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Rising import competition from low-income countries has been an important cause of the decline in manufacturing employment in many countries. Since tariffs on international trade have been progressively liberalized over the last decades, developed countries have increasingly relied non Non-Tariff Measures (NTMs) to protect their industries from for- eign competition. In this paper, we exploit a novel database on NTMs to test whether the employment effect of exposure to Chinese import competition has been less pronounced in US local areas more intensively protected by NTM. In particular, we relate changes in local employment across US labor markets to the share of local working population protected by NTMs, conditional on changes in local exposure to Chinese import com- petition, where local areas differ in their exposure to import competition because of the variation in importance of different manufacturing industries in local employment com- position. Our results indicate that NTMs protection managed to mitigate the negative employment effect of import exposure, but has no effect on local wages, which is consistent with mobility of workers across local areas until wages are equalized. These results are potentially important for policy makers in many countries.

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Do Non-Tariff barriers to trade save jobs and wages?

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April 6, 2016

Abstract

Rising import competition from low-income countries has been an important cause of the decline in manufacturing employment in many countries. Since tariffs on international trade have been progressively liberalized over the last decades, developed countries have increasingly relied non Non-Tariff Measures (NTMs) to protect their industries from foreign competition. In this paper, we exploit a novel database on NTMs to test whether the employment effect of exposure to Chinese import competition has been less pronounced in US local areas more intensively protected by NTM. In particular, we relate changes in local employment across US labor markets to the share of local working population protected by NTMs, conditional on changes in local exposure to Chinese import competition, where local areas differ in their exposure to import competition because of the variation in importance of different manufacturing industries in local employment composition. Our results indicate that NTMs protection managed to mitigate the negative employment effect of import exposure, but has no effect on local wages, which is consistent with mobility of workers across local areas until wages are equalized. These results are potentially important for policy makers in many countries.

Keywords: Non tariff barriers, Chinese Imports.
JEL Classification: E24, J23, J31.

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1 Introduction

NTMs can be broadly defined as policy measures, other than ordinary customs tariffs, that can potentially have an economic effect on international trade in goods, changing quantities traded, or prices or both. While tariffs on international trade have been progressively liberalized over the last decades, countries have increasingly relied non Non-Tariff Measures (NTMs) to restrict their market access (UNCTAD, 2013). Gourdon (2014) reports that the use of NTMs to regulate trade has been rising since the 1990s both in terms of countries adopting these measures as well as in their variety. As of today, reducing non-tariff barriers is a key part of transatlantic liberalization (Francois et al. 2013).

Given the central role that NTMs have taken in the international trade agenda, a number of papers have attempted to quantify the effect of non-tariff measures on international trade (see for example, Kee et al., 2009; Fontagné et al., 2015). Typically these papers use firm-level data to look at the effect of NTMs on firm exports. However, to the best of our knowledge, there are no studies that investigate the impact of NTM on the labour market. This is what we do in this paper in the context of US manufacturing sector.

Autor, Dorn and Hanson (2013) show that rising Chinese import competition between 1990 and 2007 significantly contributed to the aggregate decline in US manufacturing employment. In this paper, we test whether this effect has been less pronounced in local areas more intensively protected by Non-Tariff barriers. In particular, we exploit a novel database on NTM at 6-digit product level to construct indices of non-tariff protection of US manufacturing industries over time.

To translate protection of a single product into a measure of protection of an industry and eventually of a metropolitan area (we use PUMAs), we proceed as follows. First, we define that a product is protected if it is subject to a Specific Trade Concern. "Specific Trade Concerns" refer to the concerns raised by WTO members in specific committees in order to complain about non-tariff measures taken by other members.[1] Secondly, we create a measure of industry protection, based on the number of products protected in each industry, weighted by the importance of each product in total industry's trade. Thirdly, we define a metropolitan area as protected if many workers as a share of the total number of workers in that area work

[1]Specific Trade Concerns (rather than simple notifications) identify measures that are perceived by exporters and/or governments as major obstacles to trade.

in protected industries. We finally match the sectoral data on non-tariff protection to three waves of the US census (2000, 2005 and 2010) and study how non-tariff barriers affect local employment and wages.

In this paper we relate changes in local employment across US labor markets to the share of local working population protected by NTMs, conditional on changes in local exposure to Chinese import competition. PUMAs differ in their exposure to import competition because of the variation in importance of different manufacturing industries in local employment composition. Since the rise of NTMs could be already reflected into the quantities imported from China and therefore into the measure of exposure to Chinese import competition,we measure local potential exposure to Chinese competition looking only at the supply-driven component of Chinese imports (and thus use Chinese imports into European Union rather than to US).[2]

Since the rise of NTMs may be endogenous to local import exposure, we instrument for the NTMs in the US using NTMs in the EU. The identification assumption is that NTMs in the EU should not affect directly local employment changes in the US and therefore they should not be due to common unobserved shocks.

The first results indicate that (few) PUMAs with a large share of workers working in protected industries managed to offset the negative employment effect of import exposure. To quantify the results we can say that according to our results 1,000 dollar per worker increase in import exposure reduces manufacturing employment per population by 1% in a non-protected PUMA. This effect is mitigated by the presence of NTMs: in the few very protected PUMA this effect is zero.

The rest of the paper proceeds as follows. Section 2 describes the NTM data and Section 3 describes the construction of the measure of protection at the PUMA level and the match with the Census data. Section 4 presents the model and Section 5 provides the results. Section 6 concludes.

[2]This approach requires that import demand shocks in high-income countries are not the primary cause of China's export growth. It seems plausible that during the 1990s and early 2000s China's export growth was largely the result of internal supply shocks and falling global trade barriers.

2 The Specific Trade Concerns (STC) database on NTMs

Non-tariff measures include a very diverse array of policies that countries apply to imported and exported goods and that typically have restrictive and distortionary effects on international trade. Broadly defined, NTMs include all policy-related trade costs incurred from production to final consumer, with the exclusion of tariffs (Nicita and Gourdon, 2013). For practical purposes, NTMs are categorized depending on their scope and/or design and are broadly distinguished in technical measures (Sanitary and Phytosanitary Standards; and Technical Barriers to Trade) and non-technical measures (UNCTAD, 2013).[3]

The main problem behind the study of NTMs has been the scarcity of reliable databases on these measures, due to the evident difficulty in collecting and assembling these types of data. In fact, unlike tariffs, NTM data are not merely numbers and are not subject to comprehensive reporting requirements and the relevant information is often hidden in legal and regulatory documents, that are typically not centralized, but often reside in different regulatory agencies. All these issues make the collection of NTM data a very resource-intensive task (Gourdon, 2014; UNCTAD, 2013). The first attempt to collect and categorize NTMs was conducted by UNCTAD in the late 1990s, and the data is available in the UNCTAD Trade Analysis and Information System database (TRAINS - accessible via WITS), but this database has not been consistently updated in the last 15 years. Furthermore, the TRAINS database only records whether a country has imposed an NTM, without indicating whether the measure constitutes a barrier to trade or not.

Another source of information on NTMs is the WTO database on notifications, but a serious limitation of this dataset is the low compliance rate and the fact that not all countries have the same propensity to notify their measures to the WTO.[4]

In this paper, we rely on the recently released WTO database on Specific Trade Concerns, which records the concerns that have been raised by the WTO members in the dedicated committees of the WTO. In particular, we focus on concerns regarding Sanitary and Phytosanitary Standards (SPS) and Technical Barriers to Trade (TBT) measures. Sanitary and phytosanitary measures include regulations protecting human, animal and/or plant life and can include

[3]These are further distinguished in hard measures (e.g. price and quantity control measures), threat measures (e.g. anti-dumping and safeguards) and other measures such as trade-related finance and investment measures.

[4]The dataset is available at http://www.wto.org/english/res$_e$/$publications_e/wtr12_d dataset_e.htminaquantitativeformatan$
$//spsims.wto.org/web/pages/search/stc/Search.aspx.$

prohibition, quality and hygienic requirements, production and conformity assessments. TBT refer to technical regulations and standards that set out specific characteristics of a product such as its size, shape, design, functions and performance, or stipulate the way a product is labeled or packaged before it enters the marketplace.[5]

As reported in Nicita and Gourdon (2013) SPS and TBT are the most commonly used regulatory measures and are widely addressed as ones of the main obstacles to free trade.[6]

As pointed out by Fontagnè et al. (2015), the advantage of specific trade concerns over notifications or traditional information on the existence of regulations that measure the restrictiveness of product standards is that they identify measures that are perceived by exporters and/or governments as major obstacles to trade (i.e. they are important enough that countries whose exports are affected raise a "concern" to the WTO committees). As such, the information they provide relates to restrictive trade measures only.

"Specific Trade Concerns" refer to the concerns raised by WTO members in the TBT and the SPS committees in order to complain and discuss specific measures taken by other members. Committee meetings, or informal discussions between members held on the margins of such meetings, afford members the opportunity to review trade concerns in a bilateral or multilateral setting and to seek further clarification. When a country raises a concern at the SPS or TBT Committees over a measure, it specifies the product of concern , the type of concern regarding the measure and the objective of the measure concerned (see WTO, 2012 for more details).[7] The WTO Secretariat coded all the relevant information on specific trade concerns and created two databases: one on TBT measures and one on SPS measures.[8]

The TBT Specific Trade Concerns (STC) Database provides information on the 317 Specific Trade Concerns raised in the TBT Committee and the 312 concerns raised in the SPS Committee between January 1995 and June 2014.

[5] For more details on SPS and TBT measures see UNCTAD (2013).

[6] Using a database that includes the European Union, Japan and 29 developing countries, they find out that TBT affect about 30% of products, while the incidence of SPS is around 15%. They argue that SPS and TBT measures impose quality and safety standards, which often exceed multilaterally accepted norms and may erode the competitive advantage that developing countries have in terms of labour costs and preferential access (Nicita and Gourdon, 2013).

[7] This database identifies the product on which a concern is raised and not the product on which the measure is imposed. Therefore, it excludes products that are included in the notifications, but that are not object of a concern as evinced from the Committee minutes.

[8] Data are made accessible through the Integrated Trade Intelligence Portal (I-TIP), a new application that have been developed by the WTO Secretariat, that allow users to access via one portal all trade policy information notified to the WTO by its members (see http://www.wto.org/english/res$_e$/$statis_e$/$itip_e.htm$).

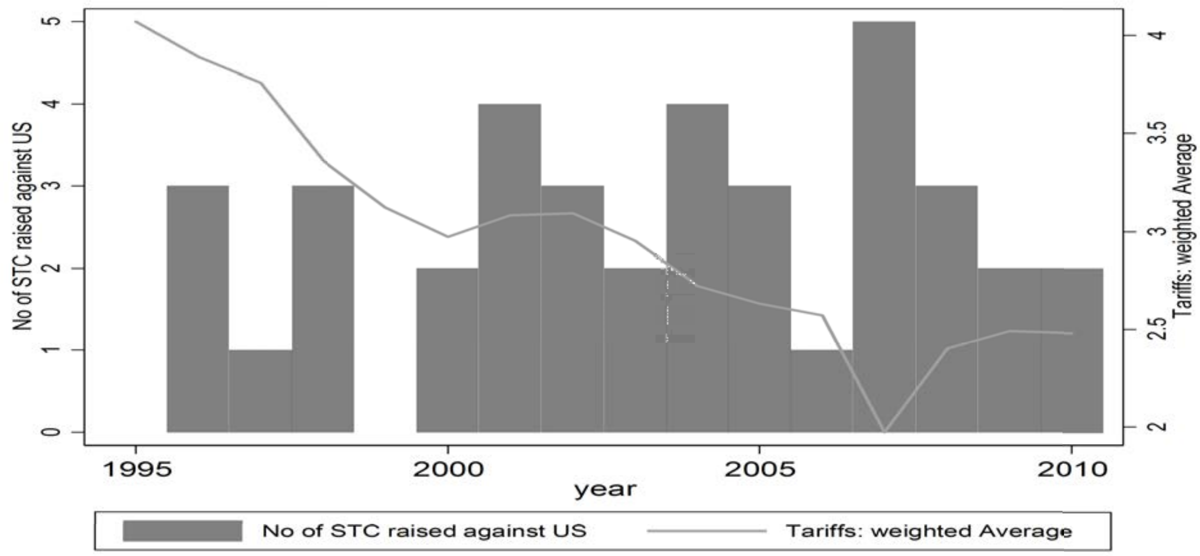

FIGURE 1. Tariff: Weighted mean applied tariff is the average of effectively applied rates on all products weighted by the product import shares corresponding to each partner country. Import weights were calculated using the United Nations Statistics Division's Commodity Trade (Comtrade) database (source World bank).

Each STC corresponds to a concern raised by one or more countries in relation to a SPS measure maintained by one or more of their trading partners. For each concern, we have information on: (i) the country or countries raising the concern and the country imposing the measure, (ii) the product codes (HS 6-digit) involved in the concern, (iii) the year in which the concern was raised to the WTO, and (iv) whether it has been resolved and how.

Our analysis focuses on a sub-sample of the 41 concerns raised by the China or the rest of the world against the US over the period 1995-2010.

Figure 1 plots the 41 STCs over time against a measure of the incidence of tariffs in the US.

3 A measure of NTM protection at the local level

3.1 NTM protection at the industry level

With the 41 STCs we first have to build a measure of industry protection and then a measure of protection at the level of PUMA.

One STC may apply to more products (defined with HS codes) and one product may be the subject of more than one concern. 41 concerns affect 1433 products over a total number of 6292 products (6-digit HS codes) (29%). If there is a concern in year t then it means that product i is protected an we define a dummy $HSp_{it} = 1$.

HS products are allocated to industry j with crossover HS-NAICS2002; each industry has N_j HS products. The incidence of NTMs in each sector is measured looking at percentage of products that are subject to one or more NTMs (Frequency index). The frequency index accounts only for the presence or absence of an NTM and summarizes the percentage of products to which one or more NTMs are applied (see also UNCTAD, 2010).

Some products may be more important than others. Therefore we weight each product by the importance of its trade in overall industry trade at the beginning of the sample period.[9]

In formal terms our measure of protection of industry j in year t is given by:

$$NTM_{jt} = \sum_{i=1}^{N} HSp_{it} * \frac{(imp + exp)_{it}}{(imp + exp)_{jt}} \tag{1}$$

where $\frac{(imp+exp)_{it}}{(imp+exp)_{jt}}$ is the weight in terms of import plus export of product i in total trade of industry j.

Table 2 shows the total number of HS products allocated to each industry (first column) and the number of protected industries in each industry at three points in time (2000, 2005 and 2010) with the relative weighted share (weighted by the incidence of each product in the industry total trade). It is clear from the table that many industries are never protected by NTMs and some other industries vary their degree of protection over time according to the number of product that are subjects to STCs

3.2 NTM protection at the PUMA level

The measure of protection at the PUMA level reflects the share of the employed population in that PUMA that works in a protected industry. The intensity of protection of different industries is measured by NTM_{jt}

$$shareprot_{mt} = \sum_{j} \frac{L_{mjt}}{L_{mt}} \times NTM_{jt} \tag{2}$$

[9] Similarly UNCTAD measures the importance of NTMs to overall imports by the coverage ratio which measures the percentage of trade subject to NTMs for importing country j. One drawback of the coverage ratio, or any other weighted average, arises from the likely endogeneity of the weights (the fact that the level of imports may be dependent on the presence of NTMs). This problem is best corrected by using weights fixed at trade levels that would arise in a world free of NTMs (and tariffs). Otherwise, the coverage ratio would be systematically underestimated. While one cannot get to that benchmark, it is possible to soften the endogeneity problem (and test for the robustness of the results) by using trade values of past periods.

Table 1. Number and weighted share of HS product protected in each NAICS sector

NAICS		Goods that received at least one STC						
		Total N	2000		2005		2010	
		of goods	N	%	N	%	N	%
111	Crop Production	185	3	0.40	172	86.88	9	1.41
112	Animal Production	45	8	58.26	17	59.11	0	0
114	Fishing, Hunting and Trapping	1	0	0	0	0	0	0
115	Support Activities for Agriculture	33	0	0	3	7.28	6	58.77
211	Oil and Gas Extraction	4	0	0	0	0	0	0
212	Mining (except Oil and Gas)	93	0	0	0	0	0	0
221	Utilities	3	0	0	0	0	0	0
238	Specialty Trade Contractors	15	0	0	0	0	5	12.02
311	Food Manufacturing	420	29	10.35	403	95.61	13	1.75
312	Beverage and Tobacco Product	29	0	0	23	76.67	3	30.63
313	Textile Mills	403	0	0	0	0	0	0
314	Textile Product Mills	40	0	0	0	0	0	0
315	Apparel Manufacturing	300	119	46.43	0	0	235	91.57
316	Leather and Allied Product	56	0	0	0	0	0	0
321	Wood Product Manufacturing	45	0	0	0	0	1	0.37
322	Paper Manufacturing	123	0	0	0	0	0	0
323	Printing and Related Support	8	0	0	0	0	0	0
324	Petroleum and Coal Products	20	0	0	0	0	0	0
325	Chemical Manufacturing	766	0	0	1	0.13	266	32.78
326	Plastics and Rubber Products	47	0	0	0	0	0	0
327	Nonmetallic Mineral Product	129	0	0	0	0	0	0
331	Primary Metal Manufacturing	375	0	0	0	0	0	0
332	Fabricated Metal Product	267	0	0	1	0	0	0
333	Machinery Manufacturing	575	1	0.004	14	0.76	43	8.77
334	Computer and Electronic Product	98	0	0	0	0	5	7.40
335	Electrical Equipment and Appliance	151	0	0	0	0	10	2.90
336	Transportation Equipment	179	0	0	9	37.60	0	0
337	Furniture and Related Product	6	0	0	0	0	0	0
339	Miscellaneous Manufacturing	546	0	0	0	0	89	6.86

Notes: Manufacturing and agriculture only. The percentages are weighted: each product is weighted by its share of import+export in total industry import+export.

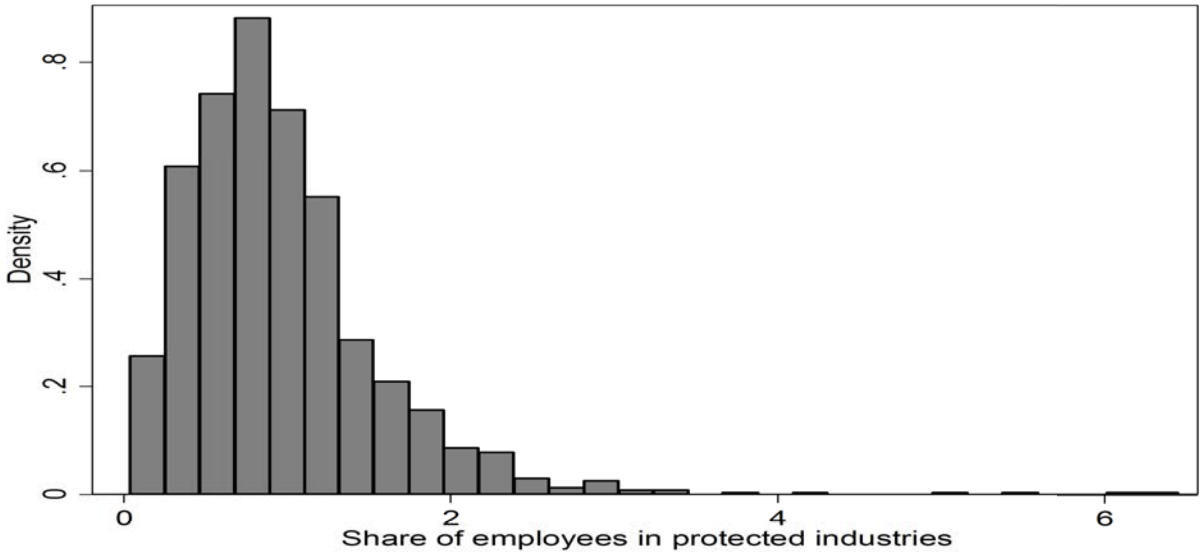

FIGURE 2. Share of protected employment across PUMAs

$\frac{L_{mjt}}{L_{mt}}$ is the share of worekrs of PUMA m that work in industry j. Therefore the industrial composition of a PUMA (together with the measure of industry protection) determines its share of protected workers. The histogram 2 below shows the distribution across PUMAs of the measure of protection which ranges from zero to more than 40% of workers working in protected industries.

The share of the employed population in that PUMA that works in a protected industry changes over time both because of the industrial composition of the PUMA and because of the changes in the measure of industry protection.

Figure 3 and 4 below show the measure of PUMA protection in 2000 and 2010 in the US. By way of example we show the maps of the State of California.

3.3 Census data

We use the 5 percent sample of the decennial census in 2000 and the 1 percent sample of the American Community Survey (ACS) in 2005 and 2010 Integrated Public Use Microsample Series (IPUMS) files. We keep only manufacturing and agriculture sectors (24 sectors at 3-digit level) and a balanced sample of 1078 PUMAs, which are present in all years. The units of observations are PUMA-year weighted averages (using IPUMs personal weights): the final dataset contains 3,234 observations (1078 PUMAs by three years). The regressions are in differences (2156 observations).

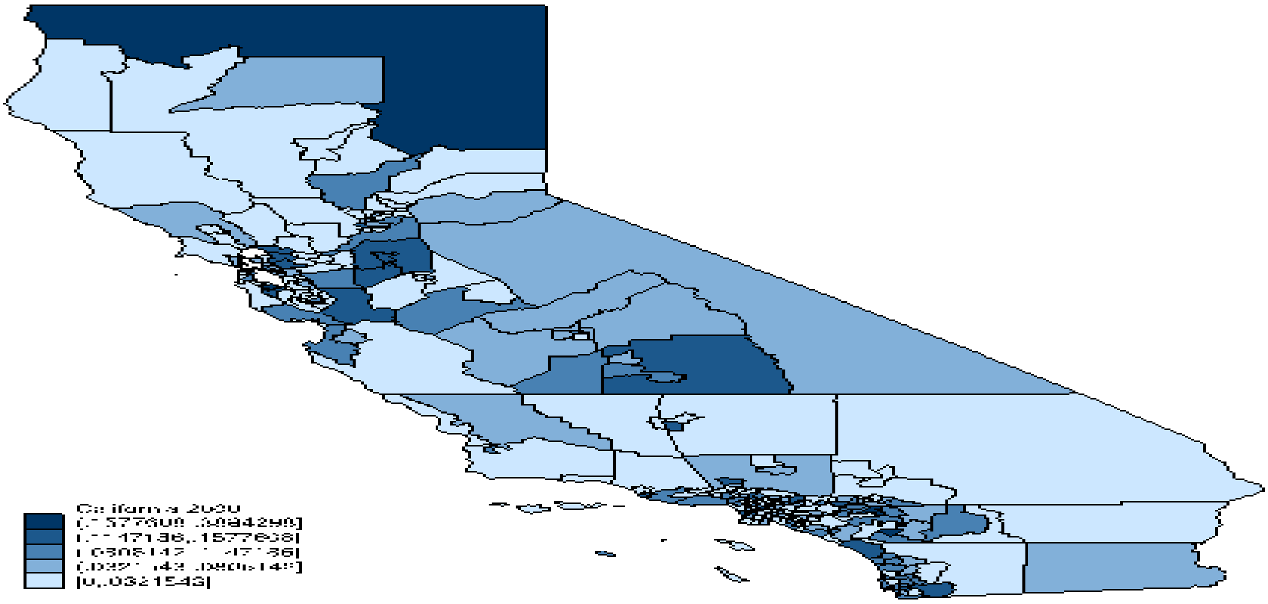

FIGURE 3. Share of protected employment, see the text for details: California 2010.

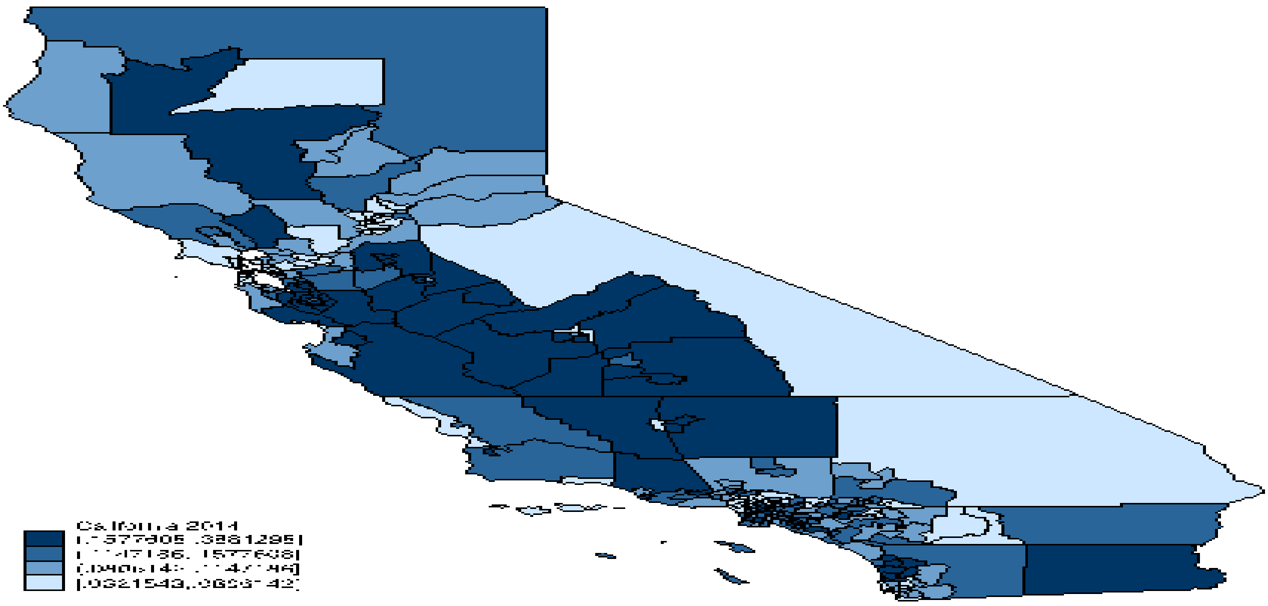

FIGURE 4. Share of protected employment, see the text for details: California 2014.

Table 2. Census descriptive statistics

	Highly protected PUMA			Lowly protected PUMA		
	2000	2005	2010	2000	2005	2010
Employment rate	0.68	0.67	0.64	0.67	0.68	0.65
	(0.07)	(0.06)	(0.06)	(0.08)	(0.06)	(0.06)
Share of manufacturing employment on total employment	0.24	0.21	0.18	0.12	0.10	0.09
	(0.08)	(0.07)	(0.06)	(0.05)	(0.04)	(0.04)
Share of manufacturing employment on working age population	0.16	0.14	0.12	0.08	0.07	0.06
	(0.05)	(0.04)	(0.04)	(0.03)	(0.02)	(0.02)
Average hourly wage	15.55	18.06	20.37	17.20	20.79	23.49
	(5.45)	(8.18)	(9.40)	(7.11)	(10.54)	(12.13)
Share of unskilled workers on total manuf. employment	0.65	0.61	0.58	0.56	0.51	0.50
	(0.13)	(0.13)	(0.13)	(0.15)	(0.15)	(0.15)
Unskilled/skilled wage gap	0.73	0.69	0.67	0.66	0.64	0.60
	(0.09)	(0.11)	(0.12)	(0.10)	(0.15)	(0.15)

Notes: High-protected indicates a PUMA with a share of protected workers higher than the median.

Table 2 describes some of the main outcome variables of the following analysis dividing the sample in high-protected PUMAs (i.e. with the measure of protection above the median) and low-protected PUMAs.

To the Census data we merge in at the PUMA-year level: (1) the measure of protection at the PUMA level defined above; (2) the data of imports from China (from Comtrade data) which will be defined below.

4 Estimation

We estimate the following equation:

$$\Delta Y_{mt} = \alpha_t + \beta_0 \Delta Impexp_{mt} + \beta_1 shareprot_{mt} + \beta_2 (\Delta Impexp_{mt} \times shareprot_{mt}) + \gamma X_{mt} + \varepsilon_{mt} \quad (3)$$

where ΔY_{mt} is the 5-year change in: (1) share of Puma's m workforce employed in manufacturing; (2) the share of Puma's m workers employed in manufacturing; (3) the share of

Table 3. Imports from China (in billions 2010 US$)

	United States	Europe
2000	1.304,70	821,8
2005	2.813,20	2.177,20
2010	3.597,20	3.708,70
2014	4.306,60	3.721,10
Growth 2000-2014	230%	352,80%

unskilled workers in manufacturing employment. The vector X_{mt} contains a set of controls for PUMA's labor force and demographic composition that might independently affect manufacturing employment (share of females, share of college educated, share of white, and average age). α_t a time dummy for the change between 2005 and 2010. Standard errors are clustered at the state level to account for spatial correlations across PUMAs. The main variables of interest are $shareprot_{mt}$ which is the measure of PUMA protection described above and $\Delta Impexp_{mt}$ which is the 5-year change in import exposure defined as in Autor, Dorn and Hanson (2013):

$$\Delta Impexp_{mt} = \sum_j \frac{L_{mj2000}}{L_{j2000}} \frac{\Delta Imp_{jt}^{EU}}{L_{mt}}. \tag{4}$$

Differently form Autor, Dorn and Hanson instead of the change in imports from China in the US we use the same variable in the EU. The reason is that imports from China in the US may already reflect the effct of NTMs which we want to measure, therefore we want a measure of potential exposure to imports rather than a measure of actual exposure (Autor, Dorn and Hanson use this measure as an instrument). The 5-year change in imports from China to the EU of industry j is weighted by the initial (year 2000) share of that industry in that PUMA. Table 3 shows that imports from China to the EU grew even more than to the US.

4.1 IVs

Since a possible concern is the endogeneity of NTM measures with respect to imports (i.e. that NTMs are raised to protect those industries where import exposure is higher), we substitute the NTMs in the US using NTMs in the EU. NTM_{jt}^{EU} is built as in equation 1 with the corresponding information on EU industries. Eventually we instrument $shareprot_{mt}$ with the share of protected workers in a PUMA calculated on the basis of the EU industry protection

Table 4. PUMA with highest share of protected workers and highest import exposure

PUMA with highest share of protected workers	
California156	Tulare County (Outside Visalia, Tulare and Porterville Cities)
California103	Merced County (West and South)–Los Banos and Livingston Cities
Texas957	South Plains Association of Governments (Outside Lubbock County)
California69	Kings County–Hanford City
North Carolina778	Sampson and Duplin Counties
Kansas369	Southwest Kansas–Dodge City, Garden City and Liberal City
Washington1034	Yakima County (Central)–Greater Yakima City
Arkansas42	Pope, Johnson, Yell, Conway and Perry Counties
California100	Madera County–Madera City
Nebraska570	Southwest Nebraska
PUMA with highest import exposure	
California140	San Jose-Sunnyvale-Santa Clara, CA
Tennessee940	Bradley, McMinn and Polk Counties–Cleveland City
California142	San Jose-Sunnyvale-Santa Clara, CA
Alabama3	DeKalb and Jackson Counties
California57	Alameda County (South Central)–Fremont City (East)
Tennessee942	Rhea, Marion, Sequatchie, Grundy, Bledsoe and Meigs Counties
Alabama13	Chilton, Tallapoosa, Chambers and Coosa Counties
North Carolina772	Catawba County–Hickory City
California138	San Jose-Sunnyvale-Santa Clara, CA
Massachusetts459	Middlesex County (Far Northeast)–Lowell City

measure: $shareprot^{EU}_{mt} = \sum_{jt} \frac{L_{mjt}}{L_{mt}} \times NTM^{EU}_{jt}$

The identification assumption is that NTMs in the EU should not affect directly local employment changes in the US therefore they should not be due to common unobserved shocks.

The following Table 4 shows the ten most protected PUMAs, which happen to belong to different States, and the ten most exposed PUMAs. These PUMAs appear to be different from the most protected ones, which is good news that NTM protection does not seem to follow import exposure but rather a general trend of NTM protection of some industries.

5 Results

Table 5 shows the results. Looking at IV results, 1000 dollar increase in potential exposure decrease the share of manufacturing over total employment by more than one percentage point, the share of manufacturing over the working population by one percentage point and the share

Table 5. Effects on manufacturing employment

	$\Delta\frac{manufempl}{totempl}$		$\Delta\frac{manufempl}{wpop}$		$\Delta\frac{unskilled}{totmanufempl}$	
	OLS	IV	OLS	IV	OLS	IV
$shareprot_{mt}$	0.071	-0.122	0.072**	-0.091*	0.056	-0.123
	(0.044)	(0.101)	(0.030)	(0.054)	(0.096)	(0.168)
$\Delta Impexp_{mt}$	-0.938***	-1.445***	-0.619***	-1.038***	-0.663*	-0.850**
	(0.208)	(0.298)	(0.125)	(0.172)	(0.361)	(0.338)
$\Delta Impexp \times shareprot$	-0.035	0.235***	-0.052**	0.171***	0.061	0.169
	(0.040)	(0.090)	(0.021)	(0.056)	(0.068)	(0.108)
female	-0.705	-1.392***	-0.089	-0.658*	-0.884	-1.136
	(0.423)	(0.456)	(0.313)	(0.359)	-1.688	-1.733
age	-0.037*	-0.019	-0.017	-0.003	0.115*	0.112*
	(0.021)	(0.027)	(0.014)	(0.019)	(0.067)	(0.063)
college	2.725***	3.368***	1.241***	1.767***	-9.780***	-9.804***
	(0.616)	(0.749)	(0.317)	(0.470)	-1.164	-1.430
white	-0.713	-1.051*	-0.996**	-1.272**	-0.052	-0.015
	(0.508)	(0.592)	(0.440)	(0.536)	-1.231	-1.433
year2010	0.896***	1.205***	0.364***	0.615***	3.769***	3.719***
	(0.161)	(0.207)	(0.104)	(0.141)	(0.334)	(0.343)
Constant	-0.160	-0.606	0.160	-0.195	-5.569*	-5.071*
	(0.845)	-1.099	(0.650)	(0.863)	-3.132	-2.935
First stage						
F test of excluded IV						
$shareprot_{mt}$		172.74***		172.74***		172.27***
$\Delta Impexp \times shareprot$		113.02***		113.02***		113.48***
Observations	2,156	2,156	2,156	2,156	2,146	2,146
R-squared	0.275	0.228	0.296	0.220	0.133	0.132

Notes: N= 1078 PUMAS by two periods. Standard errors clustered by state. Models are weighted by start of period PUMA share of national population.

of unskilled in total manufacturing employment by less than one percentage point. NTM protection at the PUMA level potentially offsets this negative effect in the first two cases while it is ineffective in the second case.

Only most NTM protected PUMAs offset negative effects of imports. Figure 5 shows the marginal effect of NTM protection on the share of manufacturing employment in the working population.

In Table 6 we show the results of the same model above for: (1) average hourly wage (full time only); (2) average hourly wage in manufacturing over average hourly wage; (3) skilled/unskilled wage gap in manufacturing. These results have to be taken with caution because we have seen that NTMs have an effect on employment. Wage results show that NTM

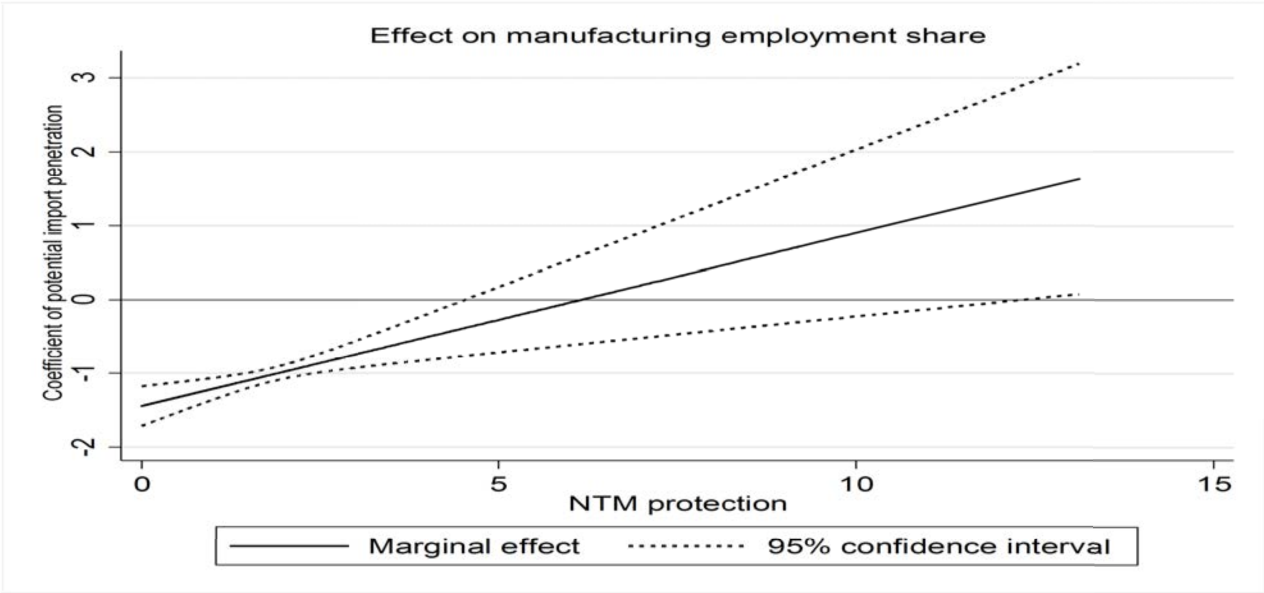

FIGURE 5. Marginal effect of NTM protection.

protection apparently has no effect on local wages, which is consistent with mobility of workers across PUMAs until wages are equivalized.

6 Conclusions

1,000 dollar per worker increase in potential import exposure reduces manufacturing employment per population by 1% in a non-protected PUMA. The effect is mitigated by NTM: in the (few) very protected PUMA this effect is zero. Chinese import exposure rose by 2600 dollars per worker between 2000 and 2014 and therefore reduced US manufacturing employment per population by 2.6% between 2000 and 2014.

US manufacturing employment per population fell by 5% between 2000 and 2014 therefore rising exposure to Chinese import competition explains around 50 percent of the US manufacturing employment decline between 2000 and 2014. Only in non-protected PUMAs, because the PUMAs protected by NTMs limited the negative effects.

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TABLE 6. Effects on manufacturing wages

	$\Delta Av.wage$		$\Delta \frac{wagemanuf.}{av.wage}$		$\Delta \frac{Wunskilled}{Wskilled}$	
	OLS	IV	OLS	IV	OLS	IV
$shareprot_{mt}$	0.001	0.008	-0.007***	-0.008	-0.003**	0.001
	(0.003)	(0.008)	(0.002)	(0.007)	(0.001)	(0.004)
$\Delta Impexp_{mt}$	0.007	0.008	-0.003	0.006	-0.005	0.001
	(0.005)	(0.017)	(0.005)	(0.012)	(0.003)	(0.008)
$\Delta Impexp \times shareprot$	-0.004*	-0.005	0.003	-0.002	0.001	-0.002
	(0.002)	(0.009)	(0.002)	(0.007)	(0.001)	(0.004)
female	-0.115***	-0.113***	0.071**	0.083**	-0.016	-0.008
	(0.038)	(0.040)	(0.034)	(0.040)	(0.031)	(0.032)
age	0.008***	0.009***	-0.006***	-0.007***	-0.000	-0.000
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
college	0.176***	0.190***	-0.078***	-0.102***	-0.007	-0.012
	(0.023)	(0.027)	(0.021)	(0.022)	(0.014)	(0.019)
white	0.022*	0.014	-0.032**	-0.019	0.016	0.018**
	(0.013)	(0.010)	(0.012)	(0.012)	(0.010)	(0.009)
year 2010	-0.082***	-0.074***	-0.018	-0.031***	0.008	0.006
	(0.011)	(0.014)	(0.011)	(0.008)	(0.007)	(0.007)
Constant	-0.223***	-0.259***	0.326***	0.364***	-0.029	-0.029
	(0.068)	(0.077)	(0.050)	(0.052)	(0.054)	(0.053)
First stage						
F test excluded IV						
$shareprot_{mt}$		172.74***		172.74***		172.05***
$\Delta Impexp \times shareprot$		113.02***		113.02***		113.39***
Observations	2,156	2,156	2,156	2,156	2,147	2,147
R-squared	0.122	0.118	0.039	0.027	0.004	0.001

Notes: N= 1078 PUMAS by two periods. Hourly wages at constant 2010 prices. Standard errors clustered by state. Models are weighted by start of period PUMA share of national population.

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