korea awarded at least twice as much to foreign sources for contracts covered by international agreements—ranging from 2 to 6 percent of the value of covered contracts compared with less than 1 to 2

⁶⁰The availability of a field and reliable data on coverage under selected international procurement varies by database. For databases that did not have a field or reliable data on agreement coverage we developed an indicator for it. We did not make any legal determination with respect to individual contract coverage under the selected international procurement agreements within our scope.

⁶¹Our analysis describing the relationship between trade agreement coverage and procurement award value did not account for additional factors and was limited due to the data available. A more robust test of this relationship would use a larger cross-section of data over time, and control for factors such as types of goods and services procured, size of the economy, type of tendering procedure, and other specific details of each agreement, among others.

⁶²See [GAO-17-168](#). We also reported that subcentral governments offered more covered procurement than central governments, but we found that the United States reported total rather than covered state-level procurement.

percent for non-covered contracts (see table 4). In particular, for contracts awarded by the USG, foreign-located firms received more than twice the value of covered compared with non-covered contracts—about \$8.8 billion compared to \$3.4 billion, respectively.⁶³ Results for the USG are similar when looking at the amount of foreign source procurement based on product and service origin. Conversely, U.S.-located firms were awarded a higher aggregate value of non-covered contracts from the USG, compared with covered contracts. (See table 4.)

⁶³The same pattern holds for foreign firms located in the other six main parties to GPA and NAFTA. The USG awarded those foreign-located firms 3 percent (\$3.9 billion) of covered versus 1 percent (\$1.3 billion) of non-covered contracts.

Table 4: Foreign Sourcing in Central Government Contracts Awarded by the United States and the Other Six Main Parties to the GPA and NAFTA, Estimated by Value and Whether Covered by One of Those Two Agreements

Dollars in millions (estimated)

			Not covered by international trade agreements ^a	Foreign not covered	Covered by international trade agreements ^a	Foreign covered	Not classified	Foreign not classified	Total
Based on firm location	United States	Value	155,505	3,351	135,444	8,773	2		290,950
		Percent		1		3			
	EU	Value	12,085	70	74,557	875	14,516	1,689	101,158
		Percent		0		1		2	
	Norway	Value	1,744	1,293	6,262	264	1		8,007
		Percent		16		3			
	Canada	Value	7,545	995	2,238	124	0		9,784
		Percent		10		1			
	Mexico	Value	15,992	49	10,300	494	69		26,292
		Percent		0		2			
Based on product or service origin	United States	Value	155,505	4,468	135,444	12,077			290,950
		Percent		2		4			
	Japan	Value	N/A	N/A	23,582	477	N/A		N/A
		Percent	N/A		N/A	N/A	N/A		
	South Korea	Value	382	29	1,321	123			1,703
		Percent		2		7			

Legend: N/A = not available

Source: GAO analysis of 2015 U.S. and foreign government procurement data. | GAO-19-414

Notes: GAO's analysis focused on the United States and the other six main parties to selected international procurement agreements: the European Union (EU), Japan, Canada, South Korea, and Norway under the World Trade Organization Agreement on Government Procurement (GPA); and Mexico and Canada under the North American Free Trade Agreement (NAFTA).

Procurement coverage and award values were derived from data reported in sources as follows: for the United States, Federal Procurement Data System-Next Generation (FPDS-NG); for Canada, Contract History; for Mexico, COMPRANET; for the EU and Norway, Tenders Electronic Daily (TED); for South Korea, the South Korea ON-line E-Procurement System (KONEPS); and for Japan, Japan's 2015 submission on 2013 covered procurement to the GPA. In KONEPS, the data on foreign procurement, and thus for covered and non-covered procurement, include goods contracts only. It is unclear whether (a) no contracts for services and construction works were foreign sourced or (b) no data on foreign sourcing of those types of contracts were collected and available.

For EU and Norway, estimates of award values were derived using methods that accounted for missing contract award values. These estimates have a relative error of +/- 2 percent or less for the EU and +/- 18 percent or less for Norway. See app. IV for more details. Below-threshold procurement in TED is excluded, since it is reported on a voluntary basis and the majority of those contract award values are missing or implausibly small.

Percent refers to percent of total.

^aWe did not analyze individual contracts or make any legal determination as to coverage.

For Canada and Norway, more central government foreign sourcing in terms of contract value occurred when procurement was not covered by trade agreements than when it was. For covered contracts, Canada's central government awarded 1 percent of the value of all contracts to foreign-located firms compared with 10 percent of the value for non-covered contracts.⁶⁴ Similarly, Norway awarded foreign-located firms more than 5 times more in non-covered than covered contracts as measured by aggregate contract value.

For the EU and Japan, data on the value of foreign sourced contracts and their agreement coverage are either not available or incomplete. The available EU data have a significant number of foreign unclassified contracts and do not include contracts below the GPA threshold values, which limits the reliability of any comparison for covered versus non-covered contracts. In addition, Japan's 2015 GPA submission of 2013 procurement data did not report on the amount of foreign source procurement broken out by covered and non-covered contracts, because, according to Japanese officials, this is not a GPA statistical reporting requirement.⁶⁵ Therefore, we could not calculate a similar comparison of the value of covered versus non-covered procurement for Japan.

Finally, with regard to the number of contracts awarded, our analysis of available data from country databases does not show a consistent relationship with international procurement agreement covered awards to foreign-located firms or for foreign-sourced goods or services. In South Korea and the United States, the number of contracts not covered by trade agreements and awarded for foreign sourced products was greater compared with covered contracts. Conversely, in Canada, EU, Mexico, and Norway, the number and share of contracts covered by trade agreements and awarded to foreign-located firms was greater compared with non-covered contracts. In percentage terms, foreign-located firms

⁶⁴Almost half of the value of Canada's non-covered procurement in 2015 is due to a single construction contract, which, according to Canadian officials, is excluded from NAFTA. Canadian officials also noted that this does not reflect Canada's typical non-covered procurement. If this contract were excluded, from the reported data, the share of foreign sourcing for non-covered contracts would be larger.

⁶⁵According to the 1994 GPA, countries are required to report the value (but not the number) of below threshold procurement by covered entities. This aggregate value does not include below threshold procurement by non-covered entities and is not disaggregated by country of origin of procured goods, services and construction services.

received the same share (9 percent) of covered and non-covered contracts awarded by the USG.

Agency Comments

We provided a draft of this product to USTR, Commerce, OMB, and GSA for comment. Commerce provided technical comments on this report, which we incorporated, as appropriate. USTR, OMB, and GSA did not comment on our draft report.

As agreed with your offices, unless you publicly announce the contents of this report earlier, we plan no further distribution until 30 days from the report date. At that time, we will send copies to the U.S. Trade Representative, the Secretary of Commerce, the Director of the Office of Management and Budget, the Administrator of the General Services Administration, and other interested parties. In addition, the report will be available at no charge on the GAO website at <http://www.gao.gov>.

If you or your staff have any questions about this report, please contact me at (202) 512-8612 or gianopoulosk@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made key contributions to this report are listed in appendix V.



Kimberly Gianopoulos
Director, International Affairs and Trade

Appendix I: Objectives, Scope and Methodology

This report examines the extent of foreign sourcing in government procurement by the United States and the other six main parties to selected international procurement agreements. Under the World Trade Organization (WTO) Agreement on Government Procurement (GPA), the other main parties, besides the United States, are the European Union (EU), Japan, Canada, South Korea, and Norway. Under the North American Free Trade Agreement (NAFTA), the other main parties are Mexico and Canada. The report (1) provides alternative broad estimates of foreign sourcing by the U.S. government (USG) and the central governments of the other six main parties to the GPA and NAFTA, and (2) assesses foreign sourcing as a share of estimated central government procurement and of estimated procurement by all levels of government, and the extent to which central government contracts that are covered under the GPA and NAFTA are foreign-sourced.

We analyzed data from two types of sources: (1) government procurement databases in Canada, the EU, South Korea, Mexico, Norway, and the United States, for 2015,¹ and (2) 2014 trade data merged with data on the types of goods and services purchased by the public sector. Since Japan does not have a national procurement database, data for Japan were based on its WTO GPA submission for 2013, which is the last submission that contains information on its foreign sourcing in government procurement.² We also interviewed cognizant government officials in Washington, D.C.; Ottawa, Canada; Mexico City, Mexico; Seoul, South Korea; and Tokyo, Japan, and reviewed available research literature to identify potential methods, sources, and data limitations. We also interviewed government officials at the EU mission in Washington, D.C. and exchanged information with officials knowledgeable of the EU government procurement database.

¹For the United States, we used a fiscal year; for the rest of the countries, we used a calendar year.

²Japan's 2015 WTO GPA submission of data on 2013 procurement included information on the "nationality of the winning tenderer" for covered procurement. While the 1994 GPA required the reporting of data on the country of origin to the extent such information was available, the revised GPA that went into effect in 2014 does not require such data. For below threshold procurement, Japan provided data on the contract value, but not the number of contracts, their type, or the "nationality of the winning tenderer". As a result, we were unable to disaggregate the value and number of below threshold contracts by source or contract type, and, therefore, were unable to include those contracts in our estimates. While Japan submitted its GPA notification on 2016 procurement, the submission did not contain data on the "nationality of the winning tenderer".

Analysis of Data on Contracts Awarded from Government Procurement Databases

We collected and analyzed data from the following five databases:

- for the United States, the Federal Procurement Data System-Next Generation (FPDS-NG);³
- for the EU and Norway, Tenders Electronic Daily (TED);
- for Canada, Contract History;
- for Mexico, the Government of Mexico e-Procurement System CompraNet; and
- for South Korea, the South Korea ON-line E-Procurement System (KONEPS).

Several of these government procurement databases included data on procurement at all levels of government—national, state, and local⁴—while others did not. Therefore, we limited our analysis to data on central government procurement. For a detailed discussion of the characteristics of each database, see appendix II.

To identify data fields that could be reasonably compared across databases, we followed a number of methodological steps:

First, we looked for fields that capture the total award value of the contract at the time of award (2015); the type of contract in terms of goods, services, and construction services; the contract award date; the contract duration; and the type of tendering procedure. We took into account the following considerations:

- *Units of analysis.* We established appropriate units of analysis across databases. Several databases contained a number of fields that were potentially relevant to our work. Specifically, in FPDS-NG the unit of analysis is the contract award. The database contains data at the contract action level (contracts, task orders, and their modifications). We used contract awards for the number of reported contracts, but for

³We did not use the Trade Agreements Report in FPDS-NG, since we report on foreign sourcing by the U.S. federal government from all countries, i.e., countries that are parties to the GPA and NAFTA and countries that are not.

⁴As we previously reported, the majority of government procurement takes place at the subcentral (state), utilities and other government entities (local) levels. See GAO, *Government Procurement: United States Reported Opening More Opportunities to Foreign Firms Than Other Countries, but Better Data Are Needed*, [GAO-17-168](#) (Washington, D.C.: Feb. 9, 2017).

certain data on indefinite delivery vehicles (IDVs) such as government-wide acquisition contracts, indefinite delivery contracts, and blanket purchase agreements, we relied on data for task orders awarded in fiscal years 2015 through July 2018 (see discussion of contract valuation and multiple-year, multiple-award contracts below) because they contained information on place of performance, country of product and service origin, and place of manufacture, which were the relevant fields for foreign sourcing.⁵ The TED database contains information on contract notices, contract award notices, and contract awards above certain thresholds set by relevant EU legislation. While the EU and Norway use contract award notices to estimate the value of covered procurement in their GPA statistical notifications, we used contract awards because they allowed us to estimate actual foreign sourcing.⁶ The databases for Canada, Mexico, and South Korea contain a contract identifier, which is the sole and unique unit of analysis that is available.

- *Contract valuation.* We established comparable fields across databases that represented the estimated maximum total value of a procurement awarded in 2015 over its entire duration. For FPDS-NG, we developed a methodology that is consistent with the methodology laid out in the revised GPA⁷ and avoids the inconsistencies of the revised U.S. methodology, which we previously reported.⁸ In particular, in October 2015, the Office of the U.S. Trade Representative (USTR) notified the WTO that the United States had revised its methodology for preparing GPA statistical reports on U.S. federal procurement. To more precisely reflect the value of the federal procurement market at the time of each report, the revised methodology presented the total amounts obligated under GPA covered contracts over a 6-year period—that is, the year the contract

⁵We excluded contracts under the micro purchase threshold (generally \$3,000 in fiscal year 2015).

⁶Multiple contract awards can be made against a given contract award notice, which is listed repeatedly for each contract award in the database. Actual values may be higher or lower than what was projected in the procurement notice.

⁷According to the revised GPA, in estimating the value of a procurement for the purpose of ascertaining whether it is a covered procurement, among other things, a procuring entity shall include the estimated maximum total value of the procurement over its entire duration, whether awarded to one or more suppliers, taking into account all forms of remuneration, including where the procurement provides for the possibility of options, the total value of such options. See the revised GPA, Art. II.6 for valuation.

⁸See [GAO-17-168](#).

was awarded plus 5 years after the award. As we previously reported, the revised methodology has both advantages and disadvantages.⁹ It improves the accuracy of reporting but introduces a 6-year delay, whereas the revised GPA requires reporting within 2 years of the end of the reporting period.¹⁰ In addition, the revised valuation methodology is not consistent with the one used by other countries and creates an internal inconsistency:

- In measuring actual obligations for procurement contracts rather than the value at the time of award, the revised U.S. methodology is inconsistent with the methodology used by other large GPA members, such as the EU, Norway, Canada, and Mexico, which report contract values at the time of award rather than actual obligations or expenditures.
- The United States continues to report the number of covered contracts to the WTO based on their award value, which leads to an inconsistency between the reported numbers and values of reported U.S. government procurement contracts. The contracts comprising the reported value of covered procurement are determined at a later time under the revised methodology and can result in a different set of contracts being used to determine the reported value.

Our current methodology uses base and all options value for all contracts awarded in fiscal year 2015 unless the contract was an IDV.¹¹ For IDVs we used the base and all options value of task orders awarded in fiscal years 2015 through July 2018 under those IDVs to avoid overestimating the total value.¹² We used the aggregate base and all options value for task orders under those contracts because

⁹See [GAO-17-168](#).

¹⁰In response to our recommendation in [GAO-17-168](#), USTR currently provides partially reported statistics of covered procurement within 2 years of the reporting period.

¹¹The total value of federal procurement we report of \$290.9 billion is less than the total amount obligated in fiscal year 2015 of \$438 billion, calculated based on (1) new contracts awarded in fiscal year 2015, (2) task orders, and (3) modifications against contracts awarded in any prior year, for which obligations occurred in fiscal year 2015. However, the value we report is greater than the amount obligated in fiscal year 2015 of \$189 billion when calculated based on (1) new contracts and (2) task orders, but excludes modifications against contracts awarded in previous years.

¹²Our estimate underestimates the full value of federal procurement awarded in 2015 since it does not include the value of task orders under the base fiscal year 2015 award, which will be awarded in subsequent years after July, 2018.

the alternative—using the base and all options value on the base IDVs—is inflated due to problematic data entries for multiple awards.¹³ As a result, our methodology produces an estimate that is consistent with methods used by other parties, internally consistent, and in accordance with the methodology for valuation in the revised GPA.¹⁴ As we noted earlier, the result is close to the obligations value currently reported in the Trade Agreements Report used by USTR to report to the WTO.¹⁵

In TED, we used the contract award value field, because it captures the appropriate measure and according to EU documentation was corrected for errors in the data.¹⁶ For the EU and Norway, we found that for above-threshold procurement approximately 15 percent and 12 percent of the contract award values were missing, respectively. We took additional steps to address these missing values to generate estimates of the total contract award values. Specifically, we implemented a Predictive Mean Matching (PMM) multiple imputation methodology for the EU and used post-stratification estimation techniques for Norway. (See app. IV for more details on both methods.) However, we excluded the value of below-threshold procurement for the EU and Norway because it is reported on voluntary basis and suffers from missing and implausible values. In particular, for the EU, about 42 percent of the contract award values below threshold are missing and another 10 percent are below €1,000. For Norway, 80 percent of the contract award values below threshold are missing. Nevertheless, as a robustness check of the results from our analysis, we applied our imputation methodology discussed in appendix IV to the entire TED dataset and found that once those values are estimated, the amount of procurement awarded

¹³See [GAO-17-168](#).

¹⁴See the revised GPA, Art. II 6.

¹⁵In prior reporting, [GAO-17-168](#), we used obligations values and estimated total procurement using cumulative obligations for fiscal year 2009 and fiscal year 2010 awards as of the end of 5 years. While cumulative obligations are the most accurate measure of federal procurement, these data are not available and do not measure the contract value at the time of contract award. While the contract value at the time of award does not imply that the full value will be obligated, we sought to achieve comparability across countries.

¹⁶In particular, we selected AWARD_VALUE_EURO_FIN_1 because according to TED documentation it includes a number of manual corrections to observations deemed by EU officials to correct errors in the data. These include manual review of some blank values and correction through review of related variables and documentation.

by the EU to U.S.- located firms increases by less than 10 percent. However, we do not consider the estimate sufficiently reliable to be included in our aggregate analysis.¹⁷

In Contract History, we used the contract value field because, according to Canadian officials, it includes the original total value of the contract at the time of the award. In addition, those officials noted that this field was used by Canada in its reporting of covered procurement for its WTO statistical notifications. In Compranet, we used the contract amount field since, according to Mexican officials, this field reflects the total value of the contract award. In KONEPS, we used the total awarded value field, since it was the only field available for our analysis and contained the value awarded for a given year (see adjustments we made for multiple-year contracts below).

- *Currency denomination.* We converted contract values reported in different currencies in the databases into dollars using the period average exchange rate for 2015 as provided by the International Monetary Fund's International Financial Statistics.
- *Contract modifications or amendments.* Since we defined the value of the award at the time of award, we selected contracts awarded in 2015 and excluded any subsequent modifications or amendments in all the databases.
- *Contract types.* We used the product and service classifications that each database used to group contracts by type. Different databases used different classification schemes, and we did not independently reclassify any contracts to a uniform classification system, since such a system does not exist and a concordance among all schemes is not possible. In FPDS-NG, we used the U.S. product and service codes to classify federal government contracts in product groups and categorized reported procurement as either goods, services, or construction services. In TED, we used the type of contract field, which categorized reported procurement as supplies, services, and works based on the EU common procurement vocabulary in TED. In Contract History, we used the grouping of goods, services, and construction, which Canadian officials provided to us based on the global shipment identification number codes and description in the

¹⁷For Norway, 25 of about 1,350 contracts were below threshold, and 20 out of the 25 had missing contract award values. Because we did not use an imputation model for Norway, we did not estimate the amount of Norway's below-threshold procurement.

database. In CompraNet, we used the type of contract field, which indicates if the contract is for goods, services, or public works. In KONEPS, the data on foreign procurement included goods only, and no classification scheme was available for foreign procurement contracts.

- *Multiple-year, multiple-award contracts.* Some countries' procurement practices include contracts awarded for multiple years, and we accounted for the valuation of those contracts by estimating their total cumulative value over multiple years at the time of award in 2015. In FPDS-NG, we accounted for the value of multiple-award contracts by using the base and all options value of task orders awarded in fiscal years 2015 through 2018 for IDVs initially awarded in fiscal year 2015.¹⁸ In TED, available documents noted that member states can use alternative multiple-year tools such as framework agreements and dynamic purchasing systems for a certain time period or for repeat purchases, respectively.¹⁹ While the indicator field for these data in TED was not sufficiently populated for further analysis of those types of contracts, the contract valuation field we used had already accounted for the total value of the contract, and thus no further adjustment was warranted. Officials in Canada provided data on multiple-year contracts, including call-ups and standing offers. However, since the contract value field we used accounted for the total value of the contract, no further adjustment was needed. For Mexico, CompraNet contains information on framework agreements and multiple-year contracts, but since the contract value field indicated the total value of the contract award, no adjustment was needed. South Korea also uses multiple-year contracts, and we made several adjustments to estimate South Korea's total value of 2015 awards. We identified multiple-year contracts in KONEPS in 2015; based on solicitation numbers, we then removed the value of contracts originally awarded in prior years, while adding the value of multiple year contracts with solicitations in 2015 and awards in 2016 and 2017.
- *Type of tendering procedure.* In all databases we included in our analysis contracts under open and limited tendering procedures.

¹⁸See prior discussion in this appendix on the units of analysis and contract valuation for data in FPDS-NG.

¹⁹Carlo Maria Cantore and Sübidey Togan, "Public Procurement in the EU," in *The Internationalization of Government Procurement Regulation*, edited by Aris Georgopoulos, Bernard Hoekman, and Petros C. Mavroidis (Oxford University Press, 2017).

Second, we identified data fields among the five databases that could potentially be used as proxy measures of foreign sourcing in government procurement:

- contractor data related to firm location
- contractor data related to firm ownership
- location of contract performance
- data on country of product and service origin

However, we did not identify a data field common to all five databases that could be used as a proxy measure of foreign sourcing. FPDS-NG contained data on all four measures listed above.²⁰ TED, CompraNet, and Contract History contained contractor data related to firm location.²¹ KONEPS and Japan's WTO submission on its 2013 procurement contained data on country of product and service origin.²² Therefore, two data fields—firm location and country of product and service origin—were available in two groups of countries as reasonable proxy measures of foreign source procurement.

Finally, we analyzed the contract data from the government procurement databases by GPA coverage. Some databases contain a field for GPA coverage, the data for which we deemed to be reliable for our purposes; for the databases that did not, we developed a proxy measure for GPA coverage. FPDS-NG contains a field on trade agreement coverage, but we found it to be unreliable as reported in previous work;²³ therefore, we

²⁰The United States had six fields, which could be used as alternative proxy measures of foreign source procurement in FPDS-NG data.

²¹In order to address the approximately 9 percent of observations with missing winner country codes (per TED database field name), we made use of winner address information including street address, city, and ZIP code that were present in nearly all observations with missing country codes. We matched this address information to a geographic information database using both exact and approximate matching (Levenshtein distance) after taking steps to clean and standardize the location information in both databases using regular expressions. Through this process, we were able to identify the appropriate country for nearly all of these observations.

²²In KONEPS, the data on foreign procurement include goods contracts only; it is unclear whether (a) no contracts for services and construction works were foreign sourced or (b) no data on foreign sourcing of those types of contracts were collected and available.

²³[GAO-17-168](#). As noted previously, we did not use the Trade Agreements Report in FPDS-NG, since we report on foreign sourcing by the U.S. federal government from all countries, i.e., countries that are parties to selected international procurement agreements and countries that are not.

constructed a method to identify GPA covered procurement using an approach that USTR confirmed is consistent with the steps applied by the USG in developing its GPA statistical notifications. TED contains an identifier for GPA covered procurement, and we used this field to estimate GPA covered procurement for Norway and the EU after taking steps to address missing values for this identifier using other information in the dataset.²⁴ Contract History contains a field that lists all internal and international agreements applicable to a contract in Canada. Therefore, covered procurement includes all contracts covered under the GPA, NAFTA, and other Canadian international procurement agreements. For Mexico, CompraNet contains a data field on type of procedure, which indicates the eligible firms that can bid on a contract. The data in this field indicate that the contract is (1) open to national firms only; or (2) international procurement under trade agreements, that is, open to both national (Mexican) firms and foreign firms from FTA partner countries; or (3) international procurement open to national firms, foreign firms from FTA partners, and all other foreign bidders.²⁵ We treated international procurement in CompraNet as a proxy for GPA covered procurement. We grouped all contracts awarded in 2015 into two categories: non-covered procurement, which includes contracts open to national firms only, and covered procurement, which includes contracts open to foreign bidders (i.e. all contracts in categories 2 and 3 described above). KONEPS does not have a data field that specifically identifies covered procurement. Therefore, we defined a proxy for covered procurement as procurement above the revised GPA thresholds by covered entities. However, we were unable to make an adjustment for goods and services excluded from the agreement, since KONEPS does not classify foreign procurement by product service codes.

To analyze the extent to which central government contracts that are covered under the GPA and NAFTA are foreign-sourced, we compared the proportion of foreign-sourced award values for contracts covered under the GPA and NAFTA to the same proportion of foreign-sourced contracts, which are not covered by those agreements. Our analysis

²⁴We attempted to determine the GPA status for contract awards when it was not present by using information about the value of the contract award notice, the type of contract, and the GPA-coverage status of contract awards within the same contract award notice. Through this process, we were able to reduce the percentage of EU contract awards missing GPA-coverage information from about 9 percent to about 5 percent.

²⁵According to Mexican officials, offers from non-FTA countries face a domestic preference price factor when evaluated.

describing the relationships between trade agreement coverage and procurement award values did not account for additional factors and was limited due to the data available. As we previously reported, the countries within our scope represent over 90 percent of the GPA countries' total government procurement.²⁶ Moreover, we previously performed consistency checks across time periods for these countries and determined that covered procurement out of total central government procurement appeared relatively stable over time. However, a more robust test of the relationship between foreign sourcing and selected international agreement coverage would use a larger cross-section of data over time and control for factors such as types of goods and services procured, size of the economy, type of tendering procedure, and other specific details of each agreement, among others.

To determine whether the procurement contract data from the five databases were reliable for our purposes, we identified in relevant countries the appropriate data sources used to prepare the countries' and the EU's submissions of statistical notifications to WTO and other government procurement reports. To ensure consistency between our methods for estimating foreign sourcing with the methods used by the countries and the EU in their estimates of covered procurement for their GPA statistical notifications, we discussed with government officials in Canada, Japan, Mexico, and South Korea their process and data used to create their statistical notifications and other WTO reports, and we took steps to replicate existing report totals of EU covered procurement. We performed a sensitivity check for the U.S. data in FPDS-NG, where more than one relevant data field was available, to determine whether the definitional differences in the data fields were likely to materially affect our results about foreign sourcing. The results were similar across all six fields that could be used as alternative proxy measures of foreign source procurement in FPDS-NG data (see app. III, tables 11 and 12).

In addition, we conducted electronic tests of all five procurement databases to identify whether the data were complete and internally consistent. We determined that the country procurement databases were sufficiently complete and internally consistent after taking the additional steps for the EU and Norway as described earlier, related to missing contract award values (see app. IV). We also shared our analyses of the data with cognizant officials from the corresponding countries who were

²⁶[GAO-17-168](#).

willing to verify our methodology and replicate our analysis. Procurement and trade officials and researchers in Canada, Mexico, South Korea and Japan answered our questions relevant to data quality including data collection, cross checks of data entries, access controls, internal reviews, primary users, completeness and updates to the data, missing values, reporting mistakes, electronic safeguards and procedures for follow-up if errors are found. In Canada and Mexico officials replicated and confirmed our methodology and results. Results for South Korea and Japan were consistent with alternative available official publications.

The various limitations in the procurement contract data that we identified and addressed, to the extent possible, affected our ability to obtain precise estimates of foreign sourcing in government procurement, but they were not an impediment to using the data for broad comparisons of orders of magnitude.²⁷ Such comparisons include the amount of foreign sourcing, measured using firm location and country of product and service origin, by the USG and central governments of the other six main parties to the GPA and NAFTA. The data also allowed broad comparisons of bilateral procurement flows among the parties, as well as comparisons by type of contract and agreement coverage, as available, for the seven parties to the GPA and NAFTA within our scope.

Analysis of Trade Data Linked to Data on the Goods and Services Purchased by the Public Sector

To obtain information on the aggregate levels and percentages of procurement by all levels of government that are imported, we relied on input-output tables from the World Input Output Database (WIOD) for 2014.²⁸ The input-output tables have an industry by industry format, with each country's industries listed separately. The data in each table are derived from publically available data from both national statistics agencies and international organizations such as the United Nations and the Organisation for Economic Co-operation and Development.²⁹ We relied on the WIOD to ensure that the combined data from different

²⁷In particular, companies owned by a firm located abroad and operated abroad were always treated as foreign because we could not identify individual investors or investor groups who owned the company stock.

²⁸The WIOD is a project funded by the European Commission, Research Directorate General, as part of the 7th Framework Programme, Theme 8: Socio-Economic Sciences and Humanities.

²⁹See Marcel P. Timmer et al., "An Illustrated User Guide to the World Input-Output Database: The Case of Global Automotive Production," *Review of International Economics*, vol. 23, no. 3 (2015).

countries was collected to be consistent. These data do not allow for distinctions between different levels of government.

To assess the reliability of estimates based on the WIOD data, we first reviewed available documentation for the database. In cases where we had questions, we received written responses from WIOD officials. In addition, we compared estimates based on the WIOD to estimates based on other databases and found similar results. In general, we found that the data were sufficiently reliable for our purposes.

To estimate the level and percent of procurement from the database, we took the following steps. First, we identified the industries associated with the governmental sector. Then, for that industry (or combination of industries), we obtained both the total level of purchases (or inputs), and the inputs that came from within that country, or other countries of interest. To obtain an estimate for the EU, we combined the purchases over the 28 member countries then in the EU.³⁰ In general, we followed a procedure outlined in a 2017 paper produced by the European Commission.³¹ In this paper, the authors describe how input-output tables can be used to measure cross-border penetration in public sector procurement.

An essential step in our method is defining which industries make up the government sector. Moreover, because the composition of the government sector and the patterns of government purchases vary by country, different measures of the government sector are more appropriate for different countries—since what goods and services the government provides or performs affects what it procures from the private sector. For example, for the EU, the government funds the majority of services in the area of public administration, defense, social security, education, and health care. In contrast, the USG funds a smaller share of health care services.

³⁰These included Belgium, Bulgaria, the Czech Republic, Denmark, Germany, Estonia, Ireland, Greece, Spain, France, Croatia, Italy, Cyprus, Latvia, Lithuania, Luxembourg, Hungary, Malta, Netherlands, Austria, Poland, Portugal, Romania, Slovenia, Slovakia, Finland, Sweden and the United Kingdom.

³¹European Commission, *Measurement of Impact of Cross-Border Penetration in Public Procurement* (February 2017), accessed December 13, 2018, <https://publications.europa.eu/en/publication-detail/-/publication/5c148423-39e2-11e7-a08e-01aa75ed71a1/language-en>.

We followed the model laid out in the European Commission paper and defined the government sector in three ways:

1. Narrowly Defined –
 - (O84) Public administration and defense; compulsory social security
2. Typically Defined –
 - (O84) Public administration and defense; compulsory social security
 - (P85) Education
 - (Q) Human health and social work activities
3. Broadly Defined –
 - (O84) Public administration and defense; compulsory social security
 - (P85) Education
 - (Q) Human health and social work activities
 - (D35) Electricity, gas, steam and air conditioning supply
 - (E36) Water collection, treatment and supply
 - (E37-E39) Sewerage; waste collection, treatment and disposal activities; materials recovery; remediation activities and other waste management services
 - (1/3) * (H49) Land transport and transport via pipelines
 - (1/2) * (H53) Postal and courier activities
 - (1/2) * (J61) Telecommunications

However, our procedure deviated from the European Commission report with regard to an additional category of expenditure in the report, final consumption by government. As in our prior reports, we did not include this category. This category includes both spending on social benefits, health care, and education as well as spending on collective items such as defense. We did not include this category in prior reports partly due to data reliability concerns about consistency in measurement of spending on social benefits across countries. However, if we had included it, that would have caused our estimates of import penetration to be smaller, because the WIOD tables do not include any cross-border expenditures for this category. For example, the percentage for the United States would have changed from about 8 percent to about 4 percent.

To construct consistent data from different countries over time, certain assumptions were made by the WIOD. An assumption that has important implications for our analysis is known as a “proportionality assumption,” which is typical in the construction of input-output tables. This assumption requires that the percentage of a product that is imported is constant across all industries. In the example provided by the WIOD: “If 20 percent of Czech absorption of electronics is sourced from Germany, then 20 percent of any Czech final or intermediate use of electronics is assumed to originate from Germany.” The WIOD has attempted to improve on the proportionality assumption by making it at a more disaggregated level, but according to the WIOD, the proportionality assumption remains a limitation of the data set and consequently of our analysis.³² Importantly for our analysis, the proportionality assumption implies that the results we obtained from this method may not capture attempts by the government sector to award a larger share of its procurement to domestic firms relative to other industries.

Another important limitation for our analysis is the scope of the industry data reported by the WIOD. Specifically, the input-output data include intermediate inputs but exclude purchases by government for investment. Such purchases could include some government assets that would be considered procurement covered by the GPA and NAFTA. For example, the input-output data could exclude construction services like those government purchases to build highways or schools that have long-term use, which are procurements potentially covered by the GPA and NAFTA.³³

Finally, while we followed a method described above that has been used to study procurement, there are alternative methods that could have also been used based on input-output data. For example, according to industry officials at the U.S. Bureau of Economic Analysis, the “Trade in Value Added” methodology is such a method, and such data are maintained by the Organisation for Economic Co-operation and Development.

We conducted this performance audit from March 2017 to May 2019 in accordance with generally accepted government auditing standards.

³²Timmer, Marcel, et. al, pg. 18.

³³Individual parties’ coverage schedules must be consulted to determine whether a specific procurement is covered by one of these agreements.

Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Appendix II: Characteristics of Central Government Procurement Databases

The following appendix contains descriptive comparative information about the five databases included in our review:

- for the United States, the Federal Procurement Data System-Next Generation (FPDS-NG);
- for the EU and Norway, Tenders Electronic Daily (TED);
- for South Korea, the South Korea ON-line E-Procurement System (KONEPS);
- for Mexico, the Government of Mexico e-Procurement System CompraNet; and
- for Canada, Contract History.

For each database, we provide its formal name and function, contract and/or agency coverage, and data field(s) related to firm location, firm ownership, source country of goods or services, location of contract execution, contract valuation, trade agreement coverage, and type of contract in terms of goods, services or construction services.

Appendix II: Characteristics of Central Government Procurement Databases

Table 5: Characteristics of the Central Government Procurement Database of the United States

Central government procurement database	Federal Procurement Data System-Next Generation (FPDS-NG) is the official procurement database for the U.S. federal government.		
Contract and/or Agency Coverage	Almost all federal executive branch agencies.	Excludes certain defense contracts.	
Data field(s) on firm location	Vendor country code (13QQ) is the “country code of the contractor address”.		
Data field(s) on firm ownership	Domestic or foreign entity (8Q) is defined based on firm ownership and has the optional values of “U.S. owned business”, “other U.S. entity (e.g., government)”, “foreign-owned business incorporated in the U.S.”, “foreign-owned business not incorporated in the U.S.”, and “other foreign entity (e.g., foreign government)”.	Foreign owned and located (13XL) is defined based on “business type” with optional “yes” and “no” values.	
Data field(s) on source country of goods or services	Country of product and service origin (9E) is based on the definition of domestic end product or service, i.e., if the product or service is a domestic end product or service, then it is a “U.S.” good or service; if the product or service is not a domestic end product or service, then the entered value is the country code that designated the preponderance of the foreign content.	Place of manufacture (9H) represents whether the end products (goods only) are manufactured inside or outside the United States in accordance with the Buy American Act.	
Data field(s) on location of contract execution	Principal place of performance (9C) is the location of the principal plant or place of business where the items will be produced, supplied from stock, or where the service will be performed.		
Data field(s) on contract valuation	Base and all options value (3A) is the mutually agreed upon total contract or order value including all options (if any).	Base and exercised options value (3B) is the contract value for the base contract and any options that have been exercised.	Action obligation (3C) is the amount that is obligated or de-obligated by the transaction.
Data field on trade agreement coverage	Within Place of manufacture (9H) , (goods only), option G is Manufactured outside U.S. - trade agreements .		
Data field on type of contract	No, but data are classified based on the Product and Service Codes Manual, which provides codes to describe products, services, and research and development purchased by the federal government.		

Source: GAO analysis of Federal Procurement Data System-Next Generation (FPDS-NG) procurement data. | GAO-19-414

Note: Text of fields in **bold italic** indicates the option used in our analysis.

Appendix II: Characteristics of Central Government Procurement Databases

Table 6: Characteristics of the Central Government Procurement Database of the European Union and Norway

Central government procurement database	<i>Tenders Electronic Daily (TED)</i> is the online version of the “Supplement to the Official Journal” of the European Union (EU), dedicated to European public procurement.				
Contract and/or Agency Coverage	European Economic Area, Switzerland, the Former Yugoslav Republic of Macedonia, and EU institutions.	All levels of government, consistent with the EU Public Procurement Directives.	Data consist of contract notices above the procurement thresholds set in EU Public Procurement Directives. Publishing below threshold notices in TED is voluntary.	Excludes certain defense contracts.	
Data field(s) on firm location	<i>WIN_COUNTRY_CODE</i> is “the country of the winning bidder”. ^a				
Data field(s) on firm ownership	No				
Data field(s) on source country of goods or services	No				
Data field(s) on location of contract execution	<i>TAL_LOCATION_NUTS</i> is the main site or location of work, place of delivery or of performance.				
Data field(s) on contract valuation	AWARD_VALUE_EURO_FIN_1 is the contract award value, in EUR, without VAT. If the value variable is missing, this variable looks for it in all other fields from which it could be taken ^b	<i>VALUE_EURO_FIN_2</i> is generally the same value as <i>VALUE_EURO_FIN_1</i> , but – if available – overwritten by human-made estimates of values for large value contracts which seemed to be incorrect.	<i>AWARD_EST_VALUE_EURO</i> is the estimated contract award value, in EUR, without VAT.	<i>AWARD_VALUE_EURO</i> is the total final contract award value, in EUR, without VAT. If the value was not present, the lowest bid is included.	<i>VALUE_EURO_FIN_1</i> is the contract award notice value, in EUR, without VAT. If a value variable is missing, this variable looks for it in all other fields from which it could be taken.
Data field on trade agreement coverage	<i>B_GPA</i> indicates if the contract is covered by the Government Procurement Agreement. ^c				
Data field on type of contract	<i>TYPE_OF_CONTRACT</i> has values for “works”, “supplies”, and “services”.				

Source: GAO analysis Tenders Electronic Daily (TED) database. | GAO-19-414

Notes: Text of fields in **bold italic** indicates the option used in our analysis.

^aAbout 9 percent of the country codes in this field were missing and we have filled them in using a matching procedure (see app. I for further details).

^bAbout 15 percent of the numerical values of this field for the EU were missing. As a result, we estimated EU value using a multiple imputation methodology. About 12 percent of contract award values for Norway were missing. As a result, we estimated Norway values using post-stratification techniques. See appendix IV for details.

^cAbout 9 percent of the values in this field were missing and we were able to fill in some values using other information in the database (see app. I for further details).

Appendix II: Characteristics of Central Government Procurement Databases

Table 7: Characteristics of the Central Government Procurement Database of Canada

Central government procurement database	<i>Contract History</i>
Contract and/or Agency Coverage	Contracts awarded by Public Works and Government Services Canada since January 2009, on behalf of federal departments and agencies. ^a
Data field(s) on firm location	<i>Supplier-address- country</i> is “the country of the supplier to the Government of Canada”.
Data field(s) on firm ownership	No
Data field(s) on source country of goods or services	No
Data field(s) on location of contract execution	No
Data field(s) on contract valuation	<i>Contract value</i> specifies the monetary value of the contract. <i>Total contract value</i> specifies the cumulative monetary value of the contract including amendments.
Data field on trade agreement coverage	<i>Trade agreement</i> specifies all trade agreement codes applicable to the contract. ^b
Data field on type of contract	No, but data are classified by Goods and Services Identification Number (GSIN).

Source: GAO analysis of Contract History (CH) database. | GAO-19-414

Notes: Text of fields in ***bold italic*** indicates the option used in our analysis.

^aAccording to Canadian officials, the Canadian Contract History database typically covers about 80 percent of the value of central government procurement.

^bA contract can be covered by international and internal agreements. Procurement not covered under international agreements includes procurement covered by Canadian internal agreements, set asides, or under no agreement.

Appendix II: Characteristics of Central Government Procurement Databases

Table 8: Characteristics of the Central Government Procurement Database of Mexico

Central government procurement database	CompraNet is the system of record on Mexican federal procurement.		
Contract and/or Agency Coverage	According to Mexican procurement database officials, all federal agencies are required to report to COMPRANET.	All levels of government that have received federal funds.	Some contracts are outside COMPANET for national security reasons.
Data field(s) on firm location	<i>AN.SIGLAS_PAIS</i> is the country where the company is located. ^a		
Data field(s) on firm ownership	No		
Data field(s) on source country of goods or services	No		
Data field(s) on location of contract execution	No		
Data field(s) on contract valuation	<i>V.IMPORTE_CONTRATO</i> is the contract amount excluding value added tax.		
Data field on trade agreement coverage	<i>N.CARACTER</i> indicates the character of the procedure, i.e., national, international covered under free trade agreements, and international open. ^b		
Data field on type of contract	<i>O.TIPO_CONTRATACION</i> indicates the type of contract, i.e., goods, services, leases, public works and services related to public works.		

Source: GAO analysis of CompraNet database. | GAO-19-414

Notes: Text of fields in ***bold italic*** indicates the option used in our analysis.

^aAccording to Mexican officials, foreign firms have to register in Mexico to participate in central government procurement procedures or use a Mexican intermediary to do so.

^bThe data field on type of procedure indicates the extent of covered procurement through three categories: (1) open to national firms only, (2) international procurement under trade agreements indicates purchases open to national and foreign suppliers from FTA partner countries; and (3) open international procedures includes solicitations open to national, foreign from FTA partners and all other foreign bidders. According to Mexican procurement database officials, offers from non-FTA countries face a domestic preference price factor when evaluated.

Appendix II: Characteristics of Central Government Procurement Databases

Table 9: Characteristics of the Central Government Procurement Data of Japan

Central government procurement database	None
Contract and/or Agency Coverage	Not applicable
Data field(s) on firm location	Not applicable
Data field(s) on firm ownership	Not applicable
Data field(s) on source country of goods or services	Yes, as reported in the World Trade Organization (WTO) notifications.
Data field(s) on location of contract execution	Not applicable
Data field(s) on contract valuation	Aggregate value of procurement above the Agreement on Government Procurement thresholds as reported in the WTO notifications.
Data field on trade agreement coverage	Yes, as reported in the WTO notifications.
Data field on type of contract	Yes, as reported in the WTO notifications.

Source: GAO analysis of Japan's 2015 WTO statistical notification on its 2013 government procurement. | GAO-19-414

Note 1: Japan reported on the "nationality of the winning tenderer" until 2015, when it provided its submission on 2013 procurement. Later submissions no longer contain data on the "nationality of the winning tenderer." According to the meeting minutes of the 2017 Trade Policy Review for Japan, the "nationality of the winning tenderer" is different based on whether the contract is for goods or services. The country of origin of goods is determined based on the information provided by the suppliers and includes countries of origin as indicated on the label attached to the procured goods and those described in the contract notes or other documents such as import invoices, producers' invoices and bills of lading. The country of origin of services is determined based on the nationality of winning tenderers. A company whose foreign ownership is over 50 percent is regarded as a foreign business operator, and the nationality of the company determines the country of origin of services. A locally established subsidiary of a foreign company whose foreign ownership is over 50 percent is regarded as a foreign business operator, and the nationality of the company determines the country of origin of services.

Note 2: While data on the value of below-threshold procurement by covered entities are available, they are not reported by the "nationality of the winning tenderer."

Appendix II: Characteristics of Central Government Procurement Databases

Table 10: Characteristics of the Central Government Procurement Database of South Korea

Central government procurement database	Korean ON-line E-Procurement System (KONEPS) is a single window for public procurement, managed by the Public Procurement Service, the central procurement agency of South Korea.	
Contract and/or Agency Coverage	All levels of government.	Excludes 23 organizations such as the Defense Acquisition Program Administration, Korea Land and Housing Corporation, the Korea Electric Power Corporations, the Ministry for Small- and Medium-sized Enterprises, as well as municipal and local procurement ^a
Data field(s) on firm location	No	
Data field(s) on firm ownership	No	
Data field(s) on source country of goods or services	<i>원산지</i> indicates the country of origin of goods and services. ^b	
Data field(s) on location of contract execution	No	
Data field(s) on contract valuation	<i>계약금액합계</i> is the contract value awarded in Korean Won.	
Data field on trade agreement coverage	No	
Data field on type of contract	<i>업무구분</i> indicates the type of contract with values goods, services, construction, leases, and foreign procurement. ^c	

Source: GAO analysis of KONEPS database. | GAO-19-414

Notes: Text of fields in ***bold italic*** indicates the option used in our analysis.

^aAccording to South Korean officials, KONEPS covers about 70 percent of the value of central government procurement.

^bThe country of origin field in the database is the country, in which the goods are grown, produced, manufactured or processed. There is no data field with the address of the awardee.

^cData on “foreign procurement” is officially reported and defined in the Korean Annual Report for goods and services only, though it is labeled “Foreign Goods” in KONEPS. Furthermore, it is unclear whether (a) no contracts for services and construction works are foreign sourced or (b) no data on foreign sourcing of those types of contracts are collected and available.

Appendix III: Additional Results Related to Foreign Sourcing by the U.S. Federal Government

The following appendix provides supplemental information from our analysis of foreign sourcing by the United States in fiscal year 2015 based on data from the Federal Procurement Data System-Next Generation (FPDS-NG). FPDS-NG contains data on four potential proxy measures of foreign sourcing—firm location, firm ownership, product and service origin, and place of performance. The database contains six fields that correspond to these four proxy measures. See tables 11 and 12. For cross-country comparisons, we use two of the six measures—vendor country code (13QQ) and country of product and service origin (9E). We disaggregate the data by country and list the top 20 countries, which are recipients of USG contracts based on firm location. See tables 13 and 14. Since about 10 percent of USG contracts are performed outside the United States, we also provide a breakdown of those contracts that are awarded to foreign-owned and –located firms by agency. See table 15. Finally, since most of these contracts by contract value are awarded by the Department of Defense (DOD), we also provide a country breakdown of DOD contracts performed outside the United States and awarded to foreign-owned and –located firms. See table 16.

Table 11: Value of Contracts Awarded by the U.S. Federal Government for the Procurement of Domestic and Foreign Goods to Domestic and Foreign Firms, Fiscal Year 2015

	Firm location	Firm ownership		Product and service origin		Place of contract performance
	By vendor country code (13QQ) ^a	By domestic and foreign entity (8Q) ^b	By foreign owned and located (13XL) ^c	By country of product and service origin (9E) ^d	By place of manufacture (9H) ^e	By principal place of performance (9C) ^f
Total foreign	12,124,223,965	15,473,149,025	8,053,769,177	16,545,181,668	5,904,029,816	23,254,519,092
<i>percent of total</i>	4	5	3	6	5	8
Total domestic	278,823,909,288	275,474,623,725	282,895,868,866	274,404,325,194	106,758,184,801	267,694,977,439
<i>percent of total</i>	96	95	97	94	95	92
Not available	1,504,789	1,865,292			178,287,303,520	
Total federal procurement	290,949,638,042	290,949,638,042	290,949,638,043	290,949,506,862	290,949,518,137	290,949,496,531

Source: GAO analysis of Federal Procurement Data System-Next Generation (FPDS-NG) procurement data. | GAO-19-414

Note: Shaded cells represent data used for cross-country comparisons.

^aVendor country code (13QQ) is the “country code of the contractor address”.

^bDomestic or foreign entity (8Q) is defined based on firm ownership and has the optional values of “U.S. owned business”, “other U.S. entity (e.g., government)”, “foreign-owned business incorporated in the U.S.”, “foreign-owned business not incorporated in the U.S.”, and “other foreign entity (e.g., foreign government)”.

^cForeign owned and located (13XL) is defined based on “business type” with optional “yes” and “no” values.

Appendix III: Additional Results Related to Foreign Sourcing by the U.S. Federal Government

^dCountry of product and service origin (9E) is based on the definition of domestic end product or service in the FAR, i.e., if the product or service is a domestic end product or service, then it is a “US” good or service; if the product or service is not a domestic end product or service, then the entered value is the country code that designated the preponderance of the foreign content.

^ePlace of manufacture (9H) represents whether the end products are manufactured inside or outside the US in accordance with the Buy American Act. The “not available” value is for services contracts, which are not contracts for manufactured end products. The shares of US and foreign contracts have been scaled by the number of service contracts.

^fPrincipal place of performance (9C) is the location of the principal plant or place of business where the items will be produced, supplied from stock, or where the service will be performed.

Table 12: Number of Central Government Contracts Awarded by the U.S. Federal Government for the Procurement of Domestic and Foreign Goods to Domestic and Foreign Firms, Fiscal Year 2015

	Firm location		Firm ownership		Product and service origin		Place of contract performance
	By vendor country code (13QQ) ^a	By domestic and foreign entity (8Q) ^b	By foreign owned and located (13XL) ^c	By country of product and service origin (9E) ^d	By place of manufacture (9H) ^e	By principal place of performance (9C) ^f	
Total foreign	46,507	48,852	41,638	49,859	26,814	53,490	
<i>percent of total</i>	9	10	8	10	7	10	
Total domestic	464,379	462,026	469,242	462,206	333,442	458,640	
<i>percent of total</i>	91	90	92	90	93	90	
Not available	7	2			152,359 ^g		
Total federal procurement	510,893	510,880	510,880	512,065	512,615	512,130	

Source: GAO analysis of Federal Procurement Data System-Next Generation (FPDS-NG) procurement data. | GAO-19-414

Note: Shaded cells represent data used for cross-country comparisons.

^aVendor country code (13QQ) is the “country code of the contractor address”.

^bDomestic or foreign entity (8Q) is defined based on firm ownership and has the optional values of “U.S. owned business”, “other U.S. entity (e.g., government)”, “foreign-owned business incorporated in the U.S.”, “foreign-owned business not incorporated in the U.S.”, and “other foreign entity (e.g., foreign government)”.

^cForeign owned and located (13XL) is defined based on “business type” with optional “yes” and “no” values.

^dCountry of product and service origin (9E) is based on the definition of domestic end product or service in the FAR, i.e., if the product or service is a domestic end product or service, then it is a “US” good or service; if the product or service is not a domestic end product or service, then the entered value is the country code that designated the preponderance of the foreign content.

^ePlace of manufacture (9H) represents whether the end products are manufactured inside or outside the US in accordance with the Buy American Act. The “not available” value is for services contracts, which are not contracts for manufactured end products. The shares of US and foreign contracts have been scaled by the number of service contracts.

^fPrincipal place of performance (9C) is the location of the principal plant or place of business where the items will be produced, supplied from stock, or where the service will be performed.

^gThe “not available” value by Place of Manufacture is for services contracts, which are not contracts for manufactured end products. The shares of US and foreign contracts have been scaled by the number of service contracts.

**Appendix III: Additional Results Related to
Foreign Sourcing by the U.S. Federal
Government**

Table 13. Top 20 Recipients of US Federal Procurement Contracts by Country and Contract Value, Fiscal Year 2015

By vendor location (13QQ) ^a			By country of product and service origin (9E) ^b			By principal place of performance (9C) ^c		
Country	Value (dollars)	Percent of total	Country	Value (dollars)	Percent of total	Country	Value (dollars)	Percent of total
United States	278,823,909,288	95.83	United States	274,336,043,355	94.29	United States	267,655,708,263	91.99
Foreign awardee (unspecified) ^d	1,274,276,631	0.44	Afghanistan	1,379,973,691	0.47	Afghanistan	2,013,256,578	0.69
United Arab Emirates	1,233,413,538	0.42	Germany	1,327,386,668	0.46	Japan	1,607,723,144	0.55
Germany	1,104,985,899	0.38	Japan	1,322,642,034	0.45	Germany	1,559,556,081	0.54
Japan	1,072,320,075	0.37	Saudi Arabia	1,066,089,407	0.37	Saudi Arabia	1,514,193,545	0.52
Saudi Arabia	952,032,544	0.33	South Korea	873,419,449	0.3	Kuwait	1,279,605,509	0.44
Bahrain	825,846,825	0.28	United Arab Emirates	852,076,673	0.29	Iraq	1,131,668,956	0.39
South Korea	754,495,388	0.26	Kenya	739,594,105	0.25	South Korea	1,122,687,006	0.39
Kenya	654,603,699	0.22	Iraq	708,833,680	0.24	United Arab Emirates	825,772,272	0.28
Canada	623,595,436	0.21	Canada	673,917,405	0.23	Kenya	815,679,025	0.28
Kuwait	609,921,253	0.21	Turkey	580,946,769	0.2	Chile	683,408,869	0.23
Denmark	495,282,266	0.17	Kuwait	561,025,996	0.19	Turkey	613,630,794	0.21
United Kingdom	386,679,753	0.13	Denmark	505,996,928	0.17	Canada	570,226,986	0.2
Afghanistan	271,379,962	0.09	Bahrain	502,664,629	0.17	The Bahamas	544,986,570	0.19
Spain	249,052,103	0.09	United Kingdom	460,447,690	0.16	Greenland	519,035,785	0.18
Italy	199,813,767	0.07	Italy	439,275,289	0.15	Qatar	495,637,921	0.17
Jordan	126,590,312	0.04	The Bahamas	393,032,223	0.14	United Kingdom	476,442,013	0.16
Iraq	122,396,710	0.04	Austria	388,105,373	0.13	Bahrain	440,241,237	0.15
Turkey	120,343,249	0.04	Spain	298,656,039	0.1	Italy	418,095,912	0.14
Singapore	111,305,413	0.04	Qatar	225,215,496	0.08	Israel	314,550,899	0.11

Source: GAO analysis of Federal Procurement Data System-Next Generation (FPDS-NG) procurement data. | GAO-19-414

Note: Countries in bold are parties to the World Trade Organization Agreement on Government Procurement and North American Free Trade Agreement

^aVendor country code (13QQ) is the “country code of the contractor address”.

^bCountry of product and service origin (9E) is based on the definition of domestic end product or service in the FAR, i.e., if the product or service is a domestic end product or service, then it is a “US” good or service; if the product or service is not a domestic end product or service, then the entered value is the country code that designated the preponderance of the foreign content.

Appendix III: Additional Results Related to Foreign Sourcing by the U.S. Federal Government

^cPrincipal place of performance (9C) is the location of the principal plant or place of business where the items will be produced, supplied from stock, or where the service will be performed.

^dSince the country name is not specified, the “foreign awardee” may be located in a country that is a party to World Trade Organization Agreement on Government Procurement and North American Free Trade Agreement or not.

Table 14. Top 20 recipients of US Federal Procurement Contracts by Country and Number of Contracts, Fiscal Year 2015

By Vendor Location (13QQ) ^a			By Country of Product and Service Origin (9E) ^b			By Principal Place of Performance (9C) ^c		
Country	Number	Percent of total	Country	Number	Percent of total	Country	Number	Percent of total
United States	464,379	90.9	United States	462,046	90.23	United States	458,389	89.51
Foreign Awardee (unspecified) ^d	31,374	6.14	Canada	3,090	0.6	Canada	2,698	0.53
Canada	2,864	0.56	Germany	2,868	0.56	Germany	2,636	0.51
Japan	1,529	0.3	Japan	2,472	0.48	Japan	2,293	0.45
Germany	1,449	0.28	United Kingdom	1,945	0.38	United Kingdom	1,672	0.33
United Kingdom	1,363	0.27	Italy	1,190	0.23	Italy	1,213	0.24
Turkey	814	0.16	Turkey	1,144	0.22	Turkey	1,174	0.23
Italy	630	0.12	South Korea	882	0.17	Afghanistan	1,000	0.2
South Korea	616	0.12	Kenya	832	0.16	South Korea	951	0.19
United Arab Emirates	425	0.08	United Arab Emirates	718	0.14	Kenya	899	0.18
Afghanistan	306	0.06	Afghanistan	640	0.12	United Arab Emirates	737	0.14
Singapore	219	0.04	Saudi Arabia	500	0.1	Iraq	615	0.12
Kuwait	165	0.03	Iraq	439	0.09	Saudi Arabia	563	0.11
Spain	152	0.03	Spain	379	0.07	Israel	547	0.11
Bahrain	137	0.03	Bahrain	339	0.07	Kuwait	464	0.09
Iraq	117	0.02	Kuwait	333	0.07	Bahrain	423	0.08
Jordan	91	0.02	Austria	284	0.06	Qatar	257	0.05
Saudi Arabia	73	0.01	Qatar	204	0.04	The Bahamas	180	0.04
Kenya	63	0.01	Denmark	178	0.03	Chile	164	0.03
Denmark	62	0.01	The Bahamas	142	0.03	Greenland	7	0

Source: GAO analysis of Federal Procurement Data System-Next Generation (FPDS-NG) procurement data. | GAO-19-414

Note: Countries in bold are parties to the World Trade Organization Agreement on Government Procurement and North American Free Trade Agreement

^aVendor country code (13QQ) is the “country code of the contractor address”.

^bCountry of product and service origin (9E) is based on the definition of domestic end product or service in the FAR, i.e., if the product or service is a domestic end product or service, then it is a “US”

Appendix III: Additional Results Related to Foreign Sourcing by the U.S. Federal Government

good or service; if the product or service is not a domestic end product or service, then the entered value is the country code that designated the preponderance of the foreign content.

^cPrincipal place of performance (9C) is the location of the principal plant or place of business where the items will be produced, supplied from stock, or where the service will be performed.

^dSince the country name is not specified, the “foreign awardee” may be located in a country that is a party to World Trade Organization Agreement on Government Procurement and North American Free Trade Agreement or not.

Table 15. Breakdown of U.S. Federal Government Contracts Performed Outside the United States and Awarded to Foreign-Owned and –Located Firms by Agency, Fiscal Year 2015

	Value of contracts (dollars)	Percent of total value	Number of contracts	Percent of total number
Department of Defense	9,840,893,280	84	10,900	26
U.S. Agency for International Development	764,993,765	7	1,027	2
Department of State	720,071,867	6	27,864	67
Department of Health and Human Services	178,986,319	2	349	1
Department of the Treasury	32,984,386	0	76	0
Other	130,311,284	1	1,428	3
Total	11,668,240,901	100	41,644	100

Source: GAO analysis of Federal Procurement Data System-Next Generation (FPDS-NG) procurement data. | GAO-19-414

Table 16. Country Breakdown of Department of Defense (DOD) Contracts Performed Outside the United States and Awarded to Foreign-Owned and –Located Firms, Fiscal Year 2015

	Value of contracts (dollars)	Percent of total value	Number of contracts	Percent of total number
Saudi Arabia	1,448,051,633	14.71	79	0.72
Germany	1,074,294,906	10.92	1,245	11.42
Japan	1,049,927,298	10.67	1,449	13.29
South Korea	719,486,766	7.31	559	5.13
Afghanistan	694,438,615	7.06	257	2.36
United Arab Emirates	633,715,649	6.44	256	2.35
The Bahamas	525,028,912	5.34	9	0.08
Canada	490,902,761	4.99	1,508	13.83
Greenland	480,709,577	4.88	4	0.04
Kuwait	406,452,315	4.13	240	2.20
Total of top 10 countries	7,523,008,432	76.45	5,606	51.43
Total awarded by DOD	9,840,893,280	100.00	10,900	100.00

Source: GAO analysis of Federal Procurement Data System-Next Generation (FPDS-NG) procurement data. | GAO-19-414

Appendix IV: Methodology for Addressing Missing Contract Award Values in the Tenders Electronic Daily Database

European Union

To report on European Union (EU) procurement data in the Tenders Electronic Daily (TED) database for 2015, we took steps to address missing contract award values, which amounted to approximately 15.2 percent of the 38,233 in-scope contract award values.¹ To address these missing contract award values, we implemented a multiple imputation methodology that imputes a range of values for each missing contract award value and allows for estimation of additional uncertainty induced by the imputation methodology. After determining that the data were likely to be conditionally missing at random,² we used predictive mean matching (PMM) to address missing values as described below. We determined that using PMM was appropriate because it can provide more robust results when the relevant variable is not normally distributed; PMM, as a form of multiple imputation, allows us to assess the variability introduced through the process of addressing missing data; and PMM, when properly specified, does not distort averages or variance in the underlying data.³

¹Our scope was central government procurement above 2015 GPA thresholds for the relevant contract type (goods, services, and construction).

²We created an indicator variable for “missing contract award value” and attempted to predict this indicator using a logistic regression using relevant variables from our dataset. Several variables had statistically significant associations with “missing contract award value”, providing evidence that these values were not missing completely at random. After specifying and testing our PMM model, which we conditioned on these and other variables, we found that the model appeared well specified with respect to standard diagnostics—such as homoscedastic residuals. It is possible, however, that additional variables, not available in our data, remain associated with the likelihood that contract award value information is missing.

³Relevant academic literature and statistical software treats PMM as a reasonable imputation method for numerical data. See Buuren and Groothuis-Oudshoorn, “mice: Multivariate Imputation by Chained Equations in R.” *Journal of Statistical Software*, volume 45, issue 3 (December 2011). According to this journal article, PMM is recommended for variables with many categories, which is a feature of several of the variables in our models. Additionally, according to this article, a benefit of using PMM is that imputations are restricted to the observed values, avoiding the risk of extreme or implausible values. Moreover, according to this article, PMM can preserve nonlinear relationships between variables even if the model is imperfectly specified. As a result of using PMM, however, our models must assume that missing contract awards are similar to complete contract awards that otherwise share similar characteristics. If the relationships between contract award values and other contract characteristics differ systematically between complete and incomplete observations, our models may produce inaccurate estimates. We present a number of sensitivity checks of the quality and reliability of the model output in this appendix.

As we discuss below, the method for addressing missing values used by the EU⁴ has none of these features.

In PMM, a regression model is first fit to complete cases in the dataset to predict values for the variable of interest for the entire dataset (i.e., including complete and incomplete cases). These predicted values are used to identify complete observations (“donors”) that are close (a “match”) to a given observation that is missing a value for the variable of interest. The PMM model draws matches using the posterior predicted distribution of the regression model. When PMM is used in conjunction with multiple imputations, this process is repeated multiple (m) times for each missing value. As a result, each of m imputations may match to a different donor. The donor’s observed value for this variable is donated to fill the blank data cell—not the predicted value used to match to this donor. The strength of the predictive model used to identify these matches will affect variation in the set of m imputed values because a better predictive model will identify donors that have observed values more consistently close to their predicted values.⁵

In order to specify our PMM model, we first explicitly tested the Ordinary Least Squares regression model used to match donors as part of the process discussed above. We performed standard regression diagnostics, including an examination of the included variables and residuals to avoid overfitting. We found that our model was able to explain 86 percent of variation in contract award values and appeared to have well-behaved (homoscedastic) residuals.⁶

⁴See, for example, European Commission, *Public Procurement Indicators 2015* (December 19, 2016).

⁵For further detail on the PMM imputation process, see Little RJA, “Missing Data Adjustments in Large Surveys.” *Journal of Business Economics and Statistics*, vol. 6 (1988), 287-296; I. R White, P. Royston, and A. M. Wood “Multiple Imputation Using Chained Equations: Issues and Guidance for Practice,” *Statistics in Medicine*, vol. 30 (2011): pp. 377–399; and Stef van Buuren, *Flexible Imputation of Missing Data*, (Boca Raton, Fla.: Chapman and Hall/CRC, 2012), pp. 68–74.

⁶Our model included variables for Log of Contract Award Notice (CAN) Value; Log of Number of Contract Awards (CA) within CAN; Log of Average of Non-Missing CA Value within CAN; Log of Number of Tender Offers within CAN; Indicator for Type of Contract (Goods / Services / Construction); Indicator for Contract GPA Coverage; Interaction of CAN value with the Number of CAs within CAN; Interaction of CAN value with the Number of Tender Offers within CAN; Tendering Country Fixed Effect Controls; and Contract Awarding Entity Type Fixed Effect Controls. Our model is one of many possible models. Alternative modeling approaches could produce different results.

We drew $m=30$ imputed values for each missing observation using the PMM process described above, which allowed us to generate estimates of the total contract value amounts and measure the uncertainty induced in those estimates by the imputation methodology. We used these measures of uncertainty to construct 95 percent confidence intervals and express these values as a percentage relative to the estimate itself.⁷ To assess the quality and reliability of the multiple imputations that followed from this predictive model, we performed four main sensitivity checks, which are included in tables 17 and 18.⁸

1. We examined the proportion imputed for each subset of the data that we planned to report. The column headed “Percent imputed contract awards” shows the proportion of the count of contracts in a given data subset that were imputed using the methodology described above. We looked to avoid any individual subset being substantially greater than the overall average of 15 percent imputed. In practice, we individually checked any subset exceeding 30 percent imputed.
2. We evaluated the level of uncertainty induced by the imputation methodology across important subgroups of the data. The column headed “95 percent confidence interval +/-” indicates the percent of the “Contract award value estimate” that, when added and subtracted to this estimate, forms the 95 percent confidence interval. The level of uncertainty expressed in the relative confidence interval results from between-imputation variance, which could indicate extreme or inconsistent matches. We looked for confidence intervals that were, in our judgment, narrow as a proportion of point estimates. In practice, nearly all of the subgroups we are choosing to report have confidence intervals smaller than plus or minus 3.5 percent of point estimates.
3. We evaluated the percent of imputed values across important subgroups of the data. “Percent of imputed value duplicates” is a diagnostic column to test for sparseness of imputation matches among the 30 imputed values for each imputed contract award. We

⁷We selected 30 imputations based on the convention of setting m equal to the proportion of missing values in the dataset. Conservatively, we selected m approximately equal to the largest proportion of missing data among subsets we planned to use. We calculated confidence intervals as a function of m and between-imputation variance. We excluded within-imputation variance from our calculation of confidence intervals because our analysis was of the population of contracts rather than a sample.

⁸Values in table 17 are subsets of the population of all contract awards in TED that are above the GPA thresholds, regardless of whether the procurement was covered by the GPA.

determined the number of duplicate imputation draws among the 30 imputed values for each observation, which could indicate sparseness in the number of suitable matches or overfitting of the model. We intended to inspect any finding with more than about 5 out of 30 (17 percent) duplicated imputation draws; in practice, however, this threshold was not reached for any subsets of the data that we have chosen to report.

4. We compared estimates resulting from our imputation methodology to published EU reports across important subgroups of the data. “Alternative estimate (EU’s missing value methodology)” shows the results of replicating a methodology for correcting missing data described in EU documents and used for some EU reports. The EU methodology is based primarily on the average value of contracts that are present in the dataset.⁹ This provides a general point of comparison, allowing us to determine which subsets of the data are likely to be responsible for estimation differences with prior EU publications. This comparison methodology therefore provides a benchmark but not a diagnostic for the imputation models. There are several important differences between our imputation methodology and the EU’s methodology.
 - a. *Calculation of confidence intervals:* The EU’s methodology results in the same value substituted for every contract award of a given type (construction goods, and services). As such, it is not possible to estimate confidence intervals for a given observation or group of observations using this methodology. In contrast, the multiple imputation models include estimates of uncertainty.
 - b. *Distortion of subgroup averages:* The EU’s methodology is not sensitive to differences in group averages apart from contract type. As a result, it may distort subgroup averages. For example, if hypothetical Country A has services contracts that average \$100 but the overall average for services contracts is \$1,000, substituting the overall average into missing values for Country A as the EU methodology would have the effect of significantly distorting Country A’s characteristics. In contrast, the imputation

⁹For each category of works (construction), supplies (goods) and services, the number of contract notices (CNs) with a value below 100 million euros (ignoring cancellations) is multiplied by the average value of the contract award notices (CANs) between 4,500 and 100 million euros published during the year. In keeping with the EU’s methodology, we excluded very large and very small contract award amounts as potential donors in our imputation model and in applying the EU’s methodology to this data.

**Appendix IV: Methodology for Addressing
Missing Contract Award Values in the Tenders
Electronic Daily Database**

models we used are designed to be sensitive to all significant reported differences in contract awards because we included all reported variables in our imputation models.

Table 17: Post Imputation Diagnostic Table for European Union (EU) TED Data: Foreign Status

Foreign winner	Contract award count	Contract award value estimate (2015 U.S. dollars)	95 percent relative confidence interval +/-	Percent imputed contract awards	Percent of imputed value duplicates	Alternative estimate (EU's missing value methodology)
No	37,963	98,523,637,634	0.2	15.2	1.7	88,845,582,396
Yes	309	2,634,074,411	0.7	15.2	1.8	2,586,574,814

Source: GAO analysis of Tenders Electronic Daily (TED) procurement data. | GAO-19-414

Table 18: Post Imputation Diagnostic Table for European Union (EU) TED Data: GPA Coverage, Type of Contract, and Foreign Status

GPA coverage	Contract type	Foreign winner	Contract award count	Contract award value estimate (2015 U.S. dollars)	95 percent relative confidence interval +/-	Percent imputed contract awards	Percent of imputed value duplicates	Alternative estimate (EU's missing value methodology)
Missing	Construction	No	50	364,425,760	2.2	6.0	15.6	270,161,252
Missing	Goods	No	1,067	11,367,210,329	0.1	5.6	3.9	11,137,962,837
Missing	Services	No	830	1,095,744,913	0.7	9.6	1.5	1,012,178,024
Missing	Goods	Yes	15	41,678,312	0.0	0.0	0.0	41,678,312
Missing	Services	Yes	25	1,647,066,161	0.0	8.0	3.3	1,645,539,600
No	Construction	No	108	1,245,593,392	0.7	14.8	5.8	1,210,578,532
No	Goods	No	4,583	7,081,523,133	0.2	7.0	1.5	6,854,410,582
No	Services	No	4,206	3,687,143,596	0.2	3.7	1.4	3,624,683,002
No	Goods	Yes	36	55,097,689	0.8	2.8	3.3	54,410,534
No	Services	Yes	18	15,262,944	1.8	16.7	0.0	16,661,015
Yes	Construction	No	1,172	14,561,224,909	0.4	16.0	2.4	14,411,071,742
Yes	Goods	No	12,073	34,585,167,780	0.4	27.3	1.6	29,423,917,167
Yes	Services	No	13,874	24,535,603,821	0.3	11.8	1.7	20,900,619,258
Yes	Construction	Yes	11	323,387,636	0.0	0.0	0.0	323,387,636
Yes	Goods	Yes	107	146,148,169	8.4	24.3	1.9	127,211,503
Yes	Services	Yes	97	405,433,500	2.8	15.5	1.8	377,686,215

Legend: GPA=World Trade Organization Agreement on Government Procurement.

Source: GAO analysis of Tenders Electronic Daily (TED) procurement data. | GAO-19-414

Based on these sensitivity checks, we determined that the post-imputation data are sufficiently reliable for our purposes of estimating total contract award values across subsets with a combination of GPA, contract type, and foreign status. In general, we found that our estimates diverge from the EU's methodology most significantly for GPA covered contracts and for data subsets with a greater proportion of missing data—as would be expected since only the missing data are affected by the choice of imputation model.

Norway

To report on Norway procurement data in the TED database for 2015, we needed to take steps to address missing contract award values (153 of 1,319 missing, or about 11.5 percent). The scale of the missing values is thus smaller than for the EU data, while the dataset as a whole is too small, in our judgment, to support correction through an imputation model. Our statistical tests found no evidence that contract award values were conditionally missing at random. Thus, we assume that the data are missing completely at random and corrected the missing data using post-stratification estimation techniques. To do so, we treated the database of contract awards as the full population of such contract awards, which provides the full joint distribution of contract attributes. We treated the complete observations (88.5 percent of the total) as our sample of this population.¹⁰ Post-stratification adjusts the sampling weights for this sample so that the joint distribution of post-stratifying variables, which we selected based on our reporting needs, matches the known population joint distribution.¹¹

Based on the resulting confidence intervals, we determined that the post-stratification sampling results in data are sufficiently reliable for subsets

¹⁰We eliminated six observations from our sample corresponding to a subgroup for which all contract award values were missing: Non-Foreign Goods contracts for which GPA categorization was also missing. As a result, our population estimates of reported contract awards may slightly underestimate actual values.

¹¹In general, when the use of multiple variables results in small or empty weighting classes, the post-stratified estimators may be unstable and include unnecessary variability that is not desirable. While our use of multiple variables resulted in many small classes, these occurred in the post-strata that had complete data and were included as census strata and did not add to the variability or instability of the resulting estimates.

**Appendix IV: Methodology for Addressing
Missing Contract Award Values in the Tenders
Electronic Daily Database**

defined by foreign status¹² and contract type (see table 20) or by foreign status and GPA coverage (see table 21).

Table 19: Post-stratification Sampling Diagnostic Table for Norway: Foreign Status

Foreign	Contract award value estimate (2015 U.S. dollars)	95 percent relative confidence interval +/-	Sample	Population
No	6,450,838,885	4.7	1,068	1,209
Yes	1,556,528,420	2.3	104	110

Source: GAO analysis of Tenders Electronic Daily (TED) procurement data. | GAO-19-414

Table 20: Post-stratification Sampling Diagnostic Table for Norway: Type of Contract and Foreign Status

Type of contract	Foreign	Contract award value estimate (2015 U.S. dollars)	95 percent relative confidence interval +/-	Sample	Population
Construction	No	1,443,541,417	0.0	117	117
Construction	Yes	1,315,324,967	0.0	7	7
Goods	No	2,591,758,065	6.9	582	679
Goods	Yes	164,615,812	17.2	63	67
Services	No	2,415,539,402	10.1	369	413
Services	Yes	76,587,642	28.1	34	36

Source: GAO analysis of Tenders Electronic Daily (TED) procurement data. | GAO-19-414

Table 21: Post-stratification Sampling Diagnostic Table for Norway: GPA Coverage and Foreign Status

GPA coverage	Foreign	Contract award value estimate (2015 U.S. dollars)	95 percent relative confidence interval +/-	Sample	Population
Missing	No	744,912	0.0	1	1
No	No	451,830,076	17.1	58	66
Yes	No	5,998,263,896	4.9	1,009	1,142
No	Yes	1,292,554,573	0.0	7	7
Yes	Yes	263,973,847	13.5	97	103

Legend: GPA=World Trade Organization Agreement on Government Procurement.

Source: GAO analysis of Tenders Electronic Daily (TED) procurement data. | GAO-19-414

¹²Foreign status is defined based on direct cross-border procurement, i.e., the successful bidder is both foreign-owned and foreign-located.

Appendix V: GAO Contact and Staff Acknowledgments

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Staff Acknowledgments

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