FDI and the Local Labor Market: Japanese Automobile Plant Openings in the 1980s*

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Abstract

Using US census data, I investigate how much Japanese automobile firms' investments contributed to local wage increases over the 1980s. My difference-in-differences estimation shows that the effect is not significant with a whole sample, but different by race. In particular, Black workers experienced a 9.3 percent wage decrease in areas where a Japanese assembly plant opened, and I consistently observed the negative effects in regressions with other specifications. My analysis also suggests a regional difference in the wage increase, and auto workers in the West experienced a larger wage increase than workers in the other regions.

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1 Introduction

In the 1970s, the rapid growth of Japanese automobile exports to the US had a serious impact on the US automotive labor market. Japanese auto imports, combined with a recession, forced around 40% of the workers in automobile-related industries to be temporarily laid off in late 1981.[1] Under political pressure from the United States, Japan imposed a voluntary export restraint (VER) and restricted the quantity of automobiles exported to the US in 1981. Additionally, the US government also requested that Japanese automotive companies invest in the US in order to offer new employment opportunities to their unemployed automotive workers. Because of this political pressure, Japanese automotive firms made their first investments in the US in the 1980s. Starting with new assembly plants opened by Honda and Nissan, more than 250 plants for automobile parts were built in the US by 1988 (Mair et al.,1998). These Japanese new assembly plants added at least 35,000 jobs, and other automobile-related plants, including those for bodies and parts, created around 337,600 additional jobs by 1998 (Sturgeon and Florida, 2004). This large job creation seems to have a large impact on the US labor market, but the effect of Japanese FDI on the US local labor market has not been investigated in the existing literature. Therefore, in this paper, I study how much Japanese automobile assembly plants contributed to increases in auto industry wages over the 1980s.

I use a difference-in-differences estimation strategy to analyze the impact of new Japanese plant openings on local wages.[2] I use US Census data for 1980 and 1990, and the local labor markets are defined by *conspumas*, which are groups of counties. I control for workers' characteristics, such as age, race, and educational attainment, in addition to the ratio of union membership in the state. I do not find any effects of Japanese plant openings on all workers once I control for state-level variation. But I do find significant *declines* in wages among Black auto workers: Japanese plant openings decreased Black auto workers' wages by

[1] In addition, although the exact number of job losses is difficult to estimate, membership in the United Auto Workers (UAW) labor union declined by one third, from 1.5 million in 1979 to 1 million in 1987.

[2] Japanese firms are only the foreign firms that invested in new locations to produce during the 1980s. Volvo built a new plant in October 1987, but it was in the same city where they previously had their plant. Renault opened a plant in June 1982, but it was based on an existing plant they took over and closed in December 1988.

9.3%. This finding is consistent with the fact that Japanese automakers hired fewer Black workers than US automakers (Cole and Deskins, 1998). In fact, in the West, where Japanese firms (specifically, Toyota) did hire a relatively large share of Black workers, I find that Japanese plant openings had no effect on Black earnings.

However, Japanese firms' location decisions are likely nonrandom. In particular, firms that pursued brownfield investments—buying existing, idled plants—had a narrower choice set than firms that pursued greenfield investments—building a new plant from scratch. Greenfield investors can choose any location to build a plant, whereas brownfield investments only occur in locations that were (endogenously) chosen and (also endgenously) idled by American companies. This selection bias could impact my estimates. Therefore, I consider an alternative specification in which I focus on greenfield investments. Following Greenstone et al., (2010), I compare wages in locations that received greenfield investments from Japanese auto firms to those that were final contenders for investment, but were ultimately passed over. The likely similarity between these winning and losing locations likely minimizes selection bias. In this sample, I find similar effects to those above: overall, Japanese plant openings had no impact on wages, but among Black workers, Japanese investments decreased wages. Additionally, I analyze if the wages of the treatment and control groups follow the same trend before the 1980s. I run a regression with the census data for 1970 and 1980 instead of the data for 1980 and 1990 and show there is no trend on county-level wages before 1980.

My research is related to the literature concerning the impact of FDI on labor markets. For example, Feliciano and Lipsey (2006) investigate how an increase in foreign-owned establishments affects the US labor market, and they find no significant employment effects in the manufacturing or non-manufacturing sectors. While the authors focus on changes in average wages across industries and states, I expand on their research by using individual-level wage data. This enables my regression to control for workers' demographics and skill level and to see the effects more precisely within detailed geographical units. Another related study is Greenstone et al. (2010) that measure the spillover effects of million-dollar plant openings in the 1980s and 1990s. They focus on firms' investment in all manufacturing industries and show the million-dollar plant openings increased local wages by 2.7%. In comparison, my

paper focuses on a well-known case in a single industry.

This study also contributes to the literature concerning the Japanese auto industry during the 1980s. For example, Feenstra (1984) and Berry et al. (1999) study how much VER raised the prices of imported Japanese cars and how this policy affected the US consumer welfare. My research instead focused on the Japanese firms' investment caused by VER. Additionally, Smith and Florida (1994) examine the location choice of Japanese auto-related firms.[3]

Focusing on Japanese investment in the US has a unique empirical advantage in the labor market analysis. Political pressure primarily drove Japanese automobile investments in the 1980s, and thus these investments are independent of firms' investment timing decisions. In general, firms analyze their business environments and decide to invest when they can anticipate their future profitability. However, econometricians cannot observe all of the factors driving the timing of firms' investment decisions. Therefore, Japanese auto firms' investments are ideal for local labor market analysis since the timing of investments can be regarded as exogenous. For example, documentation in Toyota Motor Corporation suggests that, at the time of investment, Toyota's managers did not know whether or not their US plant would turn a profit.[4] This example shows that the driving factor behind their investment was mainly political pressure, and thus I can analyze the impact on the local labor market without considering endogenous investment timing decisions.

This paper is organized as follows. Section 2 shows the characteristics of Japanese automobile investment. Section 3 introduces the data source and summary statistics. Section 4 provides a regression model. Section 5 shows the results. Section 6 discusses the robustness. Section 7 concludes.

[3]While they do not focus on the automobile industry, Head et al. (1995, 1999) and Woodward (1992) also analyze the location choices behind Japanese investments.

[4]Source: Toyota Motor 75 Years' History https://www.toyota.co.jp/jpn/company/history/75years/ (in Japanese)

Table 1: Japanese Automobile Investments in the 1980s

Company	Date of Opened	Date of Announced	Place	New Plant (Greenfield)	Employees	Union	Company Investment (million USD)	Incentive[b] Package (million USD)	Projected Capacity (cars/year)
Honda	1982. Nov	1980. Jan	Marysville, OH	Yes	5,300	No	1,300	20	360,000
Nissan	1983. Jun	1980. Oct	Smyrna, TN	Yes	4,300[c]	No	760	239	440,000[d]
Toyota	1984. Dec	1983. Feb	Fremont, CA	No	4,500	Yes	150	-	300,000
Mazda	1987. Sep	1984. Nov	Flat rock, MI	No	3,500	Yes	750	80	240,000
Toyota	1988. May	1985. Dec	Georgetown, KY	Yes	5,000	No	800	296	200,000
Mitsubishi	1988. Sep	1985. Oct	Normal, IL	Yes	3,100[b]	Yes	500-700	139	240,000
Subaru-Isuzu	1989. Sep	1986. Dec	Lafayette, IN	Yes	1,900	No	500	111	120,000
Honda	1989. Dec	1987. Sep	East Liberty, OH	Yes	1,800	No	410	78	150,000

[a] Source: Robert (2017) except the amount of incentive package, and the information of company investment and projected capacity of the Toyota's plant in Fremont, CA. This information comes from Jacob (2015).
[b] The values of incentive packages is different across different sources. For example, Robert (2017) gives smaller numbers compared to Jacob (2015).
[c] The number is as of 1992.
[d] The number includes trucks.

2 Japanese Automobile Investment in the 1980s

There are eight automakers in Japan and seven among them invested in the US during the 1980s. Table 1 shows the details of these investments. The first three investments were made by the largest three Japanese automakers (Honda, Nissan, and Toyota) and later by the other four automakers (Mazda, Mitsubishi, Subaru, and Isuzu).[5] The main purpose of VER was to reduce the imports by the largest three automakers, but this policy also urged the other relatively small auto firms to invest in the US. Those smaller automakers got only limited allocations of all Japanese car exports to the US by the Japanese government due to their smaller sales share in Japan (Jacobs, 2015). While the largest three automakers established their production facilities by themselves, the other four firms invested through joint ventures (i.e., a 50/50 share) with American or Japanese firms. Mitsubishi and Mazda jointly invested with American firms—the former with Chrysler and the latter with Ford. Subaru and Isuzu, two Japanese auto firms, cooperated to invest.

Some companies built plants in completely new places (greenfield investment), while others (Toyota in Fremont, California, and Mazda) reopened plants that were previously operated by US companies (brownfield investment). Both types of investments come with pros and cons. Most of the firms with greenfield investments had the advantage of being able to hire non-union workers, who could get accustomed to the Japanese management system relatively easily. However, these greenfield investors had to construct their business environments from scratch. For example, there was no water supply or sewage system in place when Honda and Toyota made their greenfield investments. By contrast, investing in existing facilities enabled Japanese companies to start up their businesses smoothly. In particular, the firms benefited from procurement systems and other know-how developed by the previous companies. However, they were sometimes subjected to restrictions imposed by allied companies which previously owned their plants. For example, Toyota established a joint venture with General Motors (GM) in Fremont, California, and agreed to rehire workers laid off from the former GM plant.

Firms that made greenfield investments hired new workers to operate their new facilities,

[5] Suzuki opened its production facility in Ontario, Canada in April 1989 through a joint venture with GM.

Table 2: Motor Vehicle Sector Employment and Relative Wages

Year	Share of the US Auto Workers (%)		Wages (US=100)	
	East South	Great Lake	East South	Great Lake
1970	5.7	69.4	78.9	104.9
1975	6.8	68.7	72.9	106.8
1980	9.4	64.1	73.1	109.3
1985	12.5	60.9	73.5	111.9
1990	15.6	59.4	75.2	112.8
1992	16.7	59.1	79.1	110.8

Source: Sturgeon and Florida (2004, Table 3.6)

and that contributed directly to local labor demand. Although some Japanese firms used plants that US firms previously operated and even hired the same people, their investments provided additional employment opportunities in the local labor markets. For example, Mazda operated a plant that Ford had previously run and closed four years earlier. Mazda not only provided employment to the people who were made unemployed by Ford's closure, but they improved the facility and built additional assembly lines. Toyota in Fremont, California, is another example. GM employed 6,800 hourly workers in 1978, and the number declined to around 3,000 when they closed the plant in 1982 (Adlar, 1993). Toyota's investment in this GM plant helped the unemployed who previously worked at the plant. In addition, Toyota made another investment in 1990 and hired 650 more employees. These case studies show how Japanese investments in existing US facilities may have also increased labor demand in the local labor markets.

Japanese automobile companies invested both within the traditional Midwestern auto corridor as well as in adjacent states such as Kentucky and Tennessee. Japanese auto firms that invested in the South sought access to growing markets, cheaper land and operating costs, and labor supplies with fewer union ties. The automobile industry in the South was undeveloped compared to that in the Midwest, and therefore, the impact on the local labor markets was quite large. As we can see from Table 2, the regional share of the US automotive sector employment and relative wages have dramatically increased in the East South region after 1980. In contrast, the share in the Great Lakes region decreased by 5 percentage points

between 1980 and 1992.

In addition to the effect on employment, there were large infrastructure investments made in tandem with the Japanese investments. Most of the infrastructure investments were supported by subsidies offered by state and local governments. For example, Nissan and Mazda received $239 million and $80 million, respectively, from state and local governments for improving highway connectivity, local tax exemptions, and training employees. The improved infrastructure benefited not only car production but also people living around the cities in which Japanese firms operated plants.

3 Data Source and Summary Statistics

I use the US Census' 5% sample for 1980 and 1990, which is publicly available through IPUMS-USA (Steven et al., 2021). I select male Black or White workers aged less than 65, who are employed in the automobile industry and report a positive total pre-tax wage and salary income in the year before the census.[6] The industry categorization corresponds to "351-Motor vehicles and motor vehicle equipment." This includes not only workers who are working in car plants but also those who manufacture motor vehicle parts and components in local factories. Japanese car manufacturers built just-in-time supplier relations in the US. According to Kenney and Florida (1993), more than 40% of suppliers for Japanese automakers were located within a 2-hour drive shipping radius and around 80% of suppliers meet just-in-time delivery requirements in their survey. New car plant openings can affect not only workers in the new plants but also surrounding auto parts suppliers, therefore it is reasonable to use the industry category includes motor vehicle equipment.

In addition to wage and salary income (hereafter, I refer to this variable as simply "wages"), I obtain workers' personal characteristics, such as sex, age, race, and educational attainment. Following Batistich and Bond (2019), I restrict the data to male workers to deal with the issue of changing female labor force participation across time. I also create four categories in the educational level: high school dropout, high school graduate, some

[6] I adjust the wage and salary income to 1999 dollars amount using the Consumer Price Index adjustment factors. Source: Consumer Price Index adjustment factors https://cps.ipums.org/cps/cpi99.shtml

Table 3: Summary Statistics

Variable	Mean	SD	Min	Max	Observation
Individual level					
wage	46,684.09	24,494.74	2.69	265935.90	86,276
age	39.71	11.30	16	64	86,276
black	0.11	0.32	0	1	86,276
high school dropouts	0.22	0.42	0	1	86,276
high school graduates	0.44	0.50	0	1	86,276
some college	0.27	0.44	0	1	86,276
college graduates	0.07	0.26	0	1	86,276
State level					
union membership ratio (%)	16.24	6.37	4.6	32.5	92

The sample consists only of the workers who are in the automobile industry. 67,387 samples in 1980 and 56,603 samples in 1990. The number of union membership ratio is 49 in each year.

college, and college graduate. I treat geographic areas in the census data, named *conspumas* (Consistent Public Use Microdata Areas), as the local labor markets. These are consistently defined between 1980 and 1990. Each conspuma consists of counties, and conspumas do not cross state lines. I use samples only in the continental United States, which has 539 different conspumas. I also include a control for unionization in my regression. Since I do not have the union membership status for each individual in the census data, I obtain the ratio of wage and salary workers who are union members in each state from the CPS's Union Membership and Coverage Database.[7] The data about union membership is at the state level, not at the individual level.[8]

Table 3 shows descriptive statistics of the control variables. The sample contains 86,276 workers who are in the automobile industry in 1980 or 1990. Only 11% of workers are Black and 66% of workers do not have a college education. Union membership varies across states and time, while 16% of total workers are union members on average. Table 4 shows the average union membership rates by region. Most states in the South already adopted

[7]Since the state-level data are available only from 1983, I use 1983 data to describe samples in the 1980 census. The URL for the union membership and coverage database: https://www.unionstats.com/.

[8]Using the CPS data is another possibility, but they have individual union membership status only from 1990.

Table 4: Percentage of Workers with Union Membership in Total Employees

in 1983			in 1990		
Rank:	Region	Union Membership (%)	Rank:	Region	Union Membership (%)
1	Northeast	22	1	Northeast	19
2	Midwest	20	2	Midwest	17
3	West	19	3	West	16
4	South	14	4	South	11
Total average		18	Total average		15

Source: Union Membership and Coverage Database from the CPS (http://unionstats.com/)

right-to-work laws by 1980, and therefore the average union membership rate in the South is lower than in other regions. This lower union membership rate was one of the drivers behind Japanese automobile investment in the South, such as Toyota investing in Kentucky (with an 18% union membership rate) and Nissan investing in Tennessee (with a 15% union membership rate). The Japanese companies avoided unexpected disputes with workers by investing in these lower unionized areas. In contrast, states in the traditional Midwestern auto corridor had higher percentages of unionized workers. For example, 30% of workers were union members in Michigan.

4 Econometric Model

I estimate the effect of Japanese automobile investment on local wages from 1980 to 1990. There were no Japanese automobile investments before 1980, and thus I conduct a difference-in-differences estimation at the conspuma level. I compare changes in individual wages among the treatment group to changes in wages of those in the control group. The treatment group consists of workers who live in conspumas where Japanese automobile plants opened. The control group consists of workers who do not live in conspumas where Japanese plants opened. Individuals reported the wages that they earned in the year before the census, which means that the wages in the data are from 1979 and 1989. I treat auto workers in the conspumas where plants opened before 1989 (i.e., the first six plants in Table 1) as the treatment group, and auto workers in the other conspumas as the control group.

I use the following regression equation:

$$\log(wage_{i,j,t}) = \alpha\ plant_{ij} + \beta\ year90_t + \gamma\ (plant_{ij} \times year90_t) + \theta\ X_{i,j,t} + \varepsilon_{i,j,t}. \qquad (1)$$

The dependent variable, $\log(wage_{i,j,t})$, is the log of individual i's wages at time t in conspupuma j. A treatment dummy, $plant_{ij}$, indicates whether an individual i lives in conspuma j which obtains a new Japanese plant. A post-treatment dummy, $year90_t$, is equal to 1 if the observation is in the 1990 census and 0 otherwise. The coefficient on $(plant_{ij} \times year90_t)$ is a difference-in-differences estimator which compares the change in the treatment group to the change in the control group. I include individual demographics, $X_{i,j,t}$, which are similar to those in Greenstone et al. (2010). The covariates include age, age-squared, education, and race (Black or white). There are three education dummies: high school graduate, some college, and college graduate. Additionally, I control for either union membership rates or state fixed effects to capture the state-level variation that might be confounding my estimates.

There could be a sorting effect between wages and plant locations—that is, the local wage level could attract investors to some particular areas. I argue that there is little concern for the sorting effect because the exiting literature and anecdotes suggest that the local wage level was not a primary factor for Japanese companies to decide their investing locations. For example, Woodward (1992) analyzes location choices made by Japanese companies in the East North Central and the East South Central divisions where almost all Japanese auto plants are located. Their county-level study shows that the coefficient on wages is insignificant and it has a positive sign. Instead, other factors such as interstate connectivity and educational attainment are important for the choice of the investment locations. Japanese automobile companies may have prioritized the skill level of workers to maintain the quality of products. Some of the companies, such as Honda and Toyota, planned to export their cars to Japan, and therefore the quality of their workforce is key for their business. In fact, according to the case studies, the wage rate is not in the criteria that the three largest Japanese auto firms used to choose the investment locations (Inabetsu, 1998; Kusunoki, 2004; Oshikawa, 1992).

Although the wage level was not the main factor for the Japanese firms' location decisions,

Table 5: Winning and Losing States for Japanese Greenfield Auto Investment

Firm	Year Opened	Winning State	Losing States
Honda	1982	Ohio	Arizona, Indiana, Kentucky, Missouri
Nissan	1983	Tennessee	Georgia, South Carolina
Toyota	1984	Kentucky	Georgia, Indiana, Kansas, Missouri, Tennessee
Mitsubishi	1988	Illinois	Indiana, Michigan, Ohio

Source: Robert (2017, Table 3.1)

I address concerns about the potential endogeneity following Greenstone et al. (2010). The authors focus on an investor's location choice process. They identify winning counties that received investment and losing counties that did not receive investment but were on the final list of potential investment locations. They treat winning counties as a treatment group and losing counties as a control group, assuming that counties in both groups have similar trends before the investment. Unfortunately, I do not observe finalist sites at the county level for Japanese auto investors in the 1980s. However, I observe the states that were finalists for Japanese auto investments in the 1980s, using data provided by Robert (2017).

Echoing Greenstone et al. (2010), I perform a difference-in-differences analysis using just individuals in states that received investment from Japanese auto firms (my treatment group) and those in states that were finalists for investment, but were ultimately passed over (my control group). I argue that these states likely share similar trends in pre-investment wages and unobservable determinants of automotive sector employment, and thus that, within this sample, any bias stemming from endogenous firm location decisions will be minimized. These results serve as a robustness check for my analysis using the full sample of workers from all US conspumas.

Recall that Japanese auto firms pursued two types of investment, greenfield and brownfield. In this analysis in which I restrict my sample to finalist states, I focus only on greenfield investments. Brownfield investment opportunities are endogenous, a function of previous (US) auto firm location decisions that I cannot observe. Greenfield investment decisions, by contrast, do not directly depend upon previous choices made by American automotive firms. The choice set of greenfield firms is also larger than that of brownfield firms. For

example, Toyota first received offers from thirty-six states and narrowed them down to the six states—Kentucky, Georgia, Kansas, Missouri, and Tennessee—as the finalist sites before choosing Kentucky as their final choice (Jacobs, 2015). The winning and losing states for Japanese greenfield auto firms are shown in Table 5.

5 Results

I mainly use two samples to analyze the effect of Japanese plant openings on local wages. In the first subsection, I consider all Japanese plants opened before 1989 and treat auto workers who live in conspumas with the new Japanese plants as a treatment group. I treat other auto workers as a control group. In the second subsection, I focus only on greenfield investments (i.e., plants newly build by Japanese firms). The sample consists of auto workers who live in winning states—states that obtained Japanese greenfield investment—and losing states—states that did not receive Japanese investment but were considered as the finalist sites.

5.1 Baseline Regressions

In my baseline specification, I do not distinguish between greenfield and brownfield investments and include workers from all conspumas. The results are in Table 8. The coefficients on plant×year90 represent the effects of new Japanese plant openings on local wages. The coefficient of interest is statistically significant at the 1% level on the regression in column 1. This shows that wages in the automobile industry increased by 4.1% in conspumas where Japanese assembly plants opened. However, the coefficients become insignificant once I control for state variation using either unionization rates (column 2) or state fixed effects (column 3). This means that I would overestimate the positive effect if I did not control for union membership. Union membership has the effect of increasing wages by 1.9%, and the coefficient is statistically significant at the 1% level. Without controlling for this state characteristic, the plant dummy is the only variable that varies across locations for similar workers. The plant dummy divides samples only into two groups—whether an individual lives in a conspuma that gains a new Japanese automobile plant—and this does not offer

Table 6: Regression Results using All State Sample

Dependent variable:	(1)	(2)	(3)	(4)	(5)
ln(wage)	All	All	All	White	Black
plant×year90	0.041***	0.016	0.006	0.020	-0.093**
	(0.014)	(0.021)	(0.021)	(0.020)	(0.038)
unionization rate[c]		0.019***			
		(0.001)			
state FEs	No	No	Yes	Yes	Yes
N	86276	86276	86276	76505	9769
R^2	0.240	0.269	0.282	0.297	0.179

[a] Standard errors in parentheses and are clustered by conspuma. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.
[b] Regressions control for age, age^2, black (not in the regression (4) and (5)), and educational level.
[c] Unionization rate is a state-level variable.

much variation. Additional variation at the state level is quite important in accounting for regional wage differences.

Columns 4 and 5 in Table 8 show the results of regressions by separating individuals to Black or white workers. Interestingly, the effects are different by race: Black workers see negative impacts on their wages. Column 5 shows that wages of Black workers in conspumas where Japanese assembly plants opened decreased by 9.3%, and the coefficient is statistically significant at the 1% level. Cole and Deskins (1998) argue that Japanese firms offered fewer employment opportunities to Black workers by locating their plants in areas with lower Black population ratios and hiring less Black workers.[9] They also show that Japanese automakers, especially Honda, Nissan, and Mazda, employed fewer Black workers compared to other US automakers. Based on their findings, my regression shows that Black auto workers experienced a wage decline and saw fewer gains from the Japanese plant openings.

I explore heterogeneity by region. Table 7 shows estimates for autoworkers in the West; results from the Southern and the Midwestern samples are in Appendix A. The Northeast is omitted since there was no Japanese automobile investment in that region. In the West,

[9] In addition to Japanese firms, the authors argue that Volkswagen's plant in Pennsylvania (which opened in April 1978 and closed in July 1988) also hired few Black workers.

Table 7: Regression Results using Western State Sample

Dependent variable:	(1)	(2)	(3)	(4)	(5)
ln(wage)	All	All	All	White	Black
plant×year90	0.082**	0.086**	0.082**	0.075*	0.004
	(0.041)	(0.042)	(0.041)	(0.039)	(0.065)
unionization rate[c]		0.009**			
		(0.003)			
state FEs	No	No	Yes	Yes	Yes
N	4592	4592	4592	4341	250
R^2	0.267	0.264	0.267	0.272	0.194

[a] Standard errors in parentheses and are clustered by conspuma. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.
[b] Regressions control for age, age^2, black (not in the regression (4) and (5)), and educational level.
[c] Unionization rate is a state-level variable.

Toyota's plant is only the Japanese assembly plant opened during the 1980s. Toyota established a joint venture with GM and renovated the idled plant in Fremont, California where GM closed in October 1982, and started its production in December 1984. Column 1, Table 7 shows that wages in the automobile industry increased by 8.2% in the consupuma where the Toyota-GM plant is located. The coefficients of interest are still significant after controlling for unionization rates (column 2) and state fixed effects (column 3). The effect on local wages is larger in the West compared to the result from the whole sample. This large effect in the West reflects the fact that Ford and GM closed almost all of their assembly plants on the West coast from 1970 to 1990 (Sturgeon and Florida, 2004). It is likely that the impact on the conspuma with the Toyota-GM plant stands out because of the low automotive labor demand in the other conspumas. Unlike the previous regression, I do not observe the negative and significant effect on the wage of Black workers in the West. Toyota rehired the United Auto Workers (UAW) labor union members who were laid off from the former GM plant, and their share of Black workers to the total employees (23%) is larger compared to the average of Japanese automakers (12.8%) (Cole and Deskins, 1998).[10] Toyota hired more Black workers than other Japanese automakers, and therefore there is no significant wage

[10] Toyota-GM's, Nissan's, Honda's, Mazda's plants in the authors' sample.

Table 8: Regression Results using Winning and Losing States

Dependent variable:	(1)	(2)	(3)	(4)	(5)
ln(wage)	All	All	All	White	Black
plant×year90	0.031*	-0.000	0.016	0.031	-0.102***
	(0.016)	(0.020)	(0.024)	(0.023)	(0.032)
unionization rate[c]		0.019***			
		(0.002)			
state FEs	No	No	Yes	Yes	Yes
N	60650	60650	60650	53531	7118
R^2	0.233	0.255	0.258	0.277	0.123

[a] Standard errors in parentheses and are clustered by conspuma. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.
[b] Regressions control for age, age^2, black (not in the regression (4) and (5)), and educational level.
[c] Unionization rate is a state-level variable.

decrease among the Black workers near the Toyota-GM plant.

In addition to the impact of new plant openings, my analysis also captures regional differences in union membership. The results show that the state unionization rate has a larger impact on individual wages in the Midwest than in the South and the West. A 1 percentage point increase in the unionization rate raises the average wage by 0.024% in the Midwest (column 2, Table A.1), 0.015% in the South (column 7, Table A.1), and 0.009% in the West. There are more union workers in the Midwest compared to the South and the West. The coefficient on the union membership ratio is higher in the Midwest potentially because a higher unionization rate gives all union workers more bargaining power over their working contracts.

5.2 Regressions with Winning and Losing States

In this subsection, I show the results of regressions using auto workers only in winning and losing states. The data consist of the workers who live in states shown in Table 5. I first pool all of the workers and run difference-in-differences regressions. The results in Table 8 are similar to the results using the whole sample shown in Table 6. The coefficient

Table 9: Regression Results using Nissan's Winning and Losing States

Dependent variable:	(1)	(2)	(3)	(4)	(5)
ln(wage)	All	All	All	White	Black
plant×year90	0.104***	0.112***	0.083***	0.113***	-0.309***
	(0.026)	(0.029)	(0.025)	(0.028)	(0.053)
unionization rate[d]		-0.014*			
		(0.008)			
state FEs	No	No	Yes	Yes	Yes
N	3943	3943	3943	3257	686
R^2	0.246	0.249	0.257	0.270	0.150

[a] The sample consists of individuals who live in Tennessee (Nissan's winning state), and Georgia, South Carolina (Nissan's losing states).
[b] Standard errors in parentheses and are clustered by conspuma. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.
[c] Regressions control for age, age^2, black (not in the regression (4) and (5)), and educational level.
[d] Unionization rate is a state-level variable.

on plant×year90 is positive and significant, but it becomes insignificant once controlling for state variation. The regression in column 5 also shows the negative and significant coefficient on plant×year90 for Black workers.

Next, I run regressions by each of the Japanese plant openings to compare the effects on wages only within winner and losing state pairs. Results for Nissan's case are in Table 9, and results for the other three cases (Honda, Toyota, and Mitsubishi) are in Appendix B.[11] I find a positive effect of Nissan's new plant opening on local wages. The coefficients on plant×year90 are still significant even when I control for state variation using unionization rates and state fixed effects (columns 2 and 3 in Table 9). Nissan's car plant had the largest capacity among all Japanese assembly plants (Table 1), and therefore the impact on the local labor market might be larger compared to the other plants. Additionally, I observe that the wage differential between white and Black workers is more pronounced in Nissan's case. The coefficients of interest are significant both in the white and Black worker samples and there

[11] Results in the other three cases are similar to the results with all winning and losing state samples. The coefficients on plant×year90 are insignificant with state fixed effects. Regressions also show Black workers who lived in conspumas with new Honda's and Mitsubishi's plants experienced a wage decrease.

is a large difference in the effects on these two groups (columns 4 and 5). Black workers who live in the conspuma where Nissan's plant opened experience a 31% wage decrease compared to Black workers in other conspumas. Conversely, white workers who are in the conspuma with the new Nissan's plant experience a 11% wage increase compared to white workers in other conspumas.

6 Pre-Trend Analysis

The key assumption for the difference-in-differences estimation is that the wages of the treatment and control groups follow the same trend before the 1980s. Without this assumption, it is possible that the economies in the areas where new plants opened had been thriving before the plants were built. If this is the case, then the wages of the treatment group would already have started rising before the 1980s, and thus the difference-in-differences estimation may just capture the pre-trend which is likely caused by other factors. To check the validity of this assumption, I run a placebo regression. The equation is almost the same as the one shown in Section 4, except that I use the census data for 1970 and 1980 instead of the data for 1980 and 1990. Thus, I investigate the average wage change from 1970 to 1980 instead of the change from 1980 to 1990. This exercise is similar to the ones conducted by Autor et al. (2013) and Hakobyan and McLaren (2015).

In order to proceed with the placebo test, I use the 1970 and 1980 1% metro samples of US Census data. I observe county groups as the geographical unit, instead of conspumas. Ideally, it is best to use the conspumas as in the original difference-in-differences estimation. However, conspumas are not available in the 1970 data, and moreover, the definitions of the county groups are not consistent between the 1970 census and the 1980 census. To ensure consistency, I use crosswalks made by Wiltshire (2021).[12] Similar to commuting zones in Autor et al. (2013), the crosswalks enable researchers to map observations from county groups in the 1970 and 1980 1% metro samples to the 1970 counties using adjusted person's weights. I limit the sample following the same criteria as I discuss in Section 3, but I do not restrict the sample to workers in the automotive industry because the auto industry

[12]The crosswalks are available in the author's website https://justinwiltshire.com/research-1

Table 10: Placebo Regressions

	Manufacturing Industry		All Industries	
	(1)	(2)	(3)	(4)
	All Plants	Only GF	All Plants	Only GF
plant×year80	0.059	0.083	0.032	0.045
	(0.045)	(0.061)	(0.054)	(0.079)
state FEs	Yes	Yes	Yes	Yes
N	6134	6134	6134	6134
R^2	0.862	0.862	0.902	0.902

[a] Standard errors in parentheses and are clustered by county. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

was undeveloped before the Japanese investments in most of the greenfield locations.

I use the following regression equation to conduct a placebo analysis:

$$\log(wage_{i,t}) = \alpha\ plant_j + \beta\ year80_t + \gamma\ (plant_j \times year80_t) + StateFEs_j + \varepsilon_{i,t}, \qquad (2)$$

where $\log(wage_{j,t})$ is the mean log wage in county j at time t. Unlike equation 1, a post-treatment dummy is now changed to $year80_t$ and the regression is at the county level, not at the individual level. I assign one to the variable, $plant_j$, if Japanese investment occurred in county j in the 1980s, otherwise I assign zero. I expect the coefficient on $(plant_j \times year80_t)$ to be insignificant, which means that there is no wage premium before 1980 in the counties where Japanese assembly plants open in the 1980s.

I first restrict my sample to the workers who are in the manufacturing industry and calculate the county-level mean log wage. While I assign one to $plant_j$ for all plant locations built before 1989 (results are in column 1), I only include the greenfield (GF) locations in the second regression (results are in column 2). Both coefficients on $(plant_j \times year80_t)$ are insignificant. This means that manufacturing workers in the areas where new plants opened in the 1980s did not experience a significant wage increase in the 1970s. Therefore, I also do not detect any pre-trend in the county-level mean log wage.

I also check for pre-trends in wages among all workers. Column 3 and column 4 of Table

10 show that the coefficient of interest is still insignificant in the regression with samples including all industries. Once again, I do not detect any pre-trend before plants opened in the 1980s.

7 Conclusion

I use US Census data and examine the effects of Japanese automobile firms' investments on US local labor markets during the 1980s. I do not find a significant effect in the whole sample. However, I find a significant and negative effect in the sample of Black workers. Black workers who lived in areas with new Japanese plants saw their wages decline by 9.3%. This result is in line with the argument by Cole and Deskins (1998) that Japanese auto firms hired fewer Black workers compared to US automakers and were not likely to contribute to the rise in demand for Black workers. My results also show regional differences in the effects of the labor demand increase. Autoworkers in the South benefited from higher wage gains compared to those in other areas.

There are two possible future research questions regarding the wage decrease of Black auto workers. First, Batistich and Bond (2021) show that Black workers were negatively affected by the Japanese import surge during the late 1970s. It could be that this negative effect worsened because of the new Japanese investment during the 1980s. Second, I am interested in looking at whether this negative effect on Black workers persisted and, more broadly, how foreign investment affects the racial wage differential in the long term. The Japanese investments in the 1980s are the first overseas horizontal investment by Japanese automakers, and they were not familiar with overseas production and management process at that time. As Japanese firms get used to the US business environment, it may be possible that they hire more Black workers.

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Appendix A Regressions by Region (the South and the Midwest)

Table A.1 shows the results of regression with autoworkers in the Midwest and the South. Unlike the result using a whole sample in Table 6, the coefficient of white autoworkers in the Midwest is significant. Coefficients with autoworkers in the South have the same signs as those in Table 6, but they are not statistically significant.

Table A.1: Regression Results using Midwestern and the Southern State Samples

Dependent variable:	Midwest				
ln(wage)	(1)	(2)	(3)	(4)	(5)
	All	All	All	White	Black
plant×year90	0.012	0.009	0.012	0.025**	-0.117***
	(0.014)	(0.020)	(0.014)	(0.012)	(0.022)
unionization rate[c]		0.024***			
		(0.003)			
State FEs	No	No	Yes	Yes	Yes
N	58908	58908	58908	52439	6469
R^2	0.246	0.241	0.246	0.269	0.092
	South				
	(6)	(7)	(8)	(9)	(10)
	All	All	All	White	Black
plant×year90	0.057	0.062	0.057	0.083	-0.188
	(0.070)	(0.070)	(0.070)	(0.077)	(0.117)
unionization rate[c]		0.015***			
		(0.004)			
State FEs	No	No	Yes	Yes	Yes
N	13846	13846	13846	11712	2133
R^2	0.248	0.234	0.248	0.254	0.176

[a] Standard errors in parentheses and are clustered by conspuma. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

[b] Regressions control for age, age^2, black (not in the regression (4) and (5)), and educational level.

[c] Unionization rate is a state-level variable.

Appendix B Regressions using Winning and Losing State Sample

Table B.1, B.2, and B.3 show the results of regression focusing on winning and losing states for Honda, Toyota, and Mitsubishi plants respectively. I observe the negative and significant impact of an assembly plant opening on Black autoworkers with Honda's and Mitsubishi's plants.

Table B.1: Regression Results using Honda's Winning and Losing States

	Honda				
Dependent variable:	(1)	(2)	(3)	(4)	(5)
ln(wage)	All	All	All	White	Black
plant×year90	-0.004	-0.032***	-0.016	-0.008	-0.109***
	(0.012)	(0.011)	(0.011)	(0.012)	(0.030)
unionization rate[d]		0.024***			
		(0.004)			
State FEs	No	No	Yes	Yes	Yes
N	22549	22549	22549	20633	1915
R^2	0.222	0.231	0.235	0.256	0.077

[a] The sample consists of individuals who live in Ohio (Honda's winning state), and Arizona, Indiana, Kentucky, and Missouri (Honda's losing states).
[b] Standard errors in parentheses and are clustered by conspuma. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.
[c] Regressions control for age, age^2, black (not in the regression (4) and (5)), and educational level.
[d] Unionization rate is a state-level variable.

Table B.2: Regression Results using Toyota's Winning and Losing States

Dependent variable:	(1)	(2)	(3)	(4)	(5)
ln(wage)	All	All	All	White	Black
plant×year90	0.094	0.071	0.101	0.115	-0.123
	(0.070)	(0.067)	(0.067)	(0.077)	(0.116)
unionization rate[d]		0.014***			
		(0.003)			
State FEs	No	No	Yes	Yes	Yes
N	15098	15098	15098	13620	1478
R^2	0.243	0.253	0.258	0.270	0.157

[a] The sample consists of individuals who live in Kentucky (Toyota's winning state), and Georgia, Indiana, Kansas, Missouri, Tennessee (Toyota's losing states).
[b] Standard errors in parentheses and are clustered by conspuma. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.
[c] Regressions control for age, age^2, black (not in the regression (4) and (5)), and educational level.
[d] Unionization rate is a state-level variable.

Table B.3: Regression Results using Mitsubishi's Winning and Losing States

Dependent variable:	(1)	(2)	(3)	(4)	(5)
ln(wage)	All	All	All	White	Black
plant×year90	0.012	-0.008	0.007	0.021	-0.129***
	(0.014)	(0.016)	(0.015)	(0.013)	(0.017)
unionization rate[d]		0.021***			
		(0.005)			
State FEs	No	No	Yes	Yes	Yes
N	51670	51670	51670	45745	5925
R^2	0.221	0.227	0.230	0.252	0.083

[a] The sample consists of individuals who live in Illinois (Mitsubishi's winning state), and Indiana, Michigan, and Ohio (Mitsubishi's losing states).
[b] Standard errors in parentheses and are clustered by conspuma. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.
[c] Regressions control for age, age^2, black (not in the regression (4) and (5)), and educational level.
[d] Unionization rate is a state-level variable.