The Impact of Chinese Trade on U.S. Employment: The Good, The Bad, and The Apocryphal*

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Abstract

Using Census micro data we find that the impact of Chinese import competition on US manufacturing had a striking regional variation. In high-human capital areas (for example, much of the West Coast or New England) most manufacturing job losses came from establishments industry switching to services. The establishment remained open but changed to research, design, management or wholesale. In the low human-capital areas (for example, much of the South and mid-West) manufacturing job-losses came from plant closure without much offsetting gain in service employment. Offshoring appears to drive these manufacturing job losses - the Chinese trade impact arose primarily in large importing firms that were simultaneously expanding service sector employment. Hence, our data suggest Chinese trade redistributed jobs from manufacturing in lower income areas to services in higher income areas. Finally, the impact of Chinese imports appear to have disappeared after 2007 – we find strong employment impacts from 2000 to 2007, but nothing since from 2008 to 2015

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1 Introduction

The spectacular rise in Chinese import penetration over the past 25 years is widely believed to be an important reason for the decline of U.S. manufacturing employment. Seminal studies by Autor et al. (2013) and Pierce and Schott (2016) estimate this "China shock" reduced US manufacturing employment by up to 1.5 million jobs between 1990-2007, and led surviving plants to increase capital intensity and the use of imported inputs from China.

Less is known about how this China shock affected restructuring and job flow dynamics in local labor markets and across sectors, both within and between firms, thus reshaping the location and organization of economic activity. In this paper, we use Census micro-data - in particular the Longitudinal Business Database (LBD), the Census of Manufacturing (CMF), the Longitudinal Foreign Trade Transaction Database (LFTTD) and Longitudinal Employee-Household Database (LEHD) - to investigate this question. The data links establishments with their parent firms and follows them over time, allowing us to decompose net employment growth into different job flow margins arising from job creation and destruction in continuing establishments, establishment birth and death, and the reorganization of activity within firms. We follow the empirical strategy of Autor et al. (2013) and exploit regional variations in exposure to Chinese import penetration, instrumented by China's exports to other developed countries. Our analysis leads to three key insights.

First, there was a striking regional variation in the impact of Chinese trade, which is largely masked by aggregate employment statistics. In high human capital areas (primarily the West and parts of the East Coast), the manufacturing employment losses are smaller and come predominantly from plants switching to services: the establishment remained open but switched industry codes to research, management or wholesale. The is the "Silicon Valley" story of hi-tech firms designing, marketing and managing products in the US but offshoring production to China. In the low human-capital areas (much of the South and mid-West) manufacturing job-losses came from plant closure without much offsetting gain in service employment. Hence, data suggest that imports from Chinese redistributed jobs from manufacturing in lower income areas to services in higher income areas.[1]

[1]Bernard et al. (2017) find a similar reorientation in Danish firm-level data. Aside from well-known high-tech examples of designed in the U.S. – manufactured in China, there are many other anecdotes about firms expanding employment in non-manufacturing sectors and adapting their operations to the rise of China. For example, Techtronic Industries, the owner of well-known brands Milwaukee Electric Tool, Hoover, and Ryobi among others, manufactures goods in China, but also maintains manufacturing, design, and service operations in Texas, Mississippi, and South Carolina (see "The ups and downs of moving production to China," *CBS MarketWatch,* Oc-

Second, the negative effect of Chinese imports on manufacturing employment is mainly driven by large, multinational firms that are simultaneously expanding employment in non-manufacturing. These firms are closing or reducing employment at manufacturing establishments while expanding and opening non-manufacturing establishments. Moreover, we find no evidence that large publicly listed US manufacturing firms suffered from the rise in Chinese imports - their sales, investment and market value appear unaffected. Thus, while US workers in low human-capital areas appeared to suffer from import competition, the firms employing them potentially even benefited from reducing manufacturing costs by offshoring production to China.

Third, the impact of the China shock seems to have disappeared after 2007 – we find strong employment effects between 1992 and 2007, but nothing from 2007 to 2015. Thus, while China appears historically responsible for large manufacturing job loss in the US, our results suggest this has not been a major factor for more than a decade.

As such, we characterize our findings as follows:

The Good: On average, the China shock had a significant positive effect on U.S. non-manufacturing employment.

The Bad: In areas with low initial levels of human capital, the China shock had a substantial negative effect on manufacturing employment that was not sufficiently offset by increases in non-manufacturing employment and thus led to an overall worsening of labor market conditions.

The Apocryphal: Contrary to popular narratives, the manufacturing job losses from China were not driven by the mass exit of US firms.[2] Instead, most of the manufacturing job losses are occurred at large, high-wage, importing firms that simultaneously expanded non-manufacturing employment – in part through industry switching of plants – and have on average not been affected negatively. Moreover, non-manufacturing employment in the US appears to have been increased by

tober 18, 2010, https://www.marketwatch.com/story/the-ups-and-downs-of-moving-production-to-china-2010-10-17; accessed 7/27/2018). In another example, Bernhardt Furniture of North Carolina expanded employment after 2007 where it manufactures custom, high quality furniture, some of which is for export. Bernhardt handles marketing, design, and its global operations in the U.S. (see "In a U.S. manufacturing hub, no illusions about tariffs and jobs," *Reuter*s, September 26, 2018, https://www.reuters.com/article/us-usa-trade-jobs-insight/in-a-u-s-manufacturing-hub-no-illusions-about-tariffs-and-jobs-idUSKCN1M60E0; accessed 10/9/2018).

[2]The belief that Chinese import competition not only decimated U.S. manufacturing employment but also had a negative effect on U.S. firms is at the center of the current trade dispute between the U.S. and China. See for example Peter Navarro, the Director of the National Trade Council, who opined that "Since China joined the WTO in 2001, over 70,000 American factories have closed [...] Fully half of our annual trade deficit in goods is with [China]. This is causality, not correlation." ("UC Irvine economist who never met Donald Trump is now a key advisor", *Los Angeles Times*, August 17, 2016, https://www.latimes.com/business/la-na-trump-economist-navarro-20160818-snap-story.html; accessed 1/16/2019).

Chinese trade.

Our findings indicate that the China shock induced a reorganization of economic activity by a set of larger, more productive firms that successfully adapted to import competition and expanded in other activities. This structural shift created winners and losers across U.S. local labor markets as a function of initial human capital. These unequal regional effects may be an important force behind the growing regional inequality and political polarization observed in the U.S. The latter is consistent with the findings in Autor, Dorn, Hanson and Song (2014), using worker-level data, that show negative effects on earnings for workers with lower initial wages, less labor market attachment, and shorter tenure in the manufacturing sector.

Our work is related to a broad literature examining the impact of the China's global integration on the U.S. economy. One source of gains from trade is access to new varieties of goods in both China and the U.S. that contribute to lower prices on both final goods and intermediate inputs (Handley and Limão (2017)). These new varieties, the availability of cheaper intermediate inputs, and China's own domestic policies and import tariff reductions, contributed to welfare gains in the United States (Amiti et al. (2017)) and lower U.S. prices overall (Jaravel and Sager (2018)).

Other research focuses on expanded export opportunities and the transformation of global supply chains. Feenstra and Sasahara (2017) use a global input-output analysis to show that U.S. exports may have created demand for new jobs, primarily in the services sector, that offset job losses in manufacturing from Chinese imports from 1995-2011. Related work by Wang et al. (2018) find employment downstream of manufacturing, often in services industries, is stimulated even as Chinese import competition squeezes firms in direct competition upstream in the supply chain. Hummels et al. (2014) find wage premia for workers with high educational attainment at Danish firms that engage in offshoring. We do not test these channels directly. But our firm and establishment evidence of firm reorganization is consistent with these patterns in industry aggregate employment dynamics. Nevertheless, the job gains may not accrue to the same sectors that lost employment from import competition.

Our paper is also related to a set of papers documenting job creation and destruction across firms over time and in response to trade shocks. Using the same LBD data as we do, Fort et al. (2018) document that a large share of U.S. firms simultaneously operate establishments in the manufacturing and non-manufacturing sectors. They show these multi-sector firms have expanded

their non-manufacturing employment in services and wholesale from 1977 to 2012, but they don't don't provide a causal link between the China shock and job reallocation across sectors. Bernard et al. (2006) uncover evidence that establishments industry affiliation was impacted by import competition in the 1980s and 1990s. Asquith et al. (2017) use the NETS database constructed from Dun and Bradstreet company data to decompose the impact of Chinese import penetration of net employment growth into different job creation and destruction margins. There are several advantages to using administrative micro data from the LBD data, including greater accuracy of establishment-level employment counts, the ability to link the LBD data it to important firm characteristics from other Census datasets, as well as precise information about industry affiliation. The latter is necessary to evaluate the impact of import competition on changes in firm activities.

The rest of this paper is structured as follows. Section 2 introduces the data, measurement of job flows, import penetration measures, and industry classifications. Section 3 describes our data estimation strategy. Section 4 presents our results on sectoral reallocation. Section 5 provides results on geographic variation of results by pre-China shock human capital levels. Section 6 concludes.

2 Measurement and Estimation Strategy

A key contribution of our analysis is the detailed decomposition of employment growth into variation job creation and destruction margins. First, we describe these data and the employment growth margins we construct. Second, we adapt our measures to the empirical strategy used in Autor et al. (2013).

We use multiple micro datasets from the US Census Bureau. The primary data on employment outcomes is the Longitudinal Business Database (LBD) which contains more than 7 million establishments across 5 million firms, with coverage from 1976 to 2015, and the Census of Manufacturing (CMF) which is run every 5 years (those ending with "2" or "7"). The lowest unit of observation is the establishment, defined as a physical location, and contains information on employment, payroll, the parent firm (if applicable), region and an industry code.

2.1 Employment Growth and Industry Measurement

To measure employment changes between year $t-k$ and t in sector i in commuting-zone c, we follow Davis and Haltiwanger (1992) to define employment growth as follows:

$$g_{ict,t-k} = \frac{E_{ict} - E_{ict-k}}{(0.5 * E_{ict} + 0.5 * E_{ict-k})} \tag{1}$$

where this ranges from -2 (exit) to +2 (entry). This measure has several advantages, including that we can exactly decompose employment growth rate into contributions from job creation and job destruction from continuing establishments, entry, and exit

$$g_{ict,t-k} = \frac{(JC_{ict}^{cont}) - (JD_{ict}^{cont}) + \left(E_{ict}^{entry}\right) - \left(E_{ict-k}^{exit}\right) + (S_{ict}^{in} - S_{ict}^{out})}{X_{ict}} \tag{2}$$

where

- $JC_{ict}^{cont} = \sum_{e \in cont_{ic}} max(E_{et} - E_{et-k}, 0)$ is the sum of annual job creation between $t-k$ and t of continuing establishments in sector i – CZ c, defined as having the same LBDNUM and same NAICS sector in $t-k$ and t independent of firm ID.
- $JD_{ict}^{cont} = \sum_{e \in cont_{ic}} max(-(E_{et} - E_{et-k}), 0)$ is the sum of annual job destruction between $t-k$ and t of continuing establishments in sector i – CZ c
- E_{ict}^{entry} is year t employment of establishments that entered sector i – CZ c after $t-k$
- E_{ict-k}^{exit} is year $t-k$ employment of establishments that exited sector i – CZ c before t.
- S_{ict}^{in} is year t employment of establishments that entered sector i from sector $-i$ between t-k and t
- S_{ict}^{out} s year $t-k$ employment of establishments that exited sector i – CZ c before t.

In our primary analysis we use data from the Economic Census years (92, 97, 02, 07, 12), since for these years we have industry codes in the CMF and two measures of employment from the administrative records (LBD) and the Census (CMF).

To measure industry we use the time-consistent Fort and Klimek (2018) (FK) codes, which convert all industry codes NAICS 2007 classifications. This FK industry coding was designed to

provide a continuous industry code for the entire data set to minimize spurious "industry switching". In particular, the FK codes remain constant within establishments over time unless the industry code changes in such a way as to provide meaningful change in NAICS industry classification (typically because the plant changes its code in the 5-yearly economic census). The FK process uses longitudinal information in the LBD to fill in missing codes. Prior to 1997 when the Census used SIC codes Fort and Klimek (2018) use a detailed concordance to assign NAICS codes to establishments with SIC codes that map uniquely between classifications. [3]

2.2 Measuring Local Import Penetration

To identify the effect of import penetration on employment dynamics we use a measure modeled after the one developed by Acemoglu et al. (2016). We measure the change in import penetration in industry j as the change in the level of imports originating from China as a share of U.S. initial absorption for industry j in 1991,

$$\Delta IP_{j\tau} = \frac{\Delta M_{j\tau}^{UC}}{Y_{j,91} + M_{j,91} - EX_{j,91}} \tag{3}$$

where $\Delta M_{j\tau}^{UC}$ is the change in imports from China over the period 1991 and 2012, $Y_{j,91}$ is the value of shipments for each industry in 1991 as measured by the NBER-CES database lastly $M_{j,91}$ and $E_{j,91}$ are total U.S. imports and exports in industry j in 1991. All trade flows calculated from the UN Comtrade database.

To address concerns over endogeneity we instrument for changes in U.S. imports ($\Delta IP_{j\tau}$) with Chinese exports to a set of other developed countries:

$$\Delta IPO_{j\tau} = \frac{\Delta M_{j\tau}^{OC}}{Y_{j,89} + M_{j,89} - EX_{j,89}} \tag{4}$$

[3] When longitudinal information regarding NAICS industry classification is not available FK codes are assigned randomly to establishment but remain fixed over time. For additional information about the FK codes and their implications for measurements of economic activity please see Fort and Klimek (2018). Using NAICS industry codes rather than SIC is a departure from the previous literature, however we believe this change is warranted give the availability of time consistent FK industry codes and because NAICS industries classifications are defined only based the economic activity of an establishment, where as many SIC codes are not, due to legacy reasons. Since our main treatment of interest is how competition from imports impacts domestic establishments, we believe NAICS industry affiliation is a more accurate way to measure treatment intensity. Moreover, our baseline sample spans the period from 1992-2012 and NAICS was the applicable nomenclature from 1997 forward for all establishments in the LBD, which is 75 percent of our sample years.

where $\Delta M_{j\tau}^{OC}$ is imports from China in industry j across 1991 through 2011 in eight other high-income countries excluding the US.[4] The denominator is the initial absorption in industry j in the U.S. in the year 1989.

We then apportion these industry level import penetration shocks to Commuting Zones based on each industry's share of local employment derived from the LBD lagged by 10 years (i.e. for an import penetration shock over the period 1992-2002, our instrument is constructed using 1982 employment shares)

$$\Delta IP_{c\tau} = \Delta IP_{j\tau} \frac{E_{j,t-k}}{\sum_j E_{j,t-k}} \tag{5}$$

We also control for heterogeneity across commuting zones following Autor et al. (2013), including the local manufacturing and unionized share of employment, the routine and offshorable occupation share of employment, as well as the share of female employment and the shares of the local population with a college degree and foreign born.

To measure establishment-level industry affiliation as accurately as possible we diverge from the empirical strategy developed in ADH by changing our long difference periods under consideration. We describe the reasons for these changes in detail in Section 3. We investigate the period from 1992-2012 aligning our long difference periods to overlap with years in which the Economic Census (EC) is performed (1992, 1997, 2002, 2007, and 2012). The resulting sample spans a 20 year period that only diverges from AADHP's sample by one year and provides four observations per commuting zone, generating a sample with approximately 2900 observations. As noted previously, these sample years are important because additional information about establishments is collected during EC years. All establishments provide information about their primary economic activities in these years. As such, their industry codes are more accurate, allowing us to better measures changes in economic activity that are due to increased import competition.

[4] We follow ADH by using trade flow from China to Australia, Denmark, Finland, Germany, Japan, New Zealand, Spain and Switzerland

3 Estimation Strategy

The estimation strategy follows Autor et al. (2013) by utilizing plausibly exogenous supply driven changes to import penetration from China as instruments to identify the effects on local employment dynamics. We estimate a stacked long difference equation of the form

$$\Delta x_{cj\tau} = \alpha + \beta \Delta IP_{c\tau} + \gamma X_{c,91} + \delta_r + \epsilon_{it}, \tag{6}$$

where $\Delta x_{cj\tau}$ is the a measure of employment change in commuting zone c, sector j, over the period τ in employment, job creation, job destruction, entry, exit and industry employment changes due to establishment sectoral switching. $\Delta IP_{j\tau}$ is the change in direct import penetration, and $X_{j,91}$ is a set of commuting zone specific controls for commuting zone c including the log average wage in 1991 (in 2007$), the change in log real wage (1976 - 1991), the production workers share of employment in 1991, the capital/value added in 1991, and the change in industry share of total employment (1976 - 1991). Lastly, δ_r is a Census region fixed effect allowing for differential employment trends for each of the nine Census regions. In order to control for demand shocks as described above we estimate this model using 2SLS instrumenting for $\Delta IP_{c\tau}$ with $\Delta IPO_{c\tau}$.

4 The Impact of the China Shock on Sectoral Reallocation

4.1 Average sectoral employment effects

We begin by replicating Autor et al. (2013) regression results with our LBD data in Table (1). Column (1) reports the results for the change in Chinese imports on the log change in manufacturing and non-manufacturing employment from their paper (Table 5, Panel A, columns (1) and (2)). Column (2) replicates these results with our LBD data using the same regression specification, finding slightly different results, with the small different likely because Autor et al. (2013)'s sectoral employment measures are based on worker counts from CIPUMS and the ACS instead of job counts from the LBD. But these differences do not matter for the main conclusion: the change in Chinese import penetration had a large and highly significant negative effect on local manufacturing employment; and a small, insignificant negative effect on local non-manufacturing employment.

Column (3) replaces SIC industry codes with NAICS codes (which are the codes directly reported

by the establishments), and changes the definition of IP from the employment-based one to the absorption-based one (which is common in the more recent literature, e.g. Acemoglu et al. (2016)). The two changes result in a more negative estimate for local manufacturing employment while the estimate for non-manufacturing employment changes sign and becomes positive (although remains insignificant).

Columns (4) keeps the regression specification of column (3) but change the long-differences from 1990-2000 and 2000-2007 to five year long differences aligned with economic census years; i.e. 1992-1997, 1997-2002 and 2002-2007. Somewhat surprisingly this change reduced the negative effect on manufacturing employment slightly (but it remains highly significant) and more than doubled the non-manufacturing coefficient so it now becomes significant. Column (5) extends this to include the most recent Census year of 2012 with similar results. In case our choice of Census years was unusual Column (6) used the LBD to generate every 5-year difference from 1991 to 2014 (noting we cluster at the industry level to account for the correlated errors from overlapping years) and finds similar results.[5]

Thus, in summary, we confirm the result in Autor et al. (2013) that Chinese imports appeared to generate a robust negative impact of US manufacturing employment in the regions most impacted. However, we find evidence for a significant positive impact of non-manufacturing, with this difference driven primarily by the move away from the particular long difference years of 1991-2000 and 2000-2007.[6]

Lastly, we reconsider the specification in column (5) but allow for a separate effect of Chinese import penetration for the post-2007 period. As column (7) shows, there is no evidence of a negative effect for either manufacturing or non-manufacturing employment for that period. This suggests that the negative on manufacturing occurred entirely prior to 2007, which has important implications with regards to current and future trade policy.

[5]We report the robustness of our results to alternative controls in Appendix Table (A.1).

[6]We further check that the positive non-manufacturing result is not driven by the fact that our intervals are shorter - for example by examining every 7-year, 8-year, 9-year and 10-year set of overlapping windows - and find results similar to column (5).

4.2 Decomposing the sectoral employment effects

Next, we decompose sectoral employment growth in each CZ as described in equation (2) and estimate the effect of Chinese IP on each of the components. For all of these regressions, we use our baseline regression specification from column (5) in the previous table. Table 2 reports the results for both the manufacturing sector (Panel A) and the the non-manufacturing sector (Panel B).

For reference, the first column repeats the estimation for sectoral net employment growth from column (5) of the previous table. The estimates are slightly different because we now define net employment growth as the DHS growth rate (as defined in equation (1) above) instead of the log change in employment.

As Panel A shows, the negative effect of Chinese import penetration on manufacturing employment is driven by three main channels: (i) job destruction by continuing establishments (column 3); (ii) establishment exits by continuing firms (column 6); and (iii) establishments switching their industry affiliation from the manufacturing sector to the non-manufacturing sector (column 9).[7] Together, the three channels account for more than 100% of the negative effect on local manufacturing employment. Interestingly, the China Shock also induces establishments to switch from the non-manufacturing sector to the manufacturing sector (column 8), but this effect is considerably smaller than the switching out effect. The net effect of sectoral switching thus remains strongly negative, accounting for 30% of the negative effect of the Chinese IP on local manufacturing employment.

Turning to Panel B, the positive effect of Chinese IP on local non-manufacturing employment is driven in large part by (i) lower job destruction by continuing establishments, which has a positive effect on net employment growth (column 3); (ii) increased entry of new establishments (columns 4 and 5); and (iii) fewer closings by existing firms (column 6). We also find that establishments switching their industry affiliation from manufacturing to non-manufacturing has a positive and statistically significant effect (column 8). This is simply the flip side of establishments switching out of manufacturing in Panel A. The effect on non-manufacturing employment is substantially smaller simply because local non-manufacturing employment (the nominator of the different components) is on average much larger than local manufacturing employment.

[7] As described in Section 2, continuing establishments are defined as establishments that are in the LBD (as captured by their LBDNUM) both in the beginning and the end year of a five-year long difference. The same definition applies to continuing firms (as captured by their FIRMID).

The most surprising result coming out of Table 2 is, in our view, the large and highly significant effect that sectoral switching of establishments has on net manufacturing employment. It suggests that the China shock led to important reorganization of activity at the establishment level and, by simple accounting, "removed" a large number of jobs from the manufacturing sector. Of course, the reorganization occurring within these switching establishments could be associated with job losses. Closer inspection of our data reveals that net employment growth was indeed impacted negatively by the China shock. However, this negative net effect remains relatively modest, implying that a substantial number of these manufacturing jobs are actually being "transferred" to the non-manufacturing sector.[8]

While the important role that sectoral switching has played in shaping the decline in manufacturing employment is surprising, the fact that establishments and firms change activity due to increased competition is not without precedent. Bernard et al. (2006) documented that import competition from developing countries induced changes in establishment industry affiliation in the 1980s and 1990s. Though, to our knowledge, this paper is the first to document nearly one third of all manufacturing jobs lost due to local Chinese import penetration was due to establishment industry switching.

Of course, one concern may be whether these industry codes are accurate? The Census derives industry codes from multiple sources. When an establishment is born the first source is usually the Internal Revenue Service, which collects industry information for filing for employer identification numbers (EINs). Industry affiliation data is also shared with the Census by the Social Security Administration, and collected from tax filings. In addition to these two sources, the Census Bureau also collects information relevant for industry classification in the Economic Census, conducted every five years (in years ending in 2 and 7). Specifically, all domestic non-farm business establishments are required to fill out an Industry Classification Report questionnaire that is a "brief inquiry requesting information necessary to assign a kind-of-business code."[9] This report collects information on the physical location and principal business or activity, including class of customer and details of sales, shipments, receipts, or revenues in order to assign an accurate and complete NAICS code. The

[8] Unfortunately, the LBD data does not contain worker-specific information and so, we cannot investigate to extent to which switching is associated with worker turnover. We will try to assess this question with worker-firm matched data in the future.

[9] https://www.census.gov/econ/overview/mu0010.html.

Census Bureau believes the ICR report is of higher quality than self-reported industry data collected from tax files. Therefore, if these data sources disagree, the ICR is used to assign industry codes. As a result, there are large increases in establishment reclassification in Economic Census years.[10] Since establishment-level industry codes are most accurately measure in Economic Census years we focused our analysis on these years.

More generally, while previous research including Pierce and Schott (2016) has documented that import competition from China led to job destruction and establishment exits in the U.S. manufacturing sector, we are to our knowledge the first to show that most of these negative effects are due to continuing firms and not the result of firm death. If these firms, as a result of the China shock, simultaneously increase their activities in new or already existing non-manufacturing establishments, then this would constitute an extensive-margin form of reorganization that complements the intensive-margin sector switching of continuing establishments. We investigate this possibility below.

4.3 Industry switching and sectoral reallocation

As emphasized above, the effects from industry switching by establishments are new and an important contributor to the negative manufacturing employment effect of the China shock. We therefore analyze them further by creating a switching matrix (Table 3) that links the job reallocation resulting from these establishments across the different NAICS manufacturing and non-manufacturing subsectors. For each row and column we keep the same denominator of total employment in 1 but use the numerator for subsets of industries, so that the columns and rows decompose the original switching coefficient.

Two striking results jumps out. First, manufacturing subsector 33 (metal, machinery, computer and electronics, electrical, transportation equipment, and furniture manufacturing) accounts for essentially all of the negative manufacturing employment effect of the China shock from establishments switching. Second, about 70% of these establishments switch to subsectors 54 and 55, which are professional services including R&D, marketing and management of companies. The rest switches to subsector 42, which wholesale. Collectively these three non-manufacturing subsectors

[10]This information is based on communication between the authors and several Center for Economic Studies economists at the U.S. Census.

reflect activities that are complementary to international trade, suggesting that a large part of the negative manufacturing employment effects from the China shock are related to firms offshoring manufacturing activities and switching domestic employment to activities around designing, marketing, management and wholesaling these goods now produced abroad.

Taken together, the results in Tables (2) and Table (3) demonstrate that the negative effects of Chinese import penetration on local manufacturing employment are driven almost entirely by continuing firms that simultaneously expand their activities in non-manufacturing activities, in particular in wholesale, professional services, management of companies; i.e. activities that appear complementary to international trade and offshoring of manufacturing activities. This is highly suggestive of a situation in which at least some firms – mainly large firms with already established trade links – responded to the China shock by reallocating their activity away from manufacturing towards manufacturing-related non-manufacturing activities.

5 The Impact of the China Shock on Geographical Reallocation

Our results from above indicate that Chinese import penetration led firms to reallocate jobs away from manufacturing towards management, marketing, research and wholesale activities. Since many of these activities are skill-intensive, we conjecture that this reallocation could have benefited local labor markets with relatively high human capital to the detriment of local labor markets with relatively low human capital.

To formally assess the role of human capital endowments trade-induced labor market reallocation, we split the 722 CZs in our sample into high versus low human capital as defined by above versus below median share of the population with a college degree in 1990 (i.e. prior to the China shock). Figure (1) shows that the high human capital CZs are located primarily on the coasts, in and around major cities, and the central and northwestern parts of the U.S. These CZs account for about 80 percent of total employment (and XXX percent of manufacturing employment) in the U.S.

Given this split, we re-estimate our model of the different sectoral employment growth terms allowing for a heterogenous effect of import penetration on all margins of employment growth as follows

$$\Delta x_{cj\tau} = \alpha + \beta_{hhc}\Delta IP_{c\tau} \times 1(HHC) + \beta_{lhc}\Delta IP_{c\tau} \times 1(LHC) + \gamma X_{c,91} + \delta_r + \epsilon_{it} \quad (7)$$

where $1(HHC)$ and $1(LHC)$ are both indicator variables equal to 1 for high and low human capital CZs respectively. Table 4 reports the results for the manufacturing sector. Column (1) reports the effect of import penetration on net employment growth for high human capital (HHC) vs. low human capital (LHC) commuting zones separately. We find the impact of Chinese imports is significant in both areas, but there is about a 1/3 smaller coefficient of -3.108 for the high human capital areas compared to -4.527 in the low human capital areas. This is already broadly suggestive of a somewhat greater impact on low human capital areas, although we should note in the bottom row these two coefficients are not significantly different (p-value of 0.496).[11] Column (2) reports the "conventional" effect on manufacturing employment growth - this is defined as the change in manufacturing employment that *excludes* establishment that switch industry codes over the 5-year period. We find a significant and large impact for low human capital areas of -3.999 which amounts for almost the full impact of Chinese trade on manufacturing employment in those areas. In contract in high human capital areas we see a much smaller "conventional" impact of Chinese trade on manufacturing employment of -1.468, which is not statistically significant. Looking across the columns we can see for high human capital areas the impact of Chinese trade is only significant for net industry switching, which has a coefficient of -1.640 which explains about 53% of the total impact (0.53=1.64/3.108). In contrast for low human capital areas we see the loss in manufacturing employment is driven by a combination of job-losses at continuing establishments (column (4)) and establishment exit (column (6)), with some offsetting positive impact on establishment entry, but no impact of net switching.

As alternative cut, rather than splitting our sample by geography, we can examine the distributional effects of the China Shock by investigating the differential effect of trade on establishments according to whether they are above or below the median earnings. For this exercise we estimate (6). splitting each decomposition term into two groups employment growth from establishments above and below the median with industry earnings. [12] For example, we measure example local job

[11] This pattern of results is consistent with Eriksson et al. (2019) which finds that the local effect of import competition depends critically on demographic characteristics, including the education of the workforce.

[12] We construct our measure of average earnings at the establishment-level using total payroll and employment derived from the LBD. For all existing establishments in time $t-k$ we define the median average earnings at the year

creation in CZ *c*accounted for by high average earnings (HAE) establishments in sector i over the period years $t-k$ and t, and CZ c, as follows

$$JC_{ict}^{cont,HAE} = \sum_{e \in cont_{ic}} max(E_{et} - E_{et-k}, 0) * 1(AE_{eit-k} \geq AE_{it-k}^{median})$$

where AE_{eit-k} is the average earnings of establishment e a in industry i and CZ c and AE_{eit-k}^{median} average earnings within industry i and year t. We construct the same variables for job destruction, entry, exit and net switching.

We report our result in table 5. In Panel A we once again report the effect Chinese imports on all manufacturing establishments, while in panels B and C we decompose the total effect into that change in employment caused by high and low earnings establishments respectively. Similar to the split by human capital, we see high earnings plants see the majority of their manufacturing job loss accounted for by industry switching, with no significant impact from "conventional" employment loss. In contrast, low earnings establishments see a significant "conventional" employment loss from establishment job destruction and closure, with no significant impact of next switching.

Thus, taken together, these tables show a striking result. The loss of aggregate manufacturing employment in high human capital areas (and high average earnings plants) is predominantly driven by establishments switching their industry codes from manufacturing to services between 5-year census. In low-human capital areas t(and low average earning plants) he loss of manufacturing employment is instead entirely accounted for by plant downsizing and closure.

6 Firms and the employment impact of Chinese trade

To gain further understanding of the mechanisms driving employment reallocation, we decompose in Table 6 the local employment growth effects of the China shock according to the parent firm's non-manufacturing growth, import activity and size.

We start with the top row (Panel A) which simply reproduces the decomposition for all firms from Panel A of Table 2. In Panel B we examine firms which are expanding in non-manufacturing

by 6-digit industry and classify all establishments below the median as low average earnings establishments and all with median or above average earnings as high average earnings establishments. For all establishments that enter the sample between $t-k$ and t we classify them as high or low earnings establishments based on their average earnings relative to the within-industry earnings distribution in year t.

over the long difference period. We find that approximately 75% of the total negative effect of the China shock on local manufacturing employment is accounted for by establishments belonging to firms that simultaneously expand employment in non-manufacturing. As the other columns of Panel B reveal, expanding firms account for all of increased job destruction from continuing establishments, about half of increased establishment closings, and about two thirds of increased switching of establishments from the manufacturing sector to non-manufacturing. Panel C analyzes the extent to which the negative effects on local manufacturing employment are driven by firms importing intermediates, which we measure by linking the LBD to the LFTTD firm-level trade data.[13] We find that establishments belonging to importing firms account for more than 100% of the total negative effect on local manufacturing employment, which means that establishments belonging to non-importing firms on average expanding employment in response to the China shock. Lastly, in Panel D, we report the results when splitting establishments according to whether they belong to firms with more than 1,000 employees or not.[14] We find the overwhelming majority of the negative manufacturing employment effect is accounted for by establishments belonging to large firms; primarily because these firms account for more than 100% of job destruction in continuing establishments, a large part of establishment exits and most of establishment switching.

Collectively, these results are suggestive of offshoring. Large, importing firms, which are expanding in non-manufacturing, account for the large majority of job losses in manufacturing plants. These firms presumably benefit from the provision of cheaper manufacturing good whose production is offshored to China, enabling them to expand their non-manufacturing parts of the firm. As one additional check into this hypothesis Table 7 examines the impact of Chinese trade on publicly listed US manufacturing firms.[15]

In order to construct a firm-level measure of exposure to Chinese import penetration we use the Compustat Segments database, which reports reports firm sales by line of business.[16] The Segments database allows us to construct a firm specific profile of average sales over the period 1987-1992,

[13] We define a firm as an importer if we observe positive imports of manufacturing sector goods in both year $t-k$ and t.

[14] Firm size is measured in the end year of the long difference. None of the results would change if we measured firm size instead in the beginning year. Approximately 50 percent of total manufacturing employment is accounted for by firms with more than 1,000 employees.

[15] For results on the excluded groups as well as on non-manufacturing employment see Appendix tables A.3-A.8.

[16] Each line of business is associated with an industry code and in many cases a secondary industry code reported at the 4-digit SIC. Following Bloom et al. (2013), for lines of business with two codes listed, we allocate 75 percent of the line's sales to the primary industry and 25 percent to the secondary industry

prior to rise of Chinese import penetration, which we use to construct a firm-specific measure of import penetration based on each firms exposure to industry level import penetration as follows:

$$\Delta IP_{f\tau} = \Delta IP_{j\tau} \frac{\overline{S}_{fj,87-92}}{\sum_j \overline{S}_{fj,87-92}} \tag{8}$$

where $\Delta IP_{j\tau}$is the change in imports in industry j over the period τ, as define previously, and $\overline{S}_{fj,87-92}$ is firm $f's$ average sales in industry j over the period 1987 to 1992. We construct an instrument for supply driven shocks to import penetration using $\Delta IPO_{j\tau}$ in the same way as for our local import penetration measure. In addition to allowing us to measure firm-level exposure to import penetration, the

Having constructed our measure of firm-level performance and firm-level import exposure we now turn to our baseline firm-level long difference regression specification, estimating the effect of firm-level growth rate of $\Delta IP_{f\tau}$ on global employment, sales, investment or market value over a period of τ years; $\Delta IP_{f\tau}$ is our measure of firm-level import penetration as defined in equation (8); and we include industry and period fixed effects controlling for industry- and period specific-trends. Having established that the China Shock appears to have stopped impacting local employment around 2007 and in an effort to avoid contamination from the Great Recession, we restrict the sample for these regressions to the period 1992-2007. We utilize all 5-year long difference periods over this period in order to minimize the impact of any individual sample year. In order to correct for an artificially inflated number of observations, we cluster our standard errors at both the firm and industry level. [17]

Table 7 reports our results. In summary, we find that while firms see a weakly negative relationship with Chinese trade growth across multiple measures in Panels B (I would drop Panel A as confusing) in Panel C once we weight by firms size these effects disappear, and indeed mostly turn positive. This may provide evidence that their is a heterogenous effect of import penetration on firm outcomes according to firm size with larger firms fairing better. We interpret this as evidence that reorganization due to the China Shock did not occur without some firms incurring some costs, although, large publicly listed firms appear to have no negative relationship with Chinese import growth. On net, we believe our evidence of reorganization of the U.S. economy caused by Chinese

[17] For additonal information about the data and empirical strategy see Appendix B.

import penetration provides a more nuanced picture of the effect of China on the U.S. economy.

7 Conclusion

This paper studies the effects of China's growing importance in the global economy on the location and organization of economic activity within the U.S. during the quarter century from 1990-2015. Using Census micro data we find that the impact of Chinese import competition on US manufacturing had a striking regional variation. In high-human capital areas (for example, much of the West Coast or New England) most manufacturing job losses came from establishments industry switching to services. The establishment remained open but changed to research, design, management or wholesale. In the low human-capital areas (for example, much of the South and mid-West) manufacturing job-losses came from plant closure without much offsetting gain in service employment. Indeed, when examining firm we find these Chinese trade manufacturing job losses came mainly from large multinationals that were simultaneously expanding US service sector employment. Hence, our data suggest Chinese trade redistributed jobs from manufacturing in lower income areas to services in higher income areas. Finally, the impact of Chinese imports appear to have disappeared after 2007 – we find strong employment impacts from 2000 to 2007, but nothing from 2007 to 2015.

On net, we provide evidence of significant reorganization of economic activity in response to the import penetration both within and across establishments, firms, industries and local economies puts the decline in manufacturing employment in a broader context and highlights the consequences for regional inequality and polarization of economic opportunity.

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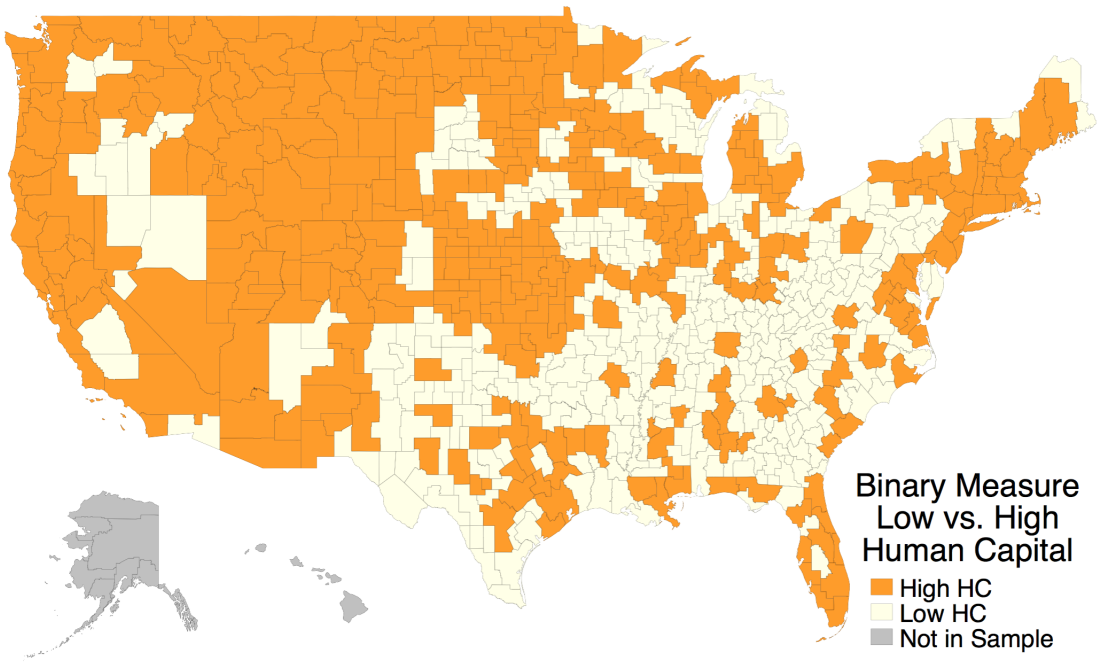
8 Figures

Figure 1: High versus Low Human Capital Commuting Zones



Note: The above figure plots commuting zones above and below the median level of human capital in 1990, where human capital is defined as the share of the population with a college degree computed using the decennial census.

9 Tables

Table 1: Local Employment Effect of Chinese Import Penetration

2SLS ESTIMATES OF CHANGE IN SECTORAL CZ EMPLOYMENT ON CHANGE IN CZ IP, INSTRUMENTED BY CHANGE IN CZ IP (OTHER COUNTRIES)

Dependent variables: annualized log change in sectoral CZ employment

	Autor, Dorn and Hanson (2013)	ADH Replication with LBD data	NAICS industries & ΔIP as in Acemoglu et al. (2018)	Census 5-year long differences 1992-2007	Census 5-year long differences 1992-2012	All 5-year long differences	Census 5-year long differences with Post-2007 interaction
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: *Manufacturing sector*							
Annual Δ in China IP	-4.231***	-5.584***	-6.694***	-4.256***	-3.687***	-5.168**	-4.402**
	(1.047)	*(1.384)*	*(1.845)*	*(1.406)*	*(1.690)*	*(2.470)*	*(1.346)*
Annual Δ in China IP × Post 2007							12.20
							(14.87)
Panel B: *Non-manufacturing sector*							
Annual Δ in China IP	-0.274	-0.230	0.977	2.201**	2.304**	2.932***	2.048**
	(0.651)	*(0.878)*	*(1.074)*	*(0.383)*	*(0.955)*	*(1.097)*	*(0.927)*
Annual Δ in China IP × Post 2007							4.365
							(6.249)
Stacked long differences	90-00	90-00	91-00	92-97, 97-02	92-97, 97-02	All 5-year stacks	92-97, 97-02
	00-07	00-07	00-07	02-07	02-07, 07-12	from 1991 to 2014	02-07, 07-12
1st stage F-stat		75.42	65.58	61.62	58.28	30.32	58.28
Observations (rounded)	1400	1400	1400	2200	2900	13500	2900

Notes: Each stack contains (rounded) 700 CZs. All regressions include the original ADH controls and Census division dummies. In columns (1) and (2), coefficients estimates are weighted by start-of-period CZ national population share and robust standard errors in parenthesis are clustered at the state level (as in ADH). In columns (3) to (7), coefficients estimates are weighted by start-of-period CZ employment and robust standard errors in parenthesis are clustered at the CZ level. * Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Table 2: Local Employment Decomposition of the Effect of Chinese Import Penetration

2SLS ESTIMATES OF CHANGE IN CZ SECTORAL EMPLOYMENT GROWTH COMPONENT ON CHANGE IN CZ IP

Dependent variables: growth contribution of component relative to average sectoral CZ employment

		Continuing Establishments		Entry of Establishments		Exits of Establishments		Sector-switching Establishments	
	Net Employment Growth	Job Creation	Job Destruction	Openings by Continuing Firms	Openings from Firm Birth	Closings by Continuing Firms	Closings from Firm Death	Switch Ins from Other Sector	Switch Outs to Other Sector
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A: *Manufacturing sector*									
Annual Δ in China IP	-3.696**	0.504	-1.122	-0.152	0.543	-1.978**	-0.314	0.459**	-1.640***
	(1.674)	*(0.667)*	*(0.846)*	*(0.535)*	*(0.518)*	*(0.831)*	*(0.802)*	*(0.186)*	*(0.596)*
Panel B: *Non-manufacturing sector*									
Annual Δ in China IP	2.291**	-0.018	0.681**	0.566	0.383	0.447	0.078	0.192***	-0.037
	(0.945)	*(0.327)*	*(0.289)*	*(0.355)*	*(0.497)*	*(0.273)*	*(0.325)*	*(0.061)*	*(0.034)*

Notes: Import penetration measure in all regressions is change in Chinese imports / absorption (AADHP) and estimation is performed for stacked five-year long differences 1992-1997, 1997-2002, 2002-2007, and 2007-2012. Each regression contains 2900 observations (stacked) and includes original ADH controls and Census division dummies. Reported coefficients estimates are weighted by initial CZ employment. Robust standard errors reported in parenthesis are clustered at CZ level. * Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Table 3: Establishment Industry Switching Sector to Sector Flows

2SLS ESTIMATES OF CHANGE IN CZ NON-MANUFACTURING EMPLOYMENT GROWTH COMPONENT ON CHANGE IN CZ IP

Dependent variables: growth contribution of component relative to average CZ manufacturing employment

		Non-manufacturing switch-in NAICS industries			
		All Non-manufacturing	54 (Professional Services) & 55 (Management)	42 (Wholesale)	Other Non-manufacturing
Manufacturing switch-out NAICS industries	All Manufacturing	-1.640***	-1.131*	-0.460**	-0.049
		(0.596)	(0.586)	(0.186)	(0.157)
	31 (Food&Bev, Textile mills, Apparel, Leather)	-0.103	-0.024	-0.085	0.006
		(0.155)	(0.050)	(0.085)	(0.113)
	32 (Wood, Paper, Petro&Coal, Chemicals, Plastics&Rubber, Nonmetallic)	0.083	0.110	-0.026	-0.001
		(0.115)	(0.077)	(0.033)	(0.057)
	33 (Metal, Machinery, Computer&Electronics, Electrical, Transportation equm, Furniture)	-1.620**	-1.217**	-0.349**	-0.054
		(0.639)	(0.603)	(0.149)	(0.081)

Notes: Import penetration measure in all regressions is change in Chinese imports / absorption (AADHP) and estimation is performed for stacked five-year long differences 1992-1997, 1997-2002, 2002-2007, and 2007-2012. Each regression contains 2900 observations (stacked) and includes original ADH controls and Census division dummies. Reported coefficients estimates are weighted by initial CZ employment. Robust standard errors reported in parenthesis are clustered at CZ level. * Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Table 4: The Effect of Import Competition on Local Manufacturing Employment by CZ Human Capital Intensity

2SLS ESTIMATES OF CHANGE IN CZ MANUFACTURING EMPLOYMENT GROWTH COMPONENT ON CHANGE IN CZ IP

Dependent variables: growth contribution of component relative to average CZ manufacturing employment

	(A) Net Employment Growth	(B) Net Switching to Non-Mfg	(A) - (B) = Conventional Employment Growth	Job Creation by Continuing Establishments	Job Destruction by Continuing Establishments	Entry of Establishments	Exit of Establishments
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Annual Δ in China IP × 1(HHC)	-3.108	-1.640**	-1.468	0.932	-0.668	-1.145	-0.587
	(2.056)	*(0.803)*	*(1.949)*	*(0.923)*	*(1.040)*	*(0.840)*	*(1.513)*
Annual Δ in China IP × 1(LHC)	-4.527**	-0.528	-3.999**	-0.100	-1.770**	2.556***	-4.690***
	(1.835)	*(0.528)*	*(1.665)*	*(0.564)*	*(0.853)*	*(0.860)*	*(1.312)*
P-values: HHC = LHC	0.496	0.117	0.187	0.195	0.247	0.000	0.006

*Notes: Import penetration measure in all regressions is change in Chinese imports / absorption (AADHP) and estimation is performed for stacked five-year long differences 1992-1997, 1997-2002, 2002-2007, and 2007-2012. Each regression contains 2900 observations (stacked) and includes original ADH controls and Census division dummies. Reported coefficients estimates are weighted by initial CZ employment. Robust standard errors reported in parenthesis are clustered at CZ level. * Significant at 10%; ** Significant at 5%; *** Significant at 1%.*

Table 5: The Effect of Import Competition by Plant Earnings

2SLS ESTIMATES OF CHANGE IN CZ MANUFACTURING EMPLOYMENT GROWTH COMPONENT ON CHANGE IN CZ IP

Dependent variables: growth contribution of component relative to average manufacturing employment

	(A) Net Employment Growth	(B) Net Switching to Non-Mfg	(A) - (B) = Conventional Employment Growth	Job Creation by Continuing Establishments	Job Destruction by Continuing Establishments	Entry of Establishments	Exit of Establishments
	(1)	(2)	(3)	(4)	(5)	(7)	(6)
Panel A: *Effect on CZ employment growth component in Manufacturing sector*							
Annual Δ in China IP	-3.696**	-1.181**	-2.515	0.504	-1.122	0.459**	-2.292*
	(1.674)	*(0.595)*	*(XX)*	*(0.667)*	*(0.846)*	*(0.186)*	*(1.256)*
Panel B: *Contribution by Estabishments with Above Median Average Earnings*							
Annual Δ in China IP	-1.571	-1.088*	-0.484	0.178	0.417	0.227	-0.908
	(1.315)	*(0.560)*	*(1.342)*	*(0.638)*	*(0.831)*	*(0.140)*	*(0.969)*
Panel C: *Contribution by Estabishments with Below Median Average Earnings*							
Annual Δ in China IP	-2.125**	-0.093	-2.032**	0.328	-1.537***	0.232*	-1.384*
	(0.913)	*(0.167)*	*(0.865)*	*(0.312)*	*(0.555)*	*(0.138)*	*(0.777)*

Notes: Import penetration measure in all regressions is change in Chinese imports / absorption (AADHP) and estimation is performed for stacked five-year long differences 1992-1997, 1997-2002, 2002-2007, and 2007-2012. All regressions include original ADH controls and Census division dummies. Reported coefficients estimates are weighted by initial CZ employment. Robust standard errors reported in parenthesis are clustered at CZ level.

* Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Table 6: Effect of IP on Local Non-Manufacturing Employment by Firm Characteristics

2SLS ESTIMATES OF CHANGE IN CZ NON-MANUFACTURING EMPLOYMENT GROWTH COMPONENT ON CHANGE IN CZ IP

Dependent variables: growth contribution of component relative to average CZ manufacturing employment

	Net Employment Growth	Job Creation by Continuing Establishments	Job Destruction by Continuing Establishments	Entry of Establishments	Exit of Establishments	Switch In of Establishments from Non-Mfg.	Switch Out of Establishments to Non-Mfg
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: *Effect on CZ employment growth component in Manufacturing sector*							
Annual Δ in China IP	-3.696**	0.504	-1.122	0.392	-2.292*	0.459**	-1.640***
	(1.674)	*(0.667)*	*(0.846)*	*(0.742)*	*(1.256)*	*(0.186)*	*(0.596)*
Panel B: *Contribution by firms expanding in Non-Manufacturing sector*							
Annual Δ in China IP	-2.833***	0.345	-1.156**	0.152	-1.107**	0.011	-1.078**
	(1.027)	*(0.327)*	*(0.539)*	*(0.406)*	*(0.534)*	*(0.058)*	*(0.498)*
Panel C: *Contribution by importing firms*							
Annual Δ in China IP	-4.425***	0.257	-1.885**	0.213	-1.755**	0.195	-1.450***
	(1.443)	*(0.514)*	*(0.810)*	*(0.463)*	*(0.808)*	*(0.150)*	*(0.554)*
Panel D: *Contribution by firms with more than 1000 employees*							
Annual Δ in China IP	-3.067**	0.937	-1.374	-0.187	-1.265	0.227	-1.404**
	(1.470)	*(0.602)*	*(0.850)*	*(0.474)*	*(0.890)*	*(0.140)*	*(0.569)*

Notes: Import penetration measure in all regressions is change in Chinese imports / absorption (AADHP) and estimation is performed for stacked five-year long differences 1992-1997, 1997-2002, 2002-2007, and 2007-2012. Each regression contains 2900 observations (stacked) and includes original ADH controls and Census division dummies. Reported coefficients estimates are weighted by initial CZ employment. Robust standard errors reported in parenthesis are clustered at CZ level. * Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Table 7: Effect of IP on Local Non-Manufacturing Employment by Firm Characteristics

2SLS ESTIMATES OF CHANGE IN FIRM PERFORMANCE ON CHANGE IN IP

Dependent variables: Change in measure of firm performance

	Employment	**Sales**	**Profits**	**Investment**	**Market Value**
Panel A: *Manufacturing Firms w/ Trade Exposure*					
D in Firm-Level China IP	-0.209	-0.345*	-3.014**	-0.110	-0.134
	(0.172)	*(0.186)*	*(1.514)*	*(0.130)*	*(0.182)*
Mean Employment	9294.1	9294.1	9294.1	9294.1	9294.1
Observations	11835	11908	11922	11964	10967
Panel B: *Manufacturing Firms w/ Trade Exposure, Employment Weighted*					
D in Firm-Level China IP	0.334	0.312	0.263	0.120	-0.472
	(0.423)	*(0.275)*	*(0.533)*	*(0.078)*	*(0.353)*
Mean Employment	77714.2	77714.2	77714.2	77714.2	77714.167
Observations	10429	10439	10451	10493	9604

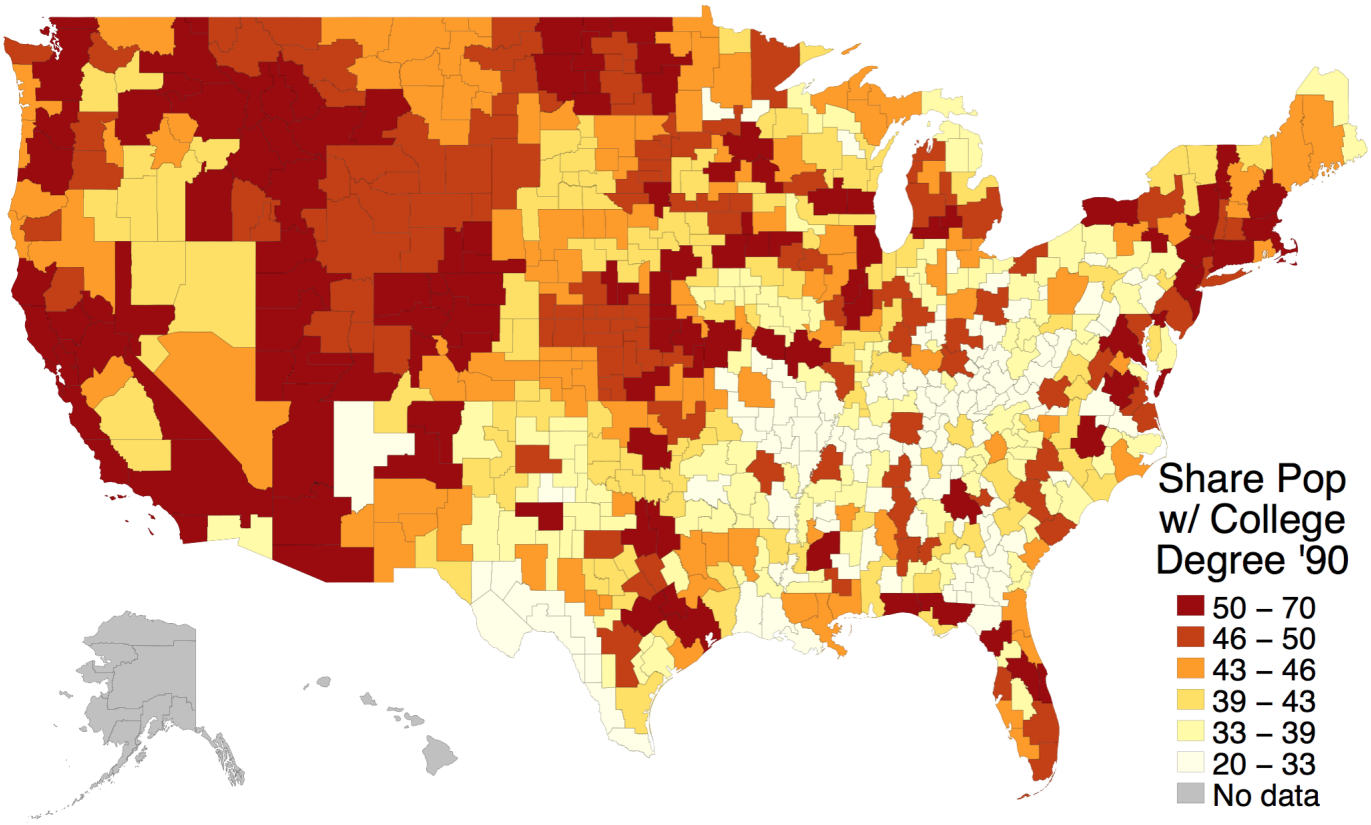
Notes: Import penetration measure in all regressions is the five year change in Chinese imports / absorption attributed to firms based on their average sales over the period 1987 to 1992. Estimation is performed on a rolling window of stacked five-year long differences spanning 1992-2007. All regressions include industry and year fixed effects. In panel C coefficients estimates are weighted by initial firm employment. Robust standard errors reported in parenthesis are clustered at firm and industry level.

* Significant at 10%; ** Significant at 5%; *** Significant at 1%.

A Appendix

A.1 Additional Figures and Tables

Figure A.1: Percentage of Commuting Zones Population with a College Degree in 1990



Note: Human capital is defined as the percentage of the total population with a college degree in 1990, which is derived from the Decennial Census.

Table A.2: Effect of IP on Employment Decomposition using ADH Long Difference Sample

2SLS ESTIMATES OF CHANGE IN CZ SECTORAL EMPLOYMENT GROWTH COMPONENT ON CHANGE IN CZ IP

Dependent variables: growth contribution of component relative to average sectoral employment

	Net Employment Growth	Job Creation by Continuing Establishments	Job Destruction by Continuing Establishments	Entry of Establishments & Firm Birth	Exit of Establishments & Firm Death	Switch Outs to Other Sector	Switch Ins from Other Sector	Net Switching from/to Other Sector
Effect on CZ employment growth component in Manufacturing sector								
Annual **Δ** in China IP	-6.031***	-0.116	1.223*	-0.578	2.240**	-0.578***	1.296**	1.874***
	(1.612)	(0.503)	(0.637)	(0.582)	(0.923)	(0.205)	(0.578)	(0.679)
Effect on CZ employment growth component in Non-Manufacturing sector								
Annual **Δ** in China IP	0.935	0.060	-0.475**	-0.066	-0.305	0.175**	0.014	-0.160*
	(0.798)	(0.291)	(0.205)	(0.636)	(0.224)	(0.083)	(0.020)	(0.084)

Notes: Import penetration measure in all regressions is change in Chinese imports / absorption (AADHP) and estimation is performed for stacked two long differences periods employed by AADHP (1991-2000, 2000-2007). All regressions include original ADH controls and Census division dummies. Reported coefficients estimates are weighted by initial CZ employment. Robust standard errors reported in parenthesis are clustered at CZ level.

* Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Table A.1: Effect of IP on Local Employment Across Various Specifications

ESTIMATES OF CHANGE IN SECTORAL CZ EMPLOYMENT ON CHANGE IN CZ IP

	Dependent variables: annualized log change in sectoral employment						
	(1)	(2)	(3)	(3)	(4)	(6)	(7)
Panel A. Manufacturing employment							
Annual Δ in China IP	-2.770**	-7.713***	-5.640***	-3.980*	-3.687**	-4.402***	-6.271***
	(1.409)	(2.251)	(1.811)	(2.031)	(1.690)	(1.346)	(1.892)
Annual Δ in China IP * Post 2007						12.20	4.114
						(14.87)	(5.376)
Panel B. Non-manufacturing employment							
Annual Δ in China IP	-0.291	0.026	1.175	2.666***	2.304**	2.048**	2.118*
	(0.697)	(0.925)	(0.722)	(0.910)	(0.955)	(0.927)	(1.135)
Annual Δ in China IP * Post 2007						4.365	3.038
						(6.249)	(1.897)
Estimation	OLS	2SLS	2SLS	2SLS	2SLS	2SLS	2SLS
ADH controls	No	No	No	Mfg share	Yes	Yes	Yes
Division dummy	No	No	Yes	Yes	Yes	Yes	Yes
Observations	2900	2900	2900	2900	2900	2900	13500

Notes: In columns 1-6 regressions, Import penetration measure is change in Chinese imports / absorption (AADHP) and estimation is performed for four long differences periods spanning Economic Census year (1992-2012) In column 7 as a robustness we use all 19 available 5-year long differene periods between 1992 and 2012. In columns 1-6 we sequencially add our preferred set of controls, reporting our preferd estimates in column 6. All reported coefficient estimates are weighted by initial CZ employment. Robust standard errors reported in parenthesis are clustered at CZ level.

* Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Table A.3: Effect of IP on Local Manufacturing Employment by Expanding and Non-Expanding Firms

2SLS ESTIMATES OF CHANGE IN CZ MANUFACTURING EMPLOYMENT GROWTH COMPONENT ON CHANGE IN CZ IP

Dependent variables: growth contribution of component relative to average manufacturing employment

	Net Employment Growth	Job Creation by Continuing Establishments	Job Destruction by Continuing Establishments	Entry of Establishments & Firm Birth	Exit of Establishments & Firm Death	Switch In of Establishments from Non-Mfg.	Switch Out of Establishments to Non-Mfg	Net Switching from/to Non-Mfg
Effect on CZ employment growth component in Manufacturing sector								
Annual Δ in China IP	-3.696**	0.504	1.122	0.392	2.292*	0.459**	1.640***	-1.181**
	(1.674)	*(0.667)*	*(0.846)*	*(0.742)*	*(1.256)*	*(0.186)*	*(0.596)*	*(0.595)*
Contribution by firms expanding in Non-Manufacturing sector								
Annual Δ in China IP	-2.833***	0.345	1.156**	0.152	1.107**	0.011	1.078**	-1.067**
	(1.027)	*(0.327)*	*(0.539)*	*(0.406)*	*(0.534)*	*(0.058)*	*(0.498)*	*(0.506)*
Contribution by firms contracting in Non-Manufacturing sector								
Annual Δ in China IP	-1.016	0.421	0.203	-0.341	0.779	0.449**	0.563**	-0.114
	(0.923)	*(0.572)*	*(0.548)*	*(0.295)*	*(0.594)*	*(0.174)*	*(0.287)*	*(0.308)*
Contribution by firms with no presence in Non-Manufacturing sector								
Annual Δ in China IP	0.153	-0.260	-0.238	0.580	0.406	–	–	–
	(0.907)	*(0.341)*	*(0.441)*	*(0.541)*	*(0.829)*			

Notes: Import penetration measure in all regressions is change in Chinese imports / absorption (AADHP) and estimation is performed for stacked five-year long differences 1992-1997, 1997-2002, 2002-2007, and 2007-2012. All regressions include original ADH controls and Census division dummies. Reported coefficients estimates are weighted by initial CZ employment. Robust standard errors reported in parenthesis are clustered at CZ level.

* Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Table A.4: Effect of IP on Local Non-Manufacturing Employment by Expanding and Non-Expanding Firms

2SLS ESTIMATES OF CHANGE IN CZ NON-MANUFACTURING EMPLOYMENT GROWTH COMPONENT ON CHANGE IN CZ IP

Dependent variables: growth contribution of component relative to average non-manufacturing employment

	Net Employment Growth	Job Creation by Continuing Establishments	Job Destruction by Continuing Establishments	Entry of Establishments & Firm Birth	Exit of Establishments & Firm Death	Switch In of Establishments from Non-Mfg.	Switch Out of Establishments to Non-Mfg	Net Switching from/to Mfg
Effect on CZ employment growth component in Non-Manufacturing sector								
Annual Δ in China IP	2.291**	-0.018	-0.681**	0.949	-0.525	0.192***	0.037	0.155**
	(0.945)	*(0.327)*	*(0.289)*	*(0.681)*	*(0.425)*	*(0.061)*	*(0.034)*	*(0.077)*
Contribution by firms expanding in Manufacturing sector								
Annual Δ in China IP	0.003	0.066	0.067	0.012	-0.012	-0.003	0.017	-0.020
	(0.123)	*(0.101)*	*(0.093)*	*(0.093)*	*(0.076)*	*(0.005)*	*(0.029)*	*(0.031)*
Contribution by firms contracting in Manufacturing sector								
Annual Δ in China IP	0.564**	-0.053	-0.167	0.281**	0.006	0.195***	0.020	0.175**
	(0.225)	*(0.106)*	*(0.127)*	*(0.126)*	*(0.134)*	*(0.062)*	*(0.026)*	*(0.078)*
Contribution by firms with no presence in Manufacturing sector								
Annual Δ in China IP	1.723**	-0.032	-0.581**	0.656	-0.518	–	–	–
	(0.827)	*(0.333)*	*(0.250)*	*(0.614)*	*(0.365)*			

Notes: Import penetration measure in all regressions is change in Chinese imports / absorption (AADHP) and estimation is performed for stacked five-year long differences 1992-1997, 1997-2002, 2002-2007, and 2007-2012. All regressions include original ADH controls and Census division dummies. Reported coefficients estimates are weighted by initial CZ employment. Robust standard errors reported in parenthesis are clustered at CZ level.

* Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Table A.5: The Effect of Import Competition on Local Manufacturing Employment by Firm Importer Status

2SLS ESTIMATES OF CHANGE IN CZ MANUFACTURING EMPLOYMENT GROWTH COMPONENT ON CHANGE IN CZ IP

Dependent variables: growth contribution of component relative to average manufacturing employment

	Net Employment Growth	Job Creation by Continuing Establishments	Job Destruction by Continuing Establishments	Entry of Establishments & Firm Birth	Exit of Establishments & Firm Death	Switch In of Establishments from Non-Mfg.	Switch Out of Establishments to Non-Mfg	Net Switching from/to Non-Mfg
Effect on CZ employment growth component in Manufacturing sector								
Annual Δ in China IP	-3.696**	0.504	1.122	0.392	2.292*	0.459**	1.640***	-1.181**
	(1.674)	*(0.667)*	*(0.846)*	*(0.742)*	*(1.256)*	*(0.186)*	*(0.596)*	*(0.595)*
Contribution by importing firms								
Annual Δ in China IP	-4.425***	0.257	1.885**	0.213	1.755**	0.195	1.450***	-1.256**
	(1.443)	*(0.514)*	*(0.810)*	*(0.463)*	*(0.808)*	*(0.150)*	*(0.554)*	*(0.595)*
Contribution by non-importing firms								
Annual Δ in China IP	0.729	0.248	-0.764	0.179	0.537	0.265*	0.190	-0.075
	(1.169)	(0.499)	(0.467)	(0.551)	(0.868)	(0.138)	(0.130)	(0.123)

Notes: Import penetration measure in all regressions is change in Chinese imports / absorption (AADHP) and estimation is performed for stacked five-year long differences 1992-1997, 1997-2002, 2002-2007, and 2007-2012. All regressions include original ADH controls and Census division dummies. Reported coefficients estimates are weighted by initial CZ employment. Robust standard errors reported in parenthesis are clustered at CZ level.

* Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Table A.6: The Effect of Import Competition on Local Non-Manufacturing Employment by Firm Importer Status

2SLS ESTIMATES OF CHANGE IN CZ NON-MANUFACTURING EMPLOYMENT GROWTH COMPONENT ON CHANGE IN CZ IP

Dependent variables: growth contribution of component relative to average non-manufacturing employment

	Net Employment Growth	Job Creation by Continuing Establishments	Job Destruction by Continuing Establishments	Entry of Establishments & Firm Birth	Exit of Establishments & Firm Death	Switch In of Establishments from Non-Mfg.	Switch Out of Establishments to Non-Mfg	Net Switching from/to Mfg
Effect on CZ employment growth component in Non-Manufacturing sector								
Annual Δ in China IP	2.291**	-0.018	-0.681**	0.949	-0.525	0.192***	0.037	0.155**
	(0.945)	*(0.327)*	*(0.289)*	*(0.681)*	*(0.425)*	*(0.061)*	*(0.034)*	*(0.077)*
Contribution by importing firms								
Annual Δ in China IP	1.243***	0.051	-0.480**	0.239	-0.363*	0.143***	0.034	0.110
	(0.372)	*(0.287)*	*(0.224)*	*(0.208)*	*(0.214)*	*(0.052)*	*(0.032)*	*(0.070)*
Contribution by non-importing firms								
Annual Δ in China IP	1.048	-0.070	-0.200	0.710	-0.162	0.049**	0.003	-0.046**
	(0.854)	(0.317)	(0.207)	(0.620)	(0.349)	(0.023)	(0.016)	(0.020)

Notes: Import penetration measure in all regressions is change in Chinese imports / absorption (AADHP) and estimation is performed for stacked five-year long differences 1992-1997, 1997-2002, 2002-2007, and 2007-2012. All regressions include original ADH controls and Census division dummies. Reported coefficients estimates are weighted by initial CZ employment. Robust standard errors reported in parenthesis are clustered at CZ level.

* Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Table A.7: The Effect of Import Competition on Local Manufacturing Employment by Firm Size

2SLS ESTIMATES OF CHANGE IN CZ MANUFACTURING EMPLOYMENT GROWTH COMPONENT ON CHANGE IN CZ IP

Dependent variables: growth contribution of component relative to average manufacturing employment

	Net Employment Growth	Job Creation by Continuing Establishments	Job Destruction by Continuing Establishments	Entry of Establishments & Firm Birth	Exit of Establishments & Firm Death	Switch In of Establishments from Non-Mfg.	Switch Out of Establishments to Non-Mfg	Net Switching from/to Non-Mfg
Effect on CZ employment growth component in Manufacturing sector								
Annual Δ in China IP	-3.696**	0.504	1.122	0.392	2.292*	0.459**	1.640***	-1.181**
	(1.674)	*(0.667)*	*(0.846)*	*(0.742)*	*(1.256)*	*(0.186)*	*(0.596)*	*(0.595)*
Contribution by firms with more than 1000 employees								
Annual Δ in China IP	-3.067**	0.937	1.374	-0.187	1.265	0.227	1.404**	-1.176*
	(1.470)	*(0.602)*	*(0.850)*	*(0.474)*	*(0.890)*	*(0.140)*	*(0.569)*	*(0.610)*
Contribution by firms with 1000 employees or less								
Annual Δ in China IP	-0.630	-0.431	-0.253	0.579	1.027	0.232*	0.237*	0.004
	(0.904)	(0.411)	(0.347)	(0.582)	(0.770)	(0.138)	(0.123)	(0.149)

Notes: Import penetration measure in all regressions is change in Chinese imports / absorption (AADHP) and estimation is performed for stacked five-year long differences 1992-1997, 1997-2002, 2002-2007, and 2007-2012. All regressions include original ADH controls and Census division dummies. Reported coefficients estimates are weighted by initial CZ employment. Robust standard errors reported in parenthesis are clustered at CZ level.

* Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Table A.8: The Effect of Import Competition on Local Non-Manufacturing Employment by Firm Size

2SLS ESTIMATES OF CHANGE IN CZ NON-MANUFACTURING EMPLOYMENT GROWTH COMPONENT ON CHANGE IN CZ IP

Dependent variables: growth contribution of component relative to average non-manufacturing employment

	Net Employment Growth	Job Creation by Continuing Establishments	Job Destruction by Continuing Establishments	Entry of Establishments & Firm Birth	Exit of Establishments & Firm Death	Switch In of Establishments from Non-Mfg.	Switch Out of Establishments to Non-Mfg	Net Switching from/to Mfg
Effect on CZ employment growth component in Non-Manufacturing sector								
Annual Δ in China IP	2.291**	-0.018	-0.681**	0.949	-0.525	0.192***	0.037	0.155**
	(0.945)	*(0.327)*	*(0.289)*	*(0.681)*	*(0.425)*	*(0.061)*	*(0.034)*	*(0.077)*
Contribution by firms with more than 1000 employees								
Annual Δ in China IP	2.163***	0.166	-0.522**	0.542*	-0.831**	0.140***	0.039	0.101
	(0.548)	*(0.364)*	*(0.266)*	*(0.313)*	*(0.368)*	*(0.052)*	*(0.033)*	*(0.071)*
Contribution by firms with 1000 employees or less								
Annual Δ in China IP	0.128	-0.184	-0.158	0.407	0.307	0.052***	-0.002	-0.054**
	(0.777)	(0.310)	(0.171)	(0.563)	(0.306)	(0.019)	(0.019)	(0.024)

Notes: Import penetration measure in all regressions is change in Chinese imports / absorption (AADHP) and estimation is performed for stacked five-year long differences 1992-1997, 1997-2002, 2002-2007, and 2007-2012. All regressions include original ADH controls and Census division dummies. Reported coefficients estimates are weighted by initial CZ employment. Robust standard errors reported in parenthesis are clustered at CZ level.

* Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Table A.9: The Effect of Import Competition on Local Manufacturing Employment by Establishment Average Earnings

2SLS ESTIMATES OF CHANGE IN CZ MANUFACTURING EMPLOYMENT GROWTH COMPONENT ON CHANGE IN CZ IP

Dependent variables: growth contribution of component relative to average manufacturing employment

	Net Employment Growth	Job Creation by Continuing Establishments	Job Destruction by Continuing Establishments	Entry of Establishments & Firm Birth	Exit of Establishments & Firm Death	Switch In of Establishments from Non-Mfg.	Switch Out of Establishments to Non-Mfg
Effect on CZ employment growth component in Manufacturing sector							
Annual Δ in China IP	-3.696**	0.504	-1.122	0.392	-2.292*	0.459**	-1.640***
	(1.674)	*(0.667)*	*(0.846)*	*(0.742)*	*(1.256)*	*(0.186)*	*(0.596)*
Contribution by Estabishments with Above Median Average Earnings							
Annual Δ in China IP	-1.571	0.178	-0.417	-0.170	0.908	0.376**	-1.463***
	(1.315)	*(0.638)*	*(0.831)*	*(0.548)*	*(0.969)*	*(0.165)*	*(0.545)*
Contribution by Estabishments with Below Median Average Earnings							
Annual Δ in China IP	-2.125**	0.328	1.537***	0.561	1.384*	0.084	-0.177
	(0.913)	*(0.312)*	*(0.555)*	*(0.530)*	*(0.777)*	*(0.070)*	*(0.161)*

Notes: Import penetration measure in all regressions is change in Chinese imports / absorption (AADHP) and estimation is performed for stacked five-year long differences 1992-1997, 1997-2002, 2002-2007, and 2007-2012. All regressions include original ADH controls and Census division dummies. Reported coefficients estimates are weighted by initial CZ employment. Robust standard errors reported in parenthesis are clustered at CZ level.

* Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Table A.10: The Effect of Import Competition on Local Non-Manufacturing Employment by Establishment Average Earnings

2SLS ESTIMATES OF CHANGE IN CZ NON-MANUFACTURING EMPLOYMENT GROWTH COMPONENT ON CHANGE IN CZ IP

Dependent variables: growth contribution of component relative to average non-manufacturing employment

	Net Employment Growth	Job Creation by Continuing Establishments	Job Destruction by Continuing Establishments	Entry of Establishments & Firm Birth	Exit of Establishments & Firm Death	Switch In of Establishments from Non-Mfg.	Switch Out of Establishments to Non-Mfg
Effect on CZ employment growth component in Non-Manufacturing sector							
Annual Δ in China IP	2.291**	-0.018	-0.681**	0.949	-0.525	0.192***	0.037
	(0.945)	*(0.327)*	*(0.289)*	*(0.681)*	*(0.425)*	*(0.061)*	*(0.034)*
Contribution by Estabishments with Above Median Average Earnings							
Annual Δ in China IP	1.832***	-0.030	-0.718***	0.276	-0.742**	0.170***	0.044
	(0.636)	*(0.366)*	*(0.276)*	*(0.403)*	*(0.371)*	*(0.057)*	*(0.032)*
Contribution by Estabishments with Below Median Average Earnings							
Annual Δ in China IP	0.459	0.011	0.038	0.673	0.218	0.022	-0.008
	(0.524)	*(0.232)*	*(0.187)*	*(0.547)*	*(0.332)*	*(0.018)*	*(0.011)*

Notes: Import penetration measure in all regressions is change in Chinese imports / absorption (AADHP) and estimation is performed for stacked five-year long differences 1992-1997, 1997-2002, 2002-2007, and 2007-2012. All regressions include original ADH controls and Census division dummies. Reported coefficients estimates are weighted by initial CZ employment. Robust standard errors reported in parenthesis are clustered at CZ level.
* Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Table A.11: Effect of IP on Local Employment for Manufacturing Subsectors

2SLS ESTIMATES OF CHANGE IN CZ MANUFACTURING EMPLOYMENT GROWTH COMPONENT ON CHANGE IN CZ IP

Dependent variables: growth contribution of component relative to average manufacturing employment

	Share of total manufacturing employment	Net Employment Growth	Job Creation by Continuing Establishments	Job Destruction by Continuing Establishments	Entry of Establishments & Firm Birth	Exit of Establishments & Firm Death	Net Switching from/to Non-Mfg
Effect on CZ employment growth component in Manufacturing sector							
Annual Δ in China IP	*100%*	-3.696**	0.504	1.122	0.392	2.292*	-1.181**
		(1.674)	*(0.667)*	*(0.846)*	*(0.742)*	*(1.256)*	*(0.595)*
Contribution by Manufacturing subsector 31 (food & bev, textile mills, apparel, leather)							
Annual Δ in China IP	*17%*	-0.906	-0.451	-0.193	-0.009	0.592	-0.048
		(0.709)	*(0.367)*	*(0.399)*	*(0.390)*	*(0.796)*	*(0.176)*
Contribution by Manufacturing subsector 32 (wood, paper, petro & coal, chemical, plastics & rubber, nonmetallic)							
Annual Δ in China IP	*28%*	2.001***	-0.712**	-1.668***	-0.346	-1.254**	0.134
		(0.760)	*(0.344)*	*(0.430)*	*(0.282)*	*(0.518)*	*(0.119)*
Contribution by Manufacturing subsector 33 (metal, machinery, computer & electronic, electrical, transportation equm, furniture)							
Annual Δ in China IP	*55%*	-4.793***	1.668*	2.982***	0.746	2.955**	-1.267**
		(1.769)	*(0.853)*	*(1.012)*	*(0.658)*	*(1.421)*	*(0.625)*

Notes: Employment shares are calculated for 2002 from County Business Pattern data. Import penetration measure in all regressions is change in Chinese imports / absorption (AADHP) and estimation is performed for stacked five-year long differences 1992-1997, 1997-2002, 2002-2007, and 2007-2012. All regressions include original ADH controls and Census division dummies. Reported coefficients estimates are weighted by initial CZ employment. Robust standard errors reported in parenthesis are clustered at CZ level.
* Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Table A.12: Effect of IP on Local Manufacturing Employment By CZ Human Capital Intensity

2SLS ESTIMATES OF CHANGE IN CZ MANUFACTURING EMPLOYMENT GROWTH COMPONENT ON CHANGE IN CZ IP

Dependent variables: growth contribution of component relative to average CZ manufacturing employment

	Net Employment Growth	Conventional Employment Growth	Job Creation by Continuing Establishments	Job Destruction by Continuing Establishments	Entry of Establishments	Exit of Establishments	Net Switching to Non-Mfg
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: *Manufacturing sector*							
Annual Δ in China IP × 1(HHC)	-3.108	-1.468	0.932	0.668	-1.145	0.587	1.640**
	(2.056)	*(1.949)*	*(0.923)*	*(1.040)*	*(0.840)*	*(1.513)*	*(0.803)*
Annual Δ in China IP × 1(LHC)	-4.527**	-3.999**	-0.100	1.770**	2.556***	4.690***	0.528
	(1.835)	*(1.665)*	*(0.564)*	*(0.853)*	*(0.860)*	*(1.312)*	*(0.528)*
P-values: HHC = LHC	0.496	0.187	0.195	0.247	0.000	0.006	0.117

*Notes: Import penetration measure in all regressions is change in Chinese imports / absorption (AADHP) and estimation is performed for stacked five-year long differences 1992-1997, 1997-2002, 2002-2007, and 2007-2012. Each regression contains 2900 observations (stacked) and includes original ADH controls and Census division dummies. Reported coefficients estimates are weighted by initial CZ employment. Robust standard errors reported in parenthesis are clustered at CZ level. * Significant at 10%; ** Significant at 5%; *** Significant at 1%.*

Table A.13: The Effect of Import Competition on Local Employment, Payroll and Average Earnings

2SLS ESTIMATES OF CHANGE IN CZ EMPLOYMENT, PAYROLL, AND EARNINGS

Dependent variables: DHS growth rate of commuting zone employment, payroll and earnings

	Manufacturing Subsectors			Non-Manufacturing subsectors		
	NAICS 31	NAICS 32	NAICS 33	NAICS 42, 54 & 55	NAICS 48-49, 51 & 52-53	All Other
Effect on CZ employment growth by Sector						
Annual **Δ** in China IP	-5.137*	0.721	-5.753**	4.393*	4.284***	1.097
	(3.086)	(2.366)	(2.550)	(2.273)	(1.647)	(1.145)
Effect on CZ payroll growth by Sector						
Annual **Δ** in China IP	-5.185	-0.723	-3.761	2.734	5.986**	-5.559**
	(3.206)	(3.427)	(3.136)	(2.666)	(2.491)	(2.614)
Effect on CZ eanrings growth by Sector						
Annual **Δ** in China IP	0.044	-1.489	1.845	-1.631	1.819	-6.758***
	(1.651)	(1.868)	(1.858)	(1.975)	(1.671)	(2.364)
N	2900	2900	2900	2900	2900	2900

Notes: Each stack contains (rounded) 700 CZs. All regressions include original ADH controls and Census division dummies. Reported coefficients estimates are weighted by initial CZ employment. All estimates are reported as DHS changes in the left hand side variable. Estimated marginal effects in logs very similar but are not reported in order to keep the sample of commuting zones consistant across specificaitions. Robust standard errors reported in parenthesis are clustered at CZ level.

* Significant at 10%; ** Significant at 5%; *** Significant at 1%.

B The Impact of the China Shock on Firm Performance

This paper provides evidence that the decline in local manufacturing employment in response to Chinese import competition was driven primarily by large, importing firms reallocating jobs towards non-manufacturing activities. One limitation of our Census micro-data is that it only covers the domestic activities of firms. Given that multinational firms account for a large and growing portion of total U.S. employment, we also wish to investigate how import penetration effects total global employment of firms as well as other firm attributes. In this appendix we address this question by utilizing data on global firm employment, sales, investment and market value from Compustat and follow a similar empirical strategy as laid out in section 3 to identify the causal effect of import penetration on firms rather than local economies. Using the Compustat database we first construct a firm-level measure of exposure to Chinese imports and then estimate the effect import exposure on employment, sales, profits, and market value. Section B.1 describes our measure of firm import exposure and performance as well as our empirical strategy and section B.2 presents our empirical results.

B.1 Data description and Empirical Strategy

In order to augment our Census micro data for this purpose, we use data on publicly traded firm listed on the North American stock markets from Compustat, which allows us to measure exposure to Chinese trade at the firm-level by providing information regarding firms sales by product type. We use the Compustat Segments database, which reports reports firm sales by line of business. Each line of business is associated with an industry code and in many cases a secondary industry code reported at the 4-digit SIC. Following Bloom et al. (2013), for lines of business with two codes listed, we allocate 75 percent of the line's sales to the primary industry and 25 percent to the secondary industry. The Segments database allows us to construct a firm specific profile of average sales over the period 1987-1992, prior to rise of Chinese import penetration. We use this sales average to construct a firm-specific measure of import penetration based on each firms exposure to industry level import penetration as follows:

$$\Delta IP_{f\tau} = \Delta IP_{j\tau} \frac{\overline{S}_{fj,87-92}}{\sum_j \overline{S}_{fj,87-92}} \tag{9}$$

where $\Delta IP_{j\tau}$is the change in imports in industry j over the period τ, as define previously, and $\overline{S}_{fj,87-92}$ is firm $f's$ average sales in industry j over the period 1987 to 1992. We construct an instrument for supply driven shocks to import penetration using $\Delta IPO_{j\tau}$ in the same way as for our local import penetration measure. In addition to allowing us to measure firm-level exposure to import penetration, the

Turning to our measure of global firm performance, Compustat allows us to measure the following: employment, sales, profits, investment and market value.[18] Employment is measure by the variable "emp" which measure annual global employment for each firm. Firm sales are measured by the variable "sale" which measure sales net of turnover. The firm investment rate is defined as the firms real capital expenditures divided by the capital stock in year t-1. Profits are defined quite broadly as sales minus cost of goods (cogs). Lastly, the market value of the firm is measure utilizing information on the monthly total return of the firm (trt1m). All measure are winsorized and we then construct long difference of all measure. DHS growth rates are employed for all outcomes that are measured in levels (employment, sales, profits and market value), while for investment our outcome is measured in changes in the investment rate.

Having constructed our measure of firm-level performance and firm-level import exposure we now turn to our baseline firm-level regression specification, which takes the form

$$\Delta x_{fj\tau} = \alpha + \beta \Delta IP_{f\tau} + \delta_j + \delta_\tau + \epsilon_{it} \tag{10}$$

where $\Delta x_{fj\tau}$ is the firm-level growth rate of either employment, sales, investment or market value over a period of τ years; $\Delta IP_{f\tau}$ is our measure of firm-level import penetration as defined in equation (9); and δ_j and δ_τ are industry and period fixed effects controlling for industry- and period specific-trends. Having established that the China Shock appears to have stopped impacting local employment around 2007 and in an effort to avoid contamination from the Great Recession, we restrict the sample for these regressions to the period 1992-2007. We utilize all 5-year long difference periods over this period in order to minimize the impact of any individual sample year. In order to correct for an artificially inflated number of observations, we cluster our standard errors

[18]Employment and sales correspond to the global rather than domestic activities of the firm. Profits are measured as sales minus cost of goods, which excludes depreciation. Investment is measured as a percent of the lagged capital stock. Market value is measured based on the firm's stock price.

at both the firm and industry level.The empirical strategy for these firm-level regressions is similar to that of Autor et al. (2016), who employ the Compustat database along with the U.S. Patent and Inventor Database to measure the effect of increased firm import penetration on innovation. Although our strategy is similar, it deviates in several key ways. First, Autor et al. (2016) do not use a rolling window of long difference periods and instead use the periods 1991-1999 and 1999-2007. Second, they weigh their regressions by the number of patents that firms file in order to produce a representative sample of innovating firms, and third – and perhaps most importantly – they utilize an industry- rather than firm-level measure of import penetration. Employing the Segments information in Compustat allows us to construct our firm specific measure of Chinese import penetration as defined by equation (9), which attributes Chinese imports to firms according to products they sold prior to the increase in Chinese trade rather than their industry affiliation. Using our firm-level measure also allows us to include industry fixed effects to control for trends, even within detailed 4-digit SIC industries, restricting our variation to differences in trade exposure across firms within the same industry.

B.2 Additional Empirical Results

In the main text we report reports the results from estimating equation (10). We interpret this as evidence that reorganization due to the China Shock did not occur without some firms incurring some costs, though its still unclear if these cost would have been larger in the absence of cheaper intermediate and offshoring opportunities as a results of increase Chinese productivity. On net, we believe our evidence of reorganization of the U.S. economy caused by Chinese import penetration provides a more nuanced picture of the effect of China on the U.S. economy. It should also be noted that are results are sensitive to the inclusion of sector rather than industry fixed effects. We report our estimates using sector fixed effects in the appendix in table (A.14). In our unweighted specification we find a negative and statistically significant effect on all outcomes, which indicates that there are significant differences in firm exposure to import penetration across industries that our preferred specification does not capture. Results when weighting by firm size are more mixed.

Table A.14: The Effect of Import Competition Firm Performance

2SLS ESTIMATES OF CHANGE IN FIRM PERFORMANCE ON CHANGE IN IP

Dependent variables: Change in measure of firm performance

	Employment	Sales	Profits	Investment	Market Value
Panel A: *All Manufacturing Firms*					
Δ in Firm-Level China IP	-0.281**	-0.613***	-2.207***	-0.223***	-0.280*
	(0.135)	*(0.166)*	*(0.719)*	*(0.083)*	*(0.145)*
Observations	16021	16169	16183	16226	14846
Panel B: *Manufacturing Firms w/ Trade Exposure*					
Δ in Firm-Level China IP	-0.315**	-0.580***	-2.469***	-0.245**	-0.279*
	(0.138)	*(0.173)*	*(0.838)*	*(0.095)*	*(0.148)*
Observations	11835	11908	11922	11964	10967
Panel C: *Manufacturing Firms w/ Trade Exposure, Employment Weighted*					
Δ in Firm-Level China IP	0.039	0.053	-0.029	0.019	-0.015
	(0.312)	*(0.232)*	*(0.308)*	*(0.061)*	*(0.301)*
Observations	10431	10441	10453	10495	9605

Notes: Import penetration measure in all regressions is the five year change in Chinese imports / absorption attributed to firms based on their average sales over the period 1987 to 1992. Estimation is performed on a rolling window of stacked five-year long differences spanning 1992-2012. All regressions include sector and year fixed effects. Sectors defined at the 2-digit SIC level. In panel C coefficients estimates are weighted by initial firm employment. Robust standard errors reported in parenthesis are clustered at firm and industry level.

* Significant at 10%; ** Significant at 5%; *** Significant at 1%.