The Manufacturing Worker’s Response to International Trade

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Abstract

This thesis investigates the impact of change in global trade conditions as measured by exchange rate movement on the probability that a given American manufacturing worker will move or change industry from 2009 to 2021. This paper evaluates how an individual’s industry of choice and location can affect their odds to move and how far they will go in response to change in trade. Through assembling expected national import shares for different industries in different states and the use of various demographic controls we predict the likelihood of movement for a given working-age adult in the United States. We use an instrumental variable approach followed by binary choice models and a bivariate probit model in order to observe the relationship between the choice to change industry and the chance to move. This paper finds that if an average manufacturing worker faces a ten percent increase in import competition as measured by predicted import share in their state and industry, then one can expect a 1.6% increase in the chance that worker migrates and a 42% increase in the chance that they change industries respectively.

Introduction

The consequences of where workers live are far-reaching and likely play a large part in determining their earning potential. Manufacturing worker location also likely plays a large part in how vulnerable they are to international trade from countries like China. The “China Shock” has been well studied in literature as a single year break in 2000; analyses have been done on deaths of despair (Schott), employment decline (Schott/Pierce, 2016), and the impact of technology vs. trade (Faber, 2021). Figure 1 shows the number of manufacturing workers over time as well as the ratio of manufacturing workers to all other employees. This one-time shock from one nation understates the effect that continuous determinants of trade (like exchange rates) have on worker decisions on which industry they will work in and where they will choose to live to maximize their earning potential. Each one of these decisions also have a number of social reasons for moving that may range from temperature to family members in a given location. Previous research has found that people migrate in social networks from place to place, especially when moving across long distances (Stewart/Taylor, 2021) and that people usually make the choice to move only about once a year thanks to lease obligations or seasonal conditions (Malmendier, 2017). Recent research has also found that automation of manufacturing industries may have done far more to lower manufacturing employment than any trade (Faber, 2021). Service workers can likely expect to see mostly benefits from increases in international trade; manufacturing workers competing with nations that hold a competitive advantage are likely to be negatively affected by trade. This study aims to find if greater imports in a manufacturing worker’s industry/state combination are associated with their movement between industries or their movement to a different location.

Empirical Model

This empirical model is meant to show how manufacturing workers move between locations and industries in response to changes in international trade as modeled by the real effective exchange rates of their state’s top five trading partners. The first stage of the model predicts imports as a ratio of total imports in a given year $t$ state $s$ industry $j$ over total GDP in a given year $t$ state $s$ given the previously mentioned REER of each states top trading partners in year $t$.

$$\ln(\frac{W_{jt}}{L_{jt}^s}) = \beta_1 x_{1t} + \beta_2 x_{2t} + \beta_3 x_{3t} + \beta_4 x_{4t} + \beta_5 x_{5t} + \theta_t + \epsilon_{jst}$$

The model above produces predicted import share $K$ for a given industry-state-year using log predicted values to avoid negative predictions that are subsequently unlogged. The most informative results came from two different multinomial logit models, in which a base level $L1$ was defined as no movement between locations or between industries for each respective model. All RHS variables remain the same between each model. The probability of observing a different level of movement $LX$ can modeled using the following:

$$\Pr(T_i | Y_i = LX) = \beta_0 + \beta_1 x_{1t} x_{1i} + \beta_2 x_{2t} x_{1i} + \beta_3 x_{3t} x_{1i} + \beta_4 x_{4t} x_{1i} + \beta_5 x_{5t} x_{1i} + \epsilon_{jst}$$

where $K$ is the aforementioned value of predicted import share in the prior year $t-1$ (as people/businesses need time to respond to global trade conditions), $N$ is made up of individual exogenous characteristics for person $i$ in year $t$, $\theta$ are year effects, $\mu$ is made up of state specific conditions, and the error term $\epsilon$ follows the marginal effects of this model for different groups, we get the impact of these different variables on the likelihood of seeing each level of movement compared to those that stay put. Multiple models all produced similar results; however, the multinomial logit allows an observer to distinguish between levels of movement and levels of industry movement. This analysis was repeated for different samples of people (college grad vs non-college grads, top 50% of age v bottom 50%, male v female).

Figure 1: Blue line shows total US manufacturing employment over time from 1940 to present day, red line shows ratio of US manufacturing employment to US total employment from 1940 to present day

Table 1: Marginal Effect of a 0 to 1 increase in predicted import share on migration probabilities based on the empirical model

<table>
<thead>
<tr>
<th>Job Response</th>
<th>Marginal Effect</th>
<th>Standard Error</th>
<th>Z-Score</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Same residence</td>
<td>-0.1611</td>
<td>0.0097</td>
<td>-16.56</td>
<td>0</td>
</tr>
<tr>
<td>Different county, same state</td>
<td>0.0879</td>
<td>0.0070</td>
<td>12.55</td>
<td>0</td>
</tr>
<tr>
<td>Different state</td>
<td>0.0676</td>
<td>0.0064</td>
<td>10.52</td>
<td>0</td>
</tr>
<tr>
<td>Lost job</td>
<td>0.0056</td>
<td>0.0024</td>
<td>2.33</td>
<td>0.02</td>
</tr>
</tbody>
</table>

Table 2: Marginal Effect of a 0 to 1 increase in predicted import share on industry movement based on the empirical model

<table>
<thead>
<tr>
<th>Variable/Job Response</th>
<th>Marginal Effect</th>
<th>Standard Error</th>
<th>Z-Score</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Same industry</td>
<td>-4.2870</td>
<td>0.0294</td>
<td>145.62</td>
<td>0</td>
</tr>
<tr>
<td>Different industry</td>
<td>3.9768</td>
<td>0.0287</td>
<td>138.44</td>
<td>0</td>
</tr>
<tr>
<td>Lost job</td>
<td>0.3102</td>
<td>0.0075</td>
<td>41.54</td>
<td>0</td>
</tr>
</tbody>
</table>

Results

- If the ratio of imports to GDP in a manufacturing worker’s industry-state rises, the worker will be more likely to move and much more likely to change their industry.
- For a 10% change in predicted import share, there is about a 1.6% increase in the chance that worker will migrate and a nearly 42% increase in the probability that they will not remain in the same industry.
- The effect of predicted import share is different depending on different groups. Men and women are affected identically, but workers who are younger and without college degrees are much more responsive than those with degrees or those above the 50th percentile of age in the sample.
- An increase in predicted import share is associated with an increase in unemployment among manufacturing workers. However, that increase in unemployment is over twelve times smaller than the increase in probability that the same worker simply switches industries. Workers find new places to earn incomes and rarely remain unemployed or leave the labor force permanently.

Data Sources

- CPS ASEC from 2008 to 2020 for person level observations and demographic characteristics
- Real Effective Exchange Rate for all countries in sample from the IMF
- Import data at the state level from the United States International Trade Commission
- GDP data from the Bureau of Economic Analysis

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References