Trade Diversion and Labor Market Outcomes*†

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Abstract

In 2018 and 2019, the US administration raised tariffs on imports from China. Did these tariffs lead to more US imports from other countries such as Mexico? Using highly disaggregated data on Mexican firm-level manufacturing exports, we find evidence of trade diversion from China to Mexico. We then combine the export data with detailed longitudinal employer-employee data for Mexican manufacturing firms to document new stylized facts about the impact of trade diversion on labor market outcomes: within job spells, trade diversion increases the earnings of individual workers; once we further account for worker mobility, the effects of trade diversion on earnings remain positive and are persistent; trade diversion increases the employment of firms exposed to higher US tariffs against China; the earnings and employment effects of trade diversion are larger for low-wage workers, and are concentrated in technology and skill-intensive manufacturing industries.

JEL Classification: F12, F14, L11.

Keywords: Earnings, employment, exports, firms, tariffs, trade costs, trade diversion, workers.

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1 Introduction

In 2018, the US administration increased tariffs on the imports of a few products – washing machines, solar panels, steel, and aluminum. It subsequently decided to raise tariffs on a whole range of products imported exclusively from China. China retaliated by raising its own tariffs on US imports, resulting in a "trade war" (Amiti, Redding, and Weinstein, 2019). By the end of 2019, the US had increased tariffs on $350 billion of Chinese imports, while China had retaliated by raising tariffs on $100 billion of US exports (Fajgelbaum and Khandelwal, 2022). In January 2020, the US and China signed the Phase One Agreement to cease further tariff escalation, but the newly erected tariffs between the two countries continued to apply. Since February 2025, the conflict between the US and China has escalated further, but at the time of writing the two countries are still negotiating to find a resolution to the trade war.

A substantial body of research studies the economic effects of the 2018–2019 trade war between the US and China, focusing primarily on the US economy, and to some extent on China (for a review, see Fajgelbaum and Khandelwal, 2022). But there are strong reasons to believe that the trade war impacted not only the US and China but also third countries not directly involved in the trade conflict. Our contribution is to investigate the effects of the US-China trade war on a third country, i.e., Mexico. Mexico is highly exposed to the trade policies of the US and China as the two countries are major trading partners of Mexico.[1] In a first step, we ask whether the increases in US tariffs against China induced US manufacturing importers to substitute imports from China with imports from Mexico. We find strong evidence that US tariffs against China resulted in "trade diversion" from China to Mexico. In a second step, we investigate whether the trade war – by reallocating trade from China to Mexico – impacted the labor market outcomes of formal workers employed by Mexico's private manufacturing firms. We find that trade diversion induced the firms exposed to higher US tariffs against China to increase employment and wages, especially for low-wage workers such as female, unskilled, and younger workers. Our paper thus contributes to understanding "how the effects of trade policy on worker outcomes are related and interact with the effect of trade policy on firm performance" (Goldberg and Pavcnik, 2016).

The setting of the Mexican economy is particularly well suited for our purposes as there are strong reasons to believe that Mexican exports to the US increased in response to higher US tariffs against China. First, the costs for the US of diverting imports from China to Mexico are comparatively low due to the competitive labor costs and geographical proximity of Mexico – and therefore low transportation costs and short shipping times. Second, Mexico's membership of NAFTA (replaced by the USMCA in 2020) makes it easier for the US to import more goods directly from Mexico than from

[1] In 2017, the US was the largest export and import market of Mexico. China was the fourth largest export market and the second largest import market of Mexico (Direction of Trade Statistics of the International Monetary Fund).

other countries. Third, Mexico and China compete in the US market in similar product categories (Utar and Torres, 2013). It is therefore reasonable to expect that Mexican exporters benefited from higher US tariffs against China by increasing exports to the US in products that the US previously imported from China.[2]

Anecdotal evidence of trade diversion from China to Mexico abounds. "Texas-based Taskmaster Components is an example of a company that has replaced Chinese imports with products from Mexico. For almost twenty years, the company has imported wheels and large tires from Asia. Because of the [...] trade war, Taskmaster has begun to source these items from Mexican suppliers" (Russell, 2019). Similar evidence for other industries is available as well. For instance, "after the US applied a ten percent tariff on Chinese silk thread, Mexican exports of the product jumped from virtually nothing in 2017 to US $1.6 million [...]. Chinese imports of knit and crochet fabrics have fallen by approximately US $3 million, while Mexican exports of these products to the United States grew by almost the same amount" (Russell, 2019).

Figure 1 plots US goods imports from Mexico and China as a share of total US goods imports over the period from 2015 to 2023. From 2018 to 2019, the import share from China declined sharply from 21.2 to 18.0 percent, while the import share from Mexico increased from 13.5 to 14.3 percent. After 2019, the import share from Mexico continued its increase and reached 15.4 percent by 2023, exceeding the Chinese import share which had further declined to 13.8 percent.[3]

In a first step, using highly disaggregated data on Mexico's 8-digit firm-level bilateral manufacturing exports between January 2016 and December 2019, this paper examines the short-run effects of higher US tariffs against China on Mexico's exports to the US. We regress Mexican firm-level bilateral exports on the changes in product-level tariffs imposed by the US against China, and we identify their effect on exports to the US. Crucially, changes in US tariffs against China can be considered as being exogenous to Mexico's exports.[4] We find evidence of trade diversion from China to Mexico, suggesting that Chinese and Mexican exports to the US are substitutes. If we compare two different products, one targeted by a 25 percentage point increase in US tariffs against China and another one not targeted,

[2] Fajgelbaum, Goldberg, Kennedy, Khandelwal, and Taglioni (2024) identify Mexico as a "winner" of the trade war as they find it increased exports to the US and the rest of the world. According to Alfaro and Chor (2023), "available data point to a looming 'great reallocation' in supply chain activity: direct US sourcing from China has decreased, with low-wage locations [...] and nearshoring/friendshoring alternatives (notably: Mexico) gaining in import share." In addition, as "the share of US imports from [...] Mexico [...] rose on average for products that saw a decline in the share imported from China, [...] the reallocation of import shares away from China is not just anecdotal."

[3] The 1.9 percentage point increase in the import share from Mexico from 2018 to 2023 does not entirely make up for the 7.4 percentage point fall in the import share from China. Other countries such as India (Sanyal, 2021), South Korea (Lovely, Xu, and Zhang, 2021), and Vietnam (Mayr-Dorn, Narciso, Dang, and Phan, 2023; Rotunno, Roy, Sakakibara, and Vézina, 2023) also increased exports to the US after the start of the trade war.

[4] In deciding on the products to be hit by higher tariffs, the US may have considered replacing imports from China with imports from Mexico, in which case our assumption of exogeneity would fail. In Appendix A we discuss several arguments supporting the opposing view that the US did not plan on replacing Chinese imports with Mexican imports.

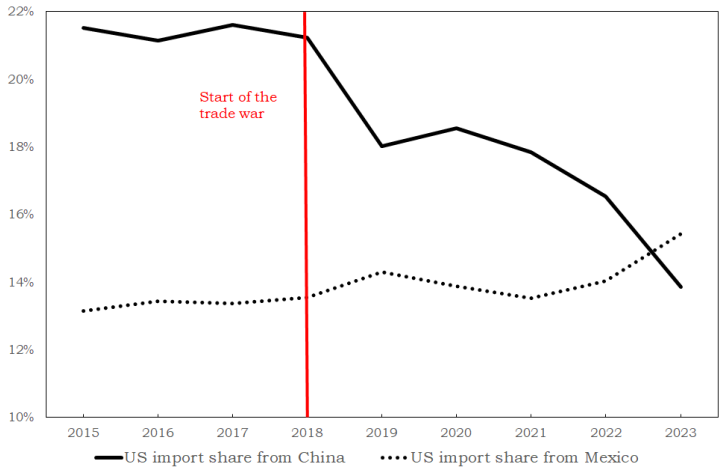

Figure 1: Shares (in %) of US goods imports from China and from Mexico in total US goods imports between 2015 and 2023. Source: Direction of Trade Statistics of the International Monetary Fund.

we find a relative increase in Mexican exports to the US of 2.7 percent for the targeted product. We also establish that trade diversion resulted from changes both at the intensive and extensive margins. At the intensive margin, higher US tariffs against China increased Mexico's mean exports per product to the US, while at the extensive margin these tariffs increased the number of products exported from Mexico to the US.

In a second step, we explore the consequences of trade diversion for the labor market outcomes of Mexican workers. We combine our firm-level trade data with longitudinal employer-employee data reporting the earnings of formal workers employed by Mexican private firms between January 2016 and December 2019. To identify the causal effects of trade diversion on Mexico's labor market outcomes, we use an instrumental variables strategy that allows us to isolate the effects of changes in US tariffs against China on Mexico's firm-level exports to the US. Specifically, we regress measures of labor market performance on firm-level exports to the US, and we instrument the latter with the firm-level exposure to US tariffs against China. As trade diversion implies that the firms exposed to higher US tariffs against China experience a surge in the demand for their exports, we expect these firms to increase their labor demand. Under the assumption that firms face an upward-sloping labor supply curve, an increase in labor demand should therefore result in more employment and higher wages (Mayr-Dorn, Narciso, Dang, and Phan, 2023; Rotunno, Roy, Sakakibara, and Vézina, 2023).[5]

We first run regressions at the worker level. We restrict our analysis to the workers who remained employed within the same firm by controlling for worker-firm fixed effects, and we find that trade diversion has a positive effect on within job-spell earnings. We estimate that a one percent increase in

[5] Upward-sloping labor supply curves at the firm level result from frictions in the labor market. Frictions may arise due to firm-specific human capital, search costs, and wage bargaining (Manning, 2011).

firm-level exports to the US driven by a firm's exposure to US tariffs against China increases earnings within job spells by 0.162 percent on average. The increases in earnings are concentrated among female, unskilled, and younger workers who typically receive lower earnings than male, skilled, and older workers. For instance, we find that men experience an increase in earnings about two thirds the size of the increase for women.

We then extend the analysis by including all the workers employed by firms before a trade diversion shock. Our approach, which we adapt from Hummels, Jørgensen, Munch, and Xiang (2014), allows us to study changes in earnings within job spells but also changes in earnings associated with leaving from the firm. It therefore addresses the sample selection that arises if only focusing on workers within job spells. Specifically, we construct cohorts of workers employed by a firm in the month before a trade diversion shock, and we track the average earnings of these cohorts over a six-month period. We find that workers experience persistent gains following a trade diversion shock. If a firm increases trade diversion by one percent, after six months its male workers can expect a total gain of 0.613 percent of their pre-trade diversion earnings, while its female workers have more modest gains of 0.471 percent. The overall effects of trade diversion (including earnings and displacement) are larger for males because male leavers increase earnings to a larger extent than female leavers. The overall effects of trade diversion are also larger for unskilled and younger workers. If a firm increases exports to the US by one percent, after six months younger and older workers can expect total gains of 0.809 and 0.451 percent of their pre-trade diversion earnings, while these effects are equal to 0.628 and 0.383 percent for unskilled and skilled workers.

Finally, we run regressions at the firm level. We find that trade diversion has a *positive* effect on employment and a *negative* effect on mean earnings. Specifically, we find that a one percent increase in firm-level US exports driven by a firm's exposure to US tariffs against China increases employment by 0.340 percent and reduces mean earnings by 0.197 percent. These effects are concentrated in technology and skill-intensive manufacturing industries such as "Chemicals, rubber, and plastics" and "Machinery and automotive." We argue that the employment increase is consistent with firms increasing production in order to satisfy the surge in export demand induced by higher US tariffs. We provide evidence that the fall in mean earnings results from a *composition effect* as firms disproportionately increase the employment of low-wage workers including female, unskilled, and younger workers. We also show that the increase in employment is mainly driven by the hiring of formal workers who were previously employed by other firms as opposed to the hiring of workers who were formerly unemployed or employed in the informal sector.

Related Literature The concept of trade diversion was introduced by Viner (1950) who argued that discriminatory trade policies (such as the formation of trade agreements) can divert trade away from non-member to member countries as the latter benefit from lower tariffs. Empirically, evidence

for the trade diverting effects of trade agreements is mixed as accounting for the joint determination of trade agreements and trade flows is a challenge. We arguably do not face this issue as the tariffs between the US and China can plausibly be assumed to be exogenous to Mexico's exports to the US.

Our paper is not the first to study trade diversion in the context of the US-China trade war. In response to higher US tariffs against China, evidence shows that the US raised imports from other countries than China (Freund, Mattoo, Mulabdic, and Ruta, 2024), including South Korea (Lovely, Xu, and Zhang, 2021), India (Sanyal, 2021), Mexico (Utar, Cebreros, and Torres, 2025), and Taiwan, the EU, and Vietnam (Nicita, 2019). Fajgelbaum, Goldberg, Kennedy, Khandelwal, and Taglioni (2024) study global trade responses to the US-China trade war. On average, they find that countries reduced exports to China and increased exports to the US and the rest of the world. Unlike these papers, our contribution is to estimate trade diversion at the firm and product levels, and to further explore the labor market consequences of trade diversion for Mexican workers.

Our paper also contributes to the vast literature that studies the effects of trade on labor market outcomes. Many studies find that import competition from China reduced earnings and employment in the US (Autor, Dorn, and Hanson, 2013; Autor, Dorn, Hanson, and Song, 2014; Pierce and Schott, 2016) and in other countries (Balsvik, Jensen, and Salvanes, 2015, for Norway; Dauth, Findeisen, and Suedekum, 2014, for Germany; De Lyon and Pessoa, 2021, for the UK). Other papers document the negative consequences of tariff reductions (Dix-Carneiro and Kovak, 2017; Hakobyan and McLaren, 2016; Revenga, 1997), or of the removal of quotas (Utar, 2014, 2018), on the labor market outcomes of the liberalizing economies. Fajgelbaum, Goldberg, Kennedy, and Khandelwal (2020) and Flaaen and Pierce (2019) find that the US-China trade war reduced wages and employment in the US. While these papers focus primarily on the negative effects of trade on labor market outcomes, our paper examines the impact of a positive trade shock driven by higher US tariffs against China.

A few papers study the effects of changes in trade policy between two countries on the labor market outcomes of third countries. Utar and Torres (2013) show that the increase in US imports from China following China's accession to the WTO had a negative effect on the employment of Mexican maquiladoras. Mayr-Dorn et al. (2023) and Rotunno et al. (2023) find that trade diversion from China to Vietnam during the trade war had a positive effect on the employment, working hours, and earnings of Vietnamese workers, especially for female and non-college-educated workers. Samaniego de la Parra, Puggioni, and Spearot (2025) find that Mexican establishments expanded revenue and formal hiring when China increased tariffs against the US but contracted when the US raised tariffs against China. Cavalcanti, Ogeda, and Ornelas (2025) show that regions in Brazil more exposed to Chinese retaliatory tariffs against the US experienced a relative increase in earnings and employment. In contrast to these papers, we rely on longitudinal employer-employee data that track individuals over time. This allows us to disentangle changes in earnings for individual workers from changes in

earnings resulting from shifts in the composition of the workforce within a firm, to analyze changes in earnings for different types of workers, and to investigate the overall effects of trade diversion, including changes in earnings within job spells and changes in earnings due to displacement.

The remainder of the paper is organized as follows. Section 2 describes the firm-level customs data for Mexico and the changes in bilateral tariffs between the US and China during the trade war. It then presents our empirical analysis on the effects of US tariffs against China on Mexico's exports to the US. Section 3 describes the employer-employee data set and provides empirical evidence on the labor market consequences of trade diversion for Mexican workers. Section 4 concludes.

2 Trade Diversion

2.1 Customs Data

The COMEXT data set on Mexico's firm-level bilateral exports (and imports) is not publicly available but can be accessed through the EconLab at Banco de México. The data set provides a firm identifier, the destination country, the 8-digit product category at the TIGIE (*Tarifa de la Ley de los Impuestos Generales de Importación y de Exportación*) level (which can be matched with the HS classification at the 6-digit level), and the transaction value (in US dollars).[6] Trade quantities (in kilograms or units) are not available. The data are reported at monthly frequency and include the universe of all Mexican free-on-board (FOB) export transactions, but we focus on manufacturing exports only (HS codes 16–96). We start our sample in January 2016 and therefore observe two years of data prior to the start of the trade war. We end our sample in December 2019 to ensure that our results are not distorted by the effects of the Covid 19 pandemic.

Table 1: Summary Statistics

	Count	Mean	Median	Std. dev.	5^{th} pctile	95^{th} pctile
Exporters	45,626	–	–	–	–	–
Exporters to the US	31,028	–	–	–	–	–
Products (8-digit TIGIE)	10,261	–	–	–	–	–
Sectors (6-digit HS)	4,315	–	–	–	–	–
Destination countries	238	–	–	–	–	–
Products per exporter	–	166.2	95	201.9	4	579
Destinations per exporter	–	13.3	6	17.8	1	49
Transaction values (US dollars)	–	223,326	1,700	5,168,278	7.3	363,100

Notes: For each variable, the table reports its count, or its mean, median, standard deviation, and values at the 5^{th} and 95^{th} percentiles. Source: Banco de México EconLab.

Table 1 provides descriptive statistics. Our sample includes 45,626 manufacturing firms (of which 31,028 export to the US), 10,261 products (8-digit TIGIE level), 4,315 sectors (6-digit HS level), and

[6] For confidentiality reasons, Banco de México use their own firm identifiers which differ from the official tax identifiers.

238 destination countries with a total of 7,129,674 observations.[7] The median firm exports an average of 95 different products to 6 destination countries (at the 5^{th} and 95^{th} percentiles, the products per exporter are 4 and 579 and the countries per exporter are 1 and 49). The median export transaction is valued at 1,700 US dollars (per month).

Our sample covers a large range of destination countries including OECD countries such as the US, Canada, Germany, and the UK but also emerging markets such as China and India as well as developed Asian countries such as Japan and Singapore. The largest market for Mexican exports in our sample is the US (80.16% of total exports between January 2016 and December 2019), followed by Canada (2.95%), China (1.62%), Germany (1.53%), Spain (1.04%), and Brazil (0.94%).

2.2 Tariff Data

The tariffs we employ for our analysis were collected by Fajgelbaum et al. (2020). Their data set provides the bilateral import tariff increases (in percentage points) enacted by the US between February 2018 and September 2019 against targeted trading partners at the 10-digit HS level. It only accounts for the tariff changes due to the trade war and ignores antidumping and countervailing tariffs or changes in tariffs not associated with the trade war. As the HS classification is only harmonized across countries up to the 6-digit HS level, we aggregate the 10-digit HS-level import tariffs against China and Mexico at the 6-digit HS level. Using US import data from Fajgelbaum et al. (2020), we calculate a weighted average of the 10-digit HS-level tariffs using the shares of 10-digit HS-level US imports in 6-digit HS-level US imports in 2017 (i.e., the year before the start of the trade war) as weights. We then merge the 6-digit HS-level US tariffs with Mexico's exports at the 6-digit HS level.

The US tariffs against China that we use for our analysis were raised in seven different waves: five waves in 2018 (the 30 and 20–50 percentage point tariff increases on solar panels and washing machines of February 2018, the 25 and 10 percentage point tariff increases on steel and aluminum of March 2018, the 25 percentage point tariff increases of July and August, and the 10 percentage point tariff increases of September), and two waves in 2019 (in May when the tariffs applied in September 2018 were increased from 10 to 25 percentage points, and the 15 percentage point tariff increases of September).[8] These tariffs predominantly targeted intermediate inputs and capital goods. In the last wave, they targeted to a larger extent consumer goods (toys, footwear, and clothing).

We also extract from the same data set China's ad valorem retaliatory tariff increases on each 8-digit HS-level product exported by the US. Using US export data from Fajgelbaum et al. (2020),

[7] Our regressions in Table 2 use fewer observations because the observations perfectly predicted by the fixed effects (i.e., singletons) are omitted. Our regressions include 16,683 firms, 6,690 products, and 197 countries.

[8] US tariffs on solar panels, washing machines, steel, and aluminum did not discriminate against China. As trade diversion occurs in the case of discriminatory tariffs, one may argue that those tariffs should be omitted from the analysis. We show in Appendix B that our results continue to hold if we omit them from our regressions.

the 8-digit HS-level tariffs are averaged at the 6-digit HS level using the shares of 8-digit HS-level US exports in 6-digit HS-level US exports in 2017 as weights. We consider six waves of Chinese tariff increases that were enacted shortly after the US increased tariffs against China (i.e., in April, July, August, and September 2018, and in May and September 2019). China mainly targeted US imports of agricultural products (including soybeans, lobster, and pork) and consumer goods (such as cars).

2.3 Empirical Analysis

In order to determine whether higher US tariffs against China induce trade diversion from China to Mexico we estimate by OLS:

$$\ln X_{ijk,t} = \alpha_1 \Delta\tau_{K,t}^{US-Ch} \times D_{US} + \alpha_2 \Delta\tau_{US,K,t}^{US-Mx} + D_{ijk} + D_{i,t} + D_{j,t} + D_{k,t} + \epsilon_{ijk,t}, \tag{1}$$

where $X_{ijk,t}$ denotes the exports of Mexican firm i to country j in 8-digit TIGIE-level product k in month t between January 2016 and December 2019. The changes (relative to the pre-trade war period) in 6-digit HS-level K US tariffs against China at time t, $\Delta\tau_{K,t}^{US-Ch}$, are interacted with a dummy variable D_{US} which is equal to one for exports to the US. Crucially, the tariffs imposed by the US against China can be considered as being exogenous to Mexico's exports (see Appendix A for a discussion).[9] To explain exports to the US we also control for the 6-digit HS-level tariffs raised by the US against Mexico during the trade war, $\Delta\tau_{US,K,t}^{US-Mx}$.[10]

We include firm-country-product D_{ijk}, firm-time $D_{i,t}$, country-time $D_{j,t}$, and product-time $D_{k,t}$ fixed effects. The D_{ijk} fixed effects imply that we consider changes in exports holding the exporter, product, and destination country triplet constant. In other words, we estimate changes in exports for a given firm exporting a particular product to the US after the US raised tariffs against China. The $D_{i,t}$ fixed effects control for time-varying characteristics of the exporters such as firm size, productivity, or financial constraints, the $D_{j,t}$ fixed effects account for business cycle fluctuations in the destination countries, while the $D_{k,t}$ fixed effects absorb time-varying features of the exported products such as changes in quality over time. The main effects of the changes in tariffs $\Delta\tau_{K,t}^{US-Ch}$ and of the country dummy D_{US} are therefore absorbed by the fixed effects. Robust standard errors are clustered at the 6-digit HS-time level. The finding $\alpha_1 > 0$ indicates that the increase in US tariffs against China in a given product category increases Mexican firm-level exports of the same product to the US relative to the rest of the world, i.e., trade diversion from China to Mexico. We also estimate equation (1) controlling for China's retaliatory tariffs against the US, $\Delta\tau_{K,t}^{Ch-US}$, interacted with the dummy variable for exports to the US, D_{US}.

[9] These tariffs are usually assumed exogenous as the first wave of US tariffs against China was largely unanticipated (Amiti, Redding, and Weinstein, 2019). One could argue that the subsequent tariff hikes were to a larger extent expected, but Fajgelbaum, Goldberg, Kennedy, and Khandelwal (2020) find little evidence of pre-trends in US industries.

[10] The US subscript means that we only include the change in US tariffs against Mexico for exports to the US.

2.4 Main Results

In column (1) of Table 2 we estimate equation (1) but we replace the product-time fixed effects $D_{k,t}$ with product fixed effects D_k. This allows us to estimate the main effect of US tariffs against China, $\Delta\tau_{K,t}^{US-Ch}$. As the interaction between $\Delta\tau_{K,t}^{US-Ch}$ and the dummy variable for exports to the US is positive, we find evidence of trade diversion from China to Mexico. A one percentage point increase in US tariffs increases Mexico's exports to the US by 0.063 percent more than to other destinations. This finding is consistent with Mexico and China competing in the US market in similar product categories. The coefficient on $\Delta\tau_{K,t}^{US-Ch}$ is insignificant, which indicates that higher US tariffs against China have no effect on Mexico's exports to non-US destinations (i.e., Mexico does not reduce exports to the rest of the world in order to increase exports to the US, nor does Mexico increase exports to both the rest of the world and the US, see Fajgelbaum et al., 2024). Utar et al. (2025) also find that higher US tariffs against China have no significant impact on Mexico's exports to non-US destinations.

In column (2) we estimate equation (1) with product-time $D_{k,t}$ fixed effects included (compared to column 1, the number of observations included in the regression falls due to a larger number of singletons being absorbed by the fixed effects). The main effect of $\Delta\tau_{K,t}^{US-Ch}$ is omitted, and only its interaction with the dummy variable for exports to the US is estimated. The results remain similar to column (1). A one percentage point increase in US tariffs against China increases Mexico's exports to the US by 0.106 percent more than its exports to the rest of the world. If we compare two different products, one targeted by a 25 percentage point increase in US tariffs against China and another one not targeted, the coefficient of 0.106 suggests a 2.7 percent $(\exp(0.106 \times 0.25) - 1)$ relative increase in exports to the US for the targeted product. Column (3) adds China's retaliatory tariffs against the US, $\Delta\tau_{K,t}^{Ch-US}$, interacted with the dummy variable for exports to the US, but its estimated coefficient is insignificant. Note that in columns (1) to (3), the effects of higher US tariffs against Mexico are insignificant (not reported), which is consistent with Utar et al. (2025).

Our results can be compared to the ones of Fajgelbaum et al. (2024) who regress the change in sectoral exports from Mexico to the US, China, and the rest of the world on changes in US and Chinese tariffs. They find evidence of trade diversion from China to Mexico, suggesting that Mexican and Chinese exports are substitutes. But US tariffs against China have a positive effect on Mexico's exports to the rest of the world, while in column (1) we obtain an insignificant coefficient. They interpret this finding as evidence that Mexico operates along a downward sloping supply curve. They also find, as we do, that China's tariffs against the US have no effect on Mexico's exports to the US.

There are two aspects worthwhile mentioning. First, Alfaro and Chor (2023) find that the sectors in which the US reduced its import share from China simultaneously experienced an increase in import unit values from Mexico. This implies that higher prices most likely contribute to the increase in exports from Mexico to the US that we observe in columns (1) to (3). We believe, however, that

Table 2: Trade Diversion

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent Variable	$\ln X_{ijk,t}$	$\ln X_{ijk,t}$	$\ln X_{ijk,t}$	$\ln X_{ijk,t}$	$\ln X_{ij,t}$	$\ln X_{ij,t}/n_{ij,t}$	$\ln n_{ij,t}$
$\Delta\tau_{K,t}^{US-Ch}$	0.008	–	–	–	0.401**	0.462***	−0.061
	(0.027)				(0.158)	(0.167)	(0.067)
$\Delta\tau_{K,t}^{US-Ch} \times D_{US}$	0.063*	0.106***	0.108***	0.113***	0.676***	0.544***	0.132*
	(0.035)	(0.039)	(0.039)	(0.040)	(0.187)	(0.180)	(0.070)
$\Delta\tau_{K,t}^{Ch-US} \times D_{US}$	–	–	−0.041	–	–	–	–
			(0.053)				
$\ln M_{i,t}^{Ch}$	–	–	–	0.019***	–	–	–
				(0.001)			
R-squared	0.847	0.853	0.853	0.833	0.844	0.828	0.868
Observations	6,325,302	6,249,720	6,249,720	5,159,612	857,778	857,778	857,778

Notes: The samples vary between January 2016 and December 2019. In columns (1)-(4), $\Delta\tau_{K,t}^{US-Ch}$ is the change in 6-digit HS-level US tariffs against China and $\Delta\tau_{K,t}^{Ch-US}$ is the change in China's 6-digit HS-level tariffs against the US. Mexico's exports to the US are also regressed on changes in 6-digit HS-level US tariffs against Mexico (not reported). D_{US} is a dummy variable equal to one for exports to the US. $M_{i,t}^{Ch}$ are firm-level imports from China. Firm-country-product D_{ijk}, firm-time $D_{i,t}$, country-time $D_{j,t}$, and product-time $D_{k,t}$ fixed effects are included (in column 1, the product-time $D_{k,t}$ fixed effects are replaced with product D_k fixed effects, and in column 4 the firm-time fixed effects $D_{i,t}$ are omitted). Robust standard errors adjusted for clustering at the 6-digit HS-time level are reported in parentheses. In columns (5)–(7), $\Delta\tau_{ij,t}^{US-Ch}$ is the mean across products of $\Delta\tau_{K,t}^{US-Ch}$ for each firm-destination-time combination. Mexico's exports to the US are also regressed on the mean across products of changes in 6-digit HS-level US tariffs against Mexico for each firm-time combination (not reported). Firm-country D_{ij}, firm-time $D_{i,t}$, and country-time $D_{j,t}$ fixed effects are included. Robust standard errors adjusted for clustering at the firm level are reported in parentheses. ***, **, and * indicate significance at the one, five, and ten percent levels.

the increase in Mexico's exports is also driven by a surge in export quantities. Our finding in Section 3.3 that firms exposed to higher US tariffs against China increase employment suggests that these firms increase production in order to satisfy the surge in export demand driven by higher US tariffs.[11] In addition, Utar et al. (2025) find that higher US tariffs against China have a positive effect on firm-level net exports (measured by the difference between a firm's total exports and total imports), which they interpret as evidence of a positive effect on domestic value-added for Mexican firms.

Second, China may reroute exports to the US via Mexico in order to circumvent US tariffs (i.e., "trade deflection"). The rules of origin under NAFTA and the USMCA prevent direct transshipments, however, as Chinese goods shipped through Mexico without any assembly or addition of Mexican inputs are subject to US tariffs. To circumvent US tariffs, Chinese firms can therefore export intermediate goods to Mexico and get them processed for re-exports to the US. This mechanism still benefits Mexican firms by allowing them to increase production and employment (as we find in Section 3.3) to satisfy the increase in export demand driven by higher US tariffs. To establish whether our trade diversion estimates are affected by rerouting, in column (4) we further control for firm-level (log) imports from China, $M_{i,t}^{Ch}$ (and omit the firm-time fixed effects). Firms importing more from China export more overall (Freund et al., 2024), but the magnitude of the trade diversion coefficient remains similar in magnitude at 0.113.

[11] Without any data on export quantities, we are unable to decompose export values into quantities and prices. Neither do we have data on Mexico's firm-level output or value-added.

Finally, we sum $X_{ijk,t}$ across products to obtain the value of exports $X_{ij,t}$ for each firm i exporting to destination j at time t. $X_{ij,t}$ can be decomposed into two components, i.e., the number of exported products $n_{ij,t}$ and the mean value of exports per product $X_{ij,t}/n_{ij,t}$ for each firm-destination-time combination. We regress the three variables (in logs) on US tariffs (averaged across products for each firm-destination-time combination) interacted with a dummy variable for exports to the US. We include firm-destination D_{ij}, firm-time $D_{i,t}$, and country-time $D_{j,t}$ fixed effects, and cluster standard errors at the firm level. Column (5) regresses $X_{ij,t}$ as the dependent variable, and provides evidence of trade diversion. At the intensive margin, trade diversion results from an increase in mean exports per product to the US (column 6), while at the extensive margin there is an increase in the number of products exported to the US (column 7). Note that the decomposition is additive and the sum of the coefficients in columns (6) and (7) is equal to the coefficients in column (5).

Appendix B provides robustness checks for the estimates reported in column (2) of Table 2. We show that our results remain robust once we allow for dynamics and include two lags on the changes in US tariffs. They also remain similar if we only consider the tariff increases enacted against China only between July 2018 and September 2019, if we measure the change in tariffs in December 2019 relative to the pre-trade war period, if we include non-manufacturing exports in our sample, and if we aggregate the data at the 6-digit HS level.

3 Labor Market Outcomes

As trade diversion implies that firms exposed to higher US tariffs against China experience a surge in the demand for their exports, we expect these firms to increase their labor demand, resulting in more employment and higher wages. To identify the effects of trade diversion on labor market outcomes, we regress earnings and employment on firm-level exports to the US, and we instrument the latter with the firm-level exposure to US tariffs against China. The first stage of our instrumental variables estimations thus delivers an estimate of trade diversion from China to Mexico.

In the next section we describe the employer-employee data set we rely on for our empirical analysis. We then proceed in two stages. First, we run regressions at the worker level to explore how the earnings of Mexican workers were impacted by trade diversion. We start by studying worker-level earnings within job spells, that is, for the workers who remained employed within the same firm. We then extend the analysis by including all the workers employed by firms before a trade diversion shock. This approach allows us to study changes in earnings within job spells but also changes in earnings associated with leaving from the firm, and it addresses the sample selection that arises if only focusing on workers within job spells. Second, we estimate regressions at the firm level and investigate the effects of trade diversion on firm-level employment and mean earnings.

3.1 Employer-Employee Data

We use the employer-employee longitudinal data set (*Microdatos Laborales*) collected by the Instituto Mexicano del Seguro Social (IMSS), the Mexican social security agency. The data are confidential but were provided to us through the EconLab of Banco de México. The data set varies at monthly frequency and reports, for formal workers employed by private firms in Mexico (including maquiladoras), their taxable income (in pesos per day) which includes wages, profit-sharing, bonuses, benefits, and in-kind compensation. In principle, all private firms are required to report to IMSS the wages they pay to their workers and to pay social security taxes for them, but not all employers comply.

In addition to the taxable income (which from now on we refer to as earnings), the data set reports each worker's year of birth, gender, and year of entry in the formal labor market (i.e., year of first registration with IMSS).[12] The data set also provides the employer's identifier, municipality, and industry.[13] Despite its richness, the data set inevitably has limitations. First, wages are bottom and top coded (at the bottom, the threshold is the minimum wage which is legally binding, while at the top the cap is set at 25 times the minimum wage).[14] Second, the number of hours worked, and the full-time or part-time status of workers are not available.[15] Third, we have no direct measure of skills such as educational attainments or occupations. Fourth, as the data set only includes formal workers, we are unable to examine the outcomes of informal workers. Lastly, as all individuals are employed, we do not have any information on unemployed individuals.

As in Section 2, we consider the period between January 2016 and December 2019 and focus on manufacturing firms only. We measure the age of workers as the difference between the year of data collection and the year of birth, and we study workers who are between 18 and 65 years old. Although the majority of workers only have one job in a given month, some workers have multiple jobs in a given month. As in Autor et al. (2014) we aggregate earnings across all jobs in a given month, and we assume that the worker's main employer is the firm that accounts for the largest share of a worker's earnings in a given month.[16] Finally, we only consider firms with more than one employee (Kumler, Verhoogen, and Frías, 2020).

As we do not have any direct measure of skills, we follow the procedure implemented by Card, Heining, and Kline (2013) to disentangle the components of wage variation attributable to worker-specific and employer-specific heterogeneity. Based on the seminal work of Abowd, Kramarz, and Margolis (1999), Card et al. (2013) regress wages on additive worker and firm fixed effects, and

[12] We set the gender indicator for an individual as missing whenever there is a change in gender.
[13] Most manufacturing firms in Mexico are single establishment (Frías, Kaplan, Verhoogen, and Alfaro-Serrano, 2024).
[14] If a worker receives more than 25 times the minimum wage, their actual wage is replaced by the top code value.
[15] Changes in daily wages therefore result from changes in hourly wages and/or in the number of hours worked.
[16] Our results remain similar if we only keep the earnings of the worker's highest-paying job (Frías et al., 2024).

they interpret the estimated worker fixed effects as a combination of individual skills and other time-invariant factors which are rewarded equally across employers. We follow their estimation procedure and use the worker fixed effects (estimated in 2016 and 2017, i.e., in the pre-trade war period) as a constant measure of skills. See Appendix C for estimation details.

Two points are worth mentioning. First, even if firms report wages to IMSS, there is no guarantee the reporting is accurate. As firms pay social security contributions for their workers depending on the wages they report to IMSS, firms have an incentive to under-report wages. Kumler et al. (2020) provide evidence of substantial under-reporting by Mexican firms, especially by smaller firms. At the same time, they find that the 1997 Mexican pension reform, which tied pension benefits more closely to reported wages, reduced the extent of under-reporting. This implies that for our period of analysis, under-reporting of wages should be less severe. And to the extent that under-reporting since the pension reform remained constant within firms over time, it should be controlled for by the inclusion of firm fixed effects (Frías, Kaplan, Verhoogen, and Alfaro-Serrano, 2024). In addition, we show in Appendix D that our results continue to hold once we restrict the sample to larger firms, for which the under-reporting of wages is minimal (Kumler et al., 2020).

Second, the anonymized employer identifier (*registro patronal*) reported by IMSS does not allow us to uniquely identify firms. The reason is that a firm can register its workers using multiple employer identifiers (for instance, for workers with different occupational risk profiles), but there is no official source of information that provides a concordance between the employer identifiers and the firms they belong to (Puggioni, Calderón, Cebreros, Fernández, Inguanzo, and Jaume, 2022). Instead, firms have an anonymized unique tax identifier (*registro federal de contribuyentes*), but it is only reported in the IMSS data set since November 2018. To address this issue, Banco de México's EconLab have provided a consistent firm identifier that encompasses the tax identifiers and employer identifiers over time. This firm identifier can be matched with the exporter identifier used in the customs data set, using a correspondence provided by the EconLab. In the majority of cases, there is a perfect match between the *registro patronal* reported in the IMSS data set and the exporter identifier used in the customs data set. But in other cases, there are multiple matches. In what follows, we rely on the firm identifier constructed by the Econlab to define a firm.

In the customs data set, we aggregate exports at the exporter-month level (and eliminate the product and destination country dimensions). We then merge (by EconLab firm identifier and month) firm-level exports with the employer-employee data set that varies at the worker-firm-month level. Of the 45,626 exporters included in our export sample, 31,028 of them report positive exports to the US, and they can be matched with 11,112 firms in the employer-employee data set. According to the EconLab, the exporters in the employer-employee data set that cannot be matched with the customs

data set do not export directly and rely on intermediaries for their export activities.[17] Once we measure the firm-level exposure to US tariffs against China, which requires firms to report positive exports in 2017 (see equation 3 below), the number of matched firms reduces to 8,909. This number further drops to 8,613 once we restrict the sample to the firms with more than one employee and with a workforce between 18 and 65 years old.[18] We rely on this sample of 8,613 matched firms at the worker-firm-month level to investigate the effects of trade diversion on worker-level earnings. We also construct a firm-level sample by collapsing the worker-firm-month data at the firm-month level. For each firm we calculate mean earnings per month, measure employment as the headcount per month, and explore how they are impacted by trade diversion.[19]

Table 3: Summary Statistics for the Employer-Employee Sample

	Observations	Count	Mean	Median	Std. dev.	5^{th} pctile	95^{th} pctile
Firms	112,844,237	8,613	–	–	–	–	–
Workers	112,844,237	5,755,737	–	–	–	–	–
Males	68,200,572	3,357,355	–	–	–	–	–
Females	44,574,855	2,395,338	–	–	–	–	–
Age (years)	112,844,237	–	34.9	34.0	10.6	20.0	54.0
Earnings (pesos per day)	112,844,237	–	407.0	268.8	379.0	126.0	1,265.4
Earnings males	68,200,572	–	472.4	323.7	414.2	134.1	1,466.3
Earnings females	44,574,855	–	307.2	221.0	290.6	118.9	871.6
Earnings skilled	51,871,498	–	602.7	436.6	466.9	172.1	1,826.0
Earnings unskilled	51,871,462	–	231.8	209.2	104.4	114.3	424.6
Earnings older	57,016,074	–	481.6	302.7	449.7	133.6	1,674.0
Earnings younger	55,828,163	–	330.9	243.4	268.9	121.1	867.8

Notes: For each variable, the table reports the number of observations in our sample, its count, or its mean, median, standard deviation, and values at the 5^{th} and 95^{th} percentiles. Source: Banco de México EconLab.

Table 3 provides descriptive statistics. Our sample includes 112,844,237 observations and is composed of 8,613 firms employing 5,755,737 workers, 58 percent of whom are male. On average, workers are 35 years old and receive 407.0 pesos per day. The table also describes mean daily earnings by gender, skills, and age (i.e., above or below the medians of skills and age). Men, skilled, and older workers receive higher earnings on average than women, unskilled, and younger workers, respectively.

3.2 Worker-Level Analysis

To investigate the effect of trade diversion on earnings, we estimate:

$$\ln w_{hi,t} = \varphi \ln X_{i,t}^{US} + D_{hi} + D_t + D_{\widetilde{hi},t_{2019}} + \varepsilon_{hi,t}, \tag{2}$$

[17] In many countries, wholesalers and retailers account for a large share of exports as they assist firms in overcoming barriers to foreign markets (Akerman, 2018).

[18] Of the 8,613 firms, 6,919 firms exactly match one *registro patronal* with one exporter in the customs data set. For the others, there are multiple matches. The 8,613 firms are associated with 13,432 different *registro patronal* identifiers.

[19] For the firms associated with multiple *registro patronal* identifiers with different industries or municipalities, we keep the industry and the municipality of the largest *registro patronal* entity.

where $w_{hi,t}$ are the daily earnings of worker h employed by firm i in month t between January 2016 and December 2019, and $X_{i,t}^{US}$ are the exports of firm i to the US in month t. We restrict the sample to the months in which firms report positive exports to the US.[20] We include worker-firm D_{hi} and month D_t fixed effects, and robust standard errors are clustered at the firm-year level (the $D_{h\widetilde{i},t_{2019}}$ fixed effects are explained further below).[21] The worker-firm fixed effects control for compositional changes within the firm as they allow us to analyze changes in earnings within job spells, that is, for the workers who remained employed within the same firm.

Firm-Level Exposure to US Tariffs against China To identify the effect of trade diversion on earnings, we instrument $X_{i,t}^{US}$ with the firm-level exposure to US tariffs against China. For each firm in each time period, we measure exposure as follows:

$$E_{i,t}^{US-Ch} = \frac{\sum_j \sum_k X_{ijk,2017} \times \Delta\tau_{K,t}^{US-Ch}}{\sum_j \sum_k X_{ijk,2017}}, \tag{3}$$

where $X_{ijk,2017}$ are the exports of firm i to country j in product k in 2017 (i.e., before the trade war), and $\Delta\tau_{K,t}^{US-Ch}$ are the changes in US tariffs against China at the 6-digit HS level K in month t. The exposure, which has a shift-share design (Borusyak, Hull, and Jaravel, 2022), weights changes in US tariffs against China with a firm's exports in each targeted product to each country relative to the firm's total exports in 2017.[22] This measure accounts for firms that were initially exporting targeted products to non-US destinations only and for which the rise in US tariffs against China makes the US market more attractive relative to other markets. The exposure is equal to zero before February 2018, while between February 2018 and December 2019 it has a mean value of 11.0 percent.

Change in the Minimum Wage The minimum wage, which is legally binding in Mexico's formal sector, was the same throughout the country until 2019 (at 88.36 pesos per day in 2018).[23] But in January 2019, Mexico doubled the minimum wage in 43 municipalities that share a border with the US (to 176.72 pesos per day), and increased it by 16 percent only (to 102.68 pesos per day) in the rest of the country. This policy aimed at preventing Mexican workers from migrating from the border region to the US for higher wages.

Using the IMSS data, Campos-Vazquez and Esquivel (2021) find that the increase in the minimum

[20] We therefore focus on within-firm changes in the intensity of exports to the US as opposed to discrete changes between zero and positive exports. As a result our estimates do not capture changes in earnings in the months that a firm transitions from no exports to positive exports to the US. They only capture changes in earnings resulting from continuous changes in exports to the US (Hummels, Jørgensen, Munch, and Xiang, 2014).

[21] Worker and firm fixed effects would instead imply that identification is based on the workers who switch employers.

[22] Non-exporters in 2017 with positive exports in later years are therefore omitted from our regressions. We observe 1,415 firms (with more than one employee and a workforce between 18 and 65 years old) with no exports in 2017 but with positive exports in 2018 and 2019 in products targeted by higher US tariffs, and 788 firms in non-targeted products.

[23] Mexico used to have three different minimum wages, but in 2015 they were unified into a single minimum wage.

wage in the border region had no effect on employment but a large impact on earnings, especially at the bottom of the income distribution. Workers who were earning less than the new minimum wage in the third quarter of 2018 saw their 2019 average earnings increase by 37 percent more than in the rest of the country. The magnitude of this effect falls to 13 percent for workers who earned up to 500 pesos per day in the third quarter of 2018 (and is insignificant for the higher-earning workers).

To control for the heterogeneous effects of the increase in the minimum wage in the border region, and therefore for the stronger increase in wages at the bottom of the income distribution, we identify workers in the 43 northern municipalities whose earnings in 2018 were below 500 pesos per day. We include in equation (2) a time-varying dummy variable $D_{h\widetilde{i},t_{2019}}$ which is equal to one for these workers in each month of 2019 (the $\widetilde{i}$ index denotes firms located in the border region).[24] As the larger increase in the minimum wage in the border region may have attracted some workers from the rest of the country, the dummy variable also accounts for workers who earned less than 500 pesos per day in the non-border region in 2018 and who moved to a new firm located in the northern municipalities in any month of 2019.[25] As a robustness check, we restrict the dummy variable $D_{h\widetilde{i},t_{2019}}$ to only include workers who in 2018 received less than the new minimum wage introduced in January 2019. We also omit from the sample in 2019 workers in the border region who earned less than the new minimum wage or less than 500 pesos per day in 2018, or all firms located in the border region in 2019.

In 2018, 85.3 percent of workers earned less than 500 pesos per day.[26] Of these, 40.2 percent were employed in the border region and 59.8 percent in non-border municipalities. The northern region employed relatively more women, with a female worker share of 46.2 percent against 37.4 percent in the rest of the country. The shares of younger and unskilled workers (below the medians of age and skills in 2018) were larger in the border region (at 52.5 and 45.4 percent) than in the non-border region (at 49.0 and 38.3 percent). Women and younger workers were more likely to be paid less than 500 pesos per day in the border region (with shares of 94.8 and 94.7 percent against 90.8 and 85.4 percent in the non-border region, respectively). The shares of unskilled workers receiving less than 500 pesos per day were similar in the two regions (at 99.8 and 99.3 percent for the border and non-border region). Firms in the border region are more export-intensive towards the US as in 2018 they sent 96.2 percent of their exports to the US against 81.5 percent for firms in the non-border region.

3.2.1 Worker Earnings within Job Spells

In column (1) of Table 4 we estimate equation (2) by OLS. The elasticity of within job-spell earnings with respect to firm-level exports to the US is positive at a value of 0.008. In other words, the more

[24] We identify these workers based on their daily earnings in the whole year of 2018 (as opposed to the last quarter or the last month of 2018) as some workers may not have worked in all months of 2018.

[25] The $D_{h\widetilde{i},t_{2019}}$ dummy variable is equal to one for 1,024,803 individual workers, of whom 41,699 workers (i.e., 4.1 percent) moved their employment from the non-border to the border region between 2018 and 2019.

[26] Of the 3,668,135 workers we observe in 2018, 38.1 percent (1,397,588 workers) are employed in the border region.

firms export to the US, the higher are earnings.

Table 4: Trade Diversion and Earnings

Earnings $\ln w_{hi,t}$	(1)	(2)	(3)	(4)
$\ln X_{i,t}^{US}$	0.008^{***}	0.162^{***}	–	0.141^{**}
	(0.001)	(0.054)		(0.055)
$E_{i,t}^{US-Ch}$	–	–	0.070^{***}	–
			(0.018)	
$E_{i,t}^{USMCA}$	–	–	–	0.014
				(0.010)
Estimation	OLS	IV	OLS	IV
First-stage $E_{i,t}^{US-Ch}$	–	0.433^{***}	–	0.395^{***}
		(0.115)		(0.117)
Kleibergen-Paap	–	14.2	–	11.4
Observations	111,225,254	111,225,254	111,225,254	111,225,254

Notes: The samples vary between January 2016 and December 2019. Instrumental variables estimation in columns (2) and (4) where firm-level exports to the US are instrumented with the firm-level exposure to US tariffs against China. Worker-firm and time fixed effects are included. Time-varying fixed effects in 2019 for the workers employed by firms located in the border region and who earned less than 500 pesos per day in 2018 are also included. Robust standard errors adjusted for clustering at the firm-year level are reported in parentheses. *** and ** indicate significance at the one and five percent levels.

In column (2) we estimate the effect of trade diversion on earnings within job spells by instrumenting exports to the US with the firm-level exposure to US tariffs against China. Consistent with our results in Table 2, the first stage shows that a firm's exposure increases firm-level exports to the US, i.e., trade diversion from China to Mexico. Compared to the OLS estimate in column (1), the earnings elasticity increases in magnitude and indicates that a one percent increase in firm-level exports to the US driven by a firm's exposure to US tariffs increases earnings within job spells by 0.162 percent on average.[27] The increase in earnings could be due to an increase in hourly wages or to an increase in the number of hours worked per day (or both), but without any data on hours worked we are unable to distinguish between the two mechanisms.

In column (3) we regress by OLS earnings on the firm-level exposure to US tariffs (Autor et al., 2013; Revenga, 1997). Consistent with column (2), the exposure has a positive effect on earnings within job spells with an elasticity of 0.070. In terms of economic effects, consider two exporters at the 25^{th} and 75^{th} percentiles of the firm-level exposure to US tariffs (their exposures are 2.3 and 23.5 percent, respectively). The coefficient of 0.070 indicates that earnings increase by $\exp(0.070 \times (0.235 - 0.023)) - 1 = 1.5$ percent when we move from the 25^{th} to the 75^{th} percentile of the exposure distribution.

One possible threat to identification arises from the renegotiation of NAFTA, which was replaced by the USMCA in 2020. The USMCA includes a "high-wage component of the labor value content" requirement which grants auto producers preferential tariffs only if 40 percent of the value of a car (45 percent for light trucks) is produced at a firm paying production workers at least 16 US dollars per

[27] The downward bias in the OLS estimate could be due to a cost shock that pushes up earnings but depresses exports.

hour. This measure was announced on 30 September 2018 and entered into force when the USMCA was signed on 1 July 2020, which is outside our sample period. Fortune-Taylor and Hallren (2022) find that from March 2019 this measure had anticipatory positive effects on wages of US workers. We therefore need to ensure that this measure does not distort our estimates of trade diversion on Mexican earnings.

The USMCA measure targets four industries at the 4-digit NAICS level (i.e., 3361, 3362, 3363, and 3369, see Fortune-Taylor and Hallren, 2022). Based on the concordances developed by Pierce and Schott (2012), the NAICS codes can be matched with 122 different 6-digit HS-level product categories. We calculate a firm's exposure to the high-wage component measure as:

$$E_{i,t}^{USMCA} = \frac{\sum_j \sum_k X_{ijk,2017} \times D_{K,t}}{\sum_j \sum_k X_{ijk,2017}}, \tag{4}$$

where $D_{K,t}$ is a dummy variable equal to one for the 122 HS-level sectors K from March 2019 onwards (i.e., the treatment start date chosen by Fortune-Taylor and Hallren, 2022). The exposure measure is equal to zero until February 2019 and subsequently has a mean value of 28.0 percent.[28]

In column (4) we estimate equation (2) but simultaneously control for the firm-level exposure to the USMCA measure. Its coefficient is insignificant, and the elasticity of earnings with respect to trade diversion only becomes slightly smaller at a value of 0.141. This finding confirms our results are not distorted by the minimum wage requirement of the USMCA. It should be noted that our exercise is overly cautious as it allows the minimum wage requirement to impact earnings from March 2019 despite only entering into force in 2020. It is also unclear whether the minimum wage of 16 US dollars has been applied by all Mexican auto producers. Some producers may have chosen to pay tariffs, while others may have replaced workers by robots (Fortune-Taylor and Hallren, 2022).

Finally, to visualize the effects of trade diversion on the earnings of workers within job spells, we compare the trends in earnings between the workers employed by firms exposed to higher US tariffs and the workers in non-exposed firms. We estimate the following specification:

$$\ln w_{hi,t} = \sum_{T=-1}^{12} \zeta_{0,T} I\left(event_{i,t} = T\right) + \sum_{T=-1}^{12} \zeta_{1,T} I\left(event_{i,t} = T\right) \times target_i + D_{hi} + D_t + D_{\widetilde{hi},t_{2019}} + \upsilon_{hi,t}, \tag{5}$$

where $target_i$ is a dummy variable equal to one if firm i is exposed to higher US tariffs, and we include indicator variables I for the event date $event_{i,t}$ which captures the month when firm i was first exposed to higher US tariffs. For the firms non exposed to US tariffs, the event date is defined as the earliest month of the trade war (i.e., February 2018). We include worker-firm D_{hi} and month D_t fixed effects, as well as time-varying fixed effects in 2019 for the workers employed by firms located in

[28] The sample correlation between $E_{i,t}^{USMCA}$ and $E_{i,t}^{US-Ch}$ is 45.8 percent.

the border region and who earned less than 500 pesos per day in 2018, $D_{\widetilde{hi},t_{2019}}$. Event times < -1 are omitted and standard errors are clustered at the firm-year level.

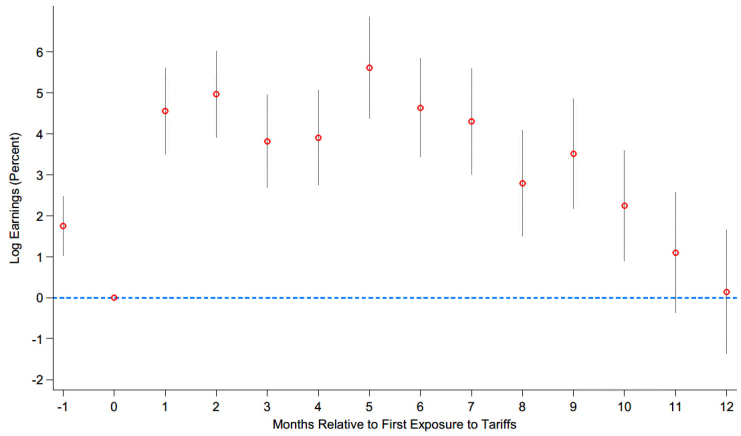

Figure 2: Coefficients on event time dummy variables for the earnings of workers employed by exposed firms relative to non exposed firms. 90% confidence intervals are reported as error bars. Source: Banco de México EconLab.

Figure 2 plots the $\zeta_{1,T}$ coefficients that capture the trends in exposed earnings relative to non-exposed earnings. We see a clear increase in earnings that lasts for about 10 months. Specifically, earnings increase by 4.56, 4.97, and 3.81 percent in event periods 1, 2, and 3, and by 2.24 percent in event period 10. These effects are consistent with trade diversion increasing earnings within job spells. Prior to the exposure to US tariffs, an anticipatory increase in earnings (of 1.75 percent) can be detected in event period -1, but it is quantitatively smaller than the post-event increases observed from event periods 1 to 10. Evidence that firms increased earnings before being exposed to higher US tariffs is therefore weak.

3.2.2 Worker Heterogeneity

We explore the heterogeneous effects of trade diversion on within job-spell earnings across different types of workers. We estimate equation (2) and we interact firm-level exports to the US with worker-level characteristics such as gender, and the initial (i.e., pre-war) levels of skills, age, and mean earnings.[29] As instruments we use the firm-level exposure to US tariffs against China and its interactions with worker-level characteristics.

In column (1) of Table 5 we interact firm-level exports to the US with a dummy variable for male workers. Both genders benefit from the US raising tariffs against China, but females benefit more than males. A one percent increase in exports to the US increases the within job-spell earnings of female workers by 0.228 percent, and by 0.151 percent only for males. This finding is consistent with Juhn,

[29] The initial values are defined in 2016, or in 2017 if the 2016 values are missing. Skills are estimated in 2016-2017.

Ujhelyi, and Villegas-Sanchez (2014) who show that reductions in US tariffs associated with NAFTA raised the relative wages of female workers in Mexico. It also suggests that higher US tariffs against China contributed to reducing the gender wage gap in Mexico's manufacturing sector (De Lyon and Pessoa, 2021).

Table 5: Trade Diversion and Worker Heterogeneity

Earnings $\ln w_{hi,t}$	(1)	(2)	(3)	(4)
$\ln X_{i,t}^{US}$	0.228^{***}	0.275^{***}	0.164^{***}	0.347^{***}
	(0.076)	(0.097)	(0.063)	(0.122)
$\ln X_{i,t}^{US} \times Male$	-0.078^{**}	–	–	–
	(0.032)			
$\ln X_{i,t}^{US} \times Skills_{16-17}$	–	-0.545^{***}	–	–
		(0.070)		
$\ln X_{i,t}^{US} \times \ln Age_{16-17}$	–	–	-1.232^{***}	–
			(0.144)	
$\ln X_{i,t}^{US} \times \ln Earnings_{16-17}$	–	–	–	-0.491^{***}
				(0.075)
$Male$	0.151^{***}	–	–	–
	(0.054)			
25^{th} percentile	–	0.569^{***}	0.494^{***}	0.589^{***}
		(0.121)	(0.083)	(0.150)
75^{th} percentile	–	0.072	-0.145^{**}	0.166
		(0.087)	(0.062)	(0.106)
Kleibergen-Paap	6.2	7.2^{*}	7.1^{*}	6.5
Observations	111,157,275	102,475,792	100,495,680	100,495,680

Notes: The samples vary between January 2016 and December 2019. Instrumental variables estimation where firm-level exports to the US and their interactions with worker-level characteristics are instrumented with the firm-level exposure to US tariffs against China and the exposure interacted with worker-level characteristics. Worker-firm and time fixed effects are included. Time-varying fixed effects in 2019 for the workers employed by firms located in the border region and who earned less than 500 pesos per day in 2018 are also included. Robust standard errors adjusted for clustering at the firm-year level are reported in parentheses. ***, **, and * indicate significance at the one, five, and ten percent levels. The worker-level characteristics used in the interaction terms (with the exception of the dummy variable for male) are demeaned.

Column (2) investigates heterogeneity arising from differences in skills. We interact exports to the US with our (demeaned) measure of skills estimated in the pre-trade war period. Within job spells, unskilled workers experience a larger increase in earnings than skilled workers. At the 25^{th} percentile of skills, the earnings elasticity is equal to 0.569. But it is insignificant at the 75^{th} percentile. Our results are therefore consistent with papers finding that the negative effects of import competition on wages and earnings are larger for unskilled workers (Autor et al., 2013; Autor et al., 2014; Balsvik et al., 2015; Dauth et al., 2014; Hakobyan and McLaren, 2016; Revenga, 1997; Utar, 2014, 2018).

We also ask whether the impact of trade diversion on earnings within job spells is heterogeneous between younger and older workers. In column (3) we interact exports to the US with the initial (demeaned) age of workers. The elasticity of earnings with respect to exports to the US is larger for younger workers. At the 25^{th} percentile of the age distribution (equal to 25 years), the elasticity is large at 0.494, while at the 75^{th} percentile (equal to 42 years) it turns negative at -0.145. Within job spells, trade diversion increases the earnings of younger workers, but reduces them for older workers.[30]

[30] For example, older workers may have reduced their working hours relative to younger workers.

Columns (1) to (3) show that trade diversion disproportionately increases the earnings of female, unskilled, and younger workers within job spells. As these workers receive on average lower earnings (see Table 3), we test for heterogeneity across initial earnings. We calculate each worker's initial mean earnings which we interact (demeaned) with exports to the US. Column (4) shows that workers with low initial earnings benefit more than workers with high initial earnings. The elasticity of earnings with respect to US exports is 0.589 at the 25^{th} percentile of the initial earnings distribution, and falls to 0.166 (which is insignificant) at the 75^{th} percentile.[31]

Overall, the finding that trade diversion increases to a larger extent the earnings of low-wage workers within job spells suggests that firms exposed to higher US tariffs against China experienced a reduction in within-firm earnings inequality. This result contrasts with Verhoogen (2008) who finds that Mexico's peso devaluation of 1994 induced more productive firms to upgrade the quality of their exports, resulting in a disproportionate increase in the wages of high-skilled workers and therefore an increase in within-industry wage inequality.

3.2.3 Worker Mobility

In Sections 3.2.1 and 3.2.2 we analyze the effects of trade diversion on worker-level earnings within job spells, that is, for the workers who remained employed within the same firm. We now extend the analysis by including all the workers employed by firms before a trade diversion shock. Our analysis, which we adapt from Hummels et al. (2014), allows us to study changes in earnings within job spells but also changes in earnings associated with leaving from the firm. It also addresses the sample selection that arises if only focusing on workers within job spells or on workers who are displaced.

Tables 4 and 5 show that trade diversion increases worker-level earnings within job spells, and this effect is stronger for low-wage workers (i.e., female, unskilled, and younger). These regressions assume that worker mobility is random conditional on job-spell fixed effects. Suppose instead that there are time-varying and worker-specific shocks that are correlated with the trade diversion events. If there is a relationship between these time-varying shocks and the set of workers who remain employed within the firm, and if high- and low-wage workers have opposite selection patterns (e.g., the low-wage workers subject to positive trade diversion shocks stay but the high-wage workers facing positive shocks leave), then our finding that low-wage workers disproportionately increase earnings in response to trade diversion could result from selection.

To understand the importance of selection, we examine worker mobility in response to trade diversion (Hummels et al., 2014). We define a trade diversion shock as an increase in firm-level exports to the US predicted by the firm-level exposure to US tariffs against China between months

[31] In Table D8 in Appendix D we investigate worker heterogeneity by gender. Unskilled and younger workers experience a larger increase in earnings irrespective of their gender, but earnings fall for older men.

Table 6: Worker Mobility in Response to Trade Diversion

	(1)	(2)	(3)	(4)	(5)	(6)
All workers	Female	Male	Unskilled	Skilled	Younger	Older
Earnings (pesos per day)	306.09	476.19	225.24	593.95	340.01	482.72
Age (years)	35.51	34.95	29.64	40.71	–	–
Skills	0.087	0.311	–	–	-0.120	0.584
Female	–	–	0.449	0.335	0.374	0.410
Observations	16,281,486	25,293,142	20,790,246	20,784,382	21,309,488	20,265,140
Leavers	Female	Male	Unskilled	Skilled	Younger	Older
Earnings (pesos per day)	231.19	323.63	197.30	543.81	246.97	366.84
Age (years)	31.56	30.66	27.99	40.06	–	–
Skills	-0.147	-0.095	–	–	-0.307	0.296
Female	–	–	0.443	0.354	0.403	0.458
Observations	3,371,657	4,649,825	5,996,458	2,025,024	5,491,865	2,529,617

Notes: The samples vary between January 2016 and December 2019. The table compares the pre-shock characteristics of the workers who leave their employers ("Leavers") after a positive trade diversion shock with the characteristics of the full set of workers ("All workers"), including the leavers and those who stay. A positive trade diversion shock is defined as an increase in predicted firm-level exports to the US, where the predicted values are obtained from regressing firm-level exports to the US on the firm-level exposure to US tariffs against China. For each firm with a positive trade diversion shock we consider the workers employed by the same firm six months prior to the shock. Unskilled and younger workers have a level of skills and age below the medians of skills and age in the sample.

t and $t+1$. We then describe the month $t-6$ characteristics of all the workers employed by firms exposed to a trade diversion shock, and compare them with the month $t-6$ characteristics of the workers who leave the firms in month t. Compared to the average worker (in the upper panel), Table 6 shows that the average leaver (in the lower panel) receives lower earnings, is younger, less skilled, and is (slightly) more likely to be female. These results indicate that there is indeed selection (conditional on observables) in our sample, but as these patterns hold irrespective of a worker's gender, skills, and age, selection is unlikely to explain our finding that trade diversion disproportionately increases the earnings of female, unskilled, and younger workers within job spells.

In a next step, we account for selection conditional on unobservables. As in Hummels et al. (2014) we examine the evolution of earnings for cohorts of workers that include both stayers and leavers. To be more precise, consider all the workers employed by firm i in a base month ν. Denote this cohort by $i\nu$, and consider the average earnings of this cohort. Suppose that in month $\nu+1$, firm i is hit by a positive trade diversion shock. Some workers from cohort $i\nu$ remain employed with firm i in $\nu+1$, while others are displaced. Displaced workers may start employment with a new firm, become unemployed, or exit (permanently or temporarily) from the formal labor market. When we calculate the cohort average wage in $\nu+1$, we however include both stayers and leavers.[32] In other words,

[32] When workers leave the IMSS data set, they may become unemployed, exit from the labor force, die, emigrate outside of Mexico, or move to an informal job. Hummels et al. (2014) set earnings to zero when workers become unemployed and when they exit due to death or emigration. We follow the same approach, but since earnings in the informal sector are not observed we also assume they are zero. Our analysis should therefore be interpreted as estimating the effects of

we fix the composition of the cohort before the trade diversion shock, and we follow this group of workers for 6 months after the shock. This allows us to estimate the overall effects of trade diversion on current and future cohort average earnings.

Since firms are affected by multiple trade diversion shocks over time (as US tariffs against China were raised in several waves), for each firm we construct multiple cohorts where each cohort corresponds to the set of workers employed by the firm in each base month ν (ν varies from January 2016 to July 2019). For each cohort $i\nu$, its trade diversion shock in month $\nu+1$ is given by firm i's percentage change in predicted exports to the US between ν and $\nu+1$, i.e., $\Delta \ln \widehat{X^{US}_{i,v+1}} = \ln\left(\widehat{X^{US}_{i,v+1}}/\widehat{X^{US}_{i,v}}\right)$. We obtain the predicted values of firm-level exports to the US by instrumenting by the firm-level exposure to US tariffs against China. We then estimate:

$$\Delta \ln w_{iv,t} = \sum_{m=1}^{6} \xi_m \left(\Delta \ln \widehat{X^{US}_{i,v+1}}\right) D_{v+m} + D_v + D_t + D_{\widetilde{i},t_{2019}} + \varrho_{iv,t}, \tag{6}$$

where $w_{iv,t}$ represents the average earnings of a firm i cohort with base month ν at time t, where $t = \nu+1, ..., \nu+6$, and its change $\Delta \ln w_{iv,t}$ is defined relative to the base month ν in order to match the trade diversion shock calculated between ν and $\nu+1$. D_{v+m} are dummy variables for the mth months after base month ν, with $m = 1, ..., 6$. We include base month fixed effects D_v and time fixed effects D_t. To control for the increase in the minimum wage in the border region in 2019, we include time-varying fixed effects $D_{\widetilde{i},t_{2019}}$ in 2019 for the firms $\widetilde{i}$ located in the border region employing workers who earned less than 500 pesos per day in 2018. We weight the regressions by the number of cohort members, and cluster standard errors at the firm-time level given that each firm has multiple cohorts in each month t. The coefficients of interest are the ξ_m, where ξ_1 is the contemporaneous effect of the trade diversion shock, ξ_2 is the effect one month post-shock, etc.

For each firm i in each base month ν, we separately create cohorts of workers by gender, skills, and age (we split workers based on whether their skills and age are above or below their sample medians). We then estimate equation (6) separately for each of the six cohorts, and report the ξ_m estimates in the upper panel of Table 7. Column (1) shows the estimates for female workers. In the month of a trade diversion shock, the elasticity of a cohort's average earnings is 0.0925. In other words, for an average female worker, the overall effect (including earnings and displacement) of a one percent increase in firm-level exports to the US driven by a firm's exposure to US tariffs is a 0.0925 percent increase in earnings. This result is consistent with our findings in Table 5 showing that trade diversion increases the earnings of female workers within job spells. Column (1) also shows that the effect of trade diversion on a female cohort's average earnings persists over time. The elasticity is equal to 0.091 one month post-shock, and remains positive at 0.098 six months after the shock.

trade diversion on present and future cohort average earnings *in the formal labor market*. To ensure that workers do not enter or exit the sample because of age, we exclude the workers who turn 18 or 65 between 2016 and 2019.

Table 7: The Overall Effects of Trade Diversion

Earnings $\Delta \ln w_{iv,t}$	(1)	(2)	(3)	(4)	(5)	(6)
All Workers	Female	Male	Unskilled	Skilled	Younger	Older
Diversion shock month 1	0.095***	0.122***	0.126***	0.077**	0.162***	0.089***
	(0.027)	(0.030)	(0.031)	(0.033)	(0.031)	(0.027)
Diversion shock month 2	0.091***	0.120***	0.120***	0.075**	0.157***	0.088***
	(0.027)	(0.029)	(0.030)	(0.032)	(0.030)	(0.026)
Diversion shock month 3	0.090***	0.119***	0.120***	0.074**	0.156***	0.088***
	(0.027)	(0.029)	(0.030)	(0.032)	(0.030)	(0.026)
Diversion shock month 4	0.089***	0.116***	0.119***	0.074**	0.154***	0.086***
	(0.027)	(0.029)	(0.030)	(0.032)	(0.031)	(0.026)
Diversion shock month 5	0.092***	0.120***	0.122***	0.074**	0.159***	0.088***
	(0.027)	(0.029)	(0.030)	(0.032)	(0.031)	(0.026)
Diversion shock month 6	0.098***	0.124***	0.133***	0.075**	0.165***	0.092***
	(0.028)	(0.030)	(0.031)	(0.033)	(0.032)	(0.027)
Six-month PDV	0.471***	0.613***	0.628***	0.383**	0.809***	0.451***
	(0.136)	(0.147)	(0.153)	(0.164)	(0.155)	(0.131)
Observations	1,089,629	1,119,368	1,053,495	1,064,021	1,095,456	1,119,649
First-month Leavers	Female	Male	Unskilled	Skilled	Younger	Older
Diversion shock month 1	0.131	0.578***	0.329*	0.436	0.503***	0.323
	(0.246)	(0.184)	(0.184)	(0.314)	(0.186)	(0.259)
Diversion shock month 2	0.376*	0.739***	0.492***	0.503*	0.576***	0.555**
	(0.228)	(0.171)	(0.170)	(0.300)	(0.176)	(0.237)
Diversion shock month 3	0.316	0.661***	0.396**	0.386	0.516***	0.467**
	(0.224)	(0.165)	(0.167)	(0.288)	(0.173)	(0.233)
Diversion shock month 4	0.165	0.569***	0.297*	0.369	0.463***	0.455**
	(0.223)	(0.165)	(0.166)	(0.283)	(0.173)	(0.231)
Diversion shock month 5	0.302	0.643***	0.407**	0.444	0.583***	0.502**
	(0.224)	(0.167)	(0.167)	(0.286)	(0.174)	(0.232)
Diversion shock month 6	−0.028	0.344**	0.079	0.168	0.338*	0.209
	(0.224)	(0.167)	(0.169)	(0.283)	(0.175)	(0.232)
Six-month PDV	1.104	3.047***	1.744**	2.004	2.556***	2.152**
	(1.104)	(0.793)	(0.827)	(1.292)	(0.850)	(1.094)
Observations	423,138	590,839	573,707	401,828	586,216	454,943

Notes: The samples vary between January 2016 and December 2019. The table reports the overall effects of trade diversion, including both earnings and displacement, on workers' present and future income streams. The upper panel includes all workers, while the lower panel only includes first-month leavers who are workers who are no longer employed by the firm in the month after the base month. All regressions include cohort fixed effects, time fixed effects, and time-varying fixed effects in 2019 for the firms located in the border region employing workers who earned less than 500 pesos per day in 2018. The six-month present discounted value (PDV) is the discounted sum of coefficients using a 7 percent discount rate. The regressions are weighted by the base-month cohort size. Robust standard errors adjusted for clustering at the firm-month level are reported in parentheses. ***, **, and * indicate significance at the one, five, and ten percent levels. Unskilled and younger workers have a level of skills and age below the medians of skills and age in the sample.

Column (1) also reports the present discounted value (PDV) of the changes in earnings over the six months period using a 7 percent discount rate.[33] The present discounted value represents the accumulated gains for female workers. After six months, an average female worker can expect a total gain of 0.471 percent of their pre-trade diversion earnings if the firm increases exports to the US by one percent.

Column (2) reports the results for males. In the month of a trade diversion shock, the elasticity of a cohort's average earnings is 0.122 and the effect persists over time. The present discounted value shows that after six months an average male worker can expect a total gain of 0.613 percent of their

[33] The average monetary policy rate of Mexico between 2016 and 2019 is around 7 percent (Monetary and Financial Statistics of the International Monetary Fund).

pre-trade diversion earnings in response to a one percent increase in trade diversion. This effect is larger in magnitude than the corresponding effect for females (of 0.471). As we found in Table 5 that within job spells trade diversion increases earnings to a larger extent for females than for males, the results in column (2) suggest that displaced male workers disproportionately increase their earnings compared to displaced females.

To see this, the lower panel of Table 7 reports the same regressions as in the upper panel but for the first-month leavers only (i.e., the workers who leave the firm in the month of a trade diversion shock). Column (1) shows that for an average female leaver, trade diversion has no significant effect on earnings (except one month post shock), resulting in an insignificant present discounted elasticity of 1.104. This finding can be reconciled with evidence suggesting that, because of childcare responsibilities, women have fewer outside options and have low bargaining power to negotiate higher earnings with employers (Sharma, 2023). It might also be that women select into lower-paid jobs, perhaps to reduce working hours. Instead, column (2) shows that the earnings of male leavers significantly increase in each of the six months after a trade diversion shock, the present discounted value of the earnings elasticity being large at 3.047. In other words, by leaving the firm male workers significantly increase their earnings, while female workers do not. This explains why in the upper panel of Table 7 we find that the overall effect of trade diversion is larger for males than for females.

Columns (3) and (4) of Table 7 provide results according to skills. In the upper panel, trade diversion has a positive effect on the present and future earnings of skilled and unskilled cohorts, but the effects are stronger for unskilled workers (with a present discounted elasticity of 0.628 against 0.383 for skilled workers). Again, these findings are consistent with the within job-spell results reported in Table 5. In the lower panel, the effects of trade diversion on the earnings of unskilled leavers are large and persistent (with a present discounted elasticity of 1.744), but they are insignificant for the skilled leavers (the present discounted elasticity of 2.004 is insignificant).[34] Unskilled workers therefore benefit more from trade diversion within job spells but also when they are displaced.

The estimates for the younger and older cohorts are reported in columns (5) and (6). Trade diversion has a positive effect on the present and future earnings of the average worker and leaver, irrespective of their age. If a firm increases exports to the US by one percent, after six months the average younger and older workers can expect total gains of 0.809 and 0.451 percent of their pre-trade diversion earnings (the larger effect for the younger cohorts is consistent with the within job-spell results of Table 5). For the younger and older leavers the cumulative gains are larger at 2.556 and

[34] As the leavers include workers switching to new jobs, one may wonder why skilled workers moving to new employers may not enjoy an increase in earnings in response to trade diversion. One possible explanation is based on the fact that industry-specific skills constitute a large part of a worker's human capital stock (Autor, Dorn, Hanson, and Song, 2014; Utar, 2018). Some firms may value workers with a certain type of skills, but the same skills may not be valued by other firms. Workers may therefore end up in occupations for which they are poorly suited, resulting in a wage cost.

2.152 percent. Both younger and older workers therefore increase their earnings whether or not they stay with the firm, but in both cases the gains are larger for the younger cohorts.[35]

Finally, we estimate the probability of workers moving between firms as a function of the firm-level exposure to US tariffs against China.[36] This allows us to determine whether workers are more likely to move to high- or to low-exposure firms. We define a dummy variable $move_{hi,t}$ which is equal to one if worker h employed by firm i at time t was employed by firm $i' \neq i$ at time $t-1$, and zero otherwise. We regress this dummy variable on the exposure of firm i at time t, $E_{i,t}^{US-Ch}$, which we interact with an indicator I which is equal to one if the exposure of firm i at time t is larger than the exposure of firm i' at time $t-1$. We estimate:

$$\begin{aligned} \Pr\left(move\right)_{hi,t} &= \phi_1 E_{i,t}^{US-Ch} + \phi_2 E_{i,t}^{US-Ch} \times I\left(E_{i,t}^{US-Ch} > E_{i',t-1}^{US-Ch}\right) + \phi_3 I\left(E_{i,t}^{US-Ch} > E_{i',t-1}^{US-Ch}\right) \\ &\quad + D_h + D_i + D_t + D_{\widetilde{hi},t_{2019}} + \eta_{hi,t}, \end{aligned} \tag{7}$$

where worker D_h, firm D_i, time D_t, and $D_{\widetilde{hi},t_{2019}}$ fixed effects are included.[37] Although the dependent variable is dichotomous, we estimate equation (7) by OLS. We prefer the linear probability model to non-linear models such as probit or logit because the former avoids the incidental parameter problem which arises when a large number of fixed effects are included.

Column (1) of Table 8 reveals that workers are 5.0 percentage points more likely to move to a higher-exposure firm.[38] This suggests that higher-exposure firms are more attractive to workers, probably because they offer higher wages as they need to hire more workers to satisfy the increase in export demand induced by higher US tariffs against China.

Columns (2) to (4) further interact the explanatory variables with dummy variables for male, skilled, and older workers. In column (2), both males and females are more likely to move to higher-exposure firms. The probability is larger for males (0.051) than for females (0.049), but their difference is not statistically significant (the p-value is equal to 0.355). Columns (3) and (4) distinguish between workers based on their skills and age. All types of workers are more likely to move to higher-exposure firms, but the probabilities are statistically larger for unskilled (0.050 against 0.041 for skilled workers) and younger workers (0.053 against 0.044 for older workers). These findings can be reconciled with the estimates reported in the lower panel of Table 7: unskilled and younger workers have a larger probability of moving to higher-exposure firms, and this allows them to disproportionately increase their present and future earnings compared to skilled and older workers.

[35] In Table 5, trade diversion reduces the earnings of older workers and has no effect on the earnings of skilled workers within job spells. Instead, the upper part of Table 7 reports an increase in the earnings of older and skilled workers. This difference most likely arises because Tables 5 and 7 are based on different specifications (regression 6 does not control for job-spell fixed effects while regression 2 does).

[36] In this case, we do not restrict the sample to the months in which firms report positive exports to the US.

[37] As we estimate the probability of moving between firms we separately control for worker and for firm fixed effects.

[38] If we regress the probability of moving on the exposure $E_{i,t}^{US-Ch}$ only, the estimated coefficient is insignificant.

Table 8: Probability of Moving to a New Employer

Probability of Moving $\Pr(move)_{hi,t}$	(1)	(2)	(3)	(4)
$E_{i,t}^{US-Ch}$	-0.036^{***} (0.003)	-0.037^{***} (0.003)	-0.052^{***} (0.003)	-0.050^{***} (0.003)
$E_{i,t}^{US-Ch} \times I\left(E_{i,t}^{US-Ch} > E_{i',t-1}^{US-Ch}\right)$	0.086^{***} (0.007)	0.086^{***} (0.007)	0.102^{***} (0.008)	0.104^{***} (0.007)
$E_{i,t}^{US-Ch} \times Male$	–	0.001 (0.001)	–	–
$E_{i,t}^{US-Ch} \times I\left(E_{i,t}^{US-Ch} > E_{i',t-1}^{US-Ch}\right) \times Male$	–	0.001 (0.003)	–	–
$E_{i,t}^{US-Ch} \times Skilled$	–	–	0.037^{***} (0.002)	–
$E_{i,t}^{US-Ch} \times I\left(E_{i,t}^{US-Ch} > E_{i',t-1}^{US-Ch}\right) \times Skilled$	–	–	-0.046^{***} (0.005)	–
$E_{i,t}^{US-Ch} \times Older$	–	–	–	0.028^{***} (0.001)
$E_{i,t}^{US-Ch} \times I\left(E_{i,t}^{US-Ch} > E_{i',t-1}^{US-Ch}\right) \times Older$	–	–	–	-0.037^{***} (0.003)
All workers	0.050^{***} (0.006)	–	–	–
Female/Unskilled/Younger	–	0.049^{***} (0.006)	0.050^{***} (0.007)	0.053^{***} (0.006)
Male/Skilled/Older	–	0.051^{***} (0.006)	0.041^{***} (0.005)	0.044^{***} (0.005)
$p-value$	–	0.355	0.032	0.001
Observations	133,327,261	133,248,233	122,105,969	133,327,261

Notes: The samples vary between January 2016 and December 2019. Worker, firm, and time fixed effects are included. Time-varying fixed effects in 2019 for the workers employed by firms located in the border region and who earned less than 500 pesos per day in 2018 are also included. Robust standard errors adjusted for clustering at the firm-year level are reported in parentheses. *** indicates significance at the one percent level. In all columns the dummy variable for an increase in exposure I, and its interactions with dummy variables for male, skilled, and older workers in columns (2), (3), and (4) are also included (not reported). Unskilled and younger workers have a level of skills and age below the medians of skills and age in the sample.

3.3 Firm-Level Analysis

To evaluate the effects of trade diversion on firm-level employment and mean earnings, we estimate:

$$\ln z_{i,t} = \phi \ln X_{i,t}^{US} + D_i + D_t + D_{\widetilde{i},t_{2019}} + \delta_{i,t}, \tag{8}$$

where $z_{i,t}$ is either mean earnings $w_{i,t}$ (in pesos per worker) or the number of workers $l_{i,t}$ employed by firm i in month t between January 2016 and December 2019. As before, we restrict the sample to months in which firms report positive exports to the US, and we instrument exports to the US with the firm-level exposure to US tariffs against China. We include firm D_i and time D_t fixed effects, as well as time-varying fixed effects $D_{\widetilde{i},t_{2019}}$ in 2019 for the firms $\widetilde{i}$ located in the border region employing workers who earned less than 500 pesos per day in 2018.

3.3.1 Firm-Level Employment and Mean Earnings

In column (1) of Table 9 we regress by OLS firm-level employment $\ln l_{i,t}$ and mean earnings $\ln w_{i,t}$ on firm-level exports to the US. Higher exports to the US increase employment and reduce mean earnings. In order to satisfy an increase in export demand, exporters hire more workers, but the new

hires receive lower wages than current employees such that firm-level mean earnings fall.

Table 9: Trade Diversion and Firm-Level Employment and Mean Earnings

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Employment $\ln l_{i,t}$							
$\ln X_{i,t}^{US}$	0.052*** (0.002)	0.340*** (0.063)	–	0.324*** (0.069)	0.266 (0.374)	0.300*** (0.090)	0.321*** (0.096)
$E_{i,t}^{US-Ch}$	–	–	0.194*** (0.033)	–	–	–	–
$E_{i,t}^{USMCA}$	–	–	–	0.020 (0.016)	–	–	–
Mean earnings $\ln w_{i,t}$							
$\ln X_{i,t}^{US}$	−0.007*** (0.001)	−0.197*** (0.033)	–	−0.208*** (0.037)	0.596 (0.407)	−0.067* (0.037)	−0.104** (0.043)
$E_{i,t}^{US-Ch}$	–	–	−0.113*** (0.014)	–	–	–	–
$E_{i,t}^{USMCA}$	–	–	–	0.014 (0.009)	–	–	–
Estimation	OLS	IV	OLS	IV	IV	IV	IV
Sample	All	All	All	All	NAICS 31	NAICS 32	NAICS 33
First-stage $E_{i,t}^{US-Ch}$	–	0.571*** (0.067)	–	0.517*** (0.067)	−0.257 (0.165)	0.750*** (0.153)	0.470*** (0.091)
Kleibergen-Paap	–	72.8*	–	59.1*	2.4	24.2*	26.9*
Observations	240,798	240,798	240,798	240,798	59,701	58,582	122,515

Notes: The samples vary between January 2016 and December 2019. Instrumental variables estimation in columns (2) and (4)–(7) where firm-level exports to the US are instrumented with the firm-level exposure to US tariffs against China. Firm and time fixed effects are included. Time-varying fixed effects in 2019 for the firms located in the border region employing workers who earned less than 500 pesos per day in 2018 are also included. Robust standard errors adjusted for clustering at the firm-year level are reported in parentheses. ***, **, and * indicate significance at the one, five, and ten percent levels.

In column (2) we instrument firm-level exports to the US with the firm-level exposure to US tariffs. The first-stage shows that tariff exposure increases firm-level exports to the US (i.e., trade diversion). The Kleibergen-Paap F statistic rejects the null of weak correlation between the instrument and exports to the US (Stock and Yogo, 2005). Compared to column (1), instrumentation increases the magnitude of the employment and mean earnings elasticities. A one percent increase in firm-level US exports increases employment by 0.340 percent and reduces mean wages by 0.197 percent. Trade diversion therefore has a positive effect on employment and a negative effect on mean earnings.

In column (3) we regress by OLS employment and mean earnings on the firm-level exposure to US tariffs against China. Consistent with column (2), the exposure has a positive effect on employment and a negative effect on mean earnings. If we compare two exporters at the 25^{th} and 75^{th} percentiles of the firm-level exposure to US tariffs (equal to 4.3 and 23.8 percent), the coefficients of 0.194 and -0.113 indicate that employment increases by 3.9 percent $(\exp(0.194 \times (0.238 - 0.043)) - 1)$ and mean earnings decrease by 2.2 percent $(\exp(-0.113 \times (0.238 - 0.043)) - 1)$ when we move from the 25^{th} to the 75^{th} percentile. Column (4) controls for firm-level exposure to the USMCA measure. Our estimates continue to show that trade diversion increases employment and reduces mean earnings.

Columns (5) to (7) estimate equation (8) separately for three 2-digit NAICS manufacturing indus-

tries.[39] Trade diversion, and its positive effect on employment and negative effect on mean earnings, can only be observed for "Chemicals, rubber, and plastics" (NAICS 32) and "Machinery and automotive" (NAICS 33). There is no trade diversion, and no effect on employment and mean earnings, for "Food, textiles, and leather" (NAICS 31).

How does "Food, textiles, and leather" differ from the other two manufacturing industries? First, its exposure to US tariffs against China (from February 2018 onwards) is on average lower (at 5.3 percent) than for "Chemicals, rubber, and plastics" and "Machinery and automotive" (at 9.3 and 12.0 percent). Second, "Food, textiles, and leather" is more intensive in female labor (its share of female workers in 2016 is 41.9 percent against 32.4 and 32.8 percent for "Chemicals, rubber, and plastics" and "Machinery and automotive") and less skilled (its mean skills are in the fourth decile while mean skills for "Chemicals, rubber, and plastics" and "Machinery and automotive" are in the sixth decile of the mean skills distribution). Otherwise the three industries have a similar mean age (in 2016 their mean age is 37 years). In Section 3.4 we further discuss possible reasons for the differences in results within manufacturing.

Finally, as in Section 3.2.1 we visualize the effects of trade diversion by comparing the trends in employment and mean earnings between the firms exposed and non exposed to US tariffs. For both employment and mean earnings we estimate equation (5) and include firm D_i, time D_t, and $D_{\widetilde{i,t_{2019}}}$ fixed effects.

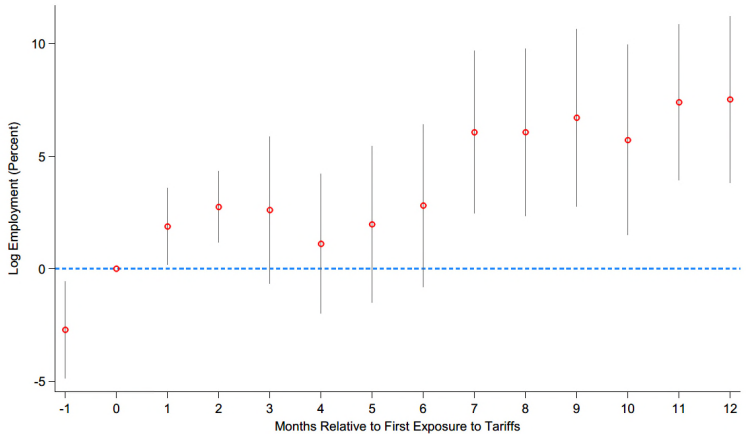

Figure 3: Coefficients on event time dummy variables for the employment of firms exposed relative to non-exposed firms. 90% confidence intervals are reported as error bars. Source: Banco de México EconLab.

Figure 3 plots the coefficients that capture the trends in exposed employment relative to non-exposed employment. In event periods 1 and 2 there is a slight increase in employment of 1.88 and 2.75 percent but the effect becomes insignificant in event periods 3 to 6. We then observe a large and

[39] We use a correspondence between the 4-digit IMSS industries and NAICS codes provided by the EconLab.

persistent increase in employment of 6.06 percent in event period 7 up to 7.52 percent in event period 12. This finding is consistent with firms increasing their workforce with a delay of about 7 months.

Figure 4 plots the coefficients for exposed relative to non-exposed mean earnings. We observe an increase in mean earnings of 1.07 percent in event period 1 up to 2.56 percent in event period 4 which then falls to 1.70 percent in event period 5. This increase reflects that firms initially raise the wages of their existing workforce, consistent with our finding that trade diversion increases the earnings of workers within job spells. It is only once firms start to significantly increase employment (around 7 months post exposure, as shown in Figure 3) that we observe a fall in firm-level mean earnings. The fall in mean earnings is large at -4.51 and -4.98 percent in event periods 11 and 12. The fall in mean earnings is consistent with firms hiring low-wage workers in response to trade diversion.

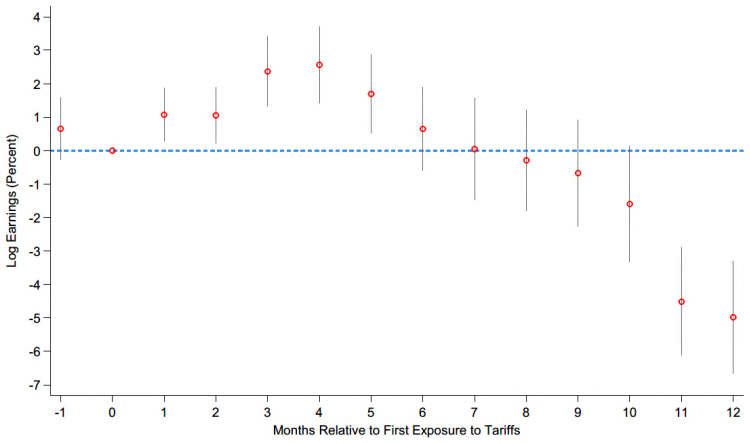

Figure 4: Coefficients on event time dummy variables for the mean earnings of firms exposed relative to non-exposed firms. 90% confidence intervals are reported as error bars. Source: Banco de México EconLab.

To conclude, trade diversion has a positive effect on employment and a negative effect on mean earnings, the effects being concentrated in "Chemicals, rubber, and plastics" and "Machinery and automotive." The increase in employment is consistent with firms increasing production in order to satisfy the surge in export demand induced by higher US tariffs. The fall in mean earnings associated with the increase in employment points towards a shift in the *composition* of the workforce towards low-wage workers: firms expand their workforce by hiring workers who receive lower earnings than current employees.[40] The next section investigates this composition effect in more detail.

3.3.2 Composition Effect

We provide evidence that the fall in firm-level mean earnings in response to trade diversion results from a *composition effect* as firms increase their workforce by predominantly hiring low-wage workers. As

[40] Firms may have increased employment by hiring part-time workers, but we are unable to investigate this possibility.

low-wage workers tend to be female, unskilled, and younger (see Table 3), we expect the employment of these workers to increase disproportionately.

Table 10: Trade Diversion and Workforce Composition

Employment $\ln l_{i,t}$	(1)	(2)	(3)	(4)	(5)
$\ln X_{i,t}^{US}$	0.667^{***}	0.538^{***}	1.055^{***}	0.761^{***}	0.833^{***}
	(0.096)	(0.080)	(0.134)	(0.101)	(0.101)
$\ln X_{i,t}^{US} \times Male$	-0.328^{***}	–	–	-0.229^{***}	–
	(0.072)			(0.063)	
$\ln X_{i,t}^{US} \times Older$	–	-0.276^{***}	–	–	-0.417^{***}
		(0.062)			(0.068)
$\ln X_{i,t}^{US} \times Skilled$	–	–	-0.763^{***}	–	–
			(0.108)		
$Male/Older/Skilled$	0.339^{***}	0.261^{***}	0.292^{***}	0.532^{***}	0.416^{***}
	(0.062)	(0.058)	(0.050)	(0.072)	(0.062)
Entrants included	Yes	Yes	No	No	No
Kleibergen-Paap	33.2^{*}	36.6^{*}	33.7^{*}	33.9^{*}	36.3^{*}
Observations	473,046	474,578	448,794	471,357	472,935

Notes: The samples vary between January 2016 and December 2019. Instrumental variables estimation where firm-level exports to the US and their interactions with dummy variables for the subsamples of male, skilled, and older workers are instrumented with the firm-level exposure to US tariffs against China and the exposure interacted with dummy variables for the subsamples of male, skilled, and older workers. Firm and time fixed effects interacted with dummy variables for the subsamples of male, skilled, and older workers are included. Time-varying fixed effects in 2019 for the firms located in the border region employing workers who earned less than 500 pesos per day in 2018 interacted with dummy variables for the subsamples of male, skilled, and older workers are also included. Robust standard errors adjusted for clustering at the firm-year level are reported in parentheses. *** and * indicate significance at the one and ten percent levels. In columns (3) to (5) the workers who entered the formal labor market after January 2018 are omitted from the samples.

In the worker-level data set, we split workers according to their gender, skills and age (i.e., with a level of skills and age above or below their sample medians). We aggregate these workers at the firm-time level and obtain the number of workers that each firm employs in each time period in each group. We stack the sub-samples together, and estimate equation (8) including interactions between firm-level US exports and dummy variables for the employment of male, skilled, and older workers.

As expected, columns (1) to (3) of Table 10 show that trade diversion disproportionately increases the employment of low-wage workers. The elasticity of employment to firm-level US exports is 0.667 for women but only 0.339 for men. It is larger for younger than for older workers (0.538 vs. 0.261), and for unskilled than for skilled workers (1.055 vs. 0.292).[41] These findings are consistent with the descriptive statistics of Table 6 showing that low-wage workers are more likely to be leavers, and with the estimates of Table 8 indicating that low-wage workers (especially unskilled and younger) are more likely to move to higher-exposure firms.

Recall that our measure of skills is estimated using data for 2016 and 2017 only (i.e., for the pre-trade war period). As a result, the regression in column (3) only includes workers who are observed in the pre-trade war period, and excludes the workers who entered the formal labor market in 2018

[41] Consistent with Table 10, in Table E7 in Appendix E we show that trade diversion increases the firm-level share of female workers, and reduces the mean skills and mean age of the firm-level workforce.

and 2019.[42] For comparative purposes, columns (4) and (5) re-estimate the regressions of columns (1) and (2) but exclude the workers who entered the formal labor market after January 2018. The results remain qualitatively similar, but in all cases the magnitude of the elasticities increases. The increase in employment resulting from trade diversion is therefore larger for the workers who were employed in the formal labor market before the start of the trade war. In other words, the increase in employment is mainly driven by the hiring of formal workers who were previously employed by other firms as opposed to the hiring of workers who were formerly unemployed or employed in the informal sector. These findings suggest that trade diversion does not necessarily increase total manufacturing employment as many new hires were simply poached from other firms in the formal sector.

Combining the results in Table 10 with the ones for worker-level and cohort-level earnings in Tables 5 and 7, we conclude that trade diversion increases the labor demand of firms exposed to higher US tariffs against China. This shift in labor demand increases firm-level employment and worker-level earnings, the effects being particularly pronounced for female, unskilled, and younger workers.

3.4 Discussion

The literature studying the effects of increased import competition on labor market outcomes of developed countries generally finds that female, unskilled, and younger workers experience a disproportionate decrease in earnings and employment (Autor et al., 2014; De Lyon and Pessoa, 2021, among others).[43] Unskilled workers are more vulnerable to import competition because they have fewer outside employment opportunities and can easily be replaced by workers from low-wage countries. Younger workers are more negatively affected because employers prefer to lay off workers with less labor market experience. Due to childcare responsibilities, women are also adversely impacted as they face discrimination in the labor market and have low bargaining power to negotiate higher earnings or job security with their employers. They also tend to be concentrated in low-skilled and labor-intensive sectors (such as textiles and clothing) typically more exposed to import competition.

Although we focus on Mexico as an emerging market economy, we find that a positive trade shock delivers symmetric results since trade diversion improves the labor market outcomes of female, unskilled, and younger workers to a larger extent. On the one hand, the disproportionate increase in labor demand for younger and unskilled workers is not surprising. Although trade diversion is concentrated in technology and skill-intensive industries ("Chemicals, rubber, and plastics" and "Machinery and automotive," see Section 3.3.1), in order to increase production the firms in these industries need to hire more production workers who are likely to be younger and unskilled as they are best suited

[42] The same applies to the results reported in column (2) of Table 5.

[43] Results for emerging markets and developing economies can be different. For instance, Bustos (2011) finds that trade liberalization induces Argentinean firms to upgrade technology and hire more skilled workers. For Brazil, Benguria and Ederington (2023) find that import competition reduces the wages of male workers relatively more.

to accomplish labor-intensive and physically demanding tasks. On the other hand, it is not clear why the (within job-spell) earnings and employment of women are more responsive to trade diversion. If men and women are imperfect substitutes in production, a positive trade shock raising the demand for tasks accomplished by female workers should increase their employment and earnings. Employment and earnings should therefore increase to a larger extent in female intensive industries. This is not what we find in Section 3.3.1 where we show that the increase in employment resulting from trade diversion occurs in male intensive sectors.

One mechanism that could explain why women benefit from trade diversion more than men is provided by Juhn et al. (2014). They argue that a positive trade shock, especially over the long run, can induce firms to adopt new technologies (e.g., computerized production processes) that complement unskilled female labor by reducing the need for physically demanding skills. As a result, women become more productive in low-skilled jobs, and their relative wages and employment increase. The prediction of Juhn et al. (2014) is consistent with our findings as trade diversion disproportionately increases the (within job-spell) earnings and employment of unskilled women.[44] An alternative mechanism that can operate in the short run is that trade increases the level of competition faced by domestic firms, reducing their ability to discriminate against women (Black and Brainerd, 2004).[45] Higher US tariffs against China presumably increase competition among Mexican firms (as they compete with each other to increase exports to the US), especially in male intensive industries which are more exposed to the increase in US tariffs (see Section 3.3.1). As a result, these firms may discriminate less against women, resulting in improved labor market outcomes for female workers.[46]

3.5 Robustness

Appendices D and E report a battery of robustness checks for the estimates reported in column (2) of Table 4 for worker-level earnings within job spells, and in column (2) of Table 9 for firm-level employment and mean earnings. In summary, we omit the observations for which multiple jobs are aggregated into a single job, for workers with multiple jobs we only retain the highest earnings they receive in each month, and we restrict the samples to permanently insured workers. To control for the change in the minimum wage in the border region, at the worker level we include time-varying fixed effects in 2019 for the workers who earned less than the new minimum wage in 2018. We omit from the sample in 2019 the workers in the border region who earned less than the new minimum wage or less than 500 pesos per day in 2018 (at the firm level, we include time-varying fixed effects in 2019

[44] Trade diversion increases the within job-spell earnings of unskilled women only (Table D8 in Appendix D). If we estimate column (3) of Table 10 for females, the employment of unskilled women increases disproportionately.

[45] Firms discriminating against women hire a larger number of men who are equally skilled but more highly paid than women. Discrimination is therefore costly, and an increase in competition induces employers to reduce discrimination in order to remain competitive in the market.

[46] In Mexico, the gender wage gap, measured as the difference between median wages of men and women relative to the median wages of men, fell from 16.5 percent in 2016 to 12.5 percent in 2021 (OECD Distribution of Earnings Database).

for – or omit from the sample in 2019 – the firms in the border region employing workers who earned less than the new minimum wage or less than 500 pesos per day in 2018). We also omit in 2019 the firms located in the border region.

We restrict the samples to larger firms for which the under-reporting of wages is minimal. In measuring the firm-level exposure to US tariffs, we consider the tariff increases in December 2019 relative to the pre-trade war period, or we omit the tariffs that were not raised against China only. We instrument firm-level exports to the US with the contemporaneous value and two lags of the firm-level exposure to US tariffs. We include the zero observations for firm-level exports to the US in the samples, consider firm-level total exports as opposed to exports to the US, and we cluster standard errors by firm or by industry-year. We perform falsification exercises by regressing in 2016 and 2017 worker-level earnings, firm-level employment and mean earnings on firm-level exports to the US instrumented with the firm-level exposure to US tariffs in 2018 and 2019. Consistent with the findings of Utar et al. (2025), we show that the increase in earnings resulting from trade diversion is only observed for firms participating in Mexico's export platform or IMMEX (*Industria Manufacturera, Maquiladora y de Servicios de Exportación*) program. Finally, as profit sharing is mandatory in Mexico and requires firms to share 10 percent of their profits with employees, firms have an incentive to outsource workers to keep employment low and avoid sharing profits. We account for the firms providing and using outsourcing services (which are required to register with REPSE, the *Registro de Prestadores de Servicios Especializados u Obras Especializadas*), but our results remain robust.

As our instrument, the firm-level exposure to US tariffs against China, has a shift-share design, we implement in Appendix F a number of diagnostic tests in order to validate our identification strategy. These tests are applied to the firm-level sample we use to estimate the effects of trade diversion on firm-level employment and mean earnings. First, we implement falsification tests and fail to reject imbalance between the tariff shocks and initial firm-level characteristics. Second, as recommended by Borusyak et al. (2022), we estimate the shock-level (i.e., HS6-time) equivalent of equation (8), which addresses the concern raised by Adão, Kolesár, and Morales (2019) that the residuals of the firm-level regressions may be correlated across firms with similar export shares, resulting in downward-biased standard errors. Our results also remain similar if we cluster standard errors across firms with similar export shares. As Goldsmith-Pinkham, Sorkin, and Swift (2020) argue that our estimates may be affected by endogeneity or pre-trends in specific sectors, we also provide evidence that our results continue to hold if we re-compute firm-level exports to the US and the firm-level exposure to US tariffs leaving out one HS2 product category at a time.

4 Concluding Remarks

We investigate the effects of the US-China trade war on Mexico's international trade and labor market outcomes. In a first step, using data on Mexico's firm-level bilateral exports at the 8-digit level, we provide evidence of trade diversion from China to Mexico resulting from changes in US tariffs against China. In a second step, we explore the consequences of trade diversion for labor market outcomes of Mexican workers. We find that trade diversion has a positive effect on earnings within job spells, especially for female, unskilled, and younger workers. To address the sample selection that arises if only focusing on workers within job spells, we then account for changes in earnings associated with leaving from the firm. We find that the overall effects of trade diversion (including earnings and displacement) on earnings are large and persistent, especially for male, unskilled, and younger workers. At the firm level, trade diversion has a positive effect on employment but a negative effect on mean earnings. The fall in mean earnings results from a composition effect as firms disproportionately increase employment of low-wage workers. We conclude that trade diversion increases the labor demand of firms exposed to higher US tariffs against China, resulting in higher firm-level employment and higher worker-level earnings.

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A Exogeneity of US Tariffs against China

In 2018, the US administration decided to raise tariffs against China in "response to China's unfair trade practices related to the forced transfer of American technology and intellectual property." These transfers were part of "China's stated intention of seizing economic dominance in certain advanced technology sectors as set forth in its industrial plans, such as *Made in China 2025*" (USTR, 2018).

In deciding on the products to be hit by higher tariffs, the Office of the United States Trade Representative (USTR) aimed "to inflict as little pain as possible on American consumers, and as much as possible on Chinese exporters" (The Economist, 2018). It targeted "imports from industrial sectors that contribute to or benefit from the *Made in China 2025* industrial policy," and excluded "goods commonly purchased by American consumers such as cellular telephones or televisions" (USTR, 2018). The USTR also ensured that alternative suppliers were available for US importers.

We argue that US tariffs against China are exogenous to Mexico's exports to the US. But when deciding on the list of products to be hit by higher tariffs, has the US administration considered replacing imports from China with imports from Mexico? If that is the case, our assumption of exogeneity would fail. In what follows, we propose several arguments, supported by anectodal evidence, suggesting that the US did not specifically plan to replace Chinese imports with Mexican imports.

US trade deficit with Mexico The large trade deficit of the US, not only with China but also with Mexico, has always been a major concern for President Trump. As a result, his administration made reducing the trade deficit with Mexico a priority in its renegotiation of NAFTA, which was replaced by the USMCA in 2020.[47] It is therefore unlikely that President Trump's goal was to replace Chinese imports with Mexican imports as it would have worsened the US-Mexico bilateral trade deficit.

Mexico is a "surprise winner" of the trade war According to anecdotal evidence, Mexico is a "surprise winner" (Longo, 2022) of the trade war, supporting the view that the imposition of US tariffs against China was not intended to benefit Mexico in particular. According to Karabell (2019), "the winners" of the trade war are "other countries, including one very prominent country that borders the US and that Trump has denounced for what he has said are its unfair trade deals with the United States under NAFTA." The trade war has "an unexpected beneficiary [...] that Trump is surely less excited to talk about. In an ironic twist, Trump's tariffs might make Mexico great again."

Mexico fights for a "slice of the pie" As noted above, in deciding on the products to be hit by higher tariffs, the US tried to ensure that importers would be able to find alternative suppliers. As a matter of fact, China only accounted for 8% of total US imports in the products that were targeted

[47] In 2019, the US threatened to impose tariffs on all imports from Mexico. The lifting of steel and aluminum tariffs against Mexico was also "under the condition that Mexico restrain export surges" to the US (The Economist, 2024).

by the first wave of US tariffs (The Economist, 2018). This means that the US could easily replace imports from China with imports from other countries than China.

In supplying the US market, Mexico was therefore in direct competition with other countries than China. As explained by Cota and Vidal (2024), Mexico "is competing at a global level [...] with other economies in Asia such as Vietnam, the Philippines, Singapore, [...] and with India." It is therefore unlikely that Mexico is "going to supplant all those imports from China," and it needs to fight for a "slice of the pie." Mexican firms have indeed been pro-active in order to increase exports to the US. As reported by the director of a Mexican company, we "have some opportunities there" and "we're trying to get the extra business" (Webber, 2019). Cota and Vidal (2024) report that some Mexican firms even organized "business tours" in order to promote their activities in the US.

To conclude, in deciding on the products to be hit by higher tariffs, we believe that the US administration did not specifically target Mexico as an alternative source for imports. First, replacing Chinese imports with Mexican imports is inconsistent with the objective of reducing the US bilateral trade deficit with Mexico. Second, the success of Mexico in increasing exports to the US has been described as a surprising and unintended outcome of the trade war. Third, as Mexico faces competition from other countries in supplying the US market, Mexican firms had to be pro-active in order to seize the opportunity of increasing exports to the US.

Finally, recall that even the literature studying the effects of US tariffs on the trade flows of the US (and China) assumes that these tariffs are exogenous. The first wave of US tariffs against China was largely unanticipated (Amiti et al., 2019), and although the subsequent waves might have been to a larger extent expected, Fajgelbaum et al. (2020) find little evidence of pre-trends in the affected industries. We therefore believe it is reasonable to assume that US tariffs against China are exogenous to Mexico's exports to the US.

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B Trade Diversion

This appendix provides additional results to corroborate our finding that higher US tariffs against China induce trade diversion from China to Mexico. First, we test for pre-trends and show that Mexico's exports in product categories targeted by changes in US tariffs were not on differential trends before the trade war. Second, we present robustness checks for the estimates reported in column (2) of Table 2.

Pre-Trends For the elasticities estimated in Section 2.4 to be identified, we need to ensure that changes in US tariffs against China are uncorrelated with Mexico's export supply shocks. We test for pre-trends and regress mean exports by firm-product-destination before the trade war on the 6-digit HS-level US tariff increases against China during the trade war. Specifically, we regress mean exports in 2016 and 2017 against the increases in US tariffs against China in 2018 and 2019 (relative to the pre-war period) interacted with a dummy variable for exports to the US (Fajgelbaum et al., 2020):[48]

$$\overline{\ln X_{ijk,16-17}} = \beta_1 \Delta\tau^{US-Ch}_{K,18-19} \times D_{US} + \beta_2 \Delta\tau^{US-Mx}_{US,K,18-19} + D_{ij} + D_k + \mu_{ijk}, \tag{B1}$$

and we include firm-country D_{ij} and product D_k fixed effects. Exports to the US are also regressed on the 2018 and 2019 changes in 6-digit HS-level US tariffs against Mexico, $\Delta\tau^{US-Mx}_{US,K,18-19}$. Robust standard errors are clustered at the 6-digit HS level.

Table B1: Pre-Trends

Exports $\overline{\ln X_{ijk,16-17}}$	(1)	(2)
$\Delta\tau^{US-Ch}_{K,18-19} \times D_{US}$	−0.431	–
	(0.403)	
$\Delta\tau^{US-Ch}_{K,18} \times D_{US}$	–	−0.068
		(0.321)
R-squared	0.468	0.468
Observations	754,219	754,219

Notes: Mean exports by firm-product-destination in 2016–2017 are regressed on the 2018–2019 changes in 6-digit HS-level US tariffs against China $\Delta\tau^{US-Ch}_{K,18-19}$ in column (1), and on the 2018 changes in 6-digit HS-level US tariffs against China $\Delta\tau^{US-Ch}_{K,18}$ in column (2). Mexico's exports to the US are also regressed on the 2018–2019 or 2018 changes in 6-digit HS-level US tariffs against Mexico (not reported). D_{US} is a dummy variable equal to one for exports to the US. Firm-country D_{ij} and product D_k fixed effects are included. Robust standard errors adjusted for clustering at the 6-digit HS level are reported in parentheses.

Column (1) of Table B1 shows the results. The estimated coefficient on changes in tariffs in 2018 and 2019 is insignificant, suggesting that Mexico's exports in product categories targeted by changes in US tariffs against China were not on differential trends before the start of the trade war. Column (2) only considers the changes in tariffs in 2018, and the estimated coefficient remains insignificant.

[48] For each product we use the largest tariff increase in 2018–2019 as the tariffs on some products were increased more than once in different waves.

Robustness In column (1) of Table B2 we regress exports on the contemporaneous value and two lags of changes in US tariffs against China (interacted with a dummy variable for exports to the US). The coefficient reported in column (1) is therefore a cumulative estimate (over three months). In column (2) we regress exports on the tariff changes enacted by the US against China between July 2018 and September 2019, and we therefore exclude the tariff changes of February and March 2018 that were not raised against China only. Finally, in column (3) we measure the change in tariffs in December 2019 relative to the pre-trade war period.

Table B2: Tariffs

Exports $\ln X_{ijk,t}$	(1)	(2)	(3)
$\Delta\tau_{K,t}^{US-Ch} \times D_{US}$	0.213^{***} (0.053)	0.126^{***} (0.039)	0.094^{***} (0.035)
Tariff changes starting in	2018m2	2018m7	2018m2
Tariff changes	By wave	By wave	2019m12
Lagged tariffs	Yes	No	No
R-squared	0.890	0.853	0.853
Observations	2,958,666	6,249,720	6,249,720

Notes: The samples vary between January 2016 and December 2019. $\Delta\tau_{K,t}^{US-Ch}$ is the change in 6-digit HS-level US tariffs against China. Mexico's exports to the US are also regressed on changes in 6-digit HS-level US tariffs against Mexico (not reported). D_{US} is a dummy variable equal to one for exports to the US. Firm-country-product D_{ijk}, firm-time $D_{i,t}$, country-time $D_{j,t}$, and product-time $D_{k,t}$ fixed effects are included. Robust standard errors adjusted for clustering at the 6-digit HS-time level are reported in parentheses. In column (1), the estimate is a cumulative effect (over three months). *** indicates significance at the one percent level.

Column (1) of Table B3 includes manufacturing and non-manufacturing industries. In column (2) we aggregate products at the 6-digit HS level. In that case, the regression controls for firm-country-HS6, firm-time, country-time, and HS6-time fixed effects.

Table B3: Different Samples

Exports $\ln X_{ijk,t}$	(1)	(2)
$\Delta\tau_{K,t}^{US-Ch} \times D_{US}$	0.107^{***} (0.038)	0.103^{***} (0.039)
Sample	All industries	HS6
R-squared	0.857	0.851
Observations	6,548,684	5,597,890

Notes: The samples vary between January 2016 and December 2019. $\Delta\tau_{K,t}^{US-Ch}$ is the change in 6-digit HS-level US tariffs against China. Mexico's exports to the US are also regressed on changes in 6-digit HS-level US tariffs against Mexico (not reported). D_{US} is a dummy variable equal to one for exports to the US. Firm-country-product D_{ijk}, firm-time $D_{i,t}$, country-time $D_{j,t}$, and product-time $D_{k,t}$ fixed effects are included. In column (2), the firm-country-product and product-time fixed effects are replaced with firm-country-HS6 and HS6-time fixed effects. Robust standard errors adjusted for clustering at the 6-digit HS-time level are reported in parentheses. *** indicates significance at the one percent level.

C Estimation of Skills

Using longitudinal employer-employee data for Germany, Card et al. (2013) disentangle the components of wage variation attributable to worker-specific and employer-specific heterogeneity. Following Abowd et al. (1999), they regress wages on additive worker and firm fixed effects, and they interpret the estimated worker fixed effects as a combination of individual skills and other time-invariant factors which are rewarded equally across employers, while the estimated firm fixed effects represent the earning premia paid by firms to all of their workers. We follow their two-step estimation procedure and rely on the estimated worker fixed effects as our measure of skills.

In a first step, we estimate:

$$\ln w_{hi,t} = D_h + D_{i,t} + \gamma z_{h,t} + \eta_{hi,t}, \tag{C1}$$

where $w_{hi,t}$ represents the daily earnings of worker h employed by firm i in month t, D_h is a worker fixed effect, $D_{i,t}$ is a fixed effect for the firm employing worker h in time t, and $z_{h,t}$ are time-varying observable characteristics. To capture the effects of life cycle and aggregate factors that affect a worker's wage at all jobs, Card et al. (2013) include time fixed effects in $z_{h,t}$ as well as quadratic and cubic terms in recentered age (age-40) interacted with educational attainments. As we do not observe education levels, we follow Frías et al. (2024) and control for time fixed effects, the square and cube of recentered age, and the square of tenure (in the formal labor market, defined as the difference between the year of data collection and the year of first registration with IMSS). We estimate equation (C1) separately for male and for female workers, and restrict our sample between January 2016 and December 2017 (i.e., the pre-trade war period). For the firm fixed effects to be identified, equation (C1) needs to be estimated on a sample of workers who change employers over the sample period. We rely on the sample of movers who switched employers between January 2016 and December 2017.

In a second step, for the workers who remained employed by the same firm between January 2016 and December 2017, we recover their estimated worker fixed effects as follows:

$$\widehat{D}_h = \frac{1}{T_h} \sum_t \left(\ln w_{hi,t} - \widehat{D}_{i,t} - \widehat{\gamma} z_{h,t} \right), \tag{C2}$$

where $\widehat{D}_{i,t}$ and $\widehat{\gamma}$ are estimated from the sample of movers in the first step, and T_h is the number of time periods worker h is observed between January 2016 and December 2017. We then assign to each worker (movers and stayers) between January 2016 and December 2019 a constant level of skills which is given by their individual fixed effect estimated between January 2016 and December 2017. Of the 5,755,737 workers included in our sample (see Table 3), the worker fixed effects are obtained for 4,506,835 workers, of whom 1,244,536 are movers and 3,262,299 are stayers between January 2016 and December 2017.

D Worker-Level Earnings within Job Spells

This appendix provides robustness checks for the estimates reported in column (2) of Table 4. It also estimates the regressions reported in Table 5 separately by gender.

Earnings and Workers In column (1) of Table D1 we estimate equation (2) but we omit from the sample observations for which multiple jobs are aggregated into a single job. In column (2), instead of adding the earnings received from multiple jobs, for each worker with more than one job we retain the highest earnings they receive in each time period. Finally, in column (3) we restrict the sample to the workers who are permanently insured by their employers.[49] Compared to the results in column (2) of Table 4, the estimated coefficients on firm-level exports to the US remain broadly unchanged, showing that trade diversion has a positive effect on earnings within job spells.

Table D1: Earnings and Workers

Earnings $\ln w_{hi,t}$	(1)	(2)	(3)
$\ln X_{i,t}^{US}$	0.164^{***}	0.163^{***}	0.164^{***}
	(0.054)	(0.054)	(0.057)
Sample	Single jobs	Highest earnings	Permanent workers
First-stage $E_{i,t}^{US-Ch}$	0.433^{***}	0.433^{***}	0.408^{***}
	(0.115)	(0.115)	(0.103)
Kleibergen-Paap	14.1	14.2	15.7
Observations	110,705,238	111,225,254	89,747,405

Notes: The samples vary between January 2016 and December 2019. Instrumental variables estimation where firm-level exports to the US are instrumented with the firm-level exposure to US tariffs against China. Worker-firm and time fixed effects are included. Time-varying fixed effects in 2019 for the workers employed by firms located in the border region and who earned less than 500 pesos per day in 2018 are also included. Robust standard errors adjusted for clustering at the firm-year level are reported in parentheses. *** indicates significance at the one percent level.

Change in the Minimum Wage To control for the heterogeneous effects of the change in the minimum wage in the border region in January 2019, in our main analysis we include time-varying fixed effects $D_{\widetilde{hi},t_{2019}}$ in 2019 for the workers employed in the border region who earned less than 500 pesos per day in 2018. In Table D2 we check the robustness of our approach in several ways.

First, in column (1) we include the same time-varying fixed effects $D_{\widetilde{hi},t_{2019}}$ but for the workers in the border region who received less than the new minimum wage of 176.72 pesos per day in 2018 (as opposed to 500 pesos per day). Second, in columns (2) and (3), we simply exclude from the sample in 2019 the workers employed in the border region who earned less than 500 or 176.72 pesos per day in 2018. Finally, in column (4) we remove from the sample in 2019 all the firms located in the border region. In all cases, our results continue to hold.

[49] If not permanently insured, workers can be temporarily insured, self-employed, freelance, rural casual laborers, etc. Permanently insured workers have more job security than non-permanently insured workers.

Table D2: Change in the Minimum Wage

Earnings $\ln w_{hi,t}$	(1)	(2)	(3)	(4)
$\ln X_{i,t}^{US}$	0.131^{***} (0.047)	0.151^{***} (0.054)	0.150^{***} (0.049)	0.154^{***} (0.056)
Daily wage threshold	176.72 pesos	500 pesos	176.72 pesos	None
Control for minimum wage in 2019	Fixed effects	Excl. workers	Excl. workers	Excl. border firms
First-stage $E_{i,t}^{US-Ch}$	0.437^{***} (0.114)	0.445^{***} (0.135)	0.442^{***} (0.118)	0.456^{***} (0.141)
Kleibergen-Paap	14.8	10.9	13.9	10.4
Observations	111,225,254	101,947,317	107,409,030	99,474,578

Notes: The samples vary between January 2016 and December 2019. Instrumental variables estimation where firm-level exports to the US are instrumented with the firm-level exposure to US tariffs against China. Worker-firm and time fixed effects are included. Robust standard errors adjusted for clustering at the firm-year level are reported in parentheses. *** indicates significance at the one percent level.

Firm Size Kumler et al. (2020) find that prior to the 1997 Mexican pension reform the under-reporting of wages was more pronounced for smaller firms. We classify firms as small if they employ fewer than five employees, as medium sized if they employ 5–50 employees, and as large if they have more than 50 employees. We then estimate equation (2) separately for the three groups of firms. Table D3 shows that our results continue to hold once we restrict the sample to large firms for which the under-reporting of wages is less severe (they are insignificant for small and medium-sized firms).

Table D3: Firm Size

Earnings $\ln w_{hi,t}$	(1)	(2)	(3)
$\ln X_{i,t}^{US}$	-0.727 (1.278)	0.156 (0.190)	0.159^{***} (0.054)
Firm size	Small	Medium	Large
First-stage $E_{i,t}^{US-Ch}$	0.292 (0.507)	0.149 (0.134)	0.435^{***} (0.117)
Kleibergen-Paap	0.3	1.2	13.8
Observations	25,941	1,570,377	109,608,973

Notes: The samples vary between January 2016 and December 2019. Instrumental variables estimation where firm-level exports to the US are instrumented with the firm-level exposure to US tariffs against China. Worker-firm and time fixed effects are included. Time-varying fixed effects in 2019 for the workers employed by firms located in the border region and who earned less than 500 pesos per day in 2018 are also included. Robust standard errors adjusted for clustering at the firm-year level are reported in parentheses. *** indicates significance at the one percent level.

Tariffs In Table D4 we measure the firm-level exposure to US tariffs against China in different ways. In column (1), we only consider tariffs that the US raised exclusively against China. This means we exclude the tariff changes enacted by the US in February and March 2018 (on solar panels, washing machines, steel, and aluminum) from the exposure measure. In column (2), instead of allowing the tariffs on some products to be raised more than once in several waves, we measure the change in tariffs as the tariff increase in December 2019 relative to the period before the tariffs were first raised.

Specifications We perform a falsification exercise to ensure that changes in US tariffs do not correlate with earnings in the pre-trade war period. We regress earnings on firm-level exports to the US in

Table D4: Tariffs

Earnings $\ln w_{hi,t}$	(1)	(2)
$\ln X_{i,t}^{US}$	0.185^{***}	0.367^{**}
	(0.061)	(0.161)
First month of tariff increases	2018m7	2018m2
Tariff changes	By wave	2019m12
First-stage $E_{i,t}^{US-Ch}$	0.455^{***}	0.193^{**}
	(0.137)	(0.085)
Kleibergen-Paap	11.1	5.2
Observations	111,225,254	111,225,254

Notes: The samples vary between January 2016 and December 2019. Instrumental variables estimation where firm-level exports to the US are instrumented with the firm-level exposure to US tariffs against China. Worker-firm and time fixed effects are included. Time-varying fixed effects in 2019 for the workers employed by firms located in the border region and who earned less than 500 pesos per day in 2018 are also included. Robust standard errors adjusted for clustering at the firm-year level are reported in parentheses. *** and ** indicate significance at the one and five percent levels.

2016 and 2017 and we instrument the latter with the firm-level exposure to US tariffs against China in 2018 and 2019. In column (1) of Table D5 all coefficients are insignificant. There is no evidence of trade diversion (in the first stage) nor of trade diversion impacting earnings (in the second stage).

Table D5: Specifications

Earnings $\ln w_{hi,t}$	(1)	(2)	(3)	(4)
$\ln X_{i,t}^{US}$	0.413	0.139^{***}	0.162^{**}	0.162^{**}
	(1.00)	(0.049)	(0.066)	(0.063)
Sample	Placebo	Full	Full	Full
Lagged exposure	No	Yes	No	No
Clustering firm	No	No	Yes	No
Clustering industry-year	No	No	No	Yes
First-stage $E_{i,t}^{US-Ch}$	0.045	0.452^{***}	0.433^{***}	0.433^{***}
	(0.112)	(0.111)	(0.140)	(0.110)
Kleibergen-Paap	0.2	6.2	9.6	15.6
Observations	87,857,756	94,058,674	111,225,254	111,225,254

Notes: The samples vary between January 2016 and December 2019. Instrumental variables estimation where firm-level exports to the US are instrumented with the firm-level exposure to US tariffs against China. Worker-firm and time fixed effects are included. Time-varying fixed effects in 2019 for the workers employed by firms located in the border region and who earned less than 500 pesos per day in 2018 are also included. Robust standard errors adjusted for clustering at the firm-year level in columns (1) and (2), at the firm level in column (3), and at the industry-year level in column (4) are reported in parentheses. In column (2), the first-stage estimate is a cumulative effect (over three months). *** and ** indicate significance at the one and five percent levels.

In column (2) we instrument exports to the US with the contemporaneous value and two lags of the firm-level exposure to US tariffs against China. The first-stage estimate is therefore a cumulative effect over three months. In columns (3) and (4) we cluster standard errors by firm and by industry-year.

Exports In Table D6 we use different variables for exports. In column (1) we allow for extensive margin adjustments and replace exports to the US with a value of zero when firms report positive exports to non-US destinations. We regress earnings on the inverse hyperbolic sine transformation of firm-level exports to the US. Our results continue to hold but the coefficient on firm-level exports to

the US is slightly smaller than the benchmark estimate reported in column (2) of Table 4.

Table D6: Exports

Earnings $\ln w_{hi,t}$	(1)	(2)
$\text{asinh}\, X_{i,t}^{US}$	0.121^{***}	–
	(0.035)	
$\ln X_{i,t}$	–	0.280^{***}
		(0.105)
Zero trade	Yes	No
First-stage $E_{i,t}^{US-Ch}$	0.653^{***}	0.282^{***}
	(0.155)	(0.097)
Kleibergen-Paap	17.8^{*}	8.5
Observations	118,015,012	118,015,012

Notes: The samples vary between January 2016 and December 2019. Instrumental variables estimation where firm-level exports to the US in column (1), and firm-level total exports in column (2), are instrumented with the firm-level exposure to US tariffs against China. Worker-firm and time fixed effects are included. Time-varying fixed effects in 2019 for the workers employed by firms located in the border region and who earned less than 500 pesos per day in 2018 are also included. Robust standard errors adjusted for clustering at the firm-year level are reported in parentheses. *** and * indicate significance at the one and ten percent levels.

In column (2) we regress earnings on firm-level total exports (as opposed to firm-level exports to the US). This allows us to capture that higher US tariffs against China may also affect firm-level exports to non-US destinations (Fajgelbaum et al., 2024). The estimated coefficient on firm-level total exports is positive and significant, and is larger in magnitude compared to the one on firm-level exports to the US reported in column (2) of Table 4.

IMMEX Firms According to Utar et al. (2025), the increase in US tariffs against China only had a positive effect on exports of firms participating in Mexico's export platform or IMMEX (*Industria Manufacturera, Maquiladora y de Servicios de Exportación*) program. The increase in earnings resulting from trade diversion should therefore only be observed for these firms. To check this hypothesis, we collected the list of IMMEX firms, together with their unique tax identifiers and the year when they first registered with the program.[50] Out of the 8,613 firms included in our sample, we identify 3,194 firms that were registered with the IMMEX program in 2017 (i.e., before the start of the trade war). These firms are large exporters (many are foreign multinationals, Utar et al., 2025) and in 2017 they represented 96.7 percent of total Mexican exports in our sample.

Columns (1) and (2) of Table D7 report the results of estimating equation (2) separately for the firms registered or not registered with the IMMEX program in 2017. Trade diversion, and its positive effect on earnings, is only observed for the IMMEX firms. This finding is consistent with the results in Table D3 showing that only the large exporters raise earnings in response to trade diversion.

[50] The website of the Mexican Ministry of Economy provides the names of firms participating in the IMMEX program, their tax identifier, and the year when they first registered with the program. The list is updated on a monthly basis and available at https://www.snice.gob.mx/cs/avi/snice/transparencia.programasfomento.html.

Table D7: IMMEX Firms

Earnings $\ln w_{hi,t}$	(1)	(2)
$\ln X_{i,t}^{US}$	0.142^{**}	0.122
	(0.060)	(0.082)
Firms included	IMMEX	Non IMMEX
First-stage $E_{i,t}^{US-Ch}$	0.394^{***}	0.779^{*}
	(0.114)	(0.474)
Kleibergen-Paap	12.0	2.7
Observations	91,696,269	19,528,985

Notes: The samples vary between January 2016 and December 2019. Instrumental variables estimation where firm-level exports to the US are instrumented with the firm-level exposure to US tariffs against China. Worker-firm and time fixed effects are included. Time-varying fixed effects in 2019 for the workers employed by firms located in the border region and who earned less than 500 pesos per day in 2018 are also included. Robust standard errors adjusted for clustering at the firm-year level are reported in parentheses. ***, **, and * indicate significance at the one, five, and ten percent levels.

Worker Heterogeneity by Gender In Table D8 we estimate the regressions reported in columns (2) and (3) of Table 5 separately by gender. For both genders, the interactions between firm-level US exports and initial skills and age are negative. Unskilled and younger workers therefore experience a larger increase in earnings irrespective of their gender. Notice that the earnings of older men fall in response to trade diversion (column 4).

Table D8: Worker Heterogeneity by Gender

Earnings $\ln w_{hi,t}$	(1)	(2)	(3)	(4)
	Female	Male	Female	Male
$\ln X_{i,t}^{US}$	0.403	0.215^{***}	0.269	0.162^{***}
	(0.281)	(0.069)	(0.194)	(0.052)
$\ln X_{i,t}^{US} \times Skills_{16-17}$	-0.550^{***}	-0.548^{***}	–	–
	(0.101)	(0.070)		
$\ln X_{i,t}^{US} \times \ln Age_{16-17}$	–	–	-0.970^{***}	-1.331^{***}
			(0.132)	(0.167)
25^{th} percentile	0.615^{**}	0.568^{***}	0.500^{***}	0.510^{***}
	(0.311)	(0.094)	(0.194)	(0.080)
75^{th} percentile	0.277	-0.053	0.035	-0.181^{***}
	(0.264)	(0.066)	(0.200)	(0.053)
Kleibergen-Paap	1.8	8.3	1.6	8.1
Observations	39,743,902	62,731,890	39,080,766	61,352,434

Notes: The samples vary between January 2016 and December 2019. Instrumental variables estimation where firm-level exports to the US and their interactions with worker-level characteristics are instrumented with the firm-level exposure to US tariffs against China and the exposure interacted with worker-level characteristics. Worker-firm and time fixed effects are included. Time-varying fixed effects in 2019 for the workers employed by firms located in the border region and who earned less than 500 pesos per day in 2018 are also included. Robust standard errors adjusted for clustering at the firm-year level are reported in parentheses. *** and ** indicate significance at the one and five percent levels. The worker-level characteristics used in the interaction terms are demeaned.

E Firm-Level Employment and Mean Earnings

In this appendix we provide robustness checks for the firm-level employment and mean earnings regressions presented in column (2) of Table 9. We also provide additional results showing how the workforce composition of firms changes in response to trade diversion. We estimate equation (8) but as dependent variables we use the firm-level share of female workers, and the mean skills and mean age of workers at the firm level in each month.

Earnings and Workers We check the robustness of our findings to the measurement of earnings and to the inclusion of different types of workers in the sample. In column (1) of Table E1 we measure employment and mean earnings excluding workers with multiple jobs. Column (2) reports the results of regressing mean earnings using the highest earnings received by workers with multiple jobs. Finally, in column (3) we restrict the sample to permanently insured workers. In all columns, our results continue to hold.

Table E1: Earnings and Workers

	(1)	(2)	(3)
Employment $\ln l_{i,t}$			
$\ln X_{i,t}^{US}$	0.340^{***} (0.063)	–	0.260^{***} (0.063)
Mean earnings $\ln w_{i,t}$			
$\ln X_{i,t}^{US}$	-0.198^{***} (0.033)	-0.196^{***} (0.033)	-0.201^{***} (0.034)
Sample	Single jobs	Highest earnings	Permanent workers
First-stage $E_{i,t}^{US-Ch}$	0.573^{***} (0.067)	0.571^{***} (0.067)	0.571^{***} (0.067)
Kleibergen-Paap	73.1^{*}	72.8^{*}	72.6^{*}
Observations	240,670	240,798	240,035

Notes: The samples vary between January 2016 and December 2019. Instrumental variables estimation where firm-level exports to the US are instrumented with the firm-level exposure to US tariffs against China. Firm and time fixed effects are included. Time-varying fixed effects in 2019 for the firms located in the border region employing workers who earned less than 500 pesos per day in 2018 are also included. Robust standard errors adjusted for clustering at the firm-year level are reported in parentheses. *** and * indicate significance at the one and ten percent levels.

Change in the Minimum Wage To control for the heterogeneous effects of the change in the minimum wage in the border region in January 2019, in column (1) of Table E2 we include time-varying fixed effects in 2019 for firms located in the border region employing workers who earned less than 176.72 pesos per day in 2018. In columns (2) and (3), we exclude from the sample in 2019 firms in the border region employing workers who earned less than 500 or 176.72 pesos per day in 2018, respectively. In column (4) we remove from the sample in 2019 all firms located in the border region. Our results remain robust.

Firm Size We estimate equation (8) separately for firms of different sizes (firms are small if they employ fewer than five employees, medium sized if they employ 5–50 employees, and large if they

Table E2: Change in the Minimum Wage

	(1)	(2)	(3)	(4)
Employment $\ln l_{i,t}$				
$\ln X_{i,t}^{US}$	0.339^{***} (0.063)	0.304^{***} (0.060)	0.307^{***} (0.061)	0.302^{***} (0.060)
Mean earnings $\ln w_{i,t}$				
$\ln X_{i,t}^{US}$	-0.196^{***} (0.033)	-0.145^{***} (0.027)	-0.143^{***} (0.027)	-0.144^{***} (0.027)
Daily wage threshold	176.72 pesos	500 pesos	176.72 pesos	None
Control for minimum wage in 2019	Fixed effects	Excl. workers	Excl. workers	Excl. border firms
First-stage $E_{i,t}^{US-Ch}$	0.571^{***} (0.067)	0.664^{***} (0.076)	0.652^{***} (0.076)	0.657^{***} (0.076)
Kleibergen-Paap	72.7^{*}	76.8^{*}	74.6^{*}	75.5^{*}
Observations	240,798	221,200	221,655	221,166

Notes: The samples vary between January 2016 and December 2019. Instrumental variables estimation where firm-level exports to the US are instrumented with the firm-level exposure to US tariffs against China. Firm and time fixed effects are included. Robust standard errors adjusted for clustering at the firm-year level are reported in parentheses. *** and * indicate significance at the one and ten percent levels.

have more than 50 employees). Table E3 shows that our results continue to hold once we restrict the sample to large firms for which the under-reporting of wages is likely less severe. Instead, the estimates are insignificant for small and medium-sized firms.

Table E3: Firm Size

	(1)	(2)	(3)
Employment $\ln l_{i,t}$			
$\ln X_{i,t}^{US}$	0.081 (0.236)	0.065 (0.230)	0.341^{***} (0.053)
Mean earnings $\ln w_{i,t}$			
$\ln X_{i,t}^{US}$	-0.386 (0.424)	-0.367 (0.278)	-0.161^{***} (0.027)
Firm size	Small	Medium	Large
First-stage $E_{i,t}^{US-Ch}$	0.468 (0.452)	0.208 (0.128)	0.621^{***} (0.079)
Kleibergen-Paap	1.1	2.6	62.2^{*}
Observations	8,907	67,363	164,135

Notes: The samples vary between January 2016 and December 2019. Instrumental variables estimation where firm-level exports to the US are instrumented with the firm-level exposure to US tariffs against China. Firm and time fixed effects are included. Time-varying fixed effects in 2019 for the firms located in the border region employing workers who earned less than 500 pesos per day in 2018 are also included. Robust standard errors adjusted for clustering at the firm-year level are reported in parentheses. *** and * indicate significance at the one and ten percent levels.

Tariffs In column (1) of Table E4 we measure the firm-level exposure to tariffs raised by the US against China only (i.e., we omit tariff increases on solar panels, washing machines, steel, and aluminum, and we only consider tariffs raised from July 2018 onwards). In column (2) we measure the firm-level exposure to the tariff increases in December 2019 relative to the period before the tariffs were first raised. Our results remain robust.

Table E4: Tariffs

	(1)	(2)
Employment $\ln l_{i,t}$		
$\ln X_{i,t}^{US}$	0.325^{***} (0.064)	0.403^{***} (0.077)
Mean earnings $\ln w_{i,t}$		
$\ln X_{i,t}^{US}$	-0.178^{***} (0.032)	-0.088^{***} (0.030)
First month of tariff increases	2018m7	2018m2
Tariff changes	By wave	2019m12
First-stage $E_{i,t}^{US-Ch}$	0.554^{***} (0.068)	0.380^{***} (0.051)
Kleibergen-Paap	66.8^{*}	56.6^{*}
Observations	240,798	240,798

Notes: The samples vary between January 2016 and December 2019. Instrumental variables estimation where firm-level exports to the US are instrumented with the firm-level exposure to US tariffs against China. Firm and time fixed effects are included. Time-varying fixed effects in 2019 for the firms located in the border region employing workers who earned less than 500 pesos per day in 2018 are also included. Robust standard errors adjusted for clustering at the firm-year level are reported in parentheses. *** and * indicate significance at the one and ten percent levels.

Specifications We perform a falsification exercise and regress firm-level employment and mean earnings on US exports in 2016 and 2017 and we instrument the latter with the firm-level exposure to US tariffs against China in 2018 and 2019. The first-stage regression in column (1) of Table E5 shows no evidence of trade diversion from China to Mexico, and the elasticities of employment and mean earnings are statistically insignificant.

In column (2) we instrument firm-level exports to the US with the contemporaneous value and two lags of the firm-level exposure to US tariffs against China. The first-stage shows that the cumulative effect of the firm-level exposure to US tariffs (over 3 months) on firm-level exports to the US is positive. In the second stage, firm-level exports to the US increase employment and reduce mean earnings. In columns (3) and (4) we cluster standard errors by firm and by industry-year.

Profit sharing is mandatory in Mexico and requires firms to share 10 percent of their profits with employees. Firms therefore have an incentive to outsource workers to keep employment low and avoid sharing profits.[51] Until 2021, when Mexico reformed the law to restrict the use of outsourcing, the subcontracting of workers was widely used, with many firms outsourcing their entire workforce to other companies. When the US raised tariffs against China, it is probable that some firms outsourced workers instead of hiring them, especially if they viewed the increase in export demand as temporary (Samaniego de la Parra et al., 2025). Our findings are therefore likely to be lower-bound estimates of the trade diversion effect on employment.[52]

[51] Until 2021, about 40 percent of private-sector workers were subcontracted to other firms.

[52] The earnings reported by IMSS include profit sharing. Our results in Table 5 showing that trade diversion disproportionately increases the earnings of low-wage workers could be affected by profit sharing if profits were evenly distributed among workers. But the amount received by each worker cannot exceed three months of their salary, which means that low-wage workers receive a smaller share of profits than high-wage workers.

Table E5: Specifications

	(1)	(2)	(3)	(4)	(5)
Employment $\ln l_{i,t}$					
$\ln X_{i,t}^{US}$	0.673	0.440***	0.340***	0.340***	0.356***
	(0.444)	(0.093)	(0.090)	(0.069)	(0.066)
$\ln X_{i,t}^{US} \times REPSE$	–	–	–	–	−0.095
					(0.064)
Mean earnings $\ln w_{i,t}$					
$\ln X_{i,t}^{US}$	−0.122	−0.284***	−0.197***	−0.197***	−0.203***
	(0.123)	(0.054)	(0.046)	(0.056)	(0.034)
$\ln X_{i,t}^{US} \times REPSE$	–	–	–	–	0.035
					(0.037)
Sample	Placebo	Full	Full	Full	Full
Lagged exposure	No	Yes	No	No	No
Clustering firm	No	No	Yes	No	No
Clustering industry-year	No	No	No	Yes	No
First-stage $E_{i,t}^{US-Ch}$	0.079	0.467***	0.571***	0.571***	–
	(0.050)	(0.070)	(0.091)	(0.101)	
Kleibergen-Paap	2.4	15.4*	39.3*	32.1*	34.9*
Observations	217,186	193,972	240,798	240,798	240,798

Notes: The samples vary between January 2016 and December 2019. In columns (1) to (4), instrumental variables estimation where firm-level exports to the US are instrumented with the firm-level exposure to US tariffs against China. In column (5), firm-level exports to the US and their interaction with a dummy variable for the firms registered with REPSE are instrumented with the firm-level exposure to US tariffs against China and the exposure interacted with the dummy variable for REPSE. Firm and time fixed effects are included. Time-varying fixed effects in 2019 for the firms located in the border region employing workers who earned less than 500 pesos per day in 2018 are also included. Robust standard errors adjusted for clustering at the firm-year level in columns (1), (2), and (5), at the firm level in column (3), and at the industry-year level in column (4) are reported in parentheses. In column (2), the first-stage estimate is a cumulative effect (over three months). *** and * indicate significance at the one and ten percent levels.

As firms providing and using outsourcing services have been required since 2021 to register with REPSE (*Registro de Prestadores de Servicios Especializados u Obras Especializadas*), we compute a dummy variable for these firms and interact it in equation (8) with firm-level exports to the US.[53] If the increase in employment resulting from trade diversion is smaller for firms outsourcing workers to other companies, we expect the interaction term to be negative. For both employment and mean earnings, column (5) shows that the interaction terms are, however, insignificant.[54] But the power of our exercise is limited as the dummy variable used in the interaction terms is time invariant and does not distinguish between firms providing as opposed to using outsourcing services.

Exports In Table E6 we run our regressions using different variables for firm-level exports. Column (1) extends the sample and includes all observations for which firms report positive exports. We replace exports to the US with a value of zero when firms only export to other countries than the US. Firm-level employment and mean earnings are regressed on the inverse hyperbolic sine transformation of exports to the US. Accounting for the extensive margin does not qualitatively affect our results as trade diversion increases employment and reduces mean earnings (but the estimated coefficients are

[53] The EconLab provided us with the *registro patronal* of the firms registered with REPSE. Out of the 8,613 firms in our sample, we identify 580 firms registered with REPSE.

[54] The interaction term is also insignificant in explaining worker-level earnings within job spells.

smaller in magnitude compared to the ones reported in column 2 of Table 9).

Table E6: Exports

	(1)	(2)
Employment $\ln l_{i,t}$		
$\text{asinh}\, X_{i,t}^{US}$	0.212^{***}	–
	(0.037)	
$\ln X_{i,t}$	–	0.493^{***}
		(0.085)
Mean earnings $\ln w_{i,t}$		
$\text{asinh}\, X_{i,t}^{US}$	-0.106^{***}	–
	(0.018)	
$\ln X_{i,t}$	–	-0.245^{***}
		(0.044)
Zero trade	Yes	No
First-stage $E_{i,t}^{US-Ch}$	1.025^{***}	0.441^{***}
	(0.134)	(0.062)
Kleibergen-Paap	58.3^{*}	50.8^{*}
Observations	290,882	290,882

Notes: The samples vary between January 2016 and December 2019. Instrumental variables estimation where firm-level exports to the US in column (1), and firm-level total exports in column (2), are instrumented with the firm-level exposure to US tariffs against China. Time-varying fixed effects in 2019 for the firms located in the border region employing workers who earned less than 500 pesos per day in 2018 are also included. Robust standard errors adjusted for clustering at the firm-year level are reported in parentheses. *** and * indicate significance at the one and ten percent levels.

In column (2) we regress firm-level employment and mean earnings on firm-level total exports. As in Table D6 at the worker level, the magnitude of the estimated coefficients becomes larger.

Explaining Firm-Level Characteristics Another way of showing how the workforce composition of firms changes in response to trade diversion is to estimate equation (8) using as dependent variables the firm-level share of female workers in each month, and the mean skills and mean age of workers at the firm level in each month. The estimates in Table E7 indicate that trade diversion increases the firm-level share of female workers (column 1), and reduces the mean skills and mean age of the firm-level workforce (columns 2 and 3). These results are consistent with the ones shown in Table 10.

Table E7: Explaining Firm-Level Characteristics

	(1)	(2)	(3)
Dependent Variable	(Log) Female share	Mean skills	(Log) Mean age
$\ln X_{i,t}^{US}$	0.235^{***}	-0.237^{***}	-0.038^{***}
	(0.051)	(0.033)	(0.008)
First-stage $E_{i,t}^{US-Ch}$	0.556^{***}	0.569^{***}	0.571^{***}
	(0.068)	(0.069)	(0.067)
Kleibergen-Paap	66.5^{*}	68.5^{*}	72.8^{*}
Observations	233,025	228,451	240,798

Notes: The samples vary between January 2016 and December 2019. Instrumental variables estimation where firm-level exports to the US are instrumented with the firm-level exposure to US tariffs against China. Firm and time fixed effects are included. Time-varying fixed effects in 2019 for the firms located in the border region employing workers who earned less than 500 pesos per day in 2018 are also included. Robust standard errors adjusted for clustering at the firm-year level are reported in parentheses. *** and * indicate significance at the one and ten percent levels.

F Validity of the Shift-Share Instrument

The firm-level exposure to US tariffs against China, which is used as an instrument for firm-level exports to the US, has a shift-share design: the "shock" component is given by the increase in US tariffs against China while the "share" component is captured by firms' initial export shares. Identification can be implemented in two ways: by relying on the exogeneity of the shocks (Borusyak et al., 2022), or on the exogeneity of the shares (Goldsmith-Pinkham et al., 2020). As we assume that US tariff increases against China are an exogenous shock, the validity of our shift-share approach depends on whether these tariff increases are indeed exogenous. In order to validate our identification strategy we implement a number of diagnostic tests as recommended by Borusyak et al. (2022). These tests are applied to the firm-level sample we rely on to estimate the effects of trade diversion on firm-level employment and mean earnings (equation 8).[55]

First, we implement falsification tests to determine whether the tariff shocks are balanced across firm-level characteristics. We consider firm-level characteristics realized prior to the increase in US tariffs against China (i.e., the 2016 and 2017 shares of female, unskilled, and younger workers which reflect the composition of a firm's workforce), as well as firm-level employment and mean earnings in 2016 and 2017 (in which case the regressions are akin to pre-trend tests). We regress these variables on the firm-level exposure to US tariffs against China, and we obtain exposure-robust standard errors clustered at the HS6 level by estimating equivalent shock-level instrumental variables regressions (Borusyak et al., 2022).

Table F1: Balance Tests

Balance Variables	Coefficient	Standard error
(Log) Employment$_{16-17}$	0.006	0.004
(Log) Mean earnings$_{16-17}$	−0.002	0.002
(Log) Share of female workers$_{16-17}$	0.001	0.001
(Log) Share of unskilled workers$_{16-17}$	0.002*	0.001
(Log) Share of younger workers$_{16-17}$	0.001	0.001
Observations	367,357	

Notes: The samples vary between January 2016 and December 2019. Firm-level initial characteristics in 2016 and 2017 are regressed on the firm-level exposure to US tariffs against China. Firm and time fixed effects are included. The exposure-robust standard errors clustered at the HS6 level are obtained from equivalent shock-level instrumental variables regressions. The shock-level estimations regress the exposure-weighted averages of firm-level initial characteristics on the exposure-weighted average of the firm-level exposure to US tariffs against China which is instrumented with changes in US tariffs against China, and are weighted by average exposure weights. Unskilled and younger workers have a level of skills and age below the medians of skills and age in the worker-level sample. * indicates significance at the ten percent level.

As shown in Table F1, in all cases but one we fail to reject imbalance as the estimated coefficients are insignificant, supporting the validity of our identification strategy. The significant estimate for

[55] As discussed by Borusyak, Hull, and Jaravel (2022), we have a "complete share" setting as the exposure shares for each firm sum to one.

the initial share of unskilled workers indicates that firms more exposed to higher US tariffs against China tend to have a higher fraction of unskilled workers, but the coefficient is significant at the 10 percent level only.

Table F2: Statistical Inference Based on Alternative Specifications and Standard Errors

	(1)	(2)	(3)	(4)
Employment $\ln l_{i,t}$				
$\ln X_{i,t}^{US}$	0.340^{***} (0.063)	–	0.340^{***} (0.046)	0.340^{***} (0.039)
Shock-level equivalent of $\ln X_{i,t}^{US}$	–	0.340^{**} (0.149)	–	–
Mean earnings $\ln w_{i,t}$				
$\ln X_{i,t}^{US}$	-0.197^{***} (0.033)	–	-0.197^{***} (0.026)	-0.197^{***} (0.022)
Shock-level equivalent of $\ln X_{i,t}^{US}$	–	-0.197^{**} (0.081)	–	–
First-stage $E_{i,t}^{US-Ch}$	0.571^{***} (0.067)	–	0.571^{***} (0.059)	0.571^{***} (0.054)
First-stage $\Delta\tau_{K,t}^{US-Ch}$	–	0.121^{***} (0.035)	–	–
Regression	Eq. (8)	Shock-level Eq. (8)	Eq. (8)	Eq. (8)
Data dimension	Firm-time	HS6-time	Firm-time	Firm-time
Clustering	Firm-year	HS6	k-means (100)	k-means (500)
Kleibergen-Paap	72.8^{*}	11.8	92.2^{*}	111.8^{*}
Observations	240,798	367,357	240,798	240,798

Notes: The samples vary between January 2016 and December 2019. In columns (1) and (3)–(4), instrumental variables estimation where firm-level exports to the US are instrumented with the firm-level exposure to US tariffs against China. Firm and time fixed effects are included. Time-varying fixed effects in 2019 for the firms located in the border region employing workers who earned less than 500 pesos per day in 2018 are also included. Robust standard errors adjusted for clustering at the firm-year level in column (1), and across 100 and 500 groups of firms with similar export shares in columns (3) and (4), are reported in parentheses. Column (2) reports the coefficients of estimating the equivalent shock-level instrumental variables regression of equation (8) with exposure-robust standard errors clustered at the HS6 level. It regresses the exposure-weighted averages of firm-level employment and mean earnings on the exposure-weighted average of firm-level exports to the US which are instrumented with changes in US tariffs against China, and is weighted by average exposure weights. ***, **, and * indicate significance at the one, five, and ten percent levels.

Second, Borusyak et al. (2022) show that the estimated coefficients of an instrumental variables regression using a shift-share instrument can be obtained from a transformed shock-level regression that yields exposure-robust standard errors as the shocks are directly used as the instrument. We therefore estimate the shock-level (i.e., HS6-time) equivalent of equation (8) for both firm-level employment and mean earnings and report the results in column (2) of Table F2. The estimated coefficients are indeed identical to the ones reported in column (2) of Table 9 (which, for convenience, are reproduced in column 1), and the exposure-robust standard errors clustered at the HS6 level indicate that these effects continue to be significant. These shock-level regressions also address the concern raised by Adão et al. (2019) that the residuals in column (1) may be correlated across firms with similar export shares, resulting in downward-biased standard errors. Finally, columns (3) and (4) show that our results remain similar if we estimate equation (8) at the firm level but cluster standard errors across firms with similar export shares (we use the k-means algorithm to categorize firms into 100 or 500 groups with similar export shares).

Finally, Goldsmith-Pinkham et al. (2020) argue that the firm-level estimates in column (1) of Table F2 may be affected by endogeneity or pre-trends in specific sectors. We therefore estimate equation (8) but re-compute firm-level exports to the US and the firm-level exposure to US tariffs leaving out one HS2 product category at a time. Columns (1) and (2) of Table F3 provide, for both employment and mean earnings, the smallest and largest values of the estimated coefficients so obtained. Overall, the results remain consistent with the ones reported in column (1) of Table F2.

Table F3: Dropping One HS2 Category at a Time

	(1)	(2)
	Smallest Coefficient	Largest Coefficient
Employment $\ln l_{i,t}$		
$\ln X_{i,t}^{US}$	0.294^{***} (0.077)	0.397^{***} (0.077)
First-stage $E_{i,t}^{US-Ch}$	0.481^{***} (0.074)	0.492^{***} (0.068)
Excluded HS2	HS 85	HS 94
Kleibergen-Paap	42.7^{*}	51.6^{*}
Observations	235,240	235,818
Mean earnings $\ln w_{i,t}$		
$\ln X_{i,t}^{US}$	-0.152^{***} (0.028)	-0.247^{***} (0.043)
First-stage $E_{i,t}^{US-Ch}$	0.594^{***} (0.068)	0.492^{***} (0.068)
Excluded HS2	HS 61	HS 94
Kleibergen-Paap	75.4^{*}	51.6^{*}
Observations	237,212	235,818

Notes: The samples vary between January 2016 and December 2019. Instrumental variables estimation where firm-level exports to the US are instrumented with the firm-level exposure to US tariffs against China. Firm and time fixed effects are included. Time-varying fixed effects in 2019 for the firms located in the border region employing workers who earned less than 500 pesos per day in 2018 are also included. Robust standard errors adjusted for clustering at the firm-year level are reported in parentheses. Columns (1) and (2) report the smallest and largest values of the estimated coefficients obtained after leaving out one (LOO) HS2 product category at a time when computing firm-level exports to the US and the firm-level exposure to US tariffs against China. *** and * indicate significance at the one and ten percent levels.