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Han Ma

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Local Labor Market Spillover of M&As

BY

Han Ma

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ACCEPTANCE

This dissertation was prepared under the direction of the Han Ma Dissertation Committee. It has been approved and accepted by all members of that committee, and it has been accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Business Administration in the J. Mack Robinson College of Business of Georgia State University.

Richard Phillips, Dean

DISSERTATION COMMITTEE

Dr. Lixin Huang (Chair)

Dr. Mark A. Chen

Dr. Omesh Kini

Dr. Vincent Yao (External-Department of Real Estate)

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ABSTRACT

Local Labor Market Spillover of M&As

BY

Han Ma

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Committee Chair: Dr. Lixin Huang

Major Academic Unit: Department of Finance

This paper examines the local labor spillover effect of mergers and acquisitions (M&As). By focusing on M&As in the manufacturing sector, I find that, in the metropolitan statistical areas (MSAs) where target firms reside, the negative effect of M&As on employment growth spills over from the manufacturing sector to the non-tradable sector through shrinking local consumer demand. Further tests with household-level data confirm this finding. The spillover effect is stronger when M&A transactions are horizontal and when an MSA relies more heavily on the manufacturing sector. Finally, lower minimum wage requirements may absorb the negative pressure from M&As on the non-tradable sector employment growth.

Local Labor Market Spillover of M&As

Han Ma[1]

September 2020

Abstract

This paper examines the local labor spillover effect of mergers and acquisitions (M&As). By focusing on M&As in the manufacturing sector, I find that, in the metropolitan statistical areas (MSAs) where target firms reside, the negative effect of M&As on employment growth spills over from the manufacturing sector to the non-tradable sector through shrinking local consumer demand. Further tests with household-level data confirm this finding. The spillover effect is stronger when M&A transactions are horizontal and when an MSA relies more heavily on the manufacturing sector. Finally, lower minimum wage requirements may absorb the negative pressure from M&As on the non-tradable sector employment growth.

Keywords: Mergers and Acquisitions, Non-tradable Sector Employment Change, Spillover Effect

JEL Classification: G34, J23

[1] Ma is from the J. Mack Robinson College of Business, Georgia State University, Atlanta, GA 30303, USA. Tel.: +1-404-413-7316; Email: hma3@gsu.edu. I am grateful to my dissertation committee members Mark A. Chen, Lixin Huang (Chair), Omesh Kini and Vincent W. Yao for their guidance and suggestions. I also thank Dalida Kadyrzhanova, Kai Li, Ron Masulis, Mo Shen and seminar participants at AFA Ph.D. poster session, MFA doctoral tutorial, MFA Annual Meeting and Georgia State University for helpful suggestions. All errors are my own.

1. Introduction

On December 11, 2005, DuPont announced its merger with Dow to form DowDupont. Eighteen days later, DuPont initiated a layoff of 28% of its workforce at the headquarters. According to a news article, *"... DuPont's layoffs are expected to take a toll on local restaurants, grocery stores, retailers and home sales as families impacted by the job cuts curtail spending or leave the area entirely..."*[2] This example indicates that while M&As may improve corporate efficiency through workforce restructuring, they may also impact other economically related firms in the local area. Although prior literature has extensively studied the effect of M&As on the labor force of target firms, the research on the potential externality of M&As on the local labor market remains scant.[3] In this paper, I investigate the spillover effect of M&As on target firms' local labor markets.[4]

For empirical analysis, I examine how M&As in the manufacturing sector affect employment growth in the local non-tradable sector. This approach can be justified for several reasons. First, although employment in the U.S. manufacturing sector has been decreasing for decades, it has received fresh public attention in recent years because of its potential profound influence on society. For example, recent studies show that the loss of manufacturing jobs has contributed to the polarization of U.S. politics in recent elections (Che et al., 2016; Jensen et al., 2017; Freund and Sidhu, 2017; Autor et al., 2019). Second, the manufacturing sector usually relies on national or global demand (Adelino et al., 2017). Therefore, M&As in the manufacturing sector are likely to be driven by local economic

[2] For more details, see "Depressing Atmosphere Envelops DuPont as Layoffs Begin," The News Journal, January 4, 2016. https://www.delawareonline.com/story/money/business/2016/01/04/dupont-workers-learning-their-fate-today/78255924/.
[3] See Li (2012), John et al. (2015), Ma et al. (2016), Lagaras (2018), and Arnold (2019).
[4] Henceforth, I refer to the local labor market around the target firms as the local labor market.

shocks. Studying M&As in the manufacturing sector helps mitigate the concern that unobserved factors may drive M&A decisions and local employment growth simultaneously. Third, the manufacturing sector is generally labor-intensive (Bureau of Labor Statistics 2017), and labor force restructuring is usually a key cost reduction method for merging firms after deal completion (Maksimovic et al., 2011; Li, 2013). Therefore, M&As in the manufacturing sector often result in post-merger downsizing, which is the source of the spillover effect I analyze.[5] Finally, I analyze the employment growth in the non-tradable sector. As the non-tradable sector is primarily driven by local consumer demand, the employment change I measure is less likely to be confounded by aggregate shocks to national income (e.g., Moretti, 2010; Mian and Sufi, 2014; Giroud and Mueller, 2017).

Following previous studies (e.g., Maksimovic et al., 2011; Tate and Yang, 2016; Lagaras, 2018), I hypothesize that M&As represent employment shocks at the target firms, and hence, focus my empirical analysis only on the target firms. In Appendix A1, I present a simple theoretical model to illustrate how M&As in the manufacturing sector may affect employment growth in the local non-tradable sector. The model indicates that a merger can reduce aggregate employment and total labor income in the manufacturing sector. The reduced labor income in the manufacturing sector results in lower consumer demand for the non-tradable sector goods and services. As a result, the non-tradable sector is forced to cut production and labor inputs. Thus, the employment shock in the manufacturing sector spills over to the non-tradable sector.

[5] Henceforth, I refer to M&As in the manufacturing sector as M&As.

Before testing the empirical implications of the model, I use establishment-level data to confirm the effect of M&As on employment at the target establishments. Using a difference-in-differences test, I find that establishments that belong to M&A targets and have their headquarters located in the metropolitan statistical area (MSA) experience an additional 15.3% decline in total employment level compared to the matched control sample. This finding is consistent with the previous studies by Li (2013), Lagaras (2018), and Arnold (2019), and provides support for the following tests on the potential spillover effect.

However, an M&A must be substantially large to have a major impact on the local area. Therefore, I follow Bhattacharyya and Nain (2011) to identify MSAs that experienced a significant jump in merger activities in a specific quarter (henceforth referred to as M&A Events). After identifying these M&A Events, I use data from the U.S. Census Quarterly Workforce Indicators (QWI) and estimate an MSA-quarter panel regression. I find that, on average, an M&A Event is associated with a 34-basis-point lower annual employment growth in the local manufacturing sector for the next three years. This represents approximately a one-third drop from the unconditional mean of the manufacturing sector employment growth.

Moreover, lower employment growth is not restricted to the manufacturing sector. Tests with the non-tradable sector show that the annual employment growth rate in the non-tradable sector is 10.9-basis-point lower after an M&A Event in the local area. Given that the non-tradable sector is primarily driven by local demand (e.g., Moretti, 2010; Mian and Sufi, 2014), my finding suggests that M&A Events are associated with a negative spillover effect on the local labor market because of lower consumer demand. A simple back-of-the-

envelope calculation suggests that one job loss in the manufacturing sector after an M&A Event is accompanied by 0.58 potential job losses in the local non-tradable sector.

The main findings of this study are robust to a variety of additional tests. To address the concern that other confounding factors may drive the lower growth rate in the non-tradable sector, I repeat the baseline regression with "false" M&A Event dates. If the reduction in employment is driven by industry trends or aggregate economic conditions, then M&A Events with completion dates "falsely" set three years before the actual dates should have similar effects as the actual events. However, the placebo test fails to replicate the same pattern as the baseline results. The results are also robust when I exclude overlapping M&A Events or define M&A Events using alternative measures. I further test the robustness by excluding sample periods after 2007 to address the concern that the baseline results are driven by the Great Recession, which not only decreased consumer demand but also increased industry restructuring activities. Finally, I control for the impact of import competition from China on local areas to address the potential confounding effect of foreign competition. The empirical results consistently support the spillover effect of M&A Events in all robustness tests.

One key identification challenge is that unobserved local economic shocks could cause an MSA to experience an M&A Event and reduce local employment growth simultaneously. To address this concern, I construct a measure to capture the exogenous variation in the probability of an MSA experiencing an M&A Event. Prior studies have shown that firms with lower valuations are more likely to become targets in corporate takeovers (Shleifer and Vishny, 2003; Edmans et al., 2012). Similarly, undervalued industries are more likely to become target industries in mergers (Rhodes-Kropf and

Viswanathan, 2004; Rhodes-Kropf et al., 2005). When a national shock hits a specific manufacturing industry and reduces the industry valuation, the industry is more likely to become a target industry for M&As. At the same time, some regions are hit harder than others because their preexisting economic structure leaves them more exposed to industry valuation shocks. Therefore, the identification strategy rests on the idea that areas with higher average valuation should have a lower probability of experiencing M&A Events.[6] I follow the spirit of existing literature and interact the preexisting composition of an MSA's manufacturing sector with the sector's aggregate valuation shock to predict the exogenous variation in the probability of an M&A event.[7] The results from the two-stage-least-square (2SLS) estimation are consistent with the baseline results and confirm the adverse spillover effect of M&A on the local non-tradable sector employment.

To further confirm the effect of M&A Events on local employment growth, I use household level data from the Survey of Income and Program Participation (SIPP) to test the employment change at the individual level. The granular data at the household level enables me to control for individual characteristics and heterogeneity. I find results consistent with MSA-level findings. Individuals who work not only in the manufacturing sector but also in the non-tradable sector suffer from downsizing associated with M&A Events. An individual who worked in the manufacturing sector (non-tradable sector) before an M&A Event is found to be 2.4% (3.7%) more likely to become unemployed in the post-M&A Event period.

[6] To mitigate the concern that local economic shocks may drive the aggregate industry valuation (e.g., a flood in Michigan may cause a valuation decrease for the auto industry), I "clean" the valuation measure by orthogonalizing it with respect to average local economic shocks. See section 4.2 for more details.
[7] A similar approach has been adopted by Bartik (1991), Blanchard et al. (1992), Autor et al. (2013), and Adelino et al. (2017).

To provide further evidence on the decline in local consumer demand and explore the potential channel, I test the effect of M&As on wage growth and workforce migration. An M&A Event is associated with reduced wage growth in both the manufacturing and non-tradable sectors. Further tests on the effect of M&As on workforce migration show that M&A Events also correlate with lower population growth, lower labor force growth, and lower net migration inflow in the next three years. I use the total payroll growth in the non-tradable sector as a proxy for sales growth because of the unavailability of a direct measure of sales growth in the non-tradable sector. Considering that the non-tradable sector is usually labor-intensive and very competitive, the total payroll should account for a relatively constant share of total sales, and hence, the total payroll growth should be in line with the sales growth.[8] I find that M&A Events are negatively related to total payroll growth in the non-tradable sector, corroborating the theoretical prediction that the decrease in non-tradable sector employment is due to lower consumer demand for goods and services. Overall, the findings on wage and migration change provide additional support for the hypothesis that M&A in the manufacturing sector lead to lower employment growth in the local non-tradable sector.

Next, I investigate whether the spillover effect of M&A Events varies across MSAs and different types of M&A deals. First, MSAs that rely more heavily on the manufacturing sector are more likely to experience a spillover effect on the non-tradable sector employment after an M&A Event. Second, compared to other mergers, horizontal mergers

[8] According to the U.S. Bureau of Labor Statistics, the labor share (ratio of employee compensation and proprietors' labor compensation to the total output) only declined by 3% from 1997 to 2014 in the retail trade industry. Meanwhile, the labor share in the nondurable goods sector declined by 15% during the same period. See https://www.bls.gov/opub/mlr/2017/article/estimating-the-us-labor-share.htm for more details.

are associated with a stronger need for, as well as greater flexibility in, cost reduction and labor restructuring. Hence, M&A Events that consist of horizontal deals should have a more pronounced impact on the local non-tradable sector employment. Tests on sub-samples and with M&A Events defined based on different types of deals confirm both conjectures.

As M&As pose externalities on target firms' local labor markets, do various labor protections have differential effects on the spillover? I investigate this by analyzing the role of minimum wage requirements on M&A spillovers. As non-tradable sector firms are more sensitive to the change in the minimum wage (Cengiz et al., 2019), the level of the minimum wage in the local state may affect firms' ability to cope with adverse demand shocks. I find that while lower employment growth in the manufacturing sector is persistent in all states, the slowdown in the non-tradable sector employment growth only occurs in states with minimum wages higher than the federal level. Additional tests also indicate that non-tradable sector employers in areas with low minimum wage levels might handle downward pressure by reducing the wage levels. These results imply that a lower level of minimum wage could help firms in the non-tradable sector absorb negative demand shocks and mitigate the adverse outcomes of M&A Events on local consumer demand.

This study is closely related to the growing literature on employment and merger decisions. The extant literature has focused on several aspects. First, the labor market provides motives for corporate M&As (Ouimet and Zarutskie, 2016; Tate and Yang, 2016). Second, M&As are associated with changes in post-merger employment levels, wages, and the composition of the workforce (Ma et al., 2016; Olsson and Tåg, 2017; Lagaras, 2018; Arnold, 2019). Finally, labor restructuring in the form of layoffs is a primary source of

synergies and value creation in corporate takeovers (John et al., 2015; Dessaint et al., 2017). This study contributes to the literature by demonstrating that the effect of M&As on employment is not restricted to the target facilities but spills over to other industries in the local area through reduced consumer demand.

The study also adds to the literature on local consumer demand changes and the non-tradable sector employment fluctuation. Moretti (2010) suggests that each new job created has a local multiplier. Mian et al. (2013) and Mian and Sufi (2014) illustrate that losses in housing net wealth are associated with a drop in household consumption and non-tradable sector employment. Giroud and Mueller (2017) and Giroud and Mueller (2019) explore the role of firms in employment growth in responses to declines in local consumer demand. This study contributes to the literature by identifying a decline in non-tradable sector employment caused by M&As in the manufacturing sector. The findings may also benefit the studies that focus on the decline in the U.S. manufacturing sector (e.g., Autor et al., 2013; Autor and Dorn, 2013; Pierce and Schott, 2016) as they provide evidence on the underlying social cost of this decline.

Lastly, the study builds a link between corporate events and the welfare of households. Shleifer and Summers (1988) suggest that hostile takeovers may boost shareholders' gain at the cost of other stakeholders. Butler et al. (2017) and Cornaggia et al. (2018) study the spillover effect of initial public offerings and find contrary results. Bernstein et al. (2018) study the effect of different bankruptcy approaches on the local economy and find that liquidated establishments affect employment adversely. In contrast to these studies, this study sheds light on the spillover effect resulting from corporate restructuring and helps complete the picture of how corporate events may affect overall social welfare.

The remainder of this paper proceeds as follows. Section 2 describes the data and summary statistics. Section 3 presents the effect of M&A Events on the local employment growth in MSAs where target firms are headquartered. Section 4 provides further evidence on the local labor market spillover of M&A Events. Section 5 presents the results on the wage change, cross-sectional variation, and role of minimum wage requirements, and section 6 concludes.

2. Data

2.1. MSA-Level Data

The MSA-level analysis uses the publicly available data from the U.S. Census QWI, which are derived from the Longitudinal Employer-Household Dynamics program at the Census Bureau and provide employment and wage information based on detailed firm characteristics, such as geography, industry, age, and size. My main analysis focuses on MSA-level data instead of county-level data for two reasons. First, for reasons of confidentiality, the U.S. Census blocks out some of the variables from the publicly available QWI data. This missing variable issue is more severe at the county level than at the MSA level. Second, the local labor market is not constrained at the local counties; the workforce can migrate between counties while MSAs are larger areas and inter-MSA travels are less frequent. I focus on the employment growth in the manufacturing sector (two-digit NAICS code 31-33) and the non-tradable sector, which consists of Retail Trade (two-digit NAICS code 44-45) and Accommodation and Food Services (two-digit NAICS

code 72).[9] (see, e.g., Mian and Sufi, 2014; Adelino et al., 2017; Bernstein et al., 2018) The data on population, and income per capita comes from the Bureau of Economic Analysis and is available at the MSA year level dating back to 1990. Finally, I obtain the data on the labor force and the unemployment rate from the Bureau of Labor Statistics. After merging all the data sources, my final sample contains 24,107 MSA-quarter observations from 345 MSAs.

2.2. M&A Data

I obtain the data on M&As from Securities Data Company (SDC). From all the deals between 1990 and 2014 with target firms belonging to the manufacturing sector, I exclude leveraged buyouts, spinoffs, recapitalizations, self-tender offers, exchange offers, repurchases, partial equity purchases, acquisitions of remaining interest, and privatizations. I also require that both the acquirers and targets are in the United States as cross-border mergers may be driven by different purposes with domestic deals. Finally, the transaction value should be at least $45 million in 2010 dollars for a target to be included in the sample.[10]

For each target, I obtain the target zip code from SDC to identify its location. If the zip code of the target is missing in SDC, I collect the address of the target's headquarters from Compustat, whereever available. One concern with the empirical analysis is that the target zip code reported in the SDC data is usually the zip codes of the target's headquarters. If a

[9] Mian and Sufi (2014) define the non-tradable sector at the four-digit North American industry classification service (NAICS) code level, but the QWI data provides the best coverage at the two-digit NAICS sectoral level. As argued by Adelino et al. (2017), the definition of the non-tradable sector as Retail Trade (two-digit NAICS code 44-45) and Accommodation and Food Services (two-digit NAICS code 72) provides the closest match with this definition.

[10] This is equivalent to the top tercile of the transaction value in my sample.

target firm operates in multiple geographic areas, the empirical analysis may overlook the employment effect in their subsidiary areas. To address this concern, I match the SDC data with the Publicly Listed National Establishment Time Series (NETS) data and check the geographic concentration of target's employment. Using a matching method based on name, location, and industry, I successfully match 569 SDC deals with the NETS data.

In Table A1, I report the employment concentration of the targets.[11] On average, 58.2% of the target employments locate in the headquarters MSAs while the same ratio is only 38.6% for the acquirers. About half of the target companies have at least 60% of their employees in the headquarters MSAs. In addition, about 72% of the target companies in the sample have the highest employment in their headquarters MSAs while the same ratio is only 60% for acquirers. Overall, a significant portion of target companies' employment concentrates in the headquarters MSAs, confirming the validity of using location information from SDC.

There are two empirical challenges in identifying the influential mergers in local MSAs. First, theoretically, a merger needs to be substantially large to have a major impact on the local labor market. Second, for some MSAs, there are more than one mergers in each quarter or in consecutive quarters, posing a challenge to identify the merger that had a real impact. To address such issues, I follow the previous studies on merger waves and identify significant jumps of M&A activities in each MSA. A similar approach has been adopted by previous studies, such as Harford (2005) and Bhattacharyya and Nain (2011). Specifically, for each MSA in the sample, I measure the quarterly M&A activities as the

[11] In table A1, I also report information on the employment concentration of the acquirers for comparison.

total transaction value of all deals announced in the quarter. Then I calculate the time series mean of transaction values in each MSA. I classify an MSA as having experienced an M&A Event in a given quarter when the combined transaction value in that quarter is at least two standard deviations higher than the time-series mean transaction value in the same MSA. This definition ensures that the M&A Events measured in the paper are significant consolidation in local areas. It also provides a clean pre-event period during which there was relatively little M&A activity. With such a definition, there are 282 M&A Events in my final sample.[12]

2.3. Establishment-Level Data

The establishment-level employment data are from the NETS Database. The NETS data provide time-series information on establishment locations, employments, estimated sales, business lines, economic performance (job and sales growth, DB Ratings, payment performance), and type of establishments (standalone, headquarters, or branch). I obtain the employment and sales information for establishments that were publicly listed between 1990 and 2014 (which is the last year of the data available to me). I match the NETS data with SDC based on names, location, and industry of the headquarters establishments at the deal announcement year. I then remove establishments in Alaska, Hawaii, and Puerto Rico.[13] Following Lagaras (2018) and Arnold (2019), I focus my analysis only on establishments with at least 50 employees during the year before deal announcements. To keep consistency with the main tests, I only keep the target establishments located in the

[12] Tests with alternative definitions of M&A Events find statistically and economically similar results. Results of the baseline regressions with alternative definitions of M&A Events are reported in table A5.
[13] The employment data in the NETS database has been validated and used by many of the existing studies such as Asker et al. (2015), Faccio and Hsu (2017), Appel et al. (2019), Borisov et al. (2019), Chava et al. (2019).

headquarters MSAs. For each target establishment, I follow Li (2013), and construct a control group based on the following criteria: 1) the establishment operates in the same two-digit NAICS sector; 2) the establishment does not experience any M&A activities during [T-3, T+3] period of the merger; and 3) the establishment is in the same employment decile and sales decile as the target establishment. For each merged establishment, I select one control establishment with employment level closest to the target establishment before the year of the deal announcement. I then test the employment change three years before and three years after the merger. In Table A2, I provide the summary statistics of the establishment level data.

2.4. Household-Level Data

My sample of the household analysis is drawn from the 1995 and 2003 panels of the micro-level SIPP data because households' MSA information is no longer available in the SIPP data after 2003. Each SIPP panel tracks 60,000 to 80,000 individuals over a period of up to four years. From the SIPP data, I obtain employment-related information regarding individuals' employment status, occupation, industry, work experience, and income. Additionally, I obtain information on demographics, such as age, sex, race, marital status, household size, and educational attainment. I exclude individuals below the age of 16 or above the age of 70 as they are less likely to be active in the labor market. I also exclude individuals with missing geographic information. As a result, my final sample includes 93,795 individuals. In Table A3, I report the summary statistics of the household level data.

2.5. Summary Statistics

Table 1 reports the summary statistics. There are a total of 24,107 observations from 345 MSAs.[14] On average, about 4% of the MSA-quarter observations show at least one influential M&A Event in the sample. In an average MSA, about 16% of the total employees work in the manufacturing sector and about 24% work in the non-tradable sector. The average quarterly wage (in 2010 dollars) for workers in the manufacturing sector is $13,819.34, while it is only $6,803.44 for workers in the non-tradable sector.

M&As in the manufacturing sector in the U.S. have been substantial, both in terms of absolute dollar value and the fraction of all merger deals. As Figure 1a shows, on average, about 20%-25% of the U.S. targets are from the manufacturing sector. Although the proportion of deals in the manufacturing sector has been decreasing since 2010, possibly because of an overall decline in the sector, the average transaction value is still higher than the merger deals in other sectors. Figure 1b presents the dollar value of all deals and the fraction of all deals with targets from the manufacturing sector. On average, deals in the manufacturing sector account for about 30% of all transaction value in the U.S. Both the absolute dollar amount and the fraction show a trend that fluctuates in the sample period. It drops in the early 1990s, and then increases from the late 1990s until it reaches the first peak at the beginning of the 21st century. It then drops to its lowest level in 2004 before climbing back up in 2005 and stays at the level till 2010. Both the dollar amount and the fraction of acquisitions in the manufacturing sector decreased in recent years and stayed at a relatively low level after 2010.

[14] Different states started reporting to the QWI at different time. For example, Massachusetts did not start reporting until 2010.

Figure 2 presents the geographic distribution of M&As in the manufacturing sector. Figure 2a shows the number of deals in each county from 1990 to 2014, while Figure 2b shows the total transaction value (in 2010 dollars) in each county during the same period. The acquisitions in the manufacturing sector show concentration in certain geographical areas. For example, most of the deals are concentrated in the northeast as well as on the west coast, most likely because of the geographic concentration of industries.

3. Effect of M&As on Employment Growth

3.1. Target Establishment Level Analysis

Although a general decline in the target employment level has been well documented by previous studies (Li, 2013; Lagaras, 2018; Arnold, 2019), in this section, I formally present a test to show the change in employment at the target firms using establishment level from NETS data. Especially, I focus on target establishments in the headquarters MSA. For each target establishment, I select a control establishment by matching on the two-digit NAICS, employment decile, and sales decile at the year before the deal announcement. If multiple control establishments are found, I choose the establishment with the closest employment level. The identifying assumption for this test is that the target and control establishments should follow similar trends in employment change in the absence of the merger.

Following previous studies, I estimate the following matched difference-in-differences design:[15]

[15] Existing studies such as Li (2013), Ma et al. (2016), Lagaras (2018) and Arnold (2019). use similar approaches to test the establishment-level employment change after M&As.

$$Log(Emp)_{i,t} = \beta_0 + \beta_1 Post_t + \beta_2 Target_i + \beta_3 Target_i \times Post_t + \gamma X_{i,t} + \theta_i + \omega_t + \varepsilon_{i,t}, \quad (1)$$

where $Log(Emp)_{i,t}$ is the log employment of establishment i at time t. $Post_t$ is the indicator for the periods after the M&A deal completion. $Target_i$ is an indicator that equals one if the establishment is a target of an M&A deal and locates in the headquarters MSA. The interaction term $Target_i \times Post_t$ captures the average treatment effect of the M&A deals. $X_{i,t}$ is a vector that contains characteristics of the establishment and the establishment's MSA.[16] θ_i measures the year fixed effects and ω_t measures the establishment fixed effects. $\varepsilon_{i,t}$ is the error term. β_3 is the main coefficient of interest. A negative and statistically significant β_3 implies that M&As have a negative impact on the employment level at the target establishments. Standard errors are clustered at the establishment level.

Table 2 reports the regression results. In columns (1) to (3) of Table 2, the dependent variable is the log(employment) at the establishment. In column (1), the coefficient of *Target* × *Post* is negative and statistically significant. It indicates that compared to the control establishments, the target establishments on average experienced a greater decline in employment level. The coefficient of -0.097 indicates that compared to the control establishments, the target establishments on average experience a 9.7% decrease in employment after the merger. In column (2) of table 2, I include firm level control variables such as log (Establishment Age) and log (Number of branches). The coefficient of *Target* × *Post* remains negative and statistically significant. The target establishments on average

[16] The control variables include log (age of the establishment), log (number of total branches of the company), log (MSA total population), log (MSA average income) and the MSA unemployment rate.

experience a 15.5% decline in employment level relative to the control establishments. In column (3), I further control for population, average income, and the unemployment rate of the establishments' MSA to address the potential influence of local economic conditions on the employment change at the establishments. The estimated results remain statistically and economically unchanged. Overall, the results indicate a general decline in the employment level at the target establishments in the headquarters MSA after the completion of the mergers. The finding is consistent with previous studies (Li,2012; Li,2013; Lagaras, 2018; and Arnold, 2019). The finding that M&As are associated with a decline in the employment level provides support for my hypothesis and tests in the following sections.

3.2. MSA Level Analysis

My analysis of the local spillover effect of M&A Events is based on the comparison between MSAs that experienced M&As Events at different times. In the baseline analysis, I estimate the following MSA-quarter level panel regression:

$$Emp\ Growth_{m,t,t+12} = \beta_0 + \beta_1 M\&A\ Event_{m,t} + \beta_2 X_{m,t} + \eta_m + \pi_t + \varepsilon_{m,t}, \qquad (2)$$

where $Emp\ Growth_{m,t,t+12}$ measures the annualized three-year employment growth rate of MSA *m*. I focus on the three-year employment growth rate because it takes time to restructure the labor force after an M&A Event (Maksimovic et al, 2011). Specifically, to calculate the employment growth rate, I compare the employment of a sector at quarter *t* (EMP_t) with the employment level of the same sector at quarter *t+12* (EMP_{t+12}). The employment growth rate is defined as $(EMP_{t+12} - EMP_t)/EMP_t$. $M\&A\ Event_{m,t}$ is an indicator that equals one if MSA *m* experienced an significant jump in merger activities in

the past four quarters.[17] $X_{m,t}$ denotes a vector of time-varying demographic characteristics including the MSA level population growth rate and the total income growth rate. In the main model specifications, I also control for the indicator whether the local MSA has a higher presence of the manufacturing sector than the national median. The rationale is that MSAs with varying degrees of dependency on the manufacturing sector might be affected differently by M&As in the manufacturing sector. I include MSA and year-quarter fixed effects, which are denoted by η_m and π_t, respectively, to control time-invariant heterogeneity and time trends.

3.2.1. Effect on Employment growth in the Manufacturing Sector

Table 3 reports the results of the baseline regressions. The dependent variable is the annualized three-year employment growth rate (× 100) in the manufacturing sector. In column (1), I control for the MSA and year-quarter fixed effects. The coefficient -0.255 indicates that, compared with the MSAs not experiencing an M&A Event in the past four quarters, MSAs with M&A Events are associate with a 25.5-basis-point lower annual employment growth rate in the next three years. This result is economically significant compared to the unconditional mean of -1.119%. In column (2), I control for MSA characteristics by including the population growth rate and the personal income growth rate in the regression. The coefficient of the M&A Event indicator remains negative and statistically significant. The coefficient decreases from 0.255 to 0.240 compared to column (1), but the magnitude remains economically large.

[17] The results estimated with windows from 1-3 quarters are consistent with the baseline findings.

In column (3), I control for whether the MSA relies heavily on the manufacturing sector to address the possibility that the M&A Event variable could, in part, be picking up an overall declining trend in the U.S. manufacturing sector rather than being caused by an M&A Event. The high manufacturing area indicator is equal to one if the share of the manufacturing sector employment in the MSA is higher than the national median. The estimated coefficient indicates that an MSA with high presence of the manufacturing sector is on average associated with a 1.78 percentage points lower employment growth rate in the next three years. Finally, in column (4), I introduce the state × quarter fixed effects to address the possibility of heterogeneous trends across states. Some states might experience specific transitions in industry composition. For example, the manufacturing sector in Michigan might be going through a decline while the manufacturing sector in Tennessee is experiencing an expansion. Therefore, controlling for the state × quarter fixed effects can effectively address the possible bias caused by state level time varying heterogeneity. The coefficient on the M&A Event dummy remains statistically significant at -0.335, indicating that MSAs with M&A Events in the past four quarters are associated with a 33.5-basis-point lower annualized three-year employment growth in the manufacturing sector.

Taken together, the results from columns (1) to (4) suggest that a significant jump in M&A activities is associated with a sector-wide employment slowdown in the MSA where the targets are located. Lagaras (2018) finds that M&As are associated with a significant decline in the employment in the target firms through increased layoffs. My findings show that the negative effect on employment growth can spread to the whole manufacturing sector.

3.2.2. Effect on Employment Growth in the Non-Tradable Sector

The previous section has established the relation between M&A Events and the decline in the employment growth rate in the manufacturing sector. In this section, I examine the spillover of the negative effect on employment growth to the non-tradable sector. As illustrated by Mian and Sufi (2014), the non-tradable sector, such as retail and restaurants, depends heavily on the local demand. Consequently, layoffs after M&As are expected to lower the average wages and consumer demand of the local community. I follow Mian and Sufi (2014) and Adelino et al. (2017) to define the non-tradable sector as consisting of Retail Trade (two-digit NAICS 44-45) and Accommodation and Food Services (two-digit NAICS 72). I replace the dependent variable in the baseline regressions with the annualized three-year employment growth rate in the non-tradable sector and repeat the regressions specified in equation (1). Table 4 reports the results.

In Table 4, columns (1) to (4) repeat the tests matching the same columns reported in Table 3. In column (1), the model with no control variables indicates that an MSA with an M&A Event in the past four quarters is associated with a 0.103% lower annual employment growth rate in the non-tradable sector for the next three years. Further, in columns (2) and (3), where I control for MSA characteristics, the economic magnitude of the coefficient on the M&A Event stays similar. The coefficients on M&A Event dummy is economically significant compared to the unconditional sample mean of 1.171%. Finally, I repeat the same process as in Table 3 and control for state × time fixed effects. The coefficient on the M&A Event is 10.9 basis points, indicating that an M&A Event correlates to a 10.9-basis-point lower annual employment growth in the non-tradable sector. I adopt column (4) in Table 4 as the main model specification in the remaining of the paper.

Overall, the results in Table 4 indicate that there is a "hidden" cost of M&As that is borne by the local community where the targets are located.[18] By laying off redundant workforce and improving corporate efficiency, M&As are associated with a slower employment growth in the local area, not only for the manufacturing sector where the targets belong, but also for other sectors, such as the non-tradable sector.

4. Robustness Analysis

4.1. Placebo Event Dates and Alternative Definitions of Events

Table 4 shows that M&As are associated with slower employment growth in the non-tradable sector. In this section, I first employ a placebo test to address the concern that the above results might be driven by other confounding factors. Specifically, I change the timing of the M&A Events by replacing the event dates with placebo event dates that are 12 quarters before the actual dates. If acquirers pick up targets from areas with deteriorating conditions in the manufacturing sector or the local economy, then it is the deteriorating economic condition, rather than the M&A Events, that causes the findings reported in the previous sections. In this case, the placebo M&A Event dates should have a similarly negative impact on employment growth. Column (1) of Table 5 reports the result of the test with the placebo event dates. The dependent variable is the annualized three-year employment growth rate in the non-tradable sector. The coefficient on the M&A Event dummy is neither statistically nor economically significant, indicating that it is not the long-term trend in the local economy that drives the results reported in the previous

[18] In appendix table A4, I also test the effect of M&A Events on the overall employment growth rate of the MSA. M&A events are found to be negatively associated with the total employment growth of the MSA.

sections. Rather, it is the M&A Events that may cause slower employment growth in the MSAs.

Second, I address the potential effect of the overlapping M&A Events. Specifically, if one MSA experiences multiple significant jumps in M&A activities within three years, the estimated employment change after the first M&A Event might be contaminated by the following events. This might cause a bias in the estimated results. To address this concern, I "clean" the events by only keeping the first M&A Event in an MSA if there are multiple M&A Events within a three-year window. I then repeat the regression with the cleaned M&A Event dummy in column (2) of Table 5. As can be seen, the coefficient on the M&A Event dummy is consistent with the baseline regression.

Third, as Figure 1 shows, a large fraction of the M&As in the manufacturing sector took place around the Financial Crisis. The crisis could also affect local consumer demand by lowering household net wealth (Mian et al., 2013). To address this concern, I exclude the employment growth data after 2007 and repeat the baseline regression. The results on the non-tradable sector employment growth are similar to the baseline results. Finally, the competition from China has caused a decline of the employment in the manufacturing sector (e.g., Autor et al., 2013; Pierce and Schott, 2016). The pressure may also lead to lower employment growth in the local non-tradable sector. Therefore, I follow Autor et al. (2013) and estimate the local areas' exposure to the Chinese import penetration.[19] I repeat

[19] I first obtain the data of the industry-level trade flows from China to the U.S. between 1991 and 2007. The data is available on David Dorn's website (https://www.ddorn.net/data.htm). I then follow Autor et al. (2013) to interact the industry level import flow with the MSA's share of employment in each industry in 1990. I aggregate the interacted value for each MSA and use it to measure an MSA's exposure to the import competition from China. Finally, I scale the MSA's exposure to import competition by U.S. real GDP. Note that the import flow data is only available from 1991 to 2007 so the test in column (4) of Table 5 is from 1991 to 2007.

baseline tests while controlling for the effect of local exposure to the Chinese import. The effect of M&A Events in column (4) remains similar to the baseline regression. Overall, tests in Table 5 confirm the findings from the baseline tests that M&As in manufacturing sector have a negative spillover effect on the local labor market in areas where the target firms are located.

The empirical tests in Table 3 and Table 4 are based on the definition of M&A Events, which is an indicator equal to one when the combined transaction value in a quarter is at least two standard deviations higher than the mean transaction value in the local MSA. In Table A5, I test the robustness of results reported in Table 3 and Table 4 by using alternative definitions of M&A Events. First, I change the definition of M&A Events to an indicator that equals one when the combined transaction value in a quarter is one standard deviation or three standard deviations higher than the mean transaction value in the local MSA. Second, I define the M&A Events based on the largest deal in terms of transaction value. Third, I construct a continuous measure and replace M&A Event dummy with the log of combined transaction value in the MSA during the last four quarters. The results in Table A5 are both statistically and economically consistent with baseline results when M&A Events are measured with alternative definitions.[20]

4.2. 2SLS Analysis

The previous sections reveal that M&A Events in the manufacturing sector are correlated with a negative spillover effect on non-tradable sector employment by lowering local consumer demand. However, the correlation can hardly be interpreted as causal

[20] I also repeat the test by replacing the dependent variable with the annualized five-year employment growth rate. The results are consistent with the baseline regression. See table A5 for more details.

because unobserved economic factors could drive both employment growth in the non-tradable sector and an M&A Event at the same time. To provide more evidence on the relation between M&A Events and local labor market spillovers, I construct a measure to capture the exogenous variation in the probability of an MSA experiencing an M&A Event.

The literature connecting stock market valuation with corporate takeovers finds that undervalued firms are more likely to be selected as targets in takeovers (Shleifer and Vishny, 2003; Edmans et al., 2012). Similarly, if more firms from the same industry are undervalued, the industry should be more likely to become a target industry (Rhodes-Kropf and Viswanathan, 2004; Rhodes-Kropf et al., 2005). Hence, if an undervalued industry accounts for a large fraction of the local employment, the area might be more appealing for potential acquirers and be more likely to experience an M&A Event. Overall, this identification strategy hinges on the notion that MSAs with various exposure to undervalued industries might have different ex-ante probabilities to experience M&A Events.

I identify the exogenous shocks on the local valuation in the following way

$$S_{m,t} = \sum_i \frac{EMP_{i,m}}{EMP_m} \, Discount_{i,t}, \tag{3}$$

where $S_{m,t}$ measures the valuation shock to MSA *m* at time *t*. $EMP_{i,m}$ measures the employment of four-digit NAICS manufacturing industry *i* of MSA *m* when the MSA first enters the sample. EMP_m measures the total employment of MSA *m* when the MSA first enters the sample. I measure the local presence of an industry using the first available observation of an MSA to mitigate the concern of potential feedback effect from local labor market to stock market valuation. I follow Edmans et al. (2012) and use $Discount_{i,t}$ as the

valuation measure. $Discount_{i,t}$ measures by how much the firms from industry *i* are traded to their maximum potential value absent managerial inefficiency and mispricing.[21] The identifying assumption in equation (3) is that while the probability of having a merger target is likely to be endogenously related to local economic conditions, an industry's valuation is more likely to be driven by aggregate economic shocks. Areas with various ex-ante exposure to each industry would have different sensitivities to the fluctuations in industry valuation. However, the local valuation measure $S_{m,t}$ is also subject to potential bias. If an industry is concentrated in one area, the idiosyncratic shock to that area (e.g., housing market crash, natural disasters) could also affect industry valuation. For example, a flood in Michigan might impact the performance and outlook of the whole auto industry and lead to a decrease in valuation in the auto manufacturing industry.

To address this issue, I calculate the weighted average discount (weighted by market value) for all firms in the same MSA, $S^L_{m,t}$. Then, I regress the original measure $S_{m,t}$ on $S^L_{m,t}$ and take the residual term $\tilde{s}_{m,t}$. If $S^L_{m,t}$ captures the common valuation shocks shared by all firms in the local area, $\tilde{s}_{m,t}$ will be orthogonal to the local economic conditions and capture the exogenous variation in the probability of an M&A Event in the MSA. I then estimate the following regression

$$M\&A\ Event_{m,t} = \alpha_0 + \alpha_1 \times \tilde{s}_{m,t-1} + \alpha_2 \times X_{m,t} + \varepsilon_{m,t}, \quad (4)$$

[21] Specifically, I follow Edmans et al. (2012) to construct the discount measure based on Tobin's Q. The successful firms in an industry are defined as firms that rank on the 80th percentile in their four-digit NAICS industry. I calculate the discount measure as (Q* − Q)/Q*. See Edmans et al. (2012) for more details. I then aggregate the discount measure of each industry with the weight of total market cap.

where $X_{m,t}$ is a vector of the characteristics of MSA m at time t. α_1 is expected to be negative if areas with industries that have higher valuation are less likely to experience an M&A Event. In the second stage, I estimate the following regression

$$Emp\ Growth_{m,t,t+12} = \beta_0 + \beta_1 \times \overline{M\&A\ Event_{m,t}} + \beta_2 \times X_{m,t} + \varepsilon_{m,t}, \qquad (5)$$

where $Emp\ Growth_{m,t,t+12}$ is the same as in equation (2) and measures the annualized three-year employment growth rate. $\overline{M\&A\ Event_{m,t}}$ denotes the predicted probability of an M&A Event in the local MSA. Columns (1) and (2) of Table 6 report the results of first stage regressions. The local discount variable is negative and statistically significant on the probability of the MSA experiencing an M&A Event. A one SD increase in the local discount variable is associated with a 1.7% lower probability of an M&A Event. This effect is economically significant as well, given that the unconditional mean of the M&A Event is only about 4%. The local discount variable has a strong explanatory power with partial F-statistics of 22.61 and 22.91 in columns (1) and (2), respectively. In columns (3) and (4), I test the effect of M&A Events on manufacturing sector employment growth. The reduced form regression in column (3) indicates that a one SD increase in the local discount variable is associated with a 50-basis-point increase in the manufacturing sector employment. Additionally, column (4) suggests that a one SD increase in the local discount variable is associated with a 70-basis-point higher growth rate in the employment of the non-tradable sector.

In the last four columns of Table 6, I report the coefficient estimates for the second-stage regressions. All coefficients in columns (5) to (7) show negative and significant effect of M&A Events on the employment growth rate in the manufacturing and the non-tradable

sectors, consistent with the ordinary least squares (OLS) results. Including or removing the control variables do not affect the point estimates significantly. However, it is important to notice that the point estimates of the 2SLS regressions are much higher than the point estimates in the OLS regression. The greater 2SLS estimates indicate that M&A Events driven by differences in valuation lead to a greater drop in employment growth than average M&A Events. This is possible as the acquiring firms could identify undervalued targets and realize the potential value gain through labor restructuring. Alternatively, the 2SLS estimates could capture the marginal effect of a large valuation change. Acquiring firms might only approach a target when the target is significantly undervalued. I use the OLS model as the preferred model because it shows the average effect of M&A Events and is more conservative.

4.3. Household Level Analysis

The previous sections have established the relation between M&A Events and the spillover effect at the MSA level. In this section, I analyze how M&A Events affect the local labor market using household-year panel data from SIPP. My purpose is to provide evidence at the micro level to corroborate the findings at the aggregate MSA level. Specifically, I estimate the following regression:

$$Outcome_{i,m,t} = \alpha_0 + \alpha_1 Initial\ Mfg(Nontradable)_i \times M\&A\ Event_{m,t,t-3} + \alpha_2 M\&A\ Event_{m,t,t-3} + \alpha_3 X_{m,t} + \alpha_4 Y_{i,t} + \eta_m + \omega_t + \theta_i + \varepsilon_{i,t}, \quad (6)$$

where $Outcome_{i,m,t}$ is an indicator of the employment outcome of individual *i* from MSA *m* at time *t*. $Initial\ MFG(Nontradable)_i$ is an indicator that equals one if the individual

was working in the manufacturing sector (the non-tradable sector) at the first appearance in the sample. $M\&A\ Event_{m,t,t-3}$ is an indicator equal to one if MSA *m* experienced an M&A Event at time *(t-3, t)*. $X_{m,t}$ is a vector of the characteristics of MSA *m* at time *t* and $Y_{i,t}$ is a vector of individual characteristics of individual *i*. η_m represents the time invariant MSA fixed effects. ω_t represents the year fixed effects and θ_i represents the individual fixed effects. To study the effect of M&A Events on the household, I focus on two outcomes. First, the probability that an individual stays in the manufacturing sector (the non-tradable sector) and second, the probability that the individual loses his job after the M&A Events.

Table A2 reports the summary statistics of the household-level data. The individuals in the sample have an average age of 40. About 53% of the individuals are married. 10% of the sample observations work in the manufacturing sector and about 12% work in the non-tradable sector.[22] Overall, about 73% of the individuals in the sample are employed during the sample period. Table 7 reports the estimated results.[23]

In Panel A of Table 7, I test the effect of M&A Events on individuals working in the manufacturing sector. The $Initial\ Mfg_i$ dummy is defined as one if the individual *i* was working in the manufacturing sector during the year of her first appearance in the sample. In columns (1) to (3), the dependent variable is an indicator whether individual *i* works in the manufacturing sector. In column (1), I do not include any control variables; in column

[22] The relative size of employment in the non-tradable and manufacturing sectors in the QWI data between 1995 and 2003 is similar to that of the SIPP data.
[23] In Table 7, I also control the cohort fixed effects of each household. This is to control for the heterogeneity of households that enter the sample at different years.

(2), I control for all individual characteristics and MSA characteristics;[24] and in column (3), I control for MSA × year fixed effects to address the potential issue that different MSAs could have different trends in the local labor market. The coefficient on the interaction term *Initial Mfg* × *M&A Event* is negative and statistically significant, indicating that an individual working in the manufacturing sector before the M&A Events is less likely to keep working in the manufacturing sector. The estimated coefficient is equal to -0.069 to -0.067 across three model specifications, indicating that after the M&A Events, a treated individual is 6.9% to 6.7% less likely to remain in the manufacturing sector. In columns (4) to (6), I test the probability of an individual being employed after the M&A Events. The coefficient estimates in columns (4) to (6) indicate that individuals who worked in the manufacturing sector before the completion of mergers are 1.9% to 2.4% more likely to become unemployed during the three-year period after the M&A Events.

Further, I test the effect of M&A Events on workers in the non-tradable sector. The *Initial Non-tradable* dummy in Panel B of Table 7 is defined as one if an individual was working in the non-tradable sector during the year of first appearance in the sample. Like the results of Panel A, the coefficient on *Initial Non-tradable* × *M&A Event* is negative and statistically significant in all specifications, indicating that individuals who worked in the non-tradable sector are more likely to leave the sector after M&A Events. The effect is also economically significant. In columns (1) to (3) of Panel B, a treated individual is about 9.8% less likely to work in the non-tradable sector after an M&A Event.

[24] The control variables include MSA population, average income, unemployment rate, household size, age, college degree, and whether the individual is married.

Further, as columns (4) to (6) indicate, an individual working in the non-tradable sector is 4.4% more likely to become unemployed after M&A Events. Overall, the results from Table 7 confirm the findings that M&As in the manufacturing sector not only lead to a reduction in employment in the manufacturing sector, but also lead to a negative spillover on employment in the non-tradable sector.

5. Wage, Migration and Cross-sectional Variation

5.1. Effect of M&A Events on Wages and Labor Migration

The previous sections have documented a negative spillover effect on employment growth from the manufacturing sector to the local non-tradable sector after significant M&A Events. In this section, I explore the potential channels of the effect by testing the wage change and migrations. Existing works such as Moretti (2010), Mian and Sufi (2014), Adelino et al. (2017) and Bernstein et al. (2018) suggest that firms in the non-tradable sector, such as retailers and restaurants, depends heavily on the local demand. As shown in the theoretical model in the Appendix, the change in employment in the manufacturing sector diffuses to the non-tradable sector through fluctuations in total labor income. If M&As have a negative effect on employment in the manufacturing sector, the decreasing total labor income in the manufacturing sector then reduces the local consumer demand for products in the non-tradable sector. This will lead to lower employment growth in the local non-tradable sector.

Due to the data limitation, I cannot directly examine the change of sales growth in the local non-tradable sector businesses in the current version of the paper. Therefore, in this section, I provide some supporting evidence of drops in local consumer demand following

M&A Events. First, I analyze the effect of M&A Events on the MSA's wage growth in Panel A of Table 8. In column (1), I study the change in wage growth in the manufacturing sector. The dependent variable is the annualized three-year quarterly wage growth in the manufacturing sector. An M&A Event is negatively correlated with the three-year wage growth rate with a coefficient of -0.203. The coefficient indicates that MSAs with an M&A Event are expected to experience a 20.3-basis-point lower annual growth in wage in the manufacturing sector. This finding is consistent with the hypothesis that M&As are associated with a higher probability of layoffs, which reduces labor demand and lead to lower wages.

Next, I shift my focus to the wage growth in the non-tradable sector. Column (2) shows that M&A Events are associated with a 16.2-basis-point lower annual wage growth in the non-tradable sector. This finding is inconsistent with that of Mian and Sufi (2014), who find little evidence on wage change in the non-tradable sector after financial crisis, potentially due to differences in sample period and nature of the events. In column (3) of Panel A in Table 8, I use the non-tradable sector total payroll growth as a proxy of the sales growth in the local non-tradable sector. The underlying assumption is that the payroll for employees accounts for a relatively constant fraction of the total sales in the non-tradable sector. In column (3), the M&A Events are associated with a 23.8-basis-point lower total payroll growth in the non-tradable sector, indicating that the total sales growth is also lower in the local non-tradable sector following M&A Events.

In Panel B of Table 8, I explore the effect of M&A Events on the migration of workforce. Following Mian and Sufi (2014), I use three different measures to test labor

mobility response after M&A Events.[25] Column (1) correlates the MSA level population growth rate with the M&A Events. There is weak evidence that the M&A Events are associated with a decline in the MSA population growth. The coefficient on the M&A Event dummy is negative but only statistically significant at the 10% level. In columns (2) and (3), I test the employment mobility using two alternative measures. In column (2), the annualized three-year labor force growth rate negatively correlates with M&A Events. Finally, in column (3), I use IRS tax return data and test the effect of M&A activities on net migration inflow. The net migration inflow is measured as number of the net in-migration per 100 people in next three years. Column (3) indicates that M&A Events are associated with 0.238 fewer in-migration per 100 people in next three years. When combined, the results from Panel B of Table 8 further confirm a decline in local consumer demand after M&A Events.

5.2. Cross-sectional Variation

5.2.1. MSA Heterogeneity

In this section, I test whether MSAs with different degrees of dependence on the manufacturing sector are affected deferentially by M&As. Presumably, MSAs with a greater presence of the manufacturing sector and a lower presence of the non-tradable sector should experience a stronger spillover effect. For this purpose, I construct the following measure as a proxy for the magnitude of the dependence on the manufacturing sector:

[25] Since the data on population is only available on an annual basis, the tests in Panel B of table 8 are performed at MSA-year level.

$$Dependence_{m,t} = \frac{Manufacting\ Emp_{m,t}}{Nontradable\ Emp_{m,t}}, \quad (7)$$

where $Manufacting\ Emp_{m,t}$ is the employment in the manufacturing sector of MSA *m* at time *t*, and $Nontradable\ Emp_{m,t}$ is the employment in the non-tradable sector of MSA *m* at time *t*. A higher ratio represents a greater dependence of the non-tradable sector on the manufacturing sector. To mitigate the effect of labor market dynamics on the evolution of the relative size of the manufacturing sector and the non-tradable sector, I calculate the time-series mean of the measure for each MSA and then split the sample based on the median value of each MSA's average dependence.[26]

Table 9 reports the regression results estimated with the subsamples of high and low dependence. Columns (1) and (2) of Table 9 report the results when the local dependence on manufacturing sector is high. The M&A Event dummy is negative and statistically significant on both employment growth and wage growth. An MSA with high dependence is expected to experience a 19.9-basis-point lower annual growth in employment and a 24.9-basis-point lower annual growth in wage when experiencing an M&A Event. However, when I repeat the tests on the sample of MSAs with low dependence on the manufacturing sector, the coefficient on the M&A Event dummy is statistically insignificant, as shown in columns (3) and (4). Overall, results in Table 9 indicate that the local labor market spillover is stronger when local on-tradable sector employment depends more heavily on the manufacturing sector.

5.2.2. Deal Heterogeneity

[26] I repeat the tests on subsamples based on cross-sectional median dependence. The results remain statistically and economically unchanged.

My analysis so far assumes that all types of mergers have a similar effect on the local employment. In this section, I test the heterogeneous effect of various types of mergers. For example, horizontal mergers are more likely to be motivated by potential synergy gain through cost savings, such as workforce reduction, than other types of mergers. In that case, target firms of horizontal mergers are expected to experience a greater post-merger employment loss. Consequently, the local area should experience a stronger drop in consumer demand, which can lead to a slower employment growth in the non-tradable sector. Meanwhile, as previous studies, such as Tate and Yang (2016) and Lagaras (2018) show, diversifying mergers are usually associated a lower probability of employment reduction. Consequently, the MSAs where the target firms of non-horizontal mergers are located should be less affected after M&A Events.

In Table 10, I test the local spillover effect of M&A Events that consist of different types of takeovers. Specifically, I first calculate the percentage of horizontal deals in each M&A Event in terms of value of transaction.[27] The result indicates that there is a stronger decrease in non-tradable sector employment if an M&A Event consists of a higher proportion of horizontal deals. In addition, the M&A Event dummy is statistically insignificant, indicating that the lower employment growth rate is almost completely driven by horizontal deals. The result in column (3) is consistent with result in column (1), indicating that M&A Events consist of more than 50% of horizontal deals are on average associated with a 25-basis-point lower annual employment growth in the non-tradable sector. However, despite a significant difference between the employment growth after horizontal and non-horizontal M&A Events, there is no statistically significant difference

[27] A merger is defined as horizontal if the acquirer and target are from the same four-digit SIC industry.

in wage growth for M&A Events with different fraction of horizontal deals. In columns (2) and (4), the M&A Event dummy is negative and statistically significant while the interaction terms are neither statistically nor economically significant. A possible explanation is that there is a downward pressure on the local consumer demand brought by all M&A Events. However, as the horizontal M&A Events have a stronger effect on the local consumer demand, they may drive the employers to lay off employees in addition to cutting their wages. Therefore, although there is no significant difference in terms of the wage growth decline between horizontal and non-horizontal M&A Events, there is a significantly stronger decline in the employment growth in the non-tradable sector after horizontal M&A Events.

Overall, the results in table 10 indicate that when there is a greater room for cost reduction and labor restructuring, the post-merger employment reduction will be stronger and there will be a stronger negative spillover to the local non-tradable sector.

5. 3. Minimum Wage Requirements and the Spillover Effect

In this section, I explore whether state level labor protection can pose a heterogeneous effect on M&A-induced spillovers in the local labor market. Specifically, I focus on the role of minimum wage requirements, which might affect the spillover effect to the non-tradable sector through a direct channel. Previous studies (e.g., Gustafson and Kotter, 2018; Cengiz et al., 2019) find that the non-tradable sector employs more minimum wage employees and firms in the non-tradable sector are, therefore, more sensitive to the changes in minimum wage requirements.[28] In that case, the spillover effect on the non-tradable

[28] For example, Cengiz et al. (2019) point out that "The minimum wage is more binding in the non-tradable sector (6.6%) than in the tradable sector (1.6%) or in the manufacturing sector (1.7%)."

sector employment might be different due to the varying minimum wage requirements in different states. I split the sample into two subsamples based on whether the state minimum wage is above or below the federal minimum wage level and repeat the baseline tests in each subsample.

Table 11 reports the estimated results. In columns (1) and (2), I test the effect of M&A Events on the MSAs' manufacturing sector employment growth in states with minimum wages above/below the federal level. The results in columns (1) and (2) are statistically and economically similar to each other, indicating that the effect of M&As on employment in the manufacturing sector is not sensitive to minimum wage requirements, A possible explanation is that firms in the manufacturing sector usually pay wages higher than the legal minimum wage. In columns (3) and (4), I test the effect of M&A Events on the non-tradable sector employment growth. The M&A Event dummy is only negative and statistically significant when the states' minimum wages are higher than the federal level.

Combined with the results from the previous sections, the results in Table 11 indicate that while mergers in the manufacturing sector might have a negative effect on the non-tradable sector employment growth through deteriorated consumer demand, lower minimum wage requirements could mitigate the severity of the negative spillover in the non-tradable sector. Finally, tests in columns (5) and (6) of Table 11 further confirm this conjecture. Column (5) shows that M&A Events do not correlate with the average wage growth rate in MSAs with minimum wage higher than the federal level while column (6) indicates that non-tradable sector firms in MSAs with lower minimum wage might be able to avoid cutting employments by lowering wages. The finding is consistent with Chava et al. (2019), who suggest that increases in federal minimum wage worsen the financial health

of small businesses in the affected states. It indicates that a lower level of minimum wage may help to absorb the negative demand pressure on the local non-tradable sector businesses.

6. Conclusion

In this paper, I examine the spillover effects of M&As on the local labor market. By focusing on M&As in the manufacturing sector, I find that areas with a significant jump in M&A activities are associated with lower employment growth not only in the manufacturing sector but also in the non-tradable sector. The spillover is likely to be driven by decreased local consumer demand. Areas with higher dependence on the manufacturing sector and areas with targets involved in horizontal mergers receive a more substantial spillover effect. Finally, lower minimum wage requirements help to ease the downward pressure on employment in the non-tradable sector after the M&A Events.

This study highlights a previously overlooked externality of M&As. From a corporate efficiency perspective, takeovers are often regarded as effective methods for cost reduction and wealth creation; however, the improvement in private profits could be accompanied by a cost on other stakeholders (Shleifer and Summers, 1988). In this paper, I find that M&As have an unexpected externality on the local communities. While authorities, such as the Federal Trade Commission and the Department and Justice, mostly consider the potential effects of M&As on consumer welfare, the potential influence on local communities also deserves attention.

Although this study sheds some light on the differential effect of M&As on local employment across states with various minimum wage requirements, it still requires future

research to provide a thorough investigation of the labor policy implications. It would also be beneficial for future research to explore changes in local household behaviors resulting from corporate takeovers.

Finally, the study also leaves an open question about the effect of M&As on the employment of acquiring companies. This study, along with other existing research (e.g., Maksimovic et al., 2011; Li, 2013; Tate and Yang, 2016; Lagaras, 2018; Arnold, 2019), is based on the assumption that M&As represent shocks to employment at the target companies. However, it is still not clear whether acquirers would experience similar employment reductions after M&As. Future research would be helpful to provide a complete picture of the effects of M&As on employment at acquirers, targets, and the communities where acquirers and targets are located.

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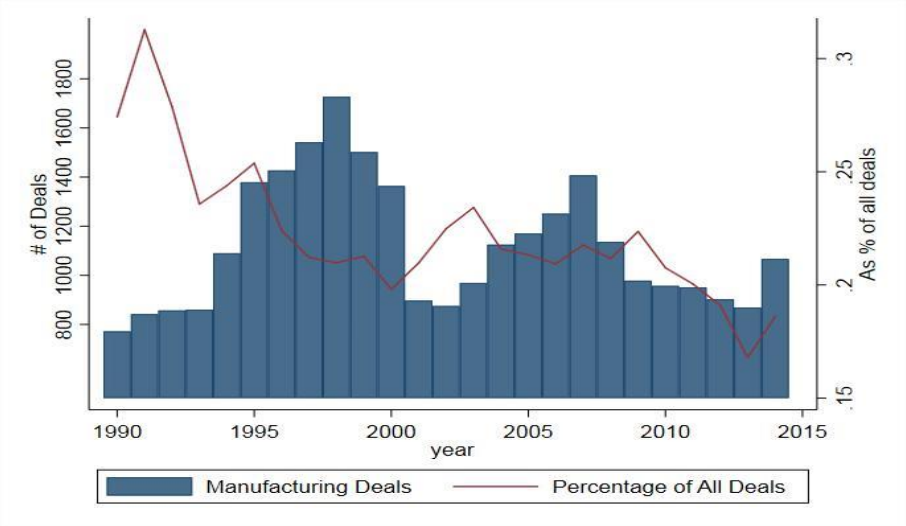
Figure 1. M&As in Manufacturing Sector

(a) Number of Deals



(b) Total value of Deals

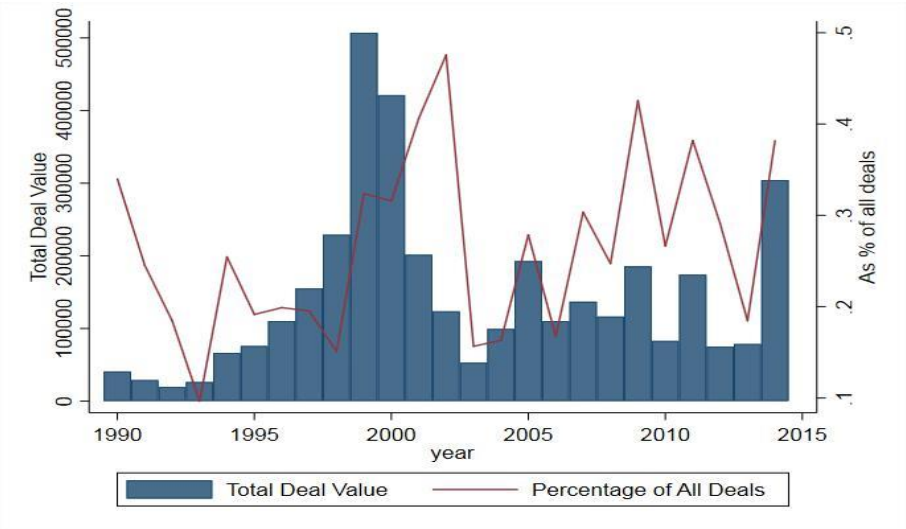
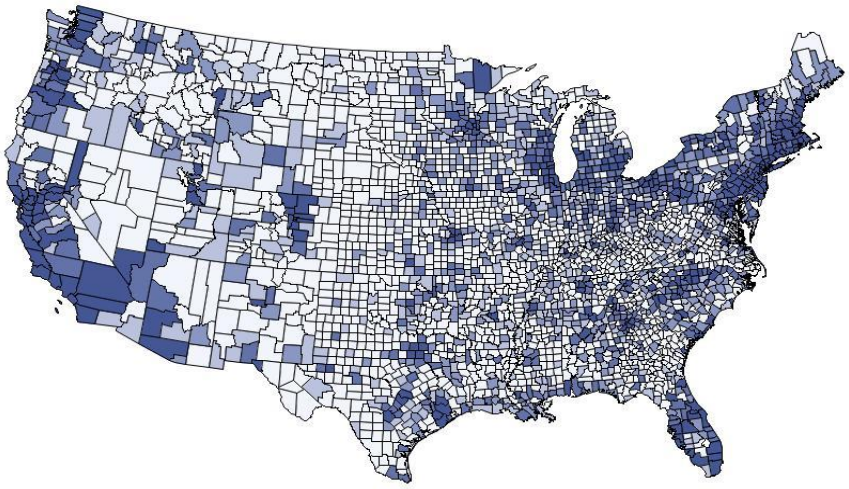


Figure 1 presents the number (ratio) (Figure 1a) and the value (ratio) (Figure 1b) of merger and acquisition deals in the manufacturing sector between 1990 to 2014. The bars represent the total number (value) of transactions each year and the solid line represents the fraction of deals in the manufacturing sector relative to all acquisitions each year. All values are in 2010 million dollars.

Figure 2. M&As in Manufacturing Sector: Geographic Distribution

(a) Number of Deals



(b) Value of Deals

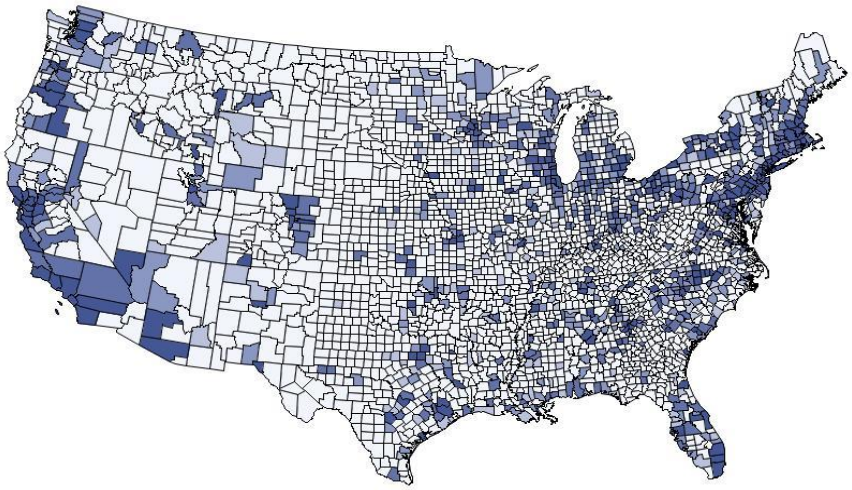


Figure 2 presents the geographic distribution of all acquisitions with targets in the manufacturing sector. Figure 2a reports the quintiles of total number of deals in each county from 1990 to 2014. Figure 2b reports the quintiles of total deal value (million dollars) in each county. All values are in 2010 dollars. Regions range from the darkest (highest quintile) to the lightest (lowest quintile).

Table 1 Summary Statistics

The table presents the summary statistics. The MSA-quarterly data is from the U.S. Census Quarterly Workforce Indicators (QWI) from 1990 to 2016. The manufacturing sector is defined as industries with two-digit NAICS code 31-33. The non-tradable sector is defined as industries with two-digit NAICS code 44-45 and 72. An M&A event is defined when the combined transaction value in a quarter in an MSA is at least two standard deviations higher than the time-series mean transaction value in the same MSA. All wages, incomes and market values are in 2010 dollars.

	(1) N	(2) Mean	(3) S.D.	(4) Min	(5) Max
MSA Characteristics					
M&A Event	24,107	0.04	0.20	0	1
Total Employment (000s)	24,107	216.02	479.45	5.46	6,871.81
Manufacturing Sector Employment (000s)	24,107	27.86	50.78	0.43	614.84
Non-tradable Sector Employment (000s)	24,107	47.92	96.96	1.98	1,378.36
Unemployment Rate (%)	24,107	6.33	2.95	1.10	32.10
Population (000s)	24,107	658.13	1,397.11	50.86	20,125.35
Total Labor Force (000s)	24,107	332.40	707.75	20.53	9,983.55
Per capita Income (2010$)	24,107	35,867.86	7,317.22	16,516.26	109,698.80
% Manufacturing Employment	24,107	0.16	0.09	0.01	0.56
% Non-tradable Sector Employment	24,107	0.24	0.05	0.11	0.63
Manufacturing Sector Quarterly Wage (2010$)	23,851	13,819.34	3,151.57	2,783.96	85,246.79
Non-tradable Sector Quarterly Wage (2010$)	24,098	6,803.44	965.48	4,536.12	30,243.16
M&A Events Characteristics					
Value of Transaction (2010$)	282	3,475.15	11,344.07	45.74	117,016.97

Table 2 Effect of M&As on the Establishment Level Employment: Establishments in HQ MSA

The table presents the effect of M&A deals on employment change at target establishments in the headquarters MSAs using establishment-year sample. Target companies from SDC is matched with the National Establishment Time Series (NETS) data from 1990 to 2014. *Target* is an indicator equal to one if an establishment belongs to an M&A target and locates in the headquarters MSAs. For each target establishment, a control establishment is selected based on a match on two-digit NAICS, employment decile, and sales decile at the year before the deal announcement. If multiple control establishments are found, the establishment with the closest employment level with the target establishment is selected. I track the employment change of the target and control establishments in a [T-3, T+3] window around each merger. *Post* is an indicator that equals one for years after the merger completion. The control variables include establishment age, number of branches in the firm, MSA population, average income, and unemployment. T-statistics are reported in the parenthesis and the standard errors are clustered at the establishment level. ***, **, * denotes statistical significance at the 1%, 5%, and 10% level, respectively.

	Log (Employment)		
	(1)	(2)	(3)
Target	0.041	-0.007	-0.015
	(0.16)	(-0.02)	(-0.05)
Post	-0.210***	-0.196***	-0.201***
	(-5.72)	(-5.19)	(-4.90)
Target × Post	-0.097***	-0.155***	-0.153***
	(-2.77)	(-4.06)	(-3.83)
Log (Age)		-0.040	-0.055
		(-0.64)	(-0.87)
Log (# of branches)		0.053***	0.057***
		(3.82)	(4.04)
Log (Population)			-0.177*
			(-1.86)
Log (Average Income)			0.038
			(0.10)
Unemployment Rate			0.006
			(0.46)
Establishment FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Observations	12,550	12,550	11,617
Adjusted R^2	0.505	0.507	0.501

Table 3 Effect of M&A Events on Employment Growth in the Manufacturing Sector

The table presents the effect of M&A Events on employment growth in the manufacturing sector (two-digit NAICS 31-33). Observations are MSA-quarters from 1990Q1 to 2016Q4. The dependent variable is the annualized three-year employment growth rate. $M\&A\ Event_{t-4,t}$ is an indicator equal to one if an MSA experienced an M&A event in the past four quarters. An M&A event is defined when the combined transaction value in a quarter in an MSA is at least two standard deviations higher than the time-series mean transaction value in the same MSA. $\%Population\ Growth_{t-4,t}$ is the annual population growth in the MSA. $\%Income\ Growth_{t-4,t}$ is the annual average income growth in the MSA. High Manufacturing Area is an indicator equal to one if the MSA's share of employment in the manufacturing sector is higher than the national median. T-statistics are reported in the parenthesis and the standard errors are clustered at the state by time level. ***, **, * denotes statistical significance at the 1%, 5%, and 10% level, respectively.

Dependent Variable: Annualized Three-Year Employment Growth (×100)				
	(1)	(2)	(3)	(4)
$M\&A\ Event_{t-4,t}$	-0.255***	-0.240***	-0.250***	-0.335***
	(-2.87)	(-2.61)	(-2.72)	(-3.50)
$\%Population\ Growth_{t-4,t}$		-11.863***	-11.508***	-12.624***
		(-3.31)	(-3.25)	(-3.11)
$\%Income\ Growth_{t-4,t}$		5.899***	6.037***	5.667***
		(4.90)	(5.01)	(4.16)
High Manufacturing Area			-1.779***	-1.541***
			(-19.91)	(-15.97)
MSA FE	Yes	Yes	Yes	Yes
Year-Quarter FE	Yes	Yes	Yes	No
State-Year-Quarter FE	No	No	No	Yes
Observations	24,107	22,731	22,731	22,731
Adjusted R^2	0.409	0.418	0.428	0.478
Mean of Dep Var -1.119				

Table 4 Effect of M&A Events on Employment Growth in the Non-tradable Sector

The table presents the effect of M&A Events on employment growth in the non-tradable sector (two-digit NAICS 44-45, 72). Observations are MSA-quarters from 1990Q1 to 2016Q4. The dependent variable is the annualized three-year employment growth rate. $M\&A\ Event_{t-4,t}$ is an indicator equal to one if an MSA experienced an M&A event in the past four quarters. An M&A event is defined when the combined transaction value in a quarter in an MSA is at least two standard deviations higher than the time-series mean transaction value in the same MSA. $\%Population\ Growth_{t-4,t}$ is the annual population growth of the MSA. $\%Income\ Growth_{t-4,t}$ is the annual average income growth in the MSA. High Manufacturing Area is an indicator equal to one if the MSA's share of employment in the manufacturing sector is higher than the national median. T-statistics are reported in the parenthesis and the standard errors are clustered at the state by time level. ***, **, * denotes statistical significance at the 1%, 5%, and 10% level, respectively.

Dependent Variable: Annualized Three-Year Employment Growth (×100)				
	(1)	(2)	(3)	(4)
$M\&A\ Event_{t-4,t}$	-0.103***	-0.115***	-0.114***	-0.109***
	(-2.67)	(-2.99)	(-2.95)	(-3.10)
$\%Population\ Growth_{t-4,t}$		5.033**	4.973**	2.847
		(2.08)	(2.06)	(1.11)
$\%Income\ Growth_{t-4,t}$		6.282***	6.259***	3.535***
		(10.95)	(10.96)	(6.95)
High Manufacturing Area			0.297***	0.329***
			(8.46)	(9.25)
MSA FE	Yes	Yes	Yes	Yes
Year-Quarter FE	Yes	Yes	Yes	No
State-Year-Quarter FE	No	No	No	Yes
Observations	24,107	22,731	22,731	22,731
Adjusted R^2	0.381	0.398	0.399	0.495
Mean of Dep Var -1.171				

Table 5 Robustness Tests

The table presents robustness tests on the effect of M&A Events on employment growth in the non-tradable sector (two-digit NAICS 44-45, 72). Observations are MSA-quarters from 1990Q1 to 2016Q4. The dependent variable is the annualized three-year employment growth rate. $M\&A\ Event_{t-4,t}$ is an indicator equal to one if an MSA experienced an M&A event in the past four quarters. An M&A event is defined when the combined transaction value in a quarter in an MSA is at least two standard deviations higher than the time-series mean transaction value in the same MSA. Column (1) reports results estimated using the placebo time of M&A Events. Column (2) reports the results estimated after removing overlapping M&A Events. Column (3) reports results estimated with the sample excluding years after 2007. Column (4) controls for the MSA level exposure to China's import competition. The MSA level exposure to China's import competition is calculated as the aggregated product of the industry level import flow and industry composition of the MSA in 1990. Then the measure is scaled by the national GDP. The data of industry level import flow is available between 1991 and 2007 and is downloaded from David Dorn's website (https://www.ddorn.net/data.htm). The control variables include the one-year population growth rate, the one-year average income growth rate, and whether the MSA's share of employment in the manufacturing sector is above the national median. T-statistics are reported in the parenthesis and the standard errors are clustered at the state by time level. ***, **, * denotes statistical significance at the 1%, 5%, and 10% level, respectively.

Dependent Variable: Annualized Three-Year Employment Growth (×100)				
	Placebo Dates	Excluding Overlapping Events	Excluding 2008-2016	Control Chinese Import
	(1)	(2)	(3)	(4)
$M\&A\ Event_{t-4,t}$	-0.022	-0.136***	-0.176***	-0.184***
	(-0.55)	(-2.82)	(-3.10)	(-4.34)
China's Import				-0.129***
				(-5.88)
Control	Yes	Yes	Yes	Yes
MSA FE	Yes	Yes	Yes	Yes
State-Year-Quarter FE	Yes	Yes	Yes	Yes
Observations	22,731	22,731	9,352	14,628
Adjusted R^2	0.493	0.493	0.513	0.505

Table 6 2SLS Estimates

The table presents regression estimates of the two stage least square regressions. Observations are MSA-quarters from 1990Q1 to 2016Q4. $M\&A\ Event_{t-4,t}$ is an indicator equal to one if an MSA experienced an M&A event in the past four quarters. An M&A event is defined when the combined transaction value in a quarter in an MSA is at least two standard deviations higher than the time-series mean transaction value in the same MSA. Columns (1) and (2) report results of the first stage estimation. Local discount is defined as the product of weighted average *discount* of a four-digit NAICS Industry and the local industry presence. Columns (3) and (4) report results of reduced form regressions. Columns (5) to (8) report the results from the second stage regressions. The control variables include the one-year population growth rate, the one-year average income growth rate, and whether the MSA's share of employment in the manufacturing sector is above the national median. T-statistics are reported in the parenthesis and the standard errors are clustered at the state by time level. ***, **, * denotes statistical significance at the 1%, 5%, and 10% level, respectively.

	First Stage		Reduced Form		Second Stage			
	$M\&A\ Event_{t-4,t}$		Manufacturing sector Emp Growth	Non-tradable sector Emp Growth	Manufacturing sector Emp Growth		Non-tradable sector Emp Growth	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Discount	-0.017***	-0.018***	0.353***	0.102***				
	(-4.76)	(-4.79)	(5.20)	(4.52)				
$M\&A\ Event_{t-4,t}$					-22.159***	-20.099***	-5.710***	-5.831***
					(-4.14)	(-4.01)	(-3.53)	(-3.57)
Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
MSA FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State-Year-Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	22,342	22,342	22,342	22,342	22,293	20,610	22,293	20,610
Adjusted R^2	0.079	0.078	0.479	0.497	-	-	-	-

Table 7 Local Spillover of M&A Events: Household Level

The table reports results estimated with individual-year penal data from Survey of Income of Program Participation (SIPP) in 1995 and 2003. In Panel A, the dependent variable in the first three columns is whether the individual is working in the manufacturing sector. Dependent variable in columns (4) to (6) is whether the individual is unemployed. *Initial Mfg* is defined as a dummy equal to one if an individual was working in the manufacturing sector during her first appearance in the sample. In Panel B, the dependent variable in the first three columns is whether the individual is working in the non-tradable sector. Dependent variable in columns (4) to (6) is whether the individual is unemployed. *Initial Non-tradable* is defined as one if an individual was working in the non-tradable sector during her first appearance in the sample. *M&A Events* is an indicator equal to one for MSA-years within 3 years of an M&A Event. The control variables in the table include log (MSA labor force), log (MSA average wage), MSA unemployment rate, log(age), college degree, married. T-statistics are reported in the parenthesis and the standard errors are clustered at the MSA level. ***, **, * denotes statistical significance at the 1%, 5%, and 10% level, respectively.

Panel A: Individuals Worked in the Manufacturing Sector						
Dep. Var	Manufacturing			Unemployed		
	(1)	(2)	(3)	(4)	(5)	(6)
Initial Mfg × M&A Events	-0.069***	-0.069***	-0.067***	0.024***	0.019**	0.020**
	(-3.53)	(-3.48)	(-3.36)	(3.11)	(2.42)	(2.48)
M&A Events	0.006***	0.007***		-0.001	-0.001	
	(3.50)	(3.51)		(-0.27)	(-0.36)	
Control Variables	No	Yes	Yes	No	Yes	Yes
MSA FE	Yes	Yes	No	Yes	Yes	No
Year FE	Yes	Yes	No	Yes	Yes	No
Cohort FE	Yes	Yes	Yes	Yes	Yes	Yes
MSA ×Year FE	No	No	Yes	No	No	Yes
Individual FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	258,260	258,260	258,260	258,260	258,260	258,260
Adjusted R^2	0.771	0.771	0.772	0.707	0.711	0.711

Table 7 Continued

Panel B: Individuals Worked in the Non-tradable Sector						
Dep. Var	Non-tradable			Unemployed		
	(1)	(2)	(3)	(4)	(5)	(6)
Initial Non-tradable × M&A Events	-0.098***	-0.098***	-0.099***	0.037***	0.044***	0.044***
	(-4.44)	(-4.44)	(-4.45)	(3.61)	(4.17)	(4.19)
M&A Events	0.016***	0.016***		-0.004	-0.006	
	(3.71)	(3.72)		(-0.96)	(-1.46)	
Control Variables	No	Yes	Yes	No	Yes	Yes
MSA FE	Yes	Yes	No	Yes	Yes	No
Year FE	Yes	Yes	No	Yes	Yes	No
Cohort FE	Yes	Yes	Yes	Yes	Yes	Yes
MSA × Year FE	No	No	Yes	No	No	Yes
Individual FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	258,260	258,260	258,260	258,260	258,260	258,260
Adjusted R^2	0.665	0.665	0.665	0.707	0.711	0.711

Table 8 Wage and Mobility

The table presents the effect of M&A Events on the wage and employment mobility. Observations in Panel A are MSA-quarters from 1990Q1 to 2016Q4. $M\&A\ Event_{t-4,t}$ is an indicator equal to one if an MSA experienced an M&A event in the past four quarters. An M&A event is defined when the combined transaction value in a quarter in an MSA is at least two standard deviations higher than the time-series mean transaction value in the same MSA. Columns (1) and (2) of Panel A report the effect of M&A Events on the annualized three-year growth rate of average quarterly wage in the manufacturing sector (two-digit NAICS 31-33) and the non-tradable sector (two-digit NAICS 44-45, 72). Column (3) of Panel A reports the effect of M&A Events on total payroll growth in the non-tradable sector. Panel B reports the effect of M&A Events on annualized three-year population growth, labor force growth and net migration inflow respectively estimated with MSA-annual data. Net migration inflow is obtained from IRS tax filing data and is measured as net migration inflow per 100 people. The control variables include the one-year population growth rate, the one-year average income growth rate, and whether the MSA's share of employment in the manufacturing sector is above the national median. T-statistics are reported in the parenthesis and the standard errors are clustered at the state by time level. ***, **, * denotes statistical significance at the 1%, 5%, and 10% level, respectively.

Dependent Variable: Annualized Three-Year Growth (×100)			
Panel A: Wage and Payroll Growth			
	Manufacturing Wage	Non-tradable Wage	Non-tradable Payroll
	(1)	(2)	(3)
$M\&A\ Event_{t-4,t}$	-0.203**	-0.162***	-0.238***
	(-2.33)	(-4.17)	(-4.39)
Control	Yes	Yes	Yes
MSA FE	Yes	Yes	Yes
State-Year-Quarter FE	Yes	Yes	Yes
Observations	21,019	21,270	22,707
Adjusted R^2	0.304	0.751	0.698
Panel B: Mobility Change			
	Population	Total Labor Force	Net Inflow
	(1)	(2)	(3)
$M\&A\ Event_{t-4,t}$	-0.065*	-0.184***	-0.237**
	(-1.92)	(-2.75)	(-2.47)
Control	Yes	Yes	Yes
MSA FE	Yes	Yes	Yes
State-Year-Quarter FE	Yes	Yes	Yes
Observations	5,758	5,758	4,734
Adjusted R^2	0.761	0.557	0.707

Table 9 Merger Spillovers: MSA Heterogeneity

The table presents the effect of M&A Events on employment/wage growth in the non-tradable sector (two-digit NAICS 44-45, 72) across MSAs with high and low dependence on the manufacturing sector. Observations are MSA-quarters from 1990Q1 to 2016Q4. The dependent variable is the annualized three-year employment/wage growth rate. $M\&A\ Event_{t-4,t}$ is an indicator equal to one if an MSA experienced an M&A event in the past four quarters. An M&A event is defined when the combined transaction value in a quarter in an MSA is at least two standard deviations higher than the time-series mean transaction value in the same MSA. Dependence on the manufacturing sector is defined as

$$Dependence_{i,t} = Manufacting\ Emp_{i,t}/Nontradable\ Emp_{i,t}.$$

Columns (1) and (2) report the employment/ wage growth when the MSA's dependence on the manufacturing sector is above the national median. Columns (3) and (4) report the employment/ wage growth when the MSA's dependence on the manufacturing sector is below the national median. The control variables include the one-year population growth rate, the one-year average income growth rate, and whether the MSA's share of employment in the manufacturing sector is above the national median. T-statistics are reported in the parenthesis and the standard error is clustered at the state by time level. ***, **, * denotes statistical significance at the 1%, 5%, and 10% level, respectively.

Dependent Variable: Annualized Three-Year Growth (×100)				
	Dependence on the Manufacturing Sector			
	High		Low	
	Emp	Wage	Emp	Wage
	(1)	(2)	(3)	(4)
$M\&A\ Event_{t-4,t}$	-0.199***	-0.249***	0.025	-0.041
	(-3.63)	(-4.04)	(0.53)	(-0.69)
Control	Yes	Yes	Yes	Yes
MSA FE	Yes	Yes	Yes	Yes
State-Year-Quarter FE	Yes	Yes	Yes	Yes
Observations	10,378	9,920	11,388	10,602
Adjusted R^2	0.484	0.734	0.535	0.772

Table 10 Merger Spillovers: Deal Heterogeneity

The table presents the effect of M&A Events on employment/wage growth in the non-tradable sector (two-digit NAICS 44-45, 72) across different types of deals. Observations are MSA-quarters from 1990Q1 to 2016Q4. The dependent variable is the annualized three-year employment/wage growth rate. $M\&A\ Event_{t-4,t}$ is an indicator equal to one if an MSA experienced an M&A event in the past four quarters. An M&A event is defined when the combined transaction value in a quarter in an MSA is at least two standard deviations higher than the time-series mean transaction value in the same MSA. $\%\ Horizontal$ is the percentage of deal value that is from horizontal deals in an M&A Event. $I(Horizontal)$ is an indicator equal one if more than 50% of the combined deal value in an M&A event is from horizontal deals. The control variables include the one-year population growth rate, the one-year average income growth rate, and whether the MSA's share of employment in the manufacturing sector is above the national median. T-statistics are reported in the parenthesis and the standard errors are clustered at the state by time level. ***, **, * denotes statistical significance at the 1%, 5%, and 10% level, respectively.

Dependent Variable: Annualized Three-Year Employment Growth (×100)				
	Emp	Wage	Emp	Wage
	(1)	(2)	(3)	(4)
$M\&A\ Event_{t-4,t}$	0.029	-0.228***	0.033	-0.190***
	(0.54)	(-3.37)	(0.63)	(-2.88)
$M\&A\ Event_{t-4,t}$	-0.242***	0.091		
$\times\ \%\ Horizontal$	(-3.28)	(1.05)		
$M\&A\ Event_{t-4,t}$			-0.250***	0.026
$\times\ I(Horizontal)$			(-3.47)	(0.30)
Controls	Yes	Yes	Yes	Yes
MSA FE	Yes	Yes	Yes	Yes
State-Year-Quarter FE	Yes	Yes	Yes	Yes
Observations	22,563	21,270	22,563	21,270
Adjusted R-squared	0.495	0.721	0.495	0.721

Table 11 Labor Protection and Spillover Effect

The table presents the effect of M&A Events on employment/wage growth in across states with different levels of minimum wage. Observations are MSA-quarters from 1990Q1 to 2016Q4. The dependent variable is the annualized three-year employment/wage growth rate. $M\&A\ Event_{t-4,t}$ is an indicator equal to one if an MSA experienced an M&A event in the past four quarters. An M&A event is defined when the combined transaction value in a quarter in an MSA is at least two standard deviations higher than the time-series mean transaction value in the same MSA. Columns (1) and (2) report changes in employment growth in the manufacturing sector (two-digit NAICS 31-33) and columns (3) and (4) report changes in employment growth in the non-tradable sector (two-digit NAICS 44-45, 72). Columns (5) and (6) report regression estimates on wage growth in the non-tradable sector. High and low minimum wage is defined based on whether the state's minimum wage level is higher than the federal minimum wage. The control variables include the one-year population growth rate, the one-year average income growth rate, and whether the MSA's share of employment in the manufacturing sector is above the national median. T-statistics are reported in the parenthesis and the standard errors are clustered at the state level. ***, **, * denotes statistical significance at the 1%, 5%, and 10% level, respectively.

Dependent Variable: Annualized Three-Year Growth (×100)						
	Manufacturing Sector Employment Growth		Non-tradable Sector Employment Growth		Non-tradable Sector Wage Growth	
	High	Low	High	Low	High	Low
	(1)	(2)	(3)	(4)	(5)	(6)
$M\&A\ Event_{t-4,t}$	-0.436***	-0.348*	-0.287***	-0.093	0.045	-0.589***
	(-3.87)	(-1.82)	(-5.70)	(-0.99)	(0.44)	(-2.92)
Control	Yes	Yes	Yes	Yes	Yes	Yes
MSA FE	Yes	Yes	Yes	Yes	Yes	Yes
State-Year-Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	14,944	6,178	14,944	6,178	14,943	6,136
Adjusted R^2	0.529	0.525	0.545	0.618	0.254	0.300

Appendix

A1. Theoretical Model

In this section, I use a simple model to illustrate how mergers in the manufacturing sector could affect employment in the local non-tradable sector. Consider an MSA with only two sectors: a manufacturing sector and a non-tradable sector. I use capital letters to denote the variables associated with the manufacturing sector and lowercase letters for the variables associated with the non-tradable sector. There are *N* producers in the manufacturing sector and *n* producers in the non-tradable sector. As different skill sets are needed in the non-tradable sector and the manufacturing sector, the labor markets for the two sectors are segmented. I assume that the manufacturing sector has an increasing and convex labor supply curve. Specifically, that the inverse labor supply curve is $W(L) = W_0 + \alpha L^M$, where M $\geqslant$ 1. For simplicity, each producer in the manufacturing sector produces only one product and the product *i* is traded nationally at a nation-wide fixed price of P_i. Without loss of generality, I assume that the only production input is labor and the production function in the manufacturing sector is given by the function $Q_i = C_i L_i$, where C_i measures the fixed assets used in production and cannot be easily adjusted. However, the local labor market is oligopsonistic, where producers in the manufacturing sector make employment decisions, knowing that the number of employees they hire has an impact on the market wage. (See Boal et al., 1997 for a literature survey on monopsony in the labor market.) Hence, producer *i*'s profit maximization problem is:

$$\max_{L_i} \Pi_i = \big(P_i C_i - W(L)\big)L_i, \tag{A1}$$

where $L = \sum_{i=1}^{N} L_i$.

The first-order condition implies that

$$L_i = \frac{P_i C_i - W(L)}{W'(L)} = \frac{P_i C_i - W_0 - \alpha L^M}{\alpha M L^{M-1}}. \quad \text{(A2)}$$

Summing up the first-order conditions for all *N* firms, we get:

$$L = \left[\frac{\sum_{i=1}^{N} P_i C_i - N W_0}{(N+M)\alpha}\right]^{\frac{1}{M}}. \quad \text{(A3)}$$

Proposition 1. *The aggregate employment in the manufacturing sector is positively related to the fixed assets each firm uses in production.*

Proof. After differentiating L with respect to C_i, we get

$$\frac{\partial L}{\partial C_i} = \frac{1}{M}\left[\frac{\sum_{i=1}^{N} P_i C_i - N W_0}{(N+M)\alpha}\right]^{\frac{1-M}{M}} P_i > 0. \quad \text{(A4)}$$

Now consider that there is an M&A deal where firm *j* is the target. The acquirer of the merger deal then chooses the post-merger allocation of fixed assets to the target C_j' by comparing the marginal return of fixed assets at the acquiring and target companies. Then the change in the aggregate employment will be affected by the acquirer's decisions on the allocation of production assets. For example, if the acquirer firm increases investment by allocating more assets in the local area ($C_j' > C_j$), there will be an ex-post increase in aggregate employment. However, of acquirers decide to reallocate the production fixed assets to produce other products ($C_j' < C_j$), then the aggregate employment will decrease. Finally, consider the extreme case that the acquirer company decides to reallocate all of the production assets of the target ($C_j' = 0$ and number of firms in the local area will become

$N - 1$ after the merger), then it can be shown that the total employment, L decreases if P_i is reasonably large or the convexity of the wage function, M, is large enough. Since $W(L)$ is an increasing function of L, if L decreases, W will decrease. As a result, the total labor income in the manufacturing sector, $I = W \times L$ will decrease.

The change in employment in the manufacturing sector then diffuses to the non-tradable sector through fluctuations in total labor income. Producers in the non-tradable sector compete for local businesses; hence, I model the non-tradable sector competition as a Cournot oligopoly game. For simplicity, I assume that each unit of labor produces one unit of good in the non-tradable sector. Producers choose production quantity, l_i, and the price, p, is determined by $p = a(I) - b(I)\sum_{i=1}^{n} l_i$, where $a(I) > 0$ and $b(I) > 0$. I assume $a(I)$ is increasing in I and $b(I)$ is decreasing in I to capture the dependence of the non-tradable sector on local demand. If total labor income in the manufacturing sector decreases, local demand decreases, indicated by a lower $a(I)$ and higher $b(I)$. The inverse labor supply curve for the non-tradable sector is $w(l) = w_0 + \beta l^m$, where $m \geq 0$. The Nash equilibrium solution of the Cournot oligopoly game is standard. Producer i's profit maximization problem is:

$$\max_{l_i} \pi_i = (p - w(l))l_i. \tag{A5}$$

The first-order condition implies that

$$l_i = \frac{a(I) - b(I)\sum_{i=1}^{n} l_i - w(l)}{b(I) + w'(l)}. \tag{A6}$$

Summing up the first-order conditions for all n firms, we get:

$$l = \frac{na(I) - nb(I)l - nw(l)}{b(I) + w\prime(l)}. \quad \text{(A7)}$$

Proposition 2. *The aggregate employment in the non-tradable sector is positively related to the total income I.*

Proof. Substituting *w*(*l*) and *w'*(*l*) into equation (A7), we get

$$l = \frac{na(I) - nb(I)l - n(w_0 + \beta l_m)}{b(I) + m\beta l^{m-1}}, \quad \text{(A8)}$$

and re-arranging equation (A8) gives us

$$(n+1)b(I)l + (m+n)\beta l^m = na(I) - nw_0. \quad \text{(A9)}$$

Let $F(l, I) = (n+1)b(I)l + (m+n)\beta l^m - na(I) + nw_0 = 0$. Applying the implicit function theorem to solve for $\frac{\partial l}{\partial I}$, we get

$$\frac{\partial l}{\partial I} = -\frac{F_I}{F_l} = \frac{(n+1)b'(I)l - na'(I)}{(n+1)b(I) + m(m+n)\beta l^{m-1}} > 0. \quad \text{(A10)}$$

Total employment in the non-tradable sector is increasing in *I*, hence, the employment shock spills over from the manufacturing sector to the non-tradable sector.

Figure A1 Share of Employments in the Manufacturing Sector Over Time

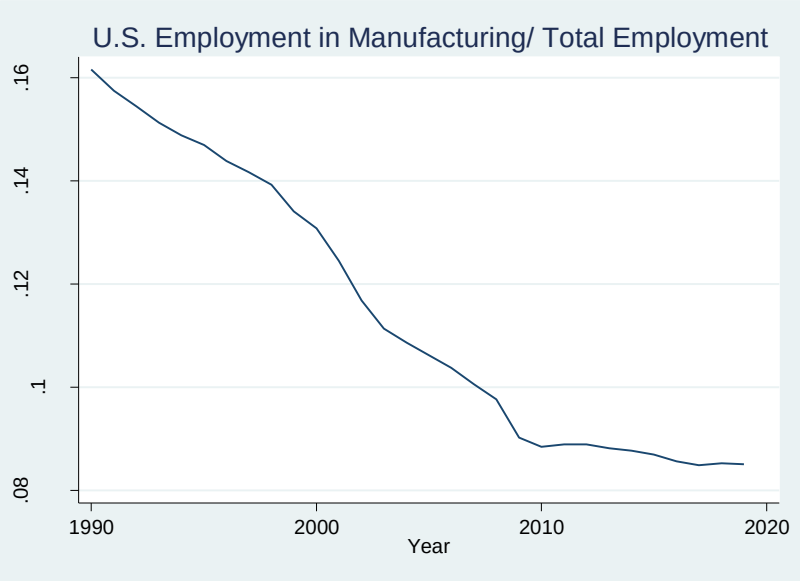


Figure A1 presents the share of employment in the manufacturing sector in the U.S. from 1990 to 2019. Source: U.S. Bureau of Labor Statistics.

Table A1 Employment Concentration

The table reports the employment concentration at the acquirer/target headquarters MSAs. The data on the employment is from the Publicly Listed National Establishment Time Series (NETS). The observations are from 1990 to 2014. Both acquirers and targets are publicly traded firms from the manufacturing sector (two-digit NAICS code 31-33). % Emp at Hq MSA is the percentage of the target employment that is in the headquarters MSA. I(Headquarters MSA is the highest) is an indicator equal to one if a company's employment at its headquarters MSA is the highest among all regions that the company operates.

	(1) N	(2) Mean	(3) S.D.	(4) Min	(5) Max
Acquirers					
Emp at Headquarters MSA	569	3,516	5,910	7	35,037
Emp at Other MSA	569	13,324	25,767	0	169,566
Total Emp	569	16,816	28,452	20	175,739
% Emp at Hq MSA	569	0.386	0.302	0.0035	1
I(HQ MSA is the highest)	569	0.598	0.491	0	1
Targets					
Emp at Headquarters MSA	569	898.5	1,852	3	13,457
Emp at Other MSA	569	1,924	4,496	0	27,926
Total Employment	569	2,905	6,068	3	38,781
% Emp at Hq MSA	569	0.582	0.349	0.00792	1
I(HQ MSA is the highest)	569	0.717	0.451	0	1

Table A2 Summary Statistics: Establishment Level

The table presents the summary statistics at the establishment level for tests reported in table 2. Target companies from SDC is matched with the National Establishment Time Series (NETS) data from 1990 to 2014. *Age* is the age of the establishment. *Number of Branches* measures the number of branches of the company. Population, Average Income and Unemployment are all at the MSA level. All wages, incomes and market values are in 2010 dollars.

	(1) N	(2) Mean	(3) S.D.	(4) Min	(5) Max
Establishments at HQ MSA					
Employment	12,558	321.10	471.81	0	2,500
Age	12,558	10.29	5.24	1	25
Number of Branches	12,558	165.05	432.52	1	10,997
Population	11,631	4,979,709.03	5,625,054.54	50,46	20,125,35
Average Income (2010$)	11,631	42,265.31	8,560.27	16,516.26	105,361.33
Unemployment Rate	11,625	5.34	1.96	1.20	20.30

Table A3 Summary Statistics: Household Level

The table reports the summary statistics of the household level sample. The data is from Survey of Income and Program Participation (SIPP) from 1995 to 2003. Individuals with age below 16 or above 70 are dropped from the sample. College is an indicator equal to one if the individual achieved college degree or higher. Employed is an indicator equal to one if the individual is employed. Manufacturing is an indicator equal to one if the individual is working in manufacturing sector (two-digit NAICS code 31-33). Non-tradable is an indicator equal to one if the individual is working in non-tradable sector (two-digit NAICS code 44-45, 72).

	(1) N	(2) Mean	(3) S.D.	(4) Min	(5) Max
Individual Characteristics					
Age	292,872	39.77	14.46	16	70
Employed	292,872	0.73	0.45	0	1
Married	292,872	0.53	0.50	0	1
College Degree	292,872	0.02	0.12	0	1
Manufacturing	292,872	0.09	0.29	0.00	1
Non-tradable	292,872	0.12	0.33	0.00	1
MSA Characteristics					
Population	292,872	5,312,092.19	5,685,703.84	118,796	19,248,312
Average Income (in 2010$)	292,872	35,908.96	7,037.70	18,271	53,199
Total Labor Force	292,872	2,667,367.58	2,757,754.39	64,538.62	9,339,938
Unemployment	292,872	0.05	0.02	0.02	0.20

Table A4 Total Employment Change

The table presents the effect of M&A Events on the total employment growth. Observations are MSA-quarters from 1990Q1 to 2016Q4. The dependent variable is the annualized three-year employment growth rate. $M\&A\ Event_{t-4,t}$ is an indicator equal to one if an MSA experienced an M&A event in the past four quarters. An M&A event is defined when the combined transaction value in a quarter in an MSA is at least two standard deviations higher than the time-series mean transaction value in the same MSA. $\%Population\ Growth_{t-4,t}$ is the annual population growth in the MSA. $\%Income\ Growth_{t-4,t}$ is the annual average income growth in the MSA. High Manufacturing Area is an indicator equal to one if the MSA's share of employment in the manufacturing sector is higher than the national median. T-statistics are reported in the parenthesis and the standard errors are clustered at the state by time level. ***, **, * denotes statistical significance at the 1%, 5%, and 10% level, respectively.

Dependent Variable: Annualized Three-Year Employment Growth (×100)				
	(1)	(2)	(3)	(4)
$M\&A\ Event_{t-4,t}$	-0.191***	-0.183***	-0.184***	-0.146***
	(-4.96)	(-4.62)	(-4.64)	(-3.96)
$\%Population\ Growth_{t-4,t}$		-1.422	-1.405	-3.163
		(-0.65)	(-0.64)	(-1.61)
$\%Income\ Growth_{t-4,t}$		6.223***	6.229***	4.025***
		(7.87)	(7.86)	(5.17)
High Manufacturing Area			-0.086**	0.012
			(-2.46)	(0.34)
MSA FE	Yes	Yes	Yes	Yes
Year-Quarter FE	Yes	Yes	Yes	No
State-Year-Quarter FE	No	No	No	Yes
Observations	24,107	22,731	22,731	22,563
Adjusted R^2	0.536	0.542	0.542	0.641

Table A5 Additional Robustness Check

The table presents results of additional robustness tests. Observations are MSA-quarters from 1990Q1 to 2016Q4. Columns (1) to (4) repeat baseline regressions with alternative definitions of M&A Events. In column (1) an M&A Event is defined as one if the combined transaction value in a quarter in an MSA is at least one standard deviation higher than the time-series mean transaction value in the same MSA. In column (2) an M&A Event is defined as one if the combined transaction value in a quarter in an MSA is at least three standard deviations higher than the time-series mean transaction value in the same MSA. In column (3) an M&A Event is defined when the transaction value in a quarter is the highest within the MSA during the sample period. In column (4) an M&A Event is defined as the logarithm of combined transaction value of the last four quarters. In column (5), the employment growth is measured by the annualized five-year growth rate. The control variables include the one-year population growth rate, the one-year average income growth rate, and whether the MSA's share of employment in the manufacturing sector is above the national median. T-statistics are reported in the parenthesis and the standard errors are clustered at the state by time level. ***, **, * denotes statistical significance at the 1%, 5%, and 10% level, respectively.

Dependent Variable: Annualized Employment Growth (×100)					
	1 S.D.	3 S.D.	Largest Deal	Total Value	5-Yr Emp Growth
	(1)	(2)	(3)	(4)	(5)
Panel A: Manufacturing Sector Employment Growth					
$M\&A\ Event_{t-4,t}$	-0.249***	-0.333***	-0.450***	-0.034***	-0.731***
	(-2.83)	(-3.15)	(-3.48)	(-2.75)	(-5.52)
Control Variables	Yes	Yes	Yes	Yes	Yes
MSA FE	Yes	Yes	Yes	Yes	Yes
State-Year-Quarter FE	Yes	Yes	Yes	Yes	Yes
Observations	22,731	22,731	22,731	22,731	19,841
Adjusted R^2	0.478	0.478	0.479	0.478	0.562
Panel B: Non-tradable Sector Employment Growth					
$M\&A\ Event_{t-4,t}$	-0.140***	-0.167***	-0.189***	-0.018***	-0.123**
	(-4.34)	(-4.26)	(-3.80)	(-3.81)	(-2.25)
Control Variables	Yes	Yes	Yes	Yes	Yes
MSA FE	Yes	Yes	Yes	Yes	Yes
State-Year-Quarter FE	Yes	Yes	Yes	Yes	Yes
Observations	22,731	22,731	22,731	22,731	19,841
Adjusted R^2	0.495	0.495	0.495	0.495	0.637