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Uni ersi of Colorado Bo lder
Bo lder, Colorado 80309

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Trade Policy and the Decline of the Labor Share

Colin Jareb
University of Colorado Boulder

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Abstract

In this paper I analyze the impact of tariffs on US imports that are used as inputs to manufacturing on labor market outcomes. I develop theoretical predictions using a model of final goods production in which firms combine labor, capital, and intermediate inputs. Utilizing changes in tariff rates, input-output tables, and local employment in the input sector, I develop a sector- and state-specific measure of exposure to tariffs in input markets. I estimate the effect of input market tariff exposure on labor market outcomes with a three-way fixed effects regression. An increase in tariff exposure is associated with increases in employment and wages; however, due to larger increases in output the labor share of output declines.

1 Introduction

In the twenty- rst century the decline of manufacturing employment and wages has been well documented by economists (see e.g Pierce and Schott 2016, Autor Dorn and Hanson 2013) and has drawn much attention from policymakers in the developed world. In the manufacturing sector, the replacement of labor with capital via automation, low-skilled labor with high-skill labor via job polarization, and high wage labor with low wage labor from abroad via o shoring have each been scrutinized as factors in explaining this decline. Broadly speaking, this decline has coincided with a decline in the share of national income owing to labor in the form of wages, salaries, and other bene ts. Further, policymakers concerned with job creation, rising inequality, and national security have increasingly become focused on this pattern of declining fortunes for workers in the manufacturing sector. Speci cally, among other policies such as subsidies for rms and industries and the renegotiation of NAFTA, the US has recently engaged in protectionism through increases in bilateral tari s.

This paper builds upon a partial equilibrium framework to study the e ect of input tari s on labor market outcomes. Speci cally, I use a model featuring a two-tier CES production function consisting of three inputs to production. At the highest tier rms producing goods for nal consumption combine intermediate goods with all other factors of production that enter into value-added. In the second tier, value-added is a CES production function consisting of labor and a xed factor of production. Moreover, intermediate inputs are considered a CES aggregate of goods that are subject to trade costs. I use this model to derive predictions regarding the response to a change in the price of intermediate inputs. To take this model and predictions to the data I construct a novel measure of exposure to tari s in input markets. I utilize national level input-output data and state level employment data to derive the amount of exposure to tariffs faced by sectors producing goods for final consumption. Further, I establish several assumptions necessary to empirically implement this model by estimating a three-way fixed effects model. I find that while wages, employment, and capital expenditure increase (decrease) in response to a rise (fall) in tariff exposure, the share of output flowing to labor declines with an elasticity of -0.062 while the share of output flowing to capital increases with an elasticity of 0.413.

A large strand of literature has documented the decline of the share of national income

my analysis I explicitly define the labor share in two ways; as the share of final sectoral output and as the share of value-added in the final goods sector.

This paper makes two primary contributions to the literature. First, this paper studies the effects of globalization and the associated policy response by studying inputs to production, instead of focusing on imports and exports or tariffs in output markets. I further focus my analysis across many manufacturing sectors and account for the input-

The paper proceeds as follows. In section II, I introduce my theoretical model and derive testable predictions. In section III, I establish a way to measure exposure to tariffs in input markets and provide my empirical specification. In section IV, I discuss the data sources used in the analysis. In section V, I produce and discuss the results. Section VI concludes.

2 Theoretical Background

The economy consists of consumers located in location j. Utility of a representative consumer in state j is $U_j = \log(C_j)$ where C_j is a CES aggregate of final good varieties produced in state j. There are S final good varieties produced by sector s. Consumers inelastically supply labor in j such that L_j is the total amount of labor supplied to firms in j. Consumer income consists of wage labor and the revenue generated by tariffs collected by the government and distributed equally among consumers across all locations.

Final goods firms produce non-tradeable goods for consumption in sector s and state j. s produces goods using a two-tier nested CES production function with a fixed factor K_{sj}, intermediate goods, M_{sj}, and labor, L_{sj}. Labor is immobile across regions and fixed by L_j; however, labor is perfectly mobile across sectors and industries. Intermediate goods are tradeable and produced by input industries i using unskilled labor. Intermediates that are sourced from abroad are subject to tariffs ($_{ik}$) and iceberg trade costs ($_{jk}$), $t_{ijk} = (1 + \quad_{ik})(1 + \quad_{jk})$.

In order to flexibly allow for varying degrees of substitutability or complimentarity between inputs into production, consider a two-tier nested CES production function. Firms operating in sector s combine intermediates with an aggregate of all other factors of production as follows

$$Q_{sj} = A_{sj} \Big[{}_{sj}^{1= \; s} VA_{sj}^{\frac{s \quad 1}{s}} + (1 \qquad {}_{sj})^{1= \; s} M_{sj}^{\frac{s \quad 1}{s}} \Big]^{\frac{s}{s \quad 1}} \tag{1}$$

M_{sj} is a CES aggregate of intermediate goods with constant elasticity of substitution .

$$M_{sj} = \Big[\sum_{i} {}_{is}^{1=} m_{isj}^{\frac{\quad 1}{}} \Big]^{\frac{}{\quad 1}} \tag{2}$$

VA_{sj} is a CES aggregate of all other inputs without a loss of generality. To x ideas, any location other than the home location. Tari s are taxes collected by the national government when goods are sourced from foreign locations$_{ik}$ = 0 for locations k which are other states. Workers are assumed perfectly mobile across sectors and industries but cannot move across locations. Labor markets are assumed to be perfectly competitive. Wages are then given by w_j . Firms rent capital at an exogenously determined rental rate, r_j . Intermediates are sourced from industry i from the lowest cost supplier inclusive of trade costs, p_{isj} . The unit cost function is given by

$$c_{sj} = w_j L_{sj} + r_j K_{sj} + \left(\sum_i {}^{1}_{isj} \; p^{1}_{isj}\right)^{\frac{1}{1}} M_{sj} \qquad (6)$$

Firm's solve the following pro t maximization problem

$$\text{argmax} \quad {}_{sj} = P^{f}_{sj} Q_{sj} \quad w_j L_{sj} \quad r_j K_{sj} \quad \left(\sum_i {}^{1}_{isj} \; p^{1}_{isj}\right)^{\frac{1}{1}} M_{sj} \qquad (7)$$

Solving the sector s rm's optimization problems yields an expression for the parameters de ning the share of each input used in producing one unit of output. Recall from equation equation 1 that the intermediate share of production is de ned by 1 $_{sj}$ and that the labor share of value added (see equation 3) is de ned by $_{sj}$. The labor share of output is given by the interaction of $_{sj}$ $_{sj}$. Taking rst order conditions and solving equation 7 yields the following expression for the labor share of output

$$ {}^{1=}_{sj}{}^{s} \; {}^{1=}_{sj}{}^{s} = (1 \quad {}_{sj})^{1= s} M^{1=}_{sj} \quad {}^{1=} \; {}^{1=}_{sj} \; m_{isj}^{1=} \; p_{isj}^{1} V A^{1=}_{sj} \quad {}^{1=} \; L^{1=}_{sj} \; w_{sj} \qquad (8)$$

For the requisite derivations see the appendix.

The use of intermediate inputs by the nal goods sector is determined by share parameters $_{isj}$ and the constant elasticity of substitution . The nal goods sector in a given location will source intermediate inputs from the lowest cost supplier of a given variety. The price of variety i which enters the unit cost function is thus a function of transport costs, the wage paid by producers of in a location k, and the industry-location speci c productivity. I assume that the nal goods sector consists of many rms purchasing goods from monopolistically competitive input industries at competitive prices. Thus, the price of a given intermediate variety is

$$p_{ij} = \min \{ p^F_{ij} ; p^H_{ij} \} \tag{9}$$

where

$$p^F_{ij} = \frac{}{\ 1} w_{ik} (\ _{ijk} + 1)(1 + \ _{jk})/A_{ik} \ \forall k \neq j \tag{10}$$

$$p^H_{ij} = \frac{}{\ 1} w_{ij} / A_{ij} \tag{11}$$

Recall, the aggregate price of intermediate goods used by s in j is as follows

$$P^m_{sj} = \Big[\sum_{i \in I^H} {}_{is} \, p_{ij}^{H \; 1-} + \sum_{i \in I^F} {}_{is} \, p_{ij}^{F \; 1-} \Big]^{\frac{}{1}} ?? \tag{12}$$

the composite price of intermediates is thus a function of the costs of inputs combined with trade costs for inputs sourced from a foreign supplier industry. Sectors which source a greater proportion of inputs from abroad face larger swings in the composite intermediate price compared to a sector with a greater proportion of domestic inputs.

Under equation ??, nal goods sectors which source a greater proportion of inputs from abroad will face larger changes in the aggregate price of intermediates when faced with a change in tari policy. This insight is critical for forming a variety of testable predictions. For the sake of convenience when referring to a change in the price of intermediate inputs I assume that this arises from a change in trade costs based on variation in tari rates. This implies additional assumptions regarding A_{ij} and $_{is}$; speci cally I assume that relative productivity across input industries within states are constant through time which follows from the assumption of a perfectly competitive labor market. Additionally, I assume that the shares of intermediate inputs purchased by the nal goods sector is constant through time. Though this assumption is strong, as it is expected that when relative tari s change nal goods rms may substitute to relatively cheaper inputs as I will show below this would bias my empirical results towards zero.

Following the production structure outlined above, in the rst-tier CES production function a change in the price of intermediates faced by a rm located in j operating in sector s will result in a change in the value-added share of output. This change in $_s$ is dependent on $_{sj}$. Sectors which have outsourced a signi cant amount of their production process, are mainly focused on assembly of nal goods, or are reliant to a signi cant degree on foreign rather than domestic suppliers would be expected to reduce output and value-added as a result of an increase in the price of intermediates. Alternatively, sectors in which rms have implemented a production process where workers and the xed factor both produce intermediate inputs and assemble nal goods, near-shored production along the value chain, or rely primarily on domestic suppliers would be expected to reduce theirrely primar26(9ed)-353()-261(thdima.9

Further, the e ect of a change in the price of intermediate inputs on labor market outcomes can be analyzed. Speci cally, the labor share of output is captured by the parameter $_{sj}$ $_{sj}$ and the labor share of value added is captured by parameter $_{sj}$. The change in the share of revenue and value-added owing to labor is dependent on the elasticity of substitution between labor and intermediates and that between labor and capital. Speci cally, a change in the price of intermediates will alter the share of revenue owing to the factors of production used in generating value-added in a location j by sector s. Further, the elasticity of substitution between and relative prices of labor and capital will determine the proportion owing to labor.

There are two cases to consider; one in which industries increase output as a result of an increase in the price of intermediate inputs, and vice versa. In the rst case, the labor share of output may increase following an increase in the price of intermediates due to low reliance on intermediate inputs as outlined above and increased competitiveness, resulting in an expansion of output and employment of labor. Alternatively, the labor share may decline if these conditions hold true, yet capital and labor are highly substitutable and the cost of capital relative to labor is low. In the second case, the labor share of output may increase following an increase in the price of intermediates because the rms that decrease output as a result of this price increase may cut output while maintaining the same level of wages and employment or switching away from intermediates towards a more labor-intensive but less productive mix of inputs. Conversely, the labor share may fall as a result of high substitutability between labor and capital and a relatively low cost of capital. In each case where the labor share falls, the labor share of value-added will fall more quickly than the labor share of output.

The above intuition is captured more formally by the following proposition.

Proposition 2. Firms operating in sector s and location j with $_{sj} > 0$, $\frac{d\ _{sj}\ \ _{sj}}{dP^{m}_{sj}} > 0$ if $_{s} >> 0$ or $_{sj}$ is small. Firms operating in sector s and location j with $_{sj} < 0$, $\frac{d\ _{sj}\ \ _{sj}}{dP^{m}_{sj}} > 0$ if $_{s} < 0$ or $\frac{dVA_{sj}}{dP^{m}_{sj}} < \frac{dQ_{sj}}{dP^{m}_{sj}}$

I rst follow Demirer (2022) in incorporating labor augmenting productivity into the original production structure by modifying equation 3.

$$V A^{x}_{sj} = \Big[{}^{1=}_{sj} {}^{s} f \; {}^{x}_{sj} L_{sj} g^{\frac{s \;\; 1}{s}} + (1 \qquad {}_{sj})^{1=} {}^{s} K_{sj}^{\frac{s \;\; 1}{s}} \Big]^{\frac{s}{s \;\; 1}} \tag{13}$$

Now, equation 1 can be rewritten as a rm-speci c production function.

$$Q^{x}_{sj} = A_{sj} \Big[{}^{1=}_{sj} {}^{s} V A^{x \frac{s \;\; 1}{s}}_{sj} + (1 \qquad {}_{sj})^{1=} {}^{s} M_{sj}^{\frac{s \;\; 1}{s}} \Big]^{\frac{s}{s \;\; 1}} \tag{14}$$

To introduce rm-speci c heterogeneity into the model I follow the nite- rm case outlined by Eaton, Kortum, and Sotelo (2012). Firm-speci c productivity is a Poisson random variable drawn from the distribution governed by the parameter ${}^{x}_{sj}(\;) = T_{sj}$. Further, rms now produce under the following heterogeneous unit cost function

$$c^{x}_{sj} = \frac{w_j L_{sj}}{{}^{x}_{sj}} + r_j K_{sj} + \Big(\sum_{i} {}^{1}_{isj} \; p^{1}_{isj} \Big)^{\frac{1}{1}} M_{sj} \tag{15}$$

It is convenient to rank and denote rms from least to highest cost, $c^{(1)}_{sj} < c^{(2)}_{sj} < c^{(3)}_{sj} :::$. Under these assumptions the total number of nal goods rms producing in sectors and state j with unit cost $c^{x}_{sj} < c$ is also a realization of a Poisson random variable with parameter ${}^{c^{x}_{sj}}_{sj}(c) = {}_{sj} c$ where

$${}_{sj} = \sum_{n} {}_{sjn} \; {}_{sjn} = T_{sj} c^{x}_{sj} \tag{16}$$

With all potential rms entering and producing in sector s and state j ordered by increasing unit-cost I can now determine the number of rms that actually enter the market.

A two-step process determines rm entry and pro ts. In the second stage, all rms that have chosen to enter the market partake in Cournot competition as follows. First, each rm is faced with the following pro t maximization problem

$$\operatorname{argmax}\ {}^{x}_{sj} = P$$

the following condition holds

$$f^{(x)}_{sj} > f^{(x+1)}_{sj} \tag{22}$$

In stage 1 of the firm's problem, firm's sequentially choose whether or not to enter the market under the zero-profit condition $^{f(X+1)}_{sj} < 0$, where firm X is the last firm that profitably enters the market.

Conditional on entry into the market and the solution to the Cournot problem, firm's choose the mix of intermediates, labor, and the fixed factor of production. As in the baseline model, taking first order conditions and solving equation 17 yields a new expression for the labor share accounting for firm-specific labor augmenting productivity

$$^{1=\ s}_{sj}\ ^{1=\ s}_{sj} = (1 \quad _{sj})^{1=\ s} M^{1=}_{sj} \quad ^{1=} \ ^{1=}_{sj}\ m^{1=}_{isj}\ p^{1}_{isj} V A^{1=}_{sj} \quad ^{1=} \ ^{x\frac{1}{}}_{sj} L^{1=}_{sj}\ w_{sj} \tag{23}$$

For the requisite derivations see the appendix.

Now, there are offsetting effects. On the one hand, firms with relatively more productive workers are incentivized to substitute away from intermediates towards labor. On the other hand, fewer workers can be used to produce the same output as a less productive firm. This is captured through the following intuition; a larger $^{n}_{sj}$ increases $_{sj}\ _{sj}$ while simultaneously lowering L_{sj} and w_{sj}, which has a second order effect of lowering $_{sj}\ _{sj}$.

Further, the dynamics of firm entry under heterogeneous productivity can yield heterogeneous market toughness across sectors and locations. Highly productive firms capture a larger share of market demand, leaving smaller demand and smaller profits for less productive firms. The sectors in which a small share of highly productive firms crowd out

faced with $dP_{sj} < 0$, then $\frac{d \quad_{sj} \quad_{sj}}{dP^{m}_{sj}} < \frac{d \quad_{s0j} \quad_{s0j}}{dP^{m}_{sj}}$ if $\quad X_{sj} < \quad X^{0}_{s0j}$. When faced with $dP_{sj} > 0$, then $\frac{d \quad_{sj} \quad_{sj}}{dP^{m}_{sj}} < \frac{d \quad_{s0j} \quad_{s0j}}{dP^{m}_{sj}}$ if $\quad X_{sj} < \quad X^{0}_{s0j}$ and $\frac{dQ_{sj}}{dP^{m}_{sj}} < 0$.

To summarize, now allowing for heterogenous productivity across rms and rm entry I have derived several theoretical predictions. The preceding propositions allow for heterogeneous labor market outcomes resulting from changes in intermediate goods prices on the basis of concentration in the nal goods sector.

3 Data Sources

In this section I provide an outline of the data sources and sample construction.

I construct a dataset consisting of state-sector observations across the United States spanning from 2008 to 2019. I utilize the Survey of Manufactures conducted by the US Census to collect data on the value of shipments and receipts for services, number of employees, total annual payroll, total capital expenditure, and total cost of materials. This data is further supplemented in 2012 and 2017 by the Economic Census. I combine this with state-level data on employment which comes from the annual County Business Patterns. Further, I use sector-level import data for NAICS 3- and 4-digit sectors which is obtained from the USA Trade database.

National level data on the use of commodities by industry are gathered from the Bureau of Economic Analysis Input-Output Accounts. Speci cally, I utilize the 2012 Commodity Industry Input-Output Table, the 2012 Use of Commodities by Industry table, and the Use of Imported Commodities by Industry table. I collect national-level tari data on HS-8 products on an annual basis from the USITC. Additionally, I gather industry-level pricing data from the Bureau of Labor Statistics. Lastly, I obtain industry concentration data for 3- and 4-digit sectors from the 2017 Economic Census.

	Mean	Standard Deviation
Labor Share	20.57	24.45
Output (billion $)	6.35	13.91
Intermediates (billion $)	3.78	10.14
Wage bill (billion $)	0.798	1.86
$tariff_{sjt}$	0.091	0.225

Table 1: Summary statistics for the main sample.

I obtain state-level employment and occupation data from the BLS Occupational Wage and Employment Statistics. This data is used to measure wages by occupations which are de ned as routine (low-skilled) and non-routine (high-skilled) following Autor and Dorn (2013) and Dvorkin and Shell (2017). Further, I gather data on state-level unionization rates in private manufacturing from the Union Membership and Coverage Database. Finally, I obtain data on NAICS sector-state speci c imports spanning the entire sample from the USA Trade database.

I construct an unbalanced panel of state-sector observations across the time period from 2008 to 2019 at the NAICS 3-digit level. I supplement this with an additional sample of

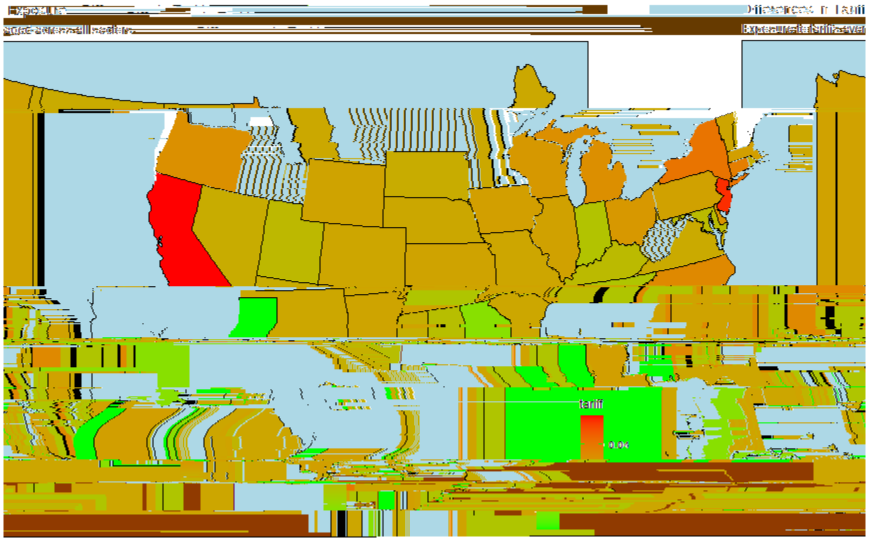

Figure 1: Mean di erence in tari exposure across states between 2008 and 2019.

4 Empirical Framework

I use variation in tari rates across intermediate inputs, states, and time to identify changes in prices of intermediates. The measure of tari exposure that I derive below follows from Lake and Liu (2022), though instead of commuting zones I measure tari exposure at the state level. Further, Dix-Carniero and Kovak (2017) also leverage regional employment data in Brazil to capture trade liberalization, though they do not account for input-output linkages. Lastly, Flaaen and Pierce (2019) construct a measure of increases in input tari s for naics 6 digit industries using BEA input-output accounts without allowing for regional variation. Ideally, the precise mix of intermediate inputs purchased by rms in each sector, state, and year could be observed in the data. However, I only observe total spending on intermediate inputs at this level of observation. To identify changes in the price of intermediates I make several assumptions and construct a measure of tari exposure for each nal goods sectors in state j in year t. For notational convenience I supress the time subscript below.

I first assume that intermediate goods industries across locations have access to the same technology and that relative productivity growth in these industries is constant across locations. Under this assumption, input industry i produces a share of all intermediate goods produced in state j equivalent to input industry i's share of employment in state j.

$$\frac{M_{ij}}{\sum_i M_{ij}} = \frac{L_{ij}}{\sum_i L_{ij}} \tag{24}$$

Define M_j as the total intermediates produced in j $(M_j = \sum_i M_{ij})$. Under a balanced trade assumption for all regions j then the following must hold

$$M_j = \sum_s M_{sj} \tag{25}$$

By rearranging equation 24 it is possible to solve for M_{ij}. This will be used to compute relative price changes faced by final sector-states. To compute these changes, first start with the cost for final goods sector s to produce a unit of output, given by (equation 6). The change in price of intermediates, P^m_{sj} that results from a change in trade costs is dependent on the degree to which firms in sector s and state j rely on foreign intermediate inputs. I then make several assumptions; first, final goods producers in j will source intermediates from suppliers based in j before purchasing intermediates from abroad. Second, is sufficiently large such that final goods producer in sector s do not respond to a change in the price of an intermediate input by substituting to an alternative intermediate. This is a strong assumption that can be revisited. Third, labor markets are perfectly competitive within states; labor is immobile across j and perfectly mobile across s and i. Lastly, I assume that in the short-run the fixed factor of production K is unchanged after a change in the price of intermediates.

the difference between the amount of i required by s in j and the amount of i produced in j to measure exposure to price swings as a result of tariffs. This requires the strong assumption that there is no relative change in wages paid to workers or in productivity across locations. This implies that changes in trade costs are driving any change in P^m_{sj} faced by the final goods sector. Further, I assume that changes in trade costs are primarily driven by tariffs; over the time period from 2008 to 2019 there are no significant improvements in technology that drastically reduce trade costs.

Following these assumptions, I can calculate the requirements for foreign inputs of sector s in j.

$$M^F_{ij} = \begin{cases} M_{ij} \quad M^H_{ij}; M^H_{ij} \\ \end{cases}$$

Exploiting variation over time in tariffs faced by the final goods sector to estimate the effect of a change in the price of intermediate inputs on labor market outcomes requires several assumptions. First, conditional on covariates and included fixed effects, there is no correlation between the error term and labor market outcomes. An additional assumption is that when there is a change in the tariff rate faced by the final goods sector this is actually the tariff rate that is paid. For example, if firms in the final goods sector change to another variety of inputs or source them from another country to avoid paying the tariff, this assumption could be violated. However, in this scenario the final goods sector is generally attempting to pay a lower price for intermediate inputs, so in the case of an increase in tariffs this measurement error would bias results towards zero. In the case that tariff rates are lowered, there is no reason to expect that firms would attempt to avoid paying a lower tariff rate. Lastly, I make a strong assumption that while firms may face tariffs in input markets they are simultaneously not responding to tariffs in output markets. For example, a final goods producer of cars which faces an increase in steel tariffs simultaneously with an increase in tariffs on cars is not changing its mix of inputs based on an increase in competitiveness in the output market.

I then run a panel data fixed effects model to estimate the effect of a change in tariffs faced by sectors in the intermediate goods market on output, employment, wages, and the share of output which flows to labor. I measure the labor share in two ways; as the share of employee compensation in the form of wages and salaries in proportion to the total value of shipments and receipts as well as in proportion to value-added. I study naics changes in actual tariffs applied to HS-8 products that are used as inputs to production or changes in M_{ij}^{H}, the amount of inputs that are supplied locally. I run the following estimating equation

$$\log(Y_{j;s;t}) = {}_0 + \log(tariff_{j;s;t}) + X_{j;s;t} + {}_j + {}_s + {}_t + {}_{r;s;t} \qquad (30)$$

$_j$ is a state fixed effect, $_s$ is a final sector fixed effect, and $_t$ is a year fixed effect. In all of my results I cluster standard errors at the state level. When the labor share is the outcome variable it is scaled by 100 before taking a logarithm. Most covariates, with the exception of my control for output tariffs, are observed at the state level. I control for GDP, population, unemployment rates, and union membership rates in the private manufacturing sector. Further, I disentangle input tariffs from tariffs in output markets by controlling for state-industry specific output tariffs. To construct this variable I interact $(1 + {}_i)$ with the sector's share of manufacturing imports flowing into each state.

Lastly, to empirically test proposition 3 I first split my sample by final goods sector into highly concentrated and non-highly concentrated sectors. At the naics 3 digit level, I choose an HHI of 110 as the cutoff; sectors which have a larger HHI are considered highly concentrated. By choosing this cutoff I ensure that roughly half of my sample is classified as highly concentrated (10 naics 3 sectors) and non-highly concentrated (11 naics 3 sectors). I rely on the 2007 Economic Census to obtain the market concentration data for each sector. I then run 30 separately for each subsample to test for heterogeneous labor market outcomes resulting from higher costs in intermediate input markets. I supplement this by running a test for equality of coefficients to verify heterogeneous effects on the basis of final goods sector concentration. Specifically, I run two regressions using seemingly unrelated estimations to flexibly allow for correlation in the error terms between each subsample. Using the estimation results a Wald test for the equality of coe cients $_{highHHI}$ = $_{lowHHI}$

Table 2: Baseline Speci cation

	(1)	(2)	(3)	(4)	(5)	(6)
	Total Wages	Employment	Output	$_{sj}$ $_{sj}$	$_{sj}$	(1 $_{sj}$) $_{sj}$
tariff $_{sjt}$	0.348	0.306	0.451	-0.062	-0.023	0.413
	(0.059)	(0.060)	(0.057)	(0.026)	(0.029)	(0.054)
GDP	0.170	0.089	0.957	-0.264	-0.267	0.406
	(0.230)	(0.218)	(0.338)	(0.191)	(0.195)	(0.351)
Unemployment	-0.087	-0.087	0.026	-0.042	-0.070	-0.026
	(0.047)	(0.046)	(0.083)	(0.051)	(0.051)	(0.085)
Population	0.362	0.314	-0.798	0.300	0.413	-0.318
	(0.361)	(0.353)	(0.519)	(0.288)	(0.329)	(0.696)
Unionization	-0.015	-0.011	-0.010	0.007	0.009	0.012
	(0.009)	(0.008)	(0.015)	(0.009)	(0.015)	(0.024)
Output Tari	1.813	1.603	1.635	-0.297	-0.166	1.475
	(0.472)	(0.445)	(0.541)	(0.331)	(0.270)	(0.387)
N	11135	11135	10115	10054	9770	8667
R^2	0.8419	0.8480	0.8031	0.6071	0.4635	0.7431

Standard errors in parentheses are clustered at state level

$p < :1$, $p < :05$, $p < :001$

Notes This table presents results for the baseline speci cation and the full sample. Columns 1 through 3 provide a decomposition of the labor share. Columns 1 and 2 enter the numerator; total wages is the average per worker wages, salaries, and other payments to workers across all rms operating in a sector, state, and year. Employment is the number of workers employed by rms operating in a state, sector, and year. Output is the reported value of sales for each sector, state, and year. Column 4 reports results for the labor share as a proportion of total sales, while column 5 reports results for the labor share as a proportion of total sales less the cost of intermediate inputs. Column 6 reports results with for the outcome as the capital share of nal sales.

Table 3: Baseline Speci cation De ated by Price Indices

	(1) Total Wages	(2) Output	(3) sj sj	(4) sj	(5) (1 sj) sj
tariff $_{sjt}$	0.348	0.457	-0.067	-0.0278	0.450
	(0.059)	(0.057)	(0.026)	(0.029)	(0.065)
GDP	0.170	0.973	-0.280	-0.273	0.130
	(0.230)	(0.337)	(0.188)	(0.196)	(0.265)
Unemployment	-0.087	0.024	-0.041	-0.071	0.022
	(0.047)	(0.083)	(0.051)	(0.050)	(0.095)
Population	0.362	-0.832	0.334	0.450	0.008
	(0.361)	(0.514)	(0.288)	(0.328)	(0.652)
Unionization	-0.015	-0.011	0.008	0.009	-0.027
	(0.009)	(0.015)	(0.009)	(0.014)	(0.031)
Output Tari	1.813	1.594	-0.25849ed1)		

An alternative explanation is that highly concentrated industries are driving the results. Autor et al. (2020) conclude that superstar rms, operating in highly concentrated in-

Table 4: High Concentration Subsample

	(1) Total Wages	(2) Employment	(3) Output	(4) $_{sj}$ $_{sj}$	(5) $_{sj}$	(6) (1 $_{sj}$) $_{sj}$
$tariff_{sjt}$	0.284	0.252	0.395	-0.050	-0.024	0.376
	(0.092)	(0.088)	(0.094)	(0.054)	(0.063)	(0.084)
GDP	0.443	0.321	1.805	-0.752	-0.904	0.780
	(0.374)	(0.373)	(0.537)	(0.232)	(0.277)	(0.576)
Unemployment	-0.063	-0.066	0.049	-0.045	-0.096	-0.033
	(0.089)	(0.085)	(0.114)	(0.074)	(0.099)	(0.140)
Population	-0.209	-0.288	-2.116	0.793	0.790	-1.273
	(0.756)	(0.719)	(0.898)	(0.488)	(0.630)	(1.284)
Unionization	-0.017	-0.017	0.0002	0.009	0.004	0.002
	(0.019)	(0.017)	(0.036)	(0.0.019)18003oWti	Td [((0.019))j8-1096(E-22.6	

Table 5: Low Concentration Subsample

	(1) Total Wages	(2) Employment	(3) Output	(4) $_{sj}$ $_{sj}$	(5) $_{sj}$	(6) $(1 \; _{sj}) \; _{sj}$
tariff_{sjt}	0.388	0.338	0.486	-0.096	-0.043	0.426
	(0.052)	(0.052)	(0.058)	(0.027)	(0.025)	(0.063)
GDP	0.073	-0.042	0.427	0.022	0.131	0.240
	(0.330)	(0.280)	(0.261)	(0.208)	(0.166)	(0.351)
Unemployment	-0.114	-0.112	-0.027	-0.010	-0.040	-0.062
	(0.045)	(0.041)	(0.086)	(0.065)	(0.051)	(0.099)

Table 7: Baseline Speci cation With Skill-Biased Labor Share

	(1) Labor Share (Low)	(2) Labor Share (High)
$tariff_{sjt}$	-0.332	0.0595
	(0.0400)	(0.0393)
N	10067	10067
R^2	0.7370	0.5856

Standard errors in parentheses are clustered at state level
$p < :1$, $p < :05$, $p < :001$

Notes This table presents results from running the baseline speci cation, further subdividing the labor share into the share owing to high-skill and low-skill occupations. High- and low-skill is de ned as non-routine and routine occupations according to Dvorkin and Shell (2017). The labor share is de ned as the sector-state-speci c high- and low-skill average wage multiplied by high- and low-skill employment, respectively. In the denominator I use sector-state-speci c total sales. The speci cation is run with all controls; however, I suppress the results for the control variables.

use state level wage-occupation data to impute employment levels by state, sector, and skill level. The results from this speci cation are found in table 7.

These results indicate that the wages and employment of low-skilled occupations in manufacturing sectors are much more negatively impacted by higher tari s in input markets. When these sectors face increased costs in intermediate input markets, they appear to be expanding output not by raising wages and employment in low-skill occupations but instead relying on high-skill, and perhaps more productive workers.

As a robustness check, I run two speci cations; the baseline and a speci cation with time and state-sector xed e ects on 4 digit rather than 3 digit NAICS sectors. When running the baseline speci cation on 4 digit sectors the coe cients do decrease in magnitude; however, the main conclusion remains unchanged. With the interacted xed e ects, the signi cance on the coe cient for the labor share of output disappears. The results for this robustness check can be found in the appendix.

6 Conclusion

In this paper I have explored the e ects of a policy response to increased globalization on

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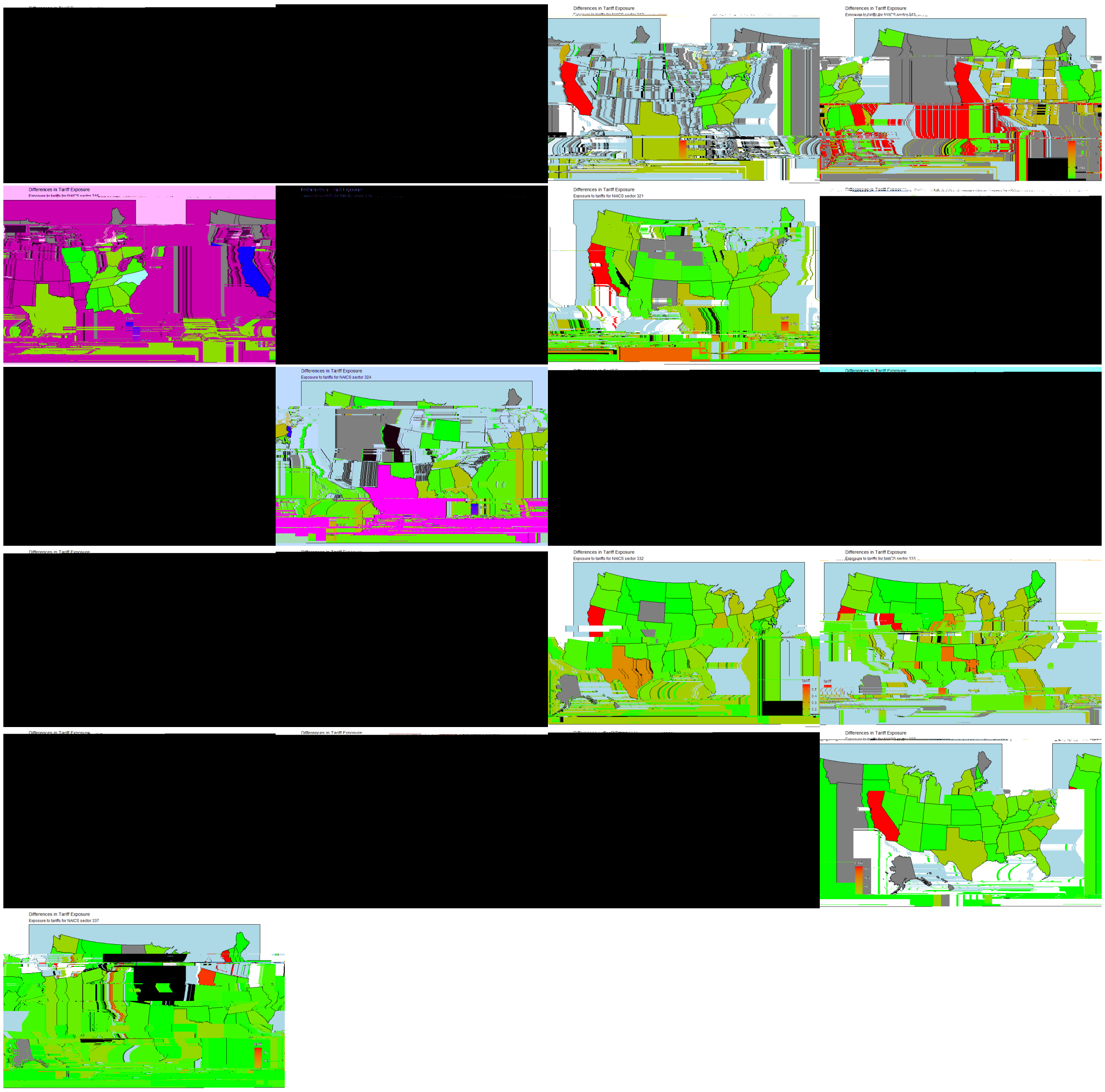

Figure B.2: Di erences in tari exposure for each naics 3 digit sector. Ordered left-to-right then top-down.

	(1) Labor Share	(2) Labor Share	(3) Labor Share	(4) Labor Share
$tariff_{sjt}$	-0.00381	-0.0409	-0.00481	-0.0409
	(0.0124)	(0.0129)	(0.0127)	(0.0129)
GDP			-0.180	-0.310
			(0.0813)	(0.123)
Unemployment			-0.0159	-0.0199
			(0.0256)	(0.0408)
Population			0.375	0.710
			(0.185)	(0.230)
Income			-0.0237	-0.0805
			(0.0398)	(0.0611)
Year, State-Sector FE	X		X	
Year, Sector, State FE		X		X
N	25797	25797	25797	25797

Standard errors in parentheses are clustered at state level

p < :1, p < :05, p < :001

Table 8: Result for the labor share of output as the outcome variable for 4-digit NAICS nal goods sectors.

In the tables below I replicate the baseline regressions for NAICS 4 digit sectors.