The China Shock and Regional Gender Pay Gaps in the United States

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1. Abstract

This capstone project tries to estimate the influence of the increase in imported goods from the People's Republic of China to the United States of America from 1990 to 2007 in 722 US commuting zones on their raw gender pay gap. This paper refers to the logarithmic gender pay gap as the difference between men's to women's logarithmic weekly wages in a commuting zone over time. It is regressed on time dummies, labor, and social-specific control variables, and the change in Chinese import exposure per worker in a US region. A two-stage least squares regression analysis with an instrumental variable of the change in Chinese import exposure growth in eight high-income countries other than the US is chosen to avoid the model's possible endogeneity. The models predict the log changes for wages and occupation status of the working-age population and derive the change in the gender pay gap. For wages, I discover an increase in the gender pay gap through a rise in US imports from China in a region while controlling for its share of employment in manufacturing. Increasing imports from China also make wages more robust for male employees with a college education, of white ethnicity, and among those born within the US than the imports for females in the same subdivision. In contrast, wages for women with no college education and of non-white ethnicity decrease more than for males in these areas. For population, I estimate a more considerable relative decrease in male than female employment in manufacturing and a tremendous relative increase in male unemployment and non-labor force participation.

2. Introduction

The gender pay gap (GPG) marks the wage difference between female and male workers. In contrast, topic-related literature differentiates between the raw or unadjusted GPG and the residual or adjusted GPG. The *raw/unadjusted* GPG expresses the difference in wages as a ratio of female wages to male wages in the analyzed field. For the US in 2022, women's median weekly earnings were 83% of men's median weekly earnings (Bureau of Labor Statistics, 2023), following the rising tendency throughout the last decades. The *residual/adjusted* GPG builds on the *raw/unadjusted* GPG data and remains after controlling for differences in observable characteristics between women and men, such as occupation. After applying several decomposition techniques, this remainder may still contain unobservable characteristics between women and men, often taken as a proxy for women's "discrimination" in wages. Deshpande et al. (2018) argue that the share of unobservable characteristics has risen over time, while Blau and Khan (2017) emphasize their substantial increase from 1980 to 2010, followed by a plateau. Whereas observable factors such as the level of education for women and men have assimilated throughout the last years, the unobservable characteristics might play a more prominent role in future research for explaining the GPG.

Therefore, this paper tries to find newer explanations behind the still persistent GPG by focusing on the influence of US imports from China on the regional GPG in the US as an until now unobservable characteristic in previous research. Figure 1 displays the parallel development of the US-GPG and the shares of US imports from China from 1990 to 2010. After China acceded to the WTO in 2001, shares of US imports from China rose from less than 9% ($102,278.4 M) to over 19% ($296,373.9 M) within the first eight years. Many researchers call this rise of Chinese exports the "China Shock" - an external shock often regarded as a quasi-natural experiment.

From an economic theory perspective, how international trade can influence the GPG is under debate. Trade liberalization leads to rising competition for local companies. Under the skill-biased technical change theory, technological upgrades save labor costs and increase high-skilled workers' premiums, resulting in a growing gap in wages and employment between skilled and unskilled workers (Violante, 2008). Even though it is hard to set boundaries on the inclusiveness of "high-skilled" professions, men are more likely to work in classical high-skilled occupations than women in the US. According to the US Bureau of Labor Statistics, in 2022, men covered 53.78% of

all life, physical, and social science occupations, 57.23% of all management occupations, 73.46% of all computer and mathematical fields, and 84.62% of all architecture and engineering occupations. Under the assumption that male workers are of higher skill than female employees, US trade with China might increase the GPG according to the skill-biased technical change theory. This belief goes with the Heckscher-Ohlin-Samuelson (HOS) model framework predicting a rise in the demand for skilled relative to unskilled labor in the US following the trade with China since it is seen as an unskilled labor-abundant country.

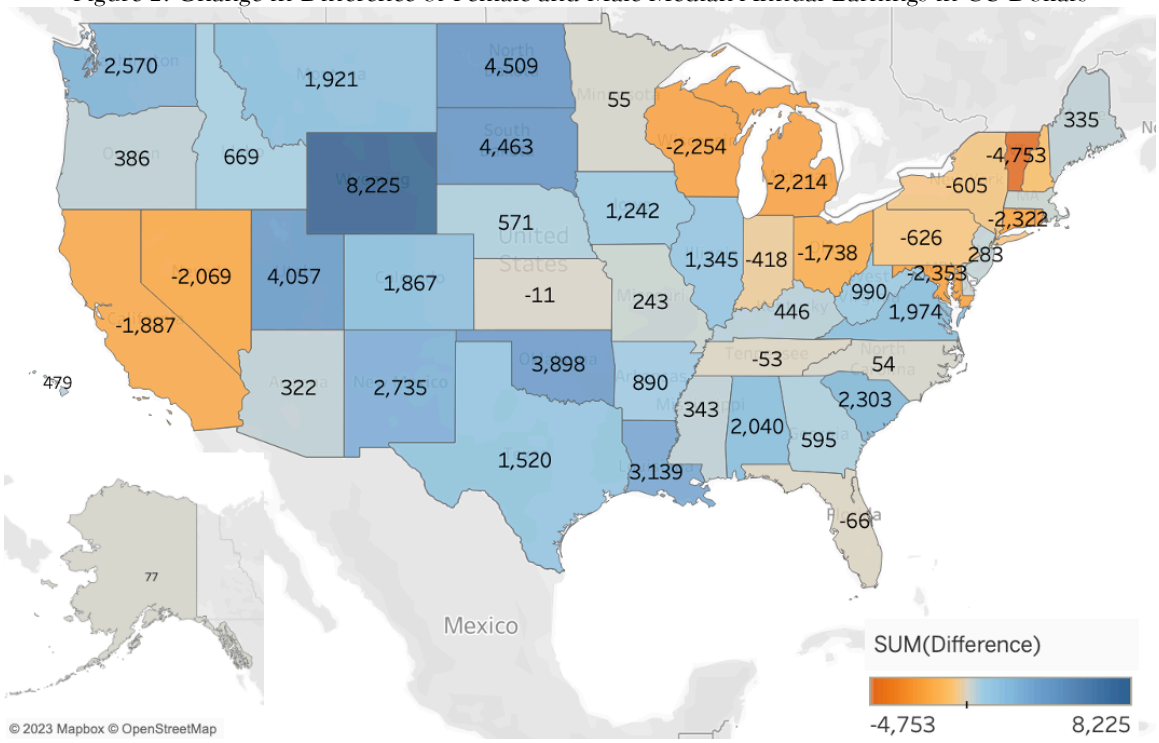
Figure 1: Women's to Men's Earnings Ratio in Median Weekly Wages vs.
Share of US-Imports from China of total US imports

Sources: Bureau of Labor Statistics, US Department of Labor & Source: US Census Bureau. Trade in Goods.

This study emphasizes the change in the US GPG on a regional level since US districts differ in institutions, demographics, and labor markets and are, therefore, differently exposed to the China shock. Autor, Dorn, & Hanson (2013) highlight the role of a district's share of workers employed in manufacturing concerning its exposure to import competition from China, often called the "workbench of the world." It affects local labor markets not just through manufacturing employment, which is adversely affected, but also along numerous other margins.

Keeping the role of the share of manufacturing workers in mind, Figure 2 compares the changes in raw GPG for each state for 1999 and 2019. Within these two decades, the raw GPG shrunk in 14 US states, including states in the southwest and the rust belt, a traditional manufacturing-focused region. The Midwest, the Rocky Mountains region, and partly the South witness an increase in their GPG.

Figure 2: Change in Difference of Female and Male Median Annual Earnings in US Dollars



Source: US Census Bureau

To discuss the issue of how the district's exposure to Chinese import competition affects its respective gender pay gap, the rest of this paper is organized as follows. Section three presents the issue's current stand of literature. Section four elaborates on the data set, methodologic strategy, and econometric model. Section five presents and discusses the estimation results, whereas Section 6 concludes this study.

3. Literature Review

Previous academic literature on the effect of international trade on labor markets and GPG primarily focuses on a nation or industry comprehensive approach.

The first group of authors argues that international trade *shrinks* a country's GPG: Hyder & Behrman (2012) in their study about Pakistan from 1960 to 2010, Kis-Katos et al. (2017) in Indonesia in the early 2000s, Fatima and Khan (2019) in 21 developing countries from 1995 to 2013, and Besedes et al. (2021) who argue that increased import competition from China negatively impacted the manufacturing sector with traditionally higher male participation. Women enter the labor market to compensate for income losses from the layoffs of men.

A second group of authors defends the belief that international trade *widens* a country's GPG: Berik et al. (2004) in Taiwan during the 1980s and 1990s, Cooray et al. (2012) in 80 developing countries from 1985 to 2005, Saure & Zoabi (2014) in Mexico from 1990 to 2007, and Meschi et al. (2016) in Turkey for the period 1992–2001.

A third group of authors discusses how the correlation between international trade and a country's GPG is somewhat *complex*: Oostendorp (2004) for 83 countries from 1983 to 1999, and Wamboye & Seguino (2015), in 48 Sub-Saharan African countries from 1991 to 2010.

Analyzing regional GPG, Benguria & Ederington (2017) focus on 558 Brazilian micro-regions during 2000-2010 and provide evidence for an increased GPG in regions with a high share of female workers in higher-paying occupations. Male workers are more exposed to import competition and exhibit higher rates of industry mobility than female workers. The opposite is true for occupational mobility. Saha (2021) analyzes the regional effects in India from trade with China from 1999 to 2012. The rural region with a higher share of women in the labor force experiences an above-average increase in GPG. With rising Chinese imports, the overserved regional occupational GPG grows by three percentage points.

The literature review revealed a lack of studies analyzing GPG's regional differences and studies focusing on developed countries such as the US. This paper aims to close this gap.

4. Data Set and Methodology

The paper's analysis refers to the data and methodology of Autor, Dorn & Hanson (2013) to answer the research question of how the change in US imports from China altered the GPG in

the US. The authors studied the correlation between the change in US imports from China and the manufacturing employment shift in 722 US commuting zones.

4.1 Data Set

Referring to the original data set as described in Autor, Dorn & Hanson (2013), statistics on international trade from 1991 to 2007 are extracted from the UN Comrade Database. The authors modified the data to proceed with the four-digit Standard Industrial Classification (SIC) codes. All import amounts are inflated to 2007 US$ using the Personal Consumption Expenditure deflator.

Data is taken from the County Business Patterns (CBP) to measure the industry structure of local labor markets and the potential exposure of Commuting Zones (CZs) to import competition in 1980, 1990, and 2000. The CBP is an annual data series extracted from the Business Register, maintained by the US Census Bureau.

Labor supply and earnings data are obtained from the Census Integrated Public Use Micro Samples (Ruggles et al. 2004) for 1970, 1980, 1990, and 2000, and the American Community Survey (ACS) for 2006 through 2008. The sample consists of individuals between age 16 and 64 and working in the year preceding the survey. The computation of wages excludes self-employed workers and individuals with missing wages, weeks, or hours. Labor supply is measured by the product of weeks worked times the usual number of hours per week. Hourly wages are computed as yearly wage and salary income divided by the product of weeks worked and regular weekly hours. All salaries are inflated to 2007 using the Personal Consumption Expenditure Index.

I prepared the following data to determine the influence of the change in US imports from China on the regional GPG. For the US statistics on employment and wage, I created 128 groups. In contrast, each group has one characteristic out of two for gender, two whether a person is born in the US or not, four according to a person's age, four according to a person's education, and two whether a person is ethnically considered as "white" or not. This data was then merged with the CBP figures to display a CZ's labor supply and earnings from 1990 to 2008. I further created dummies for people being employed, unemployed, or not in the labor force; and for working or not in the manufacturing sector (referring to SIC). I shaped bins for the number of weeks people worked and

thus for estimated log weekly wages. Finally, I took the weighted mean for the log weekly wage. I computed the CZ's population share of workers in manufacturing and non-manufacturing and that of people employed, unemployed, or not in the labor force, respectively.

Until now, the modulation resulted in a dataset of multiple unique commuting zones (i) characterized by group (g) and year (t, for t = {1990, 2000, 2008}). For the regressions, I construct composition-adjusted measures to create data at the level of a commuting zone by year, as follows:

$$L_{it}^{CA} = \sum_g \bar{\theta}_{ig} L_{igt} \tag{1}$$

where time-invariant weights $\bar{\theta}_{ig}$ are the average across periods of hours weights:

$$\bar{\theta}_{ig} = \frac{1}{3}(\theta_{ig1990} + \theta_{ig2000} + \theta_{ig2008}) \tag{2}$$

where

$$\bar{\theta}_{ig} = hours_{igt}/(\sum_g hours_{igt}) \tag{3}$$

Note that $\sum_g \bar{\theta}_{ig} = 1$.

I created average log wages for each group within a CZ at a year t: college/ non-college graduates, US-born/non-US-born, ethnically white/ethnically non-white, and male/female. Then, I subdivided the first three categories and the composition adjusted shares for manufacturing/non-manufacturing workers, unemployed people, and people not in the labor force by gender and calculated the respective log counts. I also added the variable "GPG," representing the gender pay gap, as the difference between the log of weekly wages for males and that for females. After creating the 10-year equivalent changes and renaming variables to be consistent with the work of Autor, Dorn & Hanson (2013), I merged to data with the data set on international trade. The final data set consists of 2x722 values, two for each CZ. The first refers to the CZ's characteristics from 1990 to 2000 and the second from 2000 to 2008. Each variable/row has 191 attributes/ columns assigned.

4.2 Econometric Model and Empirical Strategy

To regress the change of the regional GPG on the change of US imports from China, I rely on the model below:

$$\Delta \log\left(\frac{w_{lit}^{m}}{w_{lit}^{f}}\right) = \alpha_t + \beta_1 IPW_{uit} + \beta_2 X'_{it} + e_{it} \quad (4)$$

Where α_t represents separate time dummies for each period. The matrix X_{it} includes controls. e_{it} represents the error term. $\Delta \log\left(\frac{w_{lit}^{m}}{w_{lit}^{f}}\right)$ is the decadal log change of the difference between the weekly log wages for the male and female working-age population in a CZ over period t (t_1 = 1990 till 2000; t_2= 2000 till 2008):

$$\log\left(\frac{w_{lit}^{m}}{w_{lit}^{f}}\right) = \log(w_{lit}^{m}) - \log(w_{lit}^{f}) \quad (5)$$

ΔIPW_{uit} represents the change in Chinese import exposure per worker in a US region, where imports are apportioned to the region according to its share of national industry employment:

$$\Delta IPW_{uit} = \sum_j \frac{L_{ijt}}{L_{ujt}} \frac{\Delta M_{ucjt}}{L_{it}} \quad (6)$$

It is measured as the weighted sum of imports from China, with the weights being equivalent to the national employment shares of industries within a district. The first ratio reflects the national industry employment share consisting of L_{ijt} which displays the number of workers in in district i in industry j over period t and L_{Iit} which symbolizes the national employment share of workers in i over t. The second ratio mirrors the Chinese imports per worker in US district i over time t. ΔM_{ucjt} reflects the observed change in US imports from China in industry j between the start and end of the period t, whereas L_{it} stands for the start of period employment (year t) in region i.

I assume the chosen equation to predict the $\Delta \log\left(\frac{w_{lit}^{m}}{w_{lit}^{f}}\right)$ suffers from endogeneity

since $cov(\Delta M_{ucjt}, e_{it}) \neq 0$. Thus, we cannot regress $\Delta \log\left(\frac{w^m_{iit}}{w^f_{iit}}\right)$ on the actual causal effect of ΔM_{ucjt}. US imports from China may be correlated to undiscovered externalities such as industry labor demand shocks causing simultaneity in the regression model.

To decompose the true causal effect, this paper applies an Instrumental Variable (IV) strategy to overcome the challenge of the model's endogeneity. This proposes an IV replacing Chinese exports into the US with Chinese export growth in other high-income countries, such as Australia, Denmark, Finland, Germany, Japan, New Zealand, Spain, and Switzerland. The chosen IV ΔIPW_{oit} is specified below:

$$\Delta IPW_{oit} = \sum_j \frac{L_{ijt-1}}{L_{ujt-1}} \frac{\Delta M_{ocjt}}{L_{it-1}} \quad (7)$$

where ΔM_{ocjt} defines the change in Chinese import growth in the set of non-US high-income countries in industry j over the time t-1. It replaces ΔM_{ucjt} (change in Chinese imports to industry j over time t) and relies on 10-year-lagged employment levels to mitigate the simultaneity bias of anticipated Chinese imports affecting contemporaneous employment by region.

5. Estimation Results and Discussion

5.1 Change in Gender Pay Gap, Pooled Regressions with Controls

In Table 1, I extend the first difference model for 1990-2007 with five demographic and labor force measures to test the robustness and potentially eliminate confounds.

Column one presents the regression model without any control variables. The model regresses the decadal change of the difference between the weekly log wages for the male and female working-age population on the shift in US-Imports from China. Even though not statistically significant, an increase of one percentage point in US-Imports from China may lead to a decrease of -0.13 percentage points in the CZ's GPG.

Statistically significant estimates are calculated in column two, where I added control for the share of manufacturing in a CZ's start-of-period employment in 1990. A CZ with a one percentage point higher initial manufacturing share experiences a regional GPG decline of 0.16 percentage points over the subsequent decade. This specification also flips the effect of import exposure on

regional GPG compared to the estimate in column one and makes it statistically significant. An increase of one percentage point in US-Import exposure from China may lead to a 0.48 percentage points increase in the CZ's GPG.

Column 3 augments the regression model with geographic dummies for the nine Census divisions, which absorb region-specific trends in the GPG. These dummies mitigate the effect of the share of manufacturing in a CZ to negative 0.09, which remains statistically significant. The impact of import exposure also weakens to 0.26 percentage points but becomes insignificant.

Table 1: US-Imports from China and Change of Gender Pay Gap in Commuting Zones, 1990-2007: 2SLS Estimates.
Dep Var: 10 x Annual Change in the Difference of log Weekly Wages for Male and Female Working-age Population

	I. 1990-2007 Stacked First Differences					
	(1)	(2)	(3)	(4)	(5)	(6)
(Δ Imports from China to US)/ Worker	-0.1310 (0.1487)	0.4837** (0.2061)	0.2566 (0.1718)	0.0552 (0.1924)	0.1701 (0.2009)	0.0549 (0.2148)
% of employment in manufacturing		-0.1609*** (0.0456)	-0.0918** (0.0396)	-0.0158 (0.0337)	-0.0622* (0.0372)	-0.0206 (0.0380)
% of the college-educated population				0.0162 (0.0373)		0.0007 (0.0399)
% of foreign-born population				0.1256*** (0.0234)		0.1079*** (0.0277)
% of employment among women				0.0002 (0.0398)		-0.0209 (0.0471)
% of employment in routine occupations					0.0523 (0.1008)	-0.0045 (0.0752)
Ave offshorability index of occupations					1.3043*** (0.3457)	0.6349 (0.5664)
Census division dummies	No	No	No	Yes	Yes	Yes
	II. 2SLS First Stage Estimates					
(Δ Imports from China to OTH)/Worker	0.792*** (0.079)	0.664*** (0.088)	0.652*** (0.092)	0.635*** (0.093)	0.638*** (0.089)	0.631*** (0.090)
R^2	0.54	0.57	0.58	0.58	0.58	0.58

Notes: N=1444 (722 commuting zones x 2 time periods). All regressions include a constant and a dummy for the 2000-2007 period. First-stage estimates in Panel B also include the control variables indicated in the corresponding

columns of Panel A. Routine occupations are defined to account for 1/3 of US employment in 1980. The outsourcability index variable is standardized to a mean of 0 and a standard deviation of 10 in 1980. Robust standard errors in parentheses are clustered on state. Models are weighted by the start of period commuting zone share of the national population. ~ $p \leq 0.10$, * $p \leq 0.05$, ** $p \leq 0.01$.

Column four additionally controls for the start-of-period share of a CZ's population with a college education, the foreign-born percentage of the people, and the share of working-age women employed. The effect of the share of manufacturing in a CZ on the regional GPG further mitigates to negative 0.02 but becomes statistically insignificant. The impact of import exposure also decline to 0.06 percentage points but remains insignificant. The estimates prove a significant effect on the share of the foreign-born population in a CZ. An increase of one percentage point in the share of the foreign-born population may lead to a 0.13 percentage points increase in regional GPG. The share of college-educated people (0.016) and employed working-age women (0.0002) have insignificantly low effects.

Column five introduces occupational control variables for routine-intensive occupations and the offshorability index. The former describes positions whose primary activities follow precisely prescribed rules and procedures that make them readily codifiable. This category includes white-collar positions whose primary job tasks involve routine information processing (e.g., accountants and secretaries) and blue-collar production occupations primarily involving repetitive motion and monitoring tasks. Even though not significant, the estimates in column five suggest that the regional GPG rises by about 0.05 for each additional percentage point of initial employment in routine occupations. The former occupational control variable displays the offshorability index. It measures the average degree to which the domains in a commuting zone require neither proximity to a specific worksite nor face-to-face contact with US-based workers. The corresponding estimate in column 5 is statistically significant and positively affects the regional GPG. It rises by about 1.3 percentage points for each additional percentage point of the offshorability index of occupations — surprisingly, the effect of the share of employment in manufacturing increases in absolute value to 0.06 significantly.

The fully augmented model in column 6 only estimates significant values for the effect of the foreign-born population (0.11 percentage points). The remaining five estimates are not significant.

5.2 Change in Population and Employment Status by Gender

In this subsection, I explore the impact of import shocks in the US on the log change in the number of non-elderly adults in four mutually exclusive categories: employment in manufacturing, employment in non-manufacturing, unemployment, and labor force non-participation. In Table 2, Panel A, I find that a $1.000 worker increase in import exposure reduces the number of workers in manufacturing employment by 4.8 log points for the composition-adjusted Data. Surprisingly, I observed a decline also in non-manufacturing jobs in the affected CZ of 0.0127 (not statistically significant). In contrast, the number of unemployed and labor force non-participants increase by 5.9 and 3.3 percent, respectively, for a $1,000 per worker import shock.

In Table 2, panel B, I observe similar trends in each category. Import shocks reduce employment and raise unemployment and non-participation among both genders. The sum of the first two coefficients in panel B indicates that a $1,000 per worker increase in a CZ's import exposure reduces its employment to population rate by 0.76 percentage points. 83% of that decline is due to the loss in manufacturing employment, with the remainder due to a (not significant) drop in non-manufacturing jobs. The following two columns show almost 30% of the reduction in the employment-to-population ratio is accounted for by a rise in the unemployment-to-population rate (0.22 percentage points) while slightly more than 70% accrues to labor force non-participation (0.54 percentage points).

Table 2. Imports from China and Employment Status of Working Age Population within Commuting Zones, 1990-2007: 2SLS Estimates.

Dep Vars: 10-Year Equivalent Changes in Population Log Population Counts and Population Shares by Employment Status per Gender

	Mfg Emp		Non-Mfg Emp	Unemp		NILF	
	(1)		(2)	(3)		(4)	
			A. 100 × Log Change in Population Counts				
(Δ Imports from China to US)/ Worker	-4.8311		-0.0127	5.8837		3.2958	
	(1.2155)		(0.6671)	(1.1384)		(1.1033)	
			B. Change in Population Shares				
			Both Genders				
(Δ Imports from China to US)/ Worker	-0.6397	***	-0.1175	0.2183	***	0.5389	***
	(0.1198)		(0.1174)	(0.0528)		(0.1210)	
			Males				

(Δ Imports from China to US)/ Worker	-0.6788 (0.1435)	***	-0.1094 (0.1281)	0.2269 (0.0536)	***	0.5614 (0.1169)	***
			Females				
(Δ Imports from China to US)/ Worker	-0.5795 (0.0982)	***	-0.1431 (0.1196)	0.2039 (0.0552)	***	0.5187 (0.1457)	***

Notes: N=1444 (722 commuting zones x 2 time periods). All statistics are based on working-age individuals (age 16 to 64). The effect of import exposure on the overall employment/population ratio can be computed as the sum of the coefficients for manufacturing and non-manufacturing employment; this effect is highly statistically significant ($p \leq 0.01$) in the full sample, and all reported subsamples. All regressions include the full vector of control variables from column 6 of Table 1. Robust standard errors in parentheses are clustered on state. Models are weighted by the start of period commuting zone share of the national population. ~ $p \leq 0.10$, * $p \leq 0.05$, ** $p \leq 0.01$.

Employment in manufacturing alone declines significantly more for males (0.68) than for females (0.58). Even though not statistically significant, engagement in non-manufacturing alone suffers less from the import shock for both genders (0.11 for males, 0.14 for females) compared to the gender-respective loss in employment in manufacturing, work in both manufacturing and non-manufacturing is also characterized by a more noticeable decline for male (0.79) than for females (0.73 percent for a $1,000 per worker import shock). Unemployment and non-participation rise more for men (0.23) than women (0.20). The same applies to non-participation in the labor force with values of 0.56 and 0.51 percent, respectively, for a $1,000 per worker import shock. The more prominent effect of the decline in employment on men gets mitigated since the initial share of manufacturing employment among women (8.3% in 1990) is considerably smaller than among men (17.3%).

5.3 Change in Wages by Gender

Table three displays the influence of US-Imports from China on the GPG within commuting zones from 1990 to 2007. This estimation approach follows the same regression models as above, including control variables for regions and share of workers in manufacturing, with a college education, born outside of the US, being employed and female, in routine jobs, and engaged in offshorable occupations. In contrast to the results in Table 1, this approach focuses on the change in GPG for six specific subgroups in the US regarding the sample unit's college education, ethnicity, and place of birth.

Since this outcome only represents results for the dataset's employed population, the estimates for change in GPG estimates must be interpreted cautiously. Under the assumption that workers with lower ability and earnings are more likely to lose employment because of an adverse shock, the observed change in GPG will understate the composition-constant change in GPG. This bias also refers to Table four which looks at the pure wage changes per gender.

Table 3: US-Imports from China and Gender Pay Gap within Commuting Zones, 1990-2007: 2SLS Estimates.

Dep Var: 10-Year Equivalent Change in Avg Log Gender Pay Gap (in log pts)

	All Employed Population	College Education	No College Education	White Ethnicity	Non-White Ethnicity	US-Born	Not US-Born
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(Δ Imports from China to US)/Worker	0.0005	-0.0053*	0.0020	-0.0016	0.0091**	-0.00004	0.0031
	(0.0021)	(0.0029)	(0.0024)	(0.0024)	(0.0040)	(0.0024)	(0.0086)
R^2	0.5701	0.1965	0.5160	0.5621	0.0596	0.5527	0.0834

Notes: N=1444 (722 commuting zones x 2 time periods). All regressions include the full vector of control variables from column 6 of Table 1. Robust standard errors in parentheses are clustered on state. Models are weighted by the start of period commuting zone share of the national population. ~ p ≤0.10, * p ≤ 0.05, ** p ≤ 0.01.

Table three shows a significant adverse effect of import exposure on a CZ's GPG for college-educated and non-white workers. A $1,000 per worker increase in a CZ's exposure to US imports from China during a decade is estimated to reduce mean weekly GPG for college-educated workers by 0.0053 log points and increase that for non-white workers by 0.0091 log points.

Since only two regression results for the change in GPG in Table 3 are statistically significant, I also looked at the pure shift in weekly log wages per gender for a CZ over the same period, summarized in Table four. Even though the data set is insufficient to create reliable values for workers born outside of the US, the outcomes for the remaining five subgroups and their respective subdivisions by gender are all statistically significant.

For all workers within a CZ, mean weekly wages decrease in log percentage points with a $1,000 per worker increase in exposure to US imports from China during a decade. Respectively by gender, men's wages are more affected by import exposure than women's wages if men are college educated (reduction by 1.13 log points vs. 0.6 for women), of white ethnicity (1.42 vs.1.26), and born in the US (1.342 vs. 1.338) even though the difference to women's change in wages is almost

neglectable. In contrast, women's salaries decrease more heavily for non-college-educated workers (reduction by 1.3 log points vs. 1.1 for men) and non-white workers (1.83 vs. 0.92).

Table 4: US-Imports from China and Wage Changes within Commuting Zones, 1990-2007: 2SLS Estimates.

Dep Var: 10-Year Equivalent Change in Avg Log Weekly Wage (in log pts)

	All Workers (1)		Males (2)		Females (3)	
			A. College Education			
(Δ Imports from China to US)/Worker	-0.9031 (0.3338)	***	-1.1292 (0.3722)	***	-0.5981 (0.3488)	*
R^2	0.3121		0.1755		0.4005	
			B. No College Education			
(Δ Imports from China to US)/Worker	-1.1817 (0.2662)	***	-1.1040 (0.3118)	***	-1.3044 (0.2707)	***
R^2	0.6027		0.4813		0.7026	
			C. US Born			
(Δ Imports from China to US)/Worker	-1.3401 (0.3861)	**	-1.3419 (0.3926)	***	-1.3381 (0.2981)	***
R^2	0.3124		0.3954		0.6733	
			E. White Ethnicity			
(Δ Imports from China to US)/Worker	-1.3535 (0.3353)	***	-1.4248 (0.3881)	***	-1.2610 (0.3033)	***
R^2	0.5090		0.3644		0.6619	
			F. Non-White Ethnicity			
(Δ Imports from China to US)/Worker	-1.3433 (0.3571)	***	-0.9227 (0.3839)	**	-1.8306 (0.4362)	***
R^2	0.4958		0.3712		0.4562	

Notes: N=1444 (722 commuting zones x 2 time periods). All regressions include the full vector of control variables from column 6 of Table 1. Robust standard errors in parentheses are clustered on state. Models are weighted by the start of period commuting zone share of the national population. ~ $p \leq 0.10$, * $p \leq 0.05$, ** $p \leq 0.01$.

Coming back to Table three, even though mostly statistically insignificant, the outcomes of Table three align with the statistically significant results of Table 4. For college education, white ethnicity, and US-born, Table 3 estimates a decline of a CZ's GPG, which matches the more considerable reduction of male compared to female wages predicted in Table 4. On the other side,

table three estimates a rise in regional GPG for workers with no college education and that are non-white.

5.4 Discussion and Limitations

The regression models in this paper analyzed the effects of the increase in US imports from China within CZ from 1990 to 2007 on a CZ's change in GPG (Tables 1 and 3), employment status of working age population (table 2), and wages alone (table 4). From methodological and theoretical perspectives, this subsection wants to address several points of criticism.

Some import demand shocks may be correlated across regional districts, hindering the instrumental variables strategy to isolate supply shocks and likely bias the results towards zero. Mobility across regions as an unobserved consequence of changes in labor markets would diffuse the regression results for an increase in import exposure, for example, if workers moved from one CZ to another after losing employment. Local labor markets must be geographically integrated, fully competitive, and in continuous equilibrium. A shock to an industry sector affects the aggregate labor market through only two channels: directly, via a change in employment in the concerned sector, and indirectly, to the degree that the industry affects aggregate labor demand.

Compared to the work of Autor et al. (2013) on the change of manufacturing employment in commuting zones due to import exposure, the adjusted model used in this paper created fewer significant results, which makes it difficult to estimate an accurate correlation between the change in US imports from China on the shift in GPG. It would be interesting to see how different control variables, like employment shares in other industries, may change the regression results. Further interesting might be how the GPG changed for specific age groups and men and women working inside or outside the manufacturing sector.

The study analyses trade and labor market data until 2007 and is outdated. The financial crisis of 2007/2008, the Trump Administration from 2017 to 2021 with its protectionism, and the COVID-19 pandemic after 2020 are only a few references to how the US labor market and the US trade exposure from China changed throughout the last 16 years. Women have outnumbered men in the total US college-educated labor force since the fourth quarter of 2019 (Fry, 2022) and are particularly encouraged to start a degree in high-earning fields in science, technology, engineering, and math (STEM) through educational, marketing, media, and social organizations and

governmental policies (Jung et al., 2017). These dynamics might accelerate the decrease in GPG independently from the US trade with China.

6. Conclusion

The value of annual goods imported from China to the United States increased from 1991 to 2007, according to the United States Census Bureau. Trade in Goods. by roughly 1700%, whereas the share of US imports from China of the total US imports enlarged over the same period from 3.89% to 19.07%. This rapid US exposure to trade with China suggests consequences for the US labor market. Previous research studied the effects of imports on manufacturing firms, employees of manufacturing industries, and changes in manufacturing, non-manufacturing employment, earnings, and transfer payments across the US or transferred the approach by analyzing labor-market for other countries trading with China. This paper expands the academic literature by focusing on local labor markets and the change in their respective gender pay gap as a consequence of exposure to Chinese import competition. To study these consequences, the project focuses on data on wages and labor market participation in 722 US commuting zones from 1990 to 2007. The chosen method of this study is a two-stage least squares regression analysis with social and labor-market data as control variables and the change of Chinese import exposure in eight high-income countries other than the US as the instrumental variable. As a result, an increase of one percentage point in US-Import exposure from China may lead to a 0.48 percentage points increase in the CZ's GPG. In comparison, a one percentage point increase in initial manufacturing share decreases the regional GPG by 0.16 percentage points. Increasing imports from China reduce a CZ's GPG for college-educated employers by 0.005 and increase it for non-white employers by 0.009 percentage points. Male employees with a college education, of white ethnicity, and those born within the US experience a more substantial wage decrease than females in the same subdivision with a difference of 0.7, 0.16, and 0.004 percentage points, respectively. Female employees with no college education and non-white ethnicity experience a more substantial wage decrease than males in the same subdivision, with a difference of 0.2 and 0.9 percentage points, respectively. For shares in occupation population, the paper estimates a more considerable relative decrease in male than female employment in manufacturing (difference of 0.1 percentage points) and a tremendous relative increase in male unemployment (0.02) and non-labor force participation (0.05). This study can be redone with updated data after 2007 in future

research. Recent economic and social developments such as the US-Chinese trade war or encouraging women to enter high-paying jobs might give a new perspective on this study and the change in regional GPG.

7. References

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