Chapter 5

Enhancing U.S. Trade in a Global Economy

Trade across international borders has motivated economic analysts since at least the 19th century, when the economist David Ricardo invoked the example of wine in Portugal and wool in England to illustrate the principle of comparative advantage. But the economy, both in the United States and around the world, has changed since the days of David Ricardo and Adam Smith. Although the economics profession has converged toward a consensus on certain principles, the Administration's trade agenda also stands poised to update existing trade relationships in order to maximize the benefits that America's trade with the world generates for our citizens in the 21st century and beyond.

The United States, for instance, faces higher barriers on its exports in markets abroad than producers abroad face on their exports to the U.S. Nothing about the principle of comparative advantage would lend itself to a defense of a status quo that imposes higher barriers to exports on America's producers than on foreign producers.

The global trade system has come under strain due to the influence of countries, like China, that violate market principles and distort the functioning of global markets. When America's businesses and workers can compete in the global economy on a level playing field, however, our underlying dynamism will allow our economy to flourish. The Administration prioritizes its attempt to create the conditions that, according to the consensus principles in the economics literature, would maximize the benefits accruing to the United States—and produce gains for our trading partners as well.

Throughout America's history, trade has produced costs as well as benefits. In recent years, the economics literature has identified portions of the American population for whom the costs of recent trade expansions have exceeded the benefits. Even if fair and reciprocal international trade as a whole leaves the U.S. better off in the aggregate, this does not necessarily mean that the benefits of expanding trade flows leave all Americans better off. Indeed, new empirical evidence suggests that certain trade flows with China may have left some Americans worse off.

As the Administration continues to strengthen and update trade agreements and to pursue its trade agenda, however, the United States stands poised to capitalize on opportunities to reap the gains from trade that it has historically enjoyed. This Administration's focus on improving trade agreements will benefit American businesses and American workers across a variety of sectors—in particular, the U.S. energy and agriculture sectors possess comparative advantages and may be able to increase their exports to the rest of the world.

Analyzing the causes and consequences of trade across national borders has interested those who study economic activity for centuries. In the early 19th century, David Ricardo used hypothetical trade in English cloth and Portuguese wine to illuminate the principle of comparative advantage—the idea that by specializing and trading, both nations could be made better off, even if one were more efficient at making both products. Historically, international trade as a whole has on net increased American productivity, standards of living, and American economic growth. At the same time, however, international trade has imposed costs on some Americans.

In contemporary economics, trade is a mainstay field. Though questions persist about international trade, as in any other active field of economics, when it comes to the causes and consequences of trade, the economics profession has converged toward a consensus—in certain respects. This chapter starts by reviewing the sources of gains from trade and the central importance of comparative advantage, which are areas of universal professional agreement. U.S. trade is then placed in the context of the global economy, including an economic perspective on international trade balances.

The chapter's second section examines how the gains from trade are divided between countries. Trade flows are primarily determined by economic fundamentals like comparative advantage and geography, but policy can also play an important role. Trade agreements are the major set-pieces of modern trade negotiations and, as such, deserve analysis and consideration. Bagwell and Staiger (2001) assert that trade agreements exist to allow nations to commit to a positive-sum approach to trade; Grossman (2016) enumerates the possible political economy incentives of trade agreements, including efficiency gains among parties, improved terms of trade between parties relative to nonmembers, facilitation of multilateral trade liberalization, and provision of rents to special interests. The commitment embodied in agreements is multidimensional. In addition to formal trade barriers such as headline tariffs and import quotas, terms of contemporary international trade also depend on such instruments as nontariff barriers. Trade agreements can have an impact on these measures and can offer an important opportunity to create and maintain foundational ground rules in important areas, including intellectual property rights, labor, and environmental protections. These areas can be critical insofar as international trade can cover several areas that complement and also go beyond the reach of national law, so trade agreements offer an opportunity for trade to operate under rules that promote a level playing field.

In addition to the division of economic surplus between countries, evolving trade patterns can affect the division of gains within countries. Even if a given country has strong trade agreements and experiences positive net gains from trade as a whole, these conditions do not necessarily imply that all its citizens are better off from trade; for instance, though consumers may enjoy lower prices and greater product variety, workers for firms that fail to withstand import competition may find themselves displaced from the labor force. This displacement can have dramatic distributional effects on workers and geographies. The third section identifies the impact of trade on U.S. consumers and workers. A primary concern about trade and trade policy is how the economic surplus created by trade is shared between different segments of the population.

The fourth section examines specific existing trade opportunities for the U.S. in the agricultural and energy sectors. U.S. farmers—benefiting from access to plentiful land, rapid technological development, and well-functioning capital markets—have long exported their excess production. Thanks largely to our Nation's world-leading technology, its refined petroleum products, crude oil, and now increasingly natural gas are available for export around the hemisphere and the globe. The United States also has the largest coal reserves in the world, and could increase its international shipments. Energy exports are a crucial component of the Trump Administration's vision of energy dominance.

The United States is now actively improving its trade agreements to ensure that its trade with its international partners maximizes the net benefits

for the United States. The chapter's fifth and final section thus discusses how new and renegotiated agreements can help shape and improve trade policy.

The Economics of Trade

The international trade literature has highlighted many circumstances in which trade leaves both nations better off. Consider the elegance of the insight expressed in the principle of comparative advantage: People and nations are not equally skilled at all things; but, by specializing in the activities at which they are *relatively* most productive, individuals and nations can enrich themselves by trading the surplus generated from higher productivity for a share of the other goods and services they desire.

In selecting international trading partners, firms are likely to choose their nearest neighbors to minimize transportation costs. Larger nations also make desirable trading partners, because they can produce a wide variety of goods and services that might be attractive and they offer larger markets for exports. These observations are the basis of the "gravity" model of trade—nearer and larger objects exert greater gravitational force on each other (Melitz 2003). Thus, nearer and larger nations are likely to have more trade with one another, all else being equal. We may import exotic goods from the far reaches of the globe, but most trade is likely to be with our neighbors and other large economies.

Expanding the United States' links abroad can offer the advantages of competition: increased productivity, greater economic growth, increased innovation, lower prices, and more variety. New markets may not only provide domestic firms with more potential customers than are available in the local market and a chance to build economies of scale; they also offer the ability to purchase lower-cost inputs—so each can enhance their competitive position. Consumers—and disproportionately, low-income consumers—may benefit as import competition fosters innovation and product differentiation, as well as drives down the prices of goods and services.

The United States has long maintained a policy of encouraging greater economic freedom for all people of the world, with opportunities for free trade as a central tenet of this policy. But not all nations maintain these same policies, and this can distort global markets. Today, for instance, China challenges this U.S. policy and the world order it has engendered through its simultaneous maintenance of a growing domestic market and market-distorting initiatives, like industrial policies.

U.S. Trade in the World Economy

The scope for trade policy is constrained by the natural economic forces that determine trade flows, like geography, resource endowments, and comparative advantage. Although a nation cannot choose its neighbors, its government

can serve the interests of its citizens by shaping a trade policy that respects inherent economic forces. Trade agreements play an important role in allowing nations to commit to specific policies. Two countries might use a trade agreement to mutually obligate to lower tariff schedules, improving their joint welfare. Without the agreement, each would face a unilateral incentive to impose tariffs on the other, potentially to prohibitive levels that would leave the gains from trade unrealized. By the same logic, the agreement provides the partners with opportunities to negotiate over other, nontariff measures that can be substantial impediments to trade. Agreements are legal instruments that facilitate and establish the institutional underpinnings of exchange, including important considerations such as respect for property rights.

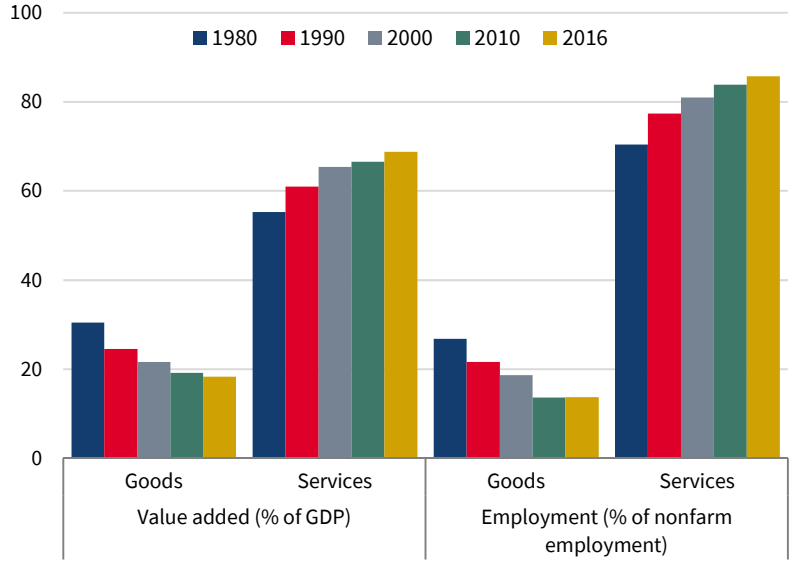
The United States is endowed with factors that provide a comparative advantage for a number of products. But this advantage can and does evolve, and technological change is an important driver of its evolution. Consider a hypothetical situation faced by a State supplying its own energy needs with oil and exporting the excess. When a neighboring State discovers a new oil deposit with lower production costs, it could make sense for the first country to quit extracting oil and buy it from the second one (and thereby save its remaining oil deposits for future generations).

The U.S. economy has changed markedly over time. In the early years of the Republic, agricultural colonies struggled to establish manufacturing for a domestic market. Later, the products of these manufacturers became exportable. In recent decades, the economy has shifted again, as figure 5-1 shows, away from manufacturing and toward service provision industries. Buera and Kaboski (2012) find that the rise in the services share of the U.S. economy has been driven by greater demand for the high-skilled labor that is associated with the country's rising income per capita. Developing economies, including China and India, are likewise making a rapid transition to service dependence as their income per capita also increases. Economists sometimes call service industries "nontradable," because a physical presence is generally required; for example, it is difficult to trade internationally in snow plowing. But technological change is opening new frontiers in service trade, both through online platforms and also via the expanding range of tradable services, like in financial management, consulting, and engineering. Perhaps in the future, satellite-controlled drones will plow snow, creating a new opportunity for international trade.

Traded goods and services have constituted a growing share of U.S. gross domestic product (GDP) over time. From 1970 to 2015, the U.S. economy grew threefold, but the total value of goods and services traded internationally increased nearly eleven times in real terms. Indeed, trade and economic growth are strongly and positively correlated. Frankel and Romer (1999) estimate that a 1-percentage-point increase in the ratio of trade to GDP raises per capita income by between 0.5 and 2 percent. This increasing economic reliance on trade makes trade policy critical to the future economy. It also means that

Figure 5-1. Goods versus Services Value Added and Employment

Percentage of GDP/private nonfarm employment



Sources: Bureau of Labor Statistics; Bureau of Economic Analysis; CEA calculations.

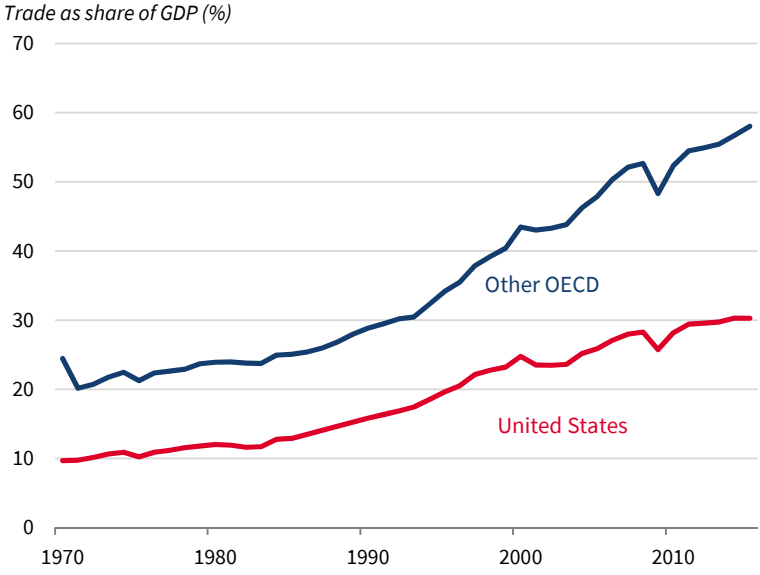
the health of the global economy now matters more to the U.S. economy than it did historically; rising GDP among our trading partners promotes U.S. export growth. Although, in comparison with other major industrialized countries, the United States has an economy that is less dependent on trade, the trends apparent in figure 5-2 reflect a general increase in international trade among developed economies.

The United States' stance on trade has evolved throughout its own history. In the late 19th century, the United States relied on high tariffs by today's standards—in the neighborhood of 30 percent. Tariff revenue accounted for roughly half of Federal revenue from the time of the Civil War until the income tax was imposed in 1913 (Irwin 2010). The Tariff Act of 1930 has a legacy of unintended consequences stemming from limited policy and monetary instruments at that time, lower economic integration than today, exchange rate frictions, and unilateral trade policy (Irwin 2011). For the last 70 years, the United States has advocated freer trade around the world, originally through the General Agreement on Tariffs and Trade (GATT) framework, and later the World Trade Organization (WTO).

Assessing the Gains from Trade

Economists agree that trade can deliver net gains for all nations involved, but debate continues about the best way to identify and to assess these gains, as well as to diagnose opportunities for improving trade policy. Trade affects a

Figure 5-2. Trade Relative to GDP for the OECD and the United States, 1970–2015



Source: World Bank.

wide variety of outcomes—from national income accounts and trade balances, to customs receipts and deliveries of foreign merchandise. One way to assess the distribution of gains between trading partners is to examine the balance of trade. If a country exports more than it imports, it runs a trade surplus; but if it buys more foreign goods and services than it sells, that surplus becomes a deficit. This is true for each bilateral trading relationship, as well as for the aggregate across all trading partners.

Exports and imports of goods and services are components of the U.S. balance-of-payments accounts, which are also known as international transactions accounts. There are three accounts: the current account, the capital account, and the financial account.[1] The current account includes international transactions in goods, services, and income. The income component includes primary income transactions like investment income, employee compensation, and income from reserve assets, as well as secondary income transactions that consist of transfers between U.S. residents and nonresidents. These transfers include government transfers and foreign remittances. The current account balance of the United States reflects earnings on U.S. corporations' foreign direct investment, whether repatriated or reinvested abroad.

[1] The United States closely adheres to international standards (BPM6) for balance-of-payment accounts, with some subtle differences. One salient difference is not adopting new guidance to account for value added on goods in integrated supply chains as service imports, due to data availability concerns. See BEA (2014) for the details. Some readers may recall previous standards (BPM5 and earlier), which merged the capital and financial accounts.

The capital account includes capital transfers and transactions of nonfinancial assets. Capital transfers involve transfers of assets (other than cash or inventories), whereas nonfinancial asset transactions largely cover intangibles such as sales of trademarks or other contracts. The financial account includes several types of investment and monetary reserves: direct and portfolio investments, and currency reserves. Financial account transactions, unlike those in the current account, can change the value of a tradable asset without changing the income or savings for either trading partner.

How can a country afford to run a trade deficit? Because the current account balance largely reflects the trade balance, the current account deficit largely reflects the trade deficit. To sustain a current account deficit, the country must be able to attract investment that offsets the currency depreciation that would normally make imported goods more expensive and exported goods cheaper in foreign markets. To sustain a trade deficit, a country must attract foreign investment to help finance the cost of buying foreign goods. The currency provided by foreigners for investment—for example, in the form of government bonds—comes from net imports of goods and services, which is equivalent to a bilateral trade deficit. The United States has been able to sustain a trade deficit in part because of the role of the U.S. dollar in the global economy (McKinnon 2001); foreigners are happy to hold U.S. dollars and dollar-denominated assets, which they obtain by selling more goods and services to Americans than they buy.

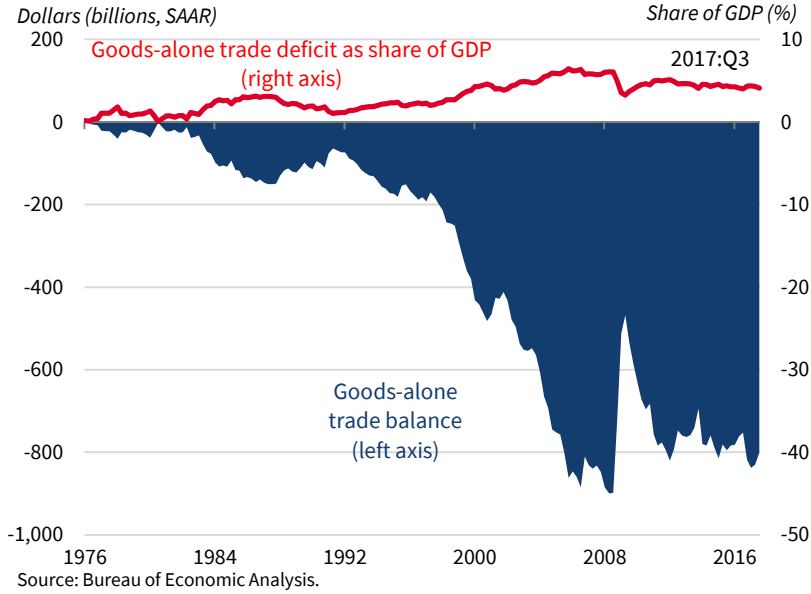
Through the third quarter of 2017 (hereafter, 2017:Q3, etc.), the United States ran a current account deficit of $338 billion. The trade deficit during the same period was $414 billion, chiefly made up of the $597 billion deficit in goods alone; the trade surplus in services was $183 billion, and the nontrade elements of the current account (income balances) had a surplus of $75 billion.

Figure 5-3 shows the evolution of the goods-alone trade balance since 1976, a period when the balance has always been a deficit. GDP has grown more than trade flows over time, resulting in the merchandise trade deficit as a share of GDP stabilizing below peak historic levels, near 6 percent.

The largest share of the current account deficit is goods trade; the United States has imported more goods than it exported in every quarter since the first quarter of 1976. This contrasts sharply with the period from 1960:Q1 to 1976:Q1, when the United States ran a merchandise trade surplus in 52 out of 65 quarters.

The sustainability of a country's external position with respect to the world, and consequently trade and foreign policy, depends on the source of the deficit and on whether current account balances are perceived to be sustainable. If the current account is in deficit because foreign debt is being funneled into high-return domestic investment, then the external deficit may not be of much concern. But an overvalued exchange rate or an excessive level of public or private consumption—which could indicate fiscal profligacy or a

Figure 5-3. U.S. Goods-Alone Trade Balance and Share of GDP, 1976–2017



Source: Bureau of Economic Analysis.
Note: SAAR = seasonally adjusted annual rate.

consumption binge—are sources of current account deficits that are of more concern. Fortunately, policy can address the latter set of issues to bring the resulting trade deficit more into line, because the books have to balance.

One important corrective mechanism for persistent current account imbalances is the adjustment of exchange rates, that is, the value of foreign currency that can be purchased for $1. Continual deficits should result in a depreciation of the U.S. dollar relative to other currencies, all else being equal. This depreciation would naturally make imports more expensive for U.S. purchasers and would make U.S. exports less expensive for foreign buyers, bringing the current account back closer to balance by increasing U.S. exports and decreasing U.S. imports. However, the U.S. dollar is the world's reserve currency, which appreciates the dollar and dampens the natural correction to trade balances (McKinnon 1982). Reserve currency status offers important benefits that should be weighed against the monetary costs for trade policy.

The aggregate trade balance is an important component of the current account balance, which reflects the excess of domestic savings over domestic investment. If a country invests more than it saves, or imports more than it exports, it finances the resulting deficit through foreign borrowing. Such borrowing appears in the financial account, which must balance the current and capital accounts. Because the relationship is definitional, policies that try to affect the trade balance without considering the broader current account balance, or vice versa, will be hard-pressed to succeed in the long run. Trade

policy focused on trade balances must be linked to current account policies (figures 5-4 and 5-5).

A contributing factor to the U.S. goods trade deficit is the strength of the dollar against other major currencies, which places downward pressure on demand for U.S. exports. The contemporary large trade deficit is not entirely unprecedented historically; as recently as the 1980s, the United States faced "twin deficits" of concern—trade and the government's budget—as have weaker European economies in recent years (Trachanas and Katrakilidis 2013). The current account reflects the balance of government, private, and corporate deficits; as any of these components expands, the current account reflects the change.

Earlier historic periods, including the gold specie standard era before World War I and the times of the oil shocks of the 1970s, have been characterized by large trade imbalances around the world. Even today, the United States is not alone in concern over structural imbalances. Fiscal and monetary policies may be more important than trade policies in determining the magnitude of trade balances (Bracke et al. 2010). The distribution of trade balances across trading partners is attributable to a variety of factors that are idiosyncratic to individual countries.

Figure 5-6 illustrates the distribution of goods and services balances across major U.S. trading partners in 2016. All countries show a services surplus offsetting a goods deficit, with the U.S. running a net bilateral surplus only with Canada and the United Kingdom.

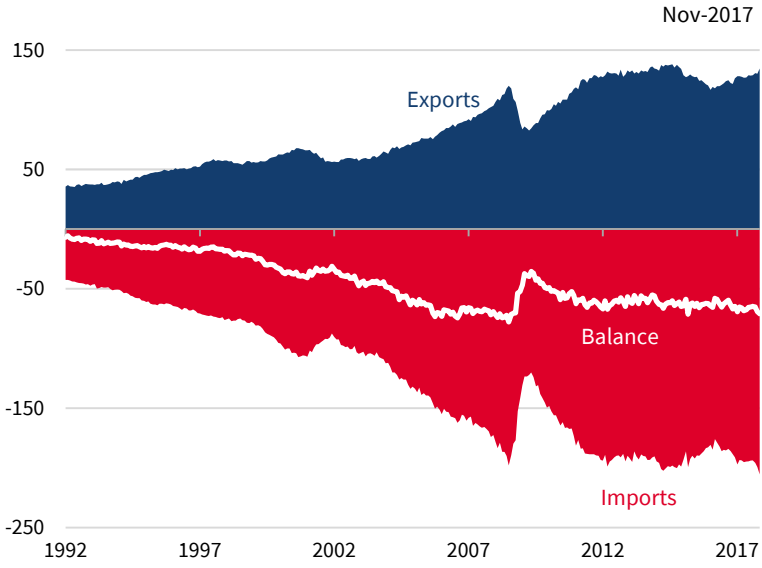
The United States has a bilateral goods deficit and a services surplus with many of its major trading partners. Overall, the United States has a goods deficit and a services surplus with the world. The services surplus is consistent with the structure of the private sector, which has evolved during the last few decades toward more services output as a share of GDP. Many other advanced economies have seen a similar evolution. Among its bilateral trade balances in 2017, the U.S. had the largest goods deficit (through 2017:Q3) with China, at $277 billion (1.44 percent of U.S. GDP); and it had the largest services surplus (through 2017:Q3) with the European Union, at $36.6 billion (0.2 percent of U.S. GDP). Comparing the first three quarters of 2017 with the same period of 2016, the bilateral U.S. goods and services trade deficit narrowed with Brazil, India, Singapore, and South Korea.

U.S. Trade Balances in Perspective

Figure 5-7 illustrates the U.S. trade balance from 1790 to the present, expressed as a share of GDP. From 1790 through 1873, the U.S. trade balance was volatile, in part due to the low trade volumes (Lipsey 1994). The trade balance swung back and forth between surplus and deficit, but was mostly in deficit. From 1873 through the 1960s, the trade balance was mostly in surplus. The largest historic surpluses were during the years 1916–17 and 1943–44, as wartime

Figure 5-4. U.S. Monthly Goods Trade with the World

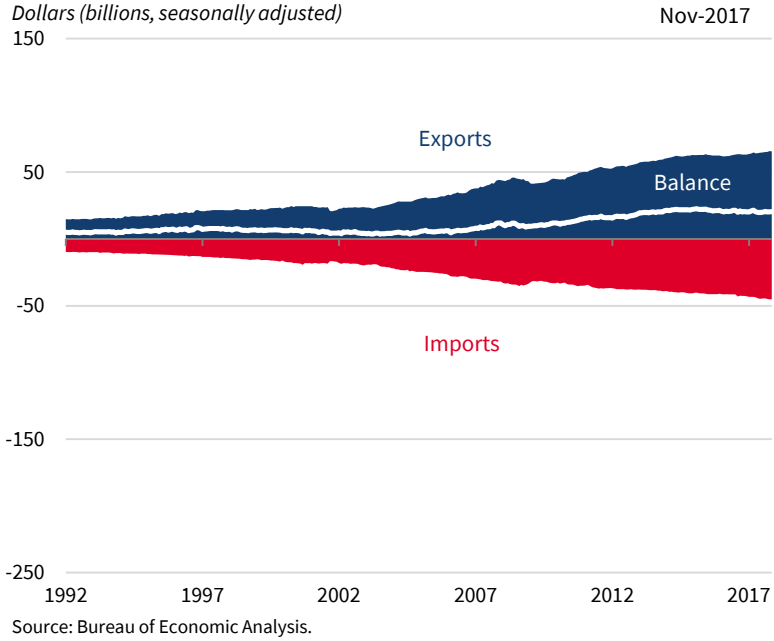
Dollars (billions, seasonally adjusted)



Source: U.S. Census Bureau.

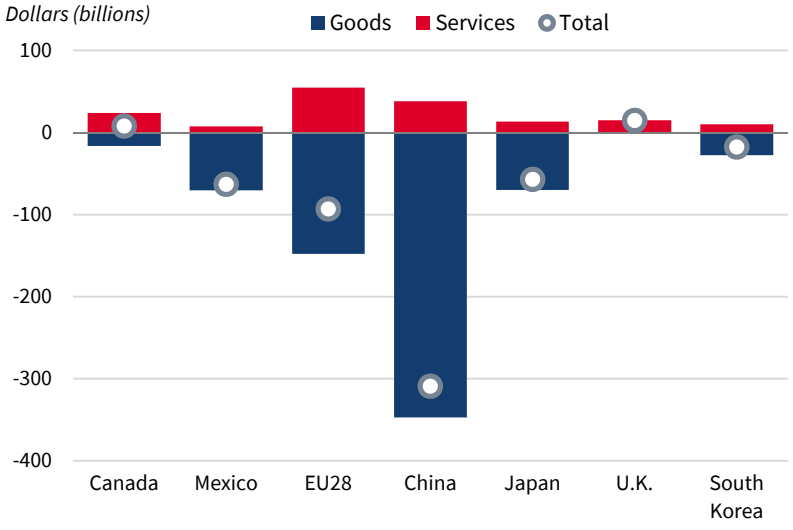
Figure 5-5. U.S. Monthly Services Trade with the World

Dollars (billions, seasonally adjusted)



Source: Bureau of Economic Analysis.

Figure 5-6. Goods and Services Trade Balance, by Country, 2016



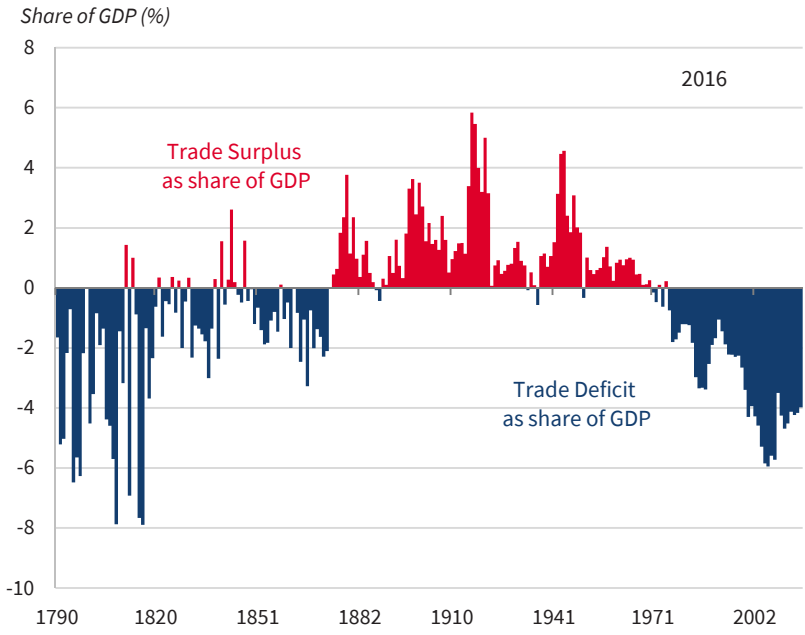
Sources: Bureau of Economic Analysis; CEA calculations.
Note: EU28 = Austria, Belgium, Bulgaria, Croatia, Republic of Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and the U.K.

production and trade with allies predominated. Since 1976, the trade balance has been continually in deficit. The largest deficit as a share of GDP was nearly 6 percent in 2006, a share exceeded in only six other years in U.S. history and not seen since 1816.

Trade policy is not randomly assigned but evolves endogenously; the United States is more likely to reach trade agreements with countries with which it has large trade volumes (Baier and Bergstrand 2007, 2009). Although trade agreements are associated with about twice as much overall trade, the causal impact on the trade balance is unclear, in part because agreements are more likely with countries that would otherwise have higher trade volumes. Nor does the presence of an agreement predict the balance of trade. The United States has free trade agreements (FTAs) with a number of countries—some of which represent net trade surpluses for the United States (Canada and Singapore), and some of which represent deficits (Mexico and South Korea).

This becomes immediately evident when comparing other countries' trade balances with their volume of total trade with the United States. In 2016, the United States ran a trade surplus of $2.6 billion with Canada on a balance-of-payments basis. The U.S. trade deficit with Mexico was $52.2 billion in 2017 through the third quarter, a deficit similar to countries further afield and without FTAs—including Japan ($42.1 billion), Germany ($51.7 billion), and India ($21.0 billion)—over the same quarters. Figure 5-8 illustrates the distribution of trade balances between major U.S. trading partners. The horizontal axis is

Figure 5-7. Trade Balance as a Share of GDP, 1970–2016



Source: Global Financial Data.
Note: Shading indicates trade deficit.

the trade balance, and the vertical axis is the trade balance as a percentage of bilateral trade. The plotted countries account for 98 percent of the United States' total trade balance and 84 percent of the goods-alone trade balance.

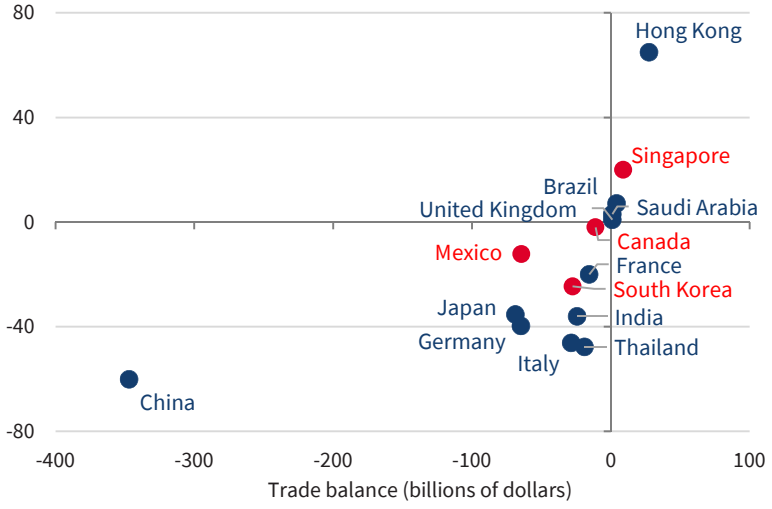
Services Trade

In contrast to goods, the United States' trade in services contributed a surplus of $183.1 billion through 2017:Q3. The U.S. economy has grown more dependent on private service-producing industries, which accounted for 68.9 percent of U.S. economic output value added during the same quarters in 2017. Focusing only on the trade in goods alone ignores the United States' comparative advantage in services, which rose as a share of U.S. exports to 33.5 percent through 2017:Q3. Travel (including that for educational purposes) has constituted the largest share of U.S. services exports. Services trade between countries has continued to grow—given declining travel costs, improvements in telecommunications, and growth in online services that allow, for example, computer coding to take place in remote locations. This allows the United States to export high-skilled services to other countries that do not share our expertise and training advantages.

There are important limitations in the evaluation of service trade data, both because of the intangibility of services and data-related issues. Although goods trade exists in a physical form that is inherently quantifiable—for

Figure 5-8. U.S. Bilateral Trade Balances with Major Trading Partners, 2016

Balance as share of total flow (%)



Sources: Bureau of Economic Analysis; CEA calculations.
Note: Trade data are on a balance-of-payments basis. Red points indicate parties with bilateral or multilateral free trade agreements with the United States.

example, using customs records and shipping manifests—services trade is harder to measure because there is no similar record produced as the service is provided. It can also be difficult to assign industries in the service sector because services can often fall into multiple industry categories, given that services trade data are called by the type of service traded rather than the industry of the supplier.

The Bureau of Economic Analysis (BEA) collects services trade data, primarily using data from surveys of U.S. companies and data from other government agencies. BEA does not publish data for all bilateral service trade relationships, largely because of source data limitations on geographic detail and data confidentiality laws.

Services trade data produced in different countries are difficult to compare because the use of different definitions and estimation methods can result in incompatible bilateral trade balances. Both the United States and the European Union reported a trade surplus with each other from 2010 through 2015; in 2016, both reported a U.S. trade surplus, though there was a discrepancy in the level of $54.8 billion on a balance of payments. This asymmetry was largely due to differing measure of financial and other business services. The United States reported $67.6 billion in service exports to the United Kingdom in 2015, while the U.K. reported $21.2 billion in service imports from the United States. Some of the discrepancy is definitional, as the United States includes the Channel Islands and the Isle of Man, which the United Kingdom omits.

This difference on asymmetries is likely small for most services, but could be larger for financial services, because offshore financial centers are located on the Channel Islands (BEA 2017b). However, the Channel Islands are unlikely to account for the difference of $46.4 billion.

The Department of Commerce, in coordination with the Office of the U.S. Trade Representative and the International Trade Commission, is working with America's foreign counterparts to develop the next generation of trade statistics. This effort aims to fill the need for more complete measures of services trade flows as services grow in relevance for the United States, complementing other efforts to regularize services trade.

Dividing the Pie: Defining Fair Trade between Countries

The United States is the most innovative and dynamic economy in the world, which can provide an enormous advantage in trade. Nonetheless, the question of whether existing trade policies are beneficial to the United States is a question distinct from the question of the underlying dynamism of the U.S. economy. But before considering how trade agreements might be amended to level the playing field and maximize the benefits of trade for the United States, the first task is to identify how current trade patterns are attributable to policies that disadvantage the United States.

The United States has played a leading role in building and maintaining the modern international trade architecture that reduces barriers to trade through both multilateral and bilateral channels. The United States is a founding member of the World Trade Organization, which now includes 164 member economies, which together represent 98 percent of global GDP and 95 percent of global trade. Under the WTO, the United States is party to a wide variety of agreements on trading rules regarding agriculture, antidumping, civil aircraft, customs valuation, dispute settlement valuation, government procurement, import licensing, intellectual property (i.e., under the Agreement on Trade-Related Aspects of Intellectual Property Rights, TRIPS), preshipment inspection, protocol of accession, rules of origin, safeguards, sanitary and phytosanitary measures, services (i.e., the General Agreement on Trade in Services, GATS), subsidies and countervailing duties, technical barriers to trade, and trade-related investment measures. WTO member countries generally set tariffs no higher than negotiated most-favored-nation rates and apply nontariff measures subject to these agreements.

The United States is party to two plurilateral FTAs encompassing eight countries in total—including the North American Free Trade Agreement (NAFTA) with Canada and Mexico; and the Dominican Republic–Central America FTA (CAFTA-DR) with Costa Rica, the Dominican Republic, El Salvador, Guatemala, Honduras, and Nicaragua. These plurilateral trade agreements

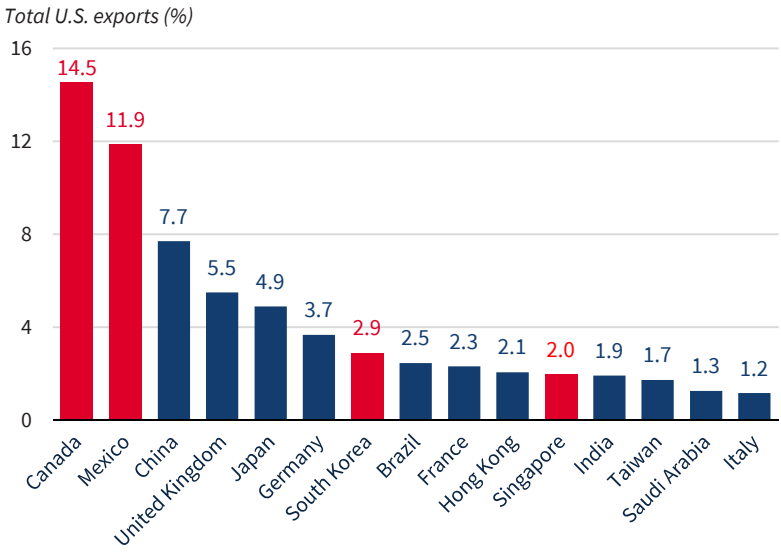
virtually eliminate tariffs on trade among partner countries and set standards to reduce nontariff measures. The United States is party to a further 12 bilateral FTAs, including with Australia, Bahrain, Chile, Colombia, Israel, Jordan, Morocco, Oman, Panama, Peru, Singapore, and South Korea. These FTAs virtually eliminate tariffs over time and set standards to reduce nontariff measures. Among the United States' FTA partners, Canada, Mexico, and South Korea were the top U.S. export destinations in 2016, constituting over 29 percent of U.S. exports, as shown in red in figure 5-9.

The United States also has in place bilateral investment treaties (BITs) with 40 countries, which aim to "protect private investment, develop market-oriented policies in partner countries, and promote U.S. exports" (USTR 2017b). The United States also participates in two sector-specific trade agreement negotiations: (1) Trade in Services Agreement (known as TiSA), an FTA that focuses on services, with 23 countries representing 70 percent of the world's services market and (2) the Environmental Goods Agreement, which seeks to eliminate tariffs on environmental goods such as wind turbines and solar water heaters, with 17 parties representing 90 percent of global exports in environment goods.[2]

Outside the WTO, FTA, and BIT systems, the United States also provides preferential tariff treatment to promote international development goals. The General System of Preferences (GSP) offers duty-free access to the U.S. market for 120 designated countries and territories, covering at least 20 percent of the tariff schedule for all GSP beneficiaries. This access is conditional on compliance with eligibility criteria including adequate and effective protection of intellectual property rights, taking steps to afford internationally recognized labor rights, and assurances of access to markets for U.S. goods and services. In 2016, U.S. imports under GSP were valued at $19.0 billion, accounting for 0.7 percent of total U.S. imports of goods and services. India, Thailand, Brazil, Indonesia, and the Philippines exported the largest amount of GSP goods by value in 2016, while smaller countries such as Georgia, Armenia, Lebanon, and Tunisia relied most heavily on GSP as a share of their exports to the United States. The list of GSP beneficiary countries periodically changes based on factors such as countries' compliance with GSP criteria or through "graduation" from the program as beneficiary countries achieve high-income status. For example, in 2017, the U.S. announced its intention to terminate Ukraine's benefits under the program and to reinstate some of Argentina's benefits (*Federal Register* 2017). The GSP program expired on December 31, 2017. As a result, imports that were previously eligible for duty-free treatment under GSP are now subject to regular duties.

[2] The negotiating parties to the Environmental Goods Agreement are Australia, Canada, Chile, China, Costa Rica, the European Union, Hong Kong, Iceland, Israel, Japan, New Zealand, Norway, Singapore, South Korea, Switzerland, Taiwan, and Turkey.

Figure 5-9. U.S. Exports of Goods and Services, by Destination, 2016



Sources: Bureau of Economic Analysis; CEA staff calculations.
Note: U.S. FTA partners in red; export levels (billions of dollars) are shown above the bar.

The GSP list is not the only trade "preference" program to benefit less-developed countries. The United States also offers duty-free entry for almost all goods to designated sub-Saharan African countries under the Africa Growth and Opportunity Act (AGOA). These countries accounted for $20.1 billion of total U.S. goods imports, 0.9 percent of total U.S. imports in 2016. AGOA is set to expire in 2025. A third program, the Caribbean Basin Initiative, offers duty-free treatment for goods imported from eligible Caribbean island and littoral countries and territories. A fourth program for Nepal was launched in 2017.

The United States also maintains bilateral and multilateral dialogues on trade and investment issues with trade partners under Trade and Investment Framework Agreements (TIFAs). In the absence of FTAs with these countries, TIFAs or equivalent agreements offer a forum to discuss trade-related issues such as on market access, labor, the environment, intellectual property right protection and enforcement, and capacity building. The United States currently has 18 TIFAs with Asian countries, 14 with Middle Eastern countries, 12 with African countries, five covering 19 North and South American countries, and five with European countries.

These agreements cover a broad range of countries and issues. But what do trade agreements do? How do they become so important to American firms, consumers, and workers? To consider these questions, it is helpful to focus on several dimensions of trade policy that are fundamental to trade agreements: formal trade barriers are one important lens, but contingent antidumping

and countervailing duties are also illustrative. Increasingly important over time are non-tariff barriers that include technical barriers to trade and other provisions that are implemented "behind the border." A third area of focus is on institutional frameworks that create the "rules of the game" to bridge trade gaps between national and international law, like intellectual property rights.

Trade Barriers

Barriers to trade block the access of foreign producers to domestic markets. Common examples include tariffs (i.e., taxes levied on imports), quotas, import licenses, and other mechanisms that limit access to the domestic market. By altering the marginal costs of domestic and foreign production, trade barriers can distort the free allocation of capital and prevent producers from specializing in areas of comparative advantage. Under WTO rules, tariffs can be imposed on all goods arriving in a country, regardless of where they originate, subject to members' commitments. Trade barriers can also be set contingently, in response to unfair trade practices. For example, dumping occurs when a foreign firm exports at less than its manufacturing cost, undercutting domestic producers. Government support through subsidies can provide an unfair advantage to foreign producers and thereby place domestic producers at a disadvantage. In response, U.S. law allows for antidumping or countervailing duties in order to address unfair trade practices like these, depending on the cause of the injury, and they are an important tool for modern trade policy.

The United States has led contemporary multilateral efforts to promote trade liberalization. Eight rounds of trade negotiations under the GATT and its successor, the WTO, have contributed to the reduction in average applied tariffs in the world's major industrial economies from more than 20 percent in the late 1940s to about 4 percent today.

In general, countries do not have one tariff rate for all products, instead using tariff schedules that differentiate between products. There are exceptions. Chile and the United Arab Emirates, for example, levy the same tariff on almost all imported products—but most countries discriminate by product. This practice is WTO-admissible, provided that the tariff applies uniformly to all members. The average tariff rate across thousands of products for any given economy can be used to measure the degree of protectionism. Average tariff rates, while often less than 5 percent in industrialized economies, are much higher in less-developed economies. This gap may be partly attributed to nonreciprocal preferential tariffs offered to less-developed economies and the relatively greater importance of trade policy to generate revenue for lower income countries (UN 2016).

Within the WTO system, tariffs can be classified into two broad categories: most-favored-nation (MFN) and preferential. MFN tariffs are levied by WTO member countries in a non-discriminatory manner—all other member states pay the same tariff for the product, unless they belong to a shared preferential

trade agreement. Lower preferential tariffs are determined in trade agreements outside the WTO. Members of certain preferential agreements—such as the South African Customs Union, the European Community, and NAFTA—pay tariff rates close to zero in their joint trade of all products.

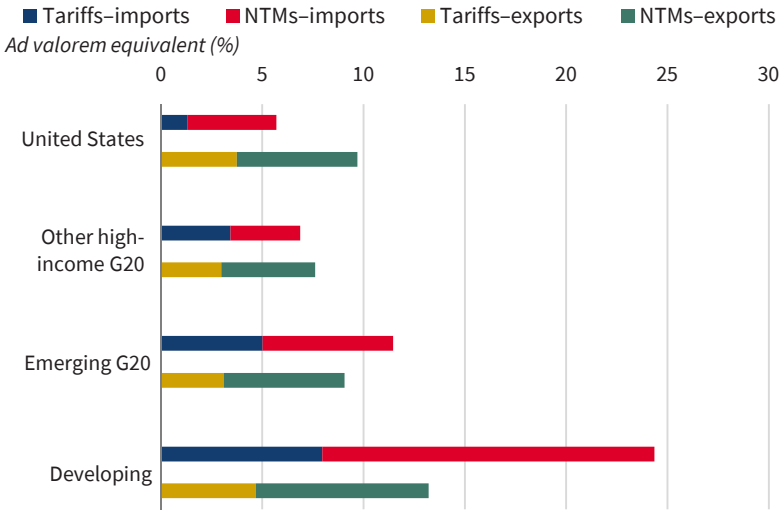
Although the United States imposes among the lowest barriers to trade in the world, substantial formal barriers remain in place elsewhere—especially in developing countries—despite the progress the international community has made to open markets.[3] Figure 5-10 uses estimates from Kee, Nicita, and Olarreaga (2008, 2009) to compare the trade barriers different regions face and impose by calculating the uniform tariff rate consistent with observed trade flows. The indices account for both tariffs and selected non-tariff measures, and thereby capture a richer dimension of trade policy than tariffs alone.

As shown in figure 5-10, U.S. exporters face formal barriers nearly three times higher than those the United States imposes on importers, and nontariff barriers imposed on U.S. exporters are 36 percent higher than those faced by importers to the United States. The United States imposes lower trade barriers than other high-income, emerging, and developing countries as a group, and U.S. exporters face higher barriers to trade than exporters in those countries; taken together, these indices summarize the prevailing imbalance the United States faces regarding trade restrictions. The figure also shows that emerging and developing economies in the figure impose higher tariffs than the markets their exporters target.

Given that tariffs differ across countries, one pertinent policy question is what is the "right" level of tariffs? The disparity between formal barriers for U.S. imports and exports could imply that the United States should erect higher trade barriers, or could imply that other countries should lower theirs. Multilateral institutions have developed with the ostensible goal of moving all countries closer to the example of the United States and other industrialized countries. But terms of trade are not equal, and tariffs are one way to equalize those imbalances. As an example, countries impose tariffs that average 9 percentage points higher for imported products for which the quantity varies little with price (Broda, Limao, and Weinstein 2008). In comparison with the average rates shown in figure 5-10, 9 percentage points is a large change. The economic intuition is straightforward—if exporters are not price-sensitive, then they will bear a greater share of economic costs of imposing the tariff, rather than domestic consumers. Higher barriers may be met by higher barriers in retaliation, or they may be met by horizontal integration and less trade.

[3]Contemporary U.S. tariff rates are low compared with historic norms. As a point of comparison, the average ad valorem rate for imports into the United States in 1913, the last year when tariffs remained the major source of U.S. Federal revenue, was 41 percent; in 1931, after enactment of the tariff-raising Smoot-Hawley Act, the average ad valorem rate was 53 percent.

Figure 5-10. Trade Barriers around the World



Sources: World Bank; World Trade Indicators; other high-income G20 and emerging G20 nations are listed in table 5-1.
Note: NTM = nontariff measures. Developing countries refers to selected non-G20 countries with pop 50 million and with sufficient data available to calculate trade restrictiveness: Egypt, Ethiopia, Nigeria, Pakistan, the Philippines, Thailand, and Tanzania.

Tariff Overhangs

WTO member countries negotiate bound tariff rates, or the maximum allowed tariff rates, across products. They can (and do) apply lower tariff rates in practice, provided that all member countries receive the same treatment. Non-WTO members can apply whatever tariff rates they choose, but their exporters do not benefit from the market access rights and formal dispute-settlement provisions available to members.

Table 5-1 summarizes tariff policies of selected economies; countries are split into three groups: high-income members of the Group of Twenty, emerging economies of the G20, and other less-developed nations with populations of more than 50 million in 2016. Table 5-1 displays the degree to which tariff rates and trade barriers vary across individual countries and products. Agricultural goods remain among the most protected in the world, while the treatment of nonagricultural goods typically varies by type.

Two categories of MFN tariff rates can affect the flexibility of trade negotiations. The *bound* tariff rate is the maximum tariff rate allowable under WTO agreements that can be levied on a given product. The *applied* tariff rate is what is actually levied, and is generally equal to or lower that the bound rate. In practice, applied rates are often much lower than bound rates—particularly when members commit only to high bound rates—with the difference between these two called the "binding overhang." The binding overhang provides a

measure of the negotiating room countries have within international trade agreements to gain concessions through altering formal trade barriers.

As shown in table 5-1, the United States—as a founding member of both the GATT and WTO—applies a "simple average" MFN tariff of 3.5 percent to imports from other WTO members, almost the same as the simple average bound rate, according to WTO tariff data. On a simple average basis, the United States has effectively zero overhang, and therefore very little flexibility to negotiate on trade barriers within the existing WTO architecture. (This situation is similar to that of the EU, which applies a simple average tariff rate of 5.0 percent, the same as its simple average bound rate, according to the same WTO data.) As shown in table 5-1, binding overhangs are typically larger for even other advanced economies, and much larger for emerging and developing countries, affording them more negotiating room. The table also confirms that binding coverage, or the share of tariff lines that are bound at the WTO, approaches or equals 100 percent for most of the world's major industrialized economies.

Observed differences in protectionism are at least in part explained by differential rates of liberalization over time. The United States has historically led by example, binding nearly all its tradable goods at the WTO at very low levels. Other countries—including India and Brazil, both GATT signatories since 1948—have been far less open, preserving high bound rates and avoiding universal binding coverage. Another reason for heterogeneity in tariff policy is the WTO practice of permitting developing and emerging economies to apply higher trade barriers. Tariff liberalization has not kept pace with rapid industrialization among emerging economies, suggesting the need for a serious reconsideration of permissible tariff differentials. More simply, it could be that U.S. leadership has failed to convince other countries to follow suit with respect to liberalization. Unilateral tariff reductions, used rarely in the United States, might be a superficially good way to establish a globalized order, but it leaves the United States with less leverage to renegotiate formal trade barriers that remain quite high in certain corners of the world.

Trade barrier policies among high-income countries *do* display a considerable amount of heterogeneity with respect to tariff peaking, or instances where MFN rates on certain products exceed 15 percent. Among other high-income members of the G20, only Australia and Saudi Arabia display fewer instances of applied tariff peaking than the United States, although both have higher bound levels and tariff overhangs. In an extreme example of tariff peaking, South Korea applied an MFN base tariff of 800.3 percent to imports of "cereals, groats, [and] meal" before the signing the Korea-U.S. FTA (USDA Foreign Agricultural Service Agricultural Tariff Tracker). In another extreme example, Egypt applies a 3000 percent tariff on alcoholic beverages (U.S. Department of Commerce 2017). Binding coverage tends to be far lower for countries in the developing

Table 5-1. Tariff Policy for Selected Economies, 2016

Country	MFN applied rate, simple average	Bound rate, simple average	Binding coverage	MFN rate, agriculture only	MFN rate, manufacturing only	MFN rate, non-agriculture
G20 high income						
United States	3.5	3.4	99.9	5.2	2.4	3.2
Australia	2.5	9.9	97.0	1.2	1.3	2.7
Canada	4.1	6.5	99.7	15.6	2.5	2.2
European Union	5.0	5.0	100.0	11.1	2.6	4.2
Japan	4.0	4.5	99.7	13.1	1.2	2.5
Saudi Arabia (2015)	5.1	11.2	100.0	6.1	4.7	5.0
South Korea	13.9	16.5	94.9	56.9	6.6	6.8
G20 emerging						
Argentina	13.7	31.8	100.0	10.3	15.7	14.3
Brazil	13.5	31.4	100.0	10.0	15.3	14.1
China	9.9	10.0	100.0	15.5	12.1	9.0
India	13.4	48.5	74.4	32.7	8.8	10.2
Indonesia	7.9	37.1	96.3	8.4	7.5	7.8
Mexico	7.0	36.2	100.0	14.6	5.1	5.7
Russia	7.1	7.6	100.0	11.0	8.1	6.5
South Africa	7.7	19.0	96.1	8.5	3.8	7.5
Turkey	10.9	28.5	50.3	43.2	2.6	5.5

world and is even relatively low for India. Tariff peaking likewise tends to be higher among emerging and developing economies.

Responses to Unfair—and Not-So-Unfair—Trade Practices

Antidumping and countervailing duties (AD/CVD) are targeted measures imposed by countries in response to unfair trade practices that lower prices below market value, harming the domestic industry. Most recently formalized in the Uruguay Round Agreement in 1994, AD/CVD orders have been widely applied in particular by low-tariff advanced economies like the United States and EU member states (Prusa 2001), although India has been the most frequent user of antidumping measures, according to the U.S. International Trade Commission (USITC 2010). The WTO Anti-Dumping and Subsidies/Countervailing Measures Agreements establish discipline regarding AD and

Table 5-1. Tariff Policy for Selected Economies, 2016 (continued)

Country	MFN applied rate, simple average	Bound rate, simple average	Binding coverage	MFN rate, agriculture only	MFN rate, manufacturing only	MFN rate, non-agriculture
*Developing, other**						
Bangladesh	13.9	169.3	15.5	16.9	12.4	13.4
Myanmar (2015)	5.6	83.3	18.8	8.6	5.9	5.1
DR of the Congo (2015)	10.9	96.1	100.0	10.9	12.4	10.9
Egypt	17.9	36.8	99.3	61.0	14.2	10.7
Ethiopia (2015)†	17.4	**	**	22.1	21.7	16.6
Nigeria	12.1	120.9	20.1	15.7	14.2	11.5
Pakistan	12.1	60.9	98.7	13.4	11.2	11.9
Philippines	6.3	25.7	67.0	9.8	4.8	5.7
Thailand (2015)	11.0	28.0	75.2	31.0	9.8	7.7
Vietnam	9.6	11.5	100.0	16.3	9.8	8.5
Tanzania	12.9	120.0	14.5	20.5	14.8	11.6

Source: World Trade Organization.

Note: This framework follows Bagwell, Bown, and Staiger (2016). All data pertain to year 2016, except where indicated by parentheses. *Selected other developing countries chosen as those with 2016 populations greater than 50 million. **Indicates nonuser (or unreported user) of the policy instrument. NA = not available. G20 = Group of 20. † Indicates WTO nonmember. MFN applied rate may be higher than the bound rate because of measurement issues arising from aggregation of HS codes and conversion of specific duties.

CVD actions, permitting the imposition of duties when there is evidence of dumping or unfair subsidies

Safeguard actions are likewise contingent, but do not require any allegation of unfair trade practice. Rather, safeguards—which are covered under the WTO Safeguards Agreement and U.S. law—are meant to afford domestic industry a period of adjustment to an environment of increased imports, via temporary import restrictions.[4] In January 2018, President Trump approved U.S. Trade Representative (USTR) recommendations for two new safeguard measures—one for certain crystalline solar photovoltaic products and a second

[4] The Tariff Act of 1930 allows the United States to impose AD/CVD orders. In the United States, AD duties are calculated using the difference between the actual price and the market value price. Countervailing duties address government assistance/subsidies and are calculated to equal the value of the subsidy (U.S. Customs and Border Protection 2017). As of January 23, 2018, the United States had 427 AD/CVD orders in place—the largest share of them targeted China (157), or concerned iron and steel products (222).

for large residential washing machines—the first completed safeguards investigations in the United States in 17 years.

Patterns of contingent trade cases provide insight into which countries' practices are most at odds with established rules. Since 1995, WTO records show that member countries have filed 344 AD and 50 CVD cases against China; indeed, as shown in figure 5-11, from 2001 to 2015 China was named as the respondent in over 29 percent of all such cases, the highest of any WTO member. In addition, between 2002 and 2015 China has also been subject to 32 specific safeguard actions at WTO. These statistics suggest that other WTO members recognize that China often uses trade tactics that others find objectionable.

Economic studies find that AD/CVD orders are effective insofar as targeted imports tend to decline after measures are imposed (Prusa 2001; Besedeš and Prusa 2017). However, despite their wide and targeted use, AD/CVD actions do not always have the desired effect. For example, investigations into the trade in crystalline solar photovoltaic (CSPV) cells and modules have resulted in two sets of AD/CVD being imposed on China and one AD duty on Taiwan in the past five years. Similarly, the U.S. government imposed import restrictions on large residential washer imports from South Korea (2013), Mexico (2013), and China (2017). As evidenced by the recent safeguard cases, neither set of actions sufficiently decreased import penetration. (Box 5-1 gives further details about the solar case.) Still, AD/CVD actions can have real repercussions. In retaliation to AD/CVD orders for solar products, China imposed a retaliatory set of duties on imports of solar-grade polysilicon from the United States, South Korea, and subsequently the EU; this polysilicon is a key input in the manufacture of solar cells, and retaliatory duties directed toward U.S. exports were at least 53.30 percent.

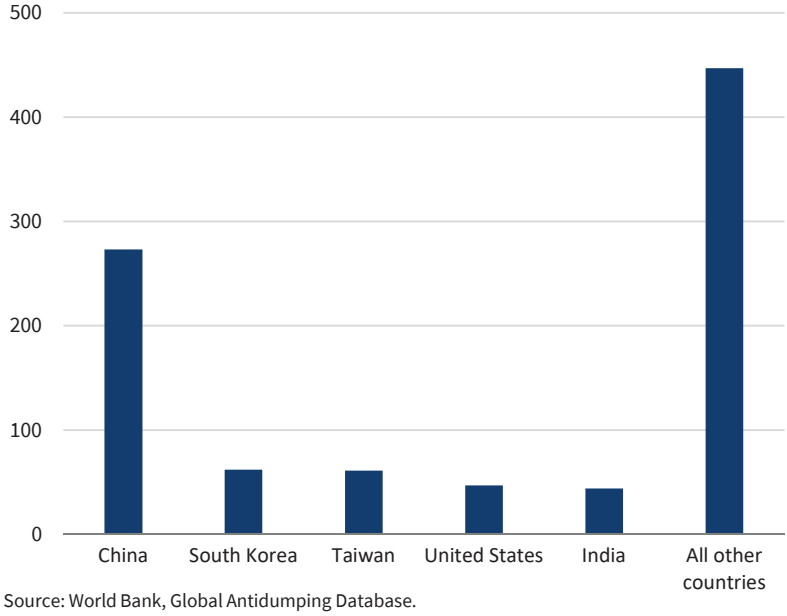
Nontariff Measures

Even though they attract the most attention, tariffs are just one type of trade barrier. Returning to figure 5-10, in many cases they account for less than half of the total trade restrictiveness of a given nation. As multilateral, regional, and bilateral efforts around the world have succeeded in lowering headline tariff rates, other types of barriers have emerged as significant impediments to international trade. These include a broad array of measures, interchangeably referred to as nontariff barriers and nontariff measures. According to the United Nations Conference on Trade and Development (UNCTAD), they are generally defined as policy measures other than customs tariffs that can have an economic effect on international trade, a broad classification that is further grouped into technical and nontechnical measures.

Technical measures include technical barriers to trade (TBT) and sanitary and phytosanitary (SPS) measures. TBT measures cover technical regulations and procedures that assess conformity with technical regulations and

Figure 5-11. Antidumping Measures, 2001–15

Number of measures as respondent country



Source: World Bank, Global Antidumping Database.

standards, except those covered by the SPS Agreement (UNCTAD 2012). They establish labeling requirements, standards on technical specifications and quality (e.g., product weight and size), other measures protecting the environment, and a conformity assessment with those measures. SPS measures seek to protect humans and animals from risks in additives, contaminants, toxins, and disease-causing organisms in their food; humans from plant- or animal-carried diseases; and animals and plants from pests, diseases, or disease-causing organisms, biodiversity, and/or to prevent or restrict "damage to a country from pests" (UNCTAD 2012).[5] These also cover conformity-assessment measures related to those restrictions including certification, testing/inspection, and quarantine. Nontechnical measures include finance measures; special preferences affecting competition; investment restrictions including local content requirements; distribution and post-sales service restrictions;

[5] In the WTO Agreement on the Application of Sanitary and Phytosanitary Measures, an SPS measure is defined as follows: "Any measure applied: (a) to protect animal or plant life or health within the territory of the Member from risks arising from the entry, establishment or spread of pests, diseases, disease-carrying organisms or disease-causing organisms; (b) to protect human or animal life or health within the territory of the Member from risks arising from additives, contaminants, toxins or disease-causing organisms in foods, beverages or feedstuffs; (c) to protect human life or health within the territory of the Member from risks arising from diseases carried by animals, plants or products thereof, or from the entry, establishment or spread of pests; or (d) to prevent or limit other damage within the territory of the Member from the entry, establishment or spread of pests."

Box 5-1. Global Safeguards for Solar Products

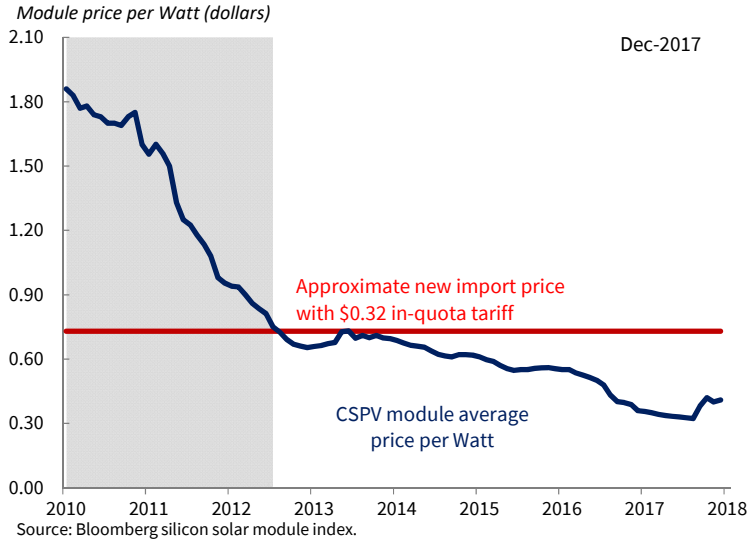
In 2017, a Section 201 global safeguards case was brought in front of the USITC for the first time in 15 years, asserting that imports of crystalline silicon photovoltaic (CSPV) cells and modules injured the domestic industry. Solar cells are assembled into modules, which are commonly used in both utility-scale and residential or commercial installations. This Section 201 complaint followed earlier antidumping actions in 2012 and 2015 that were widely viewed as ineffective. In September 2017 the USITC unanimously determined that an injury had occurred. The petition was filed on behalf of Suniva Inc. and SolarWorld Americas, two U.S.-based solar panel manufacturers. A primary goal of the petitioners is to maintain an integrated cell and module manufacturing industry in the United States.

This Section 201 action follows on the heels of years of the AD/CVD efforts to curtail Chinese undercutting of U.S. producers. The first investigation focused on Chinese imports during the years 2009–11, but the subsequent investigation during 2014–15 expanded the scope to Taiwan as well. The first investigation resulted in imposition of a dumping duty of between 14.78 and 15.97 percent on cooperating Chinese firms. All other imports were subject to a 165 percent duty in February 2015. An additional CVD between 27 and 50 percent ad valorem was required from all Chinese importers at that time. Antidumping duties with an average margin of 19.50 percent were applied on all Taiwanese imports. Yet Chinese firms relocated production facilities to other countries, including Malaysia and Vietnam, to avoid these duties. The level of imports increased. So U.S. firms decided to pursue a global safeguard strategy, which also does not require the allegation of unfair trade practices, rather than a targeted AD/CVD approach.

The petitioners' amended filing with the USITC proposed a remedy consisting of both a quota and a tariff for imported CSPV cells and a separate quota and tariff for imported modules. Solar cells and modules are differentiated products, with imported products dominating the low-cost segment of the market, which is particularly attractive to utility-scale installations. The petitioners claim that the volume and price instruments are needed to provide relief to an integrated cell and module manufacturing industry from cheaper imports that have captured much of the market. None of the USITC commissioners agreed with the petitioners, and individual commissioners made three different proposals. These included a combined quota for cells and modules, and a tariff-rate quota for cells paired with a tariff for modules. The different proposals have slightly different tariff levels and phase out differently over the course of the remedy.

CSPV prices have fallen markedly in the past decade, largely driven by technological change. Module prices fell by 84 percent between 2008 and 2014, and continued to under $0.40 per watt in 2017 (figure 5-i). This price decline has helped push the cost of installed solar generation capacity lower; between 2015 and 2017, the cost of 1 watt of utility-scale generation capacity

Figure 5-i. CSPV Module Prices, 2010–18



Source: Bloomberg silicon solar module index.
Note: CSPV = crystalline solar photovoltaic. Shading indicates a historic market price that is higher than an expected new import price.

fell from $1.80 to $1.03. This cost decrease has made solar power competitive in many markets around the country, and this has boosted demand for solar modules.

The United States currently relies heavily on trade to purchase most of its solar panels. In 2016, domestic manufacturers' market share was 11 percent of the total solar generation hardware market on a value basis. After the initial imposition of AD/CVD duties in 2013 and again in 2015, Chinese solar manufacturing was offshored to other locations, including Malaysia and Vietnam. As a result, the import shares by country of origin have changed noticeably in recent years, but domestic manufacturers have consistently been crowded out.

A factor in this rapid import penetration are allegations of forced technology transfer by Chinese parties. Though the Section 201 process was initiated by affected manufacturing firms, the interrelationship between the policy instruments highlights the interconnectedness of trade issues.

The President elected to impose a four-year remedy incorporating a tariff-rate quota for CSPV cells and a tariff for modules. The cell component is a tariff-rate quota, with a 2.5 gigawatt quota for cells and a tariff imposed beyond that level of imports. The tariff for assembled modules and for imported cells above the quota will start at 30 percent ad valorem in the first year and decrease over the duration of the remedy (USTR 2018).

and behind-the-border policies, including subsidies, government procurement restrictions, and restrictions on rules of origin.

Some nontariff measures protect health, safety, and the environment. In these cases, the imposition of rules helps to minimize the risks associated with certain products, and multilateral frameworks facilitate their adoption by governments. Others amount to deliberate, anticompetitive trade restrictions that act to increase costs for those subject to the barrier. Measures identified as primarily protectionist, or devised with the intent to undermine international competition, may be challenged and addressed through the WTO. Resolving disputes about these issues often takes substantial effort; identifying whether nontariff measures are justified is far more complicated than simply comparing tariff rates against an accepted international norm.

Economists have studied tariffs and formal trade barriers for decades, so their effects are well understood. Nontariff measures are less visible and more difficult to document, yet they are increasingly important as the WTO architecture helps erode formal trade barriers. Extra labeling, licensing requirements, unnecessary standards compliance, or duplicative health certificates clearly raise the cost of doing business and place foreign firms at a disadvantage relative to domestic producers. The literature indicates that nontariff barriers may distort trade even more than tariffs, and that as countries become richer, the trade restrictiveness of their nontariff barriers increases relative to tariffs. Because of their inherent flexibility, nontariff measures can present even greater barriers in certain sectors, including agriculture. Moreover, subjecting questionable nontariff measures to dispute resolution is in many cases a time-consuming process, during which U.S. firms suffer the loss of revenues and market share, as discussed further below.

Nontariff Barriers to Automobile Trade

The automobile sector is illustrative of the types of nontariff barriers faced by U.S. companies. A variety of these barriers are imposed by U.S. trading partners that affect automobile trade. The range and scope of these behind-the-border restrictions in just the automobile industry provides good insight into the importance, effectiveness, and breadth of such measures for restricting trade.

China. Since before China joined the WTO in 2001, it restricted the ability of foreign companies to manufacture automobiles in China by requiring them to form joint ventures with Chinese enterprises, with the foreign partner's ownership share capped at 50 percent. New regulations in 2009 extended this same requirement to the manufacturing of new energy vehicles (NEVs; e.g., electric-, biofuel-, or hydrogen-powered cars). These joint venture requirements raise concerns that foreign manufacturers are being coerced into transferring ownership of their technologies to their Chinese venture counterparts. In the case of NEVs, the USTR reports that China has pursued a variety of additional policies that, among other things, appear to discriminate against imported

NEVs and have generated serious concerns in light of China's WTO obligations. Similar concerns have been raised in connection with imported NEV batteries.

South Korea. Under the U.S.-Korea (KORUS) FTA, both parties agreed to eliminate their respective automotive and light truck headline tariff rates, some of which have already been eliminated, while others are currently scheduled to be phased out in future years. However, the USTR notes that there have been significant problems in implementing KORUS, and the U.S. government is currently seeking to improve the agreement by rebalancing it, including with respect to the auto trade. KORUS also contained provisions nominally designed to address nontariff barriers, most notably allowing for 25,000 cars per U.S. manufacturer per year that are built to U.S. automotive safety standards to be deemed as meeting South Korea's safety standards when imported (USITC 2011). Korea also streamlined its motor vehicle taxes based on engine size so that South Korea's taxes did not disproportionately disadvantage larger-sized vehicles, including U.S.-manufactured vehicles sold in Korea. Additionally, through the Autos Working Group under the KORUS Agreement, the United States has continued to seek progress on a range of additional issues, including Korea's fuel economy standards.

South Korea is considering implementing draft regulations that would require all automobile manufacturers to report vehicle repair histories to purchasers to account for any damage taking place between the manufacturing site and sale to customer. Although this is also regulated in some American States, the USTR reports that these regulations differ in important ways, so as to "create obstacles for imports, as vehicles arriving for overseas often undergo minor reconditioning prior to sale." Given the greater distance that the imported vehicles must travel from the manufacturing plant to the consumer, the USTR has urged South Korea to modify its damage disclosure regulations so that they are reasonable and consistent with international practices. The Korean Ministry of Land, Infrastructure, and Transportation has been requested to draft changes that would recognize American predelivery inspection in Korea rather than at U.S. manufacturing plants as the conclusion of the manufacturing process, so as not to duplicate already-existing robust inspection procedures and not unduly burden foreign automakers. In June 2016, the ministry proposed a rule imposing a floor on damage of more than 3 percent of the manufacturer's suggested retail price for the vehicle required to mandate reporting, which U.S. industry has argued is unreasonably low.

Japan. The United States has expressed strong concerns with the overall lack of access to Japan's automotive market for U.S. automotive companies. A variety of nontariff barriers impede access to Japan's automotive market, and overall sales of U.S.-made vehicles and automotive parts in Japan remain low, ultimately leading one major U.S. automotive manufacturer in January 2016 to cease all operations in Japan.

In recent years, nontariff barriers have included issues such as unique safety and other standards, an insufficient level of transparency, a lack of sufficient opportunities for input in developing regulations, hindrances to the development of distribution and service networks, and the lack of opportunities for U.S. vehicle models imported under the preferential handling procedure certification program to benefit from programs on the same terms as domestic models. These barriers have had the long-term effect of excluding and disadvantaging U.S. manufacturers in the Japanese market.

Colombia. Colombia's policy concerning the registration of trucks over 10.5 metric tons, both imported and domestic, before March 2013 required registrants to either pay a "scrappage fee" to the government or to scrap an old freight truck of equivalent capacity on a one-for-one basis. In March 2013, Colombia changed this policy so that companies could legally register new freight trucks only by scrapping an old freight truck of equivalent capacity—importers and other buyers no longer had the option to pay the fee. Within the first year of the policy's implementation, imports of new freight trucks fell by 65 percent and importers' reported sales-related administration costs rose by $60 million. In the first few years, sales of U.S. exporters fell by $600 million. In September 2016, Colombia announced the termination of the "one-for-one" scrappage policy by December 31, 2018. The existing policy remained in place until February 2017, when Colombia announced a new interim system that requires applying for a scrapping certificate in order to register a new truck. Importers and other registrants must pay 15 percent of the value of the new truck as a fee for the certificate. The number of available certificates will depend on the number of vehicles scrapped. Although this scrapping certificate is not a formal trade barrier, it closely resembles an in-quota ad valorem tariff of 15 percent, subject to a variable quota determined by certificate availability.

Nontariff Barriers to Agricultural Trade

Nontariff measures, especially SPSs and TBTs, are particularly prevalent in the agriculture and food sectors. Given the importance of domestic agricultural production to many countries—and the many different forms of environmental, food, and health concerns—these issues can be particularly contentious. This subsection discusses several examples of how these measures are imposed and become barriers to trade.

Indonesia: import licenses. Indonesia applies restrictive and complicated import licensing to a variety of products, including horticultural and animal products. For example, seasonal restrictions prevent the importation of oranges during Indonesian harvest periods. Beef importer licenses are issued only for specific countries of origin, so importers cannot change sourcing to respond to evolving market conditions. Separately from this issue but also relevant, meat imports are only permitted from approved facilities, but the approval process requires on-site inspection and the inspectors do not in

practice have the resources to inspect all interested U.S. facilities. Beef must be sold at set prices in Jakarta's traditional markets as a condition for continuation of import licenses. Indonesian regulations prevent the importation of poultry parts, an important market for U.S. exporters. After bilateral efforts to address the problems were unsuccessful, the United States began official WTO dispute settlement in January 2013. In December 2016, the WTO found in favor of the United States and New Zealand on 18 out of 18 claims against Indonesia's import restrictions and prohibitions. Indonesia's appeal of that decision was rejected in November 2017

The EU's ban on beef hormones. The European Union bans and restricts the importing of meat produced using various hormones, beta agonists, and other growth stimulants. Therefore, U.S. exporters that do not participate in a verification program for assuring the absence of such banned substances cannot enter the EU market. Scientific evidence has shown that the banned substances may not be harmful to consumers. The EU ban has led to WTO disputes. For example, in 1996, the United States brought a WTO dispute settlement proceeding against the European Communities by saying that the EU beef ban did not comply with its WTO obligations. Although a WTO dispute settlement panel determined that the beef ban was in fact inconsistent with the EU's WTO obligations, the EU declined to remove the ban. The United States retaliated by imposing 100 percent ad valorem tariffs on certain imports from the EU. In September 2009, the United States and the European Commission came to a compromise and established a new EU duty-free import quota for grain-fed, high-quality beef, but U.S. shipments under the quota must still comply with the EU's hormone ban. However, Argentina, Australia, Canada, New Zealand, and Uruguay have begun to compete with U.S. exporters by also shipping under the quota.

Chile's food labeling. Chile currently requires that all prepackaged food and beverage products display a front-of-package black octagonal "stop" sign if the product contains levels of sodium, sugar, calories, or saturated fats that exceed specified thresholds. The threshold is set based on quantities of 100 grams or 100 milliliters, and does not take into account the serving size of the food or beverage product. In addition, if a product is above the threshold level in more than one of these nutrient categories, then multiple stop signs must be displayed. Furthermore, the law restricts the advertising of products that require one or more stop signs, including by prohibiting the use of images deemed appealing to children under the age of 14. This prohibition, in particular the interpretation by Chilean authorities of registered trademarks that constitute advertising to children on product packaging, has been inconsistent. These measures have resulted in costs related to delays, shortages, and repackaging that have proven expensive for U.S. firms. The United States has raised concerns with these measures, both bilaterally and within the framework of the WTO Committee on Technical Barriers to Trade.

Agricultural biotechnology approval. Delays in the approval of agricultural products derived from biotechnology in China, the European Union's members, India, and other countries result in increased market uncertainty among technology providers, farmers, and traders of U.S. corn, soy, cotton, and alfalfa—leading to reduced exports of these products. For example, delays in the EU's approval process for biotechnology crops have prevented these types of crops from being placed on the EU market, even though the biotechnology events have been approved (and safely grown) in the United States. Moreover, the length of time taken for the EU to approve new biotechnology crops appears to be increasing. The EU's own legally prescribed approval time for biotechnology imports is about 12 months—six months for review by the European Food Safety Agency, and six months for the political committee process (i.e., "comitology," in the EU's parlance). However, in practice, total approval times are averaging 47 months.

India: poultry and avian influenza. Since 2007, India has restricted various U.S. agricultural products—including poultry meat, eggs, and live pigs—supposedly to prevent the entry of avian influenza into India. The United States has maintained that, as reflected in relevant international standards, no scientific basis supports this wholesale ban. In March 2012, the United States initiated a WTO dispute by requesting consultations with India. The panel found that India's ban was not based on science and breached several obligations of India under the Agreement on the Application of Sanitary and Phytosanitary Measures. The WTO Appellate Body subsequently upheld the panel's findings in 2015. India has failed to revise its requirements for poultry in a manner that would allow for U.S. imports, and the case continues to be litigated in the WTO.

Defining the Rules of the Game for Trade

In addition to lowering barriers to trade, trade agreements can provide a forum to raise and address trade concerns through dispute settlement mechanisms, including those between one nation-state and another nation-state, and between an investor and a nation-state. Such mechanisms can act as commitment devices that may deter parties from transgressing an existing agreement. In doing so, these mechanisms may overcome the incentive to cheat in order to maximize individual gains. In addition, they can help reduce the policy uncertainty associated with trade relationships by ensuring that parties to trade agreements may formally raise concerns about trade practices. Consequently, the United States has actively pursued cases through the WTO dispute settlement mechanism, and U.S. firms have used mechanisms between an investor and a nation-state in trade agreements like NAFTA.

WTO dispute settlement. The WTO dispute settlement mechanism serves as a process for addressing a variety of tariff and nontariff barriers pursuant to a variety of agreements under the WTO, including safeguards, rules of origin, agriculture, intellectual property, and government procurement. Dispute

settlement became more legalistic when the WTO replaced the GATT procedures with a reformed dispute settlement understanding that ended the right of a responding party to block the adoption of a report and added a standing Appellate Body of Members to review panel decisions. Before that, under GATT, trade disputes were at first addressed using informal consultations, or discussions, between concerned parties; within less than a decade, however, an independent panel process coalesced to examine the evidence and issue rulings in response to complaints about noncompliant trade practices (Davis 2012). The GATT system's dispute procedures were invoked in over 200 cases, and member states generally complied with findings (Hudec, Kennedy, and Sgarbossa 1993).

The efficacy of WTO dispute settlement mechanism remains an area of active debate. Davis (2012) finds that the United States gets better outcomes via formal WTO adjudication than negotiation, increasing the probability that the complaint will be resolved and decreasing the time it takes to remove the barrier in question. Mayeda (2017) finds that the United States has won 85.7 percent of the cases it has initiated before the WTO since 1995, compared with a global average of 84.4 percent. In contrast, China's success rate is just 66.7 percent. Most U.S. WTO cases target China (21) and the European Communities (19). When the United States is the respondent, it still wins 25 percent of the time, a rate that is better than the global average rate of 16.6 percent (Mayeda 2017). In comparison, the EU and Japan have won 0 percent of the cases brought against them, while China has won only 5.3 percent of the time (Mayeda 2017). Nonetheless, because countries may initiate or decline to initiate cases based on their perceived probability of obtaining a favorable outcome in the WTO dispute process, comparisons of WTO dispute statements between countries should be taken with at least some skepticism.

The TRIPS Agreement sets a minimum level of intellectual protection that each government provides and is subject to the WTO dispute settlement mechanism (WTO 2017c, 2017d). Of the 115 cases that the United States has initiated since 1995, 17 have been TRIPS cases, most of which have targeted practices by European countries.

Intellectual property rights. Secure intellectual property rights foster innovation and growth (North 1989; Mokyr 2009). Though it can take years of numerous trials and failures to invent a product and bring it to market, duplication of an invention typically requires significantly less effort. U.S. patents, trademarks, and copyrights typically grant the owners of intellectual property exclusive rights only on a territorial basis—within the United States.

The United States currently leads the world in innovation, due in no small part to a strong legal system that confers exclusive rights and privileges on the owners of intellectual property. The World Intellectual Property Organization, an agency of the United Nations, defines intellectual property (IP) as "creations of the mind, such as inventions; literary and artistic works; designs; and

symbols, names and images used in commerce." U.S. IP can be voluntarily diffused overseas in cases in which U.S. firms provide their IP to overseas partners or participate in joint ventures. In other cases, U.S. firms may agree or be pressured to submit to technology transfer conditions in order to access foreign markets or for other reasons, such as taking advantage of tax preferences, subsidies, and preferences in government procurement. But even firms without international operations may experience theft of their IP or technology by or on behalf of overseas entities. Such theft represents an involuntary transfer of IP abroad through theft, an involuntary transfer of IP that costs the United States between $227 and $599 billion annually, according to the IP Commission (Blair et al. 2017). By way of comparison, the OECD and the EU's Intellectual Property Office have estimated that the global trade in counterfeit and pirated goods alone cost as much as $461 billion in 2013, 2.5 percent of world trade.

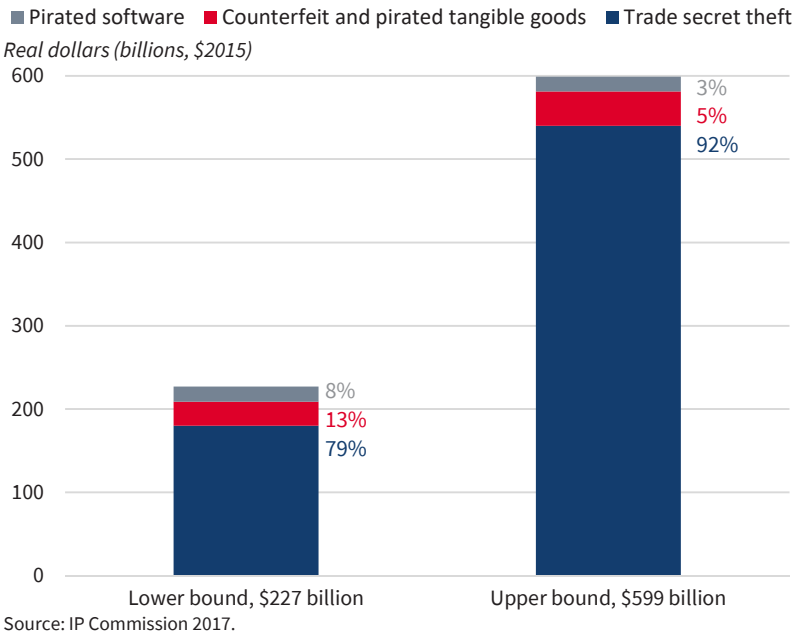
Virtually every industry in the United States either produces or uses IP, but certain IP-intensive industries are an important and growing share of the U.S. economy. These include pharmaceuticals, aerospace, computer hardware and software, electronics, medical equipment, chemicals, and automobile manufacturers. With their high rates of innovative research and development, these industries are special targets for IP expropriation.

Lost IP prevents firms from generating a return on investment in their research-and-development (R&D) costs, thus discouraging them from continuing to invest in R&D and hampering U.S. innovation. As shown in figure 5-12, the theft of trade secrets annually represents $180 billion to $540 billion in value; and pirated software and counterfeit goods combined account for about $47 billion of the costs of IP theft. Precise figures are difficult to come by, in part because firms may not be aware that their property has been stolen, or may be hesitant to publicize a theft that has been detected.

Technology transfer. Technology transfers can occur if governments require a company to transfer its IP in order to access markets in that government's country. For example, Chinese industrial policy includes provisions specifically calling for the acquisition of foreign technology and innovation. In August 2017, the U.S. government launched a Section 301 investigation into China's alleged acts, policies, and practices related to technology transfers. U.S. firms may seek to enter China for reasons including taking advantage of lower unit costs of labor, gaining access to its large domestic market, and making use of integrated supply chains for other markets. To access the Chinese markets, however, stiff entry costs in the form of mandatory IP and technology transfer requirements are sometimes imposed. Among other things, Chinese policies and practices selectively require foreign firms to transfer their technologies to Chinese subsidiaries or joint venture partners to gain access.

The ongoing investigation seeks to assess whether and how four types of Chinese practices hurt U.S. firms: (1) Chinese joint venture and other approval processes that force U.S. companies to transfer technology or

Figure 5-12. Estimated Annual Cost of IP Theft to the U.S. Economy



Source: IP Commission 2017.

otherwise compromise IP; (2) acts, policies, and practices that prevent U.S. businesses from establishing market-based terms in licenses and negotiations with Chinese companies; (3) Chinese government–supported acquisitions or investment in U.S. companies to "obtain cutting-edge technologies and generate large-scale technology transfer in industries deemed important by Chinese government industrial plans"; and (4) Chinese government–supported "intrusions" in U.S. computer networks or "cyber-enabled theft of intellectual property, trade secrets, or confidential business information."

Labor and environmental standards. Because labor and environmental rules are such an important part of domestic regulation, the United States has led the way in including enforceable labor and environmental standards into its trade agreements. The bipartisan Trade Promotion Authority calls for strong, enforceable labor and environmental provisions in all U.S. trade agreements. For example, most recently, the Trump Administration has proposed high-standard labor and environmental chapters as part of NAFTA's renegotiation. By including minimal environmental provisions in a trade agreement, a country like the United States can ensure that its firms and workers compete on more comparable terms with foreign producers.

Typically, these standards include cooperation arrangements and general commitments. For example, U.S. FTAs with Central America and the Dominican Republic, Australia, Bahrain, Chile, Colombia, Jordan, Morocco, Oman, Panama, Peru, Singapore, and South Korea include dedicated labor and

environmental chapters. The United States also requires GSP beneficiaries to comply with specified labor provisions regarding workers' rights.

Enforcement of such labor and environmental standards is difficult, partly because of measurement issues. The Trump Administration has prioritized enforcement of these provisions. For example, in October 2017 the United States took an unprecedented enforcement action pursuant to the Annex on Forest Sector Governance of the United States–Peru Trade Promotion Agreement, and blocked future imports from a Peruvian harvester because of illegally harvested timber found in its supply chain. The Trump Administration will continue to use trade agreements to level the playing field and to improve labor and environmental practices, and it will continue to prioritize enforcement.

Domestic Gains and Losses from Trade

In the pursuit of gains from trade through comparative advantage, international trade can increase total economic surplus, and trade agreements can help determine how that surplus is divided between partners. That said, trade agreements do not necessarily improve the lives of everyone within a country party to that agreement; even when an increase in trade boosts national welfare in the aggregate, there is no guarantee that all residents will be better off because of the change in trade flows.

These distributional implications of trade raise equity issues that demand consideration in the debate over trade policy. Differing empirical findings about the impact of NAFTA offer a helpful example. Hakobyan and McLaren (2016) identify the concentrated job and income losses stemming from the U.S. accession to NAFTA, and contrast those with the gains that the agreement has delivered to the U.S. economy. Meanwhile, other studies suggest the existence of net positive gains from NAFTA for U.S. GDP and employment (Dixon and Rimmer 2014; Cipollina and Salvatici 2010; Hufbauer, Cimino, and Moran 2014), even as they knowledge that there are mixed findings on industry-specific effects. While acknowledging these dispersed benefits, Hakobyan and McLaren (2016) note that a segment of manufacturing workers with low educational attainment lost 8 to 16 percent in wage growth between 1990 and 2000. Conversely, De La Cruz and Riker (2014) found small but positive effects on the wages of skilled and unskilled workers in the years 1994–2013. Though these empirical results differ, the point remains that trade can have differential types of effects across workers and between workers and consumers, underscoring the magnitude of trade's distributional effects.

Domestic Gains

Because trade agreements can expand overseas trading opportunities, they can raise the volume of domestic goods demanded by overseas consumers,

boosting domestic output, employment, and wages in exporting industries. In addition, domestic consumers may find they face lower prices on imported goods and services, lowering the cost of their consumption bundles and leaving them with excess disposable income to fund additional consumption or savings. These effects may be partially countered by a reduction in the demand for domestically produced goods and services in which trading partners have a comparative advantage, reducing the output of these goods and the corresponding employment and earnings in these industries.

Although empirical estimates of the effect of reducing barriers to trade on the domestic economy are positive, they are often modest in size (USITC 2016), because the U.S. economy is very large, and trade with any single partner (or group of partners) is a relatively small share of GDP. Examining regional trade agreements entered by the United States under Trade Authorities Procedures after 1984 (including NAFTA, the Uruguay Round, CAFTA-DR agreements, and several bilateral agreements), the USITC finds substantial increases in imports and exports resulting from their collective implementation, so that the change in aggregate trade flows over all agreements in their analysis sum to about 3 percent. The USITC (2016) estimated their joint effect on U.S. GDP at 1 percent, amounting to an additional $186 billion in U.S. production, or roughly $600 in additional wages and salaries per household, based on the current labor share. Resulting shifts in trade volumes suggest that these agreements generated a significant reshuffling of workers across industries, and led to net employment gains of approximately 1 percent. The report further estimates that regional trade agreements saved consumers up to $13.4 billion in goods pricing in 2014 while providing an expanded variety of goods for purchase.

Domestic Losses

Despite the potential of trade agreements to reduce market prices for tradable goods and expand consumption opportunities of American consumers, workers displaced by trade may experience substantial welfare losses. Trade-based worker displacement occurs when an industry faces new import competition and cannot compete with the flow of international goods and services. Even if workers hold general human capital and are readily employable in a shifting economic landscape, the transaction costs of job loss, job search, and reemployment may be larger than the reduction in market prices for that individual's consumption basket. If workers have skills that are less valuable after trade patterns shift, the welfare costs are more substantial.

Manufacturing Job Losses

A prominently cited impact of increased trade and import competition is that manufacturing employment in the United States has fallen. As a share of total nonfarm employment in the United States, figure 5-13 demonstrates its steady, marked decline during the last 50 years—the result of technological change

and automation, economic recession, and evolving consumer tastes. But international trade also contributes to the demand for manufacturing workers, both through access to foreign markets boosting U.S. exports, and foreign access to the U.S. market increasing import competition.

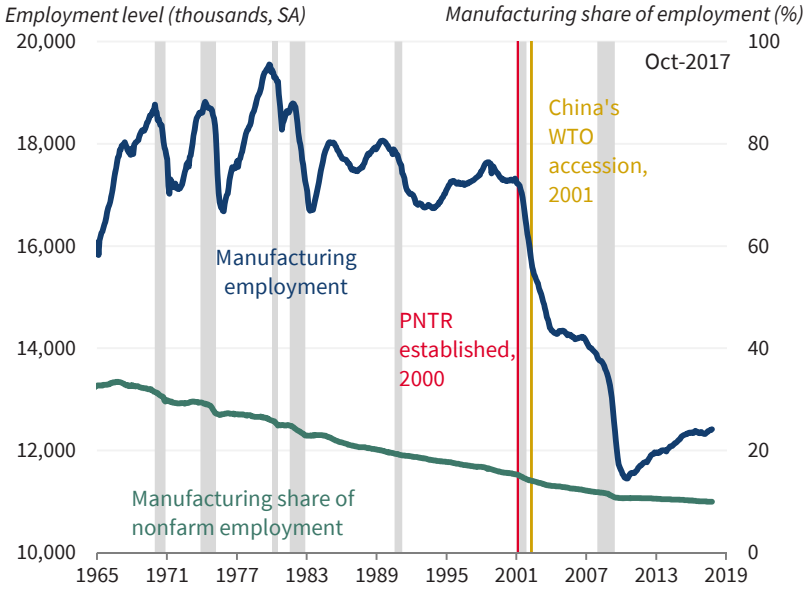
Although employment in the sector has long exhibited procyclicality, it has seen changes since 2000. In the expansionary period from the end of 2000 through 2007, the economy failed to recover the manufacturing job losses it experienced during the previous recession years. Likewise, the current business cycle, which began at the end of 2007, corresponded to a reduction in manufacturing employment of 2.2 million jobs at the trough. The addition of nearly 200,000 manufacturing jobs in the first year of the Trump Administration contributed to a partial recovery of 1.0 million jobs since manufacturing reached its trough at the beginning of 2007.

According to evidence presented in the next subsection, manufacturing employment declines since 2001 were related to changes in international trade and also to the Great Recession and the macroeconomy. Regardless of the causes, rapid losses of manufacturing jobs have large negative consequences for the affected communities and can cause harm with long-lasting effects. Currently, the United States coordinates worker-adjustment policies based on the cause of displacement, though workers displaced by all causes may face similar issues after displacement.

Trade's effects on U.S. manufacturing employment. The adverse employment and wage implications of direct or indirect Chinese import exposure to U.S. industries, particularly the manufacturing sector, have been well recognized (Autor 2010). The literature emphasizes the effects of China's accession to the WTO in 2001 and the corresponding reduction in tariff rates on Chinese imports to the United States, the "China shock," as a defining moment in the history of domestic manufacturing employment. Acemoglu and others (2016) estimate that domestic job losses from Chinese import competition over the 1999–2011 period were in the range of 2.0 to 2.4 million, with manufacturing accounting for 41 to 49 percent of this loss. Caliendo, Dvorkin, and Parro (2015) indicate that China's export growth caused the loss of about 0.8 million U.S. jobs from 2001 to 2007. Kimball and Scott (2014) find that China's accession to the WTO caused 3.2 million Americans to lose their jobs between 2001 and 2013.

These estimates of the effects of import competition on American manufacturing employment show the relatively weak ability of gains from export growth to offset the China shock *within a specific sector*. Although the U.S. also gained access to the Chinese market following WTO accession, relatively lower levels of development in China at the time of its accession implied limited Chinese consumer spending power and weaker export opportunities for the United States. However, other export markets have opened for the United States in recent years, and the job gains from these export opportunities have

Figure 5-13. U.S. Manufacturing Employment, 1965–2017



Source: Bureau of Labor Statistics.
Note: SA = seasonally adjusted; PNTR = permanent normal trade relations.

tempered the net effect of job losses due to Chinese import competition. Feenstra, Ma, and Xu (2017) use exogenous variation in exports to measure the increase in employment attributable to expanded export penetration. Weighing job gains due to increased exports to the entire world against jobs lost due to increased import competition from only China during the period spanning 1991 to 2007, they estimate net job losses of 0.2 million to 0.3 million; however, these authors estimate no net change in employment (e.g., that job gains attributable to exports to the rest of the world offset the job losses due imports from China) when they extend this analysis from 1991 through 2011.

Permanent normal trade relations with China. Other authors focus on the establishment in the United States of permanent normal trade relations (PNTR) with China as an explanation for reductions in U.S. manufacturing employment during the early 2000s. PNTR, notably, resulted in no change in U.S. tariff rates for Chinese imports. But the status change brought certainty that potential future tariff hikes were now low-probability events; low tariffs that were in place and subject to annual renewal were now in place, indefinitely. Pierce and Schott (2016) identify a significant and robust decrease in employment concentrated in industries that were the most exposed to the change in U.S. trade policy toward China to low normal tariffs. The authors hypothesize that PNTR gave U.S. firms the certainty they needed to increase the value of imports from China, resulting in greater import competition facing the U.S. manufacturing sector and a reduction in the demand for U.S. manufacturing workers.

Regardless of whether WTO accession or establishment of U.S. PNTR with China is the proper signal event, Asquith and others (2017) demonstrate that the China shock reduced manufacturing employment from 1992 to 2011 primarily due to firm exits in the aftermath of higher import pressures, and that workers displaced from exposed industries were reabsorbed into sectors that were not exposed to Chinese competition, mainly due to births of new firms.

Who are the displaced workers? A broad trade policy might consider the fate of individuals who bear the heaviest costs of increased import competition. A supplement to the Current Population Survey (CPS) measures the demographics and labor market fortunes of displaced workers, defined as those workers who were rendered at least temporarily jobless in the 36 months preceding the survey because of an establishment closing, a layoff, or insufficient work. CPS survey years 2008–16 capture the period before, during, and after the Great Recession, without the early years of the WTO or PNTR changes with respect to China. The sample includes wage and salary workers not employed in agriculture. During these survey years, manufacturing workers constituted about 18 percent of all displaced workers on average—as shown in figure 5-14, more than in construction; finance, insurance, and real estate; or wholesale trade; but less than in services and retail trade.

Figure 5-15 shows that displaced manufacturing workers during that period were, on average, less educated, and older than (1) displaced workers in other parts of the economy, and (2) nondisplaced workers. These distinctions suggest that it may be physically and psychologically more difficult for displaced manufacturing workers to find new work opportunities. Additionally, a substantially higher share of displaced manufacturing workers were male. Given the declining prime-age male labor force participation rate in the United States, this result suggests that displaced manufacturing workers may be particularly vulnerable to leaving the labor force, a hypothesis we explore in more detail below.

The geographic agglomeration of displacement. When trade patterns change for exposed, geographically concentrated industries, the types of impact—both positive and negative—can also be geographically concentrated. This is the flip side of industry agglomeration that allows firms to take advantage of being near a skilled workforce and being able to imitate competitors. The sharp downturn in U.S. manufacturing employment that has occurred since 2000 largely had an impact on the Southeastern States that have a large manufacturing presence. At the same time, some U.S. border States have benefited disproportionately from NAFTA, given the reduced shipping costs for their producers. Indeed, seven States—California, Florida, Illinois, Michigan, New York, Texas, and Washington—made up more than half of all U.S. exports in 2016.[6]

[6] State-level trade data from the Bureau of the Census is based on origin of movement, making the results skewed toward border States.

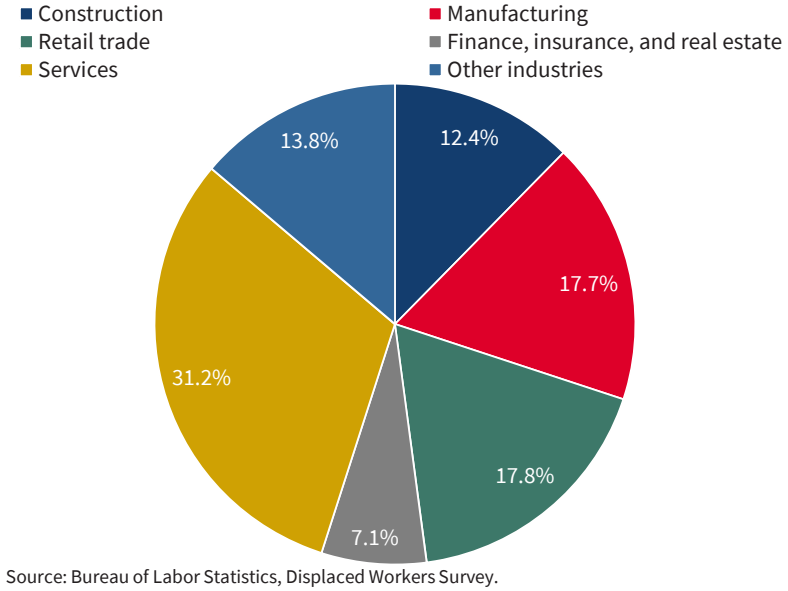
In theory, the efficient firms that thrive in the face of import competition or take advantage of new export markets have the potential to generate new employment opportunities for workers who are displaced due to trade. But regional concentration presents geographic barriers that may delay this reallocation of labor, and recent evidence on geographic mobility indicates that Americans are less likely to move than at any point in the recent past (see chapter 3). The CPS data show that only a small minority of displaced workers, both inside and outside manufacturing, reported moving in response to being displaced, while a far larger share reported finding employment in a different, broad industry category than their predisplacement industry (figure 5-16; industries are defined in figure 5-14). On this dimension, manufacturing workers were 9 percentage points more likely to change industries after job displacement than workers in other sectors.

What happens to displaced workers? Displaced workers may face a variety of obstacles to rejoining the workforce. First, because displacement may occur in agglomerated industries, relocation may be necessary to recover previous earnings levels. Second, displaced workers may face information asymmetries, lacking information on job matches, both local and further afield, that are specific to their particular skill sets. Third, displaced workers may be disadvantaged by a negative signal of quality or skills due to a layoff and therefore face difficulty competing with other job applicants in the labor market. Finally, displaced workers may lack appropriate skills to meet remaining labor market demand as the economy changes. Automation and trade shifts both change the mix of skills demanded in the United States, and the skill-biased nature of these changes implies that less-skilled workers in particular may struggle to find new jobs.

What can we say empirically about the reemployment prospects of workers displaced by trade? The CPS data do not allow us to specifically identify those workers displaced due to import competition, to automation, or to any other change in the economic fortunes of their former employers. Still, these data give a holistic picture of the reemployment patterns of workers, independent of the cause of their displacement, along with the challenges that displaced workers face in returning to the labor force.

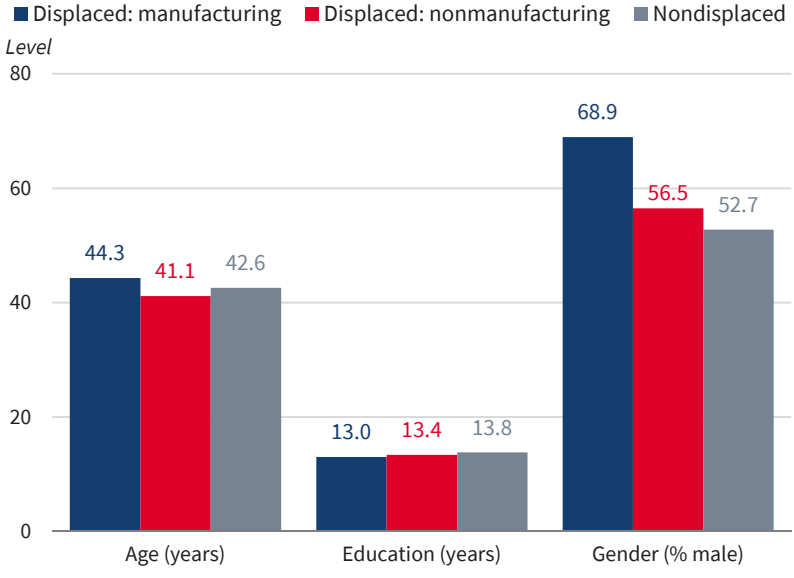
Figure 5-17 provides the reemployment prospects of private displaced workers by industry (excluding government and military workers), highlighting the differences in reemployment and labor market exit probabilities by sector of previous employment. The values in figure 5-17 represent the probabilities of reemployment and labor force exit after controlling for year fixed effects, an important consideration, given the uneven effects of the Great Recession, and after controlling for worker age. Each probability is relative to the outcome for workers in finance, insurance, and real estate (FIRE), whose unconditional reemployment rates are the highest following displacement.

Figure 5-14. Displaced Workers by Industry, 2005–15



Source: Bureau of Labor Statistics, Displaced Workers Survey.
Note: "Other industries" includes agriculture; mining; construction; transportation, communications, and utilities; wholesale trade; government; and military workers.

Figure 5-15. Characteristics of Displaced Compared with Nondisplaced Workers, 2005–15



Sources: Bureau of Labor Statistics; Current Population Survey.

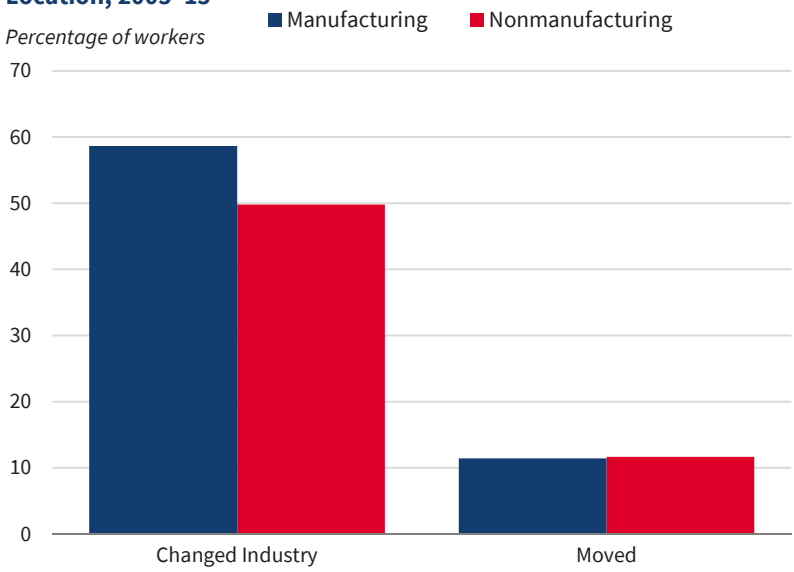
A striking conclusion from figure 5-17 is the substantial labor market disadvantage faced by workers in construction, agriculture, and retail trade industries after displacement. Agriculture and retail trade workers, relative to workers in FIRE industries, were greater than 3 percentage points more likely to exit the labor force following job loss. Construction workers remained in the labor force at rates similar to FIRE workers, but their disadvantage in reemployment was high, at 8 percentage points, compared with 14.3 percentage points in agriculture and more than 5 percentage points for retail trade workers. Again, these differences are after controlling for differences in the year of displacement and age at displacement.

Employees in the manufacturing, wholesale trade, transportation, communication, and utilities sectors fared somewhat better than those in construction, retail trade, and agriculture, experiencing differences in labor force participation rates after displacement of 1.1 percentage points or less relative to FIRE workers. But their reemployment prospects were still far weaker, a disadvantage of between 3.2 and 5.7 percentage points. At the same time, the employment and participation outcomes for workers in services were similar to FIRE workers, as were outcomes for mining workers.

These data are somewhat consistent with the results of Autor and Dorn (2013), who find that workers with abstract skills are substantially more likely to be reemployed after displacement and substantially less likely to exit the labor force. Using years of education as a proxy for abstract skills, the industry categories given in figure 5-17 are sorted from highest average years of schooling to lowest for displaced industry workers in the CPS sample. (FIRE has the highest average.) Thus, the blue bars in the figure demonstrate that reemployment prospects are increasing with the educational attainment of displaced workers. In this sense, displaced mine workers are real outliers, experiencing higher reemployment prospects than their ordering in the average educational attainment of industries would indicate. The ranking of labor force nonparticipation for formerly displaced workers in figure 5-17, however, does not as clearly conform to Autor and Dorn's predictions; no clear pattern of eventual nonparticipation by industry average education level is apparent.

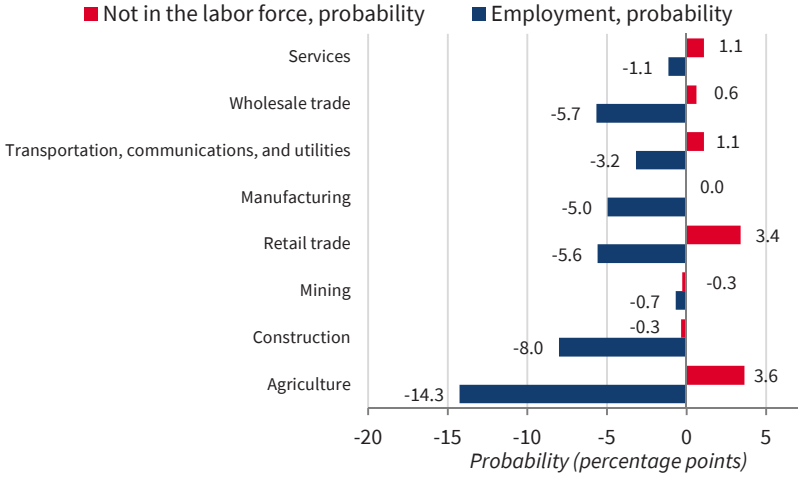
Current solutions: trade adjustment assistance. Trade Adjustment Assistance (TAA) provides job training, job search, and relocation assistance to U.S. workers displaced by trade. Although TAA has been in place since 1962, analyses of the program's efficacy provide notably mixed results. Schochet and others (2012) note that TAA participation hurts workers' financial prospects, relative to similarly displaced workers who did not participate in TAA. A 2007 evaluation of the TAA program by Reynolds and Palatucci (2012) found that only 1.4 percent of TAA participants used relocation allowances. Additionally, a 2010 evaluation by Dolfin and Beck (2010) found that the number of TAA participants who received relocation allowances was not significantly different than the number of TAA nonparticipants who received reallocation allowances

Figure 5-16. Share of Displaced Workers Changing Industry or Location, 2005–15



Source: Bureau of Labor Statistics; Current Population Survey.
Note: Industries are 11 broad categories from the 1990 Census industrial classification codes.

Figure 5-17. Probabilities of Employment and Labor Force Nonparticipation Transitions for Displaced Workers, by Industry Relative to Finance, Insurance, and Real Estate, 2005–15



Sources: Bureau of Labor Statistics; Current Population Survey.
Note: Blue and red bars represent regression coefficients from a linear probability model of employment and labor force nonparticipation, respectively. Regressions include age fixed effects and year of displacement fixed effects. All values are relative to employment and nonparticipation probabilities of workers in finance, insurance, and real estate.

from sources such as unemployment insurance claims, an indicator that relocation allowances were not a highly utilized part of the TAA program.

In the newest literature on this topic, Hyman (2018) relies on quasi-random assignment of TAA cases to different investigators and employer-employee matched Census data on 300,000 displaced workers, to assess TAA's effects on labor market outcomes. Hyman finds that the program fails to facilitate long-term adjustment. Although training under the program leads to large initial returns—$50,000 in additional cumulative earnings over a decade—such gains do not persist past 10 years. Hyman attributes the initial gains to both rising incomes and increased labor force participation. But TAA-trained workers tend not to participate in other Federal retraining efforts that would result in further formal education (e.g., Workforce Innovation and Opportunity funds, or WIOA), depressing longer-run returns. However, the nature and length of training may be different among these programs. Geographically, depreciating returns are concentrated in States with shorter training programs. Unsurprisingly, returns are concentrated in the most affected regions, where workers are likelier to switch industries and move in response to TAA training.

Other possible solutions. Beyond worker retraining efforts in TAA or WIOA, what other possible solutions to the labor market adjustment costs facing displaced manufacturing workers are available? We do not attempt an exhaustive list here, but we note that the Administration's emphasis on apprenticeship models for worker training are well positioned to assist displaced manufacturing workers.

One particular challenge for displaced workers, who are older and more likely to face short-term household budget pressures, is funding their retraining efforts while still making household financial deadlines. Designing Federal programs to deliver financial support to displaced workers during their retraining efforts would help relieve these pressures and allow workers to make more strategic long-term investments in their financial security through apprenticeships (which are sometimes, but not always, paid) or other medium-length training programs. Without financial support, some workers will find it necessary to quickly take a new job, even if it is not in their long-term best interest. TAA Trade Readjustment Allowances are payable during approved retraining periods for workers determined to be TAA-eligible. (For more on related issues, in the context of the Tax Cuts and Jobs Act of 2017, see box 5-2.)

Trade Opportunities for the United States

Trade can create opportunities for both producers and merchants in the United States to export products to the rest of the world. And U.S. policy can help to ensure that these opportunities come to fruition and deliver economic gains to Americans.

Box 5-2. Distressed Communities and the Tax Cuts and Jobs Act

As pressures from trade and technology have reduced the economic viability of American manufacturers, factory closings have left communities that relied on their jobs in distress. Job losses in distressed communities have had obvious negative effects on income and economic well-being, but also on health and mortality, including mortality from suicide (Sullivan and von Wachter 2009; Classen and Dunn 2009). Effects on the children of unemployed workers are also apparent (Schaller and Stevens 2011). Also, job loss effects are not confined to former manufacturing workers and their households; local aggregate demand falls with plant closings, inducing further consequent job losses—for example, in the service sectors. Housing markets also suffer, affecting the tax base for schools and other public goods.

In the years after the Great Recession, labor markets recovered in most of the country, even as some communities were left behind. Uneven recovery motivates households to consider migration as a way out of local unemployment and underemployment. But migration is not costless, and the overall declining proclivity of Americans to move (see chapter 3) implies the need for a rejuvenation of local job growth as one component of any policy strategy to address local employment losses. The agglomeration of trade-dependent industries makes local retraining and revitalization projects an important domestic dimension of trade policy.

The Federal government has an active set of policies to encourage investment and job creation in distressed communities, including Empowerment Zones, Enterprise Communities, Renewal Communities, and New Market Tax Credits (NMTC). The NMTC—arguably, the most successful of these programs—is structured to induce "patient" capital, providing substantial investment incentives if assets are held over a full seven years. As a result, although the majority of NMTC recipients would not have otherwise invested in the benefiting community, real estate has been the investment of choice, both because real estate returns are naturally long-run and because these investments clearly complied with NMTC regulations (Bernstein and Hassett 2015). But real estate is likely not the most effective tool for job growth, and the program is reportedly difficult for entrepreneurs to navigate.

During the past two years, bipartisan support has developed for a new program to encourage investment in distressed communities, and the Tax Cuts and Jobs Act of 2017 greenlighted the designation of Opportunity Zones to drive this investment. The Investing in Opportunity Act—original, bipartisan legislation sponsored by Senator Tim Scott (R-SC) and Senator Cory Booker (D-NJ) and Representative Pat Tiberi (R-OH) and Representative Ron Kind (D-WI), alongside nearly 100 additional cosponsors—has three key features. Opportunity Zones are limited to low-income areas that have recently experienced unemployment due to business closures or relocation. States designate particular Census tracts as Opportunity Zones, subject to particular socioeconomic criteria. They are meant to establish an investment

vehicle that pools assets from a group of investors, much like a venture capital or mutual fund for distressed community investment, to spread risk and increase the scale of investment. Finally, to incentivize investors to place capital in Opportunity Funds, the Opportunity Zone program provides investors with the option to temporarily defer and modestly reduce capital gains taxes if they keep capital in an Opportunity Fund for a period of time.

U.S. Agricultural Trade

The United States enjoys comparative advantage in many types of agricultural production thanks to ample land, favorable climate, and smooth integration of human, financial, and intellectual capital into production. Export markets are crucial to U.S. agricultural producers because American farmers produce more than American consumers can eat. The United States leads the world in agricultural exports, and runs a trade surplus for agricultural goods. The top three export markets for U.S. agricultural products in 2016 were China, Canada, and Mexico; together, these three countries accounted for 44 percent of all agricultural exports (ERS 2017a). Exports are especially important for certain products. The Department of Agriculture (USDA 2017a) estimates that American producers will export on average 76 percent of the cotton, and virtually half of all the wheat, soybeans, and rice they grow to the rest of the world, from the fiscal year 2016–17 through 2026–27 crops. In general, the United States is a major exporter of bulk agricultural commodities like coarse grains and meat, and a net importer of consumer-oriented, processed goods that provide Americans with variety, like wine, beer, and out-of-season fresh fruits and vegetables. The USDA (2017b) forecasts agricultural exports at $140 billion for fiscal year 2018. This includes $33.1 billion in oilseeds and products (including $24.1 billion in soybeans); $29.4 billion in grain and feed (including corn); $29.7 billion in beef, poultry, and animal by-products; $34.5 billion in horticultural products; and $4.8 billion in cotton.

Export markets present a growth opportunity for U.S. agriculture. Agricultural exports have grown substantially over time, as shown in figure 5-18, consistently contributing to a trade surplus for decades; today, they account for about a third of American farmers' gross cash income (Schnepf 2017), up from less than 20 percent before the mid-1970s, and less than 10 percent before the mid-1940s. By 2050, population growth and increasing standards of living are expected to require global agricultural production to increase 60 percent from the level of 2005–7 (Alexandratos and Bruinsma 2012). U.S. agriculture is well positioned to supply a large share of this rising demand, provided productivity improves and trade barriers do not prevent U.S. farmers from expanding their access to new markets and consumers.

Agricultural trade is distorted worldwide. Governments around the world have long intervened in agricultural and food markets. Interventions distort price signals and draw resources into inefficient forms of production, shifting them from areas where they could be used more productively. Figure 5-19 shows that even as high-income economies have reduced government interventions in markets for nonagricultural goods, their history of interventions in agriculture is much more heavy-handed.

Interventions in agriculture include domestic supports like production, insurance, and income subsidies, and directed trade policy like import restrictions and export controls. Both sets of policies transfer wealth between domestic consumers and producers. Governments offer several reasons for the special protective treatment of agriculture:

- to make sure enough food is available to meet domestic demand,
- to shield agricultural producers from volatile weather and market conditions, and
- to preserve rural society.

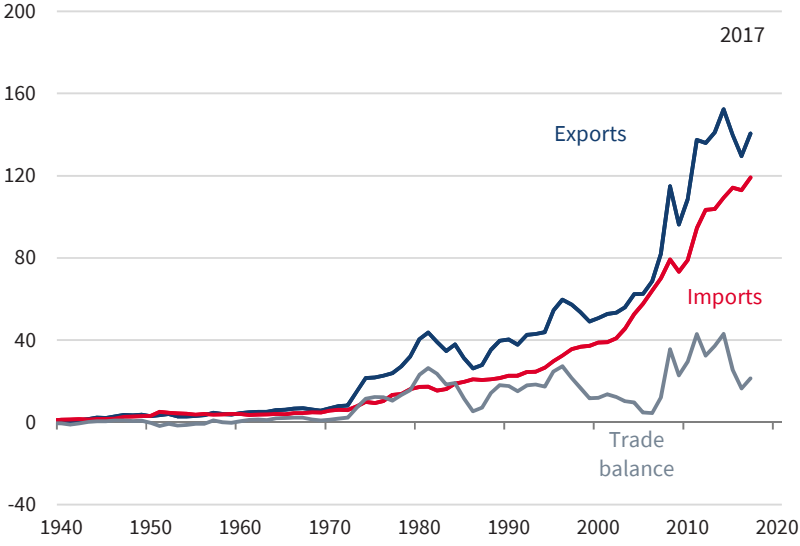
But by restricting trade and warping market signals, these policies also amplify international price spikes (Martin and Anderson 2012; Carter, Rausser, and Smith 2011), undermining living conditions of people around the globe. Anderson, Cockburn, and Martin (2010) estimate that agricultural market interventions accounted for 70 percent of the global welfare cost of all goods-market distortions, even though the sector represents just 6 percent of world trade and 3 percent of world GDP.

Under the WTO architecture, tariffs for nonagricultural goods have fallen steadily worldwide, but agriculture has not liberalized at the same pace. Despite efforts aimed at their reduction, higher barriers to trade persist, through direct restrictions like tariffs, along with a variety of nontariff measures. Figure 5-20 recreates figure 5-10 for only agricultural products, and presents tariff and overall trade restrictiveness for agricultural goods among the United States, other high-income members of the G20, emerging nations in the G20, and select countries in the developing world. Like figure 5-10, it depicts a similar overall pattern in terms of differential trade restrictiveness for agricultural products: the United States applies lower tariffs and trade barriers to agriculture than the average high-income nation, emerging economy, and developing country—however, the restrictiveness magnitudes are much higher. U.S. exporters also face notably higher barriers to trade for their agricultural exports, compared with exporters from the average high-income or emerging member of the G20. While further liberalization of agricultural trade will benefit consumers around the world, it would likely also benefit U.S. exporters.

The U.S./EU discrepancy in agricultural market protection. One example of the discrepancy in agricultural market access between even high-income countries is illustrated by the varying levels of import restrictions applied by the United States and the EU, two of the world's major producers that together

Figure 5-18. U.S. Agricultural Imports, Exports, and Trade Balance by Value, 1940–2017

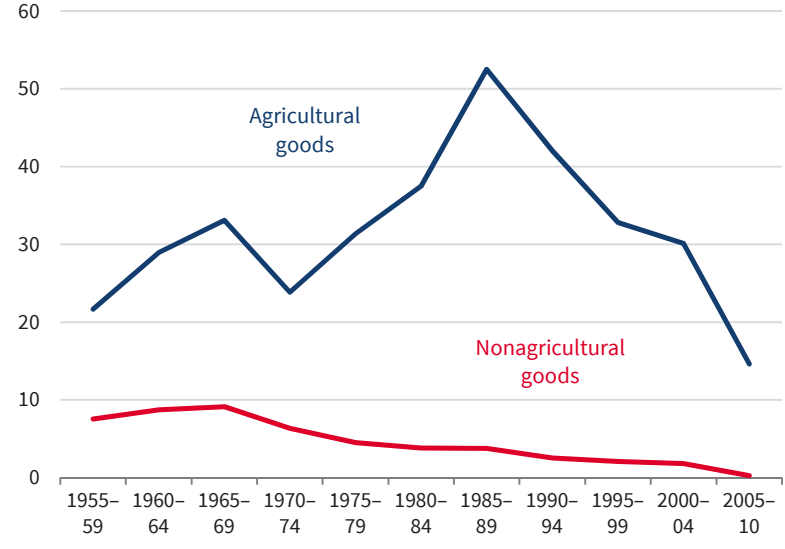
Dollars (billions)



Source: U.S. Department of Agriculture, Economic Research Service.

Figure 5-19. Government Support of Agricultural and Nonagricultural Goods in High-Income Countries

Ad valorem equivalent (%)



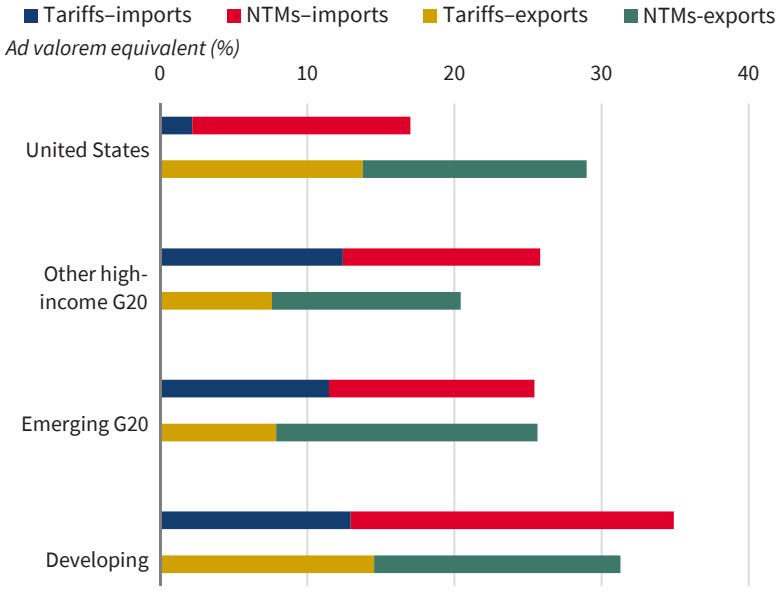
Source: Anderson, Rausser, and Swinnen (2013).

account for close to 40 percent of global agricultural trade. Agricultural trade between the two has decreased over time, due in part to the relatively high trade barriers that the EU places on U.S. agricultural exports (ERS 2016)—as shown in figure 5-21—even as overall trade between the United States and the EU has grown. In terms of simple averages for all traded goods, the United States levies a tariff of 3.5 percent on EU exports, while the EU charges 5.5 percent for U.S. exports. For agricultural commodities alone, however, the comparable rates are 4.7 percent and 13.7 percent, respectively. Many goods, including dairy and meat products, face far higher tariffs from the EU than vice versa (Beckman et al. 2015). These rates do not include EU nontariff measures that combine with tariffs to present significantly higher barriers to U.S. exports of meat products, corn, soybeans, and fruits and vegetables (Arita, Beckman, and Mitchell 2016).

Investing in productivity and negotiating trade agreements. Increases in American agricultural production are mainly due to innovations and advances in technology, in areas such as crops, livestock breeding, fertilizers, pest management, farm practices, and farm equipment and structures (Clancy, Fuglie, and Heisey 2016). Productivity-enhancing innovations rely on funding from both the public and private sectors. Although public investment in agricultural research has resulted in large economic benefits with annual rates of return between 20 and 60 percent (Fuglie and Heisey 2007), real public research investment in the United States is declining. The United States accounted for 20 to 23 percent of global public sector funding for food and agricultural R&D between 1990 and 2006, but fell behind China beginning in the late 2000s (Clancy, Fuglie, and Heisey 2016) and has since remained behind. By 2013, the United States' share of worldwide research funding fell to just 13 percent.

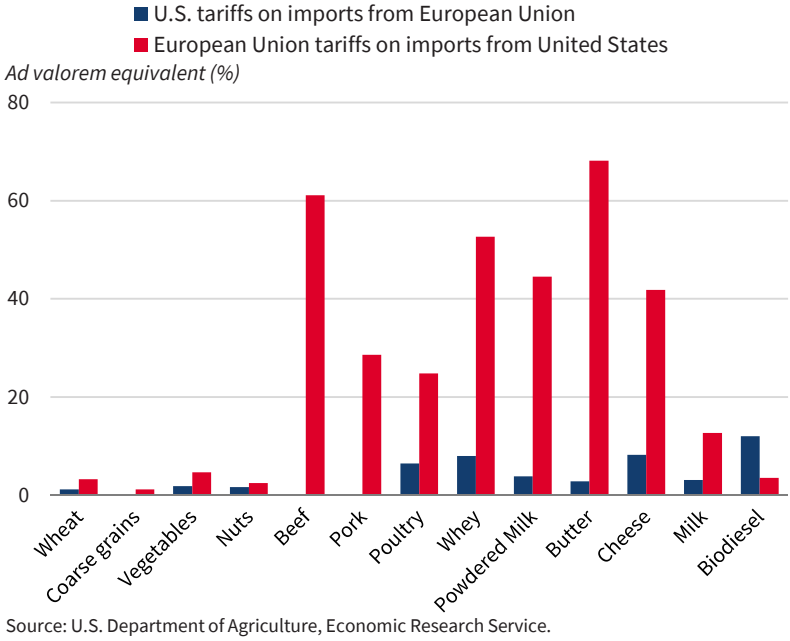
Market access supports U.S. farmers. Free trade agreements help expand U.S. agricultural exports into foreign markets. The United States' 20 current FTA partners represent 10 percent of the world's GDP and 6 percent of its population, but account for 43 percent of U.S. agricultural exports, an increase of 29 percentage points since 1990 (FAS 2016). Even though farming accounts for a relatively small share of the U.S. economy, agricultural trade makes significant and outsized contributions to GDP. Based on 2015 data, USDA's Economic Research Service estimates that each $1 billion in U.S. agricultural exports supports approximately 8,000 jobs throughout the economy, and each $1 in agricultural exports stimulates an additional $1.27 in business activity (ERS 2017b). These indirect activities include facilitating the movement of exports to their final destination. ERS (2017b) reports that U.S. agricultural exports in 2015 supported over 1 million jobs both in and outside agriculture, and also generated $302.5 billion in total economic activity.

Figure 5-20. Comparing Agricultural Trade Restrictiveness



Source: World Bank.
Note: NTM = nontariff measures.

Figure 5-21. Tariffs on Agricultural Imports



Source: U.S. Department of Agriculture, Economic Research Service.

U.S. Energy Dominance Relies on Trade

Current trends indicate that the United States may become a net energy exporter by 2026. Historical U.S. dependence on crude oil imports makes this vision seem farfetched—as recently as 2005, net imports accounted for 60 percent of domestic oil and petroleum product consumption. Even a decade ago, when over 40 percent of the total trade deficit was attributable to petroleum imports, a future where the United States was relatively independent of energy imports was inconceivable. The outlook today is decidedly different. As shown in figure 5-22, the petroleum trade balance was 12.4 percent of the total trade deficit in 2016, the lowest observation since 1991.

Between 2008 and 2017, domestic petroleum production nearly doubled and natural gas production increased by one-third, facilitated by technological improvements that enabled profitable production from resources once considered too costly to exploit. Widespread private ownership of mineral resources in the United States is unique in the world, and the willingness of mineral owners to form partnerships with developers has contributed to the observed rapid increase in production. Realizing the goal of increased exports requires specific infrastructure investments to allow for increased capacity, but also the security provided by enhanced FTAs that expressly address energy trade.

All fuels have a role to play in U.S. energy dominance. In 2017, coal exports expanded by nearly 60 percent year on year, and the industry's prospects are looking up. In natural gas, the United States is the world's leading consumer and among its leading producers, so gains can be had in increasing extraction and domestic distribution. But increasing its international trade by transporting liquefied natural gas (LNG) requires more liquefaction capacity to permit increased exports, and an expansion of pipeline links to Mexico and eastern Canada to allow more terrestrial exports. Increasing American exports of crude oil and refined products will further exploit the U.S. comparative advantage and lock in the manufacturing value-added characteristic of oil refining. Continued integration of renewable electric generation technologies into the American grid would allow for low-cost, resilient domestic electric generation. Finally, the United States has been a historic leader in civil nuclear technology, and opportunities for exporting these technologies may arise in coming years.

Coal. The United States has the largest coal reserves of any country in the world. Until the Trump Administration took office, the economic prospects for coal in the U.S. appeared bleak in the years after 2008, when U.S. coal production reached an all-time high before steadily declining. Coal-based energy production peaked in 2007, and no new coal plants for domestic utility electricity production have been built since 2014. Reducing reliance on coal is a long-term trend. From the beginning of 2002 to the end of 2016, the maximum generating capacity of coal-fired power plants in the United States fell from 306 to 270 gigawatts. Over that 14 year period, 531 coal generating units were retired,

with nameplate capacity of 59 gigawatts (new units brought online explain the difference). In 2016, coal-fired power plants made up 25 percent of nameplate generation capacity in the United States, and supplied about 29 percent of the electricity generated. Both figures are down, from 35 percent and 50 percent in 2002, respectively.

From 2015 to 2016, domestic coal production declined by 18.8 percent, to its lowest level since 1978. Contemporary employment in the coal-mining industry fell from 69,000 in January 2015 to just 49,000 by the end of 2016, a decline of 29 percent. Total U.S. coal distributions for 2016 were 737 million short tons, 17 percent less than the level of distributions in 2015.

Coal-powered steam generation has declined steadily, due to the falling price of natural gas in the past decade. Between 2008 and 2015, the use of natural gas to generate electricity grew 51 percent. Culver and Hong (2016) compared the monthly price of gas with that of coal from January 2012 to January 2016 and found that for nearly 90 percent of the months in this period, natural gas was more competitive than Appalachian coal. Natural gas was also less expensive than Appalachian, Illinois, and Rockies coal for 57 percent of the months studied.

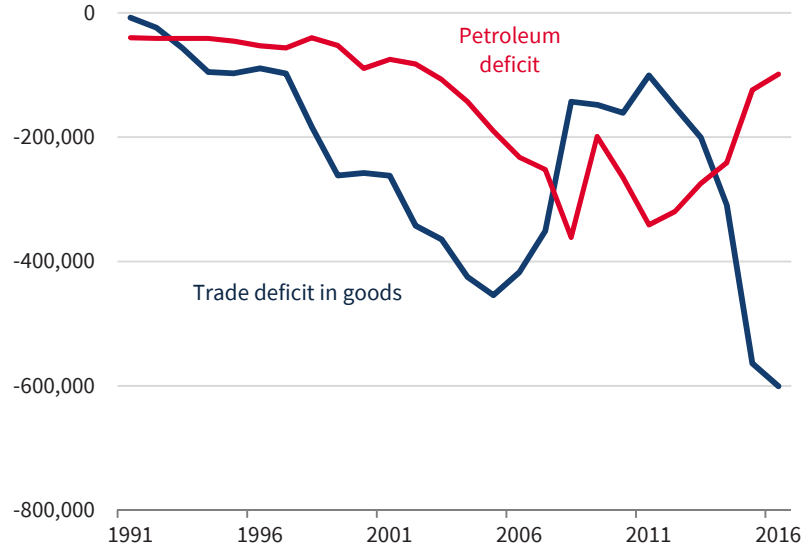
Despite this long-term trend for domestic coal production and usage, metallurgical coal exports were a bright spot in 2017. Exports of metallurgical coal from East Coast ports expanded dramatically that year, with over 25 million short tons of coal exported through the second quarter alone—an increase of roughly 27 percent from the same period in the previous year.

Wolak (2016) examines the potential impact on the world coal market of increasing coal export capacity from the West Coast. The net effect increases U.S. exports to the Pacific Basin and reduces Chinese domestic production. Increased Chinese access to less expensive, cleaner-burning U.S. coal would drive up coal prices and accelerate the switch to natural gas–fired generation in the United States. The environmental dividend of this conversion is double—U.S. emissions would fall as cleaner-burning natural gas substituted for coal, and global emissions would also decease as higher grades of U.S. exported coal would substitute for the poorest Chinese grades. Environmental economists often worry about emissions leakage as energy trade increases, but Wolak's result suggests that leakage from U.S. coal exports to Asia could well be negative. Currently, one project expanding Pacific export capacity is involved in litigation over rejected State permits in Washington State. The current capacity for coal exports to the Pacific is limited—barring a new terminal in Washington, the only outlet in the Pacific Northwest relies on transshipment through Vancouver, in Canada.

There is unlikely to be significant short-term change in coal consumption outside the United States, due to limited opportunities for international electricity sectors to substitute away from coal in the short and medium terms (Wolak 2016). Power plants have life spans that last decades; once they are

Figure 5-22. U.S. Petroleum and Total Goods Trade Deficits, 1991–2016

Dollars (millions)



Source: U.S. Census Bureau.

built, they lock in fuel demand. Wolak notes that current low natural gas prices make it unlikely that many regions of the world would expand their installed capacity of coal-fired generation in response to increased U.S. exports. This limited flexibility in global demand for coal may cause the potential gains to be short-lived. U.S. exporters are likely to be inframarginal suppliers to the Asian market as marginal Asian production is displaced. International coal trade has been price-sensitive historically; figure 5-23 shows how U.S. coal exports have fluctuated with coal prices since 2002.

Natural gas. Thanks to the technological transformation of the Nation's oil and gas sector enabling exploitation of unconventional resources (commonly termed "fracking"), U.S. natural gas production and net exports expanded over the past decade, as shown in figure 5-24. Between 2007 and 2016, annual gross natural gas withdrawals expanded by 32.3 percent. Apparent consumption of natural gas rose across all sectors during this period, with total U.S. consumption, in trillion cubic feet, rising from 23.3 in 2007 to 27.5 in 2016. The United States is the world's largest consumer of natural gas, and has been its largest producer since 2006.

Thanks in part to new infrastructure investments, U.S. natural gas exports have expanded as well; between 2007 and 2016, U.S. exports of natural gas increased by 184 percent, totaling over 2.3 trillion cubic feet in 2016. This has moved the United States from being a net importer to a net exporter of natural gas. Both major forms of exports expanded—natural gas transported

in pipelines, and LNG that can be transported by ship. Figure 5-25 shows the expansion of these exports since 2000. Export capacity utilization was 59 percent in 2017, up 7.5 percentage points from the previous year. LNG exports have the advantage in that they can be delivered to any country with an LNG-unloading terminal, as opposed to pipeline connections, which are limited to Canada and Mexico.

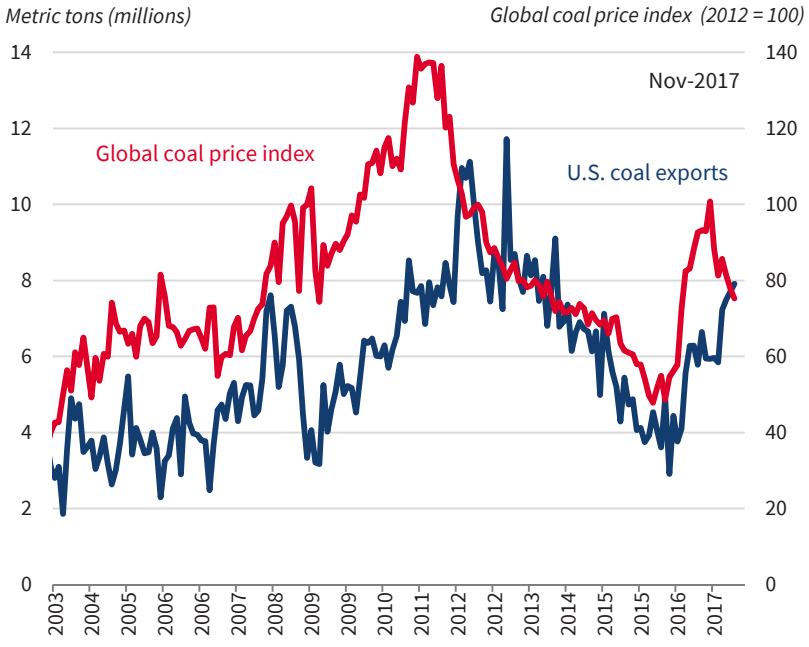
The United States exported nearly 410 billion cubic feet of LNG through August 2017, doubling the quantity exported in all of 2016. Until 2016, the only LNG capacity in the continental U.S. was configured for imports, as opposed to exports. More than 60 percent of all current export capacity came online in 2017—a total of 2.15 billion cubic feet per day. It is particularly important that four additional LNG export facilities are now under construction, in addition to expansions of two existing facilities. In the years 2001–10, LNG averaged 8.3 percent of total U.S. natural gas exports because only one export facility existed (in Alaska). As of August 2017, LNG accounts for 20 percent of total U.S. natural gas exports.

One important question is whether U.S. natural gas producers can manage to supply exports while also satisfying domestic demand. Since the shale revolution took hold in the mid-2000s, the U.S. natural gas market has been isolated from the global market by limited export capacity. New LNG capacity changes this dynamic, and U.S. exporters can sell relatively cheap U.S. natural gas on the world market. Natural gas supply is now more elastic than it was previously, and it responds to price movements more quickly (Newell, Prest, and Vissing 2016). This flexibility may be used to deepen relations in existing markets as well as in emerging markets abroad, including Latin America, Africa, and Asia. Even though Mexico has the benefit of direct natural gas pipeline links with the United States, it was also the largest market for U.S. LNG in 2017, receiving 126 billion cubic feet through October. Deeper U.S. export penetration may provide these regions with increased energy security while also helping to grow U.S. exports.

A critical factor that facilitated the ascension of the United States' natural gas market was the structuring of commodity transportation within the country. Pipeline transporting capacity is divorced from pipeline ownership, allowing competitive bidding for any producer to access transportation for the fuel generated, regardless of size (Makholm 2012). When ownership of products and capacity is bundled (along with this infrastructure being vertically integrated with larger producers), in the case of many other markets, larger, integrated firms are often able to exercise market power in lieu of regulation.

Petroleum. The same suite of technological innovations that spurred natural gas production contributed to higher U.S. crude oil production, which rose by about 5 million barrels per day between 2008 and 2015. Oil production is poised to surpass 10 million barrels per day in 2018. This windfall stands to benefit Americans even more than abundant natural gas, because oil is more

Figure 5-23. U.S. Monthly Coal Exports, 2003–2017



Sources: Energy Information Administration Quarterly Coal Report; CEA calculations.

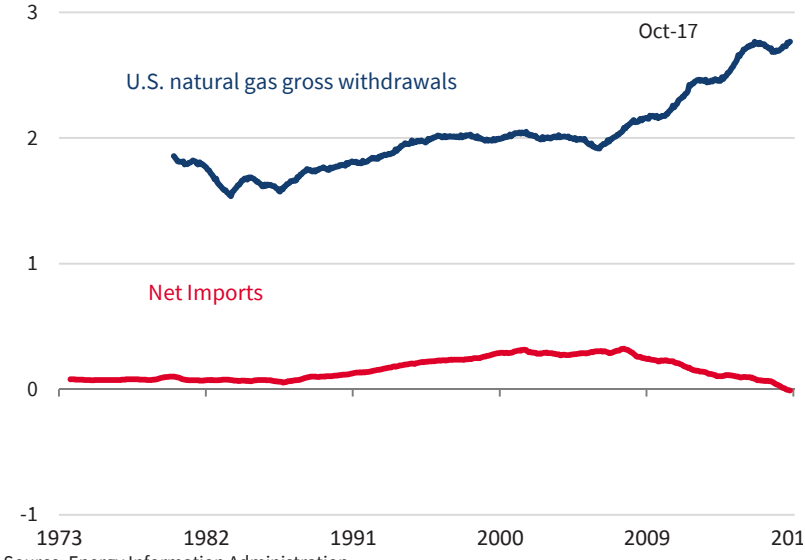
transportable than natural gas. After a 2015 decision to remove a 40-year-old crude export ban, crude oil exports ended 2017 at a monthly average of over 4,000 barrels per day. In addition to crude oil, refined product exports began to increase before the crude export ban was lifted, and the trend continued through 2017. For example, exports of refined products to Latin America have grown; over the past two decades, Latin America on average accounted for 34 percent of the consumption of U.S. petroleum product exports, and for 28 percent of the growth in these exports.

Continuing this trend and expanding U.S. capacity to export crude oil and refined products will be critical for the U.S. to reach the status of net energy exporter by 2026. New projects to expand capacity are under way; crude oil exports are expected to start from the Louisiana Offshore Oil Port (known as LOOP) in early 2018, at about 2 million barrels per month.

Renewables. Electricity is a tradable product for the United States. In 2016, the United States imported a net of 60,000 gigawatt-hours of electricity, mostly from Canada. The amount of electricity trade is small—the net imports were about 1.4 percent of total generation in 2016. So though electricity trade is not itself significant, the recent developments in the U.S. electricity sector have proven disruptive and have freed up U.S. fuels for export.

Figure 5-24. U.S. Monthly Natural Gas Withdrawals and Net Imports, 1973–2017

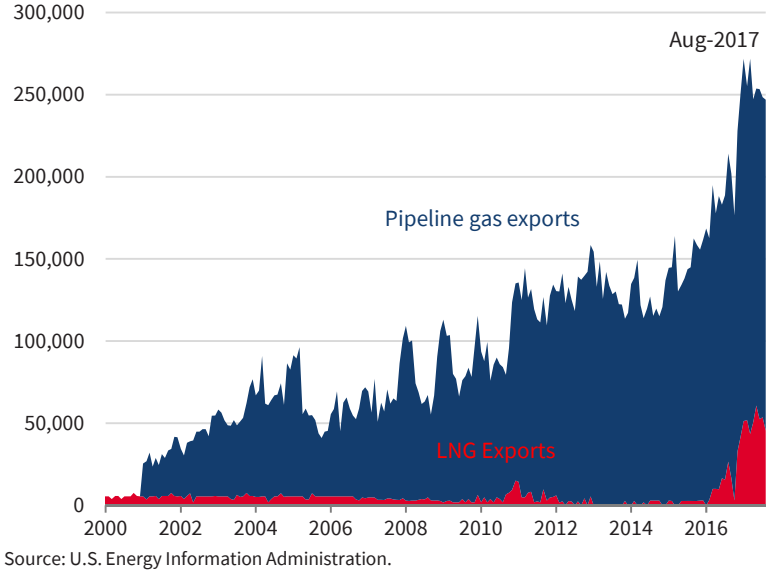
Cubic feet (millions, 12-month moving average)



Source: Energy Information Administration.

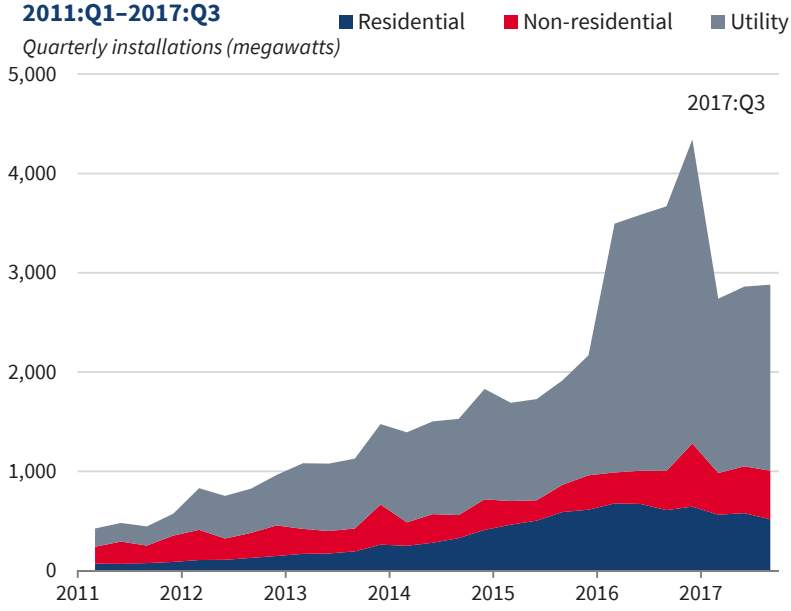
Figure 5-25. U.S. Natural Gas Exports by Pipeline and LNG, 2000–17

Millions of cubic feet



Source: U.S. Energy Information Administration.
Note: LNG = liquefied natural gas.

Figure 5-26. U.S. Quarterly Solar Photovoltaic Installations, 2011:Q1–2017:Q3



Sources: Solar Energy Industries America; GTM Research 2017:Q4 Solar Market Insight.

In recent years, renewable energy's share of generation capacity has grown substantially. The historic mainstay of renewable generation, hydroelectric power, has contributed to nearly constant installed capacity since the early 2000s. At the end of 2016, 8.4 percent of U.S. nameplate electric generation capacity was powered by nonhydroelectric renewables. Wind power grew from 1 percent of the generation mix in 2008 to 5.6 percent in 2016. More than 8,000 megawatts of new wind capacity was installed in 2016, an increase in cumulative wind capacity of 11 percent from the prior year. Texas alone installed 2,611 megawatts of capacity, and in 14 States wind generation exceeded 10 percent of total generating capacity.

Solar photovoltaic (PV) capacity has also grown rapidly since the late 2000s, contemporaneously with falling hardware and installation prices during this period. Installed capacity has grown from less than 1 gigawatt in 2008 to over 47 gigawatts in 2017. This expansion has occurred across all forms of installations, with increased solar PV implementation in the residential, nonresidential, and utility sectors (figure 5-26). An additional 22 gigawatts are currently under contract (those with signed power purchase agreements) in the United States for 2017, with another 36 gigawatts announced. State Renewable Portfolio Standards, declining technology costs, Federal tax credits and subsidies, voluntary and retail procurement, the Public Utility Regulatory Policies Act, and a new third-party ownership model for residential PV systems have all been credited as drivers of renewable growth. According to a 2012 report on

the impact of tax policies of renewables, Energy Investment Tax Credits and Production Tax Credits combined led to more than $1.7 billion in cumulative tax cuts toward developing PV infrastructure (Sherlock 2012).

Updating American Trade Policy

Historically, the United States has exercised leadership in pursuit of a policy of lowered trade barriers and increased market access. The gains from these actions have, as a whole, served to boost income in the U.S. as well as around the world. But U.S. trade with the world has also, at least in some cases, imposed costs on some Americans.

Congress delegates trade negotiating power to the President, which gives the President considerable control over the outcome of a disagreement with a trading partner. This power can be exercised without relying on a third-party arbiter such as the WTO, which ensures that the United States maintains its sovereignty with respect to economic issues.

In its first year, the Trump Administration has used all available tools to address imbalances. Section 201 of the Trade Act of 1974 seeks to protect U.S. industries faced with serious injury from import competition through the increasing imports of competing merchandise. Section 201 cases may be initiated by private petitioners that believe that imports have caused or are likely to threaten serious injury. Import competition must be a "substantial cause" of the serious injury. Two Section 201 investigations concluded in 2017 with positive injury findings by the USITC, and both resulted in Presidential proclamations of new import restrictions—one for crystalline solar photovoltaic products, and a second for large residential washing machines. These are the first Section 201 cases filed in 15 years.

Section 337 of the Tariff Act of 1930 provides possible remedies against unfair methods of competition and unfair acts in the importation of articles. Section 337 is most commonly invoked against articles that infringe on U.S. patents or trademarks, or that are made according to misappropriated trade secrets; a total of 20 cases have been completed since January 2017, and an additional 51 are under way. The primary form of remedy is an exclusion order against imported goods.

Although the President does not have a direct role, AD/CVD proceedings, which firms rather than the government typically initiate, are the most common trade action, with 33 completed investigations since January 2017, and another 30 under way.

Conclusion

This chapter began by recapitulating the consensus toward which, over time, the economics profession has converged: that trade across international borders will virtually always generate net gains for all the nations involved. The

distribution of the gains from trade within a country are also important to consider. Although efforts to expand trade have historically provided gains in the form of higher incomes and living standards in America (and around the world), trade exposure has imposed costs on certain segments of American society.

The evolving U.S. and global economies provide opportunities for the U.S. to gain from trade. The United States enjoys a comparative advantage in agricultural production, innovative goods, and many other products. Meanwhile, U.S. energy production, boosted by technological breakthroughs in recent years, has increased to the point where the United States could become a net energy exporter in the coming years. The United States remains a large and vibrant economy with many comparative advantages, and it stands poised to gain from trade agreements that allow it to maximize the benefits of its underlying dynamism while removing barriers to trade imposed by other nations that disproportionately harm American producers.