Domestic Outsourcing in the United States

David Dorn	Johannes F. Schmieder	James R. Spletzer
University of Zurich, CEPR, IZA & CESifo	Boston University, NBER, IZA & CESIfo	U.S. Census Bureau
david.dorn@econ.uzh.ch	johannes@bu.edu	James.R.Spletzer@census.gov

– January 31st, 2018 –

Abstract

The nature of the employer-employee relationship is drastically changing in the United States, with lead employers employing fewer workers directly and instead relying on intermediaries and contracting firms for providing labor services. In this paper we investigate the incidence and effects of outsourcing labor service jobs in food, cleaning, security and logistics (FCSL) to business service firms. We first provide long time series using Census and ACS data documenting large movements of FCSL jobs to business service firms, with an accelerating trend since the Great Recession. We then analyze how the outsourcing of jobs affects wages at those jobs by identifying on-site outsourcing events in the Longitudinal Employer-Household Dynamics (LEHD) dataset which allows us to compare the same worker before and after he is outsourced to a business service firm. Preliminary results suggest long-run earnings losses of about 5% for the outsourced workers and higher job-to-job mobility.

1   Introduction

Over the last decades large firms across all sectors have been increasingly relying on contractors and temp-agencies to provide labor services that were formerly provided by regular employees in-house.[1] This phenomenon of domestic outsourcing has thoroughly transformed the nature of the employment relationship for a vast number of jobs, ranging from relatively low skilled tasks like cleaning and security to high skilled tasks like human resources and accounting.[2] While growing amount of anecdotal and qualitative evidence suggests that outsourcing causes a deterioration of many aspects of job quality (see Weil, 2014, for an overview), quantitative evidence on the prevalence and consequences of domestic outsourcing in the United States is very scarce. To fill this empirical gap, one needs access to a large matched employer-employee panel, as well as research design that can credibly control for job and worker characteristics when comparing outsourced to non-outsourced jobs.

In this paper we ask the following **research questions**: How much did domestic outsourcing increase over the last decades? Does domestic outsourcing affect wages of affected workers? And finally, do economic downturns such as the Great Recession accelerate firms' decisions to outsource their workforce.

To answer these questions, we analyze the incidence and effects of domestic outsourcing using high quality data from the United States. We first provide long time series of the share of workers who work for business service firms, focusing on outsourcing of food, cleaning, security and logistics (FCSL) services. These four service types have the benefit that they correspond to clear occupation codes and industry codes and thus allow for relatively straightforward measurement of outsourcing. We first use Decennial Census and American Community Survey (ACS) data to analyze the evolution of domestic outsourcing of FCSL services over almost 7 decades. We show that the share of FCSL workers working for business service firms increased dramatically over the past decades.

We then use the Longitudinal Employer Household Dynamics (LEHD) data to provide credible causal estimates of domestic outsourcing on a number of important job characteristics. The main empirical strategy builds on Goldschmidt and Schmieder (2017), who develop a new design to identify domestic outsourcing based on worker flows in linked employer-employee data. The key idea is that with linked employer-employee data, such as the LEHD, it is possible to identify events where firms outsource labor services by spinning off parts of their workforce into either new or existing business service providers. In this case, it is possible to observe the same

---

1 Below I summarize the economics literature documenting this. In addition Weil (2014) provides many case studies and Bernhardt et al. (2016) also provides a good discussion of the available evidence for the US.

[2] I use the term domestic outsourcing to the phenomenon of firms contracting out jobs and services to business service firms within the same country, this is in contrast to offshoring which refers to moving jobs abroad.

worker before and after outsourcing and compare job characteristics to a comparable job that is not being outsourced. By applying this type of methodology to the LEHD, we are able to credibly identify the effects of domestic outsourcing on a variety of job quality measures.

Finally, we analyze whether firms' outsourcing decisions are driven by economic downturns. This is motivated by the observations that outsourcing seems to have picked up in the aftermath of the Great Recession. We investigate whether regions, i.e. Metropolitan Statistical Areas (MSA), that experienced larger downturns during the Great Recession exhibit stronger growth in outsourcing in the subsequent years. Despite the fact that a large literature has suggested that firms upgrade technology and restructure jobs along other dimensions, we do not find any significant effects of local economic shocks on outsourcing, at least in the current stage of the analysis.

Several authors have documented the increasing prevalence of domestic outsourcing in the United States. For example, Abraham and Taylor (1996) analyzed a survey question on outsourcing in the 1979-1987 Industry Wage Surveys and found an increase in the fraction of work contracted out for janitorial, machine maintenance, engineering and drafting, accounting and computer tasks. Using the industry and occupation codes in the CPS from 1983 to 2000, Dube and Kaplan (2010) found an increase in the share of janitors and guards working for firms that provide labor services to other firms. Dey et al. (2010) investigated industry and occupation codes in the Occupational Employment Statistics program and found that the share of workers in security, janitor, computer, and truck driver occupations employed in industries that provide services to other firms increased from 1989-2000. Segal and Sullivan (1997) and Autor (2003) document a sharp increase in employment in temporary help services between 1980 and 2000. Berlingieri (2013) argues that the rise in professional and business services outsourcing is responsible for around 14 percent of the increase in service employment in the US. In addition, a recent book by Weil (2014) provides an excellent overview of the topic and discusses many example of changes in business practices that facilitated the outsourcing of ever larger shares of the labor force. Most recently Katz and Krueger (2016) conducted a survey based on the earlier Contingent Worker Survey (from the Bureau of Labor Statistics) and show that the share of workers in alternative work arrangements increased from 10.7 to 15.8 percent from 2005 to 2015, and that almost half of that increase is due to temporary help work and workers provided by contracting firms.

A concern regarding this rise in outsourcing is that it potentially allows for reductions in wages for the contracted-out jobs. The outsourcing firms are often traditional lead companies in sectors such as manufacturing or finance, and typically offer attractive jobs with high wages, job security, strong worker representation, and union coverage. A long literature in economics (e.g. Dunlop, 1957; Krueger and Summers, 1998; Groshen, 1991; Gibbons and Katz, 1992) has documented sizable wage differences across sectors and firms that appear not to be explained by differences in worker productivity. Instead, factors such as collective bargaining agreements (Card et al., 2004, DiNardo and Lee, 2004) or efficiency wage considerations linked to fairness perceptions (Akerlof

and Yellen, 1990; Rees, 1993; Card et al., 2012) may lead to wage compression within firms and rent sharing of firm profits, which in turn pushes up wages for workers who would otherwise have lower paying outside job opportunities. Large employers may thus find it beneficial to outsource jobs to subcontractors in order to reduce the number of directly employed workers who benefit from a firm-specific wage premium or other firm-related benefits.

Despite the potentially important link between outsourcing and wages, research on this topic in the economics literature is quite limited. The earliest work is Abraham (1990), who compared the wages of outsourced and non-outsourced workers in the Current Population Survey (CPS). Whether a worker is outsourced or not is identified off of the industry and occupation codes of workers. She finds significantly lower wages for outsourced workers but the comparison is purely in the cross section and cannot rule out various sources of omitted variable bias driving these results. Berlinski (2008) uses the Contingent Workers and Alternative Employment Arrangements supplement to the CPS, which contains information on industry of assignment for workers employed by contract firms, and thus allows to estimate the effect of outsourcing on wages while at least partially controlling for job conditions. However, because his data is a repeated cross-section and not a panel, he cannot control for selection into outsourcing; in addition, the sample is very small and contains fewer than 100 outsourced workers. Perhaps the most credible paper to estimate the outsourcing wage differential in the U.S. is Dube and Kaplan (2010), who provide evidence from the Current Population Survey on two types of tasks, janitors and security guards, and document a substantial pay differential between outsourced and non-outsourced jobs. Dube and Kaplan use the short panel structure of the CPS to estimate specifications with individual fixed effects and thus control, in part, for selection into outsourcing. However, the downside of this approach is that it is not clear why an individual moves to a business service firm (e.g. whether the move is voluntary or involuntary) and whether the timing is correlated with events affecting the productivity and thus wage of a worker. Furthermore, it is not clear to what extent outsourced jobs differ along other dimensions that may explain their lower wage levels. Goldschmidt and Schmieder (2017) improve on this design by analyzing on-site outsourcing events in Germany, where the same worker in the same job can be observed before and after his job is being outsourced, and they find substantial earnings losses for outsourced workers. However, for the United States comparable is missing so far. Our research seeks to provide the first large-scale evidence of the prevalence of outsourcing in the U.S., and to quantify its impacts on earnings and other job quality indicators for affected workers.

We start our analysis by providing descriptive evidence on the increase in domestic outsourcing over time in the United States. For this we document the share of workers in FCSL occupations who are working for business service firms (BSF), that is firms that specialize on providing business services to other firms. For example, we consider a cleaner working for a business service firm as outsourced, while a cleaner working for a bank would be considered an in-house employee. Using data from the decennial Census and the American Community Survey, we show that the share of FCSL workers who are outsourced has increased dramatically over the past decades. For example

while in 1950, only about 2 percent of all workers in cleaning occupations were working for business service firms, this share increased to more than 25 percent in 2015, with similarly dramatic increases in security and logisitics occupations. While much of this increase occurred already in the 1970s and 80s, with a slow-down in the 1990s, the trend towards domestic outsourcing increased again in the 2000s. Since seems to have accelerated after the great recession.

The next section provides descriptive evidence on the rise of domestic outsourcing in the US. Section 3 describes our methodology for identifying domestic outsourcing in the US LEHD data and provides some descriptive evidence. Section 4 discusses our empirical method for estimating the effects of outsourcing on earnings and provides preliminary evidence of these effects. Section 5 concludes.

2   Domestic Outsourcing of FCSL Services over Time

To provide a backdrop for our analysis with the LEHD, in this section we provide descriptive evidence on the evolution of outsourcing of food, cleaning, security and logistics (FCSL) services using individual level data where we observe workers' occupations and industries and are able to therefore see whether a worker in an FCSL occupation is working for a business service firm or not. We focus on outsourcing of FCSL services, where logistics includes transportation and warehouses. These services have remained relatively stable over time and it seems likely that the nature of these tasks has been less affected by technological progress than many other jobs and occupations.[3] Furthermore these services correspond to clear occupation codes and industry codes for the respective business service firms and thus lend themselves well to empirical analysis. Finally, as we argue below, our method for identifying on-site outsourcing events likely works best for these FCSL services, where we are less likely to confound outsourcing events with start-ups, partial sales of a company and other spurious events.

2.1   Data

We combine two datasets to study domestic outsourcing over a long time period. First we use the 1 percent public use file from IPUMS of the Decennial Census form 1950 to 2000. We combine this with the 1 percent sample of the American Community Survey (ACS) from IPUMS. We extract all employed individuals age 18 to 64 along with their industry and occupation codes.

---

[3] Appendix Figure A1 shows the share of all workers in the 4 occupation groups over time. The share of workers in logistics occupations shows a marked decline in the 1950s to 1970s, probably due to increased automation, but the other occupations only showed relatively small changes over the past decades. In particular, over the past 25 years and using the more detailed 1990 occupation codes the four occupations are very stale over time.

IPUMS provides 2 sets of consistent occupation codes for the ACS and Census, a coarser classification from 1950 onwards and a finer classification from 1990 onwards. We focus here on the longer time series and the respective occupation and industry codes are provided in the appendix.

We classify a workers working in one of the FCSL occupations as outsourced, if they work for one of the FCSL business service firms where the type of employer is identified from the industry code.

2.2   The Rise of Domestic Outsourcing

Figure 1 shows the share of all workers who are working for business service firms over time from 1950 to 2015. Business service firms are defined as firms with (1950) industry codes for trucking, warehouses, or miscellaneous business services. The figure shows that overall there has been a dramatic growth of the business service sector over this time period. While in 1950 less than 2 percent of the workforce where employed by BSF, this has increased to more than 8 percent by 2015. Futhermore, the growth of the BSF share accelerated during the period covered by Census data (until 2000). Over the more recent period, where we have yearly data, we see an initial slowdown in growth in the early 2000s, perhaps related to the 2001 and 2008 recessions, but then an accelerating trend again in the aftermath of the Great Recession. In the future we plan to investigate the relationship between the incidence (and effects) of domestic outsourcing and the business cycle in more detail. At this point we are not sure whether the variation over the business cycle is due to outsourcing varying over the cycle or due to other types of business services being more cyclical.

Figure 2 shows the share of workers in FCSL occupations who are working for business service firms (defined in the same way as above). Since we do not include restaurants as business service firms (since they presumably mostly cater to final consumers and since restaurants are not separately identified from catering services and business cafeterias), the line for food workers is essentially flat at zero. The other three groups however show a stark increase over time. For example, while only about 2 percent of workers in cleaning and janitorial occupations were working for business service firms in 1950, this increased to more than 25 percent by 2015. Similarly logistics workers are much more likely to work for BSFs today than in 1950 (an increase from 4 to 20 percent) and similarly for security workers (increase from around 3 to 35 percent).

It is interesting that while logistics services show a continual increase over the entire time period, cleaning shows the fastest increase in outsourcing in the 1980s, while security had the fastest growth in the 1960 to 1980 window. This is also in contrast to Germany, where domestic outsourcing only really took off in the 1990s. What is also interesting about this that the earlier rise of domestic outsourcing in the US coincides roughly with the time period of sharp increases in wage inequality (especially at the lower end) in the US, while, similarly, the time period of fast growth of outsourcing in Germany (the 1990s) corresponds to the period of increasing inequality in the lower tail

of the wage distribution there. An open question is whether this simple correlation between increasing inequality and growth in domestic outsourcing is a causal correlation and which way the causality runs (if not in both ways).

Finally, turning to the most recent time period it appears again that while domestic outsourcing of FCSL services slowed down in the 1990s there is some evidence that it increased again in more recent years, consistent for example with the evidence in Katz and Krueger (2016) on the growth of alternative work arrangements and the other more recent evidence discusses in the introduction. Below we show that this is broadly consistent with our evidence from the LEHD, where we see a similar increase in domestic outsourcing events in recent years.

It is noteworthy that the flip-side of the increased share of FCSL workers working for business service firms is that they are disappearing from the other sectors. Appendix Figure A 2 shows the share of workers in several key industries who have FCSL occupations and reveals that the share has fallen over the past decades, in many cases quite dramatically. For example while in the 1970s, 5 percent of the workers employed in the health sectors were cleaning workers, this has fallen to less than 2 percent in recent times. These graphs also show a clear pattern of increases in food service outsourcing, something that Figure 2 cannot document due to the lack of industry codes identifying food service business service firms over the long term.

3 Measuring On-Site Outsourcing in the LEHD

We will adapt the empirical method of Goldschmidt and Schmieder (2017) to measure a treatment group of outsourced jobs and to define a synthetic control group of non-outsourced jobs. The comparison between these groups allows for an event study design that quantifies the impact of outsourcing on worker outcomes. Key to our empirical analysis is the observation of worker identifiers, firm identifiers, industry codes and earnings in the LEHD.

3.1 Data

In order to be able to investigate the effects of outsourcing FCSL services on wages it is necessary to follow workers and firms over time, in order to control for unobserved worker and job characteristics. For this we use the Longitudinal Employer-Household Dynamics data (LEHD) from the U.S. Census Bureau. The LEHD is based on wage records from the State UI administrative systems covering a few basic demographics (age, gender, …) and quarterly earnings of a worker from each employers, as well as some firm level variables (firm age and size).

We use data from 20 states that all cover the time period from 1996 to 2015. As the LEHD has added additional states over time, going back earlier would require examining fewer states and including more states would shorten our analysis window –

or working with an unbalanced sample of states. The 20 states in our sample account for 46% of national employment and a list of them can be found in the appendix. The states are geographically very diverse, covering all regions of the country and should be broadly representative for the US. The biggest downside of having only a subsample of states is that we cannot follow individuals who move out of the 20 state sample and take jobs in other states. This could be an issue if people are more likely to move to other states after outsourcing events and if we try to identify the earnings or wage losses after outsourcing. This is a particular concern for metropolitan areas along state borders between in- and out of sample states, where presumably many people move jobs across state lines.

For our analysis we use only one observation per year, in particular focusing on the earnings in the second quarter (Q2) from the main job (that is the employer that pays the highest earnings in Q2). This yields about 55 million observations per year. The data allows us to follow both workers and firms over time as long as they remain within the 20 states of our sample.

3.2   Identifying on-site outsourcing events

In many instances companies contract out part of their workforce to a legally independent sub-contractor but where the same employees continue their work at the same physical location (see Goldschmidt and Schmieder, 2017, for a discussion of such examples). In many such instances, while the jobs are outsourced, the actual workers remain the same and continue to work the same job before and after it is being outsourced. For example, when a large firm outsources a workplace cafeteria where the workers remain the same, it is possible to observe such an event as a flow of a group of workers from an establishment with an industry identifier of bank to another establishment with an industry identifier of a business cafeteria provider or food service provider. In this case, it is possible to observe the same job and worker before and after outsourcing and compare job characteristics to a comparable job that is not being outsourced. We call this type of event, where a firm outsources tasks but the workers remain the same and the task is continued to be provided at the firm, an on-site outsourcing event.

Figure 3 illustrates this in an example of a manufacturing firm that in 1995 has an in-house cafeteria that it outsources to a business service firm in 1996. In the LEHD, the workers of the cafeteria, represented by the orange box in the figure, will have the manufacturing firm identifier in 1995 but will be associated with the food business service firm identifier in 1996. Thus movements of large groups of workers out of non-business service firms into business service firms can be observed in the LEHD and plausibly identify on-site outsourcing events.

We identify such on-site outsourcing events from the observed between firm workers flows in the LEHD. Following Benedetto et al. (2007), we call a group of workers that is employed in year t at firm A and in year t+1 at firm B a "flow". We call the firm where the

7

flow originates the predecessor and the target firm of the flow the successor. We first create, for all years, a dataset of all firm to firm worker flows between year t and t+1. We then identify flows that plausibly correspond to on-site outsourcing events using the following set of criteria:

1) The flow has at least 10 workers
2) The predecessor has employment of at least 50 workers in t-1
3) The flow represents less than or equal to 30 percent of the predecessor employment in t-1.
4) The predecessor does not shrink by more than 50 percent between t-1 and t.
5) If the successor is a new firm, then the flow has to contribute at least 65 percent of the initial employment in year t.
6) The predecessor is not in the same 3 digit industry as the successor.
7) The successor is in Food, Cleaning, Security, or Logistics (FCSL) industries.

These restrictions cut the average annual number of firm to firm flows from around 8.5 million to approximately 400 firm to firm flows. The most important restriction is the first one (min. flow size) that cuts the number of flows from 8.5 million to 50,000. The various other size cutoff restrictions reduce the number of observations to about 10,000 per year and finally the FCSL restriction cuts it to about 400 per year.

The reasoning behind these restrictions is that we strife to identify events that are relatively easily interpretable and like fit a situation of a firm contracting out a group of workers together. The first restriction of a flow consisting of at least 10 workers serves to have a clearly identified group of workers. The second restriction assures that the predecessor is large enough that it outsourcing a unit is plausible. The third and fourth restrictions assure that the predecessor continues to exist as a business and does not dissolve at the time the flow occurs. In particular we want to avoid identifying firms that are breaking up or undergo massive restructuring since in that case it will be difficult to isolate the effect of outsourcing from these the effect of the other changes the firms is undergoing. The fifth restriction serves to assure that if the target of outsourcing is a new establishment, that the latter is created in response to the outsourcing event.

The key industry restrictions are 6) and 7), which make it very likely that the outsourcing events involve contracting out service jobs from a predecessor that does not focus on these services to a dedicated business service firm.

While the exact cutoffs we use here are of course debatable, we found that in practice changing these thresholds - even by a substantial amount - barely affects our main wage results reported below. As will be seen below, the average outsourcing establishments that we identify is far away from these cutoffs: much larger prior to the flow, barely shrinks and the flow is a very small part of total employment.

3.3   On-Site Outsourcing Events

Figure 4 shows the number of FCSL on-site outsourcing events by year. At the beginning of our sample period, there are about 200-300 events per year, however with a clear upwards trend and more than 700 outsourcing events in the most recent period. Figure 5 shows the number of workers who are outsourced in these events which rises from around 6000 in 1996/97 to around 16,000 in 2014/15. As can be seen from this an average outsourcing event involves around 25 to 30 workers.

Figure 4 also shows a suggestive relation between outsourcing and the business cycle. The occurrence of on-site outsourcing falls precipitously in the 2-3 years following the 2001 and the 2008 recession and shows accelerating growth from around 4 years onwards after the recessions. In particular the most recent years from the Great Recession onwards show a stark increase. It seems possible that firms first scale back outsourcing plans at the beginning of recessions due to the uncertain economic environment but then begin to restructure their production processes as the economy is coming out of the recession, e.g. through outsourcing. This might be similar to recent evidence that the Great Recession spurred technology adoption (Hershbein and Kahn, 2016).

Table 1 breaks out the on-site outsourcing events by logistics outsourcing events and food, cleaning and security outsourcing events (breaking these three out separately would generate cells too small for data confidentiality disclosure). Both types of outsourcing experienced sharp growth over time in the number of events and the number of affected workers. Furthermore the table reveals that Logistics outsourcing events typically involve slightly larger groups of workers.

Overall the growth in on-site outsourcing over the past 20 years is broadly in line with our long-term evidence from Census/ACS data in section 2, though the LEHD appears to show somewhat larger growth in outsourcing than the previous evidence (though recall that the on-site outsourcing measure we use in the LEHD is of course a flow rather than stock measure and only involves a fairly narrow type of outsourcing).

4 The Effects of On-site Outsourcing on Earnings

4.1 Generating a control group

The group of workers affected by on-site outsourcing can be followed over time, before and after the outsourcing event. In order to estimate the effect of outsourcing it is necessary to establish a counterfactual of how labor market outcomes would have evolved for the outsourced workers if they had not been outsourced. To this end, we create a control group of workers who are not outsourced using a matching algorithm. For each outsourced worker this algorithm picks a worker working in the same industry, at a similar sized firm and with a comparable earnings history as the outsourced worker in the year prior to being outsourced.

Specifically we use the following algorithm to select outsourced workers and a comparable control group for each year t, where the timing is such that t-1 is the last year at the pre-outsourcing firm:

We start with all non-outsourced workers. We then restrict our sample to workers with at least 3 years of tenure at the firm where they are employed in year t-1 (that is they are working at the same firm in t-1, t-2 and t-3). We restrict the control group to workers who are working at the same firm in year t as in year t-1. We then create cells defined by:

- Quintiles of average quarterly earnings in t=-3 and t=-2.
- Year
- State
- Industry codes (NAICS2) of the t-1 firm
- Age (4 groups)
- Imputed Education (4 groups)
- Firm age and size (2 and 3 groups respectively)

For each outsourced worker we select all workers within the same cell as the control workers. For cells with multiple outsourced workers we weight them by the inverse of the number of observations in a cell (1/N) so that we have one effective control observation for each outsourced worker.

Table 2 shows some observable characteristics for our outsourced group and the comparison workers. Note, that education is imputed in the LEHD, based on age categories, earnings categories, and industry dummies (See Abowd et al., 2006, for a discussion).[4]

The matching algorithm produces a comparison group that is very similar to the outsourced workers in terms of age and (imputed) education. However, our comparison group only broadly matches the distribution of firm age and firm size. We experimented with stratifying by age, gender, education, firm age, firm size, and firm, with no obvious change in the results reported below.

4.2 Empirical Specification

Once, the domestic outsourcing events and a suitable control group are identified, and the various datasets are merged to generate these outcome variables, the effects of outsourcing can be estimated using the following event study specification:

$$y_{it} = \sum_{k=-5}^{10} \delta_k I_{t=t^*+k} \times Outsourced_{it} + \theta_i + \alpha_t + x_{it}\beta + \varepsilon_{it} \quad (1)$$

[4] The imputations stems from the decennial census and is based on variables that are common between the decennial census and the LEHD. There are 13 education categories available.

where y_{it} is the natural logarithm of quarterly earnings of individual i in year t. $Outsourced$ is an indicator for a person being outsourced in year t^*, α_t are year fixed effects, x_{it} are individual-level time varying worker controls, and ε_{it} is an error term. Each coefficient δ_k measures the change in the outcome variable y_{it} for outsourced jobs relative to the non-outsourced control group in the k-th year relative to the year when the worker was outsourced. In addition to quarterly earnings we also investigate job to job mobility, using the same regression model but using an indicator of whether a worker is employed at the t=0 firm as an outcome variable.

While we do not directly observe the job or workplace, we can indirectly control for job characteristics under the above assumption that workers who remain at the daughter establishment after on-site outsourcing continue to be working the same job. In that case, restricting the sample to individuals in the treatment group who remain at the successor establishment after being outsourced (and the predecessor establishment before outsourcing) is a way to indirectly control for job characteristics.

Our design of creating a comparison group via our matching algorithm is a very flexible and intuitive method to generate a counterfactual. Alternatively, one can also include a general set of workers who are not matched and control flexibly for observables, which yields similar results but is computationally more demanding in very large datasets (see Goldschmidt and Schmieder for an exploration of this point). A key issue for how well out method works is whether the control group is chosen appropriately. A concern could for example be if outsourced workers come from firms or regions that are experiencing economic downturns of which outsourcing is just a symptom. In that case outsourced workers may have experienced wage losses even in the absence of outsourcing and this would imply a downward bias in our estimates of the effect of outsourcing on earnings. This concern can be addressed by judicious constructions of alternative comparison groups that take this into account, such as using workers within the outsourcing firm as a comparison group or by matching comparison workers within the same narrow region.

Overall our analysis allows us to estimate the effect of outsourcing on workers whose jobs are outsourced / moved to external business service firms. Our various restrictions make it likely that the workers are still working in the same or similar jobs as before the outsourcing event occurred but are now employed through a business service provider that provides business services to the original firm.

4.3   Results

Figure 6 a) shows the evolution of log quarterly earnings for the group of workers who are outsourced in on-site outsourcing events and the constructed control group overtime, normalized so that t=0 corresponds to the first year after outsourcing (that is outsourcing occurs between t=-1 and t=0).

One complication in the LEHD is that we do not observe for how long a worker was employed at an employer in a given quarter, only what the total quarterly earnings were.

For this reason, if an outsourced worker works at firm A in t=-1 and firm B in t=0, it is possible that she only worked for part of the quarter (Q2) at firm A in t=-1 or only for part of the quarter at firm B in t=0. On the other hand earnings in t=-3 and -2 are almost certainly for observations where a worker was employed for the full quarter of the firm.

In order to avoid a mechanical bias from these partial quarter observations, we restrict our analysis to worker-year observations where we fully observe the second quarter of the year at a single firm. In particular, we only use observations for workers in Q2, where the worker was employed in Q1 and Q3 at the same firm. This large eliminates the mechanical bias, thought it might in principle induce some selection problems, something that we are currently investigating.

Figure 6a) provides prima facie evidence that outsourcing in on-site outsourcing events leads to lower earnings among the outsourced workers. While the gap takes a little while to open up, after 7-8 years it appears to be in a range of 2-3 percent and increasing over the first few years. Note that Figure 6 b) does not restrict the sample to worker observations where the worker stays at the t=0 employer in subsequent years. Thus wages in the outsourced group might be affected by workers moving to different firms. For example, if outsourced workers leave the business service firm that they are outsourced to move to higher paying firms, the wage loss might be underestimated. If they leave to lower paying firms the wage loss may be exaggerated.

In Figure 6b), we show estimates from estimating the model in equation (1). Each point represents one of the estimated δ_k from the regression. This clearly shows that wages drop by around 2-3% over a 9 year horizon.

Figure 7 shows the survival function of staying in the t=0 firm for both the outsourced and non-outsourced groups after the outsourcing event. Jobs in the comparison group are more stable. For example, 5 years after the outsourcing event about 45 percent of workers in the control group are still at the t=0 firm, while in the outsourced group about 35 percent of workers remain in the firm they are outsourced to. The differences in mobility could either be due to workers being laid-off by the firm that they are outsourced to or due to higher quit rates among the outsourced workers. Either one of these mechanisms would suggest that outsourced jobs are worse than non-outsourced jobs along non-monetary dimensions.

5   Domestic Outsourcing during the Great Recession

Figure 2 and 4 revealed a large increase in outsourcing over time and an uptick in the aftermath of the Great Recession. One unresolved question in the literature is under what conditions firms decide to outsource part of their labor force. While there are many factors that likely affect this decision, one hypothesis is that firm may decide to outsource in response to economic downturns. Outsourcing involves substantial restructuring at the parent firm and may involve important opportunity costs in terms of

investing times and resources into this restructuring. Such restructuring may have fewer opportunity costs during economic downturns, which are often accompanied by firms restructuring their production processes (See for example Hall, 2005 or Koenders and Rogerson, 2005). In a fascinating recent study, Hershbein and Kahn (2017) analyze restructuring during the Great Recession and find that firms in MSAs that faced particularly sharp downturns significantly increase their skill requirements for new hires, suggesting that this is accompanied by restructuring and investments in new technology and production processes.

If firms find it optimal to invest in new technology during economic downturns, it seems plausible that they would also use the lower opportunity costs of downturns to outsource parts of their labor force, which similarly involves restructuring business practices. In this section we test this hypothesis using spatial variation in the local depth of the Great Recession to identify its effect on outsourcing.

Our analysis is at the MSA level and relies on the ACS data described above. Our method follows the shift-share instrumental variables strategy of Hershbein and Kahn (2017). We construct a "Bartik shock" variable (see Bartik, 1991) that captures the change in predicted employment growth in each MSA from 2006 to 2009, based on the local 3 digit industry composition. In particular, our shock calculates how much local employment growth in MSA m would have changed from 2006 to 2009, if the local industries had evolved exactly according to the national evolution of those industries. Specifically the change $\Delta \hat{E}_{mt}$ is defined as:

$$\Delta \hat{E}_{mt} = \sum_{k=1}^{K} \phi_{m,k}(\ln E_{k,t} - \ln E_{k,t-1}) \quad (2)$$

The $\phi_{m,k,\tau}$ is the employment share of 3 digit (NAICS) industry k in MSA m during 2004/05 (the average over both years). $\ln E_{k,t} - \ln E_{k,t-1}$ is the log employment growth in industry k between year $t-1$ and year t.

The shock to employment growth in MSA m is then defined as:

$$shock_m = \Delta \hat{E}_{m,2009} - \Delta \hat{E}_{m,2006} \quad (3)$$

This generates sharply divergent predictions about regional employment growth changes. For example the least hit MSA is predicted to have only a 4 percentage points decline in employment, while the most hit MSA is predicted to have a 12 percentage points decline in employment. We normalize the shock by the difference between the 90th and 10th percentile, or -0.026 log points.

We then estimate the effect of the shock in each year between 2000 and 2015 using the following specification:

$$y_{g,m,t} - y_{g,m,2007} = \alpha_0 + \sum_{j \in J} \delta_j\big(shock_m * 1_{t=j}\big) + X_m \beta + \varepsilon_{m,t} \quad (4)$$

13

where $J = \{2000, 2001, \dots 2006, 2008, 2009, \dots .2015\}$, so that 2007 is the omitted baseline year. The coefficients δ_j capture the differential trends in the outcome variables $y_{g,m,t}$ between the 90th and the 10th percentile (in terms of predicted shock) MSA. The control X_m control for a number of MSA level characteristics.

To first show that our Bartik shock does "bite", Figure 8 a) shows estimates of equation (4) for employment growth. The figure clearly shows that during the Great Recession MSAs at the 90th percentile of our shock variable fare much worse in terms of employment growth than MSAs at the 10th percentile. In particular, in 2008 and 2009 employment growth is around 2 percentage points lower in the high shock MSAs. Figure 8 b) shows the same estimate for the unemployment rate in percentage points. The pattern is similar but more persistent. Unemployment rates in the worst affected MSAs are about 2 percentage points higher in 2009 and remain elevated for about 3 years. So perhaps not surprisingly, the Bartik shock has clear predictive power for local economic activity during the Great Recession.

We now turn to estimates of equation (4) for the incidence of outsourcing. The outcome variable here is the share of workers in FCSL occupations that work for business service firms. This is a broad measure of the incidence of contracting out jobs, rather than a measure of the type of outsourcing events we observe in the LEHD. In the future we plan to replicate the same type of analysis for other measures of outsourcing, including the on-site outsourcing events from the LEHD.

In Figure 9 shows the effects of the shock on outsourcing, pooling all four service types. The pattern is quite simple: it does not appear that MSAs that experienced sharper downturns experienced additional outsourcing. The coefficients are very close to zero and the confidence intervals cover around plus to minus one percentage point, quite small relative to the overall level of outsourcing of around 40 percent. So despite the existing literature that has shown that economic downturns are associated with firm level restructuring, this does not seem to hold for outsourcing.

This is further confirmed when we break the analysis up into the 4 types of labor services: food, cleaning, security and logistics. This is shown in Figure 10, which shows that outsourcing does not seem to clearly respond to the shock in any of the service groups. With some goodwill one might be able to imagine a slight increase in heavily affected areas in outsourcing of food and logistics occupations in later years of our sample but the estimates are imprecise and never statistically significantly different from 0. Overall this does not suggest that economic downturns are an important driver of additional outsourcing.

6   Conclusion

Our analysis of the domestic outsourcing suggests that there are long term wage losses in the range of 2-3 percent relative to the control group. Interestingly this is lower than the estimates for Germany from Goldschmidt and Schmieder (2017), where FCSL outsourcing leads to wage losses of about 9-10 percent. At this stage there are many possible explanations for these differences, but it might be that outsourced workers lose compensation along non-wage margins such as access to health insurance, which likely plays a much larger role in the U.S. labor market (see Dube and Kaplan, 2010, for some evidence on this).

A recent literature documents that the rise in wage inequality in developed economies during the last few decades stems to a large extent from growing wage dispersion across firms and establishments. See, for example, Song et al. (2016) for the U.S. and Card et al. (2013) for Germany. The outsourcing of labor services provides a potential explanation for this phenomenon, as it reduces the heterogeneity of workers within firms. Indeed, Handwerker and Spletzer (2016) and Handwerker (2015) show that outsourcing increases occupational concentration in establishments and increases wage inequality. The negative wage effects from outsourcing in combination with the increases in domestic outsourcing suggest that domestic outsourcing has the potential to explain part of the increase in wage inequality, especially in the lower tail of the wage distribution.

References

John M. Abowd, Bryce E. Stephens, Lars Vilhuber, Fredrik, Andersson, Kevin L. McKinney, Marc Roemer, and Simon Woodcock: "The LEHD Infrastructure Files and the Creation of the Quarterly Workforce Indicators", US Census Technical Paper No. TP-2006-01, 2006.

Katharine G Abraham, Susan K Taylor: "Firms' Use of Outside Contractors: Theory and Evidence", *Journal of Labor Economics*, pp. 394—424, 1996.

Katharine G Abraham: "Restructuring the employment relationship: The growth of market-mediated work arrangements", *New developments in the labor market: Toward a new institutional paradigm*, 1990.

George A Akerlof, Janet L Yellen: "The fair wage-effort hypothesis and unemployment", *The Quarterly Journal of Economics*, pp. 255—283, 1990.

David H Autor: "Outsourcing at will: The contribution of unjust dismissal doctrine to the growth of employment outsourcing", *Journal of Labor Economics*, pp. 1—42, 2003.

Annette Bernhardt, Rosemary Batt, Susan N. Houseman, and Eileen Appelbaum. "Domestic Outsourcing in the United States: A Research Agenda to Assess Trends and Effects on Job Quality", 2016.

Gary Benedetto, John Haltiwanger, Julia Lane, and Kevin McKinney. "Using worker flows to measure firm dynamics." Journal of Business & Economic Statistics 25, no. 3, pp. 299-313, 2007.

Giuseppe Berlingieri: "Outsourcing and the rise in services", Working Paper LSE, 2013.

Samuel Berlinski: "Wages and contracting out: does the Law of one price hold?", *British Journal of Industrial Relations*, pp. 59—75, 2008.

David Card, Jörg Heining, Patrick Kline: "Workplace Heterogeneity and the Rise of West German Wage Inequality*", *The Quarterly Journal of Economics*, 2013.

David Card, Thomas Lemieux, W Craig Riddell: "Unions and wage inequality", *Journal of Labor Research*, pp. 519—559, 2004.

David Card, Alexandre Mas, Enrico Moretti, Emmanuel Saez: "Inequality at Work: The Effect of Peer Salaries on Job Satisfaction", *American Economic Review*, pp. 2981—3003, 2012.

Matthew Dey, Susan Houseman, Anne Polivka: *What Do We Know About Contracting Out in the United States? Evidence from Household and Establishment Surveys* in

Labor in the New Economy. National Bureau of Economic Research, Inc, 2010. URL http://ideas.repec.org/h/nbr/nberch/10824.html.

John DiNardo, David S Lee: "Economic impacts of new unionization on private sector employers: 1984—2001", *The Quarterly Journal of Economics*, pp. 1383—1441, 2004.

Arindrajit Dube, Ethan Kaplan: "Does outsourcing reduce wages in the low-wage service occupations? Evidence from janitors and guards", *Industrial and Labor Relations Review*, pp. 287—306, 2010.

John Dunlop: "The task of contemporary wage theory/Taylor G., Pierson F. New concepts in wage determination", *New York: McGraw-Hill*, pp. 3—27, 1957.

Robert Gibbons, Lawrence Katz: "Does unmeasured ability explain inter-industry wage differentials?", *The Review of Economic Studies*, pp. 515—535, 1992.

Deborah Goldschmidt, Johannes F Schmieder: "The Rise of Domestic Outsourcing and the Evolution of the German Wage Structure", *The Quarterly Journal of Economics,* August, 2017.

Erica L Groshen: "Sources of intra-industry wage dispersion: How much do employers matter?", *The Quarterly Journal of Economics*, pp. 869—884, 1991.

Robert E. Hall, "Employment fluctuations with equilibrium wage stickiness." American Economic Review, pp. 50- 65 ,2005.

Elizabeth Handwerker: "Increased Concentration of Occupations, Outsourcing and Growing Wage Inequality in the United States", 2015.

Elizabeth W. Handwerker, James R. Spletzer: "The Role of Establishments and the Concentration of Occupations in Wage Inequality", *Research in Labor Economics*, Forthcoming.

Brad Hershbein, and Lisa B. Kahn. "Do Recessions Accelerate Routine-Biased Technological Change? Evidence from Vacancy Postings", No. w22762. National Bureau of Economic Research, 2016.

Lawrence F Katz and Alan B. Krueger, "The Rise and Nature of Alternative Work Arrangements in the United States, 1995-2015," Working Paper 22667, National Bureau of Economic Research September, 2016.

Kathryn Koenders, and Richard Rogerson. "Organizational dynamics over the business cycle: a view on jobless recoveries." Review-Federal Reserve Bank of Saint Louis 87, 2005.

Alan B Krueger, Lawrence H Summers: "Efficiency wages and the inter-industry wage structure", *Econometrica: Journal of the Econometric Society*, pp. 259—293, 1988.

Albert Rees: "The Role of Fairness in Wage Determination", *Journal of Labor Economics*, pp. pp. 243-252, 1993. URL http://www.jstor.org/stable/2535192.

Lewis M Segal, Daniel G Sullivan: "The growth of temporary services work", *The Journal of Economic Perspectives*, pp. 117—136, 1997.

Lewis M Segal, Daniel G Sullivan: "The growth of temporary services work", *The Journal of Economic Perspectives*, pp. 117—136, 1997.

Jae Song, David Price, Fatih Guvenen, Nick Bloom: "Firming Up Inequality", Working Paper UCLA, 2016.

David Weil: *The Fissured Workplace: Why Work Became So Bad for So Many and What Can Be Done to Improve It*. Harvard University Press, 2014.

Tables

Table 1: Number of On-Site Outsourcing Events and Affected Workers

	Events		Workers	
	Logistics	FCS	Logistics	FCS
1996-1997	128	114	3319	2159
1997-1998	142	114	2964	2158
1998-1999	149	112	3493	2504
1999-2000	175	172	3919	4537
2000-2001	175	144	4884	3382
2001-2002	142	125	5448	3560
2002-2003	141	117	3885	3403
2003-2004	173	157	4363	3904
2004-2005	187	199	3878	4766
2005-2006	224	177	7085	3594
2006-2007	233	272	5199	5418
2007-2008	235	308	4751	5916
2008-2009	175	276	4643	5823
2009-2010	185	213	4851	4201
2010-2011	214	212	5767	4194
2011-2012	219	302	5239	8095
2012-2013	242	259	4875	5459
2013-2014	293	369	6234	8726
2014-2015	380	341	9115	7013
Avg(96-98)	135	114	3142	2159
Avg(13-15)	337	355	7675	7870
Growth	202	241	4533	5711
%Growth	149.3%	211.4%	144.3%	264.6%

Table 2: Characteristics of Oursourced Workers and Control Group

	Outsourced	Comparison	Difference
Female	44.38%	44.38%	0.0%
Age <35	21.97%	21.97%	0.0%
Age 35-44	28.58%	28.58%	0.0%
Age 45-55	30.56%	30.56%	0.0%
Age >=55	18.90%	18.90%	0.0%
Educ 10	15.84%	15.84%	0.0%
Educ 12	26.16%	26.16%	0.0%
Educ 14	32.24%	32.24%	0.0%
Educ 16	25.76%	25.76%	0.0%
Young Firm	16.85%	16.85%	0.0%
Old Firm	83.15%	83.15%	0.0%
Small Firm	17.11%	17.11%	0.0%
Medium Firm	26.60%	26.60%	0.0%
Large Firm	56.29%	56.29%	0.0%

Figures

Figure 1: The Fraction of Workers working in Business Services
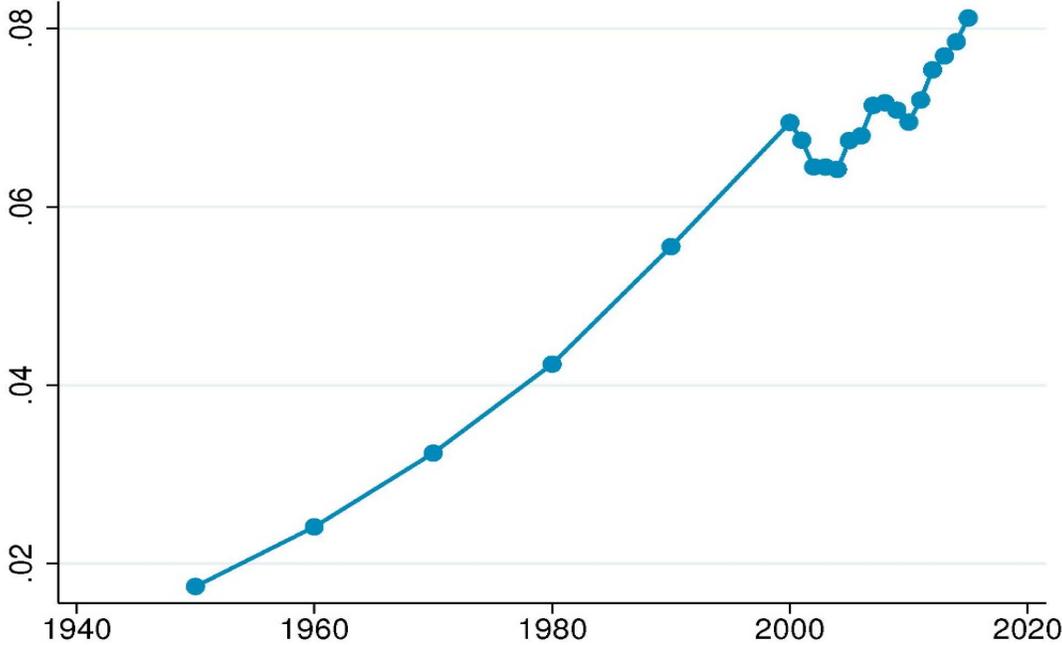

Note: The figure shows the fraction of all workers in the US working for business service firms. The fraction is calculated using IPUMS Decennial Census data from 1950 to 2000 and the Amercian Community Survey data from from 2000 to 2015. Business service firms are defined as firms with 1950 IPUMS industry codes for trucking (ind1950=526), warehouse (ind1950=527) industries or miscellaneous business services (ind1950=808).

Figure 2: The Fraction of Workers in Food, Cleaning, Security and Logistics (FCSL) Occupations who are working for Business Service Firms
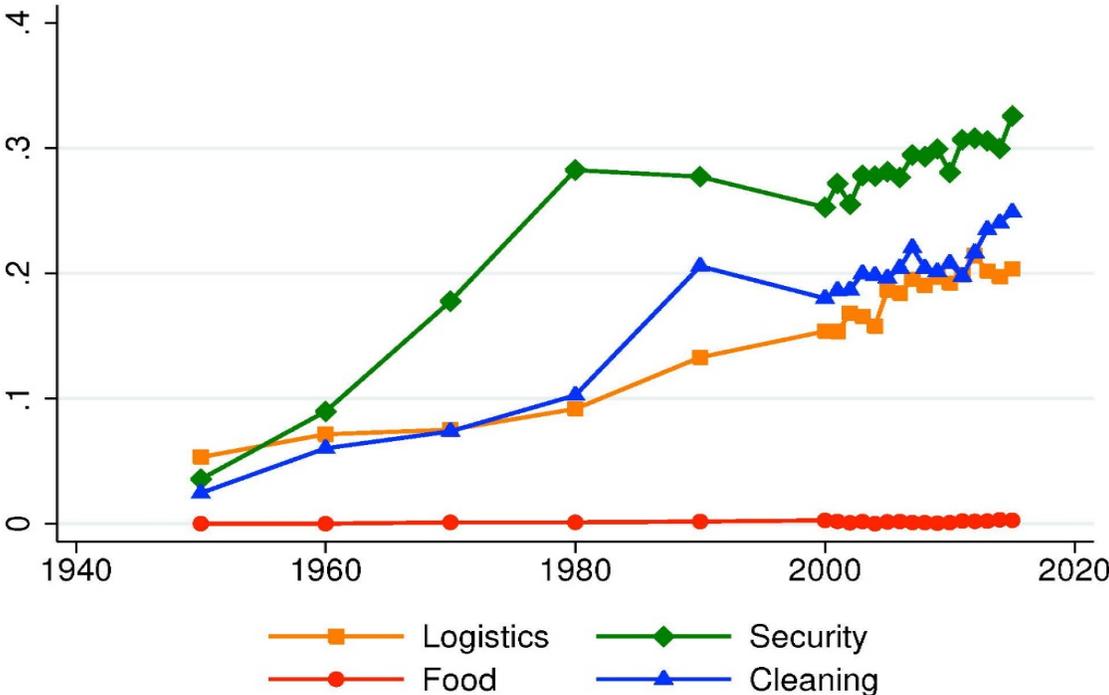
Note: The figure shows the fraction of all FCSL workers in the US working for business service firms. The fraction is calculated using IPUMS Decennial Census data from 1950 to 2000 and the Amercian Community Survey data from from 2000 to 2015. Business service firms are defined as firms with 1950 IPUMS industry codes for trucking (ind1950=526), warehouse (ind1950=527) industries or miscellaneous business services (ind1950=808).

Figure 3: Identifying On-site Outsourcing in Linked Employer-Employee Data
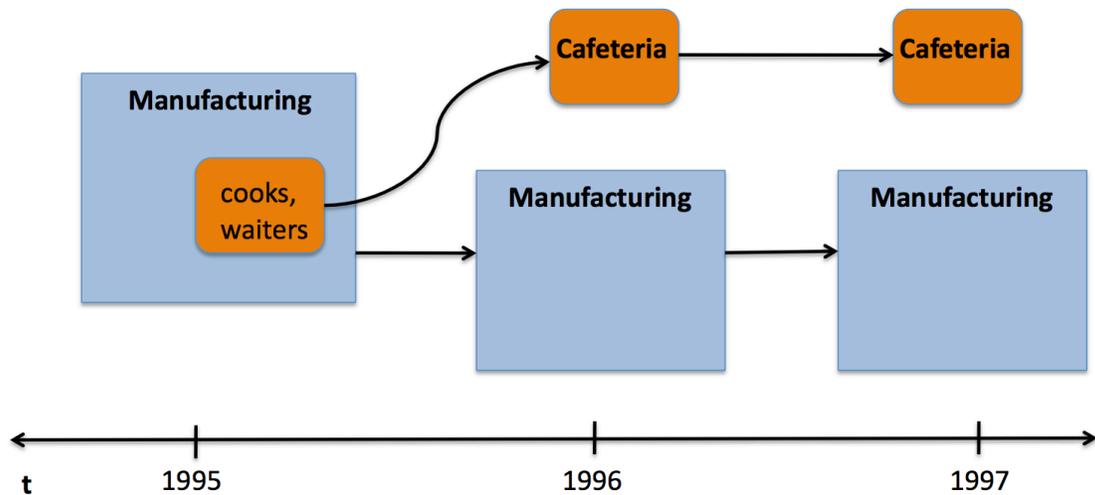
Notes: The figure illustrates the method to identify on-site outsourcing events in administrative linked employer-employee datasets like the LEHD in the US. Using data on the universe of workers who can be linked to establishments (via an establishment ID) and over time (via a person ID), one can follow workers over time and in particular observe groups of workers moving from large non-business service firm employers to business service establishments, such as cleaning firms. As explained in the text such events are very likely to correspond to on-site outsourcing events.

Figure 4: Number of On-Site Outsourcing Events in Census LEHD Data
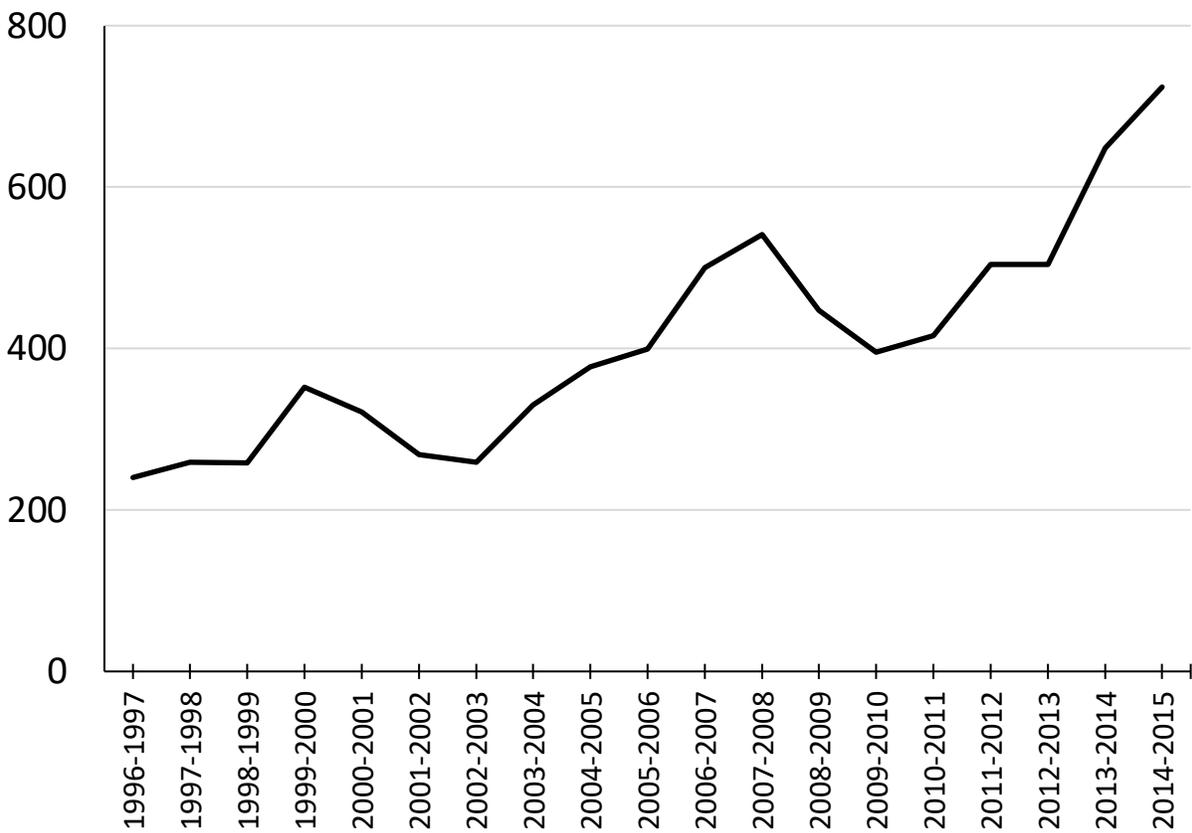
Note: The figure shows the number of outsourcing events in the Longitudinal Employer-Household Dynamics (LEHD) Data for 1996 to 2015, pooling all outsourcing events.

Figure 5: Number of Outsourced Workers in FCSL On-site Outsourcing Events
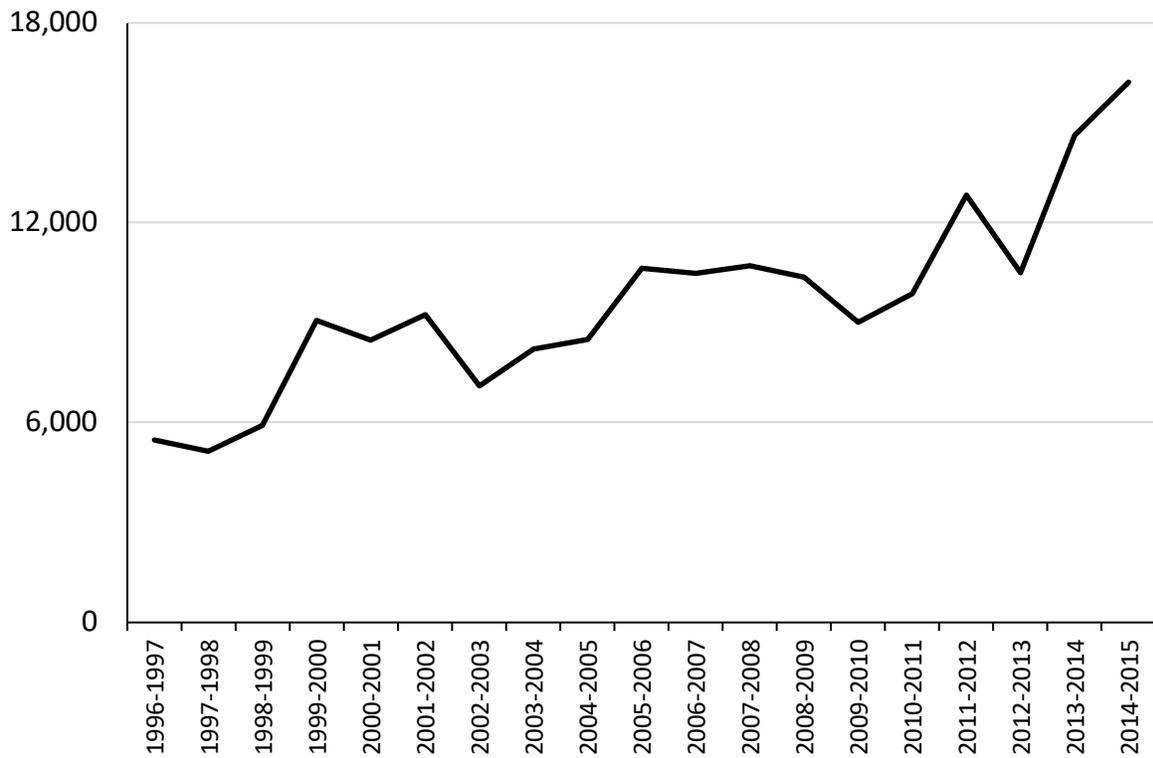
Note: The figure shows the number of workers who are outsourced in the on-site outsourcing events in the Longitudinal Employer-Household Dynamics Data (LEHD) for 1996 to 2015.

Figure 6: The Effect of On-Site Outsourcing on Log Quarterly Earnings
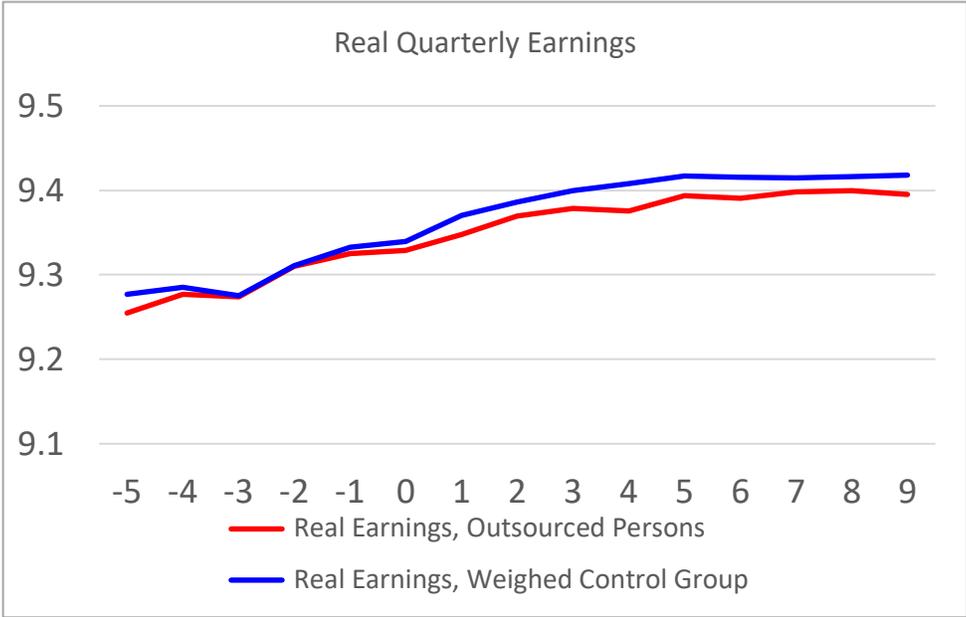
a) Comparing Means of Outsourced Workers and Control Group
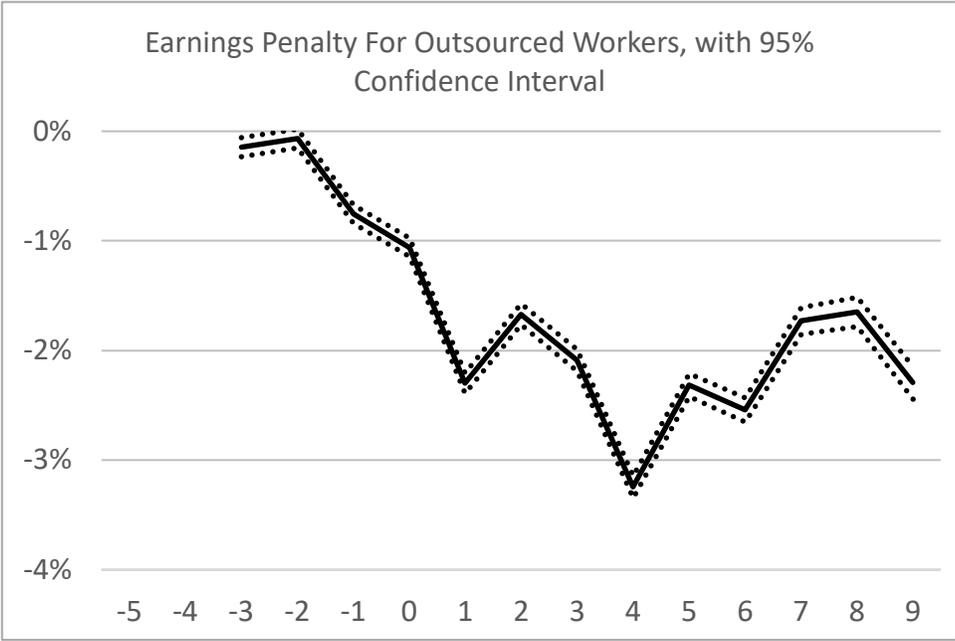

b) Regression Estimates

Note: The figure shows log quarterly earnings of workers who are outsourced between year t=-1 and t=0 (the first year at the new establishment) and the corresponding control group of non-outsourced workers. No firm restriction

Figure 7: Job-to-Job Mobility after Outsourcing
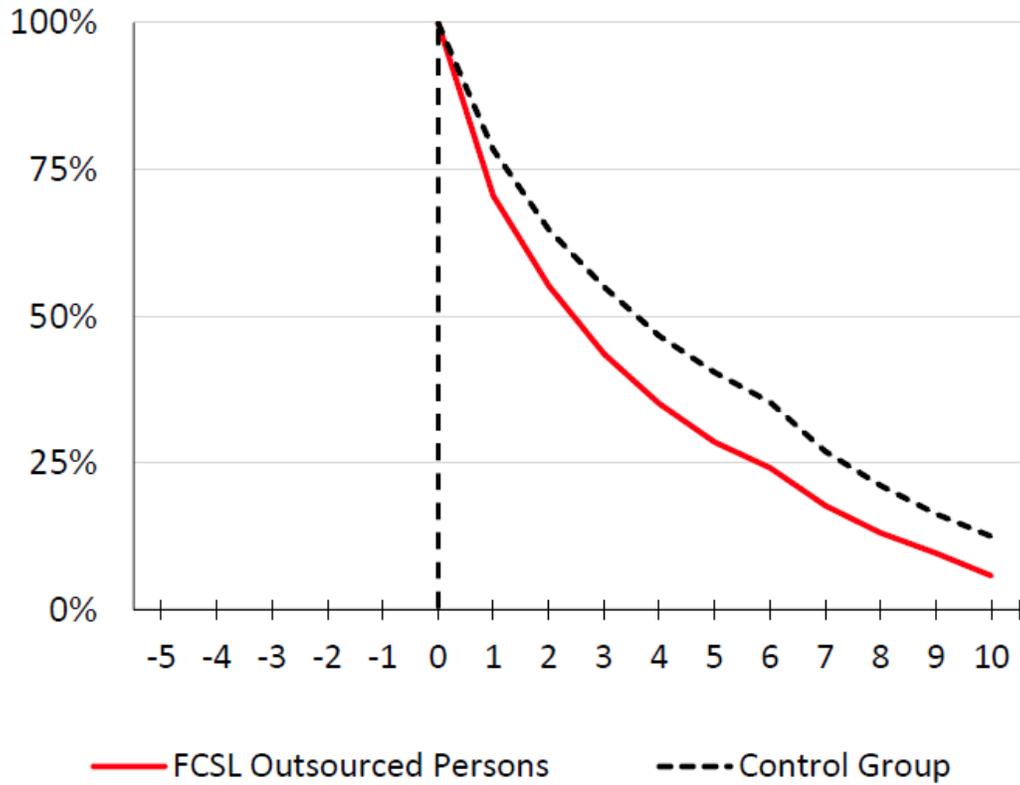
Note: The red line shows the share of workers who are outsourced in on-site outsourcing events between t=-1 and t=0 who are still employed at the firm at t=0 (the firm they are outsourced to). The black line shows the same for the control group.

Figure 8: Bartik Shock as an Instrument for Employment Growth
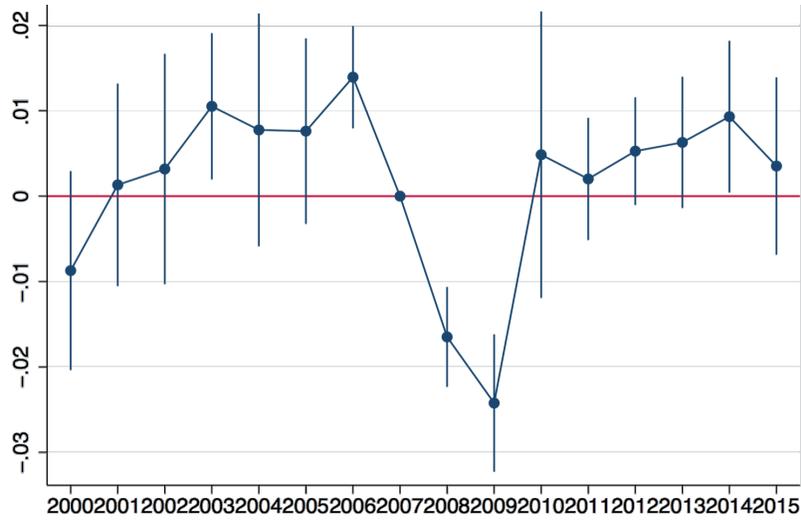
a) The Impact of the Bartik Shock on Employment Growth rates
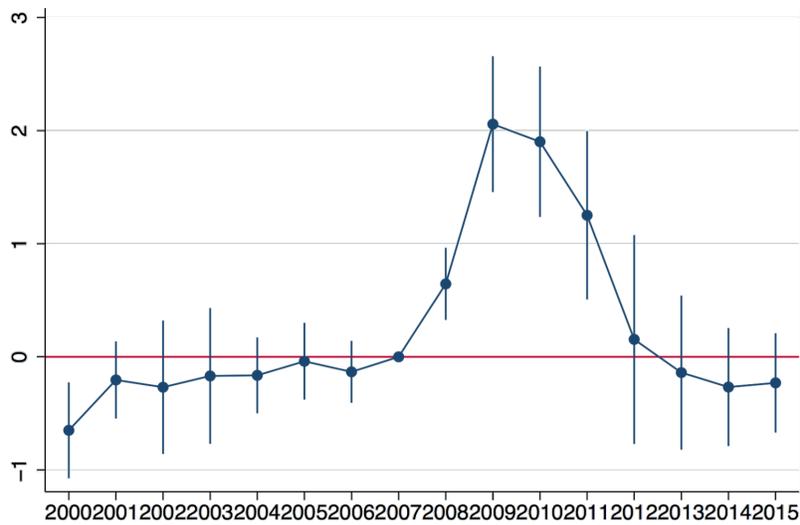
b) The Impact of the Bartik Shock on the Unemployment Rate (percentage points)

Note: The figure shows the impact of the Bartik shock variable on employment growth (Panel a) and the Unemployment rate (Panel b) for each year. Horizontal lines are 95% confidence intervals.

Figure 9: The Effect of the Bartik Shock on Outsourcing
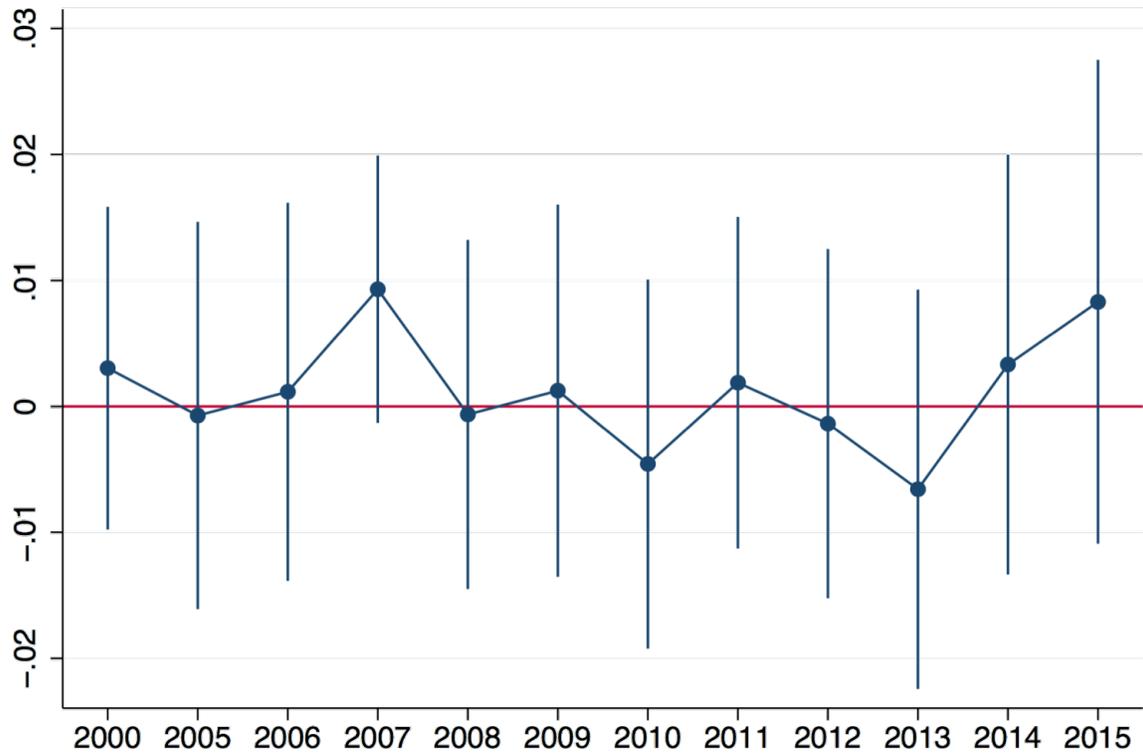
Note: The figure shows the impact of the Bartik shock variable on the share of FCSL workers working for business service firms in each year. Horizontal lines are 95% confidence intervals.

Figure 10: The Effect of the Bartik Shock on Outsourcing by Occupations
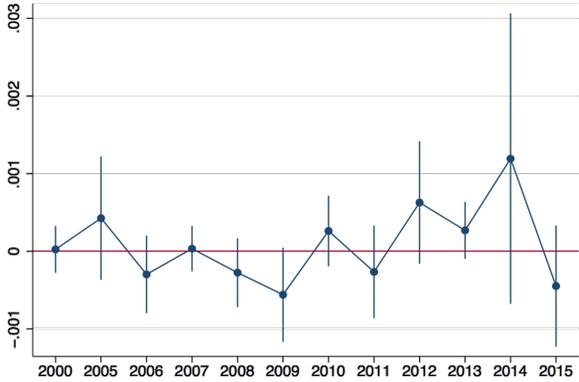

a) Food
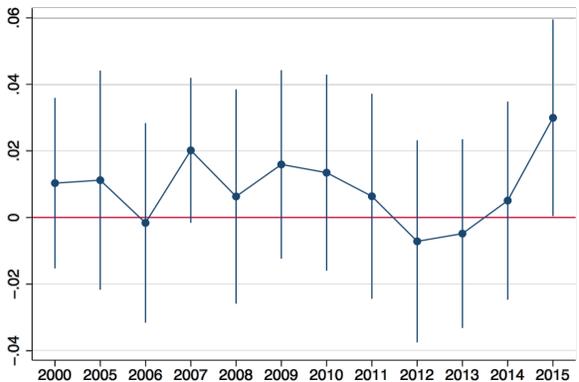
b) Cleaning
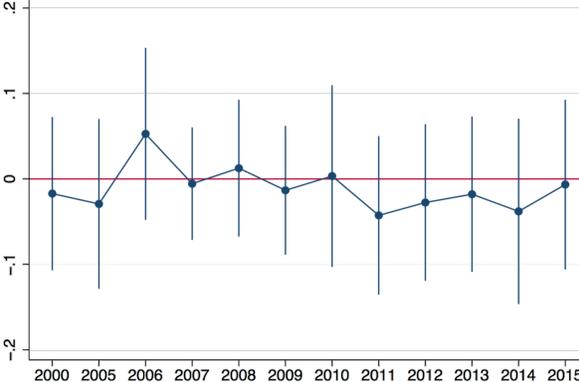
c) Security
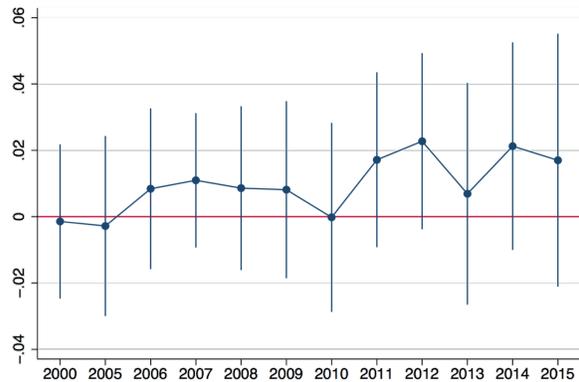
d) Logistics

Note: The figure shows the impact of the Bartik shock variable on the share of workers working for business service firms in each year. Panel a) shows the effect for Food workers, panel b) for cleaning workers, panel c) for security workers and panel d) for logistics workers. Horizontal lines are 95% confidence intervals. Horizontal lines are 95% confidence intervals.

Appendix

Industry and Occupation Codes to Classify FCSL Business Service Firms and Occupations

1950 Occupation Codes

Category	OCC1950	
Food	754	Cooks, Except private Household
Food	750	Bartenders
Food	760	Counter and fountain workers
Food	784	Waiters and Waitresses
Cleaning	770	Janitors and Sextons
Cleaning	753	Charwomen and cleaners
Cleaning	764	Housekeepers and stewards, except private households
Security	763	Guards, watchmen, and doorkeepers
Logistics	683	Truck and tractor drivers
Logistics	940	Longshoremen and stevedores
Logistics	690	Operatives and kindred workers

1950 Industry Codes

Category	1950 Code	1950 Description
Logistics	526	Trucking Service
Logistics	527	Warehousing and Storage
Temp	n/a	n/a
Cleaning	808	Misc. Business Services
Security	808	Misc. Business Services
Food	808	Misc. Business Services
All	808	Misc. Business Services

1950 Industry Codes for Identification of MHFE Industries

Category	Code	Description
Manufacturing	300s	Durable goods; See list
Manufacturing	400s	Nondurable goods; See list
Finance	716	Banking and credit
Finance	726	Security and commodity brokerage and invest companies
Health	868	Medical and other health services, except hospitals
Health	869	Hospitals
Education	888	Educational services

1990 Occupation Codes

Category	OCC1990	
Food	434	Bartenders
Food	435	Waiter/waitress
Food	436	Cooks, variously defined
Food	438	Food counter and fountain workers
Food	439	Kitchen workers
Food	443	Waiters assistant
Food	444	Misc. food prep
Cleaning	448	Supervisors of building and cleaning services
Cleaning	453	Janitors
Cleaning	405	Housekeeping, maids, butlers, stewards & lodging cleaners
Cleaning	887	Vehicle washers & equipment cleaners
Security	426	Guards, watchmen, doorkeeper
Security	415	Supervisors of guards
Logistics	804	Truck, delivery and tractor drivers
Logistics	876	Materials movers: stevedores and longshore workers
Logistics	877	Stock handlers
Logistics	883	Freight, stock and materials movers
Logistics	888	Packer and packagers by hand
Logistics	373	Material recording, scheduling, production, planning & expediting clerks

1990 Industry Codes

Category	1990 Code	1990 Description
Logistics	410	Trucking Service x
Logistics	411	Warehousing and Storage x
Temp	731	Personnel supply services
Cleaning	722	Services to dwellings and other buildings
Security	740	Detective and protective services
Food	741	Business Services
All	741	Business Services

1990 Industry Codes for Identification of MHFE in Industries

Category	Code	Description
Manufacturing	100s	Nondurable goods; See list
Manufacturing	200s	Durable goods/Petroleum and Coal products; See list
Manufacturing	300s	Machinery/Computing/Transport equipment; See list
Finance	700	Banking
Finance	701	Savings institutions, including credit unions
Finance	710	Security, commodity brokerage, and investment companies

Finance	702	Credit agencies, n.e.c.
Health	812	Offices and clinics of physicians
Health	820	Offices and clinics of dentists
Health	821	Offices and clinics of chiropractors
Health	822	Offices and clinics of optometrists
Health	830	Offices and clinics of health practitioners
Health	831	Hospitals
Health	832	Nursing and personal care facilities
Health	840	Health services, n.e.c.
Education	842	Elementary and secondary schools
Education	850	Colleges and Universities
Education	851	Vocational Schools
Education	860	Educational services, n.e.c.

States in LEHD Sample

Maryland
Illinois
Washington
Wisconsin
Idaho
Oregon
California
North
Carolina
Florida
Kansas
Montana
Colorado
Minnesota
Louisiana
Missouri
Rhode
Island
Texas
New Mexico
Hawaii
Connecticut
New Jersey
Maine

Figure A.1: Share of Workers in Various Industries who are FCSL Workers

a) 1950 Occupation Codes
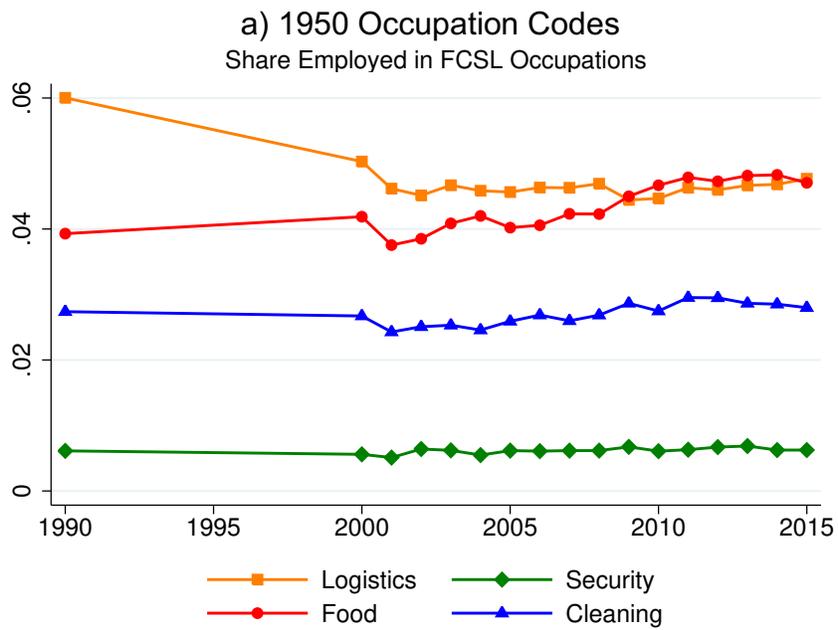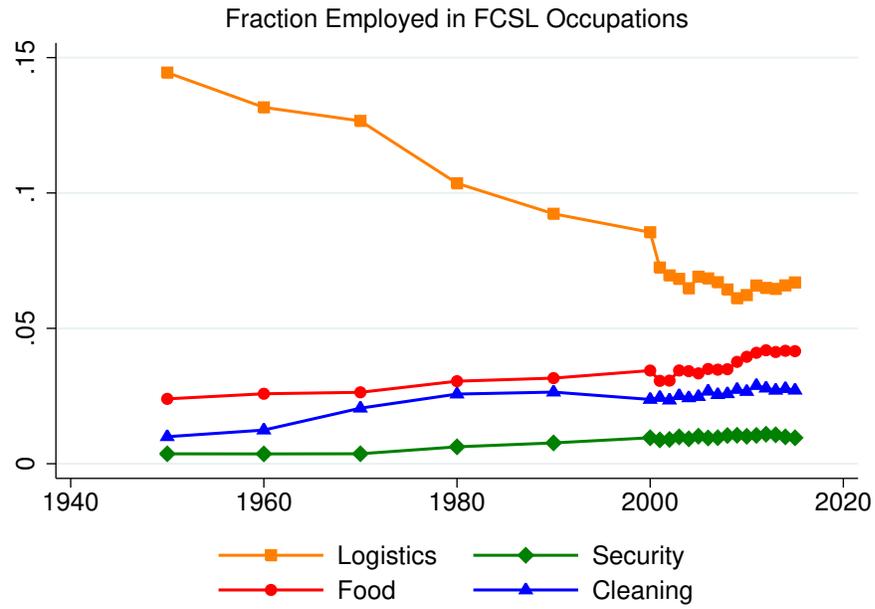
b) 1990 Occupation Codes

Note: The graphs shows the share of all workers working in Food, Cleaning, Security or Logistics occupations using the 1950 (Panel a) and 1990 (Panel b) occupation codes. 1950 to 2000 is based on the Census, while 2001 to 2015 is based on ACS data.

Figure A.2: Share of Workers in Various Industries who are FCSL Workers
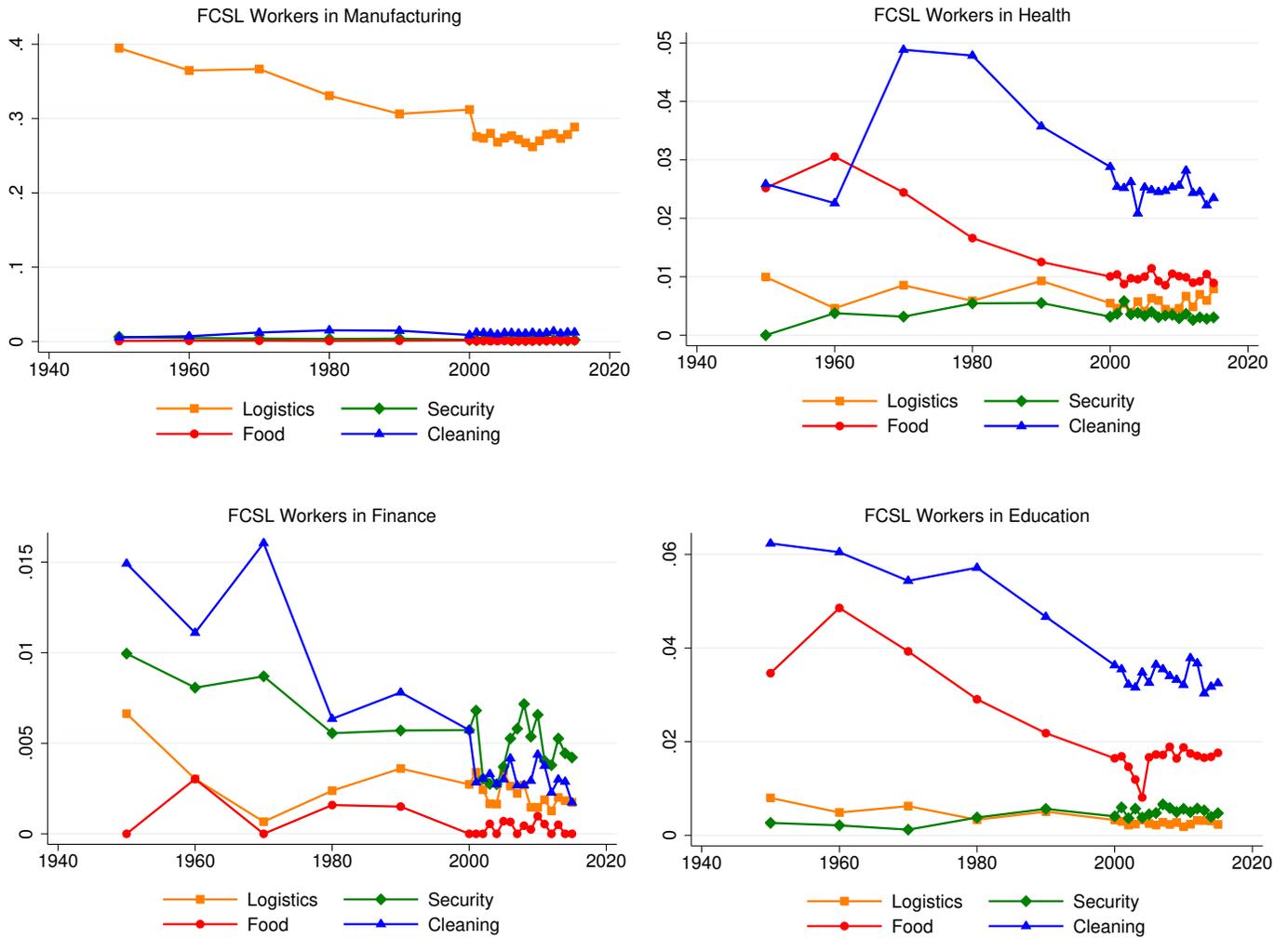
Note: The graphs show the share of individuals employed in each industry (manufacturing, health, finance, and education) using 1950 industry codes who have FCSL occupations. 1950 to 2000 is based on the Census, while 2001 to 2015 is based on ACS data.