CAGE

Working Paper

755/2025
June
2025

Trade Diversion and Labor Market Outcomes

Natalie Chen,
Dennis Novy,
Diego Solórzano

WARWICK
THE UNIVERSITY OF WARWICK

UKRI Economic and Social Research Council

Trade Diversion and Labor Market Outcomes*†

Natalie Chen Dennis Novy Diego Solórzano

May 8, 2025

Abstract

In 2018 and 2019, the US administration increased tariffs on imports from China. Did these tariffs lead to more US imports from other countries such as Mexico? Using highly disaggregated data on the universe of Mexican firm-level exports, we find evidence of trade diversion from China to Mexico. We then combine the export data with detailed longitudinal employer-employee data to investigate the impact of trade diversion on labor market outcomes for workers employed by Mexican exporters. We find that trade diversion increased the labor demand of exporters exposed to US tariffs against China, resulting in more employment and higher wages, especially for low-wage workers such as female, unskilled, younger, and non-permanently insured employees. The effects were concentrated in technology and skill-intensive manufacturing industries.

JEL Classification: F12, F14, L11.

Keywords: Employment, exports, firms, tariffs, trade costs, trade diversion, wages, workers.

*Chen and Novy acknowledge research support from the Economic and Social Research Council (ESRC grant ES/Z504701/1). For helpful suggestions and discussions, we thank Amit Khandelwal, David Hummels, Julia Cajal-Grossi, Eduardo Fraga, Sandra Poncet, Sarah Schroeder, Valérie Smeets, Allan Sørensen, Hâle Utar, and participants at the CEPR Naples Trade and Development Workshop, CEPR Paris Symposium, CEPR 3rd Workshop on Globalization and Workforce Composition in Paris, XVIIIth Danish International Economics Workshop in Aarhus, Geographic Market Integration Workshop in Cambridge, Midwest Trade Conference in Rochester, Urban Economics Association Meeting in Berlin, and at seminars in Aarhus, GTDW Geneva, Louvain-la-Neuve, Sheffield, and St Andrews. We also thank Osvaldo Veloz for support with the data. The data was accessed through the EconLab at Banco de México. The EconLab collected and processed the data as part of its effort to promote evidence-based research and foster ties between Banco de México's research staff and the academic community. Inquiries regarding the terms under which the data can be accessed should be directed to econlab@banxico.org.mx. The results of this study do not necessarily reflect official positions of Banco de México.

†Natalie Chen, Department of Economics, University of Warwick, Coventry, CV4 7AL, UK, CAGE, CESifo, and CEPR. Email: N.A.Chen@warwick.ac.uk (corresponding author); Dennis Novy, Department of Economics, University of Warwick, Coventry, CV4 7AL, UK, CAGE, CESifo, CEP/LSE, and CEPR. Email: D.Novy@warwick.ac.uk; and Diego Solórzano, Banco de México. Email: jsolorzano@banxico.org.mx.

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 elevated tariffs between the two nations continued to apply. Since February 2025, a new trade war between the two countries is looming as the recently elected US administration hit China with new tariffs and China retaliated promptly.

A substantial body of research studies the economic effects of the US-China trade war, focusing primarily on the US economy, and to some extent on China (for a review, see Fajgelbaum and Khandelwal, 2022).[1] 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.[2] In a first step, we ask whether the increases in US tariffs against China induced US 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 firms. We find that trade diversion increased the labor demand of the firms exposed to higher US tariffs against China, resulting in more employment and higher wages, especially for low-wage workers such as female, unskilled, younger, and non-permanently insured 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

[1] Evidence shows that the trade war reduced US exports and imports with a near-complete pass-through of tariff increases into domestic prices (Amiti, Redding, and Weinstein, 2019; Fajgelbaum, Goldberg, Kennedy, and Khandelwal, 2020). It also reduced US consumption (Waugh, 2019), employment (Flaaen and Pierce, 2019; Waugh, 2019), real wages (Fajgelbaum et al., 2020), and stock prices (Amiti, Kong, and Weinstein, 2022).

[2] 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).

the USMCA in 2020) makes it easier for the US to import more goods directly from Mexico than from 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.[3]

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 2010 to 2023. Until 2018, the US increased its import shares from both Mexico and China. But 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.[4]

In a first step, using highly disaggregated data on the universe of Mexico's 8-digit firm-level bilateral 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.[5] We find evidence of trade diversion from China to Mexico,

[3]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."

[4]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.

[5]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.

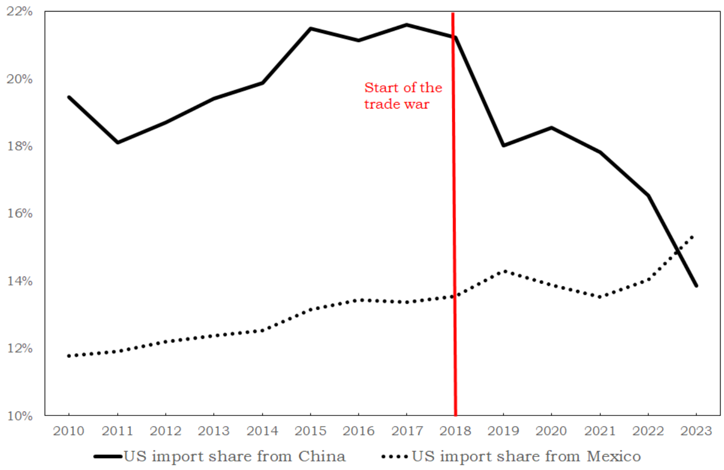

Figure 1: Shares (in %) of US goods imports from China and from Mexico in total US goods imports between 2010 and 2023. Source: Direction of Trade Statistics of the International Monetary Fund.

inducing an export boom from Mexico to the US and 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, we find a relative increase in Mexican exports to the US of 4.2 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 firm and per product to the US. At the extensive margin, these tariffs increased the number of products exported from Mexico to the US, but had no effect on the number of Mexican exporters 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 wages 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 experienced a surge in the demand for their exports, we expect these firms to increase their labor demand, resulting in more employment and higher wages (Mayr-Dorn, Narciso, Dang, and Phan, 2023; Rotunno, Roy, Sakakibara, and Vézina, 2023).

We first run regressions at the worker level and find that trade diversion had a positive effect on wages. We estimate that a one percent increase in firm-level exports to the US driven by a firm's exposure to US tariffs against China increases wages by 0.103 percent on average. Wage increases were concentrated among female, unskilled, younger, and non-permanently insured workers who typically receive lower wages than male, skilled, older, and permanently insured workers. For instance, we find that women experienced a wage increase about double the size of the increase for men. The result that low-wage workers disproportionately increased their wages suggests that firms exposed to US tariffs experienced a fall in within-firm wage inequality. Wage increases were also predominant among workers who remained employed by the same firm during the export surge (the "intensive margin" of adjustment), while workers who moved to new employers (the "reallocation margin") did not experience any significant wage increases (Autor, Dorn, Hanson, and Song, 2014).

We then run regressions at the firm level. We find that trade diversion had a *positive* effect on employment and a *negative* effect on mean wages. 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 0.146 percent and reduces mean wages by 0.197 percent. These effects were 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 the mean wage resulted from a *composition effect* as firms disproportionately increased the employment of low-wage workers including female, unskilled, younger, and non-permanently insured workers. Combining the results at the worker and firm levels, we conclude that trade diversion increased labor demand of firms exposed to higher US tariffs against China. This shift in labor demand increased both employment and wages, with the effects being more pronounced for female, unskilled, younger, and non-permanently insured workers.

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 wages and employment in the US (Autor, Dorn, and Hanson, 2013; Autor et al., 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 had a positive effect on the employment, working hours, and wages of Vietnamese workers, especially for female and non-college-educated workers. Samaniego de la Parra, Puggioni, and Spearot (2024) find that the trade war resulted in a shift in the composition of the Mexican manufacturing workforce towards outsourced workers. Cavalcanti, Ogeda, and Ornelas (2025) show that regions in Brazil more exposed to Chinese retaliatory tariffs against the US experienced a relative increase in wages and employment. In contrast to these papers, we rely on longitudinal employer-employee data that allow us to track individuals over time.

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 are available at monthly frequency and include the universe of all Mexican free-on-board (FOB) export transactions. 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. 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	65,383	–	–	–	–	–
Exporters to the US	46,024	–	–	–	–	–
Products (8-digit TIGIE)	11,177	–	–	–	–	–
Sectors (6-digit HS)	4,892	–	–	–	–	–
Destination countries	240	–	–	–	–	–
Products per exporter	–	160.2	85	203.6	2	571
Destinations per exporter	–	12.1	5	17.5	1	46
Transaction values (US dollars)	–	224,319	1,953	5,035,702	7.7	395,067

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 65,383 firms (of which 46,024 export to the US), 11,177 products (8-digit TIGIE level), 4,892 sectors (6-digit HS level), and 240 destination countries with a total of 7,551,745 observations.[7] The median firm exports an average of 85 different products to 5 destination countries (at the 5^{th} and 95^{th} percentiles, the products per exporter are 2 and 571 and the countries per exporter are 1 and 46). The median export transaction is valued at 1,953 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 (83.86% of total exports between January 2016 and December 2019), followed by Canada (3.06%), China (1.46%), Germany (1.07%), and Brazil (1.01%).

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

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

[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 30,859 firms, 8,084 products, and 212 countries.

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), 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:

$$\ln X_{ijk,t} = \alpha_1 \Delta\tau_{K,t}^{US-Ch} \times D_{US} + \alpha_2 \Delta\tau_{US,K,t}^{US-Mx} + D_{ij} + D_{jk} + D_{i,t} + D_{k,t} + \epsilon_{ijk,t}, \quad (1)$$

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

[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.

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 D_{ij}, country-product D_{jk}, firm-time $D_{i,t}$, and product-time $D_{k,t}$ fixed effects. 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 level. The finding $\alpha_1 > 0$ would indicate that the increase in US tariffs against China in a given product category increases Mexican 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}. In addition, we check whether the tariff increases by the US and China against each other impacted Mexico's exports to China by interacting the two variables with a dummy variable for exports to China, D_{Ch}.

2.3.1 Event Study

Before presenting the results of estimating equation (1), we start with an event study to visualize the effects of higher US tariffs against China on Mexico's exports to the US. We restrict the sample to exports to the US, and we compare the trends of targeted and non-targeted products by estimating the following specification (Fajgelbaum et al., 2020):

$$\ln X_{ik,t} = \sum_{T=-6}^{6} \zeta_{0,T} I\left(event_{k,t} = T\right) + \sum_{T=-6}^{6} \zeta_{1,T} I\left(event_{k,t} = T\right) \times target_k + D_{i,t} + D_k + \upsilon_{ik,t}, \qquad (2)$$

where $target_k$ is a dummy variable equal to one for each exported product k targeted by higher US tariffs against China, and we include indicator variables I for the event date $event_{k,t}$ which captures the month of the year when tariffs on product k were first raised. For non-targeted products, the event date is defined as the earliest event date of the targeted products belonging to the same 5-digit HS-level category. If a non-targeted product does not share the same 5-digit HS code as any targeted product, the event month is defined as the earliest month of the trade war (i.e., February 2018). Event times $\geqslant 6$ are binned together and event times $\leqslant -7$ are omitted. We include firm-time $D_{i,t}$ and product D_k fixed effects, and standard errors are clustered at the 6-digit HS level.

Figure 2 plots the $\zeta_{1,T}$ coefficients that capture the trends of targeted products relative to non-targeted products. While standard errors are quite large, we see a clear increase in exports in event periods 4, 5, and 6+, implying a lag of a few months until the tariffs show an effect. Specifically,

[9] The literature assumes that these tariffs are exogenous. Trump's election came as a surprise, and the first wave of US tariffs against China was largely unanticipated (Amiti et al., 2019). One could argue that the subsequent tariff hikes were to a larger extent expected, but Fajgelbaum et al. (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.

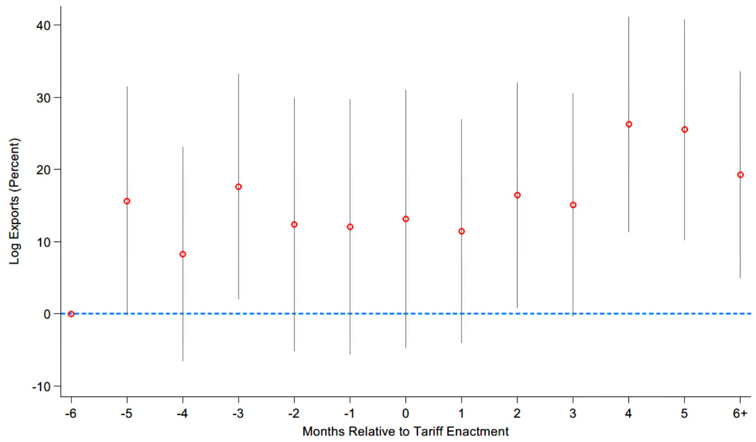

Figure 2: Coefficients on event time dummy variables for targeted products relative to non-targeted products exported from Mexico to the US. 95% confidence intervals are reported as error bars. Source: Banco de México EconLab.

exports increase by 26.3, 25.5, and 19.3 percent in event periods 4, 5, and 6+. These effects are consistent with trade diversion from China to Mexico. Prior to the changes in tariffs, an anticipatory increase in exports (of 17.6 percent) can be detected in event period −3, but it becomes insignificant in event periods −2 and −1 and is quantitatively smaller than the post-event increases observed in periods 4, 5, and 6+. Evidence that Mexican exporters increased shipments to the US prior to the increase in US tariffs is therefore weak. Moreover, in Appendix B we test for pre-trends and regress the mean exports of Mexican firms by product-destination before the trade war on the tariff increases by the US against China during the trade war. As the coefficient on US tariffs is insignificant, Mexico's exports in product categories targeted by changes in US tariffs were not on differential trends before the start of the trade war.

2.3.2 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, $\Delta\tau^{US-Ch}_{K,t}$. As the interaction between $\Delta\tau^{US-Ch}_{K,t}$ 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 0.126 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 $\Delta\tau^{US-Ch}_{K,t}$ 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 0.163 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 0.163 suggests a 4.2 percent $(\exp(0.163 \times 0.25) - 1)$ relative increase in exports to the US for the targeted product. Note that in columns (1) and (2), the effects of higher US tariffs against Mexico are insignificant (not reported), which is consistent with Utar et al. (2025).

Table 2: Trade Diversion

Dependent Variable (in logs)	Exports (1)	Exports (2)	Exports (3)	Exports (4)	Imports (5)
$\Delta\tau_{K,t}^{US-Ch}$	-0.015 (0.052)	–	–	–	–
$\Delta\tau_{K,t}^{US-Ch} \times D_{US}$	0.126^{**} (0.051)	0.163^{***} (0.054)	0.198^{***} (0.064)	0.215^{***} (0.063)	-0.096^{***} (0.017)
$\Delta\tau_{K,t}^{Ch-US} \times D_{US}$	–	–	-0.076 (0.083)	-0.071 (0.082)	–
$\Delta\tau_{K,t}^{US-Ch} \times D_{Ch}$	–	–	–	0.327 (0.202)	0.094^{***} (0.020)
$\Delta\tau_{K,t}^{Ch-US} \times D_{Ch}$	–	–	–	0.004 (0.263)	–
R-squared	0.546	0.556	0.556	0.556	0.473
Observations	7,174,774	7,095,104	7,095,104	7,095,104	39,401,192

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 and $\Delta\tau_{K,t}^{Ch-US}$ is the change in China's 6-digit HS-level tariffs against the US. In columns (1)–(4), Mexico's exports to the US are also regressed on changes in 6-digit HS-level US tariffs against Mexico (not reported). In column (5), Mexico's imports from the US are also regressed on changes in Mexico's 6-digit HS-level tariffs against the US (not reported). D_{US} and D_{Ch} are dummy variables equal to one for trade with the US or China. Firm-country D_{ij}, country-product D_{jk}, firm-time $D_{i,t}$, 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). Robust standard errors adjusted for clustering at the 6-digit HS level are reported in parentheses. *** and ** indicate significance at the one and five percent levels.

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. Column (4) further interacts $\Delta\tau_{K,t}^{US-Ch}$ and $\Delta\tau_{K,t}^{Ch-US}$ with a dummy variable for exports to China, but the estimated coefficients are also insignificant. As China's retaliatory tariffs against the US do not increase Mexico's exports to China, we conclude there is no trade diversion from the US to Mexico. This result can be explained by Mexico having a comparative advantage in exporting manufacturing inputs, while China's tariffs mainly targeted US agricultural exports.

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 also have a positive effect on Mexico's exports to the rest of the world, while in column (1) of Table 2 we obtain a negative (and insignificant) coefficient. They interpret this finding as evidence that Mexico operates along a downward sloping supply curve. Finally they find, as we do, that US tariffs against China are insignificant in explaining Mexico's exports to China, and that China's tariffs against the US have no effect on Mexico's exports to the US and China.

There are two aspects worthwhile mentioning. First, Alfaro and Chor (2023) find that the sectors in which the US reduce its import share from China simultaneously experience 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)–(4). We believe, however, that the increase in Mexico's exports is also driven by a surge in export quantities. Our finding in Section 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) to satisfy the increase in export demand driven by higher US tariffs. Column (5) estimates equation (1) using (log) imports $M_{ijk,t}$ as the dependent variable, and the change in US tariffs against China is further interacted with a dummy variable for imports from China.[12] A one percentage point increase in US tariffs against China increases Mexico's imports from China by 0.094 percent more than its imports from the rest of the world. This finding is consistent with Freund et al. (2024) who find that countries increasing exports to the US in products targeted by higher US tariffs against China also import more from China.

In contrast, higher US tariffs against China reduce Mexican imports from the US. A one percentage point increase in US tariffs against China reduces Mexico's imports from the US by 0.096 percent more than its imports from the rest of the world. According to Mao and Görg (2020), this result

[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.

[12] In column (5), Mexico's imports from the US are also regressed on changes in Mexico's 6-digit HS-level tariffs against the US. Our sample for imports is much larger than for exports. The regression includes 71,691 importers, 11,014 products (8-digit TIGIE level), 4,699 sectors (6-digit HS level), and 251 origin countries between January 2016 and December 2019. Our results remain similar if we restrict the sample to importers who are also exporters.

can be explained by higher US tariffs against China increasing Mexico's cumulative tariffs paid on US imports.[13] As the US imports intermediate inputs from China used to produce goods exported to third countries such as Mexico, higher US tariffs against China increase Mexico's costs of importing from the US.

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 consider the tariff increases enacted between July 2018 and September 2019 against China only, if we measure the change in tariffs in December 2019 relative to the pre-trade war period, if we restrict our sample to manufacturing, and if we aggregate the data at the 6-digit HS level or at quarterly or annual frequency.

2.3.3 Decomposition of Margins

In order to determine the margins of adjustment of trade diversion, we sum exports $X_{ijk,t}$ across *firms* to obtain the value of exports $X_{jk,t}$ for each product k exported to destination j at time t. $X_{jk,t}$ can be decomposed into two components, i.e., the number of exporting firms $n_{jk,t}$ and mean exports per firm $X_{jk,t}/n_{jk,t}$ for each destination-product-time combination. We regress the three variables (in logs) on changes in US tariffs against China interacted with a dummy variable for exports to the US. We control for destination-product D_{jk} and product-time $D_{k,t}$ fixed effects, and cluster standard errors at the 6-digit HS level.

Table 3: Decomposition of Margins

Dependent variable (in logs)	$X_{jk,t}$ (1)	$n_{jk,t}$ (2)	$X_{jk,t}/n_{jk,t}$ (3)	$X_{ij,t}$ (4)	$n_{ij,t}$ (5)	$X_{ij,t}/n_{ij,t}$ (6)
$\Delta\tau_{K,t}^{US-Ch} \times D_{US}$	0.156** (0.072)	0.016 (0.016)	0.140** (0.067)	–	–	–
$\Delta\tau_{ij,t}^{US-Ch}$	–	–	–	0.539*** (0.159)	0.025 (0.071)	0.514*** (0.164)
$\Delta\tau_{ij,t}^{US-Ch} \times D_{US}$	–	–	–	0.467*** (0.091)	0.080** (0.034)	0.387*** (0.084)
R-squared	0.817	0.884	0.792	0.842	0.868	0.826
Observations	2,025,775	2,025,775	2,025,775	930,020	930,020	930,020

Notes: The samples vary between January 2016 and December 2019. In columns (1)–(3), $\Delta\tau_{K,t}^{US-Ch}$ 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). Country-product D_{jk} and product-time $D_{k,t}$ fixed effects are included. Robust standard errors adjusted for clustering at the 6-digit HS level are reported in parentheses. In columns (4)–(6), $\Delta\tau_{ij,t}^{US-Ch}$ 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} and firm-time $D_{i,t}$ fixed effects are included. Robust standard errors adjusted for clustering at the firm level are reported in parentheses. D_{US} is a dummy variable equal to one for exports to the US. *** and ** indicate significance at the one and five percent levels.

Column (1) of Table 3 regresses $X_{jk,t}$ as the dependent variable. As in Table 2, we find evidence of trade diversion from China to Mexico. At the intensive margin, trade diversion results from an

[13] A cumulative tariff accounts for the effects of all tariffs incurred along the global value chain (Mao and Görg, 2020).

increase in mean exports per firm to the US (column 3), while at the extensive margin there is no change in the number of firms exporting to the US (column 2). Note that the decomposition is additive and that the sum of the coefficients in columns (2) and (3) is equal to the coefficient in column (1).

In columns (4) to (6) we repeat the exercise but 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 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} and firm-time $D_{i,t}$ fixed effects, and cluster standard errors at the firm level. Trade diversion (in column 4) results from an increase in mean exports per product to the US (intensive margin, column 6), and from an increase in the number of products exported to the US (extensive margin, column 5).

3 Labor Market Outcomes

As trade diversion implies that firms exposed to higher US tariffs against China experienced 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 wages 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 wages of Mexican workers employed by firms exposed to US tariffs against China were impacted by the increase in exports to the US. Second, we estimate regressions at the firm level and investigate the effect of trade diversion on firm-level employment and mean wages.

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 daily wage, 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).[14] We also observe each worker's working status, for instance whether workers are permanently insured by their employers.[15] The data set also provides the employer's identifier, municipality, and industry.[16] Despite its richness, the data set inevitably has limitations. First, earnings 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).[17] Second, the number of hours worked, and the full-time or part-time status of workers are not available. 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. 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 wages 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 wage in a given month.[18] 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 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

[14] We set the gender indicator for an individual as missing whenever there is a change in gender.

[15] If not permanently insured, workers can be temporarily insured, self-employed, freelance, rural casual laborers, etc. As permanently insured workers have more job security, we compare them in our analysis to all other types of workers.

[16] Most manufacturing firms in Mexico are single establishment (Frías, Kaplan, Verhoogen, and Alfaro-Serrano, 2024).

[17] If a worker receives more than 25 times the minimum wage, their actual wage is replaced by the top code value.

[18] Our results remain similar if we only keep the wage of the worker's highest-paying job (Frías et al., 2024).

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 65,383 exporters included in our export sample, 46,024 of them report positive exports to the US, and they can be matched with 22,657 firms in the employer-employee data set. According to the EconLab, some exporters in the employer-employee data set cannot be matched with the customs data set because they do not export directly and rely on intermediaries for their export activities.[19] Once we measure the firm-level exposure to US tariffs against China, which requires firms to report positive exports in 2017 (see equation 4 below), the number of matched firms reduces to 16,652. This number further drops to 15,665 once we restrict the sample to the firms with more than one employee and with a workforce between 18 and 65 years old.[20] We rely on this sample of 15,665 matched firms at the worker-firm-month level to investigate the effects of trade diversion on worker-level wages. We also construct a firm-level sample by collapsing the worker-firm-month data at the firm-month level.

[19]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). In Section 3.3.3 we find evidence of trade diversion for wholesalers and retailers, consistent with the view that Mexican firms rely on intermediaries for their export activities.

[20]Of the 15,665 firms, 12,312 firms exactly match one *registro patronal* with one exporter in the customs data set. For the others, there are multiple matches. The 15,665 firms are associated with 28,466 different *registro patronal* identifiers.

For each firm we calculate the mean wage per month, measure employment as the headcount per month, and explore how they are impacted by trade diversion.[21]

Table 4: Summary Statistics for the Employer-Employee Sample

	Observations	Count	Mean	Median	Std. dev.	5^{th} pctile	95^{th} pctile
Firms	140,923,646	15,665	–	–	–	–	–
Workers	140,923,646	7,851,802	–	–	–	–	–
Males	86,888,121	4,735,037	–	–	–	–	–
Females	53,950,606	3,112,648	–	–	–	–	–
Age (years)	140,923,646	–	35.0	34.0	10.6	20.0	54.0
Wage (pesos per day)	140,923,646	–	434.6	278.2	406.4	125.2	1,390.9
Wage males	86,888,121	–	496.6	337.6	436.3	131.3	1,583.2
Wage females	53,950,606	–	334.7	224.7	329.3	118.1	1,042.5
Wage skilled	64,581,552	–	658.8	494.3	490.2	175.9	1,826.0
Wage unskilled	64,581,460	–	235.4	209.0	113.2	111.9	446.9
Wage older	71,385,503	–	521.1	323.8	479.5	131.0	1,826.0
Wage younger	69,538,143	–	345.7	246.5	288.3	120.3	925.1
Wage permanent	111,473,322	–	458.6	290.8	425.9	127.6	1,502.1
Wage non-permanent	29,450,324	–	343.7	239.2	305.1	115.9	935.6

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 4 provides descriptive statistics. Our sample includes 140,923,646 observations and is composed of 15,665 firms employing 7,851,802 workers, 60 percent of whom are male. On average, workers are 35 years old and receive 434.6 pesos per day (around 23 US dollars at the time). The table also describes mean daily wages by gender, skills, age (i.e., above or below the medians of skills and age), and employment status. Men, skilled, older, and permanently insured workers receive higher wages on average than women, unskilled, younger, and non-permanently insured workers, respectively.[22]

3.2 Worker-Level Analysis

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

$$\ln w_{hi,t} = \varphi \ln X_{i,t}^{US} + D_h + D_i + D_t + D_{h\widetilde{i},t_{2019}} + \varepsilon_{hi,t}, \tag{3}$$

where $w_{hi,t}$ is the daily wage 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. We include worker D_h, firm D_i, 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] 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.

[22] On average, males and females have the same age, but males are more skilled than females. Permanently insured workers are older and more skilled than the non-permanently insured. Skilled workers are older than unskilled workers.

Firm-Level Exposure to US Tariffs against China To identify the effect of trade diversion on wages, 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:

$$Exposure_{i,t}^{US-Ch} = \frac{\sum_j \sum_k X_{ijk,2017} \times \Delta\tau_{K,t}^{US-Ch}}{\sum_j \sum_k X_{ijk,2017}}, \quad (4)$$

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 $\Delta\tau_{K,t}^{US-Ch}$ is the change in US tariffs against China at the 6-digit HS level K in month t. The exposure measure weights changes in US tariffs against China with a firm's exports in each targeted product to each destination country relative to the firm's total exports in 2017.[23] This measure therefore also 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 measure is equal to zero before February 2018, while between February 2018 and December 2019 it has a mean value of 10.3 percent.

As equation (3) includes worker fixed effects, it estimates the differences in wages over time between workers who are observationally similar but employed by firms with different exposures to US tariffs against China. As firms exposed to these tariffs are expected to increase their labor demand, their wages and employment should increase. If labor markets are frictionless, workers will change employers until wages between exposed and non-exposed firms are equalized. Instead, if there are frictions in moving labor between employers (because of search and matching frictions, or because firm- or industry-specific human capital makes it costly for workers to change employers, Neil, 1995), adjustment will be slow, and in the short run wages in exposed firms will remain above those of non-exposed firms. Finding that trade diversion affects wages in the short run therefore points towards frictions in moving workers between jobs. Otherwise, wages should equalize for similar workers at each point in time (Autor et al., 2014).

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).[24] 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

[23]Non-exporters in 2017 with positive exports in later years are therefore omitted from our regressions. We observe 3,310 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 2,683 firms in non-targeted products.

[24]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 wage 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).[25]

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 a time-varying dummy variable $D_{h\widetilde{i},t_{2019}}$ in equation (3) which is equal to one for these workers in each month of 2019 (the $\widetilde{i}$ index denotes firms located in the border region).[26] 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.[27] 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, we observe that 83.0 percent of workers earned less than 500 pesos per day.[28] Of these, 34.7 percent were employed in the border region and 65.3 percent in non-border municipalities. The northern region employed relatively more women, with a female worker share of 45.1 percent against 36.4 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 52.2 and 45.5 percent) than the non-border region (at 48.7 and 37.9 percent). The share of non-permanently insured workers was smaller in the border region (at 17.5 percent against 31.6 percent in the non-border region). Women, younger, and non-permanently insured workers were more likely to be paid less than 500 pesos per day in the border region (with shares of 94.6, 94.4, and 95.5 percent against 87.2, 84.1, and 88.9 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 (around 99.5 percent). Firms in the border region are more export-intensive towards the US as in 2018 they sent 95.5 percent of their exports to the US against 81.2 percent for firms in the non-border region.

[25]Increases in the minimum wage can increase wages higher up in the earnings distribution as firms want to preserve worker hierarchy (Puggioni, Calderón, Cebreros, Fernández, Inguanzo, and Jaume, 2022).

[26]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. If we identify workers based on the last quarter of 2018, our results remain similar but the number of workers included in the sample falls.

[27]The $D_{h\widetilde{i},t_{2019}}$ dummy variable is equal to one for 1,113,442 individual workers, of whom 47,994 workers (i.e., 4.3 percent) moved their employment from the non-border to the border region between 2018 and 2019.

[28]Of the 4,783,078 workers we observe in 2018, 32.2 percent (1,538,076 workers) are employed in the border region.

3.2.1 Baseline Results

In column (1) of Table 5 we estimate equation (3) by OLS. The elasticity of wages with respect to firm-level exports to the US is positive at a value of 0.005. In other words, firms pay higher wages the more they export to the US.

Table 5: Trade Diversion and Wages

(Log) Wages	(1)	(2)	(3)	(4)	(5)	(6)
$\ln X_{i,t}^{US}$	0.005*** (0.001)	0.103*** (0.030)	–	0.097*** (0.034)	0.085*** (0.029)	0.131 (0.113)
$Exposure_{i,t}^{US-Ch}$	–	–	0.074*** (0.015)	–	–	–
$Exposure_{i,t}^{USMCA}$	–	–	–	0.007 (0.010)	–	–
Estimation	OLS	IV	OLS	IV	IV	IV
Firms included	All	All	All	All	IMMEX	Non IMMEX
First-stage $Exposure_{i,t}^{US-Ch}$	–	0.719*** (0.165)	–	0.638*** (0.167)	0.694*** (0.156)	0.705 (0.515)
Kleibergen-Paap	–	19.0*	–	14.6	19.7*	1.9
Observations	139,948,014	139,948,014	139,948,014	139,948,014	102,629,421	37,093,685

Notes: The samples vary between January 2016 and December 2019. Instrumental Variables estimation in columns (2) and (4)–(6) 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 ten percent levels.

In column (2), we estimate the effect of trade diversion on wages by instrumenting exports to the US with the firm-level exposure measure 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 (according to the Kleibergen-Paap F statistic, we can reject the null of weak correlation between the instrument and firm-level exports to the US, Stock and Yogo, 2005). Compared to the OLS estimate in column (1), the wage 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 wages by 0.103 percent on average.[29] The increase in wages could be due to an increase in hourly wages or 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 directly regress by OLS wages on the firm-level exposure measure to US tariffs (Autor et al., 2013; Revenga, 1997). Consistent with column (2), the exposure has a positive effect on wages with an elasticity of 0.074. 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 2.4 and 23.1 percent, respectively). The coefficient of 0.074 indicates that wages increase by $\exp(0.074 \times (0.231 - 0.024)) - 1 = 1.5$ percent when we move from the 25^{th} to the 75^{th} percentile of the exposure distribution.

[29] For example, the downward bias in the OLS estimate could be related to a cost shock that pushes up wages but depresses exports.

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 is produced at a firm paying production workers at least 16 US dollars per hour (45 percent for light trucks).[30] 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 effects on Mexican wages.

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:

$$Exposure_{i,t}^{USMCA} = \frac{\sum_j \sum_k X_{ijk,2017} \times D_{K,t}}{\sum_j \sum_k X_{ijk,2017}}, \tag{5}$$

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 23.1 percent.[31]

In column (4) we estimate equation (3) but simultaneously control for the firm-level exposure to the USMCA measure. Its coefficient is insignificant, and the elasticity of wages with respect to trade diversion only becomes slightly smaller at a value of 0.097. 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 wages 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, 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.[32] The increase in wages resulting from trade diversion should therefore only be observed for these firms. To check this hypothesis,

[30] The minimum wage of 16 US dollars per hour aims at protecting US workers. If Mexican firms choose to pay tariffs, US workers benefit from trade protection. If they choose higher wages over tariffs, Mexico becomes less attractive and US workers benefit if US firms shift production to the US (Fortune-Taylor and Hallren, 2022).

[31] In the worker-level sample, the correlation between $Exposure_{i,t}^{USMCA}$ and $Exposure_{i,t}^{US-Ch}$ is 43.8 percent.

[32] Starting in 1965, Mexico built export assembly plants, or maquiladoras, in the region close to the US-Mexico border. Maquiladoras were allowed to import duty-free inputs, machinery, and equipment from the US as long as their finished products were exported back to the US. In 1990, Mexico set up the PITEX (*Programa de Importación Temporal para*

we collected the list of IMMEX firms, together with their unique tax identifiers and the year when they first registered with the program.[33] Out of the 15,665 firms included in our sample, we identify 3,739 firms that were registered with the IMMEX program in 2017 (i.e., before the start of the trade war).[34] These firms are large exporters (many are foreign multinationals, Utar et al., 2025) and in 2017 they represented 96.5 percent of total Mexican exports in our sample. Columns (5) and (6) report the results of estimating equation (3) separately for the firms registered or not registered with the IMMEX program in 2017. Consistent with the findings of Utar et al. (2025), trade diversion, and its positive effect on wages, is only observed for the IMMEX firms.

3.2.2 Worker Heterogeneity

We explore the heterogeneous effects of trade diversion on wages across different types of workers. We estimate equation (3) and we interact firm-level exports to the US with worker-level characteristics such as gender, the initial (i.e., pre-war) level of skills, age, employment status, and mean wage.[35] As instruments we use the firm-level exposure to US tariffs against China and its interactions with worker-level characteristics. By analyzing workers within the same firm and month, we can determine whether exposure to a firm-specific shock (driven by higher US tariffs) leads to heterogeneous effects across different types of workers.

In column (1) of Table 6 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 wages of female workers by 0.160 percent, and by 0.077 percent only for males. This finding is consistent with Juhn, Ujhelyi, and Villegas-Sanchez (2014) who show that reductions in US tariffs associated with NAFTA increased 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 private sector (De Lyon and Pessoa, 2021).

Column (2) investigates heterogeneity arising from differences in skills. We interact exports to the US with our (demeaned) measure of initial skills estimated in the pre-trade war period. Unskilled workers experience a larger wage increase than skilled workers. At the 25^{th} percentile of skills, the wage elasticity is equal to 0.706. But at the 75^{th} percentile, it is insignificant. Our results are therefore consistent with papers finding that the negative effects of import competition on wages are larger for

Producir Articulos de Exportación) program to provide firms in central and southern Mexico with similar benefits as the ones granted to maquiladoras. In 2007, the two programs were combined into the IMMEX (*Industria Manufacturera, Maquiladora y de Servicios de Exportación*) program (Utar, Cebreros, and Torres, 2025).

[33] 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.

[34] We consider the firms registered with the IMMEX program in 2017 to avoid endogenous entry. Of the 15,665 firms, 3,739 firms were registered with IMMEX in 2017, while 165 other firms joined after 2017.

[35] The initial values are defined in 2016, and otherwise in 2017 if the 2016 values are missing, while skills are estimated in 2016 and 2017 only.

Table 6: **Trade Diversion and Worker Heterogeneity**

(Log) Wages	(1)	(2)	(3)	(4)	(5)
$\ln X_{i,t}^{US}$	0.160*** (0.050)	0.322*** (0.115)	0.110*** (0.039)	0.156*** (0.031)	0.478*** (0.181)
$\ln X_{i,t}^{US} \times Male$	−0.083** (0.038)	–	–	–	–
$\ln X_{i,t}^{US} \times Skills_{16-17}$	–	−0.684*** (0.176)	–	–	–
$\ln X_{i,t}^{US} \times \ln Age_{16-17}$	–	–	−1.199*** (0.275)	–	–
$\ln X_{i,t}^{US} \times Permanent_{16-17}$	–	–	–	−0.068** (0.033)	–
$\ln X_{i,t}^{US} \times \ln Wage_{16-17}$	–	–	–	–	−0.627*** (0.181)
$Male$	0.077*** (0.030)	–	–	–	–
25^{th} percentile	–	0.706*** (0.207)	0.386*** (0.090)	–	0.817*** (0.274)
75^{th} percentile	–	0.046 (0.064)	−0.189*** (0.060)	–	0.202* (0.111)
$Permanent_{16-17}$	–	–	–	0.088*** (0.032)	–
Kleibergen-Paap	7.4*	6.2	11.6*	8.3*	4.7
Observations	139,863,349	128,552,298	126,461,442	126,461,442	126,461,442

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 variables for male and for permanently insured workers) are demeaned.

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 wages 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 wages with respect to exports to the US is larger for younger workers. At the 25^{th} percentile of the age distribution (equal to 26 years), the elasticity is large at 0.386, while at the 75^{th} percentile (equal to 42 years) it turns negative at −0.189. Trade diversion therefore increases the wages of younger workers, but reduces them for older workers.[36]

In column (4) we ask whether the wage increases driven by trade diversion differ by employment status. We interact firm-level exports to the US with a dummy variable for workers initially permanently insured.[37] The increase in wages resulting from trade diversion is larger for non-permanently insured workers. A one percent increase in exports to the US increases their wages by 0.156 percent, compared to 0.088 percent for permanently insured workers.

Columns (1) to (4) show that trade diversion disproportionately increases the wages of female,

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

[37]If a worker switches between permanent and non-permanent status, we assume they are not permanently insured.

unskilled, younger, and non-permanently insured workers. As these workers receive on average lower wages (see Table 4), we test for heterogeneity across initial wages. We calculate each worker's initial mean wage and interact it (demeaned) with exports to the US. Column (5) shows that workers with low initial wages benefit more than workers with high initial wages. The elasticity of wages with respect to US exports is 0.817 at the 25^{th} percentile of the initial wage distribution, and falls to 0.202 at the 75^{th} percentile.[38]

Overall, the finding that trade diversion increases the earnings of low-wage workers to a larger extent suggests that firms exposed to higher US tariffs against China experienced a reduction in within-firm wage 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 Employment Histories

We investigate the effect of trade diversion on the wages of workers with different employment histories. As in Autor et al. (2014), this allows us to analyze the effect of trade diversion along several margins of worker adjustment: the change in wages at the initial employment (the "intensive margin"), and the change in wages associated with moving between employers (the "reallocation margin").

We split our sample into four *mutually exclusive categories* of workers (Autor et al., 2014). We first consider two groups of workers who do not change employers during the trade war. The first includes workers who are only employed by a single firm between January 2016 and December 2019 for any duration. We refer to these workers as *Stayers*. The second group includes workers who are employed by a single firm after the start of the trade war (in February 2018) but who change jobs before the start of the trade conflict. Their change in jobs is, therefore, unrelated to the trade war. We refer to this group of workers as *Post-war Stayers*.

We then consider two groups of workers who change jobs after the start of the trade war. The first includes workers who change jobs after February 2018 (they may change more than once), and before the trade war they may or may not have changed employers. We refer to these workers as *Switchers*, and their change in jobs is possibly related to the trade conflict. The second group includes workers who were employed by one or more firms before February 2018, but they disappear from the data set for a number of months until they appear again after the start of the trade war, working for a new firm. It is unlikely that these workers change jobs due to the trade war as they ended their prior

[38] In Table D6 in Appendix D we investigate worker heterogeneity by gender. Unskilled and younger workers experience a larger increase in wages irrespective of their gender, but wages fall for skilled and older men. Also, the larger increase in wages for non-permanently insured workers is only observed for men.

employment before the start of the trade conflict, and they probably remained unemployed or worked in the informal sector until they found a new formal job after February 2018. As they have gaps in their working history and are irregularly employed, we refer to these workers as *Irregulars*.[39]

The largest group is the one of *Stayers* (4,788,021 workers), followed by *Switchers* (1,629,417 workers), *Post-war Stayers* (1,030,352 workers), and *Irregulars* (404,012 workers). We estimate equation (3) separately for each category of workers and report the results in Table 7. Trade diversion increases the wages of workers who do not change employers during the trade war. The coefficient on firm-level exports to the US is positive for *Stayers* (equal to 0.107 in column 1) and *Post-war Stayers* (equal to 0.122 in column 2). Columns (3) and (4) show that trade diversion has no effect on the wages of *Switchers* and *Irregulars*.

Table 7: Trade Diversion and Employment Histories

Workers	Stayers	Post-war Stayers	Switchers	Irregulars	All
(Log) Wages	(1)	(2)	(3)	(4)	(5)
$\ln X_{i,t}^{US}$	0.107^{***} (0.035)	0.122^{***} (0.045)	0.009 (0.027)	-0.074 (0.206)	0.103^{***} (0.031)
$\ln X_{i,t}^{US} \times \ln Age\_imss$	–	–	–	–	-0.237^{***} (0.043)
25^{th} percentile	–	–	–	–	0.141^{***} (0.033)
75^{th} percentile	–	–	–	–	0.083^{***} (0.030)
First-stage $Exposure_{i,t}^{US-Ch}$	0.745^{***} (0.196)	0.660^{***} (0.139)	0.617^{***} (0.101)	0.230^{*} (0.127)	–
Kleibergen-Paap	14.4	22.4^{*}	37.0^{*}	3.3	9.0^{*}
Observations	94,130,796	16,999,875	24,800,634	4,015,434	98,789,041

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. In column (5), firm-level exports to the US and their interaction with the (demeaned) worker's age at the first registration with IMSS are instrumented with the firm-level exposure to US tariffs against China and the exposure interacted with the (demeaned) worker's age at the first registration with IMSS. 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.

Why do workers moving to new employers after the start of the trade war (*Switchers* and *Irregulars* in columns 3 and 4) not enjoy a wage increase 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 et al., 2014; Neil, 1995; Utar, 2018).[40] Some firms may value workers with a certain type of skills, but the same skills may not be valued by other firms. By moving to a new employer, workers may end up in occupations for which they are poorly suited, resulting in a cost. The finding that

[39] When workers temporarily leave the IMSS data set, they may move to a formal job in the public sector, an informal job, become unemployed, or exit from the labor force. Combining the IMSS data with the Mexican National Survey of Occupation and Employment (ENOE), Puggioni et al. (2022) find that the majority of workers move to an informal job.

[40] Autor, Dorn, Hanson, and Song (2014) find that the workers employed by firms exposed to import competition from China experience the largest decrease in cumulative earnings when they remain employed by the same firm over time.

these workers do not benefit from the same wage increase as *Stayers* and *Post-war Stayers* may be a reflection of this cost. It might also mean that these workers select into lower-paid jobs, perhaps to reduce working hours. In addition, our finding for *Irregulars* is consistent with Puggioni et al. (2022) who find that Mexican workers who temporarily exit formal employment and therefore most likely transition to lower-paying jobs, experience a wage penalty upon re-entry in the formal labor market.

Finally, in column (5) we interact firm-level exports to the US with the age of workers when they first registered with IMSS (measured as the difference between the year of registration with IMSS and the year of birth, and is restricted between 18 and 65 years old). It is likely that the older workers were when they first registered with IMSS, the longer they have been employed in the informal sector or unemployed. As the coefficient on firm-level exports to the US interacted with formal employment age is negative, workers who spent more years unemployed or in informal employment experience a smaller wage increase. At the 25^{th} percentile of the formal employment age distribution (equal to 18 years), the wage elasticity is equal to 0.141. At the 75^{th} percentile (equal to 23 years), the elasticity is smaller at 0.083.

3.3 Firm-Level Analysis

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

$$\ln z_{i,t} = \phi \ln X_{i,t}^{US} + D_i + D_t + D_{\widetilde{i},t_{2019}} + \delta_{i,t}, \tag{6}$$

where $z_{i,t}$ is either the mean wage $w_{i,t}$ (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. 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.

3.3.1 Baseline Results

In column (1) of Table 8 we regress by OLS firm-level employment and mean wages on firm-level exports to the US. Higher exports to the US increase employment and reduce mean wages. 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 the firm-level mean wage falls.

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

Table 8: Trade Diversion and Firm-Level Employment and Mean Wages

	(1)	(2)	(3)	(4)	(5)	(6)
(Log) Employment						
$\ln X_{i,t}^{US}$	0.044^{***} (0.002)	0.146^{***} (0.049)	–	0.116^{**} (0.054)	0.177^{***} (0.064)	0.138^{***} (0.049)
$Exposure_{i,t}^{US-Ch}$	–	–	0.085^{***} (0.029)	–	–	–
$Exposure_{i,t}^{USMCA}$	–	–	–	0.041^{***} (0.014)	–	–
$\ln X_{i,t}^{US} \times REPSE$	–	–	–	–	–	0.043 (0.070)
(Log) Mean wages						
$\ln X_{i,t}^{US}$	-0.005^{***} (0.001)	-0.197^{***} (0.028)	–	-0.206^{***} (0.032)	-0.195^{***} (0.038)	-0.192^{***} (0.028)
$Exposure_{i,t}^{US-Ch}$	–	–	-0.115^{***} (0.012)	–	–	–
$Exposure_{i,t}^{USMCA}$	–	–	–	0.011 (0.009)	–	–
$\ln X_{i,t}^{US} \times REPSE$	–	–	–	–	–	−0.030 (0.053)
Estimation	OLS	IV	OLS	IV	IV	IV
Firms included	All	All	All	All	IMMEX	All
First-stage $Exposure_{i,t}^{US-Ch}$	–	0.582^{***} (0.057)	–	0.521^{***} (0.057)	0.604^{***} (0.085)	–
Kleibergen-Paap	–	105.7^{*}	–	83.2^{*}	50.1^{*}	55.2^{*}
Observations	347,452	347,452	347,452	347,452	149,211	347,452

Notes: The samples vary between January 2016 and December 2019. Instrumental Variables estimation in columns (2) and (4)–(6) 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.

and exports to the US. Compared to column (1), instrumentation increases the magnitude of the employment and mean wage elasticities. A one percent increase in firm-level US exports increases employment by 0.146 percent and reduces mean wages by 0.197 percent. Trade diversion therefore has a positive effect on employment and a negative effect on mean wages.

In column (3) we directly regress by OLS employment and mean wages 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 wages. If we compare two exporters at the 25^{th} and 75^{th} percentiles of the firm-level exposure to US tariffs (equal to 3.7 and 23.3 percent), the coefficients of 0.085 and −0.115 indicate that employment increases by 1.7 percent $(\exp(0.085 \times (0.233 - 0.037)) - 1)$ and mean wages decrease by 2.2 percent $(\exp(-0.115 \times (0.233 - 0.037)) - 1)$ 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 wages. Column (5) shows that our results hold strongly for firms that participated in Mexico's IMMEX program from 2017 onwards.

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.[41] 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., 2024). Our findings are therefore likely to be lower-bound estimates of the trade diversion effect on employment.[42]

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 (6) with firm-level exports to the US.[43] 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 wages, column (6) shows that the interaction terms are, however, insignificant.[44] 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.

To conclude, trade diversion has a positive effect on employment and a negative effect on mean wages. 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 the mean wage 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 wages than current employees.[45] The next section investigates this composition effect in more detail.

3.3.2 Composition Effect

We provide evidence that the fall in the firm-level mean wage in response to trade diversion results from a *composition effect* as firms increase their workforce by predominantly hiring low-wage workers. As low-wage workers tend to be female, unskilled, younger, and non-permanently insured (see Table 4), we expect the employment of these workers to increase disproportionately.

[41] Directors, administrators, general managers, temporary workers who work less than 60 days for a firm in a given year and professionals hired under a services contract are not entitled to profit sharing. Until 2021, about 40 percent of Mexican workers in the private sector were subcontracted to other firms (Morales Fredes, 2023).

[42] The wages reported by IMSS include profit sharing. Our results in Section 3.2.2 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.

[43] The EconLab provided us with the *registro patronal* of the firms registered with REPSE. Out of the 15,665 firms in our sample, we identify 1,603 firms registered with REPSE.

[44] The interaction term is also insignificant in explaining worker-level wages.

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

Table 9: Trade Diversion and Workforce Composition

(Log) Employment	(1)	(2)	(3)	(4)
$\ln X_{i,t}^{US}$	0.324^{***} (0.062)	0.926^{***} (0.096)	0.317^{***} (0.062)	0.446^{***} (0.085)
$\ln X_{i,t}^{US} \times Male$	-0.167^{***} (0.052)	–	–	–
$\ln X_{i,t}^{US} \times Skilled$	–	-0.677^{***} (0.079)	–	–
$\ln X_{i,t}^{US} \times Older$	–	–	-0.235^{***} (0.051)	–
$\ln X_{i,t}^{US} \times Permanent$	–	–	–	-0.328^{***} (0.084)
Male	0.157^{***} (0.050)	–	–	–
Skilled	–	0.249^{***} (0.043)	–	–
Older	–	–	0.082^{*} (0.047)	–
Permanent	–	–	–	0.118^{**} (0.049)
Kleibergen-Paap	47.6*	49.0*	52.7*	53.8*
Observations	673,621	611,722	676,588	616,991

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, older, and permanently insured 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, older, and permanently insured workers. Firm and time fixed effects interacted with dummy variables for the subsamples of male, skilled, older, and permanently insured 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, older, and permanently insured 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, five, and ten percent levels.

In the worker-level data set, we split workers according to their gender, their permanently or non-permanently insured status, their 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 of these groups. We stack the sub-samples together, and estimate equation (6) including interactions between firm-level exports to the US and dummy variables for the employment of male, skilled, older, and permanently insured workers.

As expected, Table 9 shows that trade diversion disproportionately increases the employment of low-wage workers. The elasticity of employment to firm-level US exports is 0.324 for women but only 0.157 for men. It is larger for unskilled than skilled workers (0.926 vs. 0.082), for younger than older workers (0.317 vs. 0.082), and for non-permanently insured than for permanently insured workers (0.446 vs. 0.118).[46]

Combining the results in Table 9 with the ones for worker-level wages in Table 6, we conclude that trade diversion increases the labor demand of firms exposed to higher US tariffs against China. This

[46]The disproportionate increase in the employment of non-permanently insured workers might reflect the view that firms consider the increase in export demand resulting from higher US tariffs as temporary. Consistent with Table 9, in Table E6 in Appendix E we show that trade diversion increases the firm-level shares of female and of non-permanently insured workers, and reduces the mean skills and mean age of the firm-level workforce.

shift in labor demand increases employment and wages, the effects being particularly pronounced for female, unskilled, younger, and non-permanently insured workers.

3.3.3 Industry-Level Results

IMSS classifies private firms into 276 different industries at the 4-digit level. Using a correspondence between the IMSS industries and NAICS codes (provided by the EconLab), we estimate equation (6) separately by broad NAICS groups. For each industry, Table 10 reports the elasticities of firm-level employment and mean wages in columns (1) and (2), the first-stage estimates of the firm-level exposure to US tariffs against China in column (3), and the number of observations included in each regression in column (4).

The first row of the table reports the estimates for "Manufacturing" (NAICS 31–33), which is the largest industry in our sample. Unsurprisingly, our results hold strongly for "Manufacturing" as higher US tariffs against China induce trade diversion from China to Mexico (column 3), which in turn increases employment and reduces mean wages (columns 1 and 2).

Table 10: Trade Diversion, Employment, and Mean Wages across Industries

Industries (NAICS codes)	(Log) Employment	(Log) Mean wages	First-stage exposure	Observations
	(1)	(2)	(3)	(4)
Manufacturing (31–33)	0.340^{***} (0.063)	-0.197^{***} (0.033)	0.571^{***} (0.067)	240,798
Food, textiles, leather (31)	0.266 (0.374)	0.596 (0.407)	-0.257 (0.165)	59,701
Chemicals, rubber, plastics (32)	0.300^{***} (0.090)	-0.067^{*} (0.037)	0.750^{***} (0.153)	58,582
Machinery, automotive (33)	0.321^{***} (0.096)	-0.104^{**} (0.043)	0.470^{***} (0.091)	122,515
Raw materials (11–22)	1.650 (2.421)	-0.469 (0.816)	-0.142 (0.205)	41,367
Construction (23)	-0.261 (0.570)	0.247 (0.343)	0.541 (0.632)	2,848
Wholesale and Retail (43–46)	-0.325^{**} (0.163)	-0.117^{*} (0.070)	0.601^{***} (0.166)	49,542
Services (48–92)	1.361 (2.955)	-0.085 (0.316)	0.201 (0.430)	12,897

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, five, and ten percent levels.

The next three rows of the table disaggregate "Manufacturing" into three sub-categories. Trade diversion, and its positive effect on employment and negative effect on mean wages, can only be observed for "Chemicals, rubber, and plastics" and "Machinery and automotive" (NAICS 32 and 33). There is no trade diversion, and no effect on employment and mean wages, 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 41.8 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). But the three industries have a similar mean age and share of permanently insured workers (in 2016 their mean age is 37 years and their mean share of permanently insured workers is 82 percent). In Section 3.4 we further discuss possible reasons for the differences in results within manufacturing.

The last rows of the table report the results for non-manufacturing sectors. Evidence of trade diversion is only detected for "Wholesale and retail" (NAICS 43–46), which is not surprising as the firms belonging to this industry are responsible for shipping and delivering products to businesses and consumers, and they are therefore likely to experience a surge in shipments if the US demand for Mexican goods increases. But as these firms are not involved in the production of goods, trade diversion does not increase their employment – instead, we observe a fall in the number of workers and the mean wage per firm. For "Raw materials" (NAICS 11–22), "Construction" (NAICS 23), and "Services" (NAICS 48–92), all estimated coefficients are insignificant.

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 wages and employment (Autor et al., 2014; De Lyon and Pessoa, 2021, among others).[47] 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 wages or job security with their employers.[48] 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

[47] 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.

[48] Baghai, Silva, and Soares (2024) argue that firms reward workers who can dedicate unrestricted time to their jobs with greater pay and employment stability. Due to childcare duties women suffer a penalty in the form of higher wage and employment variability. Sharma (2023) finds that import competition reduces the relative wages of women because firms have monopsony power and discriminate against women as they are less likely than men to leave their employers.

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 3.3.3), in order to increase production these industries need to hire more production workers who are likely to be younger and unskilled as they are best suited to accomplish labor-intensive and physically demanding tasks. In addition, if the increase in export demand resulting from higher US tariffs is perceived as temporary, firms are less likely to permanently insure their new hires. On the other hand, it is not clear why the wages 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 wages. Employment and wages should therefore increase to a larger extent in female intensive industries. This is not what we find in Section 3.3.3 where we show that the increase in employment resulting from trade diversion occurs in male intensive sectors.[49]

One mechanism that could possibly 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 wages and employment of unskilled women.[50] 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).[51] 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 3.3.3). As a result, these firms may discriminate less against women, resulting in improved labor market outcomes for female workers.[52] Last but not least, firms could simply disproportionately increase the employment and wages of women because of labor shortages resulting from the increased labor demand triggered by higher US tariffs.

[49] The results in Table 9 continue to hold if we restrict the sample to "Chemicals, rubber, and plastics" and "Machinery and automotive" while they are insignificant for "Food, textiles, and leather."

[50] Trade diversion increases the wages of unskilled women only (Table D6 in Appendix D). If we estimate column (2) of Table 9 for female workers, trade diversion disproportionately increases the employment of unskilled women.

[51] 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.

[52] 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).

3.5 Robustness

Appendices D and E report a battery of robustness checks for the estimates reported in column (2) of Table 5 for worker-level wages, and in column (2) of Table 8 for firm-level employment and mean wages. 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 wage 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 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, and 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, and we cluster standard errors by industry-year. We also perform falsification exercises by regressing in 2016 and 2017 worker-level wages, firm-level employment and mean wages on firm-level exports to the US instrumented with the firm-level exposure to US tariffs in 2018 and 2019.

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 wages. The effect is concentrated among female, unskilled, younger, and non-permanently insured workers. It is predominant among workers who remain employed by the same firm after the start of the trade war. At the firm level, trade diversion has a positive effect on employment but a negative effect on mean wages. The fall in the mean wage results from a composition effect as firms disproportionately increase employment of low-wage workers including female, unskilled, younger, and non-permanently insured workers. We conclude that trade diversion increases the labor demand of firms exposed to higher US tariffs against China. This shift in labor demand increases employment and wages, with the two effects being more pronounced for female, unskilled, younger, and non-permanently insured workers.

References

Abowd, J.M., Kramarz, F., Margolis, D.N., 1999. High wage workers and high wage firms. *Econometrica* 67 (2), 251–333.

Akerman, A., 2018. A theory on the role of wholesalers in international trade based on economies of scope. *Canadian Journal of Economics* 51 (1), 156–185.

Alfaro, L., Chor, D., 2023. Global supply chains: The looming "great reallocation." *NBER Working Paper* 31661.

Amiti, M., Kong, S.H., Weinstein, D.E., 2022. Trade protection, stock-market returns, and welfare. *NBER Working Paper* 28758.

Amiti, M., Redding, S.J., Weinstein, D.E., 2019. The impact of the 2018 tariffs on prices and welfare. *Journal of Economic Perspectives* 33 (4), 187–210.

Autor, D.H., Dorn, D., Hanson, G.H., 2013. The China syndrome: Local labor market effects of import competition in the United States. *American Economic Review* 103 (6), 2121–2168.

Autor, D.H., Dorn, D., Hanson, G.H., Song, J., 2014. Trade adjustment. *Quarterly Journal of Economics* 129 (4), 1799–1860.

Baghai, R., Silva, R., Soares, M., 2024. Are women more exposed to firm shocks? *CEPR Discussion Paper* 19462.

Balsvik, R., Jensen, S., Salvanes, K.G., 2015. Made in China, sold in Norway: Local labor market effects of an import shock. *Journal of Public Economics* 127, 137–144.

Benguria, F., Ederington, J., 2023. Decomposing the effect of trade on the gender wage gap. *Canadian Journal of Economics* 56 (3), 1082–1120.

Black, S.E., Brainerd, E., 2004. Importing equality? The impact of globalization on gender discrimination. *Industrial and Labor Relations Review* 57 (4), 540–559.

Bustos, P., 2011. The impact of trade liberalization on skill upgrading. Evidence from Argentina. *Barcelona GSE Working Paper* 559.

Campos-Vazquez, R.M., Esquivel, G., 2021. The effect of doubling the minimum wage on employment and earnings in Mexico. *Economics Letters* 209, 110124.

Card, D., Heining, J., Kline, P., 2013. Workplace heterogeneity and the rise of West German wage inequality. *Quarterly Journal of Economics* 128 (3), 967–1015.

Cavalcanti, T., Ogeda, P.M., Ornelas, E., 2025. The US-China trade war creates jobs (elsewhere). *Working Paper.*

Dauth, W., Findeisen, S., Suedekum, J., 2014. The rise of the East and the Far East: German labor markets and trade integration. *Journal of the European Economic Association* 12 (6), 1643–1675.

De Lyon, J., Pessoa, J.P., 2021. Worker and firm responses to trade shocks: The UK-China case. *European Economic Review* 133, 103678.

Dix-Carneiro, R., Kovak, B.K., 2017. Trade liberalization and regional dynamics. *American Economic Review* 107 (10), 2908–2946.

Fajgelbaum, P.D., Goldberg, P.K., Kennedy, P.J., Khandelwal, A., 2020. The return to protectionism. *Quarterly Journal of Economics* 135 (1), 1–55.

Fajgelbaum, P.D., Goldberg, P.K., Kennedy, P.J., Khandelwal, A., Taglioni, D., 2024. The US-China trade war and global reallocations. *American Economic Review: Insights* 6 (2), 295–312.

Fajgelbaum, P.D., Khandelwal, A., 2022. The economic impacts of the US-China trade war. *Annual Review of Economics* 14, 205–228.

Flaaen, A., Pierce, J., 2019. Disentangling the effects of the 2018-2019 tariffs on a globally connected US manufacturing sector. *Finance and Economics Discussion Series* 2019–086. Board of Governors of the Federal Reserve System.

Fortune-Taylor, S., Hallren, R.J., 2022. Worker-level responses to the USMCA high wage labor value content rules requirement. *US International Trade Commission Working Paper* 2022–01–A.

Freund, C., Mattoo, A., Mulabdic, A., Ruta, M., 2024. Is US trade policy reshaping global supply chains? *Journal of International Economics* 152, 104011.

Frías, J.A., Kaplan, D.S., Verhoogen, E., Alfaro-Serrano, D., 2024. Exports and wage premia: Evidence from Mexican employer-employee data. *Review of Economics and Statistics* 106 (2), 305–321.

Goldberg, P.K., Pavcnik, N., 2016. The effects of trade policy. In: Bagwell, K., Staiger, R.W. (Eds), Handbook of Commercial Policy Volume 1 Part A, Elsevier, Amsterdam, pp. 161–206.

Hakobyan, S., McLaren, J., 2016. Looking for local labor market effects of NAFTA. *Review of Economics and Statistics* 98 (4), 728–741.

Juhn, C., Ujhelyi, G., Villegas-Sanchez, C., 2014. Men, women, and machines: How trade impacts gender inequality. *Journal of Development Economics* 106, 179–193.

Kumler, T., Verhoogen, E., Frías, J., 2020. Enlisting employees in improving payroll tax compliance: Evidence from Mexico. *Review of Economics and Statistics* 102 (5), 881–896.

Lovely, M.E., Xu, D., Zhang, Y., 2021. Collateral benefits? South Korean exports to the United States and the US-China trade war. *Peterson Institute for International Economics Policy Brief* 21–18.

Mao, H., Görg, H., 2020. Friends like this: The impact of the US-China trade war on global value chains. *The World Economy* 43 (7), 1776–1791.

Mayr-Dorn, K., Narciso, G., Dang, D.A., Phan, H., 2023. Trade diversion and labor market adjustment: Vietnam and the US-China trade war. *Working Paper* 2304, University of Linz.

Morales Fredes, F., 2023. 3.5 million workers, the universe of the new outsourcing. *El Economista*.

Neil, D., 1995. Industry-specific human capital: Evidence from displaced workers. *Journal of Labor Economics* 13 (4), 653–677.

Nicita, A., 2019. Trade and trade diversion effects of United States tariffs on China. *United Nations Conference on Trade and Development Research Paper* 37.

Pierce, J.R., Schott, P.K., 2012. A Concordance Between Ten-Digit US Harmonized System Codes and SIC/NAICS Product Classes and Industries. *Journal of Economic and Social Measurement* 37 (1–2), 61–96.

Pierce, J.R., Schott, P.K., 2016. The surprisingly swift decline of US manufacturing employment. *American Economic Review* 106 (7), 1632–1662.

Puggioni, D., Calderón, M., Cebreros, A., Fernández, L., Inguanzo, J.A., Jaume, D., 2022. Inequality, income dynamics, and transitions of Mexican workers. *Banco de México Working Paper* 2022–14.

Revenga, A., 1997. Employment and wage effects of trade liberalization: The case of Mexican manufacturing. *Journal of Labor Economics* 15 (3), S20–S43.

Rotunno, L., Roy, S., Sakakibara, A., Vézina, P.-L., 2023. Trade policy and jobs in Vietnam: The unintended consequences of Trump's trade war. *QPE Working Paper* 2023–56.

Russell, A., 2019. Mexico is a beneficiary of the US-China trade war. *TECMA* (www.tecma.com).

Samaniego de la Parra, B., Puggioni, D., Spearot, A., 2024. "Everybody fights an American war": Market access and uncertainty during the US-China trade war. *Working Paper.*

Sanyal, A., 2021. Impact of US-China trade war on Indian external trade. ZBW–Leibniz Information Centre for Economics, Kiel, Hamburg.

Sharma, G., 2023. Monopsony and gender. *Northwestern University.*

Stock, J.H., Yogo, M., 2005. Testing for weak instruments in linear IV regression. In: Andrews, D.W.K., Stock, J.H. (Eds), Identification and Inference for Econometric Models: Essays in Honor of Thomas Rothenberg, Cambridge University Press, Cambridge, pp. 80–108.

Utar, H., 2014. When the floodgates open: "Northern" firms' response to removal of trade quotas on Chinese goods. *American Economic Journal: Applied Economics* 6 (4), 226–250.

Utar, H., 2018. Workers beneath the floodgates: Low-wage import competition and workers' adjustment. *Review of Economics and Statistics* 100 (4), 631–647.

Utar, H., Cebreros, A., Torres, L.B., 2025. The US-China trade war and the relocation of global value chains to Mexico. *Grinnell College.*

Utar, H., Torres, L.B., 2013. International competition and industrial evolution: Evidence from the impact of Chinese competition on Mexican maquiladoras. *Journal of Development Economics* 105, 267–287.

Verhoogen, E., 2008. Trade, quality upgrading, and wage inequality in the Mexican manufacturing sector. *Quarterly Journal of Economics* 123 (2), 489–530.

Viner, J., 1950. The customs union issue. Technical report. Carnegie Endowment for International Peace, New York.

Waugh, M.E., 2019. The consumption response to trade shocks: Evidence from the US-China trade war. *NBER Working Paper* 26353.

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.[53] 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

[53] 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.

References

Cota, I., Vidal, M., 2024. Mexico, the winner of the geopolitical battle between China and the United States. *El País*.

Karabell, Z., 2019. Trump's trade war is making Mexico great. *Politico*.

Longo, L., 2022. A surprise winner of the US/China trade war? Mexico. *Real Clear Markets*.

The Economist, 2018. A full-blown trade war between America and China looks likely.

The Economist, 2024. Could there be a US-Mexico trade war?

USTR, 2018. USTR issues tariffs on Chinese products in response to unfair trade practices. *Office of the United States Trade Representative*.

Webber, J., 2019. Mexico reaps gains from US-China trade war. *The Financial Times*.

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 against China were not on differential trends before the start of the trade war. Second, we present robustness checks for the estimates reported in column (2) of Table 2 showing that higher US tariffs against China increase Mexico's exports to the US relative to other destinations.

Pre-Trends For the elasticities estimated in Section 2.3 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):[54]

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

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

(Log) Exports	(1)	(2)
$\Delta\tau^{US-Ch}_{K,18-19} \times D_{US}$	−0.553 (0.368)	–
$\Delta\tau^{US-Ch}_{K,18} \times D_{US}$	–	−0.147 (0.314)
R-squared	0.484	0.484
Observations	783,191	783,191

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 the change in tariffs in 2018 and 2019 is insignificant, suggesting that Mexico's exports in product categories targeted by changes

[54] 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.

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.

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

(Log) Exports	(1)	(2)	(3)
$\Delta\tau_{K,t}^{US-Ch} \times D_{US}$	0.221** (0.087)	0.160*** (0.055)	0.133*** (0.048)
Tariff changes starting in	2018m2	2018m7	2018m2
Tariff changes	By wave	By wave	2019m12
Lagged tariffs	Yes	No	No
R-squared	0.602	0.556	0.556
Observations	3,155,022	7,095,104	7,095,104

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 D_{ij}, country-product D_{jk}, firm-time $D_{i,t}$, and product-time $D_{k,t}$ fixed effects are included. Robust standard errors adjusted for clustering at the 6-digit HS level are reported in parentheses. In column (1), the estimate is a cumulative effect (over three months). *** and ** indicate significance at the one and five percent levels.

Column (1) of Table B3 restricts the sample to manufacturing (HS codes 28–96). In column (2) we aggregate products at the 6-digit HS level. In that case, the regression controls for firm-country, country-HS6, firm-time, and HS6-time fixed effects. In columns (3) and (4) we aggregate exports at quarterly and annual frequency.

Table B3: Different Samples

(Log) Exports	(1)	(2)	(3)	(4)
$\Delta\tau_{K,t}^{US-Ch} \times D_{US}$	0.168*** (0.054)	0.205*** (0.056)	0.192*** (0.055)	0.261*** (0.076)
Sample	Manufacturing	HS6	Quarterly	Annual
R-squared	0.542	0.540	0.534	0.512
Observations	6,780,299	6,353,415	4,130,254	2,067,714

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 D_{ij}, country-product D_{jk}, firm-time $D_{i,t}$, and product-time $D_{k,t}$ fixed effects are included where time is months in columns (1) and (2), quarters in column (3), and years in column (4). In column (2), the country-product and product-time fixed effects are replaced with country-HS6 and HS6-time fixed effects. Robust standard errors adjusted for clustering at the 6-digit HS 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 wage 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 $w_{hi,t}$ is the daily wage 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 therefore rely on the sample of movers who switched employers between January 2016 and December 2017.

In a second step, for the workers who remain 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 7,851,802 workers included in our sample (see Table 4), the worker fixed effects are obtained for 6,102,707 workers, of whom 1,479,653 are movers and 4,623,054 are stayers between January 2016 and December 2017.

D Trade Diversion and Worker-Level Wages

This appendix provides robustness checks for the estimates reported in column (2) of Table 5 showing that trade diversion has a positive effect on wages. It also replicates the regressions reported in Table 6 on worker heterogeneity separately for men and women.

Wages and Workers In column (1) of Table D1 we estimate equation (3) but we omit observations from the sample for which multiple jobs are aggregated into a single job. In column (2), instead of adding the wages received from multiple jobs, for each worker with more than one job we retain the highest wage they receive in each time period. Finally, in column (3) we restrict the sample to permanently insured workers. Compared to the results in column (2) of Table 5, the estimated coefficients on firm-level exports to the US remain broadly unchanged, showing that trade diversion has a positive effect on wages.

Table D1: Wages and Workers

(Log) Wages	(1)	(2)	(3)
$\ln X_{i,t}^{US}$	0.104*** (0.031)	0.104*** (0.031)	0.093*** (0.033)
Sample	Single jobs	Highest wage	Permanent workers
First-stage $Exposure_{i,t}^{US-Ch}$	0.719*** (0.165)	0.719*** (0.165)	0.713*** (0.186)
Kleibergen-Paap	18.9*	19.0*	14.7
Observations	139,266,506	139,948,014	110,865,914

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 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 our main analysis we include time-varying fixed effects $D_{h\widetilde{i},t_{2019}}$ 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 $D_{h\widetilde{i},t_{2019}}$ 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.

Firm Size As explained in Section 3.1, 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

Table D2: Change in the Minimum Wage

(Log) Wages	(1)	(2)	(3)	(4)
$\ln X_{i,t}^{US}$	0.101*** (0.029)	0.094*** (0.028)	0.107*** (0.030)	0.098*** (0.030)
Daily wage threshold	176.72 pesos	500 pesos	176.72 pesos	None
Control for minimum wage	Fixed effects in 2019	Drop workers in 2019	Drop workers in 2019	Drop border region in 2019
First-stage $Exposure_{i,t}^{US-Ch}$	0.716*** (0.165)	0.789*** (0.194)	0.740*** (0.174)	0.811*** (0.202)
Kleibergen-Paap	18.9*	16.6*	18.1*	16.2*
Observations	139,948,014	129,944,551	135,734,443	127,186,849

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. *** and * indicate significance at the one and and ten percent levels.

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 (Campos-Vazquez, Delgado, and Rodas, 2020).[55] We then estimate equation (3) 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 likely less severe (they are instead insignificant for small and medium-sized firms, although there is evidence of trade diversion for medium-sized firms). The finding that our results hold for large firms only is consistent with the results reported in Table 5 showing that firms that raise wages in response to trade diversion are large exporters participating in the IMMEX program.

Table D3: Firm Size

(Log) Wages	(1)	(2)	(3)
$\ln X_{i,t}^{US}$	−0.366 (0.372)	0.075 (0.047)	0.102*** (0.031)
Firm size	Small	Medium	Large
First-stage $Exposure_{i,t}^{US-Ch}$	0.282 (0.262)	0.394*** (0.114)	0.725*** (0.169)
Kleibergen-Paap	1.2	12.0	18.5*
Observations	73,892	2,560,809	137,255,162

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 ten percent levels.

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, and we only consider tariffs raised from July 2018 onwards. In column (2), instead of allowing the tariffs on some products to be raised

[55] Campos-Vazquez, R.M., Delgado, V., Rodas, A., 2020. The effects of a place-based tax cut and minimum wage increase on labor market outcomes. *IZA Journal of Labor Policy* 10 (1), 1–24.

more than once in several waves, we measure the change in tariffs as the tariff increase observed in December 2019 relative to the period before the tariffs were first raised. In both cases, our results remain qualitatively similar.

Table D4: Tariffs

(Log) Wages	(1)	(2)
$\ln X_{i,t}^{US}$	0.119^{***} (0.034)	0.135^{***} (0.048)
First month of tariff increases	2018m7	2018m2
Tariff changes	By wave	2019m12
First-stage $Exposure_{i,t}^{US-Ch}$	0.712^{***} (0.174)	0.537^{***} (0.162)
Kleibergen-Paap	16.8^{*}	11.0
Observations	139,948,014	139,948,014

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 ten percent levels.

Specifications We perform a falsification exercise to ensure that the changes in US tariffs against China do not correlate with wages in the pre-trade war period. For each firm in each month, we calculate the 24-month lead exposure to changes in US tariffs against China. This allows us to assign the exposure to the tariff changes enacted in 2018 and 2019 to wages and firm-level US exports in 2016 and 2017. We restrict the sample to the 2016 and 2017 period and re-estimate equation (3). Column (1) of Table D5 shows that all coefficients are statistically insignificant. There is no evidence of trade diversion (in the first stage) nor of trade diversion impacting wages (in the second stage).

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 column (3) we allow for extensive margin adjustments and replace exports to the US with a value of zero when firms report positive exports to countries other than the US. We regress wages on the inverse hyperbolic sine transformation of firm-level exports to the US. Our results continue to hold but the estimated coefficient on firm-level exports to the US becomes slightly smaller in magnitude compared to the benchmark estimate reported in column (2) of Table 5. In column (4) we cluster standard errors by industry-year.

Worker Heterogeneity by Gender In Table D6 we run the same regressions as in Table 6 but separately by gender (for simplicity, we only replicate the regressions reported in columns 2–4 of Table 6). For both genders, the interactions between firm-level US exports and initial skills and age are negative and significant. Unskilled and younger workers therefore experience a larger increase in wages irrespective of their gender. Notice that the wages of skilled and older men fall in response to trade diversion (columns 2 and 4), while the wages of skilled and older women are not significantly

Table D5: Specifications

(Log) Wages	(1)	(2)	(3)	(4)
$\ln X_{i,t}^{US}$	-0.124 (0.237)	0.097^{***} (0.031)	–	0.103^{**} (0.040)
asinh $X_{i,t}^{US}$	–	–	0.073^{***} (0.019)	–
Sample	Placebo	Full	Full	Full
Lagged exposure	No	Yes	No	No
Zero trade	No	No	Yes	No
Clustering industry-year	No	No	No	Yes
First-stage $Exposure_{i,t}^{US-Ch}$	-0.318 (0.565)	0.712^{***} (0.178)	1.095^{***} (0.238)	0.719^{***} (0.214)
Kleibergen-Paap	0.3	6.3	21.2^{*}	11.3
Observations	65,926,706	114,951,600	151,950,133	139,948,014

Notes: The samples vary between January 2016 and December 2019 (and between January 2016 and December 2017 in column 1). 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 (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, five, and ten percent levels.

affected. Finally, the larger effect of trade diversion on the wages of non-permanently insured workers is only observed for men (column 6).

Table D6: Worker Heterogeneity by Gender

(Log) Wages	Female (1)	Male (2)	Female (3)	Male (4)	Female (5)	Male (6)
$\ln X_{i,t}^{US}$	0.504^{*} (0.280)	0.240^{***} (0.076)	0.201^{*} (0.112)	0.107^{**} (0.044)	0.162^{**} (0.077)	0.170^{***} (0.036)
$\ln X_{i,t}^{US} \times Skills_{16-17}$	-0.749^{**} (0.330)	-0.663^{***} (0.142)	–	–	–	–
$\ln X_{i,t}^{US} \times \ln Age_{16-17}$	–	–	-0.927^{***} (0.333)	-1.352^{***} (0.283)	–	–
$\ln X_{i,t}^{US} \times Permanent_{16-17}$	–	–	–	–	0.072 (0.078)	-0.107^{**} (0.042)
25^{th} percentile	0.813^{**} (0.412)	0.677^{***} (0.158)	0.435^{***} (0.166)	0.444^{***} (0.099)	–	–
75^{th} percentile	0.314 (0.202)	-0.095^{*} (0.054)	-0.010 (0.104)	-0.236^{***} (0.066)	–	–
$Permanent_{16-17}$	–	–	–	–	0.234^{*} (0.121)	0.063^{*} (0.034)
Kleibergen-Paap	2.0	11.3^{*}	2.4	9.5^{*}	2.1	8.0^{*}
Observations	48,329,574	80,222,381	40,163,380	68,762,686	40,163,380	68,762,686

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 permanently insured workers) are demeaned.

E Trade Diversion and Firm-Level Employment and Mean Wages

In this appendix we provide robustness checks for the firm-level employment and mean wage regressions presented in column (2) of Table 8. We also provide additional results showing how the workforce composition of firms changes in response to trade diversion. We estimate equation (6) but as dependent variables we use the firm-level shares of female and of non-permanently insured workers, and the mean skills and mean age of workers at the firm level in each month.

Wages and Workers We check the robustness of our findings to the measurement of wages and the inclusion of different types of workers in the sample. In column (1) of Table E1 we measure employment and mean wages excluding workers with multiple jobs. Column (2) reports the results of regressing mean wages using the highest wage 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: Wages and Workers

	(1)	(2)	(3)
(Log) Employment			
$\ln X_{i,t}^{US}$	0.144^{***}	–	0.118^{**}
	(0.049)		(0.049)
(Log) Mean wages			
$\ln X_{i,t}^{US}$	-0.197^{***}	-0.197^{***}	-0.204^{***}
	(0.028)	(0.028)	(0.029)
Sample	Single jobs	Highest wage	Permanent workers
First-stage $Exposure_{i,t}^{US-Ch}$	0.580^{***}	0.582^{***}	0.589^{***}
	(0.056)	(0.057)	(0.057)
Kleibergen-Paap	105.5^{*}	105.7^{*}	107.6^{*}
Observations	347,699	347,452	345,070

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, five, 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 (6) separately for firms with different sizes (firms are small if they employ fewer than five employees, medium if they employ 5–50 employees, and large if they have more

Table E2: Change in the Minimum Wage

	(1)	(2)	(3)	(4)
(Log) Employment				
$\ln X_{i,t}^{US}$	0.141^{***} (0.049)	0.142^{***} (0.048)	0.139^{***} (0.049)	0.139^{***} (0.048)
(Log) Mean wages				
$\ln X_{i,t}^{US}$	-0.197^{***} (0.028)	-0.156^{***} (0.024)	-0.154^{***} (0.025)	-0.156^{***} (0.025)
Daily wage threshold	176.72 pesos	500 pesos	176.72 pesos	None
Control for minimum wage	Fixed effects in 2019	Drop firms in 2019	Drop firms in 2019	Drop border region in 2019
First-stage $Exposure_{i,t}^{US-Ch}$	0.580^{***} (0.057)	0.649^{***} (0.063)	0.636^{***} (0.063)	0.644^{***} (0.063)
Kleibergen-Paap	105.0^{*}	104.3^{*}	100.9^{*}	103.2^{*}
Observations	347,452	321,722	322,652	321,638

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.

than 50 employees, Campos-Vazquez et al., 2020). 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. The estimates are insignificant for small firms. For medium-sized firms, the results are less clear cut as these firms increase exports to the US in response to higher US tariffs, but they do not change their employment while their mean wage falls.

Table E3: Firm Size

	(1)	(2)	(3)
(Log) Employment			
$\ln X_{i,t}^{US}$	-0.138 (0.258)	-0.115 (0.120)	0.207^{***} (0.042)
(Log) Mean wages			
$\ln X_{i,t}^{US}$	-0.526 (0.540)	-0.302^{**} (0.117)	-0.141^{***} (0.024)
Firm size	Small	Medium	Large
First-stage $Exposure_{i,t}^{US-Ch}$	0.255 (0.241)	0.320^{***} (0.098)	0.634^{***} (0.073)
Kleibergen-Paap	1.1	10.6	74.7^{*}
Observations	25,759	121,953	198,832

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, five, and ten percent levels.

Tariffs In column (1) of Table E4 we measure the firm-level exposure to changes in tariffs that the US raised exclusively against China (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)
(Log) Employment		
$\ln X_{i,t}^{US}$	0.131^{**} (0.050)	0.145^{***} (0.053)
(Log) Mean wages		
$\ln X_{i,t}^{US}$	-0.188^{***} (0.028)	-0.112^{***} (0.025)
First month of tariff increases	2018m7	2018m2
Tariff changes	By wave	2019m12
First-stage $Exposure_{i,t}^{US-Ch}$	0.564^{***} (0.057)	0.422^{***} (0.043)
Kleibergen-Paap	96.9^{*}	96.7^{*}
Observations	347,452	347,452

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, five, and ten percent levels.

Specifications We perform a falsification exercise and assign the firm-level exposure to US tariffs against China in 2018 and 2019 to firm-level employment, mean wages, and US exports in 2016 and 2017. We restrict the sample to the 2016 and 2017 period and re-estimate equation (6). Surprisingly, the first-stage regression in column (1) of Table E5 provides evidence of trade diversion from China to Mexico (this finding contrasts with the results reported in column 1 of Table D5 at the worker level). However, the elasticities of employment and mean wages 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 wages.

Column (3) 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 wages 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 wages (but the estimated coefficients are smaller in magnitude compared to the ones reported in column 2 of Table 8). Column (4) shows that our results remain robust to clustering by industry-year.

Explaining Firm-Level Characteristics Another way of showing how the workforce composition of firms changes in response to trade diversion is to estimate equation (6) using as dependent variables

Table E5: Specifications

	(1)	(2)	(3)	(4)
(Log) Employment				
$\ln X_{i,t}^{US}$	0.121 (0.080)	0.172*** (0.064)	–	0.146** (0.064)
$\text{asinh}\, X_{i,t}^{US}$	–	–	0.101*** (0.028)	–
(Log) Mean wages				
$\ln X_{i,t}^{US}$	−0.031 (0.033)	−0.222*** (0.038)	–	−0.197*** (0.045)
$\text{asinh}\, X_{i,t}^{US}$	–	–	−0.105*** (0.017)	–
Sample	Placebo	Full	Full	Full
Lagged exposure	No	Yes	No	No
Zero trade	No	No	Yes	No
Clustering industry-year	No	No	No	Yes
First-stage $Exposure_{i,t}^{US-Ch}$	0.297*** (0.066)	0.470*** (0.063)	0.938*** (0.109)	0.582*** (0.089)
Kleibergen-Paap	20.1*	26.5*	73.5*	42.7*
Observations	167,624	258,594	437,439	347,452

Notes: The samples vary between January 2016 and December 2019 (and between January 2016 and December 2017 in column 1). 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 (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, five, and ten percent levels.

the firm-level shares of female and of non-permanently insured workers in each month, and the mean skills and mean age of workers at the firm level in each month. The estimates in Table E6 indicate that trade diversion increases the firm-level shares of female and of non-permanently insured workers (columns 1 and 4), and reduces the mean skills and mean age of the firm-level workforce (columns 2 and 3). These results are consistent with the ones reported in Table 9.

Table E6: Explaining Firm-Level Characteristics

Dependent variable	(Log) Female share	Mean skills	(Log) Mean age	(Log) Non-permanent share
	(1)	(2)	(3)	(4)
$\ln X_{i,t}^{US}$	0.119*** (0.037)	−0.235*** (0.028)	−0.031*** (0.007)	0.217*** (0.059)
First-stage $Exposure_{i,t}^{US-Ch}$	0.574*** (0.059)	0.586*** (0.059)	0.582*** (0.057)	0.636*** (0.064)
Kleibergen-Paap	95.2*	97.5*	105.7*	99.1*
Observations	328,538	316,770	347,452	271,921

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.