Estimating Employment Adjustment Costs of Trade Liberalization

James J. Fetzer, Claire Willits, and Marinos Tsigas*

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Abstract

This paper reviews methods used to estimate and account for labor adjustment costs from trade changes. While there is conflicting evidence from ex-post studies as to how difficult it is for labor to adjust to changes in trade, ex-ante studies find that adjustment costs may be large and they may vary widely depending on several factors, e.g., skill, experience, sector. For example, Autor, Dorn, and Hanson (2013) find that the increase in U.S. imports from China during 1992 to 2007 lowered earnings and employment of workers in competing industries and increased the use of social security disability insurance. They also find that high-wage workers tended to move outside the industrial sector during this period and therefore had less noticeable declines in earnings. Stone, Sourdin, and Legendre (2013), however, find that there is no consistent evidence of large or systematically difficult adjustment by labor for trade, by examining labor force surveys for Brazil, Canada, Israel, South Africa, UK, and the United States. They find that occupational effects are greater than industry effects and that workers may benefit or be hurt by the increased trade. We first review results from ex-post studies of labor adjustment. Then we examine how labor adjustments are typically measured in ex-ante simulations. Next, we review several approaches estimating labor adjustment costs. Lastly, we use a GTAP model which utilizes expanded statistics for U.S. labor markets and dynamic labor markets to analyze various trade scenarios and under different labor market conditions.

We find that reducing substitutability between labor in different occupations and different sectors leads to a decline in export growth, but a larger welfare gain from global trade liberalization. We also find that occupational specific churning is not much larger than sector specific churning. It also appears that as we reduce substitutability between occupations and sector employment, labor adjustment shifts from employment churning to wage variability to some extent. Future work should analyze the dynamics of worker movements across occupations and sectors as a result of trade liberalization.

Keywords: Employment adjustment costs, economy-wide modeling

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*Corresponding author, International Trade Commission, (202) 708-5403, james.fetzer@usitc.gov. We would like to thanks participants at the USITC seminar the 2014 GTAP conference for their invaluable comments and suggestions. However, the authors are solely responsible for any remaining errors. The opinions and conclusions expressed in this paper are those of the authors and are not views of the Commission as a whole or of any individual Commissioner.

Introduction

We examine methods used to estimate and account for labor adjustment costs. While there is conflicting evidence from ex-post studies as to how difficult it is for labor to adjust to changes in trade, ex-ante simulations find that adjustment costs may be large and widely vary, are larger when capital is mobile, and vary for workers with different skill levels and experience. Some of features of this literature are measuring inter-industry job churning, estimating the gap between actual and desired employment, accounting for unemployment and training, introducing job moving costs in labor supply, accounting for the "option value" or new opportunities in protected sector, accounting for heterogeneous workers with sector specific experience, and employment matching models with finitely lived workers.

We first review results from ex-post studies of labor adjustment. Then we examine how labor adjustments are typically measured in ex-ante simulations. Next, we review several approaches estimating labor adjustment costs. Lastly, examine an economywide analysis of the response of occupational and sector specific employment to infer the labor adjustment costs of global trade liberalization. We examine the impact of changes in the substitutability of labor between different occupations and sectors to get a sense of the degree to which labor adjustment costs vary with the substitutability of different types of labor.

Ex-post evidence of labor adjustment

There is conflicting evidence from ex-post studies of labor adjustment costs of trade as to how difficult it is for labor to adjust to changes in trade. Autor, Dorn, and Hanson (2013) find that the increase in U.S. imports from China during 1992 to 2007 lowered earnings and employment of workers in competing industries and increased the use of social security disability insurance. They also find that high-wage workers tended to move outside the industrial sector during this period and therefore had less noticeable declines in earnings.

However, Stone, Sourdin, and Legendre (2013) find that there is no consistent evidence of large or systematically difficult adjustment by labor for trade, by examining labor force surveys for Brazil, Canada, Israel, South Africa, UK, and the United States. They find that occupational effects are greater than industry effects and that workers may benefit or be hurt by the increased trade.

A survey of the estimates of earnings losses following mass layoffs or displacement in the United States by Couch and Placzek (2010) finds that the first year impact of the displacement on wages of displaced workers is much higher than the long term losses. While the estimated losses vary by paper and data source, the first year impact is typically at least 50 percent larger and could be twice or even three times as large as the long term losses. The impact on wages in the first year ranges from 14 to 66 percent and the long term impact (one to six years depending on the study) ranges from 7 to 47 percent. Also the adjustment tends to increase a decreasing rate (for example see Couch and Placzek (2010) and Jacobson, LaLonde, and Sullivan (2005)).

Metrics of labor adjustment

The primary metrics used in ex-ante simulations measuring the labor adjustments costs of trade policy are the value of adjustment costs as a share of the gains to trade and wages and the length of the adjustment. The value of employment adjustments costs can be a sizable share of the gains from trade. Davidson and Matusz (2010) estimate that the training costs by U.S. workers of adjusting to trade liberalization is a little more than a third of the gains from trade when an additional month of training is needed and increase to about three-fourths of the gains if 15 months of training are needed.

Adjustment costs as a share of wages are estimated to be high on average, but a highly variable share of wages. Artuç, Chaudhuri, and McLaren (2010) find that adjustment costs for U.S. workers average about six and half times annual wages. However, the standard deviation of the share is about five times the annual wage suggesting that that costs could be much smaller or much higher. They find that the large variability is not specific to particular sectors and is at least four times the annual wage in each sector.

Worker heterogeneity can affect the labor adjustment cost share of wages. Artuç, Chaudhuri, and McLaren (2010) find that “not so old” workers in the import-competing sector benefit from better wages in other sectors because they have the option of eventually moving. They indicate that these workers’ lower moving costs lead to a higher “option-value” and that trade is Pareto-improving for many workers in the import-competing sector. Applying the same methodology as Artuç, Chaudhuri, and McLaren (2010) as to Brazilian workers, Dix-Carneiro (2011) finds average mobility cost to be on the order of 50 times annual wages. However, he finds smaller adjustment costs for formal sector workers in Brazil when accounting for sector specific experience and selection. He finds that median adjustment costs are 1.4 to 2.7 times the annual wage in the formal sector when accounting for these differences. Dix-Carneiro (2011) finds that the median value of the adjustment costs for the residual sector increases to 12 to 14 times the annual wage.

Capital mobility also can affect trade adjustment costs. Dix-Carneiro (2011) finds that employment adjustment costs are lowest when capital is fixed (and there is no change in capital for labor to adjust to), but higher when capital is imperfectly mobile than perfectly mobile. However, even when capital is imperfectly mobile, he finds that the gains from trade increase by much greater proportion than labor adjustment cost compared to when capital is fixed.

The adjustment time for labor may be lengthy and more than a few years in duration. Estimating the impact of eliminating a 30 percent tariff in the U.S. market, Artuç, Chaudhuri, and McLaren (2010) find that 95% of labor reallocation is completed within 8 years. For Brazilian workers, Dix-Carneiro (2011) estimates adjustment times of between 3 to 16 years for 80% of reallocation, depending upon capital mobility and the size of the shock.

Modest labor adjustment costs are not necessarily undesirable. Matusz and Tarr (1999) note that zero unemployment costs are socially suboptimal since it would imply insufficient search time by temporarily unemployed workers. They also note that while the social costs of adjustment are relevant to compare to aggregate welfare, knowledge of the distribution of the private costs (and benefits) of adjustment are relevant in helping diffuse political opposition to trade reform.

Dixon and Rimmer (2002) indicated that quantification of adjustment costs requires four components: analysis with an economywide focus; regional, occupational, and industry level detail; dynamics that capture the rates as which labor shifts between regions, occupations, and industries; and forecasting changes in the economic conditions that will affect the type of adjustment that is required of labor.

Approaches for ex-ante calculation and accounting for labor adjustment costs

The various ex-ante simulations used a variety of methodologies to estimate labor adjustment costs. The most common method is to modify labor supply. Artuç, Chaudhuri, and McLaren (2010) and Dix-Carneiro (2011) introduce moving costs into labor supply where high idiosyncratic costs lead to a slow responsiveness to wages. Davidson and Matusz (2010) specify rates of transition between employment, unemployment, and training in a "high tech" sector in a Poisson process.

Francois, Jansen, and Peters (2011) indicate that calculating the standard or absolute deviations of changes in sectorial employment is a useful way to measure employment adjustment costs. However, they point out that this since it does not include all workers who change jobs, but not just net employment flow between sectors, it will underestimate the amount of job churning going on. When applied to recent free trade agreements, this calculation tends to be less than one percent for employment for the U.S. and the EU, but larger for partner countries in Central and South America. They report calculations indicating that an EU-Andean FT would generate less than 0.03 percent labor displacement for the EU and a 1 to 3 percent labor displacement of the Andean countries. They also report that estimates for the labor displacement resulting from and EU-Central American FTA would be 0.2 to 0.3 percent for the EU, but that it would be 15 to 17 percent for Panama and range from 2 to 11 percent for other Central American countries.

Casacuberta and Gandelman (2010) estimate the labor cost of adjustment as the share of the employment gap closed during adjustment. Estimating frictional employment from a counterfactual profit maximization, they assume desired and frictional employment are proportional and that actual and desired levels of employment are equal during the year of median values for investment and employment growth. Using data for Uruguay, they find that labor shortages lead to less responsiveness in creation of other factors and to larger adjustment in the destructive side and that trade policy can shift adjustment functions.

Estimating the duration of underemployment and training that result from a change in trade policy is another way of measuring adjustment costs. Davidson and Matusz (2001, 2010) use a model where low ability workers with guaranteed employment can switch to a high tech sector with high wages, required training, and possible unemployment. They find low ability workers will switch to the high tech sector in response to trade liberalization. They find that much of the adjustment costs for these workers are resource costs of training and that these costs may range from 30 to 90 percent of the gains from this policy.

Using a model with a residual sector, Dix-Carneiro (2011) finds that a moving subsidy is better at compensating losers than retraining, but that it generates higher welfare adjustment costs. Their simulation depends on assumptions regarding the job breakup and acquisition rates, the probability of a need for retraining, and the time and resources costs of training. Also using Brazilian data, Coşar (2013) has a two-sector small open economy matching-model with overlapping generations of workers with finite lives, frictional labor markets, and sector-specific human capital that generates endogenous unemployment spells and job-specific rents. Workers accumulate human capital through learning by-doing. He finds that skills are only transferable to jobs in the same sector and that adjustment can take a very long time.

A multiregional, economy-wide analysis of labor adjustments

Lastly, we use a GTAP model which utilizes expanded statistics for U.S. labor markets to analyze a trade scenario under different labor market conditions. Data from the U.S. Bureau of Labor Statistics have been used to disaggregate labor to twenty-two types of labor based on occupational characteristics (Carrico and Tsigas (2014)). Our database has fifty-seven sectors and 6 regions: the United States, rest of NAFTA, EU27, Japan, China, and a rest of the world.

With the disaggregated occupation data, we are able to follow the approach of Carrico and Tsigas (2014) which allows some occupations to more substitutable with capital than others. In our base case scenario potential adjustments in U.S. labor markets are based on the following assumptions; workers assigned to the twenty-two occupations can move freely from sector to sector; and workers can also change occupations within two groups of occupations-High capital substitutability (HCS) workers and Low capital substitutability (LCS) workers. In the first alternative scenario, we restrict the movement of U.S. workers across occupations by lowering the elasticity of transformation which models these worker movements from -10 to -0.2. In the second alternative scenario, we not only restrict the movement of workers across occupations as we did in the first alternative scenario, but we also restrict the reallocation of labor across sectors by lowering the elasticity of transformation of labor between sector from negative infinity to -1.

The main trade scenario that we examine is a removal of all import duties by all countries in the model. We simulate this scenario under different assumptions about the extent of potential adjustments in U.S. labor markets.

In Table 1 we report the simulated effects for wages and the U.S. economy from the three scenarios. In the base case scenario returns to land, capital, and almost all labor types increase, while returns to natural resources decline. Land rents increase the most- by 5.0 percent.

Changes in employment vary by sector in most part depending greatly on the change in sector output from trade liberalization (see Table 2). Employment in the processed rice, paddy rice, wool, and chemical rubber products increase at the greatest rate (20 to 50 percent), while the largest absolute gains in employment came in the chemical rubber products sector (See Table 3). The greatest decline on a relative basis came in the leather goods and "textile and apparel" sectors (15 to 20 percent), while the largest decline in number of workers were in the machinery and equipment, fabricated metals, and other business service sectors. Changes in employment for each occupation are almost proportional within a particular sector.

The change in occupational employment was similar to the impact on sectors in which those occupations were concentrated. Employment increases at the greatest rate in sciences (1.5 percent), but there are larger absolute gains in construction, management, and education. The expansion of the chemical, rubber, and plastics sector help drive the increase the science occupation. The largest decline in employment on both an absolute and relative basis comes for architects and engineers (1.3 percent decline). A significant share of these workers is employed in the other machinery and equipment sector which declines in output significantly. There is also a large absolute decline in production workers.

For each one of the labor groups, occupation specific wages increased by similar rates. The average wage rate for all of the HCS occupations rose by 1.2 to 1.3 percent, while the average wage rate for most of the LCS occupations increased by only 0.10 percent. Wages for architects and engineers fell by 0.1 percent. There is no variation in wages in occupations for a particular sector for the base scenario since employment is assumed to be perfectly mobile between sectors.

U.S. GDP expands by 0.04 percent, exports expand by 7.0 percent, and imports expand by 7.56 percent. The U.S. economy gains from the global removal of imports tariffs. U.S. welfare increases by $51.2 billion. Gains in allocative efficiency amount to $6.7 billion, with about $2.2 billion of those gains originating in imports. Most of the U.S. welfare gains, however, arose from improvements in the U.S. terms of trade ($44.5 billion).

While we have no dynamic moving costs or temporary unemployment in this static framework, following Francois, Jansen, and Peters (2011) we can measure net churning between occupations and sectors. At least 600,000 employees or 0.5 percent of the labor force change jobs as a result of liberalization. This estimate understates understates the gross changes of employees within particular occupations and sectors, and it overstates the actual adjustment to the extent that some job churning will not be necessary due to economic growth and voluntary departures from the workforce as suggested by Dixon and Rimmer (2002). The estimated churn includes proportionate number of HCS and LCS workers. Workers in the chemical rubber products sector account for about one-quarter of the churn, which isn't surprising given the impact on output on this sector trade liberalization.

It is possible that net churning of sector specific occupational employment can provides some insight into differences in churning between occupations within a given sector. However, there is not much difference between the sector specific occupational churn and the change in sector employment. Sector specific churning is at least 96 percent of occupational-sector specific churning in all scenarios for global liberalization. This is because occupational changes within a sector move in the same direction for the most part.

In the two alternative scenarios we reduce U.S. labor markets adjustment in response to a global removal of import tariffs. As a result of lesser adjustment in U.S. labor markets, the cost of labor increases by more than in the base case scenario.

In the first alternative scenario where occupational substitutability is reduced, the average wage of both HCS and LCS workers increases by more than in the baseline scenario. There is a larger increase in wages for all HCS occupations except for product related workers and the impact on LCS occupations is mixed. The reduced substitutability of employment means that wages respond more to trade liberalization with the standard deviation of wages increasing from 0.6 to 2.0. Occupational employment effects are all 0.7 percent or less in magnitude and the largest sector specific effects are smaller than for the base case scenario.

In the second alternative scenario where substitutability of labor within a sector is also reduced, wage changes now can vary across sector. There is a slightly larger increase in the average wage of both HCS and LCS workers and for wages of all HCS occupations. The wage increases are typically higher for LCS occupations, although the increase in wages for science workers and decline in wages for architecture/engineers are both dampened as sector specific wages now absorb some of the effects of trade liberalization. The ability of wages to vary across sector increases variability in wages as seen by the standard deviation for wages increasing from 2.0 to 6.3. Employment churn declines by 40 percent in this scenario, but the same sectors have the largest impact on employment as the other scenarios.

In the two alternative scenarios, returns to land increase by less than in the base scenario, while returns to other natural resources decline by more. As a result of lesser adjustment in U.S. labor markets, U.S. exporters are less able to take advantage of free trade. The volume of U.S. exports expands by 6.84 percent in the first alternative scenario and by 6.22 percent in the second alternative scenario. Despite the smaller degree of adjustment in labor markets, the U.S. economy gains more from the global removal of imports tariffs in the two alternative scenarios than in the base case scenario. U.S. welfare increases by $54.0 billion in the first alternative scenario with most of the additional welfare gains originating in improved terms of trade.

Conclusion

We find that reducing substitutability between labor in different occupations and different sectors leads to a decline in export growth, but a larger welfare gain from global trade liberalization. We find that occupational specific churning is not much larger than sector specific churning. This could mean that net churning is not significantly different than gross churning or that trade liberalization leads to little churning between occupations and sectors. In our simulations, we find larger changes in employment across sectors than occupations, which could imply lower adjustment costs for labor. It also appears that as we reduce substitutability between occupations and sector employment, labor adjustment shifts from employment churning to wage variability to some extent.

While a static analysis can provide insight into how labor adjusts to changes in trade policy, it only measures the net changes in employment. However, a small net change in employment may hide large gross changes in employment. A dynamic analysis that measures workers that are both entering and exiting particular occupations and industries is necessary to estimate gross changes in labor. As mentioned earlier, Dixon and Rimmer (2002) indicate that a dynamic analysis of labor adjustment needs to capture the rates as which labor shifts between regions, occupations, and industries. While the occupation and sector specific labor data used in our static analysis measure the net changes between occupations and industries, it does not capture the gross change in employment between occupations and industries.

However, the disadvantage of a dynamic analysis is that it requires additional assumptions about the nature of the dynamics which may not be obvious to make. The estimated adjustment cost may also be sensitive to these assumptions. Future work should allow for both capital and labor to adjust from immediate impact to the long run and therefore allow for measurement of the gross change in employment by sector and occupation. This analysis should also explore the sensitivity of the results to different assumptions about the nature of the dynamics.

Table 1. Simulated effects for U.S. economy from removal of all import duties by all countries under different assumptions about U.S. labor market adjustments

	Base case scenario	First alternative scenario	Second alternative scenario
Returns to factors of production, percent change			
Land	5.016	4.546	3.405
Other natural resources	-2.542	-3.055	-3.758
Capital	1.568	1.804	1.873
Labor occupations, HCS, average wage rate	1.253	1.548	1.637
Occupation specific wages			
Social services	1.275	1.636	1.732
Protective services	1.248	1.473	1.494
Food preparing and servicing	1.253	1.527	1.653
Building and grounds maintenance	1.254	1.517	1.563
Personal care and services	1.263	1.590	1.690
Sales related	1.245	1.473	1.541
Office and administrative support	1.252	1.509	1.556
Farming, fishing, and forestry occupations	1.280	1.709	1.721
Construction and extraction	1.302	2.266	2.754
Installation, maintenance, and repair	1.265	1.649	1.750
Production related	1.198	1.006	0.922
Transportation and material moving	1.269	1.627	1.643
Healthcare support	1.274	1.630	1.724
Labor occupations, LCS, average wage rate	0.104	0.192	0.538
Occupation specific wages			
Management	0.108	0.371	0.738
Business and financial	0.092	-0.052	0.296
Computer, mathematical	0.058	-1.127	-0.606
Architecture, engineering	-0.053	-4.146	-2.388
Sciences	0.349	7.865	6.192
Legal	0.087	-0.356	-0.221
Education, training, and library	0.130	0.754	0.966
Arts, design, entertainment, sports, media	0.085	-0.358	-0.014
Healthcare practitioners and technical	0.128	0.711	0.928
GDP, percent change in volume	0.048	0.051	0.049
Exports, percent change in volume	7.045	6.842	6.226
Imports, percent change in volume	7.564	7.740	7.512
Private consumption (up), percent change in volume	0.430	0.482	0.516
Welfare effects and components, million U.S. dollars			
Overall welfare (EV)	51,284	54,046	57,652
Allocative efficiency (CNTalleffr)	6,730	7,186	6,822
Alloc. effic., import changes (CNTqimr)	2,277	2,299	2,137
Alloc. effic., import changes (CNTqor)	-1,521	-1,392	-1,162
Alloc. effic., other changes	5,974	6,279	5,846
Terms of trade	44,554	46,860	50,830
Traded goods (CNTtotr)	31,345	32,293	35,866
Savings/investment (CNTcgdsr)	13,208	14,567	14,965

Table 2. Simulated effects of sector specific output and employment from removal of all import duties by all countries under different assumptions about U.S. labor market adjustments

	Base case scenario		First alternative scenario		Second alternative scenario	
	Output	Employment	Output	Employment	Output	Employment
Paddy rice	27.74	31.08	27.45	30.76	19.20	22.67
Wheat	-7.36	-7.37	-7.70	-7.72	-5.63	-5.83
Cereal grains nec	3.41	4.28	3.34	4.22	2.78	3.69
Vegetables, fruit, nuts	-0.22	0.33	-0.30	0.26	-0.34	0.15
Oil seeds	-1.32	-0.85	-1.52	-1.06	-1.44	-1.11
Sugar cane, sugar beet	-5.53	-5.40	-5.57	-5.44	-4.94	-5.05
Plant-based fibers	4.05	4.94	3.78	4.67	2.63	3.54
Crops nec	-2.25	-1.86	-2.45	-2.06	-1.77	-1.49
Bovine cattle, sheep and goats, etc.	0.39	1.00	0.36	0.97	-0.20	0.30
Animal products nec	5.41	6.45	5.36	6.40	3.76	4.82
Raw milk	0.66	1.28	0.61	1.24	0.37	0.96
Wool, silk-worm cocoons	26.29	29.53	25.28	28.41	13.45	15.93
Forestry	-1.28	-1.26	-1.32	-1.26	-1.12	-1.06
Fishing	0.15	0.53	0.08	0.48	0.02	0.39
Coal	-0.21	-0.09	-0.27	-0.13	-0.40	-0.40
Oil	-0.54	-0.58	-0.66	-0.71	-0.71	-0.82
Gas	-0.89	-1.13	-1.03	-1.30	-1.13	-1.49
Minerals nec	-0.21	0.02	-0.31	-0.03	-0.42	-0.19
Bovine meat products	0.73	2.18	0.72	2.22	0.25	2.07
Meat products nec	9.49	11.05	9.40	11.00	6.71	13.83
Vegetable oils and fats	-6.68	-5.28	-6.90	-5.36	-6.88	-8.40
Dairy products	0.68	2.23	0.62	2.36	0.39	2.43
Processed rice	54.75	57.11	54.19	56.78	42.93	70.60
Sugar	-6.10	-4.73	-6.15	-4.65	-5.46	-7.17
Food products nec	0.58	2.13	0.56	2.28	0.33	2.33
Beverages and tobacco products	0.17	1.77	0.20	2.04	0.18	2.19
Textiles	-14.23	-12.83	-14.38	-12.93	-9.52	-14.07
Wearing apparel	-13.28	-11.90	-13.31	-11.91	-8.03	-12.96
Leather products	-20.93	-19.63	-21.15	-19.85	-10.91	-16.01
Wood products	-1.37	0.24	-1.37	0.41	-1.12	-0.05
Paper products, publishing	-0.47	1.20	-0.50	1.35	-0.70	0.97
Petroleum, coal products	1.30	3.10	1.27	3.28	0.86	3.30
Chemical, rubber, plastic products	18.20	20.25	17.69	19.95	12.03	19.67
Mineral products nec	-2.06	-0.42	-2.10	-0.24	-1.81	-0.96
Ferrous metals	-4.87	-3.32	-4.76	-3.14	-3.20	-3.73
Metals nec	-8.38	-6.86	-8.47	-6.88	-5.45	-6.98
Metal products	-2.81	-1.25	-2.71	-1.12	-1.95	-1.68
Motor vehicles and parts	-1.92	-0.33	-1.83	-0.21	-1.49	-0.73
Transport equipment nec	-6.51	-5.01	-5.51	-3.97	-3.16	-3.54
Electronic equipment	-7.69	-6.12	-7.51	-5.86	-5.92	-6.12
Machinery and equipment nec	-5.15	-3.61	-4.74	-3.17	-2.90	-2.95
Manufactures nec	0.32	1.92	0.18	1.83	-0.25	1.36
Electricity	0.70	2.60	0.68	2.87	0.44	2.79
Gas manufacture, distribution	-0.06	1.82	-0.08	2.11	-0.16	2.10
Water	0.27	1.98	0.28	2.24	0.16	2.37
Construction	0.67	2.53	0.78	3.64	0.77	4.53
Trade	-0.19	2.03	-0.14	2.51	-0.08	2.69
Transport nec	0.23	2.51	0.18	2.98	-0.01	2.90
Water transport	1.74	4.08	1.71	4.56	1.42	5.38
Air transport	-0.63	1.63	-0.69	2.08	-0.63	1.78
Communication	-0.22	1.61	-0.16	1.97	-0.17	2.03
Financial services nec	-0.05	1.56	-0.01	1.90	-0.07	1.89
Insurance	-0.28	1.32	-0.22	1.67	-0.21	1.62
Business services nec	-0.34	1.27	-0.33	1.58	-0.36	1.40
Recreational and other services	0.05	1.72	0.09	2.11	0.07	2.25
Public Administration, etc.	0.20	1.84	0.07	2.09	0.05	2.19
Dwellings	-0.40	1.57	-0.40	1.87	-0.34	1.99

Table 3. Simulated effects of occupational specific employment from removal of all import duties by all countries under different assumptions about U.S. labor market adjustments

	Base case scenario	First alternative scenario	Second alternative scenario
Labor occupations, HCS			
Social services	0.214	0.012	0.015
Protective services	-0.138	-0.108	-0.095
Food preparing and servicing	-0.041	-0.043	-0.013
Building and grounds maintenance	-0.061	-0.082	-0.067
Personal care and services	0.079	-0.034	-0.013
Sales related	-0.095	-0.022	-0.012
Office and administrative support	-0.042	-0.040	-0.039
Farming, fishing, and forestry occupations	0.598	0.377	0.100
Construction and extraction	0.458	0.090	0.177
Installation, maintenance, and repair	0.088	-0.027	-0.006
Production related	-0.243	0.195	-0.033
Transportation and material moving	0.130	-0.019	-0.011
Healthcare support	0.195	0.002	0.008
Labor occupations, LCS			
Management	0.270	0.231	0.032
Business and financial	-0.175	-0.119	-0.125
Computer, mathematical	-0.445	-0.267	-0.276
Architecture, engineering	-1.325	-0.704	-0.617
Sciences	1.549	0.586	0.413
Legal	-0.229	-0.165	-0.198
Education, training, and library	0.256	0.110	0.083
Arts, design, entertainment, sports, media	-0.183	-0.117	-0.160
Healthcare practitioners and technical	0.213	0.086	0.063

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