Terminating NAFTA:

The National and State-by-State Impacts on Jobs, Exports and Output

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Summary

Using a methodology that enables us to capture the full impacts (both positive and negative; direct and indirect) across the U.S. and international economies, we find that a termination of the North American Free Trade Agreement (NAFTA) would have significant net negative impacts on the U.S. economy and U.S. employment, particularly over the immediate years after termination. Termination would re-impose high costs of tariffs on U.S. exports and imports, which would reduce the competitiveness of U.S. businesses both domestically and abroad. U.S. exports would drop, both to Canada and Mexico and globally, as U.S. output becomes more expensive and therefore U.S. businesses would be less competitive in these markets. Foreign purchasers would shift away from U.S. goods and services in favor of lower-cost goods and services made in other international markets, particularly those made in Asia.

These efficiency losses and trade shifts would have an impact on U.S. production of both goods and services, and thus also on U.S. employment. We estimate that, if NAFTA is terminated and most-favored nation (MFN) duties are re-imposed for U.S. trade with Canada and Mexico, the level of U.S. real output would fall 0.6 percent below levels that would prevail if NAFTA were in effect in each of the first one to five years after termination. Lower output means less employment after all the gains and losses are tallied: on balance 1.8 million workers would immediately lose their jobs in the first year with full termination and the return of MFN tariffs.[1]

While the focus of our study is the short- to medium-term, we also examine the national impacts of terminating NAFTA over the longer term (i.e., 10 years and after). Terminating NAFTA would have negative impacts on jobs, exports and output even after new supply chains are formed. In this longer run, we estimate that U.S. GDP would remain depressed by over 0.2 percent, permanently.

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[1] As discussed in what follows, we also estimate the much higher impacts of the possibility that Mexico could retaliate with what are known as "bound tariffs" (far above MFN tariffs) on the U.S. economy and jobs.

1. Introduction

The likelihood that NAFTA could be brought to an end without a new agreement is high enough to ask what impacts such an outcome would have on the U.S. economy and U.S. jobs. This study attempts to answer that question.[2] Our focus is on the status quo (2016) compared to a situation with no agreement, in the short- to medium term (one to five years after termination). In other words, we examine the impact that terminating NAFTA – and not replacing it with another agreement – would have on the 2016 economy (output, exports and jobs) both nationally and state-by-state. We assume a hard termination of NAFTA in which there are immediate shocks to U.S. markets in the first year that over time are partially offset as companies and consumers throughout the global supply chain adjust.

To fully assess these potential impacts, we must examine the effect of raising U.S., Canadian and Mexico tariffs to non-NAFTA rates (i.e., those currently in effect for countries that are not parties to NAFTA or another preferential trade agreement). These tariff rates are limited by World Trade Organization (WTO) commitments, and are readily observable from countries' tariff schedules.

Our analysis also needs to consider the ways, both positive and negative, in which the first-order actions (raising tariffs) affect supply chains and the locations where goods are produced. This mix of supply chain and location effects in turn will drive changes in productivity, new investment, and the prices paid by consumers. In some instances, U.S. production and related employment may increase. In others, both will decline. Also important to consider is the way these changes affect consumers. For example, when the price of a good (parts or finished goods) or service increases because a tariff is imposed,[3] consumers (be they manufacturers or households) buy less, and firms shift to lower-cost foreign suppliers. When customers buy less, producers make less still, and

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[2] We are *not* seeking to measure the impacts of NAFTA since it was implemented. NAFTA has been in effect for 23 years and over that time, many other important changes to the U.S. economy have happened, from the implementation of other U.S. trade agreements (bilateral, regional and multilateral) to such economy-shaking developments as the widespread use of the Internet. NAFTA was a driver in changes to U.S. supply chains over the last 23 years, and so was the Internet. Disentangling the impacts of NAFTA separate from the other important developments is not our task in this paper.

[3] While tariffs are technically imposed only on goods crossing borders, not services, those tariffs on goods can add to the cost of services imports and exports. A recent U.S. International Trade Commission study demonstrates how services providers indirectly incorporate the costs of tariffs into their services (e.g., when they use equipment and capital that is imported or is made from imported components subject to tariffs). In addition, the value of goods produced in global supply chains does not distinguish between the value of services used to make the good (e.g., R&D or design services, transportation services, warehousing services), and the value of the manufactured components. When the good enters the United States, the tariff is imposed on the full value of the good, including embedded services, not just the manufactured components of the good. U.S. International Trade Commission, *The Economic Effect of Significant U.S. Import Restraints: Ninth Update 2017*, Inv. No. 332-325, Pub. No. 4726, Chapter 3, https://www.usitc.gov/publications/332/pub4726c.pdf.

workers lose jobs (the usual short- to medium-run impact) or see their wages decline (the long-run impact). Less spending by consumers (and producers) reverberates throughout the economy, with reduced sales and employment impacts on supplier industries and reduced spending by families and individuals on nights out at restaurants or movie theaters, cutbacks in optional spending (e.g., on child day care or education programs, or postponement of medical care, needed or optional). Lower spending on these services can trigger job losses in those sectors as well.[4]

To reflect these complex relationships, we employ a model specifically designed to capture such effects (briefly described in Section 2.1 and detailed in Appendix A). We examine two scenarios (Section 2.2), focusing primarily on the short- to medium-term impacts (meaning starting from the immediate cancelling of NAFTA through the next five years):

> Scenario A: The United States raises tariffs to MFN on imports from Canada and Mexico; Canada and Mexico re-impose MFN duties on imports from the United States; Canada and Mexico trade stays duty-free between them;
>
> Scenario B: The United States raises duties to MFN rates, Canada does the same, Mexico raises duties to bound rates; Canada-Mexico trade remains duty-free.

Tariff Types

Most-favored nation (MFN) tariffs are tariff rates a country applies to imports from all trading partners that are members of the World Trade Organization (WTO), unless the country has a preferential trade agreement, like NAFTA, that stipulates different (lower) duties on imports from specific countries. Under WTO rules, MFN tariffs are the same for all non-preferential partners (those not part of a preferential trade agreement).

Countries also have **bound tariffs**, which are (sometimes much) higher rates than MFN tariffs. Bound tariffs are the maximum tariff rate for a given product that a country has committed not to exceed. WTO members have the flexibility to apply tariffs at any level up to their bound level.

Under WTO rules, while a WTO member can raise its applied tariff to the bound tariff, it cannot apply different tariffs against different countries. In the absence of an FTA, the same tariff rate must be applied against all WTO members. In other words, each member qualifies for the best rate on offer, or the MFN rate. If bound tariffs apply to one partner, they apply to all.

Our results are reported in Section 3. Briefly, we find that terminating NAFTA would have negative impacts on the U.S. economy, most severe in the short- to medium term (up to five years).[5] During this period, U.S. real GDP (U.S. output of goods and services) would decline by 0.6 percent annually, or $119 billion (Scenario A) to 1.2 percent annually, or $231 billion (Scenario B). U.S. exports to

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[4] Another recent study follows a similar modeling path. See Terrie Walmsley and Peter Minor, "Reversing NAFTA: A Supply Chain Perspective," ImpactECON Working Paper, March 2017, https://impactecon.com/wp-content/uploads/2017/02/NAFTA-Festschrift-Paper-1.pdf. Appendix C compares our research to that of ImpactECON and others who have recently released assessments of the economic consequences of terminating NAFTA.

[5] The estimates that follow are the impacts that would immediately result in the first year, remaining at these lower levels for the up to five years after termination.

the world would decline by 2.5-5.0 percent annually. U.S. imports from the world also decline, by 3.6-7.5 percent annually. This follows from a combination of higher costs for trade with two major U.S. trading partners, and the fall in U.S. competitiveness and U.S. incomes with NAFTA elimination, which together drive the decline in trade.

Reduced output hits employment. While some sectors may see job increases, most see job losses. In the short- to medium term, U.S. employment would drop on net by 1.8 million (Scenario A) to 3.6 million jobs (Scenario B), with two-thirds of those jobs held by workers in production and lower skilled occupations. U.S. manufacturing would lose between 82,000 and 157,000 jobs, on net, in the first years after termination. Canadian and Mexican workers would also lose jobs on net: over 1.2 million in Canada, and 2.3 to 10.3 million in Mexico. Interestingly, as other countries benefit from trade shifting to them from the United States, Canada and Mexico, net employment would increase in China (+2.0 million), Germany (+123,500), Japan (+291,400), and Korea (+146,000), among others.

Our Results Are Conservative

Our analysis understates the impacts of terminating NAFTA in at least two important ways. First, it does not include an assessment of how the end of benefits provided by NAFTA to U.S. companies selling to the Mexican and Canadian governments would reduce U.S. sales, output and jobs (NAFTA partner concessions on public procurement); how the end of certain investment protections afforded by NAFTA would affect U.S. production costs, or how changes to some rules of origin would impose higher costs on U.S. producers. The costs of these "nontariff measures" were not included in our analysis.

Second, it does not include an estimate of the costs of employment transition or the costs of unemployment that would result from the increase in U.S. trade barriers. None of the analysis presented here is meant to say there have been no adjustment costs in the past with implementation of the NAFTA. However, those costs have been realized. We are where we are, and unwinding the NAFTA would, in a sense, represent a decision to revisit comparable adjustment costs again for a second time.

Over the longer term (i.e. 10 years or longer), if NAFTA remains terminated, supply chains will adjust and the United States will recover somewhat. This means employment levels will also partially recover. However, output and employment would remain below levels they would have been if NAFTA were not terminated. Economic output would be lower by between $36 and $99 billion a year, and net employment would be reduced by over 200,000 jobs (Scenario A), and as many as nearly 700,000 jobs (Scenario B) based on the structure of the U.S. economy in 2016 (in other words, this is how much lower U.S. output would be in 2016 had NAFTA been terminated 10 years prior).[6] Our results for Scenario A are consistent with other estimates of the benefits of NAFTA, which tend to be on the order of annual boosts to U.S. output of $50 billion: when we examine the impacts of terminating NAFTA factoring in the growth in base GDP over the next 10 years and longer, the cost of terminating NAFTA averages about $50 billion annually.

[6] Our analysis of short- to medium-term effects is complemented by an analysis of long-run reduction in the level of GDP (known in the economic growth literature as a "level effect").

2. Methodology

We briefly describe here the model we used for our analysis; a detailed description of our approach is provided in Appendix A (section 2.1). We also describe our two scenarios for assessing the potential impacts of terminating NAFTA (our "experiments") (section 2.2).

2.1 The model

We base our analysis on the Global Trade Analysis Project (GTAP) database. The GTAP database covers international trade and economy-wide inter-industry relationships and national income accounts, as well as tariffs, some nontariff barriers and other taxes. This includes value-chain related linkages across industries and borders. These data are included in a computer-based model of production and trade (an overview of the technical features of the model, known as a "computable general equilibrium" (CGE) model, is provided in Appendix A.) While our model incorporates the GTAPv10 database, we have updated the data from the 2014 benchmark year to better reflect the U.S. economy in 2016.

Trade Facilitation and NAFTA

Another open question is the impact of NAFTA termination on trade costs linked to non-tariff measures (NTMs). NAFTA was a pioneer agreement in tackling NTMs affecting customs procedures, for example, and many of its benefits are also incorporated in the WTO's more recent Trade Facilitation Agreement (TFA). As such, if the NAFTA parties all fully implement their TFA commitments, then this provides some buffer against NTM costs following from NAFTA termination.

However, if any of the NAFTA parties backslide on their TFA commitments, then NAFTA termination will involve the re-imposition of non-tariff barriers affecting the movement of goods across borders as well as tariffs, and the costs of terminating NAFTA -- measured in productivity, income and jobs --will be substantially more than the estimates reported here. Adjustment costs would then also be higher.

The base year for our analysis of the termination of NAFTA is 2016, the most recent year for which detailed national and state-level employment and output data are available from the Bureau of Economic Analysis. We focused on short- to medium-run effects (one to five years), but also report results for the longer term should NAFTA remain terminated for 10 years or longer. In this second case, the comparison to keep in mind is "what would 2016 have looked like if NAFTA had been terminated 10 years ago."

In addition to economy-wide impacts, we consider the impacts of terminating NAFTA on the U.S. workforce. For the short- to medium-run analysis emphasized here, we treat wages as "sticky," meaning changes in demand for labor (positive or negative) are reflected in changes in employment rather than changes in wages. We examine the employment impacts on workers in different occupation/skill categories in the United States. **It is important to emphasize that our employment impact estimates are net. They take into account potential increases as well as decreases in employment as demand increases in some cases for U.S. products, and declines in others.** These changes arise not only from the direct impacts of the re-imposition of tariffs, but also the indirect impacts of changes in supply and demand for goods and services generally

across the economy. Thus, our estimates for some sectors (e.g., motor vehicles) will be different from those of other researchers who do not consider the fuller economic effects of increases in the cost of motor vehicle production in the United States.

2.2 Experiments

As noted above, NAFTA permits the United States to withdraw from the agreement, at which point it would be entitled to raise U.S. tariffs on imports from Canada and Mexico (now at zero rates for qualifying goods) back up to MFN rates.[7] The average U.S. MFN rate re-imposed by this analysis is 1.91 percent on imports from Canada and 3.92 percent on imports from Mexico (see Table 1 below). Canada and Mexico would also be entitled to raise their duties on U.S. imports to their MFN rates. The average MFN rate for Canada we used is 3.54 percent, and for Mexico, 5.00 percent. NAFTA stipulates that if one party withdraws, the trade agreement would remain in effect between the remaining two parties, meaning that trade between Canada and Mexico would continue duty-free. This is our first "experiment," Scenario A.

Alternatively, we also consider the possibility that Mexico imposes its much higher bound tariff rates on U.S. imports after the United States pulls out of NAFTA. It could do this under WTO rules by applying the bound rates to imports of products from WTO members with which it does not have preferential trade agreements. This would include China and, in the absence of NAFTA, the United States. A substantial portion of Mexico's imports enter duty free as a result of 19 free trade agreements.[8] In our second experiment, Scenario B, the United States re-imposes MFN duties on imports from Canada and Mexico as described above for Scenario A, Canada imposes MFN duties[9] on imports from the United States, and Mexico imposes bound duties on imports from the United States. These duties average 37.51 percent in our analysis. Mexico-Canada trade remains duty-free.

Table 1 reports trade-weighted MFN and bound tariff rates that would be applied to U.S.-Canada-Mexico trade in the absence of NAFTA. The United States has bound its tariff rates at its MFN rates. In other words, U.S. bound and MFN tariffs are virtually the same. Canada has some bound rates that are higher than its MFN rates. However, according to the WTO, 99.7 percent of Canadian tariffs are bound at their MFN rates.

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[7] In many instances those MFN rates are now zero thanks to all the trade liberalization that has followed from multilateral trade initiatives since 1994, when NAFTA went into effect (e.g., the Uruguay Round and the Information Technology Agreements).

[8] Mary Amiti and Caroline Freund, "U.S. Exporters Could Face High Tariffs without NAFTA," Federal Reserve Bank of New York *Liberty Street Economics* (blog), April 17, 2017, https://piie.com/blogs/trade-investment-policy-watch/us-exporters-could-face-high-tariffs-without-nafta.

[9] U.S. bound and MFN tariff rates are the same. Canada's trade-weighted average MFN rate was 3.5 percent, and its trade weighted average bound rate was 5.0 percent (according to the WTO). Mexico's average MFN rate was 5.0 percent, and its average bound rate was 37.5 percent. See Table 1.

Overall U.S. MFN tariffs on imports from Canada averaged 1.91 percent, compared to 3.54 percent for Canadian imports from the United States. At the detailed sector level (reported in Appendix B), differences can be even more pronounced (primarily due to the differing mixes of trade within a given sector category, as the tariff rates reported are trade-weighted). For example, absent NAFTA, Canadian tariffs on the current mix of U.S. agricultural goods, processed food and beverages/tobacco products exported to Canada would be considerably higher (14.83 percent) than comparable U.S. duties (5.22 percent).

U.S. and Mexican MFN tariffs overall in the absence of NAFTA would not be dissimilar to U.S. MFN tariffs on imports from Mexico (5.00 percent in Mexico compared to 3.92 percent in the United States). Again, sector level differences are sometimes quite large. As with Canada, Mexico's average MFN tariffs on imports of agricultural goods, processed foods and beverages/tobacco from the United States would be several multiples of those applied by the United States to imports from Mexico in the absence of NAFTA -- 22.71 percent compared to 8.23 percent. The picture changes dramatically if Mexico were to impose its bound tariff rates on imports from the United States in the absence of NAFTA. Those rates are many multiples of the U.S. tariff rates for every sector (see Appendix B). Overall, they average 37.71 percent on imports into Mexico, compared to 3.92 percent on imports into the United States.

Table 1
Trade-Weighted Tariffs that Would Impact U.S.-Canada-Mexico Trade in the Absence of NAFTA
(Percent)

	Average MFN U.S. tariffs on imports from Canada	Average MFN U.S. tariffs on imports from Mexico	Average MFN Canadian tariffs on Imports from the U.S.	Average MFN Mexican tariffs on imports from the U.S.	Average Mexican bound tariffs on imports from the U.S.
Tariffs on Goods	1.91	3.92	3.54	5.00	37.51
Agriculture, processed foods, beverages	5.22	8.23	14.83	22.71	44.36
Other goods	1.59	3.55	2.15	3.67	36.99

Sources: U.S. Bureau of Economic Analysis (2016 trade data) and the World Bank/UNCTAD WITS database (2015 trade-weighted tariff rates at the sector level).

3. Results

We have examined the short- to medium-term and longer-term impacts of terminating NAFTA on the national economy (section 3.1). We present the short- to medium-term impacts on each of the 50 U.S. states (section 3.2). We have also looked at impacts on non-NAFTA countries (section 3.3).

3.1 U.S. national level results

As shown in Table 2a, terminating NAFTA would cause real U.S. GDP to drop from levels reached in 2016 by between 0.6-1.2 percent for each year the agreement is no longer in effect up to and including the first one to five years after termination. Based on the structure of the U.S. economy in 2016, the macroeconomic impact amounts to a "hit" to U.S. economic output of between $119 billion (Scenario A) and $231 billion (Scenario B), in 2016 dollars, taking the 2016 U.S. economy as a reference point. As costs rise, so too does inflation. In the short- to medium term, U.S. CPI increases by 0.1-0.2 percent. Short- to medium-term impacts by sector are detailed in Appendix B.

Output declines in nearly every sector of the U.S. economy. Services sectors are hit the hardest for several reasons. First, as the largest component of the U.S. economy, services are key inputs into the output of every U.S. sector. In addition to a direct hit from reduced services exports, services output suffers as manufacturing, agriculture and energy output also decline. In addition, consumers are hit by higher costs and, for many, unemployment and therefore lower spending power for the nation's 126 million households, which is estimated at $654 per household (Scenario A) to $1,264 (Scenario B) per year in the first one to five years after NAFTA's termination. As a result, households pull back on spending; services like education, entertainment and even healthcare are on the front lines of the spending reduction impacts. On the export side, goods exports fall consistently across sectors, scenarios, and time. Services exports increase as they are not hit directly by tariffs on goods (but the increase is not enough to offset the declines in domestic consumption so services output overall declines).

Over the long run (10 years and later) (Table 2b), as investors respond and capital investment is shifted out of the most adversely impacted sectors (and out of the United States overall) and into others, the level of annual U.S. GDP is estimated to then remain roughly 0.2-0.5 percent lower, or by $36-99 billion.[10] These estimates are in line with the research of others who focus on the longer-term impacts of NAFTA on the U.S. economy. Consumer prices remain 0.1 to 0.2 percent higher.

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[10] As noted above, these estimates are based on the structure of the U.S. economy in 2016 (our analysis is structured to answer this question: "what is the impact on 2016 GDP, trade and employment had NAFTA been terminated 10 years earlier?"). With reference to the increasing size of the U.S. economy in future years (i.e., factoring in economic growth), in the MFN tariff scenario we estimate the comparable long-run annual cost of NAFTA termination to be approximately $50 billion per year in terms of reduced annual GDP.

Table 2a
Estimated Annual U.S. National Impacts of Terminating NAFTA: Short- to Medium-Term Impact

	Scenario A	Scenario B
GDP (percent)	-0.6	-1.2
GDP (value in billions of 2016 dollars)	-$119.4	-$231.0
U.S. Exports to the World (percent)	-2.5	-5.0
U.S. Imports from the World (percent)	-3.6	-7.5
U.S. Employment (thousands)	-1,809.6	-3,611.4
- Higher skilled workers (a)	-602.2	-1,201.5
- Lower skilled workers (b)	-1,207.4	-2,409.9
Change in U.S. Labor Income (percent)	-0.9	-1.9
Change in disposable household income (value in billions of 2016 dollars)	-$82.3	-$159.2
Cost per U.S. household (dollars)	$654	$1,264
Consumer prices (CPI) (percent)	+0.1	+0.1

Table 2b
Estimated Annual U.S. National Impacts of Terminating NAFTA: Longer-Run Impact

	Scenario A	Scenario B
GDP (percent)	-0.2	-0.5
GDP (value in billions of 2016 dollars)	-$36.4	-$99.0
U.S. Exports to the World (percent)	-4.4	-10.4
U.S. Imports from the World (percent)	-2.6	-6.3
U.S. Employment (thousands)	-233.8	-696.3
Change in U.S. Labor Income (percent)	-0.3	-0.8
Change in disposable household income (value in billions of 2016 dollars)	-$25.1	-$68.2
Cost per U.S. household (dollars)	$199	$542
Consumer prices (CPI) (percent)	+0.1	+0.2

Scenario A: U.S. raises duties to MFN rates; Canada and Mexico do the same against U.S. exports; Canada-Mexico trade stays duty-free.
Scenario B: U.S. raises duties to MFN rates, Canada does the same, and Mexico raises duties to bound rates.
(a) Higher skilled workers include, for example, managers, professionals, technicians and similar workers.
(b) Lower skilled workers include, for example, store, sales and other services workers; office and administrative staff, production workers, machine operators, and farm workers.
Source: Authors' estimates.

Reduced output also hits employment. U.S. employment would drop by 1.8 million (Scenario A) to 3.6 million (Scenario B) jobs in the short- to medium term. Most of the job losses would affect workers holding lower-skilled occupations, including production workers in manufacturing and agriculture and lower-wage workers in services industries. Wages and other worker income would also decline, by 0.9 percent to 1.9 percent. Over the longer term, as the economy adjusts and workers move into new jobs, the drop in the number of U.S. jobs abates, but only somewhat. It remains below pre-NAFTA termination levels by 233,800 to 696,300 jobs. Counting the loss of jobs in the short run, and the mixture of lost jobs and lower wages in the long run, we estimate

that total labor income falls between 0.9 percent (Scenario A) and 1.9 percent (Scenario B) in the short run, and between 0.3 percent and 0.8 percent in the long run.

One reason U.S. output drops is that U.S. exports to the world decline considerably under both scenarios, even though some of the lost export sales to Canada and Mexico find buyers in other countries. Overall, U.S. producers are less competitive in global markets as their input costs rise and production shifts outside the United States. U.S. imports also drop overall, because the end of NAFTA means higher costs for imports from two important economic partners, and because U.S. exports (used ultimately to pay for imports) become less competitive and therefore decline.

Table 3
Change in Bilateral Trade: Short- to Medium-Term Impact
(Percent)

	Scenario A	Scenario B
U.S. Exports to:		
Canada	-17.4	-14.4
Mexico	-17.4	-62.8
Canadian Exports to:		
United States	-7.6	-9.3
Mexico	+3.5	+60.2
Mexican Exports to:		
United States	-17.4	-62.8
Canada	+3.5	+60.2
U.S. Imports from:		
Canada	-7.6	-9.3
Mexico	-11.4	-27.0
Canadian Imports from:		
United States	-17.4	-14.4
Mexico	+6.2	-8.9
Mexican Imports from:		
United States	-17.4	-62.8
Canada	+3.5	+60.2

Scenario A: U.S. raises duties to MFN rates; Canada and Mexico do the same against U.S. exports; Canada-Mexico trade stays duty-free.
Scenario B: U.S. raises duties to MFN rates, Canada does the same, and Mexico raises duties to bound rates.
Source: Authors' estimates.

Further detail on exports for all three NAFTA economies is reported in Table 3. Not surprisingly, U.S. exports to Canada and Mexico drop (from 17 percent in Scenario A to

63 percent in Scenario B) as do U.S. imports from Canada and Mexico (from 7.6 percent in Scenario A to 27 percent in Scenario B).[11]

3.2 State results

We have also disaggregated our national results for the short- to medium term by state, as shown in Tables 4-8. Every state loses output and employment if NAFTA is terminated. This varies across states, depending on economic structure and the size of state economies.

Table 4a
Impact of Termination of NAFTA on State Output, Short- to Medium-Term Impact, Scenario A
(Millions of dollars)

Alabama	-1,319.0	Montana	-299.8
Alaska	-288.9	Nebraska	-736.6
Arizona	-2,022.1	Nevada	-1,001.9
Arkansas	-787.4	New Hampshire	-506.5
California	-16,729.4	New Jersey	-3,758.7
Colorado	-2,118.7	New Mexico	-580.0
Connecticut	-1,668.8	New York	-9,950.0
Delaware	-479.7	North Carolina	-3,358.0
District of Columbia	-808.9	North Dakota	-331.7
Florida	-6,303.6	Ohio	-3,964.0
Georgia	-3,523.5	Oklahoma	-1,076.4
Hawaii	-591.1	Oregon	-1,491.7
Idaho	-457.7	Pennsylvania	-4,591.5
Illinois	-5,110.6	Rhode Island	-382.2
Indiana	-2,098.5	South Carolina	-1,390.2
Iowa	-1,168.8	South Dakota	-311.1
Kansas	-954.8	Tennessee	-2,119.8
Kentucky	-1,283.1	Texas	-9,933.2
Louisiana	-1,447.6	Utah	-1,053.1
Maine	-398.9	Vermont	-208.4
Maryland	-2,560.6	Virginia	-3,261.6
Massachusetts	-3,291.4	Washington	-3,038.7
Michigan	-3,136.4	West Virginia	-441.4
Minnesota	-2,177.1	Wisconsin	-2,007.4
Mississippi	-703.4	Wyoming	-209.7
Missouri	-1,952.8	TOTAL	-119,420.4*

Scenario A: U.S. raises duties to MFN rates; Canada and Mexico do the same against U.S. exports; Canada-Mexico trade stays duty-free.
* The sum of the states may not exactly equal the national total because the state estimates are based on gross state output, which may not sum perfectly to national output, upon which the national estimate is based.
Source: Authors' estimates.

[11] While we do not focus attention on bilateral trade balances in this report, we note that the changes in export and import values imply that the combined U.S. bilateral trade deficit with Canada and Mexico would roughly double under Scenario A, with an even greater increase in Scenario B.

Table 4b
Impact of Termination of NAFTA on State Output, Short- to Medium-Term Impact, Scenario B
(Millions of dollars)

Alabama	-2,595.0	Montana	-626.0
Alaska	-580.4	Nebraska	-1,424.0
Arizona	-3,834.5	Nevada	-1,977.0
Arkansas	-1,549.2	New Hampshire	-952.1
California	-31,498.9	New Jersey	-7,336.0
Colorado	-4,086.6	New Mexico	-1,146.4
Connecticut	-3,221.7	New York	-19,200.4
Delaware	-926.5	North Carolina	-6,384.1
District of Columbia	-1,588.6	North Dakota	-654.5
Florida	-12,262.3	Ohio	-7,794.5
Georgia	-6,791.2	Oklahoma	-2,164.0
Hawaii	-1,175.0	Oregon	-2,373.5
Idaho	-859.8	Pennsylvania	-9,014.0
Illinois	-9,948.7	Rhode Island	-747.8
Indiana	-4,147.3	South Carolina	-2,684.4
Iowa	-2,210.5	South Dakota	-615.2
Kansas	-1,887.4	Tennessee	-4,192.9
Kentucky	-2,462.8	Texas	-19,804.1
Louisiana	-3,261.9	Utah	-2,077.3
Maine	-778.0	Vermont	-400.4
Maryland	-4,976.0	Virginia	-6,265.6
Massachusetts	-6,194.4	Washington	-5,889.6
Michigan	-5,891.2	West Virginia	-899.7
Minnesota	-4,163.5	Wisconsin	-3,820.7
Mississippi	-1,410.6	Wyoming	-441.5
Missouri	-3,756.4	TOTAL	-231,001.6*

Scenario B: U.S. raises duties to MFN rates, Canada does the same, and Mexico raises duties to bound rates.
* The sum of the states may not exactly equal the national total because the state estimates are based on gross state output, which may not sum perfectly to national output, upon which the national estimate is based.
Source: Authors' estimates.

Table 5a
Impact of Termination of NAFTA on State Exports to World, Short- to Medium-Term Impact, Scenario A
(Millions of dollars)

Alabama	-1,588.8	Montana	-65.3
Alaska	-112.0	Nebraska	-603.3
Arizona	-173.3	Nevada	-163.5
Arkansas	-196.5	New Hampshire	-5.6
California	-2,372.1	New Jersey	-517.2
Colorado	-112.0	New Mexico	-50.0
Connecticut	+139.4	New York	-521.6
Delaware	-153.2	North Carolina	-579.4
District of Columbia	+133.4	North Dakota	-197.9
Florida	-747.6	Ohio	-1,972.8
Georgia	-693.7	Oklahoma	-92.3
Hawaii	+12.5	Oregon	-368.6
Idaho	-133.6	Pennsylvania	-486.7
Illinois	-1,718.3	Rhode Island	-47.2
Indiana	-1,785.8	South Carolina	-2,033.6
Iowa	-775.5	South Dakota	-182.1
Kansas	-431.5	Tennessee	-1,367.4
Kentucky	-1,036.0	Texas	-4,419.1
Louisiana	-880.3	Utah	-283.3
Maine	-60.5	Vermont	-58.6
Maryland	-12.5	Virginia	-194.0
Massachusetts	+134.0	Washington	-27.7
Michigan	-4,426.5	West Virginia	-78.8
Minnesota	-628.2	Wisconsin	-627.0
Mississippi	-380.7	Wyoming	-12.6
Missouri	-600.9	TOTAL	-33,556.0*

Scenario A: U.S. raises duties to MFN rates; Canada and Mexico do the same against U.S. exports; Canada-Mexico trade stays duty-free.
* Because of differences in the scope of national export data (more sectors available, more exporters available (e.g., Puerto Rico)) compared to state export data, the sum of state-level export data reported here will not equal the total value of U.S. export declines from a NAFTA termination calculated from national export data from Census.
Source: Authors' estimates.

Table 5b
Impact of Termination of NAFTA on State Exports to World, Short- to Medium-Term Impact, Scenario B
(Millions of dollars)

Alabama	-2,454.8	Montana	-79.1
Alaska	-168.6	Nebraska	-712.1
Arizona	-313.8	Nevada	-369.4
Arkansas	-274.5	New Hampshire	-40.8
California	-2,130.5	New Jersey	-928.2
Colorado	+278.8	New Mexico	-37.9
Connecticut	+225.5	New York	-1,077.9
Delaware	-195.0	North Carolina	-832.0
District of Columbia	+415.1	North Dakota	-354.2
Florida	-980.0	Ohio	-3,604.3
Georgia	-1,093.3	Oklahoma	-156.5
Hawaii	+136.6	Oregon	-583.1
Idaho	-154.8	Pennsylvania	-1,078.0
Illinois	-3,293.3	Rhode Island	-122.3
Indiana	-3,144.8	South Carolina	-3,117.5
Iowa	-1,065.0	South Dakota	-194.7
Kansas	-1,675.5	Tennessee	-2,499.4
Kentucky	-466.7	Texas	-12,641.1
Louisiana	-2,336.1	Utah	-628.5
Maine	-59.4	Vermont	-76.7
Maryland	+233.7	Virginia	-29.9
Massachusetts	+334.8	Washington	+703.8
Michigan	-7,070.9	West Virginia	-219.5
Minnesota	-1,111.2	Wisconsin	-1,265.2
Mississippi	-941.6	Wyoming	-25.4
Missouri	-693.7	TOTAL	-57,968.3*

Scenario B: U.S. raises duties to MFN rates, Canada does the same, and Mexico raises duties to bound rates.
* Because of differences in the scope of national export data (more sectors available, more exporters available (e.g., Puerto Rico)) compared to state export data, the sum of state-level export data reported here will not equal the total value of U.S. export declines from a NAFTA termination calculated from national export data from Census.
Source: Authors' estimates.

Table 6a
Impact of Termination of NAFTA on State Exports to Canada, Short- to Medium-Term Impact, Scenario A
(Millions of dollars)

Alabama	-939.7	Montana	-145.7
Alaska	-61.2	Nebraska	-297.0
Arizona	-383.9	Nevada	-290.8
Arkansas	-215.7	New Hampshire	-117.3
California	-4,549.2	New Jersey	-1,245.5
Colorado	-509.8	New Mexico	-56.3
Connecticut	-300.1	New York	-2,405.1
Delaware	-83.7	North Carolina	-1,134.4
District of Columbia	-68.8	North Dakota	-382.5
Florida	-970.5	Ohio	-3,664.3
Georgia	-1,247.0	Oklahoma	-235.9
Hawaii	-59.7	Oregon	-446.4
Idaho	-170.9	Pennsylvania	-1,824.1
Illinois	-2,853.3	Rhode Island	-110.7
Indiana	-2,299.3	South Carolina	-637.6
Iowa	-693.8	South Dakota	-157.8
Kansas	-376.9	Tennessee	-1,660.7
Kentucky	-1,477.4	Texas	-3,259.4
Louisiana	-372.6	Utah	-270.9
Maine	-217.8	Vermont	-178.3
Maryland	-341.9	Virginia	-664.4
Massachusetts	-723.3	Washington	-1,285.7
Michigan	-5,088.7	West Virginia	-222.5
Minnesota	-826.0	Wisconsin	-1,222.9
Mississippi	-438.4	Wyoming	-31.4
Missouri	-1,043.0	TOTAL	-48,260.3*

Scenario A: U.S. raises duties to MFN rates; Canada and Mexico do the same against U.S. exports; Canada-Mexico trade stays duty-free.
* Because of differences in the scope of national export data (more sectors available, more exporters available (e.g., Puerto Rico)) compared to state export data, the sum of state-level export data reported here will not equal the total value of U.S. export declines from a NAFTA termination calculated from national export data from Census.
Source: Authors' estimates.

Table 6b
Impact of Termination of NAFTA on State Exports to Canada, Short- to Medium-Term Impact, Scenario B
(Millions of dollars)

Alabama	-781.4	Montana	-126.8
Alaska	-45.3	Nebraska	-243.9
Arizona	-269.4	Nevada	-209.9
Arkansas	-168.6	New Hampshire	-86.3
California	-3,504.9	New Jersey	-1,020.7
Colorado	-430.7	New Mexico	-43.9
Connecticut	-217.6	New York	-1,857.3
Delaware	-66.2	North Carolina	-851.8
District of Columbia	-53.5	North Dakota	-286.2
Florida	-741.4	Ohio	-2,978.7
Georgia	-973.5	Oklahoma	-164.8
Hawaii	-46.8	Oregon	-344.0
Idaho	-138.3	Pennsylvania	-1,414.2
Illinois	-2,216.9	Rhode Island	-80.1
Indiana	-1,869.7	South Carolina	-496.9
Iowa	-550.7	South Dakota	-138.4
Kansas	-305.3	Tennessee	-1,268.7
Kentucky	-1,198.6	Texas	-2,433.3
Louisiana	-292.8	Utah	-207.9
Maine	-174.3	Vermont	-126.6
Maryland	-251.4	Virginia	-519.2
Massachusetts	-531.1	Washington	-1,003.8
Michigan	-4,227.5	West Virginia	-147.4
Minnesota	-650.7	Wisconsin	-965.9
Mississippi	-334.3	Wyoming	-22.9
Missouri	-855.1	TOTAL	-37,935.6*

Scenario B: U.S. raises duties to MFN rates, Canada does the same, and Mexico raises duties to bound rates.
* Because of differences in the scope of national export data (more sectors available, more exporters available (e.g., Puerto Rico)) compared to state export data, the sum of state-level export data reported here will not equal the total value of U.S. export declines from a NAFTA termination calculated from national export data from Census.
Source: Authors' estimates.

Table 7a
Impact of Termination of NAFTA on State Exports to Mexico, Short- to Medium-Term Impact, Scenario A
(Millions of dollars)

Alabama	-472.1	Montana	-68.0
Alaska	-15.7	Nebraska	-633.7
Arizona	-1,023.8	Nevada	-181.1
Arkansas	-231.9	New Hampshire	-72.9
California	-5,291.9	New Jersey	-511.6
Colorado	-410.4	New Mexico	-245.1
Connecticut	-171.2	New York	-858.8
Delaware	-37.4	North Carolina	-707.4
District of Columbia	-30.0	North Dakota	-222.8
Florida	-775.4	Ohio	-1,239.0
Georgia	-734.1	Oklahoma	-147.2
Hawaii	-46.3	Oregon	-130.3
Idaho	-149.2	Pennsylvania	-684.2
Illinois	-2,178.1	Rhode Island	-51.2
Indiana	-1,244.4	South Carolina	-438.3
Iowa	-917.5	South Dakota	-273.0
Kansas	-469.0	Tennessee	-846.1
Kentucky	-535.8	Texas	-12,962.1
Louisiana	-485.3	Utah	-215.5
Maine	-26.6	Vermont	-52.4
Maryland	-168.4	Virginia	-289.1
Massachusetts	-418.8	Washington	-518.7
Michigan	-2,691.0	West Virginia	-33.2
Minnesota	-805.0	Wisconsin	-644.5
Mississippi	-236.4	Wyoming	-13.5
Missouri	-804.4	TOTAL	-42,409.8*

Scenario A: U.S. raises duties to MFN rates; Canada and Mexico do the same against U.S. exports; Canada-Mexico trade stays duty-free.
* Because of differences in the scope of national export data (more sectors available, more exporters available (e.g., Puerto Rico)) compared to state export data, the sum of state-level export data reported here will not equal the total value of U.S. export declines from a NAFTA termination calculated from national export data from Census.
Source: Authors' estimates.

Table 7b
Impact of Termination of NAFTA on State Exports to Mexico, Short- to Medium-Term Impact, Scenario B
(Percent)

Alabama	-1,820.3	Montana	-137.7
Alaska	-51.9	Nebraska	-1,012.9
Arizona	-5,378.0	Nevada	-556.2
Arkansas	-573.8	New Hampshire	-268.9
California	-17,231.2	New Jersey	-1,681.3
Colorado	-927.3	New Mexico	-844.7
Connecticut	-751.8	New York	-2,962.7
Delaware	-107.5	North Carolina	-2,188.5
District of Columbia	-85.1	North Dakota	-395.8
Florida	-2,578.0	Ohio	-4,458.5
Georgia	-2,549.6	Oklahoma	-416.8
Hawaii	-122.4	Oregon	-355.2
Idaho	-239.8	Pennsylvania	-2,623.9
Illinois	-6,856.9	Rhode Island	-175.7
Indiana	-3,952.5	South Carolina	-1,467.1
Iowa	-1,563.7	South Dakota	-469.1
Kansas	-1,023.7	Tennessee	-3,164.1
Kentucky	-1,685.9	Texas	-54,413.9
Louisiana	-3,359.6	Utah	-584.6
Maine	-75.0	Vermont	-111.6
Maryland	-512.4	Virginia	-908.6
Massachusetts	-1,549.4	Washington	-1,709.0
Michigan	-8,693.7	West Virginia	-148.0
Minnesota	-1,960.9	Wisconsin	-2,168.1
Mississippi	-790.4	Wyoming	-50.6
Missouri	-1,840.5	TOTAL	-149,554.5*

Scenario B: U.S. raises duties to MFN rates, Canada does the same, and Mexico raises duties to bound rates.
* Because of differences in the scope of national export data (more sectors available, more exporters available (e.g., Puerto Rico)) compared to state export data, the sum of state-level export data reported here will not equal the total value of U.S. export declines from a NAFTA termination calculated from national export data from Census.
Source: Authors' estimates.

Table 8a
Impact of Termination of NAFTA on State Employment, Short- to Medium-Term Impact, Scenario A

Alabama	-24,579	Montana	-6,290
Alaska	-4,390	Nebraska	-12,294
Arizona	-33,924	Nevada	-16,340
Arkansas	-15,269	New Hampshire	-8,287
California	-215,754	New Jersey	-50,462
Colorado	-34,353	New Mexico	-10,402
Connecticut	-21,564	New York	-117,083
Delaware	-5,538	North Carolina	-55,040
District of Columbia	-8,481	North Dakota	-5,366
Florida	-110,409	Ohio	-64,296
Georgia	-56,436	Oklahoma	-20,483
Hawaii	-8,939	Oregon	-22,758
Idaho	-9,102	Pennsylvania	-71,328
Illinois	-72,297	Rhode Island	-6,028
Indiana	-35,381	South Carolina	-25,335
Iowa	-19,305	South Dakota	-5,589
Kansas	-17,413	Tennessee	-36,651
Kentucky	-23,047	Texas	-154,013
Louisiana	-25,604	Utah	-18,051
Maine	-7,950	Vermont	-4,217
Maryland	-35,297	Virginia	-48,556
Massachusetts	-44,789	Washington	-40,778
Michigan	-51,192	West Virginia	-8,417
Minnesota	-34,462	Wisconsin	-33,986
Mississippi	-14,800	Wyoming	-3,658
Missouri	-34,722	TOTAL	-1,809,588*

Scenario A: U.S. raises duties to MFN rates; Canada and Mexico do the same against U.S. exports; Canada-Mexico trade stays duty-free.
* The sum of the states may not exactly equal the national total because the state estimates are based on state employment data, which may not sum perfectly to national employment, upon which the national estimate is based.
Source: Authors' estimates.

Table 8b
Impact of Termination of NAFTA on State Employment, Short- to Medium-Term Impact, Scenario B

Alabama	-48,953	Montana	-12,686
Alaska	-8,800	Nebraska	-24,347
Arizona	-67,999	Nevada	-32,672
Arkansas	-30,197	New Hampshire	-16,709
California	-431,482	New Jersey	-100,687
Colorado	-68,667	New Mexico	-21,018
Connecticut	-43,149	New York	-234,457
Delaware	-11,083	North Carolina	-109,852
District of Columbia	-17,038	North Dakota	-10,745
Florida	-220,319	Ohio	-127,667
Georgia	-111,743	Oklahoma	-40,977
Hawaii	-17,934	Oregon	-45,567
Idaho	-18,171	Pennsylvania	-142,716
Illinois	-143,597	Rhode Island	-12,183
Indiana	-70,487	South Carolina	-50,231
Iowa	-38,169	South Dakota	-11,190
Kansas	-34,603	Tennessee	-72,342
Kentucky	-45,330	Texas	-308,740
Louisiana	-51,864	Utah	-36,299
Maine	-15,944	Vermont	-8,498
Maryland	-70,845	Virginia	-96,621
Massachusetts	-90,004	Washington	-81,086
Michigan	-100,758	West Virginia	-17,011
Minnesota	-69,094	Wisconsin	-67,106
Mississippi	-29,661	Wyoming	-7,434
Missouri	-68,958	TOTAL	-3,611,363•

Scenario B: U.S. raises duties to MFN rates, Canada does the same, and Mexico raises duties to bound rates.
* The sum of the states may not exactly equal the national total because the state estimates are based on state employment data, which may not sum perfectly to national employment, upon which the national estimate is based.
Source: Authors' estimates.

3.3 Impacts on non-NAFTA countries

Terminating NAFTA would also impact non-NAFTA countries which would benefit from shifts in sourcing and production out of North America. The disruption of NAFTA-based supply chains would, for example, boost the competitiveness of Asia-Pacific and even European based suppliers relative to firms in North America. Output of goods and services in these economies would increase, and with it, employment.

Table 9a
Impact of Terminating NAFTA on Non-NAFTA Trading Partners, Short- to Medium-Term Impact, Scenario A

	GDP (percent)	Employment (thousands)
China	+0.16	+2,006.1
Korea	+0.35	+146.0
Japan	+0.24	+291.4
Germany	+0.20	+123.5

Scenario A: U.S. raises duties to MFN rates; Canada and Mexico do the same against U.S. exports; Canada-Mexico trade stays duty-free.
Source: Authors' estimates.

Table 9b
Impact of Terminating NAFTA on Non-NAFTA Trading Partners, Short- to Medium-Term Impact, Scenario B

	GDP (percent)	Employment (thousands)
China	+0.07	+1,720.2
Korea	+0.33	+151.0
Japan	+0.64	+743.3
Germany	+0.52	+308.1

Scenario B: U.S. raises duties to MFN rates, Canada does the same, and Mexico raises duties to bound rates.
Source: Authors' estimates.

4. Conclusions

Terminating NAFTA would be expensive to the United States by any measure. When the impacts are assessed using a framework that considers all of the ways in which the U.S. economy interacts, both domestically and internationally, terminating NAFTA has negative consequences that ripple throughout the economy. Those costs would be especially large in the first one to five years after NAFTA is terminated. But even over the longer term, the costs remain high and are significant. In short, terminating NAFTA would permanently reduce U.S. economic output, exports and employment.

Terminating NAFTA would prove to be a "win" for leading trading partners outside the NAFTA region. As supply chains shift to take advantage of relatively lower-cost production opportunities in non-NAFTA countries, those economies would grow faster and, with that growth, expand employment.

5. References

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Appendix A: Methodology In Detail

To estimate the economic effects of terminating NAFTA, we start with the Global Trade Analysis Project (GTAP) database, which is integrated in a computable general equilibrium (CGE) model. The mathematical structure of our model, starting with the GTAP database, follows Egger et al, augmenting the basic Eaton-Kortum-Armington structure of the GTAP model with monopolistic competition, depending on the sector.[12]

The GTAP database covers international trade and economy-wide interindustry relationships and national income accounts, as well as tariffs, some nontariff barriers and other taxes. While our GTAP model database is based on version 10 (for 2014 data), we have updated the data to better reflect the U.S. economy in 2016. We have also estimated the trade elasticities and used in the model an extended version of the gravity model database employed by Egger et al (2015).

The model simulates the percentage changes in aggregate economic measures, including U.S. real GDP and aggregate employment, when moving from the baseline or reference level (in this case with NAFTA in effect in 2016) to the counterfactual (NAFTA has been terminated). The model results are then converted into percentage changes when moving from counterfactual levels to the actual levels that prevailed in the baseline. The short-run results assume NAFTA has been recently terminated. The long-run results assume NAFTA had been terminated long enough in the past (8 to 10 years) so that we look at an alternative (counter-factual) 2016 from this longer-term perspective, where adjustment to NAFTA termination (drops in wages, shifts in investment out of sectors) has had time to take place.

Economists use this type of model to compare the global economy (GDP, trade flows, employment and other variables) before a policy action is taken (called *ex ante* analysis), and after a policy action is taken (called *ex post* analysis).[13] For the immediate impact (short to medium-term) we use a version of the model where wages are sticky (a similar assumption is used by ImpactECON,[14] and where capital is used where installed (so steel mills do not start making t-shirts and pajamas, for example). We also use a long-run version, where labor supply/participation responds to changes in wages (with a real wage elasticity of aggregate supply 0.5) and where capital is reallocated across sectors and countries to reflect changes in returns.

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[12] See Francois, J., Manchin, M., & Martin, W. (2013). "Market structure in multisector general equilibrium models of open economies." In D. Jorgenson and P. Dixon eds., *Handbook of computable general equilibrium modeling*, vol. 1, Elsevier, and Egger, Peter, Joseph Francois, Miriam Manchin, and Douglas Nelson. "Non-tariff barriers, integration and the transatlantic economy." *Economic Policy* 30, no. 83 (2015): 539-584.

[13] See the various chapters in D. Jorgenson and P. Dixon eds. (2013), *Handbook of computable general equilibrium modeling*, vol. 1, Elsevier.

[14] Walmsley and Minor, op. cit.

We disaggregated the job impacts into “skilled” and “unskilled” labor categories based on the five GTAP labor categories: c1, senior officials and managers and professionals; c2, technicians, technical professionals; c3, shop workers, sales workers and other services workers; c4, office clerks, administrative staff, and c5, production workers, machine operators and farm workers. We map these categories against employment levels according to sectors used by the U.S. Bureau of Economic Analysis (BEA) for 2016 employment, and estimate the share of each GTAP skill category that are employed in each BEA sector (a concordance is provided in the Table A.3). Jobs data from BEA are provided at national and state level by industry on a NAICS sector basis. The Bureau of Labor Statistics (BLS) provides a more limited set of data on jobs (not all employment in the BLS data is included in the broader BEA employment counts). However, the BEA data do provide both a break down by occupational categories and by NAICS. On the basis of the share of NAICS level employment by occupational category in the BLS data, we have allocated BEA employment across industries according to occupational category.

We then incorporated the skilled/unskilled disaggregation into the model following Walmsley and Carrico 2016.

Finally, for state level analysis, we first map state-level data on employment and GDP for NAICS sectors from BEA to corresponding model sectors. We then map national changes in production and employment at industry level to the corresponding state data at the model sector level. The impact on states therefore reflects the variation in the output and employment structure across state economies.

Table A.1
Sector Concordances

GTAP no.	GTAP Sector	Our Model Sector No.	Our Model Sectors	NAICS No.	NAICS Category
1	PDR - Paddy rice	1	Primary agriculture	11	Agriculture, Forestry, Fishing and Hunting
2	WHT – Wheat	1	Primary agriculture	11	Agriculture, Forestry, Fishing and Hunting
3	GRO - Cereal grains n.e.c.	1	Primary agriculture	11	Agriculture, Forestry, Fishing and Hunting
4	V_F - Vegetables, fruit, nuts	1	Primary agriculture	11	Agriculture, Forestry, Fishing and Hunting
5	OSD - Oil seeds	1	Primary agriculture	11	Agriculture, Forestry, Fishing and Hunting
6	C_B - Sugar cane, sugar beets	1	Primary agriculture	11	Agriculture, Forestry, Fishing and Hunting
7	PFB - Plant-based fibers	1	Primary agriculture	11	Agriculture, Forestry, Fishing and Hunting
8	OCR - Crops n.e.c.	1	Primary agriculture	11	Agriculture, Forestry, Fishing and Hunting
9	CTL - Bovine cattle, sheep and goats, horses	1	Primary agriculture	11	Agriculture, Forestry, Fishing and Hunting
10	OAP - Animal products n.e.c.	1	Primary agriculture	11	Agriculture, Forestry, Fishing and Hunting
11	RMK - Raw milk	1	Primary agriculture	11	Agriculture, Forestry, Fishing and Hunting
12	WOL - Wool, silk-worm cocoons	1	Primary agriculture	11	Agriculture, Forestry, Fishing and Hunting
15	COA – Coal	2	Primary energy	21	Mining, Quarrying, and Oil and Gas Extraction
16	OIL – Oil	2	Primary energy	21	Mining, Quarrying, and Oil and Gas Extraction
17	GAS – Gas	2	Primary energy	21	Mining, Quarrying, and Oil and Gas Extraction
43	ELY - Electric power	2	Primary energy	21	Mining, Quarrying, and Oil and Gas Extraction
44	GDT - Gas manufactured and distributed	2	Primary energy	21	Mining, Quarrying, and Oil and Gas Extraction
19	CMT - Bovine meat prods	3	Processed foods	311	Food Manufacturing
20	OMT - Meat and fish products n.e.c.	3	Processed foods	311	Food Manufacturing
21	VOL - Vegetable oils and fats	3	Processed foods	311	Food Manufacturing
22	MIL - Dairy products	3	Processed foods	311	Food Manufacturing
23	PCR - Processed rice	3	Processed foods	311	Food Manufacturing
24	SGR – Sugar	3	Processed foods	311	Food Manufacturing
25	OFD - Food products n.e.c.	3	Processed foods	311	Food Manufacturing
14	FSH – Fishing	3	Processed foods	311	Food Manufacturing
26	B_T - Beverages and tobacco products	4	Beverages and tobacco	312	Beverage and Tobacco Product Manufacturing
32	P_C - Petroleum, coal products	5	Petroleum and coal products	324	Petroleum and Coal Products Manufacturing
33	CRP - Chemical, rubber, plastic products	6	Chemical, rubber, plastic products	325, 326	Chemical Manufacturing + Plastics and Rubber Products Manufacturing
35	I_S - Ferrous metals	7	Metals	331, 332	Primary Metal Manufacturing + Fabricated Metal Product Manufacturing
36	NFM - Metals n.e.c.	7	Metals	331, 332	Primary Metal Manufacturing + Fabricated Metal Product Manufacturing
37	FMP - Metal products	7	Metals	331, 332	Primary Metal Manufacturing + Fabricated Metal Product Manufacturing
38	MVH - Motor vehicles and parts	8	Motor vehicles and parts	3361, 3362, 3363	Motor Vehicle Manufacturing + Motor Vehicle Body and Trailer Manufacturing + Motor Vehicle Parts Manufacturing

GTAP no.	GTAP Sector	Our Model Sector No.	Our Model Sectors	NAICS No.	NAICS Category
40	ELE - Electronic equipment	9	Electrical machinery	334	Computer and Electronic Product Manufacturing
27	TEX – Textiles	10	Textiles	313, 314	Textile Mills + Textile Product Mills
28	WAP - Wearing apparel	11	Apparel	315	Apparel Manufacturing
29	LEA - Leather products	12	Leather products	316	Leather and Allied Product Manufacturing
30	LUM - Wood products	13	Wood, paper products	321, 322, 323	Wood Product Manufacturing + Paper Manufacturing + Printing and Related Support Activities
31	PPP - Paper products, publishing	13	Wood, paper products	321, 322, 323	Wood Product Manufacturing + Paper Manufacturing + Printing and Related Support Activities
39	OTN - Transport equipment n.e.c.	14	Other transportation equip.	3364, 3365, 3366, 3369	Aerospace Product and Parts Manufacturing + Railroad Rolling Stock Manufacturing + Ship and Boat Building + Other Transportation Equipment Manufacturing
41	OME - Machinery and equipment n.e.c.	15	Other machinery	333, 335	Machinery Manufacturing + Electrical Equipment, Appliance, and Component Manufacturing
13	FRS – Forestry	16	Other goods	327, 337, 339	Non-metallic Mineral Product Manufacturing + Furniture and Related Product Manufacturing + Miscellaneous Manufacturing
18	OMN - Minerals n.e.c.	16	Other goods	327, 337, 339	Non-metallic Mineral Product Manufacturing + Furniture and Related Product Manufacturing + Miscellaneous Manufacturing
34	NMM - Mineral products n.e.c.	16	Other goods	327, 337, 339	Non-metallic Mineral Product Manufacturing + Furniture and Related Product Manufacturing + Miscellaneous Manufacturing
42	OMF - Manufactures n.e.c.	16	Other goods	327, 337, 339	Non-metallic Mineral Product Manufacturing + Furniture and Related Product Manufacturing + Miscellaneous Manufacturing
46	CNS – Construction	17	Construction	23	Construction
50	ATP - Air transport	18	Air transport	481	Air Transportation
49	WTP - Water transport	19	Maritime transport	483	Water Transportation
48	OTP - Other transport	20	Other transport	482, 484, 485, 486, 487, 488, 493	Rail, Truck, Transit and Ground, Passenger, Pipeline, Scenic and Sightseeing Transportation, + Support Activities for Transportation + Warehousing and Storage
47	TRD - Trade and distribution	21	Trade and distribution	42, 44-45, 72	Wholesale and Retail Trade, Accommodation and Food Services
51	CMN - Communications	22	Communications	491, 492, 51	Information + Postal Service + Couriers and Messengers

GTAP no.	GTAP Sector	Our Model Sector No.	Our Model Sectors	NAICS No.	NAICS Category
52	OFI - Financial services	23	Finance	521, 522, 523, 525	Monetary Authorities-Central Bank + Credit Intermediation and Related Activities + Securities, Commodity Contracts, and Other Financial Investments and Related Activities + Funds, Trusts, and Other Financial Vehicles
53	ISR – Insurance	24	Insurance	524	Insurance Carriers and Related Activities
54	OBS - Other business services, IT services	25	Business & professional services	53, 54, 55, 56	Real Estate and Rental and Leasing + Professional, Scientific, and Technical Services + Management of Companies and Enterprises + Administrative and Support and Waste Management and Remediation Services
55	ROS - Recreational and other services	26	Personal services	71	Arts, Entertainment, and Recreation
45	WTR - Water and sewer services	27	Other services	22, 61, 62, 81, 99	Utilities + Educational Services + Health Care and Social Assistance + Other Services (except Public Administration) + Federal, State, and Local Government (excluding state and local schools and hospitals)
56	OSG - Other public services	27	Other services	22, 61, 62, 81, 99	Utilities + Educational Services + Health Care and Social Assistance + Other Services (except Public Administration) + Federal, State, and Local Government (excluding state and local schools and hospitals)
57	DWE - Residential services, dwellings	27	Other services		

Table A.2
Country/Regions

Australia	Ecuador	Lithuania	Kuwait
New Zealand	Paraguay	Luxembourg	Oman
China	Peru	Malta	Qatar
Hong Kong	Uruguay	Netherlands	Saudi Arabia
Japan	Venezuela	Poland	Turkey
Korea	Costa Rica	Portugal	United Arab Emirates
Taiwan	Guatemala	Slovakia	Egypt
Cambodia	Honduras	Slovenia	Morocco
Indonesia	Nicaragua	Spain	Tunisia
Laos	Panama	Sweden	Benin
Malaysia	El Salvador	United Kingdom	Burkina Faso
Philippines	Dominican Republic	Switzerland	Cameroon
Singapore	Trinidad and Tobago	Norway	Cote d'Ivoire
Thailand	Austria	Iceland & Lichtenstein	Ghana
Viet Nam	Belgium	Albania	Guinea
Bangladesh	Cyprus	Bulgaria	Nigeria
India	Czech Republic	Belarus	Senegal
Pakistan	Denmark	Croatia	Ethiopia
Sri Lanka	Estonia	Romania	Kenya
Canada	Finland	Russia	Madagascar
United States	France	Ukraine	Malawi
Mexico	Germany	Tajikistan	Mauritius
Argentina	Greece	Armenia	Rwanda
Bolivia	Hungary	Georgia	Tanzania
Brazil	Ireland	Iran	Uganda
Chile	Italy	Israel	Zambia
Colombia	Latvia	Jordan	Zimbabwe
			South Africa
			Rest of the World

Table A.3
Mapping of BEA occupation data to GTAP labor categories

(Percent)

GTAP Code	GTAP category	BEA Code	BEA category	Share of total*
c1_off_mgr_pros	Senior officials and managers, professionals, lawmakers	11-0000	Management Occupations	5.05
c1_off_mgr_pros	Senior officials and managers, professionals, lawmakers	13-0000	Business and Financial Operations Occupations	5.19
c1_off_mgr_pros	Senior officials and managers, professionals, lawmakers	15-0000	Computer and Mathematical Occupations	2.97
c1_off_mgr_pros	Senior officials and managers, professionals, lawmakers	17-0000	Architecture and Engineering Occupations	1.78
c1_off_mgr_pros	Senior officials and managers, professionals, lawmakers	19-0000	Life, Physical, and Social Science Occupations	0.82
c1_off_mgr_pros	Senior officials and managers, professionals, lawmakers	21-0000	Community and Social Service Occupations	1.44
c1_off_mgr_pros	Senior officials and managers, professionals, lawmakers	23-0000	Legal Occupations	0.77
c1_off_mgr_pros	Senior officials and managers, professionals, lawmakers	25-0000	Education, Training, and Library Occupations	6.15
c1_off_mgr_pros	Senior officials and managers, professionals, lawmakers	27-0000	Arts, Design, Entertainment, Sports, and Media Occupations	1.35
c2_2tech_aspros	Technicians, technical professionals	29-0000	Healthcare Practitioners and Technical Occupations	5.93
c3_service_shop	Shop workers, sales workers, other service workers	31-0000	Healthcare Support Occupations	2.88
c3_service_shop	Shop workers, sales workers, other service workers	33-0000	Protective Service Occupations	2.41
c3_service_shop	Shop workers, sales workers, other service workers	35-0000	Food Preparation and Serving Related Occupations	9.25
c3_service_shop	Shop workers, sales workers, other service workers	37-0000	Building and Grounds Cleaning and Maintenance Occupations	3.15
c3_service_shop	Shop workers, sales workers, other service workers	39-0000	Personal Care and Service Occupations	3.22
c4_clerks	Office clerks, administrative staff	41-0000	Sales and Related Occupations	10.35
c4_clerks	Office clerks, administrative staff	43-0000	Office and Administrative Support Occupations	15.69
c5_ag_othlowsk	Production workers, machine operators, farm workers	45-0000	Farming, Fishing, and Forestry Occupations	0.33
c5_ag_othlowsk	Production workers, machine operators, farm workers	47-0000	Construction and Extraction Occupations	3.98
c5_ag_othlowsk	Production workers, machine operators, farm workers	49-0000	Installation, Maintenance, and Repair Occupations	3.89
c5_ag_othlowsk	Production workers, machine operators, farm workers	51-0000	Production Occupations	6.49
	Production workers, machine operators, farm workers	53-0000	Transportation and Material Moving Occupations	6.93
			Total	100.00

Appendix B: Results Detailed by Sector

Table B.1
Trade-Weighted Tariffs on U.S.-Canada-Mexico Trade, in the Absence of NAFTA
(Tariffs in Percent; Value in Millions of U.S. Dollars)

Sector	U.S. MFN tariffs on imports from Canada	U.S. MFN tariffs on imports from Mexico	Canadian MFN tariffs on Imports from the U.S.	Mexican MFN tariffs on imports from the U.S.	Mexican bound tariffs on imports from the U.S.
Primary agriculture	3.48	3.69	3.73	14.87	49.66
Primary energy	0	0	0	0	25.37
Processed foods	5.70	13.59	20.87	32.24	38.92
Beverages and tobacco	1.55	0.63	11.05	16.80	36.61
Petroleum and coal products	7.99	7.44	1.94	0.70	66.91
Chemicals, rubber, plastics	2.54	3.45	2.18	3.90	33.23
Metals	1.43	1.81	0.77	1.70	33.60
Motor vehicles	2.59	7.21	4.63	5.34	34.02
Other transportation equip.	0.14	0.56	1.13	0.55	34.12
Electrical machinery	0.47	0.88	0.28	3.03	39.36
Other machinery	0.47	0.88	0.23	2.63	34.12
Textiles	6.74	9.19	6.12	10.12	34.81
Apparel	12.97	10.93	15.49	19.87	35.02
Leather and footwear	11.53	6.99	8.07	7.69	33.59
Wood, paper	0.01	0.11	0.09	2.03	33.30
Other goods	1.83	3.16	1.78	4.95	34.90
All goods	1.94	4.01	3.22	4.86	37.87
Value of tariff cost savings, based on 2016 goods trade	$5,511	$12,052	$8,612	$11,179	$87,043

Sources: U.S. Bureau of Economic Analysis (2016 trade data) and the World Bank/UNCTAD WITS database (2015 trade-weighted tariff rates at the detailed sector level).

Table B.2

Impact on U.S. GDP (2016 dollars) of Termination of NAFTA, Short- to Medium-Term

(Millions)

	Scenario A	Scenario B
Primary agriculture*	**-70**	**-18**
Primary energy	**-137**	**-295**
Manufacturing	**-9,421**	**-15,493**
Processed food	-237	-390
Beverages and tobacco	-410	-3,453
Petroleum and coal products	-1,330	-3,703
Chemicals, rubber, plastics	-588	-1,876
Metals	-889	-665
Motor vehicles	-237	-390
Other transportation	-378	-571
Electronic equipment	-1,665	1,240
Other machinery	-162	1,129
Textiles	-107	-178
Clothing	-35	-28
Footwear, leather, footwear	0	14
Wood, paper	-1,088	-1,866
Other goods*	-289	-1,691
Services	**-109,793**	**-215,196**
Construction	-12,179	-25,871
Air transport	-319	-378
Water transport	-91	-194
Other transport	-2,065	-3,931
Trade and distribution	-23,262	-46,961
Communications	-5,040	-9,859
Financial services	-5,888	-11,467
Insurance	-4,022	-7,357
Business and professional services	-24,411	-40,839
Personal and recreational services	-1,489	-3,085
Other services	-31,026	-65,254
TOTAL	**-119,420**	**-231,002**

* includes forestry products, minerals, mineral products and other manufactures (see Table Appendix Table A.1)

Scenario A: U.S. raises duties to MFN rates; Canada and Mexico do the same against U.S. exports; Canada-Mexico trade stays duty-free.

Scenario B: U.S. raises duties to MFN rates, Canada does the same, and Mexico raises duties to bound rates.

Source: Authors' estimates.

Table B.3
Impact on U.S. Exports of Termination of NAFTA, Short- to Medium-Term
(percent)

	Scenario A	Scenario B
Primary agriculture*	**-4.7**	**-6.6**
Primary energy	**-0.6**	**-3.3**
Manufacturing	**-3.6**	**-8.1**
Processed food	-16.7	-15.9
Beverages and tobacco	-5.4	-3.5
Petroleum and coal products	-1.2	-10.6
Chemicals, rubber, plastics	-1.5	-4.4
Metals	-1.5	-8.9
Motor vehicles	-16.0	-22.6
Other transportation	0.9	1.8
Electronic equipment	-1.1	-1.9
Other machinery	0.0	-8.5
Textiles	-7.7	-10.6
Clothing	-10.9	-9.4
Footwear, leather, footwear	-7.6	-8.1
Wood, paper	-1.0	-4.2
Other goods*	-5.0	-16.1
Services	**2.0**	**6.6**
Construction	5.8	13.5
Air transport	0.9	2.7
Water transport	0.8	1.3
Other transport	2.1	5.4
Trade and distribution	-0.1	3.8
Communications	3.8	10.0
Financial services	1.9	6.2
Insurance	1.0	4.3
Business and professional services	3.3	8.8
Personal and recreational services	2.1	6.4
Other services	2.9	8.3
TOTAL	**-2.5**	**-5.0**

* includes forestry products, minerals, mineral products and other manufactures (see Table Appendix Table A.1)
Scenario A: U.S. raises duties to MFN rates; Canada and Mexico do the same against U.S. exports; Canada-Mexico trade stays duty-free.
Scenario B: U.S. raises duties to MFN rates, Canada does the same, and Mexico raises duties to bound rates.
Source: Authors' estimates.

Table B.4

Net Number of U.S. Jobs Impacted by Termination of NAFTA, Short- to Medium-Term

(Number)

	Scenario A	Scenario B
Primary agriculture*	**-3,723**	**-960**
Primary energy	**-3,227**	**-6,778**
Manufacturing	**-82,082**	**-156,887**
Processed food	-24,657	-37,588
Beverages and tobacco	-3,920	-6,396
Petroleum and coal products	-608	-5,037
Chemicals, rubber, plastics	-7,653	-20,933
Metals	-6,876	-21,359
Motor vehicles	-6,644	-5,168
Other transportation	-2,340	-3,428
Electronic equipment	-3,330	2,562
Other machinery	-1,153	8,115
Textiles	-1,979	-3,226
Clothing	-877	-678
Footwear, leather, footwear	11	413
Wood, paper	-15,403	-26,080
Other goods*	-6,651	-38,085
Services	**-1,720,556**	**-3,446,738**
Construction	-176,621	-372,291
Air transport	-2,301	-2,619
Water transport	-559	-1,168
Other transport	-43,133	-80,188
Trade and distribution	-437,239	-884,117
Communications	-43,317	-84,371
Financial services	-55,655	-108,389
Insurance	-26,087	-47,720
Business and professional services	-222,497	-371,746
Personal and recreational services	-159,630	-331,337
Other services	-553,518	-1,162,793
TOTAL	**-1,809,588**	**-3,611,363**

* includes forestry products, minerals, mineral products and other manufactures (see Table Appendix Table A.1)

Scenario A: U.S. raises duties to MFN rates; Canada and Mexico do the same against U.S. exports; Canada-Mexico trade stays duty-free.

Scenario B: U.S. raises duties to MFN rates, Canada does the same, and Mexico raises duties to bound rates.

Source: Authors' estimates.

Appendix C
Comparison of Recent NAFTA Termination Studies

	Trade Partnership Worldwide, LLC	ImpactECON	Moody's Analytics	Peterson Institute
Study	"Terminating NAFTA: The Impact on the U.S. Economy and Workers," prepared for the Business Roundtable, January 2018	"Reversing NAFTA: A Supply Chain Perspective," Working Paper, March 2017, https://impactecon.com/wp-content/uploads/2017/02/NAFTA-Festschrift-Paper-1.pdf	"The Anatomy of a NAFTA Deal," November 2017, https://www.economy.com/mark-zandi/documents/2017-11-17-NAFTA.pdf	"Withdrawing from NAFTA Would Hit 187,000 US Exporting Jobs, Mostly in Heartland," November 2017, https://piie.com/blogs/trade-investment-policy-watch/withdrawing-nafta-would-hit-187000-us-exporting-jobs-mostly
Scenarios examined	(1) NAFTA terminated, MFN duties are reimposed on trade between the U.S. and Canada and U.S. and Mexico; Canada-Mexico trade remains duty-free (2) NAFTA terminated, scenario (1) ensues except that Mexico imposes bound tariff rates on imports from the U.S. only	(1) NAFTA terminated, U.S. MFN duties on goods are re-imposed, examines impact on low-skilled workers only (2) NAFTA terminated, U.S., Canadian and Mexican MFN duties on goods from US re-imposed, Canada-Mexico trade remains duty-free, examines impact on low- and high-skilled workers	(1) NAFTA renegotiated with only 1 change: raise the U.S. content of qualifying motor vehicles to 35% and total North American content to 70% (2) NAFTA terminated, MFN duties re-imposed by the US on Mexico and Mexico on the US, US-Canada trade is covered by US-Canada FTA (3) US withdraws from NAFTA and US, Canada and Mexico impose 25% duties on imports	NAFTA terminated and Canada and Mexico apply MFN duties to US products imported from the US
Approach	Computable general equilibrium (GTAP 10)	Computable general equilibrium based on GTAP. Their version and database allows them to focus on differential tariffs imposed along supply chains, rather than only at the final product level.	Proprietary macro models for the US, Canada and Mexico into which they input declines in trade for each scenario estimated by applying "elasticities from the literature" to changes in tariff rates.	"[U]sed a simple estimate of demand elasticities with MFN tariff rates… Then takes that decline in US exports and estimates what would happen to US production of those exports and to production of all goods that are directly and indirectly linked to those exports ... It is then assumed that employment falls with the decline in production."

	Trade Partnership Worldwide, LLC	ImpactECON	Moody's Analytics	Peterson Institute
Top Line Results	(1) US GDP, -0.6; US exports to world, -2.5%, US export to NAFTA, -17.4%, US imports from world, -3.6%; US imports from NAFTA, -7.6 to -11.4%, CPI, +0.1%, US jobs, -1.8 million (2) US GDP, -1.2%; US exports to world, -5.0%; US export to NAFTA, -14.4% to -62.8%, US imports from world, -7.5%, US imports from NAFTA, -9.3 to -27%, CPI, +0.1%, jobs, -3.6 million Reports results by state Reports results for Canada and Mexico	(1) US GDP, -0.03%; US exports to NAFTA, -2.29%; US imports from NAFTA, -3.77%; CPI, +0.07%; unskilled labor, -67,726 (2) US GDP: -0.09%; US exports to NAFTA, -16.42%; US imports from NAFTA, -8.03%; CPI, -0.43%; unskilled labor, -255,678, skilled plus unskilled labor, -1.2 million jobs Reports results for Canada and Mexico	(1) US GDP, +0.03% in 2019, settling out at +0.02% in 2021 and thereafter; US exports to Mexico, +1.2% (2) US GDP, -0.75% in 2019, stabilizes in out years at -0.10%; unemployment rises to 4.5% from 4%, household income growth slows, peso and Canadian dollar depreciate (3) Stock market panics and drops; GDP declines for 4 quarter (recession), unemployment rises to 7.5%, inflation increases Results reported for US states, Canada and Mexico (provinces and states)	US exports decline, US production declines, and 187,000 workers lose jobs over 1-3 years Reports results by state and county
Comparison to this study (key similarities/differences)		Like this study, they consider all the dynamic adjustments of a policy shock (termination of NAFTA) but, unlike this study, under the assumption of perfect competition. Like this study, they focus only on tariffs applied to goods Their employment simulation considering both skilled and unskilled workers is most similar to that of this study. However, they work with two skill/occupational categories for jobs, rather than the 5 this study examines.	Unlike this study's estimated trade volume effects, the Moody's trade volume effects fed into the Moody's macro model, which drive their estimates, do not reflect linkages between sectors, resource constraints, how changes in incomes feed back through the economy to determine changes in trade flows, or how value chain structures will impact on changes in trade flows.	Unlike this study, the focus is only on the impact on U.S. exports to Canada and Mexico Unlike this study, there is no consideration of tariff changes in the United States Unlike this study, there is no consideration of the dynamic effects of reduced U.S. exports