Distributional Impacts of the Canada-U.S. Free Trade Agreement

By Brian K. Kovak and Peter M. Morrow*

Between 1988 and 2004, Canadian income inequality increased substantially, as the Gini coefficient of household income increased between 13 and 15 percent, depending upon the household income measure used (Burkinshaw, Terajima and Wilkins, 2022). This increase in inequality coincided with the implementation of the 1989 Canada-U.S. Free Trade Agreement (CUSFTA), which cut tariffs to zero on nearly all non-agricultural trade between Canada and the U.S. Was the simultaneous increase in inequality caused by the FTA, or was this simply a temporal coincidence?

We address this question by extending the analysis of Kovak and Morrow (2022), who study the labor market effects of the FTA by comparing career trajectories for otherwise similar workers whose initial industries subsequently faced different tariff cuts under the FTA. Here, we focus on distributional impacts by examining how the effects of tariff cuts on employment and earnings differed for workers with different initial income levels. Our findings suggest that the effects of the FTA on earnings inequality were small, and the point estimates imply a slight reduction in earnings inequality among workers employed in manufacturing prior to the FTA's enactment.

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I. Context, Data, and Empirical Approach

CUSFTA went into effect on January 1, 1989, phasing out tariffs for nearly all non-agricultural goods trade between Canada and the U.S. over the subsequent 10 years.[1] This Agreement provides a nearly ideal setting in which to study the causal effects of changing bilateral trade policy (Trefler, 2004). The FTA was not part of a larger reform package; it was not a response to other macroeconomic shocks; and the associated tariff changes were not confounded by pre-existing trends in industry performance.[2]

Average Canadian tariffs on imports from the U.S. fell from 10 percent in 1988 to zero by 1989, while average U.S. tariffs facing Canadian exports fell to zero from 3 percent. These averages mask substantial heterogeneity across industries; the interquartile range between the 75^{th} and 25^{th} percentiles of Canadian tariff cuts was 6.4 percentage points, and 2.4 percentage points for U.S. cuts. While these tariff changes are smaller than in many developing-country trade liberalizations, the large relative size of the U.S. economy and its geographic proximity to Canada led to large changes in trade flows from Canada's perspective.[3]

We compare labor market outcomes for otherwise similar Canadian workers who were initially employed in industries facing different Canadian or U.S. tariff changes, using a design analogous to Autor et al. (2014). We measure tariff cuts from 1988 to 1998 as $-\Delta \ln(1+\tau_j^c)$, where $c \in \{\text{CAN}, \text{US}\}$

[1] See Kovak and Morrow (2022) for additional details on the context, data, and empirical approach.

[2] See Kovak and Morrow (2022) Section 5.1.

[3] U.S. import penetration in Canada increased by 40 percentage points from 1988 to 2004 – more than 4 times larger than the growth in Chinese import penetration in Canada during this period (Kovak and Morrow, 2022) and the growth in Chinese import penetration in the U.S. during 1991-2011 (Autor et al., 2014).

is the country imposing the tariff in 4-digit NAICS industry j. Because tariffs went to zero in all industries, this measure equals the initial value of $\ln(1+\tau_j^c)$. We then relate these tariff changes to worker outcomes Y_{ifj} for worker i initially employed at firm f in manufacturing industry j using the following worker-level specification:

$$\begin{aligned} Y_{ifj} =& \beta_0 - \beta_1 \Delta \ln(1+\tau_j^{\text{CAN}}) \\ & - \beta_2 \Delta \ln(1+\tau_j^{\text{US}}) + \mathbf{X}_i' \beta_3 \\ & + \mathbf{X}_f' \beta_4 + \mathbf{X}_j' \beta_5 + \epsilon_{ifj}. \end{aligned} \tag{1}$$

Workers are assigned the tariff cut in their *initial* industry of employment, defined as the final year in 1986-1988 in which the worker had strictly positive earnings and a valid industry code, so that even if a worker switches industries after 1988, they remain associated with the same initial-industry tariff change. Because we multiply the tariff changes by negative one, a positive estimate of β_1 implies that workers whose initial industry faced larger Canadian tariff cuts experienced more positive values of the outcome Y.

The vectors $\mathbf{X}_i'$, $\mathbf{X}_f'$, and $\mathbf{X}_j'$ are worker, initial firm, and initial industry level controls as described in Kovak and Morrow (2022), including pre-FTA industry outcome growth and contemporaneous changes in MFN tariffs facing third countries. The error term, ϵ_{ifj}, is clustered by the worker's initial four-digit NAICS industry.

Our sample consists of workers initially employed in manufacturing who were working age (22-64) during 1986-2004. We require that workers had positive earnings in at least one year during 1986-1988 to assign an initial firm and industry of employment.[4]

We examine two outcomes using worker-level longitudinal data from Statistics Canada's T2-LEAP-LWF linked firm-employee dataset: years worked and cumulative earnings. Years worked is defined as a worker's number of years with positive earnings during 1989-2004.[5] Cumulative earnings is the sum of real earnings from 1989 to 2004 divided by the worker's average real earnings in years with strictly positive earnings during 1986-1988. We present results for overall years worked and cumulative earnings from all sectors, along with additive decompositions of both outcomes across firms, industries, and sectors. This approach allows us to measure longitudinal worker-level adjustment that would be unobserved in firm- or industry-level research designs.

To understand how the CUSFTA tariff cuts affected inequality among Canadian workers, we examine differences in the effects for workers with different initial earnings levels. Specifically, we split the full sample into three equally sized groups based on initial average yearly earnings terciles, referring to the groups as low-, middle-, and high-income workers.

II. Effects of Tariff Cuts on Years Worked and Earnings

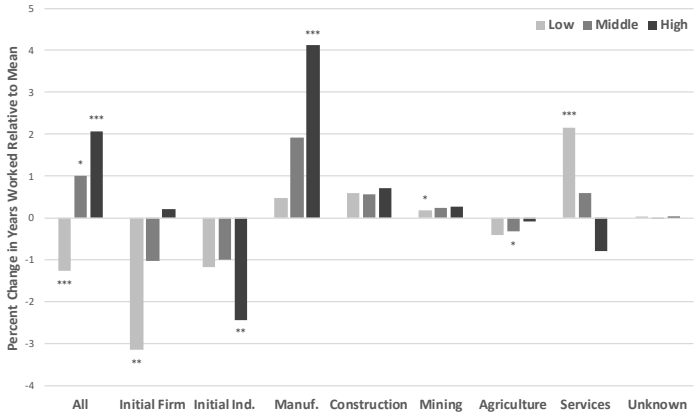
We begin by estimating (1) for years worked during 1989-2004 for the three different groups. The regression estimates appear in Appendix Table A1. To understand the magnitudes of the effects, we calculate the predicted change in years worked for an interquartile difference in tariff cuts, expressed as a share of the unconditional mean years worked for the relevant group.

Figure 1 shows these magnitude estimates for each income group for Canadian tariff cuts (panel a) and U.S. tariff cuts (panel b). The first set of columns shows the overall effect on years worked at all firms in all industries. Low-, middle-, and high-income worker results are represented by the light gray, dark gray, and black bars, respectively. The subsequent sets of columns additively decompose this overall effect into years worked at the initial firm, at other firms in the initial manufacturing industry, in other manufacturing industries, or in other sectors.[6] For example,

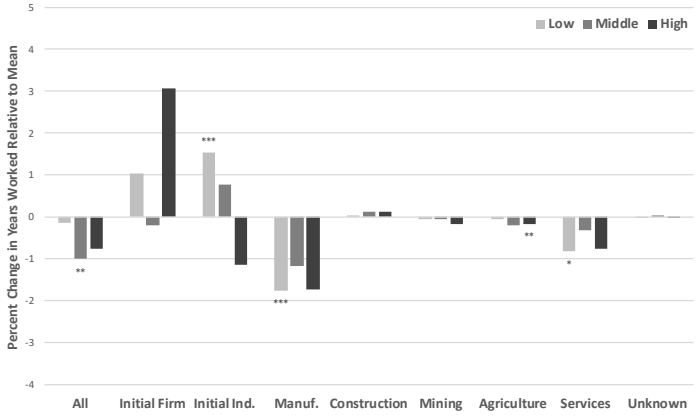
[4] We omit workers in the Territories (Yukon, Northwest Territories, and Nunavut) to avoid disclosure concerns due to their very small populations, totaling 0.33 percent or less of Canada's overall population during our sample period.

[5] This is also equal to 16 minus years unemployed.

[6] Sector definitions: manufacturing: NAICS=3xxx,



(a) Effect of Canadian Tariff Cuts



(b) Effect of U.S. Tariff Cuts

Figure 1. : Effects of Tariff Cuts on Years Worked, by Initial Income

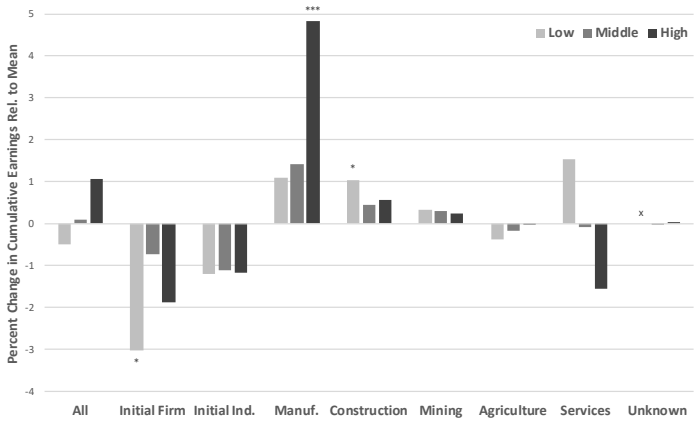
Note: Bars show predicted differences in years worked when facing tariff changes that differ by the interquartile range (0.064 for Canadian tariff cuts in panel a and 0.024 for U.S. tariff cuts in panel b), expressed as a percent of each group's mean years worked (11.9 years for low-income, 13.4 for middle-income, and 13.6 for high-income). Stars indicate statistical significance, clustering errors by 4-digit NAICS: *** p<0.01, ** p<0.05, * p<0.1.

the interquartile difference in Canadian tariff cuts reduced low-income workers' years worked by 0.150 ($= -2.351 \cdot 0.064$), less than two months. The unconditional mean of years worked is 11.9 for low-income workers. Therefore the interquartile gap in tariff cuts reduced years worked for these workers by 1.3 percent.

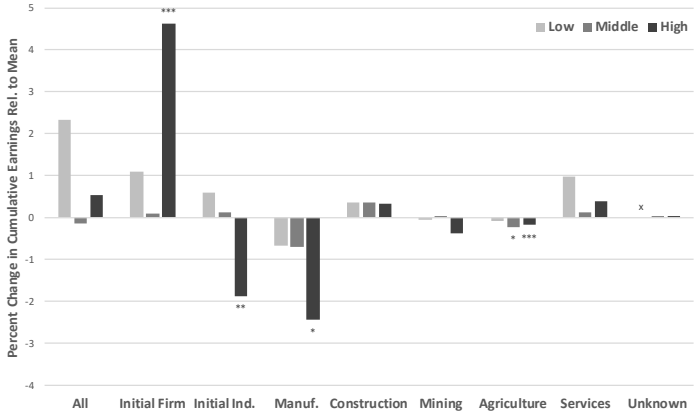
Panel (a) shows that Canadian tariff cuts drove a small decline in years worked for low-income workers, primarily due to reductions in years worked in the initial firm and initial industry that were not entirely offset by additional years worked in the service sector. Middle- and high-income workers saw more favorable effects, partly through smaller reductions in time employed in the initial firm, and more time in other manufacturing industries. While all these effects are small, low-income workers primarily adjusted to increased import competition by moving to services, while higher-income workers found employment in other manufacturing industries.

The results for U.S. tariff cuts in panel (b) are generally small and in most cases have the opposite sign of those for Canadian tariff cuts, as expected. Low-income workers

construction: 22xx,23xx, mining: 21xx, agriculture: 1xxx, services: ≥4xxx.



(a) Effect of Canadian Tariff Cuts



(b) Effect of U.S. Tariff Cuts

Figure 2. : Effects of Tariff Cuts on Cumulative Earnings, by Initial Income

Note: Bars show predicted differences in cumulative normalized earnings when facing tariff changes that differ by the interquartile range (0.064 for Canadian tariff cuts in panel a and 0.024 for U.S. tariff cuts in panel b), expressed as a percent of each group's mean cumulative normalized earnings (19.4 for low-income, 15.0 for middle-income, and 14.2 for high-income). Stars indicate statistical significance, clustering errors by 4-digit NAICS: *** p<0.01, ** p<0.05, * p<0.1. x indicates estimate withheld to avoid disclosure concerns.

whose initial industry gained freer access to the U.S. export market spent slightly more time at their initial firm or at other firms in the same industry, and spent less time in different manufacturing industries or in services.

Having observed these shifts between firms, industries, and sectors, we examine how the FTA tariff cuts affected worker earnings by estimating (1) using cumulative normalized earnings as the dependent variable. Regression estimates appear in Appendix Table A2. Figure 2 shows magnitude estimates calculating the difference in predicted cumulative earnings growth for workers facing the interquartile difference in tariff cuts analogous to Figure 1. For example, the interquartile difference in U.S. tariff cuts increased high-income workers' cumulative earnings at their initial firm by 0.657 ($= 26.26 \cdot 0.025$). The unconditional mean of cumulative normalized earnings for high-income workers is 14.2, indicating that during 1989-2004 high-income workers earned on average 14.2 times their average yearly earnings in the pre-FTA period. Therefore, the interquartile difference in U.S. tariff cuts drove an increase in earnings from

the initial firm equivalent to 4.6 percent of initial earnings.

The cumulative earnings effects in Figure 2 are similar to those for years worked in Figure 1: overall effects are small for all groups and for both sets of tariff changes. This largely reflects offsetting effects in the initial firm and in other manufacturing firms. For example, while high-income workers facing increased import competition from Canadian tariff cuts earned less from their initial firm and initial industry (panel a), these losses were more than offset by increased earnings elsewhere in manufacturing. In panel (b), despite substantial positive initial-firm earnings effects of U.S. tariff cuts among high-income workers, lower earnings from other firms in the same industry or other manufacturing industries are almost entirely offsetting. This smoothing influence of transitions between firms stands in sharp contrast to the findings of Autor et al. (2014), who find that U.S. workers facing Chinese import competition experienced persistent earnings losses despite transitioning to new firms, because those firms faced similar import competition on average.[7]

III. Net Effects Across the Initial Earnings Distribution

The preceding results reflect comparisons between workers facing the interquartile difference in tariff cuts, but workers in different initial income terciles had different industry mixes and therefore faced different tariff cuts. The preceding results also presented the effects of Canadian and U.S. tariff cuts separately, but the combined net effects of the two sets of cuts also differed by industry. Some industries faced more import competition from larger Canadian tariff cuts and others gained freer access to U.S. markets from larger U.S. tariff cuts.

To understand the overall impact of the FTA, we calculate the combined effect of Canadian and U.S. tariff cuts on workers in each initial income group, taking into account each group's initial industry mix. Specifically, we calculate the average fitted value from the tariff component of (1) for each set of workers:

$$-\hat{\beta}_1 \frac{1}{N_g} \sum_{i \in \mathcal{G}^g} \Delta \ln(1 + \tau^{\text{CAN}}_{j(i)}) - \hat{\beta}_2 \frac{1}{N_g} \sum_{i \in \mathcal{G}^g} \Delta \ln(1 + \tau^{\text{US}}_{j(i)}), \tag{2}$$

where $g \in \{\text{low,middle,high}\}$ is the income group, $\mathcal{G}^g$ is the set of workers in this group, N_g is the number of workers in $\mathcal{G}^g$, and $\tau_{j(i)}$ is the tariff of the industry in which worker i was initially employed.

We calculate these net effects in two ways. First, we estimate (1) pooled across initial income groups, so differences in (2) across groups reflect only differences in the tariff cuts facing each group's initial industry mix. These estimates appear as black dots in Figure 3. Second, we also allow for the effects of tariff changes, $\hat{\beta}_1$ and $\hat{\beta}_2$, to vary by income group g, consistent with the variation in effects across groups in Figure 2. These estimates allowing for heterogeneous effects and appear as gray dots in Figure 3.

Note that (2) identifies the effect of *differences* in tariff cuts on *differences* in cumulative earnings; it does not identify the overall effect of the FTA, which is absorbed by the constant in (1). While the overall level of the estimates in Figure 3 is therefore not informative, one may still infer relative effects across initial income levels.

The black dots in Figure 3 are very similar across initial income groups, exhibiting a very slight decline when moving from lower to higher initial income. This pattern implies that higher income workers were initially employed in industries that saw larger average Canadian tariff cuts relative to U.S. tariff cuts. One should not over-interpret these small differences across groups, particularly given the overlapping standard errors. That said, the pattern of estimates suggests that, if anything, the FTA tariff cuts reduced inequality, as the effects were slightly more favorable for initially lower income workers.

The gray dots in Figure 3 allow for het-

[7] See Figure IV in Autor et al. (2014) and our replication and related analysis in Figures A16 and 5 of Kovak and Morrow (2022).

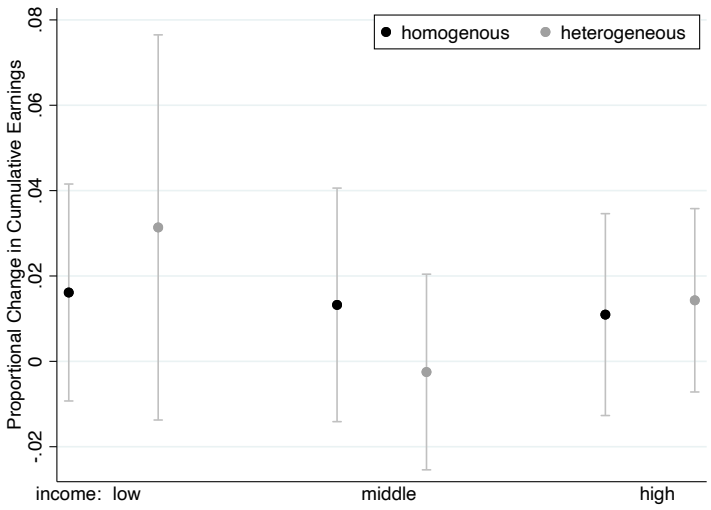


Figure 3. : Net Effects of FTA Tariff Cuts on Cumulative Earnings

Note: Net effect of Canadian and U.S. tariff changes on cumulative normalized earnings by initial income group, as in (2). Black dots use common, pooled regression estimates across initial income groups, while gray dots allow for heterogeneous effects of tariff changes on earnings across groups. Error bars reflect 95 percent confidence intervals.

erogeneous effects of tariff cuts $\hat{\beta}_1$ and $\hat{\beta}_2$ across initial income groups and find similar effects. Differences across groups remain small — the difference in net earnings effect between low- and high-income workers is only 1.7 percentage points — and the confidence intervals are large in comparison to these differences.

IV. Conclusion

Kovak and Morrow (2022) find that despite substantial effects of FTA-induced import competition and access to a large export market on Canadian workers' employment and earnings in their initial firm and industry, shifts into other industries and sectors largely offset these effects. Results here echo those findings; the same broad pattern is true for workers with different initial income levels. Moreover, the effects of Canadian and U.S. tariff cuts generally had opposite signs, so their effects tended to offset as well, further reducing the size of the net effects of the FTA tariff cuts on worker outcomes. Overall, the FTA had minimal effects on inequality, measured as differences in net effects on workers with different initial income levels. While the point estimates suggest slightly more positive effects on initially low-income workers, these differences are too small to yield strong conclusions.

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Appendix: Supplemental Analysis
(FOR ONLINE PUBLICATION)

This Appendix provides additional results referenced in the main text of Kovak and Morrow (2023) "The Distributional Impact of the Canada-U.S. Free Trade Agreement."

Table A1—: Effects of Tariff Cuts on Years Worked, by Initial Income

	(1) Total	(2) Initial Firm	(3) Initial Ind.	(4) Manuf.	(5) Constr.	(6) Mining	(7) Agric.	(8) Services	(9) Unknown
Panel A: Low-Income (n=27,902)									
$-\Delta \ln(1+\tau_j^{\text{CAN}})$	-2.351***	-5.834**	-2.182	0.866	1.110	0.345*	-0.734	4.015***	0.0641
	(0.803)	(2.808)	(1.508)	(2.109)	(0.698)	(0.202)	(0.496)	(1.422)	(0.0462)
$-\Delta \ln(1+\tau_j^{\text{US}})$	-0.596	4.887	7.261***	-8.287***	0.0845	-0.254	-0.291	-3.919*	-0.0781
	(1.787)	(3.991)	(2.578)	(2.590)	(1.271)	(0.300)	(0.950)	(2.169)	(0.0604)
R-squared	0.091	0.134	0.056	0.051	0.046	0.019	0.027	0.066	0.006
Panel B: Middle-Income (n=27,902)									
$-\Delta \ln(1+\tau_j^{\text{CAN}})$	2.115*	-2.142	-2.097	4.023	1.221	0.524	-0.673*	1.267	-0.00909
	(1.156)	(5.198)	(1.726)	(3.696)	(0.824)	(0.362)	(0.401)	(1.300)	(0.0322)
$-\Delta \ln(1+\tau_j^{\text{US}})$	-5.361**	-0.976	4.208	-6.231	0.698	-0.337	-1.023	-1.703	0.00188
	(2.275)	(8.274)	(4.528)	(6.153)	(1.726)	(0.568)	(0.731)	(2.998)	(0.0779)
R-squared	0.053	0.078	0.030	0.040	0.028	0.025	0.018	0.049	0.005
Panel C: High-Income (n=27,901)									
$-\Delta \ln(1+\tau_j^{\text{CAN}})$	4.409***	0.448	-5.150**	8.765***	1.508	0.567	-0.182	-1.640	0.0920
	(1.414)	(4.649)	(2.129)	(2.912)	(1.004)	(0.853)	(0.285)	(2.394)	(0.0699)
$-\Delta \ln(1+\tau_j^{\text{US}})$	-4.159	16.68	-6.198	-9.408	0.699	-0.847	-0.892**	-4.165	-0.0264
	(3.009)	(12.15)	(6.297)	(9.316)	(2.023)	(0.903)	(0.377)	(4.635)	(0.0898)
R-squared	0.083	0.108	0.055	0.046	0.020	0.039	0.011	0.049	0.005

Note: Dependent variable is the number of years worked (with nonzero earnings) during 1989-2004. The independent variables of interest are the 1988-1998 tariff cuts facing U.S. exports to Canada ($-\Delta \ln(1+\tau_j^{\text{CAN}})$) or facing Canadian exports to the U.S. ($-\Delta \ln(1+\tau_j^{\text{US}})$) in the worker's initial industry. A positive (negative) coefficient means that larger tariff cuts in the worker's initial industry lead to increased (decreased) years worked. Column (1) examines total years worked, (2) years worked at the initial firm, (3) at firms other than the initial firm, but in the same initial 4-digit industry, (4) in manufacturing industries (NAICS=3xxx) other than the initial industry, (5) in construction (NAICS=22xx,23xx), (6) in mining (NAICS=21xx), (7) in agriculture (NAICS=1xxx), (8) in services (NAICS≥4xxx), or (9) in a firm with unknown industry code. Each worker-year is assigned to only one category in columns (2) through (9) based on the primary (highest-earning) job, so the coefficients in columns (2) through (9) sum to the overall effect in column (1). The effect on years non-employed equals the estimate in column (1) times negative one. All specifications include extensive worker, initial firm, and initial industry controls, described in Kovak and Morrow (2022). Standard errors clustered by 4-digit NAICS industry. *** p<0.01, ** p<0.05, * p<0.1.

Table A2—: Effects of Tariff Cuts on Cumulative Earnings, by Initial Income

	(1) Total	(2) Initial Firm	(3) Initial Ind.	(4) Manuf.	(5) Constr.	(6) Mining	(7) Agric.	(8) Services	(9) Unknown
Panel A: Low-Income (n=27,902)									
$-\Delta \ln(1+\tau_j^{\text{CAN}})$	-1.445	-9.137*	-3.615	3.365	3.177*	1.033	-1.104	4.706	x
	(6.915)	(5.414)	(3.114)	(5.392)	(1.615)	(0.693)	(0.742)	(4.005)	x
$-\Delta \ln(1+\tau_j^{\text{US}})$	18.15	8.572	4.615	-5.216	2.820	-0.296	-0.618	7.640	x
	(12.40)	(9.084)	(4.895)	(8.622)	(2.494)	(1.351)	(1.339)	(8.428)	x
R-squared	0.152	0.043	0.017	0.041	0.030	0.017	0.016	0.131	x
Panel B: Middle-Income (n=27,902)									
$-\Delta \ln(1+\tau_j^{\text{CAN}})$	0.235	-1.684	-2.617	3.330	1.045	0.742	-0.406	-0.170	-0.00577
	(2.996)	(6.449)	(2.183)	(3.894)	(0.992)	(0.667)	(0.370)	(1.976)	(0.0261)
$-\Delta \ln(1+\tau_j^{\text{US}})$	-0.772	0.673	0.777	-4.159	2.186	0.264	-1.307*	0.748	0.0467
	(4.590)	(10.44)	(5.313)	(6.746)	(1.875)	(0.972)	(0.662)	(2.978)	(0.0648)
R-squared	0.119	0.058	0.025	0.046	0.025	0.024	0.014	0.061	0.005
Panel C: High-Income (n=27,901)									
$-\Delta \ln(1+\tau_j^{\text{CAN}})$	2.398	-4.121	-2.574	10.74***	1.260	0.524	-0.0567	-3.414	0.0349
	(3.232)	(5.339)	(2.151)	(3.396)	(1.015)	(0.813)	(0.208)	(2.758)	(0.0353)
$-\Delta \ln(1+\tau_j^{\text{US}})$	3.005	26.26***	-10.54**	-13.77*	1.899	-2.105	-0.999***	2.237	0.0188
	(4.249)	(9.827)	(4.887)	(7.364)	(1.944)	(1.586)	(0.282)	(3.733)	(0.0509)
R-squared	0.124	0.094	0.062	0.049	0.018	0.039	0.010	0.056	0.005

Note: Dependent variable is cumulative earnings during 1989-2004 divided by the workers average real earnings in years with strictly positive earnings during 1986-1988. The independent variables of interest are the 1988-1998 tariff cuts facing U.S. exports to Canada ($-\Delta \ln(1+\tau_j^{\text{CAN}})$) or facing Canadian exports to the U.S. ($-\Delta \ln(1+\tau_j^{\text{US}})$) in the worker's initial industry. A positive (negative) coefficient means that larger tariff cuts in the worker's initial industry lead to increased (decreased) cumulative earnings. Column (1) examines total years worked, (2) years worked at the initial firm, (3) at firms other than the initial firm, but in the same initial 4-digit industry, (4) in manufacturing industries (NAICS=3xxx) other than the initial industry, (5) in construction (NAICS=22xx,23xx), (6) in mining (NAICS=21xx), (7) in agriculture (NAICS=1xxx), (8) in services (NAICS$\geq$4xxx), or (9) in a firm with unknown industry code. Each worker-year is assigned to only one category in columns (2) through (9) based on the primary (highest-earning) job, so the coefficients in columns (2) through (9) sum to the overall effect in column (1). All specifications include extensive worker, initial firm, and initial industry controls, described in Kovak and Morrow (2022). Standard errors clustered by 4-digit NAICS industry. *** p<0.01, ** p<0.05, * p<0.1.