Trade and American Jobs

The Impact of Trade on U.S. and State-Level Employment:

2016 Update

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Executive Summary

U.S. trade continues to expand, and with it, U.S. employment. Based on the latest available data (2014), trade supports 41 million U.S. jobs. This means that more than one in every five U.S. jobs is linked to exports and imports of goods and services. Nearly three times as many jobs were supported by trade in 2014 as in 1992 – before the accelerated wave of trade liberalization that began with the implementation of the North American Free Trade Agreement in 1994 – when our earlier research found that trade supported 14.5 million jobs, or one in every ten U.S. jobs.

- As U.S. trade -- both exports and imports -- has grown over the past two decades, caused in part by trade liberalizing international agreements, so has the number of U.S. jobs tied to trade. Indeed, trade-dependent U.S. jobs have grown more than three times faster than U.S. jobs generally.

- Every U.S. state has realized net employment gains directly attributable to trade.

- Trade has a positive impact on U.S. jobs in both the services and manufacturing sectors.

- U.S. trade with countries involved in the Trans-Pacific Partnership (TPP) and the Trans-Atlantic Trade and Investment Partnership (TTIP) negotiations account for important shares of this trade related employment. In 2014, trade with TPP partners supported 15.6 million jobs, and trade with the TTIP countries (the European Union) supported an additional 6.9 million jobs. Importantly, trade with TTP and TTIP countries currently supports a net positive number of jobs in every state.

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Laura M. Baughman and Joseph F. Francois[*]

I.   Introduction

The 2016 Trade and American Jobs report updates a series of path-breaking studies, first issued by Business Roundtable in 2007, that offer a thorough examination of the impacts of trade on U.S. jobs.[1] The report examines the impacts of both exports *and* imports of goods and services on U.S. employment based on the latest available data (2014). It confirms that trade has a net positive impact on American jobs. Importantly, the positive impact of trade on U.S. employment has grown significantly during the past two decades, coinciding with the liberalization of U.S. trade both multilaterally through the World Trade Organization and bilaterally and regionally through free trade agreements.

II.   The Importance of Trade to the United States

Trade has become a vital part of the U.S. economy. Since the middle of the 20th century,

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[*]   Laura M. Baughman is President of Trade Partnership Worldwide, LLC (TPW, www.tradepartnership.com). She holds degrees in economics from Columbia and Georgetown Universities. Dr. Joseph Francois is Managing Director of Trade Partnership Worldwide, LLC, and Professor of Economics, University of Bern, Department of Economics and (designated) Managing Director, World Trade Institute. He also holds numerous research fellowships and professorships at think tanks and universities around the world. Dr. Francois formerly was the head of the Office of Economics at the U.S. International Trade Commission, and a research economist at the World Trade Organization. Dr. Francois holds a PhD in economics from the University of Maryland, and economics degrees from the University of Virginia.

[1]   Laura M. Baughman and Joseph Francois, *Trade and American Jobs: The Impact of Trade on U.S. and State-Level Employment*, prepared for the Business Roundtable, February 2007; Laura M. Baughman and Joseph Francois, *Trade and American Jobs: The Impact of Trade on U.S. and State-Level Employment, An Update*, prepared for the Business Roundtable, July, 2010; Business Roundtable, *How the U.S. Economy Benefits from International Trade and Investment* (2013); and *Trade and American Jobs: The Impact of Trade on U.S. and State-Level Employment, 2014 Update*, prepared for the Business Roundtable, October 2014.

U.S. exports and imports have grown steadily and today trade reflects a large share of the nation's economic activity. In 2014, total trade (exports plus imports) represented 30 percent of gross domestic product (GDP), up from 10.6 percent when the General Agreement on Tariffs and Trade — the precursor to the World Trade Organization (WTO) — was launched in 1947.

Export Trends

U.S. exports continue to grow. For more than two decades, total U.S. exports have increased at an average *annual* rate of 6.4 percent, notwithstanding the declines experienced during the 2001-2002 and 2008-2009 recessions. In the four years since the last recession, export growth has been especially strong, averaging 8.4 percent per year. Goods exports (e.g., industrial, agricultural) generally dominate total U.S. exports, accounting for just under 70 percent of total exports. However, services exports have also been growing, increasing at an average annual rate of 6.7 percent over the past two decades. As a result, services' share of total U.S. exports has increased from 28 percent in the early 1990s to just over 30 percent today. (Detailed data are provided in Appendix A, Table A1.)
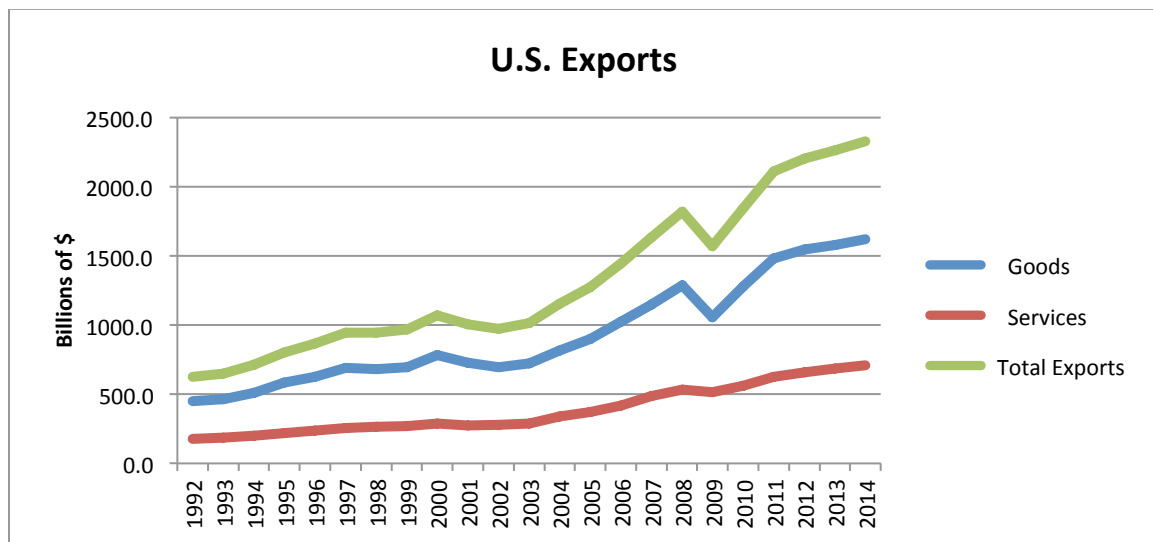
Source: Bureau of Economic Analysis, U.S. Department of Commerce, as detailed in Appendix Table A1.

Leading U.S. exports[2] in 2014 included aerospace products and parts; motor vehicles and parts; basic chemicals; pharmaceuticals and medicines; oilseeds and grains; measuring, electromedical and control instruments; semiconductors; resins, rubber and artificial fibers; agriculture and construction machinery, and other general purpose

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[2]   Based on four-digit North American Industrial Classification System codes, excluding petroleum.

machinery.

Leading services exports include business, professional and technical services; royalties and license fees, and financial services.

Import Trends

U.S. imports have generally increased over the past two decades, spurred by periods of strong economic growth and curtailed by the 2001-2002 and 2008-09 recessions. (Detailed data are provided in Appendix A, Table A2.) The correlation between imports and economic growth makes sense given that approximately 60 percent of U.S. merchandise imports are raw materials, capital goods and industrial products used by U.S. manufacturers and farmers to produce goods in the United States. When U.S. manufacturing or agricultural output slows or contracts, producers' and farmers' need for imported raw materials and other inputs declines. Likewise, when household income drops as it does during a recession, families put off buying expensive consumer goods, including consumer goods imports which constitute 40 percent of total goods imports.

In terms of services, key imports include business, professional, and technical services; travel; and insurance services. These are services purchased by U.S. entities, such as U.S. companies using foreign legal services, or U.S. tourists traveling abroad.
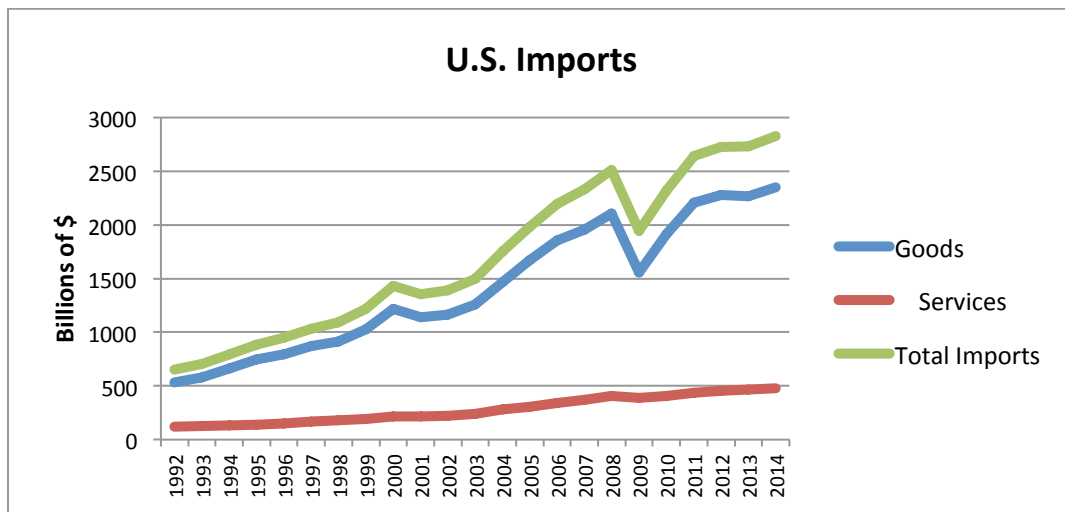
Source: Bureau of Economic Analysis, U.S. Department of Commerce, as detailed in Appendix A, Table A2.

"Openness" of the U.S. Economy to Trade

Trade agreements have been an important contributor to the growth in trade, particularly during the past two decades. They have increasingly reduced foreign barriers to trade, opening new markets for U.S. exports, while also opening the U.S. market to increased imports from other countries.

- Significant global liberalization began between the United States and members of the WTO as the Uruguay Round was implemented in 1995.

- China joined the WTO in December 2001, starting the process of opening its market to U.S. exports of goods and services.

- FTAs were implemented with Mexico and Canada (NAFTA 1993), Jordan (2001), Chile and Singapore (2004), Australia (2005), Morocco (2006), Central America (2006- 2009), Bahrain (2006), Oman (2009), Peru (2009), and South Korea, Colombia and Panama (2012). Each of these agreements helped to increase total U.S. trade, including both exports and imports. The share of total U.S. goods exports with bilateral or regional trade agreement partners has increased from less than 1 percent in 1992 (when the United States had just two FTA partners, Israel and Canada), to 47 percent in 2014 (when the United States had 20 FTA partners).[3]

As U.S. manufacturers, farmers and services providers have taken advantage of the lower costs of inputs and other benefits of FTAs, the importance of global value chains to U.S. companies, farmers and their workers has increased. U.S. exports have increasingly incorporated imported parts or components: according to data from the OECD and the WTO, foreign parts and components represented 15.0 percent of the value of U.S. goods and services exports in 2011 (the most recent year available), compared to 11.5 percent in 1995.[4] Similarly, foreign producers increasingly rely on U.S. inputs to make goods or services later exported back to the United States. U.S.-made parts and components accounted for 25.1 percent of the value of U.S. goods and services imports in 2009, up from 21.9 percent in 1995.[5] Companies have lowered costs through these value chains, becoming more competitive in U.S. and foreign markets and relying more than ever on suppliers in other countries for inputs to U.S. production.

Consequently, the importance of trade to the U.S. economy has increased significantly during the last two decades. During this period of accelerating trade liberalization, total trade – exports plus imports – rose from 20 percent of GDP in 1992 to 30 percent in 2014 (see Appendix A, Table A3 for detailed data).

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[3]   Services trade data for many individual countries are not available, so it is not possible to include services trade with current and prospective FTA partners in this calculation.

[4]   OECD (2015), Import content of exports (indicator). doi: 10.1787/5834f58a-en (Accessed on 18 November 2015)

[5]   *Ibid.*

Trade's Share of GDP
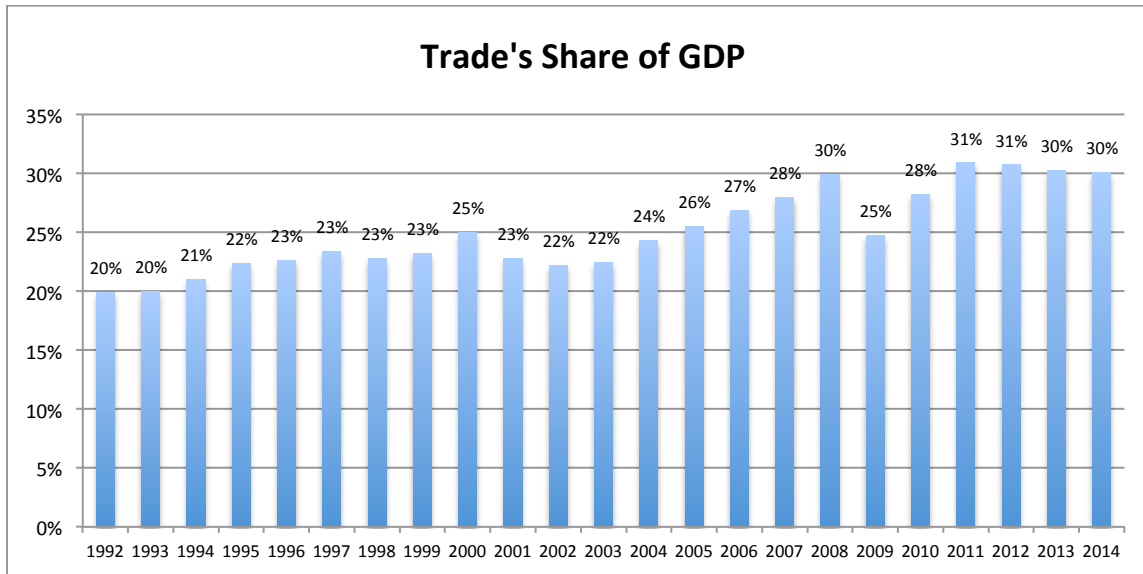
Source: Derived from Bureau of Economic Analysis, U.S. Department of Commerce

The prospects for eliminating or reducing unnecessary costs to trade are good. The United States has two new ambitious trade agreements pending: (1) the Trans-Pacific Partnership agreement (TPP), which was recently completed with 11 other countries in the Asia-Pacific region and (2) the Trans-Atlantic Trade and Investment Partnership agreement (TTIP), which is still under negotiation with members of the European Union. In 2014, the trading partners participating in the TPP and TTIP trade agreements purchased about 62 percent of total U.S. goods exports. If these trade agreements are implemented, the share of U.S. goods exports covered by bilateral or regional trade agreements would rise from 47 percent in 2014 to nearly 70 percent.[6]

In addition, ongoing negotiation of a multilateral (or plurilateral) services agreement (i.e., the Trade in Services Agreement) aims to address costly barriers to cross-border services trade facing U.S. exporters and importers. While services trade is not subject to tariffs, it faces a range of non-tariff barriers. These include conflicting or differing regulations between trading partners and differing registration or licensing requirements, among others, all of which raise the costs of cross-border services trade.[7] Addressing barriers to services trade would cause trade to increase as U.S. services providers become more cost-competitive in international services markets.

[6]   We focus on goods exports here only because the U.S. government does not publish services export data for all of the U.S. FTA partners or for all of the pending FTA partners.

[7]   More detailed examples of such barriers to services trade and the degree to which they constitute barriers to trade can be found in Koen G. Berden et al, *Non-Tariff Measures in EU-US Trade and Investment, An Economic Analysis* (Rotterdam, the Netherlands: ECORYS Nederland, 2010), chapters 13-17.

III.   Trade and American Jobs

Concerns about the impact of trade on U.S. jobs are widespread in America. While stories about the negative impacts receive frequent attention in the media and by policymakers, less well known are stories about the positive impacts of trade on U.S. jobs. Consequently, the perception exists that on balance the impact of trade on jobs is negative.

To better evaluate this perception, it is appropriate to explore in detail the roles trade plays in adding to or subtracting from U.S. employment rolls. An assessment of the impacts of trade on U.S. jobs should use an approach that captures the full range of the many ways in which those impacts are experienced by farmers, manufacturers, services providers, workers and consumers. This study uses such an approach, which is detailed in Appendix B. Briefly stated, it explores the direct and indirect effects of exports, the direct and indirect effects of imports, and the effects of additional trade-induced spending on U.S. output and consumption and, consequently, jobs.

It is generally accepted that exports have a positive impact on U.S. jobs. Even trade critics agree that exports support the jobs of workers and farmers who manufacture goods or services that are exported. They also agree that exports support jobs in up- and downstream sectors of the economy – for example, jobs associated with making the fertilizer used to grow the wheat that is exported, or transporting goods to ports to be exported. The methodology in this report captures these direct and indirect effects of U.S. exports.

However, many worry that imports have a negative impact on U.S. jobs. Some suggest that the overall impact is negative because U.S. imports typically exceed U.S. exports, so national and bilateral trade deficits equate to net negative job losses from trade.[8] This conclusion is based on a flawed assumption that all imported goods or services can be produced by U.S. farmers, manufacturers or services providers in the same quantities, qualities and prices as the imported goods or services.[9] This most certainly is not the case. Job loss estimates based on this assumption would overstate the negative impact of imports on U.S. jobs. The methodology in this report does not employ this flawed assumption. It reflects the differences in price, quantity and quality between imported goods and U.S.-produced goods. It also captures the jobs directly and indirectly related to the process of importing goods and services into the United States (e.g., jobs

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[8]   One typical example is **"Trade Policy and Job Loss: U.S. Trade Deals with Colombia and Korea Will be Costly,"** EPI Working Paper by Robert E. Scott, Feb. 25, 2010, http://epi.3cdn.net/87da5b7ec4f5677422_o9m6bh6nv.pdf.

[9]   A typical example of this flawed assumption in action is the assertion that a particular number of jobs is created from $1 billion of exports, and the same number of jobs is lost from $1 billion of imports.

associated with transporting imports from the ports to warehouses, jobs at the warehouses, or retail jobs that sell the imported goods if they are finished consumer products).

Most analysts seeking to assess the impacts of trade on U.S. jobs stop with the direct and indirect impacts of exports and imports. In doing so, they miss the largest source of job-creating activity that comes from trade: the extra spending power companies, workers and consumers have in their bank accounts, spending power that generates still more job-supporting economic activity. Additional spending power comes from, for example, wages of direct and indirect workers in export-related jobs, from wages of direct and indirect workers in import-related jobs, and from consumers who take advantage of lower prices for goods and services resulting from imports, which in turn supports still more economic activity that supports even more jobs. The extra income is spent on other goods and services (movie tickets, restaurant meals, education, health care, for example) and that spending supports jobs in those sectors. In addition, trade (exports and imports) has a positive impact on U.S. productivity with associated impacts on output, and these output effects have job impacts. The methodology in the report captures all these effects.[10]

Briefly, the analysis found:

- In 2014, an estimated 41 million jobs were tied to trade (see Table 1).

- These jobs represent 22.1 percent of total employment, or more than one in five jobs (see Table 1).

- As the economy has become more dependent on trade, employment related to trade has increased at more than three times the rate of non-trade related employment. Between 2004 and 2014, trade-dependent jobs increased by 31 percent (from 31.3 million[11] to 41.0 million), compared to 9.9 percent for employment generally.[12]

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[10]   Our methodology does not capture the number of jobs supported by foreign investments in the United States, and therefore our results **likely understate** the number of U.S. jobs tied to the international economy. We do capture the jobs at U.S. subsidiaries of foreign firms that are linked to trade (exports and/or imports). We do not capture jobs at foreign companies not engaged directly or indirectly in foreign trade.

[11]   Baughman and Francois (2007), *op cit*.

[12]   Derived from U.S. Bureau of Economic Analysis, "Total full-time and part-time employment by industry," (accessed November 23, 2015).

Table 1
Net Number of U.S. Jobs Related to Trade,* 2014
(Thousands)

Total	+40,999.1
Agriculture, forestry, fishing	+708.6
Manufacturing	+1,474.7
Services	+33,801.3
Construction	+2,337.7
Wholesale trade	+1,514.0
Retail trade	+4,412.8
Information	+908.2
Finance, insurance	+2,150.6
Transportation, warehousing	+1,518.3
Real estate, rental, leasing	+1,780.8
Professional, scientific & technical	+2,806.9
Management of companies, admin. support	+3,088.1
Education	+1,055.5
Health care, social assistance	+4,953.8
Accommodation and food services	+3,178.3
Arts & entertainment	+1,215.4
Other services	+2,880.9
Energy (mining, utilities)	-699.5[13]
Government	+5,714.0
Share of Total U.S. Employment	22.1%

* "Trade" = exports plus imports of goods and services.
Source: Authors' estimates.

- Nearly three times as many jobs were supported by trade in 2014 compared to 1992 – before the accelerated wave of trade liberalization that began with the implementation of NAFTA in 1994 – when our earlier research found that trade

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[13] The U.S. energy sector presents a special case with respect to the impacts of trade on jobs. Despite significant increases in domestic crude oil production, the United States still imports a significant share of the petroleum it consumes. According to the Energy Information Agency, in 2014, the United States relied on imports for 27 percent of its petroleum consumption and about 46 percent of the crude oil processed in U.S. refineries was imported (see http://www.eia.gov/tools/faqs/faq.cfm?id=32&t=6). Therefore, our modeling scenario (the impact of the absence of trade – exports and imports of petroleum, as described in Appendix A) means that the United States would need to produce all of its petroleum, including crude oil, requirements domestically. This would be expensive: the costs of producing this oil domestically would be high, drawing resources (including labor) from other sectors of the economy at great expense.

supported 14.5 million jobs, or 10.4 percent of total U.S. jobs.[14]

- Trade has a positive impact on U.S. jobs in both the services and manufacturing sectors.

As noted above, the biggest impacts of trade are the ways in which it increases spending across the U.S. economy. Again, trade makes manufacturers, farmers and services providers more competitive, giving them and their workers more income to spend on other goods and services. Because trade lowers the costs of goods and services bought by consumers, consumers have more money to spend on goods and services that are not traded internationally – like dinners out, pre-school or day care for one's child, or a home renovation project. Thus, Table 1 reports large trade-related jobs in sectors like "Construction," "Education" and "Arts and entertainment." The estimates in Table 1 reflect the increased spending that goes on throughout the economy as a result of higher incomes and lower costs due to trade, as explained above.

U.S. Jobs Related to Trade with TPP & TTIP Countries

Given that the United States finished negotiating the TPP agreement and is continuing to negotiate the TTIP trade agreement, it is also useful to examine the number of U.S. jobs tied to trade with countries involved in those agreements.

Table 2 shows that trade with TPP countries supported more than 15.6 million jobs in 2014, 8.4 percent of total employment and 38.0 percent of all trade-related jobs.

Table 3 shows that trade with the EU supported more than 6.8 million jobs in 2014, 3.7 percent of total employment and 16.9 percent of all trade-related jobs.

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[14]   Laura M. Baughman and Joseph Francois, *Trade and American Jobs: The Impact of Trade on U.S. and State-Level Employment*, prepared for the Business Roundtable, February 2007, Table 6, p. 12.

Table 2
Net Number of U.S. Jobs Related to Trade with TPP Countries,* 2014
(Thousands)

Total	+15,590.8
Agriculture, forestry, fishing	+168.0
Manufacturing	+829.8
Services	+12,526.2
Construction	+637.8
Wholesale trade	+575.4
Retail trade	+1,677.1
Information	+355.9
Finance, insurance	+903.2
Transportation, warehousing	+371.6
Real estate, rental, leasing	+682.6
Professional, scientific & technical	+1,076.0
Management of companies, admin. support	+1,184.1
Education	+408.7
Health care, social assistance	+1,917.9
Accommodation and food services	+1,207.9
Arts & entertainment	+446.9
Other services	+1,081.1
Energy (mining, utilities)	-145.5[15]
Government	+2,212.2
Share of Total U.S. Employment	8.4%

* "Trade"= exports plus imports of goods and services.
Source: Authors' estimates.

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[15]   See footnote 10.

Table 3
Net Number of U.S. Jobs Related to Trade with the EU,* 2013
(Thousands)

Total	+6,913.3
Agriculture, forestry, fishing	+96.5
Manufacturing	+364.6
Services	+5,401.4
Construction	+138.4
Wholesale trade	+254.4
Retail trade	+741.6
Information	+163.6
Finance, insurance	+255.4
Transportation, warehousing	+170.6
Real estate, rental, leasing	+319.8
Professional, scientific & technical	+504.1
Management of companies, admin. support	+554.4
Education	+188.3
Health care, social assistance	+883.9
Accommodation and food services	+534.1
Arts & entertainment	+202.6
Other services	+490.2
Energy (mining, utilities)	+31.4
Government	+1,019.5
Share of Total U.S. Employment	3.7%

* "Trade"= exports plus imports of goods and services.
Source: Authors' estimates.

State-Level Trade-Related Employment

As demonstrated by a breakdown of the national employment estimates by state (see Table 4), every U.S. state realizes a net positive impact from trade. Not surprisingly, the largest states benefit the most. Shares of total state employment related to trade ranged from a low of 17.6 percent (Oklahoma and Wyoming) to a high of 23.2 percent (Washington). Tables 5 and 6 present the results by state for trade with TPP partners and the European Union, respectively. See Appendix B for an explanation of our methodology for breaking down trade-related employment by state.

Table 4
Net Number of U.S. Jobs Related to Trade, By State, 2014
(Thousands)

Alabama	+567.5	Montana	+140.2
Alaska	+90.9	Nebraska	+290.8
Arizona	+772.8	Nevada	+367.8
Arkansas	+348.4	New Hampshire	+183.9
California	+4,869.2	New Jersey	+1,185.7
Colorado	+733.9	New Mexico	+218.1
Connecticut	+518.3	New York	+2,709.2
Delaware	+127.0	North Carolina	1,232.1
District of Columbia	+201.4	North Dakota	+111.1
Florida	+2,502.5	Ohio	+1,502.6
Georgia	+1,283.8	Oklahoma	+401.0
Hawaii	+205.8	Oregon	+498.4
Idaho	+202.2	Pennsylvania	+1,658.1
Illinois	+1,711.1	Rhode Island	+136.5
Indiana	+812.6	South Carolina	+579.3
Iowa	+456.3	South Dakota	+130.0
Kansas	+400.9	Tennessee	+857.2
Kentucky	+539.3	Texas	+3,150.6
Louisiana	+553.2	Utah	+387.2
Maine	+180.5	Vermont	+95.3
Maryland	+812.7	Virginia	+1,135.5
Massachusetts	+990.7	Washington	+945.7
Michigan	+1,187.9	West Virginia	+187.0
Minnesota	+788.6	Wisconsin	+800.8
Mississippi	+339.5	Wyoming	+70.7
Missouri	+826.7	TOTAL	+40,999.1

Source: Authors' estimates.

Table 5
Net Number of U.S. Jobs Related to Trade with TPP Countries, By State, 2014
(Thousands)

State	Value	State	Value
Alabama	+210.9	Montana	+ 52.9
Alaska	+33.6	Nebraska	+ 109.0
Arizona	+293.5	Nevada	+139.3
Arkansas	+131.0	New Hampshire	+71.6
California	+1,876.9	New Jersey	+ 453.5
Colorado	+282.9	New Mexico	+85.1
Connecticut	+198.0	New York	+1,037.6
Delaware	+48.3	North Carolina	+478.3
District of Columbia	+77.0	North Dakota	+42.8
Florida	+941.9	Ohio	+561.4
Georgia	+487.9	Oklahoma	+160.0
Hawaii	+76.5	Oregon	+189.9
Idaho	+76.2	Pennsylvania	+633.4
Illinois	+647.4	Rhode Island	+53.3
Indiana	+299.9	South Carolina	+219.4
Iowa	+169.7	South Dakota	+49.0
Kansas	+152.6	Tennessee	+317.8
Kentucky	+195.7	Texas	+1,225.6
Louisiana	+207.2	Utah	+149.8
Maine	+69.0	Vermont	+36.5
Maryland	+307.1	Virginia	+426.7
Massachusetts	+384.5	Washington	+348.9
Michigan	+436.2	West Virginia	+71.6
Minnesota	+304.4	Wisconsin	+303.8
Mississippi	+128.9	Wyoming	+28.0
Missouri	+310.4	TOTAL	+15,590.8

Source: Authors' estimates.

Table 6
Net Number of U.S. Jobs Related to Trade with the EU, By State, 2014
(Thousands)

Alabama	+93.7	Montana	+23.4
Alaska	+16.9	Nebraska	+46.3
Arizona	+132.9	Nevada	+61.2
Arkansas	+57.6	New Hampshire	+31.9
California	+846.1	New Jersey	+196.3
Colorado	+127.5	New Mexico	+40.0
Connecticut	+86.7	New York	+453.9
Delaware	+21.1	North Carolina	+206.4
District of Columbia	+34.9	North Dakota	+20.4
Florida	+415.3	Ohio	+242.7
Georgia	+211.4	Oklahoma	+78.0
Hawaii	+34.1	Oregon	+86.8
Idaho	+34.2	Pennsylvania	+274.6
Illinois	+281.0	Rhode Island	+23.5
Indiana	+130.0	South Carolina	+94.2
Iowa	+72.6	South Dakota	+21.2
Kansas	+70.0	Tennessee	+136.4
Kentucky	+85.7	Texas	+568.1
Louisiana	+95.9	Utah	+66.6
Maine	+30.5	Vermont	+16.2
Maryland	+135.1	Virginia	+188.4
Massachusetts	+170.9	Washington	+160.3
Michigan	+189.8	West Virginia	+33.2
Minnesota	+134.4	Wisconsin	+129.6
Mississippi	+57.3	Wyoming	+13.7
Missouri	+134.3	TOTAL	+6,913.3

Source: Authors' estimates.

IV   Conclusion

Our analysis demonstrates that trade continues to be important – indeed, increasingly important – to the U.S. economy and American workers. As the U.S. economy has become more open and both exports and imports have grown, so too have U.S. jobs dependent on trade.

Thus, policy makers and others seeking to create new jobs for unemployed Americans should not overlook the opportunities afforded by trade policies, negotiations and programs that increase America's participation in the international marketplace.

Appendix A

Trade Data

Table A1
U.S. Exports to the World, 1992-2014
(Billions)

	Goods Exports	Services Exports	Total Exports
1992	$448.2	$177.3	$625.5
1993	465.1	185.9	651.0
1994	512.6	200.4	713.0
1995	584.7	219.2	803.9
1996	625.1	239.5	864.6
1997	689.2	256.1	945.3
1998	682.1	262.8	944.9
1999	695.8	271.3	967.1
2000	781.9	290.4	1,072.3
2001	729.1	274.3	1,003.4
2002	693.1	280.7	973.8
2003	724.8	290.0	1,014.7
2004	814.9	338.0	1,152.8
2005	901.1	373.0	1,274.1
2006	1,026.0	416.7	1,442.7
2007	1,148.2	488.4	1,636.6
2008	1,287.4	532.8	1,820.3
2009	1,056.0	512.7	1,568.8
2010	1,278.5	563.3	1,841.8
2011	1,482.5	627.8	2,110.3
2012	1,545.7	656.4	2,202.2
2013	1,578.4	687.9	2,266.3
2014	1,620.5	710.6	2,331.1

Source: U.S. Department of Commerce, Bureau of Economic Analysis, using "Census basis" trade data for goods.

Table A2
U.S. Imports from the World, 1992-2014
(Billions)

	Goods Imports	Services Imports	Total Imports
1992	$532.7	$119.6	$652.3
1993	580.7	123.8	704.4
1994	663.3	133.1	796.3
1995	743.5	141.4	884.9
1996	795.3	152.6	947.8
1997	869.7	165.9	1,035.6
1998	911.9	180.7	1,092.6
1999	1,024.6	192.9	1,217.5
2000	1,218.0	216.1	1,434.1
2001	1,141.0	213.5	1,354.5
2002	1,161.4	224.4	1,385.7
2003	1,257.1	242.2	1,499.3
2004	1,469.7	283.1	1,752.8
2005	1,673.5	304.4	1,977.9
2006	1,853.9	341.2	2,195.1
2007	1,957.0	372.6	2,329.5
2008	2,103.6	409.1	2,512.7
2009	1,559.6	386.8	1,946.4
2010	1,913.9	409.3	2,323.2
2011	2,208.0	435.8	2,643.7
2012	2,276.3	452.0	2,728.3
2013	2,268.4	463.7	2,732.1
2014	2,347.7	477.4	2,825.1

Source: U.S. Department of Commerce, Bureau of Economic Analysis, using "Census basis" data for goods.

Table A3
"Openness" of U.S. Economy, 1992-2014
(Billions and Percent)

	Total U.S. Trade*	Total Trade's Share of U.S.GDP
1992	$1,300.9	19.9%
1993	1,374.8	20.0
1994	1,534.3	21.0
1995	1,715.4	22.4
1996	1,831.7	22.6
1997	2,009.6	23.3
1998	2,068.7	22.8
1999	2,240.6	23.2
2000	2,569.4	25.0
2001	2,422.1	22.8
2002	2,431.5	22.1
2003	2,584.2	22.5
2004	2,982.2	24.3
2005	3,339.0	25.5
2006	3,723.6	26.9
2007	4,047.8	28.0
2008	4,406.9	29.9
2009	3,570.9	24.8
2010	4,217.3	25.2
2011	4,792.8	30.9
2012	4,962.0	30.7
2013	5,035.0	30.2
2014	5,213.8	30.1

* "Total Trade" is goods and services exports plus goods and services imports, using "balance of payments" basis data to coincide with GDP data.
Source: U.S. Department of Commerce, Bureau of the Census, National Income and Product Accounts tables.

Appendix B

Methodology

We applied a multi-sector multi-country computable general equilibrium (CGE) model of the U.S. economy to estimate the impacts of trade on U.S. employment. CGE models use regional and national input-output, employment and trade data to link industries in a value added chain from primary goods to intermediate processing to the final assembly of goods and services for consumption. Inter-sectoral linkages may be direct, like the input of steel in the production of transport equipment, or indirect, via intermediate use in other sectors (e.g., energy used to make steel that is used in turn in the transport equipment sector). Our CGE model captures these linkages by incorporating firms' use of direct and intermediate inputs. The most important aspects of the model can be summarized as follows: (i) it covers all world trade and production; and (ii) it includes intermediate linkages between sectors within each country.

The Model

The specific model used was the Global Trade Analysis Project (GTAP) model (see Hertel 2013). The model and its associated data are developed and maintained by a network of researchers and policymakers coordinated by the Center for Global Trade Analysis at the Department of Agricultural Economics at Purdue University. Guidance and base-level support for the model and associated activities are provided by the GTAP Consortium, which includes members from government agencies (e.g., the U.S. Department of Commerce, U.S. Department of Agriculture, U.S. Environmental Protection Agency, and U.S. International Trade Commission, European Commission), international institutions (e.g., the Asian Development Bank, Organization for Economic Cooperation and Development, the World Bank, United Nations and the World Trade Organization), the private sector and academia. Dr. Francois is a member of the Consortium.

The model assumes that capital stocks are fixed at a national level. Firms are assumed to be competitive, and employ capital and labor to produce goods and services subject to constant returns to scale.[16] Products from different regions are assumed to be imperfect substitutes in accordance with the so-called "Armington" assumption. Armington elasticities are taken directly from the GTAP v. 9 database, as are substitution

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[16]   Compared to dynamic CGE models and models with alternative market structures, the present assumption of constant returns to scale with a fixed capital stock is closest in approach to older studies based on pure input-output modeling of trade and employment linkages. In the present context, it can be viewed as generating a lower-bound estimate of effects relative to alternative CGE modeling structures.

elasticities for value added.

We are interested in the impact of trade on the U.S. and state economies given the U.S. wage structures in 2014 (i.e., given the prevailing wage structure of the labor force in a given year, how many jobs in the U.S. economy and in each state's economy were linked either directly or indirectly to trade?). As such, the model employs a labor market closure (equilibrium conditions) where wages are fixed at prevailing levels, and employment levels are forced to adjust. This provides a model-generated estimate of the U.S. jobs supported, at current wage levels, by the 2014 level of trade.

Data

The model incorporates data from a number of sources. Data on production and trade are based on national social accounting data linked through trade flows (see Reinert and Roland-Holst 1997). For the 2014 simulation, social accounting data are drawn directly from the most recent version of the GTAP dataset, version 9. Trade data (both exports and imports) exclude re-exports.[17] This dataset is benchmarked to 2011 and includes detailed national input-output, trade, and final demand structures for 140 countries across 56 sectors (see Table A-1). We updated the trade and national account data to 2014.

The basic social accounting and trade data are supplemented with data on tariffs and non-tariff barriers from the World Trade Organization's integrated database and from the UNCTAD/World Bank WITS dataset. All tariff information has been concorded to GTAP model sectors within the version 9 database.

The GTAP model sectors were concorded to state-level employment data from the Commerce Department's Bureau of Economic Analysis (BEA). This allowed us to map nationwide effects to individual states. Based on the availability of employment data as well as the size of some of the sectors, we expanded some sectors (e.g., "Trade" into its "Wholesale" and "Retail" components) and collapsed others (e.g., individual food products into one sector, "Food Products," or individual transportation modes into one sector, "Transportation"). BEA does not disclose state-level employment data for certain sectors for confidentiality reasons. For some of these sectors, we were able to use Moody's Analytics state-level employment estimates to estimate the missing national employment to undisclosed sectors in these states. However, because we mixed employment data from two sources (BEA and Moody's), the sum of the employment effects for the states may not add perfectly to the total for the United States.

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[17]   See https://www.gtap.agecon.purdue.edu/databases/contribute/reexports.asp.

The 140 GTAP countries/regions are aggregated into seven groupings: the United States, Canada, Japan, Mexico, other TPP countries, the European Union and rest-of-world.

Table A-1
GTAP Model Sectors

Paddy rice*	Wood products
Wheat*	Paper products, publishing
Cereal grains*	Petroleum and coal products
Vegetables, fruits, and nuts*	Chemicals, rubber, plastics
Oil seeds*	Mineral products
Sugar cane*	Ferrous metals
Plant-based fibers*	Non-ferrous metals
Other crops*	Metal products
Cattle, sheep, goats, and horses*	Motor vehicles and parts
Other animals*	Other transport equipment
Raw milk*	Electronic equipment
Wool, silk-worm cocoons*	Other machinery and equipment
Forestry	Other manufactures
Fisheries	Electricity
Coal	Gas manufacture, distribution
Oil	Water
Gas	Construction
Other minerals	Wholesale and retail trade**
Bovine meat products	Water transport
Other meat products	Air transport
Vegetable oils and fats	Other transport
Dairy products	Communication services
Processed rice	Financial services
Sugar	Insurance services
Other food products	Other business services
Beverages and tobacco	Recreational and other services
Textiles	Government, education, health
Wearing apparel	services**
Leather products	

* While GTAP has data for subsectors of agriculture, the U.S. Department of Commerce does not publish total U.S. employment for agricultural subsectors, so we were forced to look at these sectors in the aggregate.
** GTAP does not break these categories down further.

Modeling Simulation

The simulation conducted with the GTAP model involved imposing changes in U.S. trade, in this instance a hypothetical elimination of all U.S. exports and imports of goods and services by imposing prohibitive duties against goods trade with the United States across the board, and prohibitive trade costs against services trade with the United States.[18]

Our results tell us how much U.S. and state output and employment would decline were the United States to cease exporting and importing goods and services, tracing changes at the border as they work through the U.S. economy. The net negative (or positive, in some cases) impacts on output and jobs from an absence of trade serve as a proxy for the opposite: the net positive (or negative) impacts on U.S. output and employment *because* of trade. We report the results from this second perspective in this paper.

References

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Reinert, K.A.. and D.W. Roland-Holst (1997), "Social Accounting Matrices," in Francois, J.F. and K.A. Reinert, eds. (1997), *Applied methods for trade policy analysis: a handbook*, Cambridge University Press: New York.

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[18] We have modeled an extreme shock to the economy to show the extent to which sectors of the economy are tied to trade. We are not suggesting that a prohibitive tariff is a policy option that has been proposed by anyone. It is useful to understand the job impact of complete elimination of both exports and imports, in order to quantify the opposite scenario: the job impact of actual U.S. trade in the experiment years.