Trade and American Jobs

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

An Update

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Executive Summary

U.S. trade continues to expand, and with it, U.S. employment. Today, more than 38 million U.S. jobs depend on trade. That means more than one in every five U.S. jobs is linked to exports and imports of goods and services.

- Services sector jobs figure prominently among these trade-dependent jobs. Moreover, contrary to popular belief, the net impact of trade on the number of U.S. manufacturing jobs is positive.

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

- As U.S. trade -- both exports and imports -- has grown over the past decade, caused in part by trade liberalizing international agreements, so has the number of U.S. jobs tied to trade. Indeed, trade-dependent jobs have grown at a faster pace that U.S. jobs generally.

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The Impact of Trade on U.S. and State-Level Employment:
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Laura M. Baughman and Joseph F. Francois[*]

I.   Introduction

This report updates a path breaking study issued in 2007 by the Business Roundtable that offered a thorough examination of the impacts of trade on U.S. jobs. The earlier study and this update examine the impact on U.S. employment of both exports *and* imports of goods and services. It confirms that the net impact of trade on American jobs remains positive today. By implication, trade liberalization, which increases both exports and imports, results in net job creation rather than net job loss, as some assert.

II.   The Importance of Trade to the United States

Trade has become an increasingly important part of the U.S. economy. Our exports and imports have grown consistently since the middle of the 20th Century and trade makes up an increasingly large portion of U.S. GDP. In 2008, total trade (exports plus imports) represented more than 30 percent of U.S. Gross Domestic Product. In 1947, at the launch of the General Agreement on Tariffs and Trade (the precursor to the World Trade Organization), it represented only 7.5 percent of U.S. GDP.

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Export Trends

U.S. exports continue to grow. Over the last 13 years, total U.S. exports have increased at an average annual rate of 6.8 percent. In the last three years, since our last study, export growth has been especially strong, averaging 12.5 percent per year. The United States is a competitive exporter of industrial machinery, chemicals, aircraft, and semiconductors. Leading services exports include foreign travel/tourism, financial services, royalties and insurance.

Table 1
U.S. Exports to the World, 1995-2008
(Billions)

	Merchandise Exports	Services Exports	Total Exports
1995	$575.2	$219.2	$794.4
1996	612.1	239.5	851.6
1997	689.2	256.1	934.5
1998	670.4	262.8	933.2
1999	684.0	281.9	965.5
2000	772.0	298.6	1,070.6
2001	718.7	286.2	1,004.9
2002	685.2	292.3	977.5
2003	715.8	304.3	1,020.2
2004	806.2	353.1	1,159.2
2005	892.3	389.1	1,281.5
2006	1,015.8	435.9	1,451.7
2007	1,138.4	504.8	1,643.2
2008	1,277.0	549.6	1,826.6

Source: U.S. Department of Commerce, Bureau of Economic Analysis

Import Trends

U.S. imports have also been increasing over the last 13 years. Approximately half of U.S. merchandise imports are raw materials, capital goods and industrial products used by U.S. manufacturers to make goods in the United States. Thus, import demand is significantly impacted by growth in U.S. industrial production. The other half of U.S. merchandise imports is finished consumer goods. Key services imports include travel and transportation services – Americans traveling abroad for business or pleasure.

Table 2
U.S. Imports from the World, 1995-2008
(Billions)

	Merchandise Imports	Services Imports	Total Imports
1995	$749.4	$141.4	$890.8
1996	803.1	152.6	955.7
1997	876.8	165.9	1,042.7
1998	918.6	180.7	1,099.3
1999	1,031.8	199.2	1,231.0
2000	1,226.7	223.7	1,450.4
2001	1,148.6	221.8	1,370.4
2002	1,168.0	231.1	1,399.1
2003	1,264.9	250.3	1,515.2
2004	1,478.0	291.2	1,769.2
2005	1,683.2	313.5	1,996.7
2006	1,863.1	349.0	2,212.0
2007	1,969.4	375.2	2,344.6
2008	2,117.2	405.3	2,522.5

Source: U.S. Department of Commerce, Bureau of Economic Analysis

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

Another important contribution to the growth in trade over the last 13 years is trade liberalization, which opened new markets for U.S. exports of both goods and services at the same time it opened the U.S. market to increased imports from other countries.

◗ Gradual reductions in trade barriers began in 1994 between Mexico and the United States as part of the North American Free Trade Agreement (NAFTA).

◗ Significant global liberalization began between the United States and members of the World Trade Organization 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, and at the same time the United States began to gradually open its markets to Chinese exports of textiles and apparel, in particular.

◗ Free trade agreements were implemented between the United States and Jordan (December 2001), Chile and Singapore (January 2004), Australia (January 2005), Morocco (January 2006), Central America (March 2006-January 2009), Bahrain

(August 2006), Oman (January 2009), and Peru (February 2009). Each of these initiatives helped to increase U.S. exports as well as U.S. imports, and thus total U.S. trade.

Table 3 shows the "openness" of the U.S. economy, measured as the value of total trade (exports plus imports) relative to the value of U.S. GDP. The importance of trade to the U.S. economy has increased significantly over the last 13 years. Rising from 23 percent of GDP at the beginning of this period of accelerating trade liberalization, total trade grew to represent more than 30 percent of GDP in 2008.

Table 3
"Openness" of U.S. Economy, 1995-2005
(Billions and Percent)

	Total U.S. Trade*	Total Trade's Share of U.S.GDP
1995	$1,714.5	23.1%
1996	1,831.7	23.4
1997	2,010.2	24.1
1998	2,069.6	23.5
1999	2,240.7	24.0
2000	2,568.5	25.8
2001	2,426.4	23.6
2002	2,433.2	22.9
2003	2,586.1	23.2
2004	2,979.1	25.1
2005	3,332.9	26.4
2006	3,711.3	27.7
2007	4,025.6	28.6
2008	4,370.0	30.3

* "Total Trade" is goods and services exports plus goods and services imports.
Source: U.S. Department of Commerce, Bureau of the Census, from National Income and Product Accounts tables.

III.   Trade and American Jobs

As the U.S. economy fights its way out of a deep recession and millions of American workers search for jobs, it is appropriate to ask what role trade plays in job creation and job destruction. Americans accept that exports are good for the U.S. economy and job supporting, even job creating. President Barack Obama vowed in his January 2010 State of the Union Address to double U.S. exports in five years, thereby creating 2 million U.S. jobs. But his ability to make good on this pledge depends in part on his ability to convince a number of U.S. constituencies that trade liberalization is also good for the economy and good for jobs. Trade agreements that open foreign markets to U.S. exports also include provisions that liberalize partner countries' access to the U.S. market, which some groups fear will cost U.S. jobs.

This fear of the impacts of trade liberalization on U.S. jobs results from simplistic methods many analysts use to estimate the job effects of trade. For example, they estimate that a particular number of jobs is created from $1 billion of exports, and assume (incorrectly) that the same number of jobs would be lost from the same $1 billion of imports. Alternatively, they report only an estimate of the direct jobs associated with exports, ignoring the many more indirectly tied to those same exports. Or they focus only on trade in goods, ignoring the many jobs associated with trade in services, in which the United States enjoys a trade surplus.

The public policy debate has long needed an approach to evaluating the number of total U.S. jobs related to trade that is comprehensive and balanced. Our research is path breaking because it takes such as approach. It takes into account not only the job gains but also job costs associated with trade. It covers both exports and imports. It considered both goods and services. In addition it uses a methodology that permits the full range of interactions between different sectors of the U.S. and international economies, and that eliminates any double counting of job impacts, either positive or negative. The Appendix describes the details of our methodology.

Our earlier research found that U.S. trade in 2004 supported 31 million U.S. jobs, *nearly* one in five U.S. jobs. Our updated research continues to show that total trade – both exports and imports – supports jobs. Moreover, expansion of trade – both exports and imports – continues to shift jobs into the sectors that supply exports and deliver imports. The importance of trade to American jobs was even greater in 2008: higher levels of trade in that year supported 38.4 million jobs, *more* than one in five U.S. jobs (see Table 4). These are jobs that would not exist but for trade. The increase also reflects a growing shift of workers towards jobs in sectors that produce goods or services for export, or that work in goods or services sectors that consume imports. While trade-dependent jobs are concentrated in services sectors, it is important to note that trade has a net positive impact on U.S. manufacturing jobs as well.

Table 4
Related to Trade,* 2008
(Thousands)

Total	38,418.8
Construction	2,559.2
Manufacturing	491.2
Services	29,332.5
Wholesale, retail trade	5,913.0
Professional, scientific, tech.	1,932.0
Finance, insurance	1,848.0
Transportation, warehousing	1,525.3
Information services	1,040.3
Other services	17,073.8
Other	6,036.0
Share of Total U.S. Employment	21.1%

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

Our updated assessment of the number of U.S. jobs that depend on trade also shows that trade dependent jobs grew at a faster pace that total employment. Between 2004 and 2008, trade-dependent jobs increased by 22.7 percent, compared to 6.8 percent for employment generally. In other words, as the economy has become more dependent on trade, employment related to trade has increased at a faster pace than non-trade related employment.

State-Level Trade-Related Employment

A breakdown of the national employment estimates by state shows that every state realizes a net positive impact from trade (see Table 5). Not surprisingly, the largest states benefited the most. Shares of total state employment related to trade ranged from a low of 18.7 percent (Wyoming) to a high of 23.1 percent (Hawaii).

Table 5
Net Number of American Jobs
Linked to Trade, By State, 2008
(Thousands)

Alabama	+529.7	Montana	+133.8
Alaska	+97.5	Nebraska	+263.5
Arizona	+732.8	Nevada	+373.2
Arkansas	+320.7	New Hampshire	+179.5
California	+4,326.1	New Jersey	+1,148.1
Colorado	+695.5	New Mexico	+235.9
Connecticut	+491.6	New York	+2,510.8
Delaware	+124.5	North Carolina	1,137.9
District of Columbia	+196.8	North Dakota	+99.0
Florida	+2,300.5	Ohio	+1,447.9
Georgia	+1,188.1	Oklahoma	+423.3
Hawaii	+201.7	Oregon	+469.2
Idaho	+186.4	Pennsylvania	+1,590.8
Illinois	+1,652.8	Rhode Island	+133.6
Indiana	+761.5	South Carolina	+547.5
Iowa	+408.6	South Dakota	+114.5
Kansas	+377.3	Tennessee	+784.7
Kentucky	+488.8	Texas	+2,960.8
Louisiana	+551.8	Utah	+358.4
Maine	+181.0	Vermont	+91.6
Maryland	+782.6	Virginia	+1,077.4
Massachusetts	+921.9	Washington	+842.8
Michigan	+1,132.0	West Virginia	+192.6
Minnesota	+741.0	Wisconsin	+742.8
Mississippi	+317.9	Wyoming	+75.7
Missouri	+774.3	TOTAL	+38,418.8

Source: Authors' estimates.

IV   Conclusion

Our analysis demonstrates that trade continues to be important – indeed, increasingly important – to 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 that trade.

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

Appendix

Methodology

Different options are available to estimate trade linkages to employment and output. One involves manipulation of input-output tables to map the linkages between exports and/or imports to labor demand and total output across sectors. Such an approach presents several problems, however. The first is that the shares in the base data basically fix the structure of production and demand. In addition, there may be double counting, as the net effect of exports and imports is not the simple sum of export effects and import effects. In addition, such an approach may also overestimate effects unless the impact of substitution toward trade with the rest of the world is also included.

To accommodate these issues, we applied a computable multi-sector model of the U.S. economy. Computable general equilibrium (CGE) models are characterized by an input-output structure (based on regional and national input-output and employment tables) that explicitly link industries in a value added chain from primary goods, over continuously higher stages of intermediate processing, to the final assembling of goods and services for consumption. Inter-sectoral linkages are direct, like the input of steel in the production of transport equipment, and indirect, via intermediate use in other sectors. The model captures these linkages by modeling firms' use of factors 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.

Data

Our data come 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 2008 experiment, social accounting data are drawn directly from the most recent version of the Global Trade Analysis Project (GTAP) dataset, version 6.0. (Dimaranan and McDougall, 2002). The GTAP version 7 dataset is benchmarked to 2004 and includes detailed national input-output, trade, and final demand structures. Using macro and related trade and employment data, we updated the dataset to 2008.

The basic social accounting and trade data are supplemented with trade policy data, including additional data on tariffs and non-tariff barriers. The data are supplemented with data from the Commerce Department's Bureau of Economic Analysis on state-level employment. These data allow us to map nationwide effects to state-level changes in employment.

The data on tariffs are taken from the World Trade Organization's integrated database, with supplemental information from the World Bank's assessment of detailed pre- and

post-Uruguay Round tariff schedules and from the UNCTAD/World Bank WITS dataset. All of this tariff information has been concorded to GTAP model sectors within the version 7 database. The sectors in the model are shown in Table A-1. The GTAP regions are aggregated into the U.S. and rest-of-world.

Table A-1
Model Sectors

Agriculture	Lumber and wood products
Forestry	Paper, pulp, publishing
Fisheries	Petroleum and coal products
Coal	Chemicals, rubber, plastics
Oil	Non-ferrous metals
Gas	Iron and steel
Other minerals	Fabricated metals
Processed foods	Transport equipment
Beverages and tobacco	Other manufactures
Textiles	Construction
Wearing apparel	Trade and transport
Leather	Other private services
	Public services

The Model

Single representative, composite households comprise each region, with expenditures allocated over personal consumption and savings. The composite household owns endowments of the factors of production and receives income by selling them to firms. It also receives income from tariff revenue and rents accruing from import/export quota licenses (when applicable). Part of the income is distributed as subsidy payments to some sectors, primarily in agriculture.

On the production side, in all sectors, firms employ domestic production factors (capital, labor and land) and intermediate inputs from domestic and foreign sources to produce outputs in the most cost-efficient way that technology allows. Capital stocks are fixed at a national level. Firms are competitive, and employ capital and labor to produce goods and services subject to constant returns to scale.[1] Products from different regions are

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[1]   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.

assumed to be imperfect substitutes in accordance with the so-called "Armington" assumption. Armington elasticities are taken directly from the GTAP v. 7 database, as are substitution elasticities for value added.

We were interested in the impact of trade on the U.S. and state economies given the U.S. wage structures in 2008. In other words, given the prevailing wage structure of the labor force in the 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, we employ a labor market closure (equilibrium conditions) where we fix wages at prevailing levels, and force employment levels to adjust. This provides a direct estimate of the jobs supported, at current wage levels, by the 2008 level of trade.

Experiment

The experiment conducted with the model involve imposing changes in U.S. trade, in this instance effectively eliminating U.S. exports and imports by imposing prohibitive duties against trade with the United States across the board.[2] This allows us to trace changes at the border as they work through the U.S. economy.

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. These results thus also measure the reverse scenario: how much 2008 levels of trade in goods and services contributed to U.S. and state output and employment. We report the results from this second perspective in this paper.

References

Dimaranan, B.V. and R.A. McDougall, (2002). Global Trade, Assistance, and Production: The GTAP 5 Data Base, Center for Global Trade Analysis, Purdue University.

Hertel, T., W.E. Ianchovichina and B.J. McDonald (1997), "Multi-Region General Equilibrium Modeling," in J.F. Francois and K.A. Reinert, Eds. *Applied Methods for Trade Policy Analysis: A Handbook*, Cambridge University Press.

Huff, K., R. McDougall and T. Walmsley (2000), "Contributing Input-Output Tables to the

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[2]   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.

GTAP Data Base," GTAP Technical Paper No. 01, GTAP consortium.

McDonald, S. and K. Thierfelder (2003), "Deriving a Global Social Accounting Matrix from GTAP version 5 Data, "GTAP consortium.

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.