The Surprisingly Swift Decline of U.S. Manufacturing Employment

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Post-War U.S. Manufacturing Employment

U.S. Manufacturing Employment
NBER Recessions Shaded

Employment (Million)

Post-War U.S. Manufacturing Employment
Post-War U.S. Manufacturing Employment

-2.9 million over 3 years
Post-War U.S. Manufacturing Employment

U.S. Manufacturing Employment

NBER Recessions Shaded

-2.9 mill over 3 years
Introduction

• The sharp decline in US manufacturing employment is closely linked to a change in U.S. trade policy granting China Permanent Normal Trade Relations (PNTR) status

• PNTR did not change actual tariff rates
  – They were already at the low levels offered WTO member
  – But this status required annual approval by Congress

• The possibility of large tariff increases before PNTR likely discouraged
  – US firms from offshoring
  – Chinese firms from expanding
While US employment falls after 2001, real value added continues to rise at more-or-less the historical pace.
Outline

• US-China Trade Policy
• Data
• Baseline results
• Extended results
• Other outcomes
• Conclusion
US NTR and Non-NTR Tariffs

- **NTR** = Normal Trade Relations
  - Synonym for Most Favored Nation (MFN)
  - Clinton?

- The US has two basic tariff schedules
  - **NTR tariffs**: generally low; for WTO members
  - **Non-NTR tariffs**: generally high; for non-market economies; set by Smoot-Hawley (1930)

- So, how does China fit into these categories?

1980 (February)
China was granted temporary NTR status by the US Congress

Thereafter, this temporary NTR status requires annual re-approval by Congress

Annual renewals of MFN status were uncertain. The House tried to deny NTR every year after the Tiananmen Square incident; these efforts succeeded in 1990, 1991 and 1992, but the Senate failed to act on them in those years; the average vote against NTR from 1990-2000 is 38 percent

2000 (October)
U.S. Congress grants China PNTR, eliminating the risk that a failed vote might lead to a jump in tariffs

2001 (December)
China enters WTO
Measuring the Policy Change

• We define a measure of the effect of the policy as:

\[ \text{NTR Gap} = \text{Non-NTR Tariff} - \text{NTR Tariff} \]

• Two useful attributes
  – Measures extent to which tariffs could increase prior to PNTR
  – Varies across industries

• We can preview the results in two simple pictures that divide US industries according to whether their NTR gaps are above or below the median
Preview of Findings – Employment
Public NBER-CES Data

• Split industries into two groups
  – Above median exposure
  – Below median exposure
Preview of Findings – Employment
Public NBER-CES Data

- Split industries into two groups
  - Above median exposure
  - Below median exposure
- Trends are parallel before PNTR but diverge after PNTR
- (We use the gap as a continuous variable in our regression analysis.)
Preview of Findings – Trade
Public Census Trade Data

- Divergence is also evident in trade data
- Imports of more-exposed imports from China jump after PNTR relative to the imports from rest-of-world (ROW)
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NTR Gap = Non-NTR Tariff – NTR Tariff

- Compute NTR Gap for each HS8 using the *ad valorem* equivalent tariff rates from Feenstra, Romalis and Schott (2003)

- NTR Gap for industry $i$ is the mean gap over the HS8s captured by the industry

- Available for 1989-2001, we use the NTR Gap for 1999 in the regression results to follow
Distribution of 1999 NTR Gap Across Industries

Distribution of 1999 NTR Gap

Mean: 0.32
Std Dev: 0.15
Census Employment Data

- **LBD**
  - Annual employment of all U.S. establishments, 1977-2009

- **CM**
  - Employment + other attributes for all manufacturing establishments every five years, 1977(5)2007

- **LFTTD**
  - Transaction-level US import data
    - Value
    - HS Product
    - Importer ID
    - Foreign exporter ID
Census Employment Data

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Empirical Strategy

• We use a difference-in-differences strategy to examine the link between PNTR/WTO and U.S. manufacturing employment outcomes
  – 1st difference: industries with higher vs lower NTR Gaps
  – 2nd difference: growth after 2001 versus after 1990 (prior peak)
Industry-Level OLS Diff-in-Diff (DID)

\[ \frac{\Delta E_i^{t:t+d}}{E_i^t} = \alpha_d 1\{post - PNTR\} \times NTR Gap_i^{1999} + \gamma_d X_{it} + \delta_{id} + \delta_{td} + \varepsilon_{itd} \]

Cumulative percent change in industry \(i\) employment \(d\) years after NBER peak \(t=\{1990,2001\}\)

DID Term
Interaction of indicator for post-PNTR period and continuous, time-invariant NTR Gap

Industry attributes, e.g., K/L and S/L

Industry and peak-year fixed effects

t = NBER peak \{1990,2001\}
d = 1:6 years after peak
i = industry
Industry-Level OLS Diff-in-Diff (DID)

$$\Delta \frac{E_{i}^{t:t+d}}{E_{i}^{t}} = \alpha_d 1\{post - PNTR\} \times NTR\ Gap_{i}^{1999} + \gamma_d X_{it} + \delta_{id} + \delta_{td} + \varepsilon_{itd}$$

- Cumulative percent change in industry $i$ employment $d$ years after NBER peak $t=\{1990,2001\}$
- DID Term
  - Interaction of indicator for post-PNTR period and continuous, time-invariant NTR Gap
- Industry attributes, e.g., K/L and S/L
- Industry and peak-year fixed effects

- Two sets of results
  - Baseline: only control for industry capital and skill intensity
  - Extended: control for everything we can think of
### Basic Industry-Level Regressions

**Bold** = statistically significant at 10% level

<table>
<thead>
<tr>
<th>Percent Change in Industry Employment</th>
<th>Years After NBER Peak (LBD)</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>1{post-PNTR} x NTR Gap&lt;sub&gt;i&lt;/sub&gt;</td>
<td>-0.104</td>
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<td>ln(K/L&lt;sub&gt;it&lt;/sub&gt;)</td>
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<td>Observations</td>
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<td>R2</td>
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<td>Fixed Effects</td>
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<td>Employment Weighted</td>
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<td>Implied Impact of PNTR</td>
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</tbody>
</table>
Baseline Results
DID Controlling for Industry K/L and S/L Only

After 7 years, cumulative employment growth is 15.6 percent lower than 7 years after the 1990 peak.

After 1 year, cumulative employment growth is 3.4 percent lower than 1 year after the 1990 peak.
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Alternate Explanations?

- Alternate explanations must explain:
  - **Timing**: why do U.S. employment fall and Chinese imports rise with PNTR?
  - **Variation across industries**: Why are changes in employment and imports greater for industries most affected by the policy change?

- Maybe the employment declines are related to changes in Chinese policy?
  - Not obvious why they would be correlated with the U.S. NTR gap, but we can check…
Alternate Explanations

• Changes in Chinese Policy
  – Reduce barriers to foreign investment – Nunn (2007)
  – Lower import tariffs – Brandt et al. (2013)
  – Eliminate export licensing requirements – Bai et al. (2007)
  – Eliminate production subsides – Girma et al. (2007), Bown (2012)

• Union Resistance in the US – unionstats.org

• Bursting of the US tech bubble – IT dummy; control for prior growth

• Rising Chinese competitiveness – control for capital and skill intensity

• End of Textile and Clothing Quotas – Khandelwal et al. (2013)
Results are similar even after accounting for many alternate explanations.

If we use different DID specifications, we also get similar results.
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• US-China Trade Policy

• Data

• Baseline vs Extended Results

• Other results
  – Other Countries
  – Margins of Adjustment
  – Participation in trade by U.S. and Chinese firms
  – Plant-level

• Conclusion
Other Countries?

• The EU granted permanent NTR status to China in 1980
  – So, no annual renewals

• Dissimilarity of US and EU results indicates that the outcomes we observe in the U.S. are unlikely to be driven by
  – A productivity shock in China
  – A technology shock in industries that happen to have high gaps

• We can use employment from a different source – UNIDO – to compare the US and the EU
Overview of U.S. versus EU
Employment Data from UNIDO

Manufacturing Employment

Overview of U.S. versus EU
Employment Data from UNIDO

DID regression analysis reveals that the post-PNTR differences are statistically significant for the US but not the EU.

The dissimilarity of US and EU results indicates that US outcomes are not driven by:
(i) a productivity shock in China
(ii) a technology shock in industries that happen to have high NTR gaps

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Margins of Adjustment

• **Job Destruction (JD)**
  – PC: plant contraction at continuing firms
  – PD: plant death at continuing firms
  – FD: firm death

• **Job Creation (JC)**
  – PE: plant expansion at continuing firms
  – PB: plant birth at continuing firms
  – FB: firm birth
Implied Impact of PNTR

JC contributes 17 to 41 percent across 2001-2007

Relates to research by Faberman (2012) on “jobless” recoveries and the end of the “great moderation” after 2001
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Trade DID

• Trade data not available till 1990s

• So, amend DID to compare 2001-2005 to 1997-2001
  – 1st difference: products with higher vs lower NTR Gaps
  – 2nd difference: imports from China vs other U.S. trading partners

• Examine:
  – Value
  – Number of US importers
  – Number of Chinese exporters
  – Number of US-Chinese importer-exporter pairs
PNTR and U.S. Imports from China

Implied Impact of PNTR on US Trade

Growth Relative to ROW

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Conclusions

• Strong link between US manufacturing job loss, US trade and PNTR

• U.S. imports from China surge in same industries where employment declines occur, along with number of U.S. importers, Chinese exporters and importer-exporter pairs

• Results are robust to inclusion of proxies for wide array of alternate explanations, as well as alternate specifications

• PNTR associated with both increased job destruction and decreased job creation
Thanks