Stockholm School of Economics
Department of Economics
5350 Master's thesis in economics
Academic year 2022-2023

Import Competition and Gender Differences in Labor Market Responses in Mexico

Clara Magnusson (24357)
Viktoria Piirainen (42116)

Abstract: This paper examines the impact of increased Chinese imports in Mexican commuting zones over the period 1990-2010. We use a Bartik instrument and exploit initial differences in industry gender composition, allowing us to generate variation in local import exposure. The results show that Chinese imports in female-intensive manufacturing industries have a significant negative impact on local female manufacturing employment. On the other hand, we find no effect of imports in male-intensive industries on male manufacturing employment. Moreover, we find that low-educated workers are impacted the most by the import shock.

JEL classification: E24, F14, F16, I24, J16, J21, L60, R12
Keywords: Trade Shock, Labor Market Effects, Bartik Instrument, Gender Differences, Mexico

Supervisor: Céline Zipfel
Date submitted: 15 May 2023
Date examined: 24 May 2023
Discussants: Adam Chwojnicki & Isak Alveteg
Examiner: Karl Wärneryd

Acknowledgements

We would like to begin by thanking our thesis supervisor Céline Zipfel for her invaluable support. We also want to extend our thanks to Karin Hederos from the *Swedish Institute for Social Research* (SOFI) who has been more than generous in providing advice and encouragement. Of course, we also want to thank our peers who have motivated and helped us daily from beginning to end.

Table of Contents

List of Tables

List of Abbreviations

IPUMS	Integrated Public Use Microdata Series
INEGI	National Institute of Statistics and Geography
OECD	Organisation for Economic Cooperation and Development
WTO	World Trade Organization
NAFTA	North American Free Trade Agreement
CZ	Commuting Zones
OLS	Ordinary Least Squares
2SLS	Two-Stage Least Squares
IV	Instrumental Variable
LFP	Labor Force Participation
FLFP	Female Labor Force Participation
SBTC	Skill-Biased Technical Change

1 Introduction

With China's entry into the World Trade Organization in 2001, its integration into the global economy accelerated, prompting increased interest in the effects of import competition on labor markets. While there is ample research showing that import competition has reduced manufacturing employment in developed regions such as the United States and Europe (Autor, Dorn, and Hanson 2013; Dorn and Levell 2021), the evidence from developing countries is less clear-cut and shows that import competition has also stimulated sectoral reallocation and formal employment growth for some groups of workers (see e.g. Connolly 2022; Mansour, Medina, and Velasquez 2022 Gaddis and Pieters 2012).

This thesis joins the field of research that investigates the impact of Chinese import competition on labor market outcomes in developing countries. Mexico is a particularly interesting case because of the economy's emphasis on manufacturing goods production (Sánchez-Juárez, García-Andrés, and Revilla 2015) and salient surge in Chinese imports since the early 2000s. Additionally, the low female participation rate in Mexico compared to other emerging economies (Bolio et al. 2019) makes it crucial to understand the gender dynamics of the labor market effects. Gendered labor market outcomes of trade is an area where the World Bank has identified a need for further research (The World Bank 2021b).

We use variation in import exposure across Mexican commuting zones (CZs) stemming from initial differences in industry-gender employment composition, in order to estimate the effects that Chinese competition has had on local Mexican labor markets between 1990 and 2010. To purge the results from endogeneity concerns, we further instrument import flows to Mexico using Chinese import flows to the rest of the world. Furthermore, we disaggregate the results for men and women into different subgroups by educational level and marital status, and study potential reallocation effects into non-trading sectors.

Our findings show that import competition from China has an adverse effect on manufacturing employment in Mexico, with the decline in employment primarily attributed to increased import competition in female-intensive industries. We estimate that one unit trade shock decrease local female manufacturing employment by 1.604 percentage points on average. In contrast, we do not detect any negative employment effects in response to an import shock in male-intensive industries. Moreover, the heterogeneity analysis reveals that the reduction in female manufacturing employment is attributed to women with low levels of education. Our results also suggest that men reallocate into the service sector and left the labor force in response to the trade shock

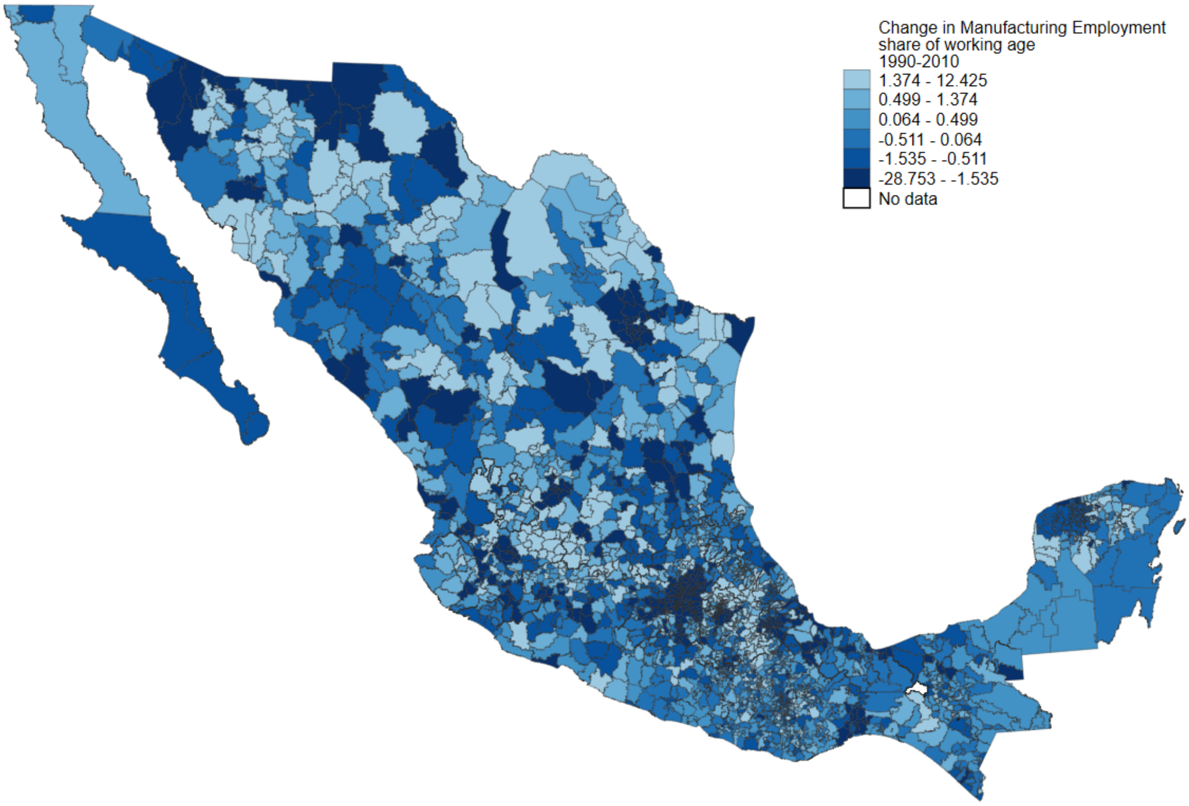
This thesis contributes to the literature in several ways. While the effects of Chinese imports on Mexican employment rates and labor force participation (LFP) have been documented in previous research, much of the heterogeneity underlying these effects remains unexplored. Hence, we aim to fill this research gap. Specifically, we differ from the existing literature on labor market effects of Chinese import competition in Mexico by constructing two separate import exposure variables for men and women. This allows us to exploit gender variation in industry specialization, as men and women tend to work in different industries. This way, we obtain a measure of the trade shock that distinctly affects male- and female-intensive industries respectively. This approach builds on Autor, Dorn, and Hanson 2019 who find that this method has a significant impact on their results in the U.S. To our knowledge, no previous study has used this technique in Mexico, and we are also the first study extending this empirical approach to non-trading and services employment.[1] Furthermore, we add to the literature by studying new outcomes associated with different degrees of labor market participation, namely manufacturing employment by educational level and marital status.

The rest of this thesis is organised as follows. Section 2 outlines the institutional setting in Mexico, including gender differences in the labor market and some features of the surge in Chinese imports. An overview of the literature on the current state of research is given in Section 3, while Section 4 lays out the theoretical framework. Sections 5 and 6 present the empirical strategy and key features of the data. Section 7 then presents the results while Section 8 provides several robustness tests. Finally, Section 9 provides a discussion about the results before a conclusion is drawn in Section 10.

[1] Previous research suggests that Chinese import competition has led to reallocation effects from manufacturing to other sectors (see e.g. Mansour, Medina, and Velasquez 2022; Connolly 2022).

2 Mexico Setting

As a developing country, Mexico faces large challenges, one being the relatively slow economic growth which has averaged around 2% per year between 1980 and 2018 (The World Bank 2023). Much of this is due to a high level of labor informality with around 56% of the working age population in informal labor markets (INEGI 2022).



Source: IPUMS. Authors' compilation.

Figure 1: Change in Manufacturing Employment in Mexico 1990-2010

Sánchez-Juárez, García-Andrés, and Revilla 2015 underscore that the manufacturing industries are imperative to the Mexican economy through their forward and backward linkages in production. Figure 1 displays changes in manufacturing employment rates as a percentage of the working age population in Mexican commuting zones between 1990 and 2010. The map uses a color scheme to highlight areas where manufacturing employment has decreased (dark blue) or increased/remained relatively stable (lighter blue) over time. Notably, the capital Mexico City, located in the south-center of the country, represents one of the dark-blue clusters that have experienced a reduced share of manufacturing employment. Conversely, the map also shows a band of northern regions near the U.S. border that have not seen a decline in manufacturing employment, which may be attributed to the growth of export-oriented industries in those areas. The map reveals that the dark blue clusters are spread throughout the country and not exclusively concentrated to one particular geographical area. Overall, we note that there are significant regional disparities.

The subsequent section outlines the institutional setting in Mexico by first describing the main sectoral differences in female and male labor market participation, with an emphasis on the manufacturing sector during the period of study. Thereafter, we describe the features characterizing the salient surge in Chinese import competition in Mexico.

2.1 Gender Differences in the Mexican Economy

There are salient gender gaps in Mexico's economic activities. Even though female labor force participation (FLFP) in Mexico has increased over recent decades, it was still at 45.7% in 2022.[2] This was lower than the corresponding average for Latin America and the Caribbean at large, which amounted to 51% (ILOSTAT 2022). The persistent gender gap in Mexico is estimated to cause a potential loss of up to 25% of income per capita (The World Bank 2019).

The manufacturing and services industries were two of the main employing sectors in the Mexican economy in the 1990s. The National Institute of Statistics and Geography (INEGI) has compiled two reports on gender differences in economic activities in Mexico, which overlap with the period studied in this thesis. The first report, covering the years 1993 and 1998, highlights that the manufacturing sector was one of the main employing sectors in Mexico in the 1990s (INEGI 2004).[3] Women experienced a lower participation rate in all industries, including manufacturing.[4] Male participation rates were higher in all

[2]Measured as a share of women aged 15 and above.

[3]Within the manufacturing sector, the industries gathering most number of employees (71%) were metal products, machinery and equipment, food, drinks and tobacco, textiles and garments, and the leather industry.

[4]On average, 30.3% of all employed in manufacturing industries were women in 1993, a number which had risen to a modest 33.6% in 1998.

manufacturing industries with one exception - the textile industry - where the proportion of women was 50.4% in 1998. The lowest rates of female participation were encountered in the basic metals industry, where only 2% of employees were women in 1993 (98% men) and 11.6% in 1998 (88.4% men). In the remaining manufacturing industries, the proportion of women varied around 20-30%. In these years, the employed personnel in the services sector were also mostly made up of men, with 65 employed women for every 100 men in 1998. The subsectors within the service industry that contributed mostly to female employment were restaurants and hotels, professional, technical, personal and household services, educational services, medical, social assistance and organizations (INEGI 2004).

The manufacturing and services industries remained central to Mexican employment after 2010 (INEGI 2019).[5] In 2013, the proportion of women in the manufacturing sector was 35%. The sectors with a high female share of workers were the textile industry not including clothes (62%), clothing industry (59.6%), other manufacturing (48.4%), and electronic equipment (49.1%). The industries with the lowest female share of workers were wood (14.5%), basic metals (12.9%), and metal products (16.9%).

Additionally, there are large geographical disparities in FLFP with considerable gender gaps in regions like Tabasco, Veracruz, and Chiapas and smaller gender gaps in Mexico City, Colima, and Baja California (The World Bank 2019). Women are over-represented in the informal sector, which pays lower wages and ultimately decreases incentives for women to participate in the labor market. This employment gender gap persists despite having closed the gender gaps in primary, secondary, and tertiary education enrollment (The World Bank 2021a).

Another source of gender disparity is the difference in endowments and access to productive inputs. The gender gap in financial access is significantly larger than in the rest of Latin America as well as other OECD countries (The World Bank 2021a). These gaps are inflated by information asymmetries in Mexican credit markets, which leaves women much less likely to own financial assets such as bank accounts, pension funds, or insurance policies.

[5] The INEGI report from 2019 covers data from 2013 and 2018.

Furthermore, the division of household work is unbalanced between the genders in Mexico, as women spend on average up to 26 more hours per week on household chores and up to 12 more hours per week on childcare than men (The World Bank 2019). This implies that women in Mexico also become less flexible in the labor market and take on part-time informal employment to a larger extent than men. This effect is amplified by low trust in childcare services, which otherwise could alleviate the burden of household work. Mexico also has a high rate of teenage pregnancies, despite a slight decline over recent years. Teenage pregnancies have negative effects on the educational and economic opportunities of the mothers, as it is the third leading cause of girls in Mexico dropping out of school (ibid).

2.2 Chinese Import Competition

Over the past 30 years, China has transitioned to a market-oriented economy and significantly reduced trade costs. The country's integration into global trade, partly reflected by its entry into the World Trade Organization in 2001, has increased exponentially in recent decades. This has given rise to changing dynamics such as increased competition, lower prices for consumer goods, and labor market effects. As seen below in Figure 2, there was a clear increase in Chinese imports to Mexico during the first decade of 2000, with a minor drop during the financial crisis in 2009.

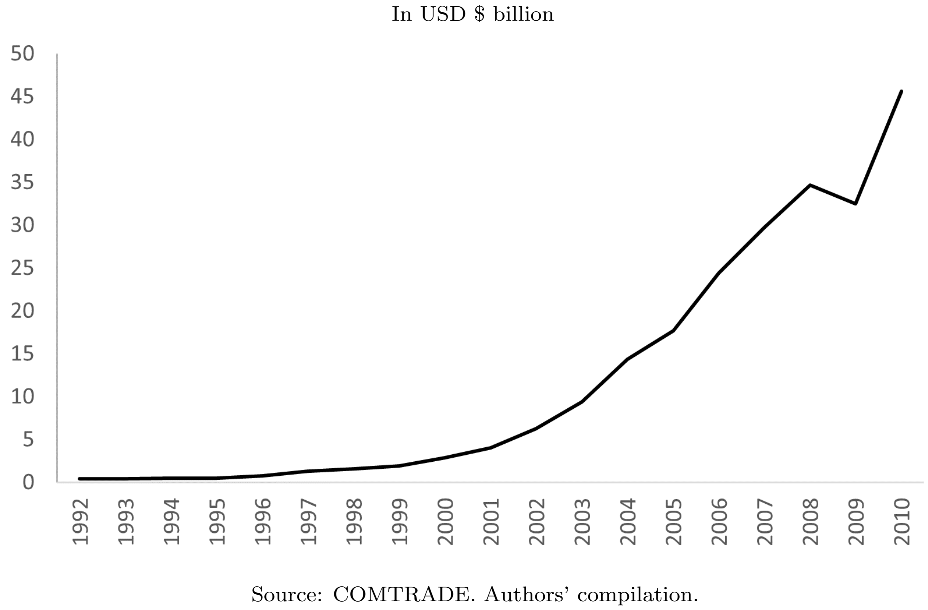


Figure 2: Total Imports in Goods from China to Mexico 1992-2010

The rise of China's global presence in the market has exposed different industries to varying degrees. The largest import exposures were in the textiles and apparel industry, but also in industries like computers and electronics, and electrical equipment. Notably, the rise in Chinese import competition did not only affect a handful of labor-intensive industries but rather a diverse range of manufacturing sectors with distinct features (Blyde and Fenantes 2019).

Beyond increased import competition in the domestic market, manufacturing firms in Mexico experienced an increase in import competition in export destinations; specifically in the U.S. (Mendez 2015). Mexico has had a competitive advantage in manufacturing production within the North American Free Trade Agreement (NAFTA) and a long tradition of exporting manufactured goods to the U.S. One industry that was especially affected by the surge in Chinese competition on export markets is textile and apparel. In 2000, Mexico was the largest single supplier of textiles and apparel to the U.S. However, this shifted throughout the 2000s as the Chinese quantity and market share of apparel in the U.S. (Robertson 2019).

3 Literature Review

This thesis relates to several strands of literature. First, it is closely connected to the research on the effects of Chinese import competition on labor market outcomes, a field that has received increased attention in the empirical literature during the last decade. Much of the research on this topic follows a study by Autor, Dorn, and Hanson 2013 who exploit the initial industry composition of U.S. commuting zones to obtain quasi-exogenous variation in imports from China over time. They find that the import shock has a significant reducing impact on manufacturing employment in U.S. commuting zones and that this effect is particularly salient for men. Through a follow-up study, Autor, Dorn, and Hanson 2019 additionally incorporate initial gender employment composition in U.S. commuting zones. They similarly find that trade-induced decline in manufacturing employment reduces the economic stature of men relative to women.

Since this seminal contribution, several studies have documented the effects of Chinese imports in other parts of the world, including in Latin America. Costa, Garred, and Pessoa 2016 also take a local labor markets approach and find that import competition from China is associated with slower manufacturing wage growth in Brazil. Mansour, Medina, and Velasquez 2022 examine Peruvian gender differences in local labor market responses to Chinese import competition. While they do not find a negative effect on male employment, they find a negative effect on the employment of low-educated women. Morales, Pierola, and Sanchez-Navarro 2021 also study Peru but use industries as the unit of observation rather than local labor markets and find that individuals with low levels of education are more likely to move into informal employment as trade with China increases. In Chile, César and Falcone 2020 find that industries with higher exposure to Chinese import competition see relative declines in employment, revenue and physical capital, and that these effects are concentrated among establishments with low initial levels of productivity.

This thesis also relates to the literature on trade and sectoral reallocation effects through movements into non-competing or informal sectors of the economy. (See e.g. Wacziarg and Seddon Wallack 2004; Artuç, Chaudhuri, and McLaren 2010; Gaddis and Pieters 2012; Dix-Carneiro 2014). Acemoglu et al. 2016 outline a conceptual framework that explains the total national impact of Chinese import exposure on employment as consisting of the *direct impact* on exposed industries, the *indirect impact* on linked industries, the *aggregate reallocation effects*, and the *aggregate demand effects*. In contrast to many empirical findings of the direct effects in the manufacturing sector, indirect effects in non-trading sectors do not seem to be exclusively adverse. Connolly 2022 studies the China import shock in Brazil and looks at gender-specific labor outcomes beyond manufacturing, namely in the traded and non-traded sectors respectively. While Connolly finds that regions with higher exposure to imports have slower wage growth in the traded and formal sectors, she also documents that the trade-induced wage decline has a positive effect on employment in the formal sector - especially for women. Regions more exposed to Chinese imports experience an increase in the female employment to population ratio and a decrease in male and female unemployment rates.

There are also some studies, prior to this, documenting the labor market effects of Chinese import competition in Mexico. Mendez 2015 uses Mexican municipalities to define local labor markets and finds that Chinese import competition has a negative effect on Mexican manufacturing employment share. This effect is larger for regions with high exposure to Chinese competition in the U.S. market. With regards to gendered effects, Mendez finds that men's employment in manufacturing declines as a result of the import shock. For female workers, however, Mendez notes the opposite effect. Mendez documents a slight increase in the proportion of manufacturing employment among women, while the share of non-manufacturing employment decreases. Mendez finds no effect on wages. A more recent piece of research is a working paper by Heckl 2022. Heckl extends the analysis of Mendez 2015 to include sectors beyond manufacturing and adds labor force participation and unemployment as outcomes. She finds that while Mexican employment rates drop and unemployment rates increase for both sexes, men's LFP is unaffected while women are more likely to leave the labor force entirely. Moreover, she performs heterogeneity analyses across industries and documents that manufacturing industries stand for the largest decline in employment, and a slight positive effect for men in the services industry. Finally, Blyde, Busso, and Romero Fonesca 2020 add to the results by Mendez by analyzing the effects on different types of workers in Mexico. They find that the impact is most prominent for production workers than for non-production workers and suggest that this indicates that lower-skilled workers were more severely affected. Additionally, their results indicate that the increased indirect Chinese competition in the US product market is not very important in determining the Mexican labor market responses.

Lastly, this thesis is related to the literature on factors affecting gender gaps in employment and LFP in Mexico more generally, as these factors may also be possible determinants of differences in labor market responses to trade shocks. The empirical literature shows that improved access to education, childcare facilities, and better working conditions are all factors that improve female labor market participation in Mexico. Household responsibilities are also identified as an important determinant of formal employment. Duval-Hernandez 2022 discovers that Mexican women with household responsibilities are less likely to acquire formal employment despite the preference for formal employment among informal workers. Additionally, San Juan Bernuy and Boertien 2023 find that women in Mexico are more likely to work if they have a partner with low income, while men's education has a positive effect on women's labor participation. Also, López-Acevedo et al. 2021 find that availability of childcare facilities, higher education, and increased wages in the service sector are key factors that improve FLFP in Mexico.

4 Theoretical Framework

4.1 Direct Effects

Autor, Dorn, and Hanson 2013 have developed a theoretical model that treats local labor markets as open sub-economies with three main outcomes. These are changes in wages ($\hat{W}_i$) and manufacturing employment in industries producing traded ($\hat{L}_{Ti}$) and non-traded ($\hat{L}_{Ni}$) goods.

$$\hat{W}_i = \sum_j c_{ij} \frac{L_{ij}}{L_{Ni}} \left[\theta_{ijC} \hat{E}_{Cj} - \sum_k \theta_{ijk} \phi_{Cjk} \hat{A}_{Cj} \right] \tag{1}$$

$$\hat{L}_{Ti} = \rho_i \sum_j c_{ij} \frac{L_{ij}}{L_{Ti}} \left[\theta_{ijC} \hat{E}_{Cj} - \sum_k \theta_{ijk} \phi_{Cjk} \hat{A}_{Cj} \right] \tag{2}$$

$$\hat{L}_{Ni} = \rho_i \sum_j c_{ij} \frac{L_{ij}}{L_{Ni}} \left[-\theta_{ijC} \hat{E}_{Cj} + \sum_k \theta_{ijk} \phi_{Cjk} \hat{A}_{Cj} \right] \tag{3}$$

In this model of monopolistic competition, a region i produces a non-traded homogeneous good (N) and multiple traded manufacturing goods (T). Wage and employment outcomes are the sum of increased demand for Chinese imports in each industry j (given by the change in Chinese expenditure $\hat{E}_{Cj}$) times the initial output by region i in industry j that is shipped to China (θ_{ijC}). We then add/subtract this by the decreased export demand in international markets where Chinese competition has increased. This is calculated as Chinese export capability ($\hat{A}_{Cj}$) times the initial output by region i in industry j that is shipped to market k (θ_{ijk}) and the market initial share of Chinese exports (ϕ_{Cjk}). These are then summed across industries j and weighted by initial ratio of industry local employment ($\frac{L_{ij}}{L_{Ti}}, \frac{L_{ij}}{L_{Ni}}$). This is multiplied by a scaling factor for general equilibrium ($c_{ij} > 0$) and the equations for employment are also scaled by the current-account deficit in region i (ρ_i).

According to this model, a positive shock to Chinese export supply ($\hat{A}_{Cj}$) will decrease region i's wage, decrease employment in traded goods and increase employment in non-traded goods. This implies a reallocation effect in the local labor market. On the other hand, a positive shock to Chinese demand ($\hat{E}_{Cj}$) will increase region i's wage, increase employment in traded goods, and decrease employment in non-traded goods. What this implies is that with balanced trade between exports and imports, the aggregate labor demand in a country should remain the same. However, in times of unbalanced trade, the local labor markets will be affected with respect to both wages and employment.

To use the above in empirical analysis, we assume that the current account deficit (ρ_i) and the general equilibrium scalar (c_{ij}) are equal across Mexican regions and thus $\rho_i c_{ij} = \alpha$. If we exclude the Chinese import demand component, the employment effect on Mexican local labor markets is:

$$\hat{L}_{Ti} = -\alpha \sum_{j}^{J} \frac{L_{ij}}{L_{Ti}} \frac{X_{ijMX}}{X_{ij}} \frac{M_{CjMX}}{E_{MXj}} \hat{A}_{Cj} \approx -\tilde{\alpha} \sum_{j}^{J} \frac{L_{ij}}{L_{MXi}} \frac{M_{CjMX} \hat{A}_{Cj}}{L_{Ti}} \tag{4}$$

In Equation 4, MX denotes Mexico and employment in its trading industries depends on the supply-driven change in Chinese exports ($M_{CjMX} \hat{A}_{Cj}$). This model predicts that a supply-driven increase in Chinese exports will have a negative effect on manufacturing employment in Mexican local labor markets.

4.2 Indirect Effects

Acemoglu et al. 2016 expand on the theoretical model of Autor, Dorn, and Hanson 2013 and conceptualize a framework to decompose the total employment effects of increased imports from China on national and local labor markets. The decomposition consists of four different effects.

National Employment Impact
= *Direct Impact on Exposed Industries*
+ *Indirect Impact on Linked Industries*
+ *Aggregate Reallocation Effects*
+ *Aggregate Demand Effects*

They define the direct impact of import competition as the employment effects on industries that directly compete in the production of the imported goods from China. Next, they introduce the indirect impact on employment which can be divided into two components. A shock to the demand of a domestically produced competing good will subsequently reduce demand for the inputs of this industry as well. For example, suppose that the mining industry supplies ores and minerals to the manufacturing industry. Hence, these industries will be indirectly affected through *upstream effects*. On the other hand, the trade shock will also affect industries that are purchasing the output of manufacturing firms. These *downstream effects* are more ambiguous in direction as the import competition may pressure the input prices to a lower level and could have positive indirect employment effects. The reallocation effects represent a possible shift of factors of production to non-competing industries, such as the service sector, which could stabilize employment. However, this shift may not be as smooth as in theory, which in turn could lead to negative aggregate demand effects.

$$\begin{aligned}
&\text{Local Employment Impact}\\
&= \textit{Direct Impact on Exposed Industries}\\
&+ \textit{Local Impact on Linked Industries}\\
&+ \textit{Local Reallocation Effects}\\
&+ \textit{Local Demand Effects}
\end{aligned}$$

Acemoglu et al. 2016 argue that the direct impact on the local labor market is comparable to the national impact when scaled to local industry composition. However, the remaining three effects may differ from the national aggregates. For example, input-output linkages may stretch across multiple regions, which will distort the indirect local employment effects. However, the aggregate reallocation and demand effects are argued to be connected to their local counterparts. As suggested by Autor, Dorn, and Hanson 2013 among others, the worker migration effects of these market shocks are moderate. This implies that the workers instead would transition to other industries within the same local labor market when hit by direct employment shocks.

4.3 Trade and Heterogeneous Effects

As covered in Section 2, there are salient gender differences in industry employment in Mexico. This implies that external market shocks that vary by industry may cause heterogeneous gender labor market effects. This section will present theories on why gender differences in sectoral distribution exist which can then be used to better evaluate gender differences in responses. Further, as we study heterogenous outcomes by educational level and marital status, we present a theoretical motivation as to why these characteristics can drive labor market responses to trade.

As outlined above, theory predicts that an import competition shock can induce a reallocation of workers into non-trading sectors. However, the magnitude and speed of this reallocation process also depend on the prevalence of labor market adjustment costs and the flexibility of labor markets (IMF, WB, WTO 2017). Research on the reallocation process has shown that labor mobility frictions can increase the costs and lengthen the time for adjustments. The barriers can arise from the costs involved in switching occupations, industries, or moving between regions, as well as from labor market frictions like those related to job security laws and imperfect credit markets (IMF, WB, WTO 2017). In developing countries, factor mobility frictions are generally higher (Artuç et al. 2015), and when faced with trade adjustments, female, older, and less skilled workers may experience more severe impacts due to greater frictions (Artuç and McLaren 2015).

There are several ways in which increased trade can affect differential labor outcomes across genders. On one hand, female and male labor may be treated as imperfect substitutes (Ostry et al. 2018) which can cause heterogeneous responses to trade. On the other hand, Becker 1957 argues that competition, which can stem from increased international trade, can diminish the ability of employers to discriminate against workers based on non-productive attributes.

Skill-biased technical change (SBTC) theory describes a shift in production that favors skilled workers over unskilled workers. This is equivalent to a comparative advantage of workers with higher levels of education (Bartel and Lichtenberg 1987). This type of technical change can be induced by trade and may ultimately put upward pressure on the demand for skilled labor and increase the skill premium. Empirically, this has shown to be the case even in ow-skill-intensive economies (Goldberg and Pavcnik 2007). As trade is associated with improved access to new technologies, this also allows firms to computerize processes and lessen the need for physical labor in blue-collar occupations (Juhn, Ujhelyi, and Villegas-Sanchez 2013; Juhn, Ujhelyi, and Villegas-Sanchez 2014). One common hypothesis is that men and women differ in their skill sets as workers, for example, that women have a disadvantage with respect to physical skills. Following SBTC, this implies that the trade-induced demand for skilled labor could favor women (with a comparative advantage in non-physical skills) who are highly educated (high-skilled). Simultaneously, if women are less educated than men, they may not be able to gain from the increase in high-skilled jobs.

Another demographic determinant of employment is marital status. Although marriage can be seen as a choice of personal preference and adherence to social norms, it can also be viewed through the lens of economic theory and utility maximization. Marriage allows individuals to share costs and incomes which creates flexibility in the labor market (Becker 1973). In the case of a trade shock that differs in the impact on men and women, we expect a shift in the comparative advantage of market labor. This may then also cause a shift in the allocation of home and market production of married couples as they try to maximize household utility. Shore 2010 portrays marriage as a mechanism for mitigating employment-related risks and providing a safeguard against economic shocks. His research reveals that husbands typically face greater individual income risks during recessions, but that this risk is attenuated when accounting for changes in cross-sectional variance. This is attributed to improved intra-household risk-sharing as a coping mechanism in response to economic downturns. Therefore, we might expect to see resilience to labor market shocks when looking at the married population.

5 Empirical Strategy

5.1 Import Penetration Variable

To obtain geographical variation in imports from China, we construct a Bartik-style instrument. The identification strategy, named after Timothy Bartik (Bartik 1991), has become an influential method in several fields, including trade and labor economics (Cunningham 2021). The Bartik instrument typically consists of two components: one share element which is constant over time and one shift element which varies with time.

In this thesis, the Bartik-style instrument is an import penetration index that captures the degree to which a local labor market has been exposed to Chinese import competition. Specifically, the index is an industry-weighted change in imports, varying across commuting zones (CZs) and time-periods (1990-2000 and 2000-2010). As the data on trade flows only is provided at the national level across industries, we take advantage of the heterogeneity in initial local industry composition to yield geographical variation in import exposure.

$$\Delta IP_{it}^{mx} = \sum_j \frac{L_{jit_0}}{L_{it_0}} \times \frac{\Delta I_{jt}^{mx}}{L_{jt_0}} \tag{5}$$

Specifically, we define equation (5) where ΔIP_{it}^{mx} measures the change in imports across Mexican commuting zones (i) and time (t). This variable consists of the base-year industry composition measured by the CZ employment in industry j (L_{jit_0}) over the total CZ employment (L_{it_0}) in 1990 (t_0). Then, this component is multiplied by (ΔI_{jt}^{mx}) which is the change in industry imports in 1000 U.S. dollars from China to manufacturing industry j, normalized by the total national employment in the industry at base-year (L_{jt_0}).

To distinguish between shocks that hit female- and male-intensive industries respectively, we follow Autor, Dorn, and Hanson 2019 and modify the import penetration variable into two additive components by gender. This allows us to capture two channels of the import shock, one channelled through female-intensive industries and one channelled through male-intensive industries. As manufacturing industries vary in their gender composition, trade shocks are expected to affect employment outcomes differently depending on which industries are exposed and what the geographical-sectoral gender distribution looks like. We define equation (6).

$$\Delta IP_{fit}^{mx} = \sum_j \frac{f_{jit_0} L_{jit_0}}{L_{it_0}} \times \frac{\Delta I_{jt}^{mx}}{L_{jt_0}} \quad \text{and} \quad \Delta IP_{mit}^{mx} = \sum_j \frac{(1-f_{jit_0}) L_{jit_0}}{L_{it_0}} \times \frac{\Delta I_{jt}^{mx}}{L_{jt_0}} \tag{6}$$

Here, $1 - f_{jit_0}$ and f_{jit_0} each represent the male and female share of employment in each geographical-industry pair at the base-year. Hence, the trade flows are divided into two components. ΔIP_{fit}^{mx} is the import shock that can be attributed to initial local female employment composition while ΔIP_{mit}^{mx} is the import shock that can be attributed to initial local male employment composition.

5.2 Main Model Specification

Our baseline specification is defined follows.

$$\Delta Y_{it} = \beta_0 + \beta \Delta IP_{it}^{mx} + \delta \mathbf{X}_{it_0} + \sigma \Delta N_{it_0} + \gamma_t + \varepsilon_{it}, \qquad \varepsilon_{it} \sim N(0, \sigma_i^2) \tag{7}$$

And the gender-specific Bartik instruments are run together in a separate regression.

$$\Delta Y_{sit} = \beta_0 + \beta_1 \Delta IP_{fit}^{mx} + \beta_2 \Delta IP_{mit}^{mx} + \delta \mathbf{X}_{it_0} + \sigma \Delta N_{it_0} + \gamma_t + \varepsilon_{it}, \qquad \varepsilon_{it} \sim N(0, \sigma_i^2) \tag{8}$$

In this first-difference specification, ΔY_{sit} denotes decadal changes in the labor market outcome of interest of the working age population 15–64 in CZ i among gender group s (males, females, or both) during time interval t. Following Autor, Dorn, and Hanson 2013, we stack differences for the two periods, in our case 1990 to 2000 and 2000 to 2010. The labor market outcomes ΔY_{sit} are i) manufacturing employment rate ii) labor force participation iii) non-trading employment rate and iv) services employment rate. We also estimate the effects on manufacturing employment rate by educational level and marital status.[6] All outcomes are measured as the change in employment or LFP as a share of

[6]The manufacturing employment rate captures the direct effects and the *intensive* margin, while the labor force participation rate can be said to capture the *extensive* margin. Indirect employment effects are captured by measuring services and non-trading employment rates.

the working-age population within gender group s in commuting zone i.

γ_t is a time-fixed effect covariate that controls for factors that are constant across commuting zones but vary across our two time periods. $\mathbf{X}_{it_0}$ represents a vector of 1990 base-year controls that could correlate with a change in labor market outcomes. These are 1990 CZ population composition in gender, employment, working age, educational attainment, as well as the 1990 share of occupations susceptible to automation and offshoring. The last covariate, initial routine task intensity, is a construction from Autor and Dorn 2013 which has been used in previous research (Autor, Dorn, and Hanson 2013; Faber 2020) and controls for the fact that employment loss can occur due to computerization rather than Chinese import competition.[7]

Furthermore, ΔN_{it_0} controls for tariff reductions introduced by the North American Free Trade Agreement (NAFTA). The trade agreement between Mexico the US and Canada came into effect in 1994, leading to a change in import and export tariffs. If these industry-level tariff changes also correlate with CZ-variation in Chinese import competition, this may bias our estimates. Hence, we control for CZ exposure to NAFTA, based on initial CZ employment shares and NAFTA-induced tariff changes. The creation of this covariate draws on code and data from (Hakobyan and McLaren 2016) and is constructed as follows.

$$\Delta N_{it_0} = \sum_j \frac{L_{jit_0}}{L_{it_0}} \times \Delta\tau_j \tag{9}$$

Where $\Delta\tau_j$ represents NAFTA tariff changes at the industry-level. As we estimate regressions in first differences, unobserved variables that vary across CZs but are constant over time are differenced out. Hence, we do not have to include a set of CZ-fixed effects. In all specifications, we control for the start-of-period 1990 manufacturing industry share, and when we study other outcomes than manufacturing employment, we include the initial industry share of the sectors measured in the outcome. This way, we ensure that we focus on variation in exposure to Chinese imports stemming from differences in the industry mix

[7]Given the absence of data on routine-intensive occupations in the Mexican census, we use occupation-level data routine task intensity in the U.S. following Faber 2020. Thereafter, we aggregate occupations to common occupation groups and compute the arithmetic means.

within local employment and not a general declining trend which is likely to be stronger in CZs more dependent on that industry. Standard errors are clustered at the commuting zone-level in all regressions.

5.3 Instrument

Furthermore, we follow the literature in this field and instrument Chinese imports to Mexico with Chinese imports to the rest of the world in equations (7) and (8). We want to ensure that the identified effects source from a supply-driven increase in imports from China and not demand-driven domestic market changes in Mexico. Hence, in the construction of the import penetration measure, we replace Mexican imports from China with other countries' imports from China. As the US-Mexico markets are highly connected, we exclude the US from the instrument. This results in the following import penetration measure:

$$\Delta IP_{it}^{world} = \sum_j \frac{L_{jit_0}}{L_{it_0}} \times \frac{\Delta I_{jt}^{world}}{L_{jt_0}} \tag{10}$$

The updated first-difference equation then becomes:

$$\Delta Y_{it} = \alpha_i + \beta \widehat{\Delta IP_{it}^{mx}} + \delta \mathbf{X}_{it_0} + \varepsilon_{it}, \qquad \varepsilon_{it} \sim N(0, \sigma_i^2) \tag{11}$$

where $\widehat{\Delta IP_{it}^{mx}}$ are the predicted values given from regressing ΔIP_{it}^{mx} on ΔIP_{it}^{world}.

5.4 Validity of Research Design

5.4.1 Relevance Condition

For an instrumental variable approach to be valid, the instrument has to have a clear effect on the independent variable of interest (Angrist and Pischke 2009). To check whether this condition is satisfied, we run a first stage regression of ΔIP^{mx} on ΔIP^{world}, with all control variables used in the reduced form regressions for manufacturing employment.[8] In this first stage regression, as well as in all second stage regressions, ΔIP^{mx} is regressed on

[8]We also check that the first stage regressions with additional controls satisfy the relevance condition.

ΔIP^{world} separately, while the gender-specific import variables are included simultaneously. As seen in Table 1, all regressions yield a statistically significant relationship and F-values exceed the rule-of-thumb minimum level of 10 in all regressions. All coefficients exhibit a positive effect of the instrument on the endogenous import measure. Hence, we conclude that the relevance condition is satisfied.

Table 1: First Stage Regression

	ΔIP^{mx}	ΔIP^{mx}_{female}	ΔIP^{mx}_{male}
ΔIP^{world}	0.049***		
	(0.002)		
$\Delta IP^{world}_{female}$		0.063***	
		(0.002)	
ΔIP^{world}_{male}			0.042***
			(0.001)
R^2	0.970	0.974	0.982
F-statistics	3015.6	1466.5	3121.5

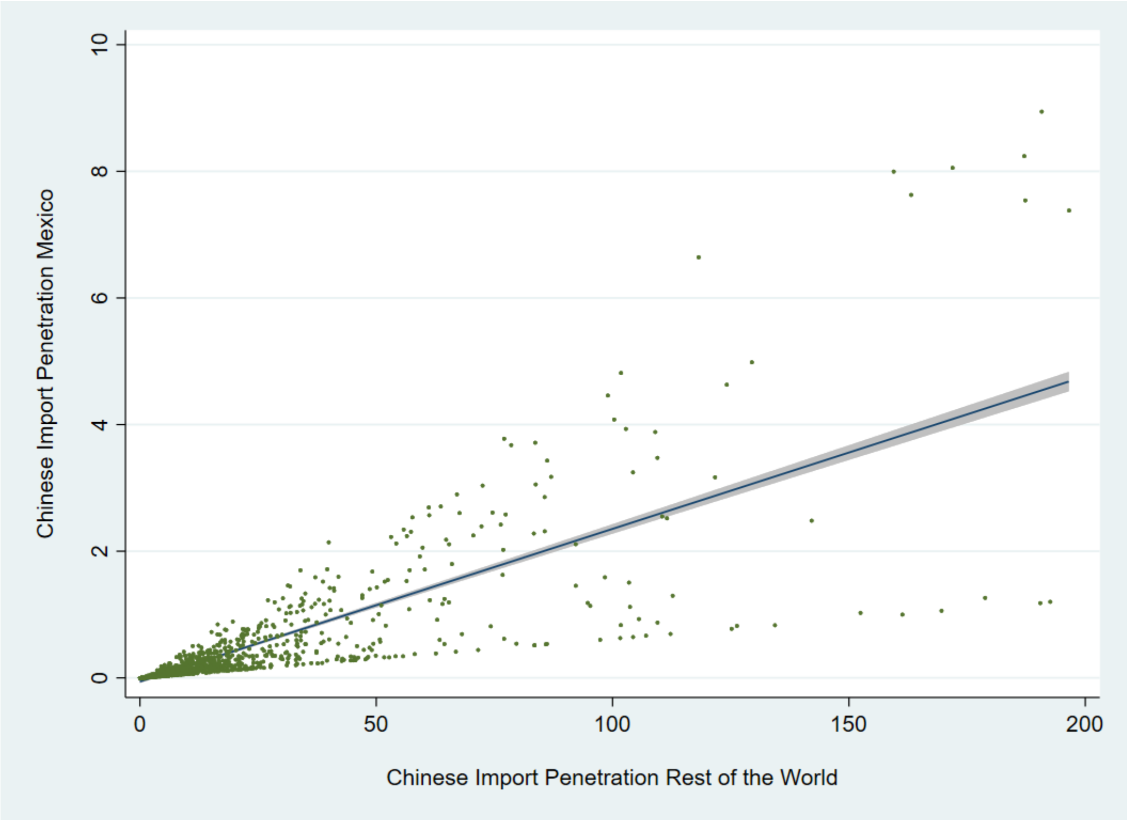
Observations = 3608 (1804 commuting zones over 2 time periods)

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Demographic controls for base-year 1990: log of CZ population size, share of men, share of female employed, share of people with primary, secondary and tertiary education respectively, share of people in work-age, share of people with children below 5 years old, share of routine jobs, initial manufacturing share. Other controls: NAFTA tariff reduction exposure and a time-dummy. Weighted to 1990 CZ working age population. Standard errors are clustered at the CZ-level.

Figure 3: First Stage Scatter Plot



Penetration is measured as change in import penetration between the years 1990-2010. Each dot in the scatter plot represents a commuting zone. Two outliers with high exposure, CZ 13061 and 41, are excluded in the figure.

In the above scatter plot, we also observe a positive relationship between the instrument and the independent variable. This further illustrates the compliance of the relevance condition.

5.4.2 Exclusion Restriction

A key identifying assumption of an instrumental variable approach is the exclusion restriction, namely that our instrument only affect the outcome through our independent variable. In the case of a Bartik instrument, there are two perspectives on how to understand the exclusion restriction, where one relates to the shift component and the other to the share component (Cunningham 2021). As previously outlined, our Bartik instrument consists of import flows to Mexico from China (shifts) and initial industry composition in local labor markets (shares). Hence, we evaluate how these components relate to and satisfy the exclusion restriction.

The shifts perspective is explained by Borusyak, Hull, and Jaravel 2022, who argue that temporal shocks can provide exogenous variation. They show that, as long as the independent shocks affect many industries, a Bartik design allows for causal identification provided that the shocks are uncorrelated with the bias of the shares. Applied to our empirical strategy and setting, the exclusion restriction would thus mean that the growth in Chinese imports to Mexico is only driven by the boost of supply in China and not an increase in demand from Mexico. To illustrate the bias of a demand-driven increase, suppose that there is a natural resource discovery in one or several CZ, leading to improved local economic conditions, higher employment rates and, in turn, a surge in Chinese imports. Then, a reversed causality bias would arise as the improved economic conditions and employment outcomes also drive the increase in imports and not only the other way around. To address this kind of endogeneity concern and ensure that our instrument captures the variation of the supply-driven rather than demand-driven increase in Chinese imports, we instrument our Bartik instrument of Chinese imports to Mexico with growth in imports to other countries. The exclusion restriction then becomes that growth in Chinese imports to other countries, excluding Mexico and the U.S.[9], should only affect Mexican employment and labor market outcomes through the simultaneous growth in Chinese imports to Mexico.

The shares perspective is presented by Goldsmith-Pinkham, Sorkin, and Swift 2020, who argue that the identifying assumption of a Bartik design relates to the exogeneity of initial industry employment shares. As discussed by the authors, such shares are often equilibrium objects and co-determined with labor market outcomes, which makes it difficult to think of them as exogenous. An empirical strategy can still be valid, however. What is important is that the initial shares, conditional on observables, do not predict *changes* of the outcome as opposed to *levels* of the outcome. In this thesis, we include a large battery of covariates for initial characteristics, reducing the risk of bias. These are initial demographic characteristics, initial manufacturing employment share as well as

[9] We exclude the U.S. from the instrument, as Chinese imports to the U.S. has been shown to have an effect on manufacturing demand in Mexico (Majlesi 2016)

the initial share of the labor market outcome of interest, e.g. initial service employment share when studying service employment outcomes. Furthermore, Goldsmith-Pinkham, Sorkin, and Swift 2020 propose ways of testing the plausibility of this assumption. One is to identify the industries that account for the largest part of the identifying variation by computing so called "Rotemberg weights". If the employment shares of these industries exhibit a strong correlation with other initial demographic characteristics, they argue that there is an elevated risk of the exclusion restriction being violated. Heckl 2022 performs the above procedure for Mexican CZs. She finds that four of the five industries with the highest Rotemberg weights are all manufacturing industries. The fifth industry is the agricultural sector and correlates with a set of initial characteristics[10], which is is not a concern for this thesis as we do not include the agricultural sector in our analysis. The manufacturing industry shows a significant correlation with the CZ share of highly educated. However, the fact that the manufacturing industries do not display any other statistically significant correlations is reassuring for our empirical design.

5.4.3 Imperfect Mobility

The local labor market approach is based on the assumption that the labor force is not perfectly mobile across space. If an import shock would cause workers to migrate, we would underestimate any negative effects. However, previous research suggests that workers, especially blue-collar workers, are not perfectly mobile. In the case of Mexico, Majlesi and Narciso 2018 has documented migration patterns in response to Chinese imports. However, their study has municipalities as the main unit of observation while our thesis uses CZs. Besides reflecting a higher level of aggregation than municipalities, CZs take into account commuting patterns and are thus constructed to have a higher degree of economic integration than municipalities. Furthermore, Majlesi and Narciso 2018 find no statistically significant difference between men and women in domestic migration, implying that potential gender differences in labor market responses should not be driven by migration patterns.

[10] CZ share of women, share employed in tradable industries, share with children under 5, and share with high education

6 Data

6.1 Census Data

We obtain information on employment and other demographic characteristics from the Mexican census survey, originally collected by The National Institute of Statistics and Geography (INEGI). We acquire data for the years 1990, 2000 and 2010 from the Integrated Public Use Microdata Series (IPUMS) where 10% nationally representative samples of the census data are available. The Census is an attractive source of data as it contains a rich variety of demographic characteristics such as employment, industry, marital status, and educational level. Another appealing feature is the geographical information on the municipality of residence of each individual and which industry they work in, which is essential for our empirical strategy.

Following Faber 2020, we aggregate the IPUMS household-level data to the commuting zone level which is the main unit of observation in all regressions and our definition of a local labor market. Commuting zones are regional units that feature a high degree of economic integration, as measured by commuting patterns. CZ is a more adequate measure of a local labor market than, for example, municipalities or regions as the latter may reflect political rather than economic boundaries. This process narrows down the sample of 2438 municipalities into a sample of 1804 CZs.[11] The sample is restricted to wage and salary workers in working age 15-64 and excludes self-employed.

6.2 Trade Data

The United Nations Comtrade database offers data on trade flows between countries on an annual basis. We collect data on Chinese manufacturing imports to Mexico for the years 1992, 2000 and 2010. Import values are measured in U.S. Dollars and product codes are provided according to the harmonization system of 1992 (HS92). We use import flows in 1992 as a proxy for import flows in 1990. The data on Chinese imports to other

[11] This is smaller than Faber's data set on 1806 CZs as we drop two CZs: municipality 7092, which no longer has available data in IPUMS and municipality 7058 which has missing data for practically all years and variables.

countries are also originally from Comtrade but are taken from the World Integrated Trade Solution (WITS) as the latter offers a convenient way to retrieve the data in country groups.

To get consistent commuting zone industry employment data across years and match it with trade flow data, we follow the crosswalk employed by Faber 2020 presented in Table 14 in the Appendix. This crosswalk allows us to match product category codes with household industry information and yields a number of 19 industries of which 13 belong to the manufacturing sector.

6.3 Descriptive Statistics

We now turn to descriptively describe the census data in the commuting zones over the three years 1990, 2000 and 2010.

Table 2: Commuting Zone Characteristics

	1990		2000		2010	
Share of Population	Mean	SD	Mean	SD	Mean	SD
Married	0.344	(0.02)	0.370	(0.02)	0.383	(0.02)
Child Under 5	0.157	(0.01)	0.153	(0.01)	0.132	(0.02)
No Education	0.353	(0.17)	0.240	(0.13)	0.158	(0.10)
Primary Education	0.491	(0.10)	0.531	(0.06)	0.534	(0.05)
Secondary Education	0.110	(0.05)	0.153	(0.06)	0.206	(0.06)
Tertiary Education	0.047	(0.03)	0.076	(0.04)	0.102	(0.05)
Share of Working Age	Mean	SD	Mean	SD	Mean	SD
Employed	0.333	(0.095)	0.389	(0.094)	0.391	(0.083)
Manufacturing Employed	0.081	(0.052)	0.089	(0.060)	0.070	(0.046)
Non-trading Employed	0.200	(0.080)	0.254	(0.083)	0.283	(0.082)
Service Employed	0.140	(0.067)	0.180	(0.070)	0.212	(0.075)
Commuting Zones	1804		1804		1804	

Table 2 presents CZ means and standard deviations on demographic characteristics. We observe that marriage shares have increased, although decrementally. The share of population with at least one child under the age of 5 has, on average, decreased. The share of population without education has considerably decreased and the largest relative increases were in secondary and tertiary education. By observing the standard deviations, we see the largest variation across commuting zones in the share population without education.

In the second part of the table, we examine employment patterns as a share of the commuting zone working age population. It shows that employment has been increasing overall but with a decline in growth between 2000 and 2010. Manufacturing employment saw an average decrease between 2000 and 2010 while employment in non-trading sectors, such as services, increased over the whole period. This indicates that the manufacturing industry may have been the cause of slow employment growth in Mexico.

Table 3: Commuting Zone Change in Import Penetration

		Percentiles		
	Mean	25th	50th	75th
1990-2000				
ΔIP	0.081	0.014	0.060	0.121
$\Delta \text{IP}_{female}$	0.021	0.002	0.014	0.027
ΔIP_{male}	0.060	0.012	0.048	0.095
2000-2010				
ΔIP	1.682	0.200	1.031	2.463
$\Delta \text{IP}_{female}$	0.421	0.019	0.224	0.470
ΔIP_{male}	1.260	0.155	0.794	1.993

Weighted by CZ base-year working age population.

Reported in 1000 $ USD

Table 3 illustrates the CZ distribution of import penetration shock for the two time periods. As expected, as men represent a larger share of manufacturing employment, the male penetration index is much larger than the female one. The large increase between the two periods (1990-2000 vs 2000-2010) looks similar in magnitude for both women and men (2000% and 2100%).

7 Results

7.1 Manufacturing Employment

Table 4: Effects on Manufacturing Employment

a) 2SLS

	Manufacturing Employment		
	F+M	Female	Male
	I. Overall Trade Shock		
ΔIP^{IV}	-0.465**	-0.392**	-0.533**
	(0.16)	(0.15)	(0.18)
	II. Female and Male Shock		
ΔIP^{IV}_{female}	-1.368**	-1.604***	-1.029
	(0.43)	(0.34)	(0.56)
ΔIP^{IV}_{male}	-0.140	0.047	-0.353
	(0.2)	(0.16)	(0.27)
N	3608	3608	3608

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

b) OLS

	Manufacturing Employment		
	F+M	Female	Male
	III. Overall Trade Shock		
ΔIP	-0.525**	-0.444**	-0.594**
	(0.17)	(0.15)	(0.19)
	IV. Female and Male Shock		
ΔIP_{female}	-1.532**	-1.649***	-1.319*
	(0.45)	(0.34)	(0.59)
ΔIP_{male}	-0.087	0.080	-0.278
	(0.22)	(0.16)	(0.30)
N	3608	3608	3608

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Employment is measured as a CZ share of all/women/men respectively. Ages 15-64. Stacked First Differences Years 1990, 2000 and 2010. Demographic controls for base-year 1990: log of CZ population size, share of men, share of female employed, share of people with primary, secondary and tertiary education respectively, share of people in work-age, share of people with children below 5 years old, share of routine jobs, initial manufacturing share. Other controls: NAFTA tariff reduction exposure and time-fixed effects. Weighted to 1990 CZ working age population. Standard errors are clustered at the CZ-level.

In Table 4, we report the effects on manufacturing employment. Subtable a) displays the results from the 2SLS regressions and subtable b) the OLS. Panels I and III refer to the specification with only the general import penetration measure included in the specification, while panels II and IV display the results from the specification with the gender-specific import penetration indexes. We see that the 2SLS and OLS results are qualitatively similar in terms of significance and direction. The OLS estimates are slightly larger in magnitude than the 2SLS estimates, consistent with the prediction there may be demand-driven import changes that correlate negatively with employment.[12] As the 2SLS is our preferred specification, we will henceforth mainly interpret and comment on those estimates.

In almost all regressions in Table 4, we find negative effects of Chinese import exposure on the average CZ manufacturing employment share. The effects are salient for the general import penetration measures presented in panel I. The interpretation of the estimate -0.465 in the top left column is that one unit trade shock, a 1000 USD dollar import increase at the CZ-level, decreases CZ manufacturing employment by 0.465 percentage points on average. The negative relationship persists when observing manufacturing outcomes for men and women separately. One unit trade shock decreases average commuting zone female employment by 0.392 percentage points on average while the effect is slightly larger in magnitude for men. These results corroborate with previous findings in Mexico, showing that Mexican manufacturing employment has decreased in response to the import shock from China.

When moving on to the gender-specific measures in panel II, a clear pattern emerges. The import penetration measures $\Delta \mathrm{IP}^{IV}_{female}$ and $\Delta \mathrm{IP}^{IV}_{male}$ capture the gender-specific import shocks. Notably, we find that employment effects mainly seem to be driven by import exposure in female-intensive industries. Compared to the general measure in panel I, the negative effect on female manufacturing employment amplifies substantially and becomes significant at the 0.1% level. Simultaneously, the results show that import exposure in male-specific industries does not have equivalent explanatory power. The coefficients on $\Delta \mathrm{IP}^{IV}_{male}$ are all statistically insignificant and smaller in magnitude. We can reject at the 10% significance level (p=0.090) that an import shock in female-intensive industries has an equal impact on female and male employment (coefficients -1.604 and -1.029 in Table

[12]For example, there may be CZs that have experienced a CZ-specific negative economic shock that has reduced local employment and increased demand for cheap Chinese inputs, a problem that is addressed in the 2SLS regressions.

4). The trade shock in female-intensive industries also has an economically larger effect on average employment than a unit trade shock in all industries. We can reject at the 5% level that the general- and female-driven coefficients are equal with regards to overall (p=0.026) and female (p=0.001) employment outcomes.

While previous studies have documented drops in Mexican manufacturing employment for men and women, none of these have applied initial industry gender composition to show whether these effects are channeled through male- or female-intensive industries. When we perform this analysis, we note that most of the effect appears to be driven by female-intensive industries. When comparing the Table 4 estimates of the shock on female-intensive industries on female manufacturing employment (-1.604) and the shock on male-intensive industries on male manufacturing employment (-0.353), we observe that the former is not only larger but also significant at a 0.1% level. We test for the equality of these two estimates which can be rejected at a 5% significance level (p=0.012). These results imply that female employment seems to be less resilient to import competition in female-intensive industries than male employment to import competition in male-intensive industries.

Table 5: Effects on Manufacturing Employment by Educational Attainment

2SLS Results

	Female Manufacturing Employment			*Male Manufacturing Employment*		
	Primary	Secondary	Tertiary	Primary	Secondary	Tertiary
	I. Overall Trade Shock			III. Overall Trade Shock		
ΔIP^{IV}	-0.336**	-0.037	-0.011	-0.521***	-0.076	-0.034*
	(0.12)	(0.02)	(0.01)	(0.13)	(0.04)	(0.01)
	II. Female and Male Shock			IV. Female and Male Shock		
$\Delta \text{IP}^{IV}_{female}$	-1.259***	-0.040	-0.061*	-0.895*	0.045	-0.045
	(0.27)	(0.10)	(0.03)	(0.42)	(0.15)	(0.06)
$\Delta \text{IP}^{IV}_{male}$	-0.002	-0.036	0.007	-0.385*	-0.120	-0.031
	(0.13)	(0.03)	(0.02)	(0.19)	(0.08)	(0.02)
N	3608	3608	3608	3608	3608	3608

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Employment is measured as a CZ share of all/women/men respectively. Ages 15-64. Stacked First Differences Years 1990, 2000 and 2010. Demographic controls for base-year 1990: log of CZ population size, share of men, share of female employed, share of people with primary, secondary and tertiary education respectively, share of people in work-age, share of people with children below 5 years old, share of routine jobs, initial manufacturing share. Other controls: NAFTA tariff reduction exposure and time-fixed effects. Weighted to 1990 CZ working age population. Standard errors are clustered at the CZ-level.

Next, we explore the heterogeneity of our baseline results. In Table 5, we examine the effects on manufacturing employment by educational attainment. The estimate of the general trade shock in panel I and the trade shock specific to female-intensive industries in panel II have a significant negative impact on employment of females with only primary education. This suggests that the reduction in female manufacturing employment documented in Table 4 seems to be attributed to low-educated women. These results are in line with the findings of Mansour, Medina, and Velasquez 2022, who document a similar pattern in response to the Chinese trade shock in Peru.

With respect to the heterogeneity in employment effects by men's educational attainment levels, we find an overall negative effect for men with only primary education. However, when splitting up the import penetration into gender-components, this effect loses some significance but increases in magnitude for the female penetration index. This indicates that both import competition in female- and male-intensive industries has led to a drop in manufacturing employment of low-educated men.

Table 6: Effects on Manufacturing Employment by Marital Status

2SLS Results

	Female Manufacturing Employment		*Male Manufacturing Employment*	
	Married	Unmarried	Married	Unmarried
	I. Overall Trade Shock		III. Overall Trade Shock	
ΔIP^{IV}	-0.170	-0.217**	-0.279**	-0.242**
	(0.10)	(0.07)	(0.10)	(0.09)
	II. Female and Male Shock		IV. Female and Male Shock	
$\Delta \text{IP}^{IV}_{female}$	-0.947**	-0.652***	-0.374	-0.647*
	(0.28)	(0.17)	(0.35)	(0.26)
$\Delta \text{IP}^{IV}_{male}$	0.111	-0.060	-0.245	-0.095
	(0.06)	(0.11)	(0.13)	(0.14)
N	3608	3608	3608	3608

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Employment is measured as a CZ share of all/women/men respectively. Ages 15-64. Stacked First Differences Years 1990, 2000 and 2010. Demographic controls for base-year 1990: log of CZ population size, share of men, share of female employed, share of people with primary, secondary and tertiary education respectively, share of people in work-age, share of people with children below 5 years old, share of routine jobs, initial manufacturing share. Other controls: NAFTA tariff reduction exposure and time-fixed effects. Standard errors are clustered at the CZ-level. Weighted to 1990 CZ working age population.

In Table 6, the results for women and men employed in manufacturing are disaggregated by marital status. We see that the general estimate of the trade shock in panels I and III have a significant negative effect on manufacturing employment among unmarried women and men as well as married men. This effect cannot be found for married women. However, we cannot statistically reject that the estimated effect on married women's employment rate is different from that of unmarried women. The same goes for the comparison between married women and married men. Hence, we cannot make any definite conclusions from the general estimate.

Moving on to the gender-specific import measures in panels II and IV, we see a drastic change in the estimated coefficients. The import penetration in female-intensive industries has a large significant effect on manufacturing employment for both married and unmarried women. The interpretation of the coefficients of $\Delta \text{IP}^{IV}_{female}$ is that one unit trade shock to female-intensive industries leads to a 0.947 percentage point reduction in the share of married women employed and 0.652 percentage points for unmarried women employed. This implies that the trade shock in female-intensive industries led to drops in manufacturing employment among both married and unmarried women. We cannot statistically reject that the estimates are equal, which contradicts the hypothesis that married women would be more likely to exit employment as a result of economic safety from a partner. The gender-specific instruments remove the significance of the effect on manufacturing employment for married men.

7.2 Labor Market Adjustments

Once we have recorded the adverse impacts on manufacturing employment, we proceed to examine the potential destinations of the displaced workers. We investigate the effects on the extensive margin by analyzing labor force participation and employment in sectors other than manufacturing. This approach allows us to get an indication as to whether these individuals exit the workforce entirely or simply transfer to other sectors within it.

In Table 7 we observe a significant decrease in male labor force participation in response to the general import penetration index, which is significantly different from the estimated effect on female labor force participation (p=0.020). When we add gender-specific penetration indexes, this effect disappears. This implies that neither Chinese competition in female-intensive nor male-intensive manufacturing sectors alone can explain the exit of men from the labor force. As most coefficients are not statistically significant, including the overall labor force participation (F+M), we proceed to look within the labor force to observe where workers might have reallocated.

Table 7: Effects on Labor Force Participation

a) 2SLS

	Labor Force Participation		
	F+M	Female	Male
	I. Overall Trade Shock		
ΔIP^{IV}	-0.167	0.288	-0.498**
	(0.11)	(0.22)	(0.19)
	II. Female and Male Shock		
ΔIP^{IV}_{female}	-0.674	-0.630	-0.327
	(0.35)	(0.50)	(0.42)
ΔIP^{IV}_{male}	0.016	0.617	-0.559
	(0.18)	(0.44)	(0.34)
N	3608	3608	3608

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

b) OLS

	Labor Force Participation		
	F+M	Female	Male
	III. Overall Trade Shock		
ΔIP	-0.203	0.234	-0.502**
	(0.12)	(0.20)	(0.17)
	IV. Female and Male Shock		
ΔIP_{female}	-0.608	-0.548	-0.292
	(0.35)	(0.52)	(0.44)
ΔIP_{male}	-0.028	0.571	-0.592
	(0.18)	(0.42)	(0.35)
N	3608	3608	3608

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Labor force participation is measured as a CZ share of all/women/men respectively. Ages 15-64. Stacked First Differences Years 1990, 2000 and 2010. Demographic controls for base-year 1990: log of CZ population size, share of men, share of female employed, share of people with primary, secondary and tertiary education respectively, share of people in work-age, share of people with children below 5 years old, share of routine jobs. Initial industry shares: manufacturing, services, utilities, construction, mining, education. Other controls: NAFTA tariff reduction exposure and time-fixed effects. Standard errors are clustered at the CZ level. Regressions weighted to 1990 CZ working age population.

We examine the indirect effects on non-trading industries, such as the service sector. As presented by Acemoglu et al. 2016, these can be interpreted as the indirect, reallocation and demand effects of import competition which can affect employment in both directions. For example, we could observe a negative employment effect if non-trading industries are upstream industries providing inputs (services) to a declining manufacturing industry. In this case, the non-trading sector could experience a drop in employment. However, we could also observe a positive labor reallocation into the non-trading and services sectors if they are downstream industries that benefit from higher competition and lower prices on Chinese inputs. Similarly, non-manufacturing sectors could benefit from a local reallocation of factors of production, away from manufacturing industries.

Table 8: Effects on Non-trading Employment

	a) 2SLS				b) OLS		
	Nontrade Employment				*Nontrade Employment*		
	F+M	Female	Male		F+M	Female	Male
	I. Overall Trade Shock				III. Overall Trade Shock		
ΔIP^{IV}	0.075	0.021	0.166	ΔIP	0.073	0.030	0.159
	(0.09)	(0.07)	(0.12)		(0.08)	(0.07)	(0.12)
	II. Female and Male Shock				IV. Female and Male Shock		
$\Delta\text{IP}^{IV}_{female}$	-0.109	0.107	-0.204	ΔIP_{female}	0.085	0.247	0.052
	(0.21)	(0.24)	(0.28)		(0.22)	(0.24)	(0.31)
$\Delta\text{IP}^{IV}_{male}$	0.141	-0.010	0.300	ΔIP_{male}	0.068	-0.064	0.206
	(0.15)	(0.11)	(0.22)		(0.17)	(0.12)	(0.24)
N	3608	3608	3608	*N*	3608	3608	3608

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Employment is measured as a CZ share of all/women/men respectively. Ages 15-64. Stacked First Differences Years 1990, 2000 and 2010. Demographic controls for base-year 1990: log of CZ population size, share of men, share of female employed, share of people with primary, secondary and tertiary education respectively, share of people in work-age, share of people with children below 5 years old, share of routine jobs, initial manufacturing and non-trading employment share. Other controls: NAFTA tariff reduction exposure and time-fixed effects. Standard errors are clustered at the CZ-level. Regressions weighted to 1990 CZ working age population.

Table 8 reports the effects of import penetration on employment in all the non-trading sectors.[13] We find no statistically significant effects on non-trading employment. However, the direction of the effects is mostly positive. The coefficient on the general import penetration in panel I is positive with respect to all employment outcomes. The female and male specific coefficients in panel II are also positive with respect to their corresponding gender, but not statistically significant.

[13]The non-trading sectors are mining, utilities, construction, education RD, and service

Table 9: Effects on Service Employment

a) 2SLS

	Service Employment		
	F+M	Female	Male
	I. Overall Trade Shock		
ΔIP^{IV}	0.157*	0.109	0.215**
	(0.06)	(0.06)	(0.07)
	II. Female and Male Shock		
$\Delta \text{IP}^{IV}_{female}$	-0.101	0.090	-0.243
	(0.20)	(0.22)	(0.22)
$\Delta \text{IP}^{IV}_{male}$	0.250*	0.116	0.380*
	(0.12)	(0.11)	(0.15)
N	3608	3608	3608

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

b) OLS

	Service Employment		
	F+M	Female	Male
	III. Overall Trade Shock		
ΔIP	0.147*	0.110	0.197**
	(0.06)	(0.06)	(0.07)
	IV. Female and Male Shock		
$\Delta \text{IP}_{female}$	-0.032	0.164	-0.172
	(0.20)	(0.21)	(0.22)
ΔIP_{male}	0.224	0.087	0.357*
	(0.12)	(0.10)	(0.15)
N	3608	3608	3608

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Employment is measured as a CZ share of all/women/men respectively. Ages 15-64. Stacked First Differences Years 1990, 2000 and 2010. Demographic controls for base-year 1990: log of CZ population size, share of men, share of female employed, share of people with primary, secondary and tertiary education respectively, share of people in work-age, share of people with children below 5 years old, share of routine jobs, initial manufacturing and service employment share. Other controls: NAFTA tariff reduction exposure and time-fixed effects. Standard errors are clustered at the CZ-level. Regressions weighted to 1990 CZ working age population.

When we single out services in Table 9, the effects are more pronounced. We find that one unit trade shock increases the CZ overall service employment share by 0.157 percentage points on average. Furthermore, import penetration in male-intensive industries has a positive effect on male service employment (0.380). This suggests that there is an indirect labor market reallocation of men in response to import competition in male-intensive manufacturing industries. Nevertheless, the effect of import penetration in female-intensive industries on female service employment is small (0.090) and lacks significance.

8 Robustness

8.1 Industry Robustness

As a first robustness check, we want to ensure that one single industry is not driving the main results in Table 4. We do this by sequentially removing an industry from the import penetration measure, and adding it as a separate covariate in the specification. We repeat this process 13 times, dropping one manufacturing industry at a time. If the significance and magnitude of the original estimate disappear and are taken over by the single industry covariate, this suggests that this one single industry may be driving our main results.

In Appendix A.3 we present figures illustrating the results of this robustness test. The dots represent the point estimates of the import exposure effect when each manufacturing industry is dropped and included as a separate covariate. We focus on the general and female import penetration indexes, as these are the measures that yield statistically significant results in Table 4. With respect to the general import penetration index, we find that the 2SLS results are robust to practically all industry exclusions. The point estimate remains negative independently of which industry is dropped.

However, the effect of the general import penetration index on overall and female employment is sensitive to two industry exclusions, namely computers and electronics, and electrical machinery. These industry groups generate statistically significant negative effects on general employment individually[14] and decrease the magnitude and statistical significance of the original estimate containing the remaining industries. This suggests that these industries are key for explaining our findings of the manufacturing employment effects of the import shock in Mexico. This is consistent with the empirical findings of Blyde and Fenantes 2019 who document that the computers and electronics, and electrical equipment industries were two of the industries that experienced the largest increase in Chinese import exposure.

[14]The computers & electronics industry coefficient is -0.689 and significant at the 5 level and the electrical machinery coefficient is -3.31 and significant at the 1% level. The coefficients for the single industries are not tabulated.

When we turn to observe the female-intensive import estimate on female employment outcomes (1.604 in Table 4), the main coefficient remains statistically robust at the 5 % level to all industry exclusions. Hence, we conclude that the original estimate of the female index on female manufacturing employment is robust.

8.2 Heterogeneity robustness

Next, we test the robustness of the heterogeneity analyses for sub-groups of the population within each commuting zone. Our main concern here is that increased import competition may affect educational attainment and marital status itself. Changes in marriage rates and educational attainment that are constant across CZs are absorbed by the time-fixed effects γ_t in our main specification (equation 7). However, if there are differential changes in marriage rates and educational attainment within commuting zones that correlate with the import penetration shock, this would threaten a causal interpretation.

The results from regressing marital status and educational attainment outcomes are presented in Tables 10 and 11 respectively. Importantly, we do not find significant effects of imports on primary education. This is reassuring for the results in Table 5, showing that the employment drop in response to the trade shock is mostly driven by low-educated women and men. By contrast, imports in female-intensive industries seem to have a negative effect on the average CZ tertiary education level of women. Thus, we cannot conclude that imports in female-intensive industries have reduced high-educated women's employment level in manufacturing industries. Men's average educational attainment level seems to be largely unaffected by the imports. The exception is tertiary education, which seems to increase in response to import competition in male-intensive industries and decrease in response to imports in female-intensive industries. However, we do not find significant effects for high-educated men in our main specification.

With regard to marital status, we find reductions in the manufacturing employment rate among both married and unmarried women. These results seem to be robust as we find no significant effect of imports on women's average CZ marriage rate. Furthermore, we do not find a significant effect of imports on men's marital status, providing support that the negative effects on married and unmarried men's manufacturing employment are robust as well.

Table 10: Effects on Female Demographics

	Married	Primary	Secondary	Tertiary
	I. Overall Trade Shock			
ΔIP^{IV}	-0.294*	0.204	-0.338	-0.062
	(0.13)	(0.20)	(0.17)	(0.07)
	I. Female and Male Shock			
$\Delta \text{IP}^{IV}_{female}$	-0.849	0.181	0.142	-0.390*
	(0.49)	(0.54)	(0.44)	(0.18)
$\Delta \text{IP}^{IV}_{male}$	-0.093	0.212	-0.512	0.057
	(0.16)	(0.41)	(0.36)	(0.12)
Obs	3608	3608	3608	3608

Standard errors in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Employment is measured as a CZ share of all/women/men respectively. Ages 15-64. Stacked First Differences Years 1990, 2000 and 2010. Demographic controls for base-year 1990: log of CZ population size, share of men, share of female employed, share of people with primary, secondary and tertiary education respectively, share of people in work-age, share of people with children below 5 years old, share of routine jobs, initial manufacturing share. Other controls: NAFTA tariff reduction exposure and time-fixed effects. Standard errors are clustered at the CZ-level. Weighted to 1990 CZ working age population.

Table 11: Effects on Male Demographics

	Married	Primary	Secondary	Tertiary
	I. Overall Trade Shock			
ΔIP^{IV}	-0.172	-0.027	-0.207	0.043
	(0.11)	(0.19)	(0.20)	(0.05)
	I. Female and Male Shock			
$\Delta \text{IP}^{IV}_{female}$	-0.195	0.038	0.341	-0.391*
	(0.30)	(0.54)	(0.48)	(0.16)
$\Delta \text{IP}^{IV}_{male}$	-0.164	-0.051	-0.406	0.200*
	(0.20)	(0.41)	(0.44)	(0.10)
Obs	3608	3608	3608	3608

Standard errors in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Employment is measured as a CZ share of all/women/men respectively. Ages 15-64. Stacked First Differences Years 1990, 2000 and 2010. Demographic controls for base-year 1990: log of CZ population size, share of men, share of female employed, share of people with primary, secondary and tertiary education respectively, share of people in work-age, share of people with children below 5 years old, share of routine jobs, initial manufacturing share. Other controls: NAFTA tariff reduction exposure and time-fixed effects. Standard errors are clustered at the CZ-level. Weighted to 1990 CZ working age population.

8.3 Instrument Robustness

Furthermore, we test the robustness of our instrument. Specifically, we replace the import flows from China to the rest of the world with import flows to a set of countries that featured a similar income level to Mexico in 2001, namely Argentina, Brazil, Chile, Colombia, Costa Rica, Greece, Panama, and Portugal.[15] All first stage regressions yield a satisfactory F-value exceeding the rule of thumb of 10. Results of the reduced form regressions using this instrument are presented Appendix A.4. These regressions yield similar results for practically all outcomes. We even obtain more precise results reflected by greater statistical significance.

[15]Mendez 2015 identifies and uses these countries based on income statistics presented in the World Bank report (2001).

9 Discussion

This thesis provides further insights into how the salient increase in Chinese manufacturing imports between 1990 and 2010 affected the Mexican labor market. Consistent with previous findings in Mexico, as well as the theoretical model by Autor, Dorn, and Hanson 2013, we find that Chinese imports decrease the average CZ manufacturing employment share. The employment reduction appears to be most prominent among low-educated and mainly driven by import exposure in female-intensive industries. Even though we do not find an effect on the average employment in non-trading industries, we find some positive reallocation effects of men into the service sector. Subsequently, we discuss the mechanisms and implications of these empirical findings.

One of the key findings of this paper is that the female-intensive index seems to be the main driver of the reduction in manufacturing employment. The question then becomes why imports that hit male-intensive industries do not seem to have a corresponding effect. A reasonable mechanism behind this pattern could be that the occupational structure differs between male- and female-intensive industries. Suppose that the originally female-intensive industries are more labor-intense than male-intensive industries, or have a higher concentration of occupations sensitive to lay-offs. All else equal, this would imply that they experience a greater negative effect on employment. Although this thesis has an industry focus, underlying occupational structures *within* the industries may be the cause of this difference. This would be an interesting avenue for further research to explore.

There are also mechanisms to be discussed concerning the heterogeneity analyses of the subgroups of the population. The fact that the decline in employment is greatest among the low-educated is consistent with the theory that trade-induced technical upgrading can reduce the demand for low-skilled labor. We do not find differential effects across married and unmarried workers in manufacturing. Thus, we do not find support for the theory that married women would be more likely to leave (or less likely to enter) employment because of income security through their partner.

Most estimates of men's labor force participation point in a negative direction. However, we find no evidence of a decline in FLFP as a result of increased Chinese import competition, which is in sharp contrast to previous findings in Mexico by Heckl 2022. We attribute this difference to the inclusion of a time-fixed effects dummy in specification 7 where we control for any events that differ between the two periods and that affected all commuting zones. When we remove this dummy, the LFP results are similar to those of Heckl 2022.

Import competition in male-intensive industries seems to have a small positive reallocation effect of men to the services sector. In contrast, the coefficients for women's employment in services are smaller and not statistically significant. This may be attributed to the fact that men are more flexible in the labor market than women and face lower labor market adjustment costs, as detailed in the theory section. But another reason may also be that we do not fully capture women's movements in the economy. This thesis has utilized a comprehensive employment measure.[16] However, it is important to note that the Mexican economy exhibits significant levels of informal employment (The World Bank 2019). Women could be moving into parts of the economy that we do not capture in our measures, such as informal self-employment. To our knowledge, no previous study has examined whether import competition drives people to self-employment. This would therefore also be an area for further research.

While our study specifically examines the effects of Chinese import competition on Mexican local labor markets between 1990 and 2010, our findings may have broader implications for other countries and time periods. For instance, our methodology and approach to disaggregating the results by gender, marriage status, and educational level could be adapted and applied to other settings. Moreover, our results suggest that trade shocks can have differential effects on men and women, which is a finding that could be relevant for policymakers in other contexts. Overall, our results offer insights that may have broader relevance beyond the specific context of Mexico in the 1990s and 2000s.

[16]We include both formal and informal employment. Formal employment includes laborers and white-collar workers who work for pay, while informal employment consists of paid day laborers. Self-employed persons, both formal and informal, are excluded.

10 Conclusion

This study provides empirical evidence supporting the hypothesis that a manufacturing import shock can reduce employment in the local manufacturing industry. We furthermore show that Chinese imports in female-intensive manufacturing industries have a significant negative impact on local female manufacturing employment. However, we do not find comparable results in manufacturing for men but document a small shift of men's employment to the service sector. Moreover, the study reveals that women and men with lower levels of education are particularly vulnerable to the import shock and therefore more likely to leave their jobs in the manufacturing sector when directly exposed.

There are several contributions in this study. One lies in the development of gender-specific import measures (following Autor, Dorn, and Hanson 2019) in the Mexican setting. Given the salient disparities in male and female industry employment in Mexico, the gender-specific variables provide a deeper understanding of the effects of trade shocks. Moreover, this thesis has made a valuable contribution to the field by examining the effects on various subgroups of the population, specifically groups based on marriage and educational attainment.

In terms of future research, it would be worthwhile to delve even deeper into the indirect effects and the extent of labor readjustments triggered by the import shock from China. Furthermore, it would be of interest to examine the reasons behind the gender differences in employment effects found in this paper. One such area would be to look further into occupational gender segregation and see if that might explain gender differences in labor market resilience to trade shocks.

References

Acemoglu, Daron et al. (2016). "Import Competition and the Great US Employment Sag of the 2000s". In: *Journal of Labor Economics* 34.S1, S141–S198.

Angrist, Joshua D and Jörn-Steffen Pischke (2009). *Mostly Harmless Econometrics: An Empiricist's Companion*. Princeton university press. ISBN: 9780691120355.

Artuç, Erhan, Shubham Chaudhuri, and John McLaren (2010). "Trade shocks and labor adjustment: A structural empirical approach". In: *American economic review* 100.3, pp. 1008–1045.

Artuç, Erhan and John McLaren (2015). "Trade policy and wage inequality: A structural analysis with occupational and sectoral mobility". In: *Journal of International Economics* 97.2, pp. 278–294.

Artuç, Erhan et al. (2015). "A global assessment of human capital mobility: the role of non-OECD destinations". In: *World Development* 65, pp. 6–26.

Autor, David H and David Dorn (2013). "The Growth of Low-Skill Service Jobs and the Polarization of the US Labor Market". In: *American Economic Review* 103.5, pp. 1553–1597.

Autor, David H, David Dorn, and Gordon H Hanson (2013). "The China Syndrome: Local Labor Market Effects of Import Competition in the United States". In: *American Economic Review* 103.6, pp. 2121–2168.

— (2019). "When Work Disappears: Manufacturing Decline and the Falling Marriage Market Value of Young Men". In: *American Economic Review: Insights* 1.2, pp. 161–178.

Bartel, Ann P and Frank R Lichtenberg (1987). "The comparative advantage of educated workers in implementing new technology". In: *The Review of Economics and statistics*, pp. 1–11.

Bartik, Timothy J (1991). "Who benefits from state and local economic development policies?" In: pp. 8–14.

Becker, Gary S (1957). *The Economics of Discrimination*. University of Chicago press. ISBN: 9780226041049.

Becker, Gary S (1973). "A theory of marriage: Part I". In: *Journal of Political economy* 81.4, pp. 813–846.

Blyde, Juan S, Matias Busso, and Dario Romero Fonesca (2020). "Short- and long-run labor market adjustment to import competition".

Blyde, Juan S and Oscar Fenantes (2019). "The heterogeneous impacts of import competition on Mexican manufacturing plants".

Bolio, Eduardo et al. (2019). *One Aspiration Two Realities*. URL: `https://www.mckinsey.com/featured-insights/americas/one-aspiration-two-realities-promoting-gender-equality-in-mexico` (visited on 03/02/2023).

Borusyak, Kirill, Peter Hull, and Xavier Jaravel (2022). "Quasi-experimental shift-share research designs". In: *The Review of Economic Studies* 89.1, pp. 181–213.

Connolly, Laura (2022). "The effects of a trade shock on gender-specific labor market outcomes in Brazil". In: *Labour Economics* 74.102085.

Costa, Francisco, Jason Garred, and João Paulo Pessoa (2016). "Winners and losers from a commodities-for-manufactures trade boom". In: *Journal of International Economics* 102, pp. 50–69.

Cunningham, Scott (2021). Yale university press. ISBN: 9780300255881.

César, Andrés and Guillermo Falcone (2020). "Heterogeneous effects of Chinese import competition on Chilean manufacturing plants". In: *Economía* 20.2, pp. 1–60.

Dix-Carneiro, Rafael (2014). "Trade liberalization and labor market dynamics". In: *Econometrica* 82.3, pp. 825–885.

Dorn, David and Peter Levell (2021). "Trade and Inequality in Europe and the US".

Duval-Hernandez, Robert (2022). "Choices and Constraints: The Nature of Informal Employment in Urban Mexico". In: *The Journal of Development Studies* 58.7, pp. 1349–1362.

Faber, Marius (2020). "Robots and reshoring: Evidence from Mexican labor markets". In: *Journal of International Economics* 127.103384.

Gaddis, Isis and Janneke Pieters (2012). "Trade liberalization and female labor force participation: Evidence from Brazil."

Goldberg, Pinelopi Koujianou and Nina Pavcnik (2007). "Distributional effects of globalization in developing countries". In: *Journal of economic Literature* 45.1, pp. 39–82.

Goldsmith-Pinkham, Paul, Isaac Sorkin, and Henry Swift (2020). "Bartik instruments: What, when, why, and how". In: *American Economic Review* 110.8, pp. 2586–2624.

Hakobyan, Shushanik and John McLaren (2016). "Looking for local labor market effects of NAFTA". In: *Review of Economics and Statistics* 98.4, pp. 728–741.

Heckl, Pia (2022). "Import Shocks and Gendered Labor Market Responses: Evidence from Mexico".

ILOSTAT (2022). *ILO Modelled Estimates and Projections database (ILOEST).* ILO. URL: `https://ilostat.ilo.org/data/` (visited on 03/01/2023).

IMF, WB, WTO (2017). *Making Trade an Engine of Growth for All.* URL: `https://www.imf.org/~/media/Files/Publications/PP/041017joint-wto-wb-imf-trade-paper.ashx` (visited on 04/05/2023).

INEGI (2004). *Las Mujeres y los Hombres en las Actividades Económicas - Censos Económicos 1994 y 1999.*

— (2019). *Las Mujeres y los Hombres en las Actividades Económicas - Censos Económicos 1994 y 1999.*

— (2022). *National Occupation and Employment Survey.*

Juhn, Chinhui, Gergely Ujhelyi, and Carolina Villegas-Sanchez (2013). "Trade liberalization and gender inequality". In: *American Economic Review* 103.3, pp. 269–273.

— (2014). "Men, women, and machines: How trade impacts gender inequality". In: *Journal of Development Economics* 106, pp. 179–193.

López-Acevedo, Gladys et al. (2021). "Changes in female employment in Mexico: Demographics, markets and policies". In: *Estudios Económicos (México, DF)* 36.1, pp. 115–150.

Majlesi, Kaveh (2016). "Labor market opportunities and women's decision making power within households". In: *Journal of Development Economics* 119, pp. 34–47.

Majlesi, Kaveh and Gaia Narciso (2018). “International import competition and the decision to migrate: Evidence from Mexico”. In: *Journal of Development Economics* 132, pp. 75–87.

Mansour, Hani, Pamela Medina, and Andrea Velasquez (2022). “Import competition and gender differences in labor reallocation”. In: *Labour Economics* 76.102149.

Mendez, Oscar (2015). “The effect of Chinese import competition on Mexican local labor markets”. In: *The North American Journal of Economics and Finance* 34, pp. 364–380.

Morales, Fernando, Martha Denisse Pierola, and Dennis Sanchez-Navarro (2021). “Import competition in the manufacturing sector in Peru: Its impact on informality and wages”. In: *Economía* 44.88, pp. 45–75.

Ostry, Jonathan David et al. (2018). International Monetary Fund. ISBN: 9781484337127.

Robertson, Raymond (2019). *How US Imports from China Affect Mexican Labor Markets.* URL: `https://bush.tamu.edu/wp-content/uploads/2020/05/V10-8_China-Mexico_Takeaway.pdf` (visited on 03/20/2023).

San Juan Bernuy, Victoria and Diederik Boertien (2023). “The influence of partners’ resources on women’s employment in Mexico”. In: *Community, Work Family* 26.1, pp. 97–117.

Shore, Stephen H (2010). “For better, for worse: Intrahousehold risk-sharing over the business cycle”. In: *The Review of Economics and Statistics* 92.3, pp. 536–548.

Sánchez-Juárez, Isaac, Adelaido García-Andrés, and David Revilla (2015). “Identification of key productive sectors in the Mexican economy”. In: *Expert Journal of Economics* 3.1.

The World Bank (2019). *Mexico Gender Assessment.* URL: `http://documents.worldbank.org/curated/en/377311556867098027/Mexico-Gender-Assessment` (visited on 03/01/2023).

— (2021a). *Expanding Financial Access for Mexico’s Poor and Supporting Economic Sustainability.* URL: `https://www.worldbank.org/en/results/2021/04/09/expanding-financial-access-for-mexico-s-poor-and-supporting-economic-sustainability` (visited on 04/10/2023).

The World Bank (2021b). *The Distributional Impacts of Trade.* URL: https://openknowledge.worldbank.org/server/api/core/bitstreams/f525eb64-cea2-5060-b7b6-25cccafeb768/content (visited on 05/10/2023).

— (2023). *The World Bank In Mexico.* URL: https://www.worldbank.org/en/country/mexico/overview (visited on 05/05/2023).

Wacziarg, Romain and Jessica Seddon Wallack (2004). "Trade liberalization and intersectoral labor movements". In: *Journal of international Economics* 64.2, pp. 411–439.

A Appendix

A.1 OLS Results of Heterogeneity Analysis

Table 12: Effects on Manufacturing Employment by Marital Status, OLS-estimates

	Female Manufacturing Employment		*Male Manufacturing Employment*	
	Married	Unmarried	Married	Unmarried
	I. Overall Trade Shock		III. Overall Trade Shock	
ΔIP^{IV}	-0.218*	-0.222***	-0.308**	-0.274**
	(0.11)	(0.06)	(0.10)	(0.09)
	II. Female and Male Shock		IV. Female and Male Shock	
$\Delta\text{IP}^{IV}_{female}$	-1.087***	-0.558**	-0.595	-0.714*
	(0.27)	(0.17)	(0.35)	(0.28)
$\Delta\text{IP}^{IV}_{male}$	0.161**	-0.076	-0.183	-0.082
	(0.06)	(0.11)	(0.15)	(0.15)
N	3608	3608	3608	3608

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Employment is measured as a CZ share of all/women/men respectively. Ages 15-64. Stacked First Differences Years 1990, 2000 and 2010. Demographic controls for base-year 1990: log of CZ population size, share of men, share of female employed, share of people with primary, secondary and tertiary education respectively, share of people in work-age, share of people with children below 5 years old, share of routine jobs, initial manufacturing share. Other controls: NAFTA tariff reduction exposure and time-fixed effects. Standard errors are clustered at the CZ-level. Weighted to 1990 CZ working age population.

Table 13: Effects on Manufacturing Employment by Educational Attainment, OLS-estimates

	Female Manufacturing Employment			*Male Manufacturing Employment*		
	Primary	Secondary	Tertiary	Primary	Secondary	Tertiary
	I. Overall Trade Shock			III. Overall Trade Shock		
ΔIP^{IV}	-0.374**	-0.040	-0.014	-0.551***	-0.078	-0.037*
	(0.12)	(0.02)	(0.01)	(0.14)	(0.04)	(0.02)
	II. Female and Male Shock			IV. Female and Male Shock		
$\Delta \text{IP}^{IV}_{female}$	-1.281***	-0.068	-0.060	-0.895*	0.009	-0.051
	(0.28)	(0.10)	(0.03)	(0.45)	(0.15)	(0.06)
$\Delta \text{IP}^{IV}_{male}$	0.021	-0.028	0.005	-0.349	-0.115	-0.031
	(0.13)	(0.04)	(0.02)	(0.20)	(0.09)	(0.02)
N	3608	3608	3608	3608	3608	3608

Standard errors parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Employment is measured as a CZ share of all/women/men respectively. Ages 15-64. Stacked First Differences Years 1990, 2000 and 2010. Demographic controls for base-year 1990: log of CZ population size, share of men, share of female employed, share of people with primary, secondary and tertiary education respectively, share of people in work-age, share of people with children below 5 years old, share of routine jobs, initial manufacturing share. Other controls: NAFTA tariff reduction exposure and time-fixed effects for. Weighted to 1990 CZ working age population. Standard errors are clustered at the CZ-level.

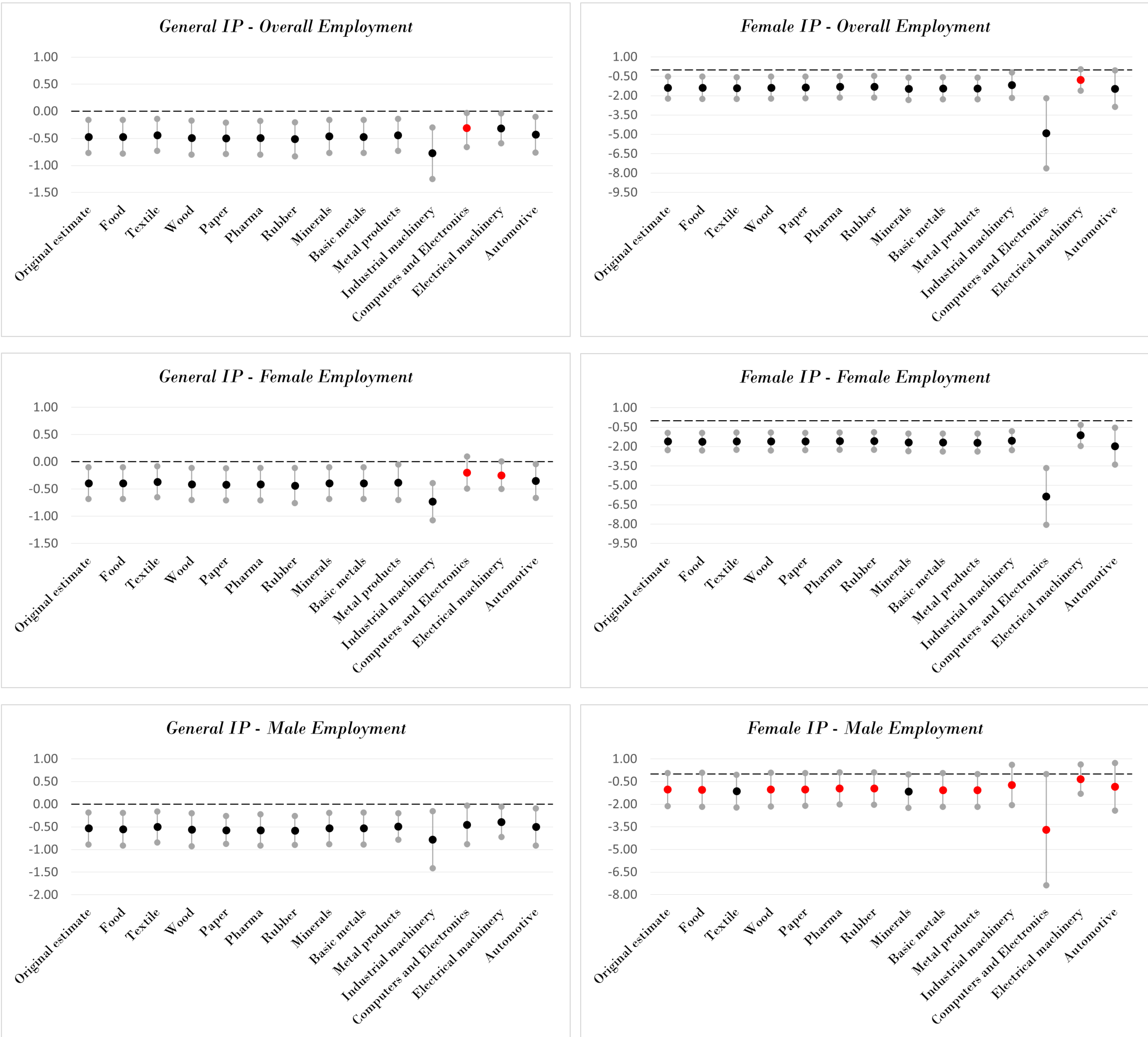
A.2 Overview of Industry Crosswalk

Table 14: Industry Crosswalk

		Mexican Census Data		
Industry	HS92	1990	2000	2010
Agriculture	1–15	10,001–10,999	110–119	1110–1199
Manufacturing				
Food products & beverages	16–24	31,001–31,099	310–311	3110–3120
Textiles & apparel	41–43, 50–67	31,101–31,211	312–315	3130–3160
Wood products	44–47	31,301–31,399	320, 336	3210, 3370
Paper & printing	48–49	32,001–32,099	321–322	3220–3230
Pharmaceuticals & other chemicals	27–38	32,101–32,132, 32,199	323–324	3240–3250
Rubber & plastic products	39–40	32,141–32,152	325	3260
Minerals	25–26, 68–71	32,201–32,299	326	3270
Basic metals	72, 7401–7406, 7501–7504, 7601–7603, 7801–7802, 7901–7903, 8001–8002, 81	32,301–32,399	330	3310
Metal products	73, 7407–7419, 7505–7508, 7604–7616, 7803–7806, 7904–7907, 8003–8007, 82–83	32,401–32,404	331	3320
Industrial machinery	84	32,411	332	3330
Computers & electronics	8508–8510, 8517–8548	32,412–32,413, 32,422–32,423	333	3340
Electrical equipment & machinery	8501–8507, 8511–8516	32,421	334	3350
Automotive & transport equipment	86–89	32,431–32,441	335	3360
Non-trading Industries				
Mining	.	20,001–20,999	210–212	2110–2199
Utilities	.	41,000–41,999	220–222	2210–2222
Construction	.	42,001–42,999	230–239	2361–2399
Education, R&D	.	82,001–82,099	540–541, 610	6111–6199
Services	.	82,101–85,999	430–539, 550–564, 620–939	4310–5620, 6211–9399

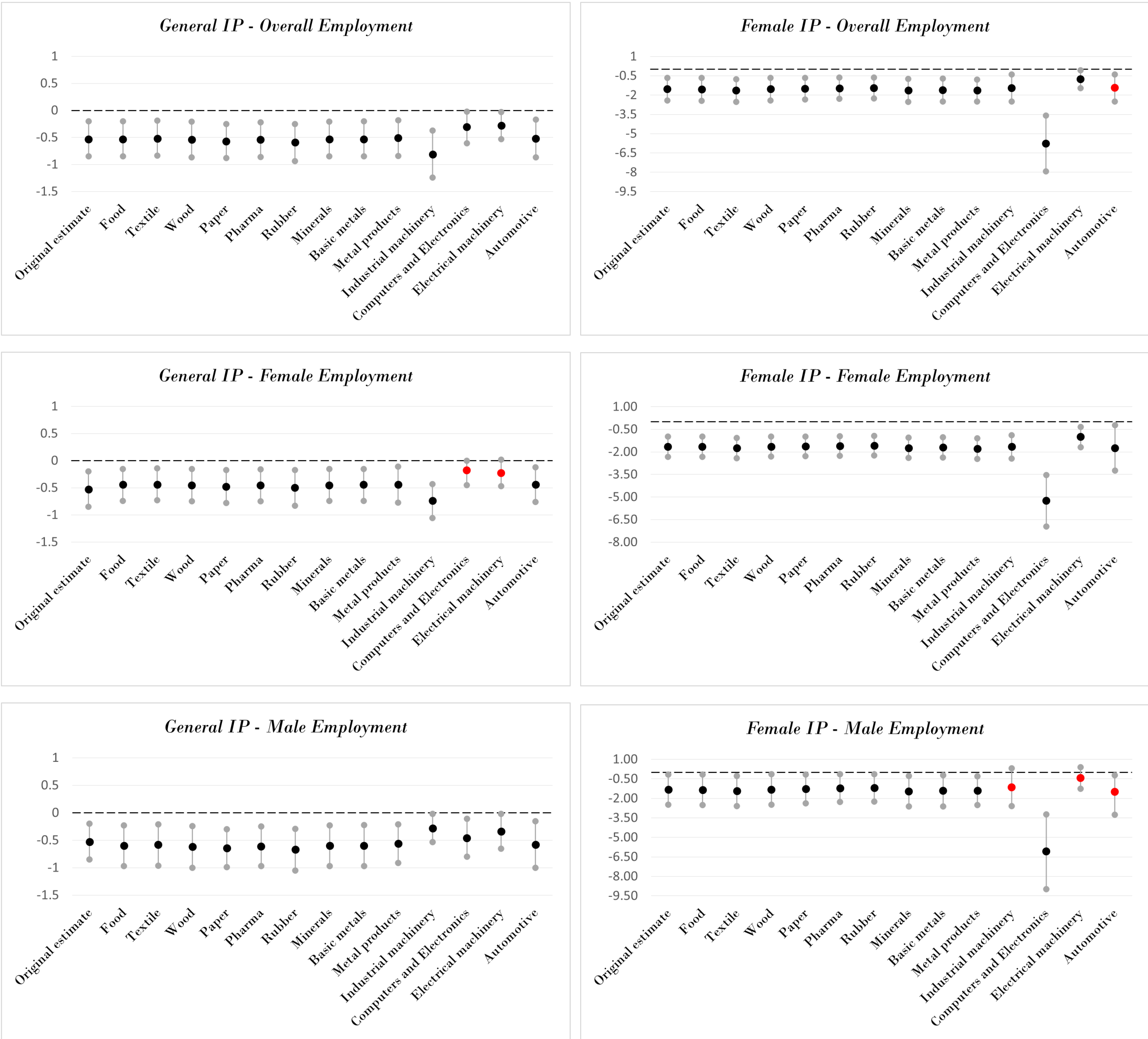
A.3 Industry Robustness

Figure 4: 2SLS Robustness Analysis - Industries



2SLS coefficient estimates (including upper and lower bounds, 95 % confidence interval) for all regressions when one industry is excluded at a time. The red markers indicate estimates that are not significantly different from zero at the 5% level.

Figure 5: OLS Robustness Analysis - Industries



OLS coefficient estimates (including upper and lower bounds, 95 % confidence interval) for all regressions when one industry is excluded at a time. The red markers indicate estimates that are not significantly different from zero at the 5% level.

A.4 Instrument Robustness

The following Tables 15-19 check for the robustness of the results by changing the instrument using import flows from China to a smaller set of countries that had similar income to Mexico. These are Argentina, Brazil, Chile, Colombia, Costa Rica, Greece, Panama, and Portugal.

Table 15: Robustness: Effects on Manufacturing Employment

2SLS Results

	Manufacturing Employment		
	F+M	Female	Male
		I. Overall Trade Shock	
ΔIP^{IV}	-0.540**	-0.448**	-0.628**
	(0.18)	(0.16)	(0.21)
		II. Female and Male Shock	
$\Delta \text{IP}^{IV}_{female}$	-1.777***	-1.937***	-1.505*
	(0.45)	(0.35)	(0.59)
$\Delta \text{IP}^{IV}_{male}$	-0.112	0.067	-0.324
	(0.23)	(0.17)	(0.30)
N	3608	3608	3608

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Employment is measured as a CZ share of all/women/men respectively. Ages 15-64. Stacked First Differences Years 1990, 2000 and 2010. Demographic controls for base-year 1990: log of CZ population size, share of men, share of female employed, share of people with primary, secondary and tertiary education respectively, share of people in work-age, share of people with children below 5 years old, share of routine jobs, initial manufacturing share. Other controls: NAFTA tariff reduction exposure and time-fixed effects. Standard errors are clustered at the CZ-level. Weighted to 1990 CZ working age population.

Table 16: Robustness: Effects on Manufacturing Employment by Marital Status

2SLS Results

	Female Manufacturing Employment		*Male Manufacturing Employment*	
	Married	Unmarried	Married	Unmarried
	I. Overall Trade Shock		III. Overall Trade Shock	
ΔIP^{IV}	-0.190	-0.255**	-0.331**	-0.285**
	(0.10)	(0.08)	(0.11)	(0.11)
	II. Female and Male Shock		IV. Female and Male Shock	
$\Delta \text{IP}^{IV}_{female}$	-1.121***	-0.813***	-0.653	-0.844**
	(0.27)	(0.22)	(0.35)	(0.28)
$\Delta \text{IP}^{IV}_{male}$	0.132	-0.061	-0.219	-0.091
	(0.07)	(0.12)	(0.15)	(0.16)
N	3608	3608	3608	3608

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Employment is measured as a CZ share of all/women/men respectively. Ages 15-64. Stacked First Differences Years 1990, 2000 and 2010. Demographic controls for base-year 1990: log of CZ population size, share of men, share of female employed, share of people with primary, secondary and tertiary education respectively, share of people in work-age, share of people with children below 5 years old, share of routine jobs, initial manufacturing share. Other controls: NAFTA tariff reduction exposure and time-fixed effects. Standard errors are clustered at the CZ-level. Weighted to 1990 CZ working age population.

Table 17: Robustness: Effects on Manufacturing Employment by Educational Attainment

2SLS Results

	Female Manufacturing Employment			*Male Manufacturing Employment*		
	Primary	Secondary	Tertiary	Primary	Secondary	Tertiary
	I. Overall Trade Shock			III. Overall Trade Shock		
ΔIP^{IV}	-0.383**	-0.042	-0.014	-0.607***	-0.085	-0.042**
	(0.13)	(0.02)	(0.01)	(0.16)	(0.04)	(0.01)
	II. Female and Male Shock			IV. Female and Male Shock		
$\Delta\text{IP}^{IV}_{female}$	-1.507***	-0.075	-0.075*	-1.227**	-0.006	-0.075
	(0.29)	(0.10)	(0.03)	(0.47)	(0.14)	(0.06)
$\Delta\text{IP}^{IV}_{male}$	0.006	-0.030	0.008	-0.392	-0.113	-0.030
	(0.14)	(0.03)	(0.02)	(0.22)	(0.09)	(0.02)
N	3608	3608	3608	3608	3608	3608

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Employment is measured as a CZ share of all/women/men respectively. Ages 15-64. Stacked First Differences Years 1990, 2000 and 2010. Demographic controls for base-year 1990: log of CZ population size, share of men, share of female employed, share of people with primary, secondary and tertiary education respectively, share of people in work-age, share of people with children below 5 years old, share of routine jobs, initial manufacturing and service employment share. Other controls: NAFTA tariff reduction exposure and time-fixed effects. Standard errors are clustered at the CZ-level. Regressions weighted to 1990 CZ working age population.

Table 18: Robustness: Effects on Labor Force Participation

2SLS Results

	Labor Force Participation		
	F+M	Female	Male
	I. Overall Trade Shock		
ΔIP^{IV}	-0.204	0.346	-0.620**
	(0.11)	(0.24)	(0.22)
	II. Female and Male Shock		
$\Delta \text{IP}^{IV}_{female}$	-0.915*	-0.840	-0.548
	(0.38)	(0.55)	(0.47)
$\Delta \text{IP}^{IV}_{male}$	0.042	0.757	-0.645
	(0.18)	(0.47)	(0.39)
N	3608	3608	3608

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Labor force participation is measured as a CZ share of all/women/men respectively. Ages 15-64. Stacked First Differences Years 1990, 2000 and 2010. Demographic controls for base-year 1990: log of CZ population size, share of men, share of female employed, share of people with primary, secondary and tertiary education respectively, share of people in work-age, share of people with children below 5 years old, share of routine jobs. Initial industry shares: manufacturing, services, utilities, construction, mining, education. Other controls: NAFTA tariff reduction exposure and time-fixed effects. Standard errors are clustered at the CZ-level. Regressions weighted to 1990 CZ working age population.

Table 19: Robustness: Effects on Service Employment

2SLS Results

	Service Employment		
	F+M	Female	Male
	I. Overall Trade Shock		
ΔIP^{IV}	0.199**	0.152*	0.257**
	(0.07)	(0.07)	(0.08)
	II. Female and Male Shock		
$\Delta \text{IP}^{IV}_{female}$	0.055	0.222	-0.052
	(0.23)	(0.24)	(0.25)
$\Delta \text{IP}^{IV}_{male}$	0.248	0.127	0.363*
	(0.13)	(0.12)	(0.15)
N	3608	3608	3608

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Employment is measured as a CZ share of all/women/men respectively. Ages 15-64. Stacked First Differences Years 1990, 2000 and 2010. Demographic controls for base-year 1990: log of CZ population size, share of men, share of female employed, share of people with primary, secondary and tertiary education respectively, share of people in work-age, share of people with children below 5 years old, share of routine jobs, initial manufacturing and service employment share. Other controls: NAFTA tariff reduction exposure and time-fixed effects. Standard errors are clustered at the CZ-level. Regressions weighted to 1990 CZ working age population.