Local labor market effects of the 2002 Bush steel tariffs

James Lake* and Ding Liu†
Southern Methodist University

June 5, 2021

Abstract

President Bush announced the three-year imposition of safeguard tariffs on a variety of steel products in early 2002. Based on US local labor markets and US input-output tables, we use a difference-in-difference methodology to analyze the local labor market employment effects of these tariffs depending on how much local labor markets rely on steel as an intermediate input and how much they rely on steel production. Our results show that, at best, the tariffs only slightly boosted local employment in steel-producing industries. But, the tariffs substantially depressed local employment in steel-consuming industries and this depression did not bounce back after Bush removed the tariffs. These results suggest significant and long-lasting damage from the Trump administration’s national security tariffs on steel and aluminum.

JEL: F13, F14, F16

Keywords: Bush steel tariffs, safeguard tariffs, local labor markets, intermediate inputs, downstream, steel-consuming

*E-mail: jlake@smu.edu
†E-mail: dingl@smu.edu
1 Introduction

Economists, policy makers and the general public usually think of tariffs and protection as synonyms. After all, governments generally impose tariffs to protect a domestic industry from foreign competition. However, domestic firms in other industries suffer from tariffs on the importable goods they use as intermediate inputs. The unprecedented breadth and scale of the Trump administration’s tariff war brought this negative effect of tariffs to the front of the public discussion. Indeed, Trump’s first attack in the tariff war was the Section 232 “national security” tariffs on steel and aluminum that are key inputs for the US manufacturing sector. And, his subsequent attacks on China prioritized tariffs on intermediate goods and capital goods that firms use as inputs rather than prioritizing tariffs on goods bought by the general public. Stories spread through the media highlighting situations like the reduced global competitiveness of US boat manufacturers who rely on aluminum or mass layoffs at US steel pipe manufacturers who rely on steel as their key input.

While the recent tariff war renewed public interest and policy-making focus on the adverse effects on firms who rely on importable goods as intermediate inputs, these are not new issues. Similar issues were very topical when President George W. Bush imposed “safeguard” tariffs on steel in 2002. After years of unsuccessfully pressing the Clinton administration to impose these safeguard tariffs, the steel industry successfully persuaded the Bush administration to start the safeguard tariff process within 6 months of President Bush taking office in January 2001 (Devereaux et al. (2006)). Eventually, a very-often cited analysis by Francois and Baughman (2003) was undertaken on behalf of the Consuming Industries Trade Action Coalition (CITAC). They concluded that the Bush steel tariffs cost 200,000 even though only 197,000 workers were employed in the entire steel-producing industry. In this paper, we analyze the impact of the Bush steel tariffs on employment in the steel-consuming industry, the steel-producing industry, and the overall manufacturing sector.

Our analysis uses a difference-in-difference methodology in a local labor markets setting. In June 2001, President Bush asked the US International Trade Commission (USITC) to investigate whether steel safeguard tariffs should be imposed. In October 2001, the USITC concluded that imports were a substantial cause of serious injury to the steel injury and recommended that President Bush impose tariffs of on over 170 steel products. In March 2002, President Bush imposed tariffs of 10-30% on 171 steel products. Based on the input-output structure of the US economy and the industrial employment composition of US local labor markets, we construct a measure that reflects the vulnerability of US commuting zones (CZs) to the Bush steel tariffs through their use of steel as an input. We also construct a measure that reflects the dependence of US CZs on employment in the steel-producing
industry. After controlling for various factors (including time-varying state-level trends, time-varying national shocks, time-invariant CZ-level attributes, and time-varying Chinese import competition), our difference-in-difference approach essentially checks whether changes in CZ-level employment outcomes between the pre- and post-Bush steel tariff periods (first difference) are related to differences in the local exposure of CZs to the Bush steel tariffs (second difference).

Our main results revolve around the effects of the Bush steel tariffs on local employment in the steel-consuming industry. We alternatively think of the steel-consuming industry as the entire manufacturing sector or the most steel-intensive subset of industries within manufacturing. In either case, conditional on the controls, there is no pre-trend in local employment (as a share of the CZ-level 1998 working age population) during the pre-Bush steel tariff years of 1998, 1999 and 2000. Starting in 2001 when President Bush asked the USITC to investigate safeguard tariffs for steel and the USITC recommended that President Bush impose steel tariffs, we find statistically and economically significant effects. These effects continue growing through 2002 and 2003 and stabilize thereafter. This timing links with the steel tariffs going into effect in March 2002 and, despite President Bush initially imposing them for three years, ultimately removing them in December 2003 after a November 2003 WTO ruling against their WTO-legality.

Our estimated effects are economically significant, especially in the highly steel-intensive industries. A change in CZ-level vulnerability to the Bush steel tariffs between the 25th and 75th percentile explains about 40% of the change in the manufacturing employment share between 2000 and 2003. This number rises to around 100% of the change in the employment share for the subset of industries that we define as the intensive steel-consuming industries within the manufacturing sector.

In contrast, the Bush steel tariffs had little meaningful impact on local employment in the steel-producing industry. Based on a CZs dependence on steel-producing employment, we find a positive and statistically significant effect on overall manufacturing employment in the post-Bush tariff years of 2001-2004 that disappears thereafter. However, the economic magnitude is very small. Conditional on CZs having strictly positive steel-producing employment, the change between the 25th and 75th percentiles of dependence on steel-producing employment never explains more than about 1% of the contemporaneous change in employment since 2000. Moreover, the effects on employment in steel-producing industries rather than overall manufacturing employment are of similar economic magnitude but never statistically significant. Thus, our results suggest little positive employment effects of the Bush steel tariffs on steel industry employment but sizable negative effects of the tariffs on employment in steel consuming industries.
As pointed out by Cox and Russ (2018), “Estimates of job losses in steel-using industries as a consequence of the [Bush] safeguard tariffs imposed in the early 2000s are few but range from 26,000 to 200,000 jobs.” Moreover, the two studies referenced here are both policy analyses rather than academic analyses. At the high end, and still very often-cited by the media, is the analysis of Francois and Baughman (2003) carried out by their international trade consultancy firm Trade Partnership for the lobby group Consuming Industries Trade Action Coalition (CITAC). They obtain their 200,000 job loss result using a simple OLS regression that regresses monthly US employment in steel-consuming industries on a steel producer price index and overall manufacturing employment. At the low end with their 26,000 job loss result is Hufbauer and Goodrich (2003) in a policy analysis for the non-partisan Peterson Institute for International Economics. To the best of our knowledge, ours is the first academic analysis on the employment effects of the Bush steel tariffs.

Various recent papers have focused on the negative effects of the Trump administration’s trade war. Multiple papers have focused on the fact that the tariff increases were indeed passed on to US importers rather than foreign exporters (e.g. Amiti et al. (2019); Fajgelbaum et al. (2020); Cavallo et al. (2021)). Handley et al. (2020) emphasize the negative effect of tariffs on intermediate inputs for export sales. They found that exported US goods that have intermediate inputs highly exposed to Trump’s trade war tariffs effectively faced advalorem tariffs of up to 4% on their exports.

Most closely related to our paper in this strand of the literature on Trump’s trade war tariffs is Flaaen and Pierce (2020). Like us, they analyze the impact of tariffs on employment outcomes using a difference-in-difference approach with time-varying treatment effects. Different to our analysis, their main analysis is a monthly industry-level analysis but they still find a sizable role for tariffs reducing industry-level employment through increasing the cost of the industry’s intermediate inputs. In an extension, they investigate how county-level unemployment responds to a county’s vulnerability based on the local industry use of inputs hit by Trump’s tariffs. Apart from looking at a different historical policy episode than Flaaen and Pierce (2020), our CZ-level analysis focuses on local manufacturing and within-manufacturing employment outcomes rather than their local but aggregate unemployment outcome. Moreover, Flaaen and Pierce (2020) only have 18 months of data after the tariffs come into effect and the tariffs are still in effect at the end of their sample period. In contrast, our analysis looks at both the short-run effects when the Bush steel tariffs are in effect and the medium-to-long run changes up to 5 years after the steel tariffs ended.

Two recent papers have also focused on the adverse employment effects of tariffs but

---

through temporary trade barriers on intermediate inputs. Bown et al. (2021) find that US anti-dumping (AD) duties against China over the 1998-2016 period cost nearly 2 million jobs in downstream industries. Barattieri and Cacciatore (2020) find that employment in downstream industries falls by 0.5% points following a 1% point increase in the share of imports subject to AD and countervailing duties in upstream industries. Like us, Barattieri and Cacciatore (2020) also find little evidence that tariffs boosted employment in industries protected by the tariffs. However, neither paper analyzes the effect of safeguard tariffs. Yet, the MFN nature of safeguard tariffs rather than the discriminatory nature of anti-dumping and countervailing duties gives policy importance to understanding the effects of safeguard tariffs. Moreover, as the recent public and policy discussion in the US has indicate, the employment impacts of the Bush steel tariffs are crucial for an overall understanding of real world implications of trade policy.

The rest of the paper proceeds as follows. Section 2 presents our difference-in-difference estimation strategy. Section 3 introduces the data. Section 4 presents the results. Section 5 concludes.

2 Empirical methodology

Letting $c$ index commuting zones (CZs) and $t$ index periods, the simplest difference-in-difference (DD) specification would be

$$y_{ct} = \alpha_0 + \alpha_1 V_c + \alpha_2 Post_t + \beta B_c \times Post_t + \epsilon_{ct}.$$  \hspace{1cm} (1)

Here, $y_{ct}$ is a labor market outcome at the CZ-year level. As a share of the initial period CZ working age population, our main labor market outcomes are the share of manufacturing employment, the share of employment in steel-consuming industries and the share of employment in steel-producing industries. $B_c = [V_c \ D_c]$ is a vector of time-invariant measures of CZ exposure to the Bush steel tariffs: $V_c$ is a measure of vulnerability to using steel as an intermediate input and $D_c$ is a measure of dependence on steel production. $Post_t$ is an indicator variable for whether period $t$ is year 2001 and onwards given the USITC started their steel safeguard tariff investigation in June 2001 and handed down their report recommending the imposition of steel tariffs in October 2001. Most of our analysis uses annual data from 1998-2008 so that $t = 1998, 1999, 2001, ..., 2008$ with 2000 being the omitted base year. However, we also present results using quarterly data from 1998:Q1 to 2008:Q4. $\epsilon_{ct}$ is
the error term and we always cluster standard errors by state.

Since the vector of coefficients of interest is $\beta$, fixed effects can control for various confounding factors. Using CZ and time fixed effects yields the following specification:

$$y_{ct} = \alpha_0 + \beta B_c \times \text{Post}_t + \gamma_c + \gamma_t + \varepsilon_{ct}. \quad (2)$$

This controls for time-invariant CZ variables such as a CZ's historical dependence on manufacturing, steel production and steel consumption (e.g. initial employment shares in these sectors). The time fixed effects control for time-varying national shocks including business cycle fluctuations.

Our main specification goes further in two ways. First, we allow time-varying treatment effects $\beta = (\beta_{1998}, \beta_{1999}, \beta_{2000}, \ldots, \beta_{2008})$ with 2000 (or 2000:Q4) being the omitted base period. Thus, our time-varying treatment effects are always measured relative to this base period. These time-varying treatment effects allow for differential pre-trends corresponding to a CZs level of exposure to the Bush steel tariffs. They also allow the effects of the steel tariffs to emerge immediately or slowly after their implementation and to persist throughout the sample period or reverse themselves after the steel tariffs are removed in late 2003.

Second, we add state-time fixed effects and time-varying CZ-level controls. The state-time fixed effects control for time-varying shocks at the state-level rather than at the national-level (e.g. state-level rather than national-level business cycle fluctuations). The main time-varying CZ control we use is a measure of Chinese import penetration given the large literature emphasizing the adverse impacts on US labor market outcomes of rising Chinese import penetration over our sample period. Ultimately, our main specification is

$$y_{ct} = \alpha_0 + \beta B_c \times Y year_t + \delta X_{ct} + \gamma_c + \gamma_{st} + \varepsilon_{ct}. \quad (3)$$

where $Y year_t = [1998_t, 1999_t, 2001_t, \ldots, 2008_t]$ is a vector of indicator variables such that, for example, $1998_t = 1$ if $t = 1998$.

A key consideration when addressing identification issues in a difference-in-difference framework is whether the parallel trends assumption holds. Our use of time-varying treatment effects directly illustrate the plausibility of this assumption. Specifically, pre-trends will show up as economically and statistically significant effects in the years of 1998 and 1999 before the year 2000 base period.
3 Data

3.1 Section 201 and the Bush steel tariffs

In 1974, the U.S. Congress delegated tariff setting authority to the executive branch in certain situations under Section 201 of the 1974 Trade Act. Specifically, Section 201 allows the USITC to investigate whether import surges are a *substantial cause of serious injury* to a domestic industry and make policy recommendations in a report to the President. The USITC can self-initiate a Section 201 investigation or it can be triggered by a trade association, firm, union, or group of workers. After considering the USITC’s report and recommendations, the President decides on what policies, if any, will be implemented.

After years of unsuccessfully pressuring the Clinton administration to initiate a Section 201 safeguard investigation, early 2001 saw renewed optimism by the steel industry under the new Bush administration. Indeed, President Bush asked the USITC to initiate a Section 201 investigation in early June 2001. The USITC did so and concluded its investigation in October 2001. It’s report found that an import surge of steel was a substantial cause of serious injury being suffered by the steel industry and recommended tariffs be imposed on a wide range of steel products (USITC (2001)). Largely following the report’s recommendations, President Bush imposed steel tariffs of 13%-30% in March 2002 on over 171 8-digit HS steel products. These tariffs were set to shrink to zero by March 2005. However, other countries challenged whether the safeguard tariffs met the WTO criteria for safeguard tariffs and the WTO ruled in their favor. President Bush ultimately complied with the WTO ruling and removed the tariffs in December 2003.

3.2 Steel and the input-output structure of the US economy

We concord the 8-digit HS Bush steel tariff products to the 6-digit NAICS industries in the BEA I-O tables. The 171 8-digit HS products hit with Bush steel tariffs map into four 6-digit NAICS products $i = 331111, 331222, 332910, 335120$. Respectively, these are Iron and Steel Mills, Steel Wire, Metal Valve Manufacturing, and Lighting Fixture Manufacturing.

Using the 1997 BEA input-output (I-O) tables, we construct measures of how much each 6-digit NAICS industry relies on each of the other our 6-digit NAICS industries as an input. We construct two measures of how much industry $j$ uses of industry $i$ as an input per dollar of

---

3 See Presidential Proclamation 7529 of March 5, 2002.
4 Further information on this WTO dispute can be found on the WTO website.
5 To do so, we first use the HS to NAICS 1997 concordance from Pierce and Schott (2012) and then use the BEA concordances provided with their I-O tables to go from NAICS 1997 to the the BEA’s NAICS I-O 1997 codes.
industry \( j \)'s output: a direct requirement that represents industry \( j \)'s purchases of industry \( i \) as an input, and a total requirement that measures this as well as the amount of industry \( i \) embedded in other inputs used by industry \( j \). We denote these requirements by \( r_{ij} \), with the context making clear whether this is a direct requirement or a total requirement.

Table 1 summarizes the direct and total requirement data. Panel A lists the top intermediate inputs measured in terms of the average total requirement per $100 of output across all industries in the economy. The top four intermediate inputs are outside manufacturing, but are also much more aggregate 2-digit or 3-digit NAICS industries: Wholesale Trade, Management, Real Estate, and Truck Transportation. The fifth most important intermediate input, and the most important manufacturing input is one of the four Bush steel tariff products: Iron and Steel Mills. On average, another industry in the economy uses $2.67 of this steel per $100 of its output either directly or embedded in their other inputs. Rounding out the top five most important manufacturing inputs are Petroleum Refineries, Other Basic Organic Chemical Manufacturing, Paper and Paperboard Mills, and Semiconductors and Related Device Manufacturing with an average usage by other industries of $1.46-$2.09 per $100 of output. The next most important input hit with Bush steel tariffs is Metal Valve Manufacturing with an average usage by other industries of $0.37 per $100 of output and this places it in the top 10% of manufacturing inputs and the top 20% of all inputs in the economy. Overall, steel is a very important input in the economy and this includes the steel hit by the Bush steel tariffs.

Panel B of Table 1 shows the industries that most rely on the four steel industries hit by the Bush steel tariffs. Usage in Panel B is defined as the sum of the total or direct requirement across the four industries hit with Bush steel tariffs. Panel B shows that the ranking of industries who most rely on steel is very similar regardless of whether input usage is defined as total or direct requirements. The industry that most relies on the Bush steel tariff industries is Rolled Steel Shape Manufacturing with a total requirement of the Bush steel tariff industries of $40.51, and a direct requirement of $39.36, per $100 of output. The 20 industries that most rely on steel use a total requirement of at least $14 per $100 of output and these industries all have a direct requirement of steel of at least $9.50 per $100 of output. Ultimately, many manufacturing industries rely very heavily on the steel industries hit by the Bush steel tariffs as an intermediate input.

3.3 CZ-level exposure to Bush steel tariffs

We construct two CZ-level measures of exposure to the Bush steel tariffs. \( V_c \) captures a CZ’s vulnerability to the Bush steel tariffs through its reliance on local production that uses steel
as an input. In contrast, $D_c$ captures a CZ’s dependence on the Bush steel tariffs through dependence on local steel production.

We use three steps to construct the CZ-level measure of vulnerability to the Bush steel tariffs $V_c$. First, we use 1998 import weights from the USITC Dataweb to aggregate from 8-digit HS Bush steel tariffs to 6-digit NAICS tariffs used by the 1997 BEA I-O tables (see Section 3.2). Indexing these 6-digit NAICS industries by $i$ and 8-digit HS products by $h$, the Bush tariff for 6-digit NAICS industry $i$ is

$$\tau_i = \sum_{h \in H(i)} \frac{IM_h}{IM_i}$$

where $H(i)$ is the set of 8-digit HS Bush steel tariff products that map to 6-digit NAICS industry $i$ and $IM$ denotes imports. As described above, the 171 8-digit HS products hit by the Bush steel tariffs map into four 6-digit NAICS products $i = 331111, 331222, 332910, 335120$.

Second, we construct a measure of how much CZ $c$ relies on these four 6-digit NAICS steel industries. Specifically,

$$R_{ci} = \sum_j \frac{r_{ij} e_j L_{jc}}{L_j L_c}.$$  

Here, we start with the total requirement $r_{ij}$ of NAICS steel industry $i$ used by NAICS industry $j$ (per dollar of industry $j$ output). We then multiply by industry $j$’s output $e_j$ to get the total requirement of steel $i$ to produce the industry-level output $e_j$ and divide by US industry $j$ employment to get a per US industry-$j$ worker measure of reliability on steel $i$. To convert into the CZ-level measure $R_{ci}$, we aggregate across all industries $j$ using the employment shares $\frac{L_{jc}}{L_c}$ in CZ $c$. Ultimately, $R_{ci}$ is a per-worker measure of how much CZ $c$ relies on the 6-digit NAICS steel industry $i$ as an intermediate input.

Third, we aggregate across the NAICS steel industries hit with Bush steel tariffs to get an overall measure of CZ vulnerability to the Bush steel tariffs. Thus, our final measure of CZ-level vulnerability to the Bush steel tariffs is:

$$V_c = \sum_i \tau_i R_{ci}.$$  

We use two steps to construct the CZ-level measure of dependence $D_c$ on local steel production protected by the Bush steel tariffs. To proxy for an industry’s size, we start with a US-level output per worker measure for steel industry $i$: $\frac{e_i}{L_i}$. We then scale this by the Bush steel tariff for industry $i$ and aggregate to the CZ-level using CZ-level employment
shares:

\[ D_c = \sum_i \tau_i \frac{e_i}{L_i} L_c. \]

Figure 1 shows the spatial distribution of CZ-level vulnerability to the Bush steel tariffs \( R_c \) and CZ-level dependence on the Bush steel tariffs \( D_c \). Panel A illustrates vulnerability \( V_c \). It shows the Rust Belt states are particularly vulnerable to tariffs on steel through their reliance on steel as an input, especially Michigan, Ohio, Indiana and Kentucky. Other pockets of particular vulnerability include South-West Texas and around the Gulf Coast into Louisiana; eastern Texas and south-eastern New Mexico; north-eastern North Dakota and north-west Wisconsin; and the mountain states of Wyoming, Colorado, and Utah and into north-east Nevada. Given our estimation strategy uses state-year fixed effects, Panel B illustrates vulnerability after removing state-year means. As expected, this generates a lot more variation across the US and this variation underpins our later results.

Panel C illustrates dependence \( D_c \). About 46% of all CZs have no employment in the four Bush steel tariff industries and hence \( D_c = 0 \). The CZs with highest dependence are scattered across the US with the biggest cluster in the Rust Belt areas of eastern Michigan, eastern Ohio, and western Pennsylvania. While positively correlated, the correlation between vulnerability \( V_c \) and dependence \( D_c \) is not very strong with a correlation coefficient of 0.38. Panel D illustrates dependence after removing its state-year mean and shows more variation across the US. In particular, Panels B and D show the different geographic variation in vulnerability and dependence underlying the separate estimates of their effects in our later results.

3.4 Employment outcomes

All of the employment data used in our main analysis comes from the County Business Patterns (CBP). Our main analysis uses three CZ-level employment variables, each expressed as a share of the 1998 CZ working age population.\(^6\) First, the manufacturing employment share covers the 2-digit NAICS sectors 31-33. Second, the steel-consuming industry employment share covers the 6-digit NAICS industries where the direct requirement for any of the four 6-digit NAICS steel industries hit by the Bush steel tariffs exceeds $5 per $100 of output. There are 62 of these industries (see Table 1 for a snapshot) and cover about 20% of US manufacturing employment. Third, the steel-producing industry share of employment covers the four 6-digits NAICS steel industries hit by the Bush steel tariffs. In extensions, we also

\(^6\)To get CZ working age population, we use PUMA-level 2000 decennial data from IPUMS and concord to the county-level and then the CZ level using the concordances from Autor and Dorn (2013) (obtained from David Dorn’s website).
consider two additional employment variables, again as a share of the 1998 CZ working age population: the non-manufacturing employment share, and the overall employment share.

Our main analysis uses annual data because higher frequency county-level employment data at the 6-digit NAICS level is not publicly available. Figure 2 shows how these five employment share variables change over our 1998-2008 sample for the US. Panel A plots each employment share relative to its own 2000 value while Panels B and C shows how these shares vary over time. For the three main employment share variables – manufacturing, steel-consuming industries, and steel-producing industries – each is around 80% of its 2000 value by 2008. In levels, the manufacturing employment share falls by 2.2% points from 9.7% in 1998 to 7.5% in 2008 and the steel-consuming industry employment share falls by 0.4% points from 1.9% to 1.5% over this same period. The fall in steel-consuming industries is about 20% of the fall in the manufacturing sector and matches its employment share within manufacturing and makes it an important industry within the US economy. The steel-producing employment share falls by a small absolute amount of 0.025% points from 0.118% to 0.093%. Each of these employment share variables, especially the steel-consuming industry employment share, decline particularly quickly in the 2001-2002 window.

In contrast to the manufacturing employment share and employment shares within manufacturing, the non-manufacturing employment share rises from around 95% of its 2000 level in 1998 to about 110% of its 2000 level in 2008. In turn, the overall employment to working age population share rises from around 95% of its 2000 level in 1998 to about 105% of its 2000 level in 2008. In levels, the non-manufacturing employment share rises 8.5% points from 51.8% in 1998 to 60.3% in 2008 and leads the overall employment to working age population ratio to increase by 6.4% from 61.5% to 67.9%.

Figure 3 illustrates the CZ-level variation in employment outcomes over the 2000-2008 period. This period starts the year before the investigation process for Bush steel tariffs began in 2001 and goes through till the end of our sample period. Panels A, C and E depict the employment share changes for manufacturing, steel-consuming industries and steel-producing industries respectively while Panels B, D and F remove CZ and state-year fixed effects. Panel A shows the decline in the manufacturing employment share over this period is heavily concentrated in the eastern half of the US. After removing the fixed effects, Panel B shows much more geographic variation that underlies our later results. Comparing Panel B with Panel B of Figure 1 reveals a negative correlation, especially in the Rust Belt states of Michigan, Indiana and Ohio where the correlation coefficient is 0.49 and is suggestive of our later results. While still heavily concentrated in the eastern half of the US, Panel C shows more geographic variation there in terms of the contraction in steel-consuming industry employment. After removing the fixed effects, a comparison of Panel D and Panel
B of Figure 1 again reveals a negative correlation, especially in the same Rust Belt states where the correlation coefficient is 0.38. Overall, Figures 1 and 3 give a good idea of the variation underlying our main results later about the negative consequence of the Bush steel tariffs.

Panel E of Figure shows the change in steel-producing industry employment. It shows a general decline in western Pennsylvania, eastern Michigan and north-eastern Ohio which corresponds to Panel C of Figure 1 as the areas most dependent on employment in the Bush steel tariff industries. The correlation coefficient between the employment decline and dependence \( D_c \) for these three states is -0.33. Although not as visually obvious, this negative correlation remains -0.31 after removing the fixed effects and comparing Panel F with Panel D of Figure 1.

### 4 Results

#### 4.1 Main results

Standard international trade theory suggests that steel tariffs should boost production of steel but reduce production of firms that use steel as a key intermediate input. To the extent that industrial employment is positively correlated with industrial production, employment should rise in the steel-producing industry but fall in industries that rely on steel as an important intermediate input. In turn, the net effect on manufacturing output is ambiguous given the key nature of steel as an input throughout the manufacturing sector.

Figure 4 shows our main results. It shows the relevant point estimates and 95% confidence intervals for the time varying treatment effects \( \beta_t \) from equation (3). Panel A shows the effects of vulnerability \( V_c \) to the Bush steel tariffs on manufacturing employment as a share of CZ-level working age population. Importantly, Panel A shows the absence of a pre-trend: our measure of vulnerability to the Bush steel tariffs does not impact the change in employment between either 1998 or 1999 and 2000. Moreover, these point estimates are very small. However, Panel A shows statistically significant negative point estimates from 2001 onwards. That is, given overall US manufacturing employment is falling over our sample period, manufacturing employment fell more in CZs that were more vulnerable to the Bush steel tariffs. This effect roughly doubles from 2001 to 2002 and then remains relatively stable through 2008.

These effects from Panel A are economically significant. To see this, we multiply the year \( t \) point estimate from equation (3) by the change between the 25th and 75th percentiles of vulnerability to Bush steel tariffs and express it as a share of the mean change in the CZ-level
manufacturing employment between 2000 and year t. Doing so reveals that the Bush steel tariffs accounts for nearly 55% of the change in manufacturing employment between 2000 and 2001. Despite the 2002 point estimate roughly doubling from 2001 to 2002, the fall in manufacturing employment outweighs this so that the 75-25 change in vulnerability to Bush steel tariffs accounts for around 40% of the change in manufacturing employment between 2000 and 2002. These results illustrate the Bush steel tariffs had quick and notable adverse impacts on manufacturing employment.

Perhaps surprisingly, Panel A shows that the adverse effects of the steel tariffs on manufacturing employment extend do not disappear in the short-to-medium term. While the 2008 point estimate in Panel A is very imprecise, the point estimates in the 2002-2007 period are very stable in terms of their magnitude as well as their statistical and economic significance. This is despite the steel tariffs being removed at the end of 2003. In part, the longer effects could be due to the steel tariffs initially being set to last until March 2005 even though a successful WTO challenge by other countries led President Bush to remove around 15 months earlier than planned. But the stability of the effects extending through at least 2007 suggests the adverse effects of the steel tariffs extended well beyond when the tariffs were expected to expire. Unfortunately, the Great Recession began in late 2008 and complicates a longer-run analysis.

Naturally, the manufacturing sector as a whole relies on steel as a key intermediate input. Nevertheless, some manufacturing industries rely on steel more than other manufacturing industries. Thus, we expect stronger effects in manufacturing industries that especially rely on steel as an intermediate input if the effects from Panels A actually reflect effects of the Bush steel tariffs.

Panel B shows the results where the dependent variable is employment in steel-consuming industries rather than overall manufacturing employment. As discussed above, we define steel-consuming industries as the set of industries that have a direct requirement for any of the Bush steel tariff industries of at least $5 per $100 of output. Importantly, Panel B illustrates the absence of a pre-trend; indeed, the point estimates flip sign between 1998 and 1999 so that, if anything, employment is fluctuating above and below its 2000 level across 1998 and 1999. Moreover, Panel B also illustrates the same qualitative effects as for overall manufacturing but with a stronger economic magnitude. The statistically significantly adverse effects of vulnerability to the Bush steel tariffs emerge in 2001 and 2002 and remain relatively stable over the rest of the sample period (the 2008 point estimate is again statistically insignificant).

In terms of economic significance, moving from the 25th to 75th percentile of vulnerability to the Bush steel tariffs accounts for about 140% of the change in steel consuming
industry employment between 2000 and 2001 and about 80% of the change between 2000 and 2002. Thus, the economic magnitude of Bush steel tariff vulnerability in the steel consuming industry is about double that for overall manufacturing. This is exactly what one would expect if the treatment effects are indeed reflecting effects of the steel tariffs.

Panels A-B show the substantial negative effects of the Bush steel tariffs for CZs who are vulnerable due to their reliance on steel as an intermediate input. Panels C-D investigate the potentially positive impacts of the Bush steel tariffs on CZs dependent on steel production. Despite the intuitive expectation of a positive effect, our results are fairly precisely estimated zero or near-zero effects. While Panel C shows some positive and statistically significant effects on overall manufacturing employment in the years 2001-2004, they are very small in economic magnitude. Using the end points of the 95% confidence intervals for the treatment effect point estimates and moving from the 25th to 75th percentile of CZs with strictly positive sensitivity to the Bush steel tariffs (i.e. nearly 50% of CZs have no steel employment) accounts for no more than around 1% of the manufacturing employment change between 2000 and any given year. When the dependent variable is employment in the steel-producing industry, Panel D shows all point estimates are often negative and always statistically insignificant. The exercise using the 75-25 change in sensitivity to the Bush steel tariffs accounts for no more than around 4% of the steel-producing industry employment change between 2000 and any given year. Overall, the results in Panels C-D support fairly precisely estimated zero or near-zero effects.

Ultimately, the key conclusion from Figure 4 is that the Bush steel tariffs had substantial negative effects and no significant positive effects on local employment. CZs especially vulnerable to the Bush steel tariffs because they relied on steel as an intermediate faced notably worse outcomes in terms of overall manufacturing employment and even more so in terms of employment in the heavy steel-consuming industries within manufacturing. Moreover, CZs who could potentially benefit from the Bush steel tariffs because of their dependence on local steel production did not see any notable benefits either in terms of overall manufacturing employment or employment in steel producing industries. These results emphasize the importance of downstream industries when imposing tariffs on key intermediate inputs.

4.2 Extensions and robustness

Alternative dependent variables One may wonder whether the negative effects on local employment of local vulnerability to the Bush steel tariffs spill over into the non-manufacturing sector and whether we can detect these negative effects in overall employment. Thus, we first investigate the effect of vulnerability to the Bush steel tariffs on two additional
employment outcomes: non-manufacturing employment and overall employment. Panel A of Figure 5 shows the results for non-manufacturing employment. The estimates are quite imprecise but are never statistically significant and often close to zero. Thus, there is no evidence of important spillover effects on non-manufacturing employment. Panel B shows the results for overall employment. As expected, the point estimates are very close to the sum of the point estimates for manufacturing and non-manufacturing employment. Thus, the point estimates are negative. However, the noise in the non-manufacturing point estimates means the point estimates for overall employment are generally statistically insignificant.

Our analysis thus far as measured CZ employment outcomes as a share of a CZ’s 1998 working-age population. Panels C-F of Figure 5 instead measure these employment outcomes as a share of a CZ’s aggregate employment. Overall, these results show our baseline results remain robust when switching to employment outcomes as a share of CZ aggregate employment.

Alternative measures of steel tariff exposure Our baseline measure of vulnerability to the Bush steel tariffs, $V_c$, aggregates across reliability $R_{ci}$ on each of the Bush steel tariff industries $i$ (see equation (6)). Further, CZ $c$’s reliability on steel industry $i$, $R_{ci}$, aggregates across the usage of steel industry $i$ by every other industry $j$ in the economy using the industry-$j$ total requirements $r_{ji}$ for steel input $i$ and the industry-$j$ output. We now modify this measure in two alternative ways. First, Panels A-B of Figure 6 show the results using industry-level direct requirement rather than total requirement for steel. Second, Panels C-D of Figure 6 show the results when using industry-level value added rather than industry-level output. Both sets of results show our baseline results remain robust when using these alternative measures of vulnerability to the Bush steel tariffs.

Alternative specifications We now investigate three alternative specifications. Our baseline analysis does not weight our regressions. On one hand, one may be concerned that the results are overly influenced by smaller CZs. On the other hand, Solon et al. (2015) argue that such a concern is not a reason to use regression weights. Instead, they argue that such concerns should be dealt with by exploring heterogeneity of the causal effect according to CZ-size. Thus, we follow their advice and do not use regression weights in our main analysis. Nevertheless, they also argue that important differences between unweighted and weighted regression results can indicate model misspecification. Thus, Panels A-D of Figure 7 use regression weights corresponding to the 1998 CZ-level working age population. It shows our baseline results are robust to using these regression weights.

Ideally, our main analysis would use higher frequency data rather our annual data. Un-
fortunately, monthly or quarterly data is not publicly available for local labor markets (e.g. counties) at the detailed industry-level needed to construct our measures of steel-consuming and steel-producing employment. However, it is available at more aggregated industry level so that we can construct CZ measures of manufacturing employment at the quarterly frequency.

Panels E-F of Figure 7 show the results using 2000:Q4 as the base period and reinforce our main results. Importantly, they provides further support for the absence of a pre-trend: the point estimates are always statistically insignificant very stable in the period 1998:Q1-2000:Q3 before the Bush steel tariffs. Panel A shows the effects of vulnerability phase in and become statistically significant in 2001:Q3 and 2002:Q1 and remain stable and statistically significant thereafter. This timeline matches the institutional historical timeline of the tariffs according to Devereaux et al. (2006). After years of unsuccessfully pressuring the Clinton administration to initiate a Section 201 safeguard investigation, 2001:Q1 saw renewed optimism by the steel industry under the new Bush administration. Indeed, 2001:Q2 saw Bush ask the USITC to initiate an investigation and 2001:Q3 saw the USITC conclude that Bush should impose steel tariffs that were actually imposed in 2002:Q1. Ultimately, the higher frequency results in Figure 7 support the results from our main analysis.

As a final robustness check, we explore a placebo specification. Our main analysis focuses on how the growth of CZ-level employment variables in the 2001-2003 period relate to our measure of CZ-level vulnerability to steel tariffs. Indeed, steel is the most important intermediate input made by the manufacturing sector (see Table 1). The second most important intermediate input made by the manufacturing sector is the output of the Petroleum Refineries industry (NAICS 324110; see Table 1). Thus, we estimate equation (3) by replacing our measure of vulnerability to steel tariffs with reliability on the output of the petroleum refinery industry. As a placebo exercise, we expect to do not expect to see any statistically significant effects. Panel G of Figure 7 reflects these expectations with the point estimates generally being far from statistical significance at conventional levels.

**Anti-dumping duties** One potential concern of analyzing the Bush steel tariffs is the concurrent presence of anti-dumping (AD) duties on steel. As is well known, the US steel industry has been one of the main historical recipients of AD duties. Panel A of Table 2 illustrates the industrial composition of AD duties over the 1996-2002 period and the overlap with products hit by Bush steel tariffs.\(^7\) Over this period, 497 8-digit HS products were hit with AD duties, with some hit multiple times, and 315 (63%) of these were Iron and Steel

---

\(^7\)Our AD data comes from the Global Antidumping Database - 1980’s-2015 hosted by The World Bank and originally developed by Chad Bown.
(HS Chapter 72) and Articles of Iron and Steel (HS Chapter 73) products. Of these 315 steel products, 219 (70%) were hit with Bush steel tariffs. Thus, substantial and concurrent overlap exists between the products targeted by the Bush steel tariffs and AD duties.

Of the 219 products with overlap between AD duties in the 1996-2002 period and Bush steel tariffs, 175 (80%) were across six AD cases. As Panel B of Table 2 shows, these 175 instances of AD duties fall within just six AD cases: two each for the steel product categories of cut to length steel, cold rolled steel, and hot rolled steel. For two cases, the AD duties only lasted a few months because the preliminary duties expired upon the USITC reaching a final injury determination of “no injury”. For the other four cases, the AD duties were in place until at least 2003 and overwhelmingly still in place by 2015. Moreover, as Panel B of Table 2 shows, AD duties in these steel product categories stretch back to an earlier wave of steel AD cases in the early 1990s. Ultimately, for most of the Bush steel tariff products, steel AD duties had been in effect long before and stayed in effect long after the Bush steel tariffs. Thus, given the very different timing of these AD duties and the Bush steel tariffs, our results are unlikely to be driven by steel AD duties.

5 Conclusion

The breadth and scale of President Trump’s tariff war has renewed interest – among academics, policy makers, and the general public alike – in the negative effects of tariffs on domestic firms who rely on importable goods as intermediate inputs. Surprisingly, this paper is the first academic analysis we know of that investigates the employment effects of the Bush steel tariffs from the early 2000s.

Our main result is that the Bush steel tariffs have statistically and economically significant effects on employment in industries relying on inputs hit with the Bush steel tariffs. Moving from the 25th to the 75th percentile of CZ-level vulnerability to the Bush steel tariffs can explain about 40-60% of the change in CZ-level manufacturing employment between 2000 and the 2001-2003 period when the Bush steel tariffs were developed and implemented. This figure rises to around 100% when looking at employment in CZ-level steel-consuming industries. Moreover, these effects do not reverse themselves once the Bush steel tariffs were removed at the end of 2003 and persist throughout our sample period which ends in 2008. Thus, the Bush steel tariffs had important and persistent effects on employment in the overall manufacturing sector and especially in industries that used steel intensively.

In contrast, we find no evidence of economically meaningful increases of employment in the steel-producing industries where the Bush steel tariffs applied. Ultimately, our analysis emphasizes the costs of the Bush steel tariffs on intermediate inputs and downplays the
benefits of the Bush steel tariffs for protected industries. This contributes to a growing body of evidence finding similar conclusions in other trade policy settings, including the tariff war of the Trump administration and the historical use of temporary trade barriers (anti-dumping and countervailing duties) by the US.

References


Figure 1: CZ-level vulnerability and dependence on Bush steel tariffs

Notes: Definitions of vulnerability and dependence in main text. Panels B and D remove state fixed effects. See main text for further details.
Figure 2: US national employment share changes 1998-2008

Notes: All employment shares are shares of 1998 US working age population. In Panel B, left-hand scale for Manufacturing series and right-hand scale for Steel-consuming and Steel-producing series. See main text for further details.
Figure 3: CZ-level change in employment shares 2000-2008

Notes: All employment shares are shares of 1998 CZ-level working age population. Panels B, D and F remove state-year and CZ fixed effects. See main text for further details.
Figure 4: Effects of vulnerability and dependence on CZ-level employment shares

Notes: All panels estimate equation (3) in main text. All dependent variables are employment shares are shares of 1998 CZ-level working age population. Standard errors clustered by state. See main text for further details.
Figure 5: Alternative dependent variables

Notes: All panels estimate equation (3) in main text. Employment share dependent variables in Panels A and B are shares of 1998 CZ-level working age population. Employment share dependent variables in Panels C-F are shares of time-varying CZ-level total employment. Standard errors clustered by state. See main text for further details.
Figure 6: Alternative measures of vulnerability to Bush steel tariffs

Note: All panels estimate equation (3) in main text. All dependent variables are employment shares are shares of 1998 CZ-level working age population. When constructing CZ-level vulnerability, Panels A-B use direct requirement (rather than indirect requirements) and Panels C-D use industry-level value added (rather than industry-level output). Standard errors clustered by state. See main text for further details.
Note: All panels estimate a variant of equation (3) in main text. All dependent variables are employment shares of the 1998 CZ working age population. Panels A-D use regression weights corresponding to 1998 CZ working age population (rather than an unweighted regression). Panels E-F use quarterly data (rather than annual data) and uses state-quarter fixed effects (rather than state-year fixed effects) Panel G defines the vector $B$ in equation (3) as reliability on the Petroleum Refinery industry (rather than vulnerability and dependence on steel). Standard errors clustered by state. See main text for further details.
Table 1. Steel usage as an intermediate input

Panel A. Top intermediate inputs in economy (total requirement)

<table>
<thead>
<tr>
<th>NAICS</th>
<th>Industry</th>
<th>Economy Rank</th>
<th>Manuf. Rank</th>
<th>Avg. Usage per $100</th>
</tr>
</thead>
<tbody>
<tr>
<td>420000</td>
<td>Wholesale trade</td>
<td>1</td>
<td></td>
<td>$8.46</td>
</tr>
<tr>
<td>550000</td>
<td>Management of companies and enterprises</td>
<td>2</td>
<td></td>
<td>$5.71</td>
</tr>
<tr>
<td>531000</td>
<td>Real estate</td>
<td>3</td>
<td></td>
<td>$3.47</td>
</tr>
<tr>
<td>484000</td>
<td>Truck transportation</td>
<td>4</td>
<td></td>
<td>$3.09</td>
</tr>
<tr>
<td>331111</td>
<td>Iron and steel mills</td>
<td>5</td>
<td>1</td>
<td>$2.67</td>
</tr>
<tr>
<td>211000</td>
<td>Oil and gas extraction</td>
<td>6</td>
<td></td>
<td>$2.64</td>
</tr>
<tr>
<td>221100</td>
<td>Power generation and supply</td>
<td>7</td>
<td></td>
<td>$2.27</td>
</tr>
<tr>
<td>324110</td>
<td>Petroleum refineries</td>
<td>8</td>
<td>2</td>
<td>$2.09</td>
</tr>
<tr>
<td>325190</td>
<td>Other basic organic chemical manufacturing</td>
<td>9</td>
<td>3</td>
<td>$1.88</td>
</tr>
<tr>
<td>3221A0</td>
<td>Paper and paperboard mills</td>
<td>10</td>
<td>4</td>
<td>$1.83</td>
</tr>
<tr>
<td>334413</td>
<td>Semiconductors and related device manufacturing</td>
<td>13</td>
<td>5</td>
<td>$1.46</td>
</tr>
<tr>
<td>325211</td>
<td>Plastics material and resin manufacturing</td>
<td>15</td>
<td>6</td>
<td>$1.45</td>
</tr>
<tr>
<td>33441A</td>
<td>All other electronic component manufacturing</td>
<td>16</td>
<td>7</td>
<td>$1.29</td>
</tr>
<tr>
<td>321113</td>
<td>Sawmills</td>
<td>20</td>
<td>8</td>
<td>$1.06</td>
</tr>
<tr>
<td>336300</td>
<td>Motor vehicle parts manufacturing</td>
<td>24</td>
<td>9</td>
<td>$0.99</td>
</tr>
<tr>
<td>322210</td>
<td>Paperboard container manufacturing</td>
<td>25</td>
<td>10</td>
<td>$0.97</td>
</tr>
<tr>
<td>332910</td>
<td>Metal valve manufacturing</td>
<td>80</td>
<td>30</td>
<td>$0.37</td>
</tr>
<tr>
<td>331222</td>
<td>Steel wire drawing</td>
<td>148</td>
<td>75</td>
<td>$0.17</td>
</tr>
<tr>
<td>335120</td>
<td>Lighting fixture manufacturing</td>
<td>273</td>
<td>171</td>
<td>$0.05</td>
</tr>
</tbody>
</table>

Panel B. Top industries using steel as an intermediate input

<table>
<thead>
<tr>
<th>NAICS</th>
<th>Industry</th>
<th>Total Requirement</th>
<th>Direct Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rank</td>
<td>Usage per $100</td>
<td>Rank</td>
<td>Usage per $100</td>
</tr>
<tr>
<td>-------------</td>
<td>-----------------------------------------------</td>
<td>-------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>331211</td>
<td>Rolled steel shape manufacturing</td>
<td>1</td>
<td>$40.51</td>
</tr>
<tr>
<td>331210</td>
<td>Iron, steel pipe and tube from purchased steel</td>
<td>2</td>
<td>$38.24</td>
</tr>
<tr>
<td>331222</td>
<td>Steel wire drawing</td>
<td>3</td>
<td>$36.34</td>
</tr>
<tr>
<td>332114</td>
<td>Custom roll forming</td>
<td>4</td>
<td>$32.28</td>
</tr>
<tr>
<td>332311</td>
<td>Prefabricated metal buildings and components</td>
<td>5</td>
<td>$29.05</td>
</tr>
<tr>
<td>332600</td>
<td>Spring and wire product manufacturing</td>
<td>6</td>
<td>$23.15</td>
</tr>
<tr>
<td>332996</td>
<td>Fabricated pipe and pipe fitting manufacturing</td>
<td>7</td>
<td>$22.79</td>
</tr>
<tr>
<td>332111</td>
<td>Iron and steel forging</td>
<td>8</td>
<td>$20.15</td>
</tr>
<tr>
<td>332420</td>
<td>Metal tank, heavy gauge, manufacturing</td>
<td>9</td>
<td>$18.47</td>
</tr>
<tr>
<td>333921</td>
<td>Elevator and moving stairway manufacturing</td>
<td>10</td>
<td>$18.40</td>
</tr>
<tr>
<td>332812</td>
<td>Metal coating and nonprecious engraving</td>
<td>11</td>
<td>$17.66</td>
</tr>
<tr>
<td>333924</td>
<td>Industrial truck, trailer, and stacker manufacturing</td>
<td>12</td>
<td>$17.48</td>
</tr>
<tr>
<td>332313</td>
<td>Plate work manufacturing</td>
<td>13</td>
<td>$17.42</td>
</tr>
<tr>
<td>332323</td>
<td>Ornamental and architectural metal work manufacturing</td>
<td>14</td>
<td>$17.22</td>
</tr>
<tr>
<td>332312</td>
<td>Fabricated structural metal manufacturing</td>
<td>15</td>
<td>$17.24</td>
</tr>
<tr>
<td>332213</td>
<td>Saw blade and handsaw manufacturing</td>
<td>16</td>
<td>$15.38</td>
</tr>
<tr>
<td>332430</td>
<td>Metal can, box, and other container manufacturing</td>
<td>17</td>
<td>$15.07</td>
</tr>
<tr>
<td>336991</td>
<td>Motorcycle, bicycle, and parts manufacturing</td>
<td>18</td>
<td>$14.74</td>
</tr>
<tr>
<td>33211A</td>
<td>All other forging and stamping</td>
<td>19</td>
<td>$14.64</td>
</tr>
<tr>
<td>336500</td>
<td>Railroad rolling stock manufacturing</td>
<td>20</td>
<td>$14.29</td>
</tr>
</tbody>
</table>

Notes: NAICS codes are 6-digit 1997 NAICS codes from BEA I-O classification system. In Panel A, the Avg. Usage per $100 is defined as 100 multiplied by the average reliability r_ij across all industries j of input i listed in the table. In Panel B, the Usage per $100 is defined as 100 multiplied by the sum of reliability r_ij across the four Bush steel tariff industries i for the industry j listed in the table. See main text for more details.
Table 2. Anti-Dumping Duties and Bush Steel Tariffs

Panel A. Overlap

<table>
<thead>
<tr>
<th>Steel</th>
<th>AD</th>
<th>Non-AD</th>
<th>AD non-steel</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bush tariff products</td>
<td>219</td>
<td>73</td>
<td></td>
<td>292</td>
</tr>
<tr>
<td>Non-Bush tariff products</td>
<td>96</td>
<td></td>
<td>182</td>
<td>278</td>
</tr>
<tr>
<td>AD totals</td>
<td>315</td>
<td></td>
<td>182</td>
<td>497</td>
</tr>
</tbody>
</table>

Panel B. Overlap and duration of AD duties

<table>
<thead>
<tr>
<th>Year</th>
<th>AD Case-ID</th>
<th>Steel type</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1992</td>
<td>AD-573</td>
<td>Cut to length steel</td>
<td>Revoked on 1 country in 2000 and other 10 countries in 2005.</td>
</tr>
<tr>
<td>1992</td>
<td>AD-588</td>
<td>Hot rolled steel</td>
<td>Preliminary duties lifted after 4-6 months because final injury determination of &quot;no injury&quot;.</td>
</tr>
<tr>
<td>1992</td>
<td>AD-597</td>
<td>Cold rolled steel</td>
<td>Revoked on all 3 countries in 2000.</td>
</tr>
<tr>
<td>1998</td>
<td>AD-806</td>
<td>Hot rolled steel</td>
<td>By 2015, still in force on 1 country. Revoked on other two countries in 2011.</td>
</tr>
<tr>
<td>1999</td>
<td>AD-829</td>
<td>Cold rolled steel</td>
<td>Preliminary duties lifted after 4-6 months because final injury determination of &quot;no injury&quot;.</td>
</tr>
<tr>
<td>2001</td>
<td>AD-894</td>
<td>Cold rolled steel</td>
<td>Preliminary duties lifted after 4-6 months because final injury determination of &quot;no injury&quot;.</td>
</tr>
</tbody>
</table>