

Web Appendix - Not for Publication

The Rise of Domestic Outsourcing and the Evolution of the German Wage Structure

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1 Data Processing

We start with the universe of social security records from 1975 to 2009 in Germany, from the Integrated Employment Biographies (IEB) database. The data is provided at the employment spell level, and each record includes a person ID, establishment ID, employment spell start and end date, wage, and various other information on the worker (birth year, sex, education, occupation), employer (industry, county) and job type (full-time, part-time, apprentice).

1.1 Identifying On-site Outsourcing Events

To identify on-site outsourcing events, we take one record for each worker in each year, using the employment spell that includes June 30 of that year. If a worker has multiple employment spells that include June 30, we use the spell with the highest wage. We then track year-to-year worker movements between establishments, noting the number of employees that move between any pair of establishments from one year to the next. We create a file that consists of these yearly flows between establishment pairs, dropping any flow that consists of fewer than 10 workers.

A flow of workers from one establishment - the predecessor - to another establishment - the successor - is defined as an on-site outsourcing event in year t if the following conditions hold:

- the size of the outflow from the predecessor establishment is less than or equal to 30% of the predecessor's total employment in time $t - 1$
- If the successor is a new establishment (i.e. the establishment ID shows up for the first time in time t), then the inflow from the predecessor to the successor makes up 65% or more of the successor's total employment in time t

- The number of workers at the predecessor in time t is not less than half the number of workers at the predecessor in time $t - 1$
- The successor is in either a food, cleaning or security industry (industry codes used are listed in table A-4)
- The predecessor is not in a food, cleaning or security industry, more broadly defined (industry codes provided in table ??)

For all flows between establishment pairs that are identified as outsourcing events, we call the predecessor establishment the mother, and the successor establishment the daughter.

1.2 Identifying the control group

We use propensity score matching to create an appropriate control group for the outsourced workers. We start with the universe of outsourced workers (i.e. all workers who were employed by the mother establishment in year $t - 1$ and by the daughter establishment in year t , for all mother-daughter pairs that were identified as on-site outsourcing events in year t). For each industry-occupation-year cell¹ that contains at least one outsourced worker in the year prior to outsourcing (year $t - 1$), we take all non-outsourced workers in the same cell to be the potential control group. We restrict this sample to workers with at least two years of tenure at their current establishment, and exclude workers who changed establishments between time $t - 1$ and time t from the control group. Using this sample, we estimate a probit regression of whether a worker is outsourced or not, including controls for tenure and establishment size in the current year (i.e. the year prior to outsourcing), and wages in the two previous years. For each outsourced worker, we take the non-outsourced worker with the closest estimated propensity score as the control.

2 Alternative Outsourcing Definition: Occupational Lay-off Outsourcing

2.1 Definition

The methodology used to identify on-site outsourcing events is certain to miss many occurrences. In particular, our method only finds outsourcing events where the outsourced employees are all employed together by another establishment. This likely captures many events where entire units of workers are outsourced to contracting firms, but it will not capture situations where an employers lays off all workers who are providing a certain task

¹We use 3-digit occupation codes and the most detailed industry codes available: 3-digit codes in years 1975-1998, and 5-digit codes starting in year 1999.

and contracts out this task to a business service provider. In this case the workers who are affected by outsourcing are laid off and may or may not find jobs in similar occupations. In our data such outsourcing events should be represented as cases where groups of workers of similar occupations are jointly leaving an establishment, but rather than being employed together in the next period at a different establishment identifier, they are dispersed among many other firms and possibly unemployment.

We call these outsourcing events occupational lay-off (“OL”) outsourcing and formulate an alternative specification to identify these events. Instead of using movements of workers between establishments, we look at the movements of certain occupational groups out of an establishment. In particular, an establishment is said to have experienced a OL outsourcing event for a particular occupation group, say cleaning, in year t if:

- the establishment loses its last cleaning worker in time t ; that is, it had at least 1 worker in a cleaning occupation in time $t - 1$ and zero workers in these occupations in time t
- the establishment had at least 5 workers in cleaning occupations in any of the previous 5 years
- it had at least 50 workers in time $t - 1$ and did not shrink by more than 50% between time $t - 1$ and t
- the establishment is not in an industry related to cleaning

In addition, if the same establishment has multiple instances of OL outsourcing, we keep only the first one. We define OL outsourcing of food and security occupations in the same way.

Figure A-13 (a) shows the frequency of occupational lay-off outsourcing events by year. These occurrences are more common than on-site outsourcing events, with around 50-60 per year in West Germany and increasing to around 70 per year in the late 1990s. The increase in outsourcing over time is less pronounced which seems in particular due to a large number of cleaning OL outsourcing events at the beginning of our sample period as revealed in Figure A-13 (b).

The two spikes in food service outsourcing in 1983 and 1988 are also present in the OL outsourcing measures and likely due to the same events that explain the spikes in the on-site outsourcing figures.

2.2 The Effect of Occupational Lay-off Outsourcing on Workers

While the wage effects of on-site outsourcing captures the impact of changing the identity of the employer of record while holding job characteristics constant, the effect of OL outsourcing on wages must be interpreted differently. OL outsourced workers are groups of workers who are laid off together with all other workers of their occupation and presumably replaced by a business service firm, and the effect on their wages captures not only the cost of outsourcing but also the impact of being laid off and potentially experiencing an unemployment spell, losing human capital, and perhaps having to change occupations in order to find a new job.

In order to analyze the effect of OL outsourcing on workers, we need to modify our definition of OL outsourcing slightly so that we can better identify the affected workers. Instead of allowing the outsourcing to occur gradually over time, we require that it happens all at once. Specifically, we say that a modified OL outsourcing of cleaning workers has occurred at an establishment at time t if the establishment had at least 10 workers in cleaning occupations in time $t - 1$ and has 75% fewer cleaning workers in time t . In addition, the establishment must have at least 50 workers in time $t - 1$. We also check years $t + 1$ and $t + 2$ and make sure that the establishment does not shrink to less than half of its $(t - 1)$ -size in those years, and that it does not hire back 10% more of its cleaning workers. Finally, the establishment must not be in a cleaning-related industry. Food and security OL outsourcing events are defined analogously.

We repeat the process of using propensity score matching, described above, to find a control group for workers outsourced in this type of event. In the interest of space, we present only the regression estimates of the effect of occupational lay-off outsourcing on log wages and employment in Figure A-16. In panel (a), we see that, similar to what we saw with the on-site outsourcing definition, wages drop sharply relative to the control group after outsourcing. In this case, they fall by about 8% and remain permanently lower. While the number of days worked per year starts to dip slightly even before outsourcing occurs, at the time of outsourcing the number of days working drops by more than 40 days per year, likely reflecting the fact that many of these workers experience at least some spell of unemployment after leaving the outsourcing firm. Days worked starts to recover immediately, and after 10 years is only slightly lower relative to non-outsourced workers.

3 The Effect of Outsourcing on the Employment Structure

3.1 Herfindahl Index of Occupational Concentration

Let n_{ojt} be the number of workers in occupation o at establishment j in year t . N_{jt} is the total number of workers at establishment j in year t . The Herfindahl index of occupational concentration is simply the sum of the squared employment shares of all occupations or:

$$H_{jt} = \sum_o \left(\frac{n_{ojt}}{N_{jt}} \right)^2$$

This can be interpreted as the probability that two randomly picked workers in an establishment have the same occupation.

The occupational concentration index in the economy (plotted in Figure 9a) is just the mean across establishments in a given year t .

3.2 Simulating the Effect of Outsourcing on the Employment Structure

Let $n_{csl,j,t}$ be the number of CSL workers at establishment j and t and $n_{other,j,t}$ be the number of non-CSL workers, where for now we omit the j and t subscripts. Let $F_{t,k}(n_{csl}|n_{other})$ be the conditional distribution function of the number of CSL workers conditional on the number of non-CSL workers as well as the year t and the industry k of an establishment. The expected number of total workers of an establishment with n_{other} non-CSL workers in industry k can be written as: $\int n_{csl} + n_{other} dF_{t,manuf}(n_{csl}|n_{other,j,t})$

The (expected) total number of workers in manufacturing can be written as:

$$N_{t,manuf} = \sum_{j \in Manuf.} \int n_{csl} + n_{other} dF_{t,manuf}(n_{csl}|n_{other,j,t})$$

Similarly if for simplicity we only allow for 2 occupations (in the actual simulation we use 11 occupations) we can write the expected Herfindahl occupational concentration index of an establishment as:

$$H_{j,t} = \int \left(\frac{n_{csl}}{n_{csl} + n_{other,j,t}} \right)^2 + \left(\frac{n_{other,j,t}}{n_{csl} + n_{other,j,t}} \right)^2 dF_{t,j}(n_{csl}|n_{other,j,t})$$

In order to compute the counterfactual we compute the expected number of workers and the expected Herfindahl index under the assumption that the distribution of *CSL* workers conditional on the number of non-CSL workers remained identical to the 1975 distribution. So for example if a bank with 100 non-CSL workers in 1975 had a probability of 0.5 to have

0 CSL workers and a probability of 0.5 to have 10 CSL workers, then we assume that this distribution still holds in subsequent years. So for example we get the counterfactual total number of manufacturing workers in the year 2008, $\hat{N}_{2008,manuf}$, by computing:

$$\hat{N}_{2008,manuf} = \sum_{j \in Manuf.} \int n_{csl} + n_{other} dF_{1975,manuf}(n_{csl}|n_{other,j,2008})$$

Similarly we can compute the counterfactual expected Herfindahl index as:

$$\hat{H}_{2008,manuf} = \sum_{j \in Manuf.} \int \left(\frac{n_{csl}}{n_{csl} + n_{other,j,2008}} \right)^2 + \left(\frac{n_{other,j,2008}}{n_{csl} + n_{other,j,2008}} \right)^2 dF_{1975,j}(n_{csl}|n_{other,j,2008})$$

In practice we compute the empirical conditional distribution function $F_{1975,j}(\cdot|n_{other})$ within 2 digit industry groups interacted with 10 establishment size groups (deciles, where size is measured in terms of non-CSL employment).

4 Outsourcing of Non-FCSL Services

In the paper we focus on outsourcing of FCSL Services, where we believe our method of identifying on-site outsourcing events works well and is likely to identify real instances of outsourcing. There are a number of other labor services where outsourcing likely occurred and where there is at least some correspondence between occupations and industries of business service firms that provide such tasks. In Figure A-18 we show that the share of workers in accounting, IT, advertising, office, assistant and consulting occupations who are working for business service firms has increased substantially. We then estimated Dube-Kaplan style regression (as in section III.C) of the effect of working for a business service firm on log daily wages (Table A-9). We do find negative effects of working for a business service firms with a range of magnitudes. E.g. for IT occupations, accounting, and advertising the effects are smaller than for our FCSL occupations, while they are similar for consultants and substantially larger for ‘other assistants’. Interestingly for phone operators we find a zero effect even though call centers have been the subject of various news articles and case studies that suggested substantial negative effects. There are very few workers with the occupation code phone operators (13,000 over the entire sample period), so maybe call center type jobs don’t use this code and instead use something like ‘salesperson’ or ‘customer representative’ – we are not sure.

We did try to implement our on-site outsourcing method for these alternative services but we do think it is fundamentally harder to interpret for example a group of worker splitting

of and moving to an advertising or consulting firm. Using the on-site outsourcing method for this other services, for most of these events it looks like there are no wage effects. For example for outsourcing to BSF establishments that are ‘call centers’ or ‘secretarial services’ we find a precise zero effect. In that the mean log wage is much higher than in our overall sample (almost 45 log points). It might be that we are picking up flows from when the German Postal Service was privatized in the 1990s (most of these events are from that time period), which wouldn’t really be outsourcing and these jobs might have been covered by strong collective bargaining rules even afterwards. In general, we find these results much less trustworthy, especially since they are very inconsistent with the Dube-Kaplan style results, which is why we did not include them in the paper.

5 Description of Appendix Figures and Tables

The following provides a brief description of the tables and figures in this online appendix.

5.1 Tables

A-1 Establishment Characteristics in Year 2000 by Outsourcing / BSF Status

To give a sense of establishment characteristics in our sample, Table A-1 shows a cross-section of establishments with at least 50 employees in the year 2000. The first column restricts the sample to establishments with any on-site outsourcing event between 2000 and 2010. The second column shows all establishments that do not have an on-site outsourcing event and the last column all FCSL business service firm establishments.

A-2 Outsourcing Establishment Characteristics by Daughter Type Table A-2 shows establishment characteristics of establishments that have an on-site outsourcing event in the following year, broken up by outsourcing type.

A-3 Cleaning, Food, Security and Logistics Occupation Codes Table A-3 lists the occupation codes that we use to classify workers as being in food, cleaning, security or logistics occupations.

A-4 Daughter Establishment Industry Codes Table A-4 lists the industry codes that we use to classify the daughter establishments as food, cleaning, security, logistics business service firms or temp agencies.

A-5 Business Service Firm Industry Codes Table A-4 lists the industry codes that we use to classify establishments as food, cleaning, security, logistics business service firms or temp agencies when we compute long time series.

A-6 The Effects of Outsourcing on Log Daily Wages - Alternative Comparison Groups Table A-6 shows robustness checks of the main estimates of the effect of onsite outsourcing on wages using alternative specifications. See table notes for details.

A-7 The Effects of Outsourcing on Log Daily Wages - by Subgroups Table A-7 shows the effects of the main estimates of the effect of onsite outsourcing on wages by different subgroups. See table notes for details.

A-8 The Effects of Outsourcing on Log Daily Wages - Outsourcing to Temp Agencies Table A-8 focuses on the effect of on-site outsourcing to temp agencies on log wages. Column (1) shows the effect for all workers outsourced to temp-agencies, while column (2) restricts it to fulltime workers before outsourcing and column (3) to parttime workers before outsourcing.

A-9 The Effects of Outsourcing on Log Daily Wages for Other Occupations Table A-9 shows the effect of outsourcing on non-FCSL occupations using the same specification as the Dube-Kaplan style regression in the paper in section III.C.

A-10 The Effects of Outsourcing on Establishment Wage Premia Table A-10 shows estimates of equation (3) in the paper but using the estimated establishment effect from the AKM model as the dependent variable.

A-11 The Evolution of the West German Wage Structure from 1985 to 2008 for Women Table A-11 shows the same analysis as Table IV in the main paper, but for women. For women CLS outsourcing explains slightly less of the overall increase in inequality than for men, but CLS occupations are also a much smaller share of the female labor force.

A-12 The Effects of BSF Employment Share in an Occupation on Occupation Wages at the County Year level Table A-12 shows regressions on the county by year level where we regress average log wages of workers in FCSL occupations on the share of workers who are working for business service firms in that year and county. This can be viewed as an alternative identification strategy (not necessarily better), which uses only

county level variation as a source of identification. We find it reassuring that we obtain results in a similar ballpark (somewhat larger).

A-13 The Effect of Proxies for Wage Premia on the Probability of Outsourcing

Table A-13 shows an expanded version of the regressions in Table III in the main paper. Panel A shows regressions for all establishments in the German administrative data with at least 50 workers. Columns (1) to (4) correspond to the main Table III, while in columns (7) we show the regression when all measures are included simultaneously. Column (8) shows the effect when in addition to the AKM effect we include the AKM effect interacted with a linear time trend which suggests that the AKM effect becomes a more important predictor over time. In Panel B, we show the same specifications but restricted to the IAB establishment panel observations (with two additional measures for wage premia).

A-14 The Effects of On-Site Outsourcing on Log Daily Wages - Alternative Outsourcing Definitions

We show some robustness checks to the baseline on-site outsourcing definition in Table A-14. Restricting to larger predecessor employment and flow sizes reduces the sample and increases wage losses marginally, which is consistent with larger rents at larger firms. Changing the restriction on whether the mother is downsizing and how much of the mother employment is in the flow has almost no effect on the sample size (or on the estimates).

5.2 Figure

A-1 Workers in FCSL Occupations By Year Figure A-1 shows the absolute number (a) and share (b) of workers in FCSL occupations in West Germany.

A-2 Characteristics of Outsourcing Establishments, before and after outsourcing

In Appendix Figure A-2 (a) we graph the number of workers employed in the outsourced occupation at the mother establishment (i.e. for establishments outsourcing cleaning tasks, this would be the number of workers who are in occupations labeled “cleaner”) in the years surrounding outsourcing (which occurs between year -1 and 0). We find that this number drops sharply at the time of outsourcing and does not increase, indicating that these workers are not replaced. If our method were instead just capturing layoffs or quits of groups of workers while the corresponding tasks still stayed in-house, then the mother establishment would have to replace these workers with others in the same occupation. Appendix Figure A-2 (b) shows establishment size before and after outsourcing, and while establishment size decreases slightly in the years before outsourcing, there is only a small drop at the time of

outsourcing and afterwards employment continues to be relatively flat, assuring us that we are not capturing mass layoffs or other types of restructuring or downsizing.

A-3 Outsourced Workers by Year Figure A-3 shows the number of workers who are outsourced by on-site outsourcing events in our data.

A-4 Comparing Outsourcing to Matched Non-Outsourcing Establishments In Figure A-4, we show a series of results that explore what happens at the mother establishment before and after outsourcing relative to comparable establishments that do not outsource. For this analysis we created a matched comparison group where we match on the establishment level, but in very much the same spirit as the worker level matching in the main analysis. Figure A-4 shows various outcomes where we exclude the workers who are outsourced from the calculation of the outsourcings establishments characteristics. Employment at the outsourcing establishment falls slightly before outsourcing but all other variables are very smooth around the outsourcing event.

A-5 Workers Who Remained at Outsourcing Firms Figure A-5, showing outcomes for workers who are employed at the outsourcing firm at $t=-1$ and remained at the outsourcing firm at $t=0$. These results also suggests that outsourcing firms aren't experiencing fundamentally different trends or substantial reorganization.

A-6 Employment Outcomes of Outsourced and Non-Outsourced Workers Before and After Outsourcing Figure A-6 shows additional outcome variables using the same set-up as for Figure IV and V in the paper. In particular it shows days in UI, total UI payments received and total yearly income (earnings plus UI payments).

A-7 Comparing Wages for Outsourced and Non-outsourced Workers using Balanced Panels Figure A-7 a) to c) correspond to Figure IV c) in the main paper with alternative balancing horizons. Figure A-7 d) shows the regression versions.

A-8 Comparing Estimated Wage Premia (AKM Effects) based on FCSL and Non- FCSL workers Figure A-8 shows a binned scatter plot of AKM effects estimated using food, cleaning, security and logistics (FCSL) workers and non-FCSL workers. Both sets of AKM effects are normalized to have a mean of zero in the overall establishment distribution. Each dot corresponds to 1/20th of the observations. Sample is restricted to all German establishments with at least 50 employees. The regression coefficient of the simple regression is 0.68 (SE: 0.0011).

To correct for the downward bias from measurement error, we took all workers who are not in FCSL occupation and divided them into two equal sized random samples (on the worker level, not the employment spell level, so that worker histories stay together). We then estimate the AKM model separately for each sample and keep the predicted establishment FE, call these EFE1 and EFE2. If measurement error of the establishment FE in the AKM model is only due to small sample imprecision or due to measurement error of individual wages where the error is IID across individuals, then the measurement error of EFE1 and EFE2 is uncorrelated. We then regress the predicted AKM effect estimated using FCSL worker only on EFE1, but instrument EFE1 with EFE2. Since the measurement error of EFE1 and EFE2 is uncorrelated given the above assumptions this gives an unbiased estimate for the slope coefficient.

The measurement bias corrected regression coefficient (using split sample IV to correct for measurement error in the RHS variable) is 0.77 (SE: 0.0013). All standard errors clustered on the establishment level.

A-9 Establishment Characteristics of Outsourced and Non-outsourced Jobs before and after Outsourcing The figure shows for the group of outsourced and non-outsourced workers establishment characteristics, using the same design as Figure IV and VI in the paper.

A-10 The Effects of Outsourcing by Characteristics of Outsourcing Firm Figure A-10 shows regression estimates of the effects of being outsourced in an on-site outsourcing event on log wages before and after the outsourcing event. The regression is based on equation (2) in the paper where outsourcing is interacted with characteristics of the outsourcing establishment. The Figure shows the estimates for workers outsourced from the top and bottom quartile of the establishment size and mean wage distribution.

A-11 Change in AKM Effect by Pre-Outsourcing AKM Effect Quartile Figure A-11 shows how the estimated AKM effect changes after on-site outsourcing depending on the AKM effect of the outsourcing establishment.

A-12 The Effect of Working at a Business Services Firm on Log Daily Wages by Time Period Figure A-12 shows estimated outsourcing wage effects using the Dube-Kaplan method by different time periods and outsourcing types.. Each point is the estimated coefficient from a separate regression of log wages on an indicator variable which equals one if the worker is employed at a business services firm and zero otherwise for the corresponding

time period (on the x-axis).

A-13 Frequency of Occupational Layoff Outsourcing Events by Year Figure A-13 shows the frequency of occupational layoff outsourcing events (see discussion above).

A-14 Regression Estimates of the Effects of being Outsourced on Employment Outcomes, using Occupational Layoff Outsourcing Figure A-13 shows the wage estimates of occupational layoff outsourcing events (see discussion above).

A-15 The Evolution of the West German Wage Structure for Women This corresponds to Figure X in the main paper, but shows the evolution of the wage structure for women.

A-16 The Frequency of the term 'Outsourcing' on Google Books Analysis Site Ngram over Time The Figure uses Google's ngram tool to show how often the term 'outsourcing' appears in all books in the Google Books database by year. Accessed October 16, 2014.

A-17 Share of all Worker Working for Business Service Firms The figure shows the share of all full-time male workers in West Germany who are working for a business service firm.

A-18 Share of Workers Working for Business Service Firms in Selected Occupations Figure A-18 shows the share of workers working for business service firms in selected non-FCSL occupations. See discussion above.

A-19 Total Number of Workers in OS-Occupations, before and after Outsourcing to New Establishments Figure A-19 compares establishments with an on-site outsourcing event between year -1 and 0 to a matched control group of establishments that do not outsource at the same time, but it restricts to outsourcing events where the daughter is a new establishment. The figure shows the combined number of workers in the outsourcing occupations (e.g. cleaners for cleaning type outsourcing events) who are working in the mother and daughter at each point in time for the outsourcing establishments. For the control group the figure simply shows the workers in the respective occupations in the control establishment.

Table A-1: Establishment Characteristics in Year 2000 by Outsourcing / BSF Status

	Establishments outsourcing on-site 2000-2010	All Non-OS Estab.	Business Service Firms
# Employees	902.70 (2,594.93)	174.10 (408.22)	127.11 (152.88)
Avg Wage in Euro	85.39 (19.98)	81.77 (21.34)	57.59 (20.01)
AKM Effect	0.03 (0.16)	-0.01 (0.17)	-0.21 (0.21)
Avg Yrs of Education	10.67 (1.01)	10.64 (1.22)	9.84 (0.83)
Share College	0.09	0.09	0.02
Share Female	0.41	0.41	0.35
Share West Germany	1.00	1.00	1.00
Firm Age in Yrs	18.41 (9.24)	18.77 (8.75)	13.78 (9.24)
Share Food Workers	0.04	0.02	0.06
Share Cleaning Workers	0.03	0.04	0.19
Share Security Workers	0.01	0.01	0.05
Share Logistics Workers	0.08	0.07	0.23
Industry Shares			
Agriculture	0.00	0.00	0.00
Mining, Energy	0.01	0.01	0.00
Investment, Production	0.29	0.21	0.00
Consumption Goods	0.12	0.10	0.00
Construction	0.03	0.05	0.00
Retail	0.18	0.14	0.00
Traffic, Telecom	0.04	0.05	0.33
Health	0.02	0.04	0.00
Services	0.29	0.30	0.65
Other	0.02	0.08	0.00
Observations	678	58554	4959

Notes: Table shows mean of each variable with standard deviation in parentheses. All characteristics as of 2000. Outsourcing Establishments are included if they were involved in an outsourcing events between 2000 and 2010. Business Services Firms includes temp firms. Excludes establishments with less than 50 employees.

Table A-2: Outsourcing Establishment Characteristics by Daughter Type

	Food	Cleaning	Security	Logistics
# of Employees	604.00 (1,924.12)	614.07 (1,229.02)	1,237.00 (2,789.90)	1,163.20 (3,014.05)
Avg Wage in Euro	64.93 (18.55)	71.38 (18.18)	86.18 (22.29)	85.79 (19.03)
AKM Effect	-0.07 (0.12)	-0.06 (0.15)	0.07 (0.16)	0.08 (0.14)
Avg Yrs of Education	10.43 (0.90)	10.45 (0.89)	10.62 (1.23)	10.48 (0.90)
Share College	0.05	0.07	0.09	0.07
Share Female	0.68	0.61	0.36	0.32
Share West Germany	1.00	1.00	1.00	1.00
Firm Age in Yrs	15.74 (9.14)	15.79 (10.92)	15.04 (7.66)	13.95 (9.31)
Share Food Workers	0.10	0.07	0.01	0.01
Share Cleaning Workers	0.04	0.16	0.01	0.01
Share Security Workers	0.01	0.02	0.07	0.00
Share Logistics Workers	0.03	0.03	0.14	0.13
Industry Shares				
Agriculture	0.00	0.00	0.00	0.00
Mining, Energy	0.00	0.00	0.01	0.01
Investment, Production	0.06	0.12	0.18	0.30
Consumption Goods	0.04	0.02	0.18	0.20
Construction	0.00	0.04	0.03	0.05
Retail	0.55	0.01	0.04	0.30
Traffic, Telecom	0.00	0.03	0.08	0.06
Health	0.12	0.23	0.02	0.01
Services	0.20	0.44	0.39	0.07
Other	0.02	0.11	0.06	0.01
Observations	440	215	98	1162

Notes: Mean of each variable with standard deviation in parentheses. Data includes all outsourcing mother establishments. Excludes East Germany prior to 1997. Statistics calculated in year before outsourcing. For firms that outsource multiple times, the first outsourcing incident is used.

Table A-3: Cleaning, Food, Security and Logistics Occupation Codes

Occupation Type	Occupation code	Label
food	911	Restaurant, inn, bar keepers, hotel proprietors, catering trade dealers
food	912	Waiters, stewards
food	913	Others attending on guests
food	411	Cooks
food	412	Ready-to-serve meals, fruit, vegetable preservers, preparers
cleaning	923	Other housekeeping attendants
cleaning	933	Household cleaners
cleaning	934	Glass, buildings cleaners
cleaning	936	Vehicle cleaners, servicers
cleaning	937	Machinery, container cleaners and related occupations
security	791	Factory guards, detectives
security	792	Watchmen, custodians
security	793	Doormen, caretakers
logistics	714	Motor vehicle drivers
logistics	741	Warehouse managers, warehousemen
logistics	742	Transportation equipment drivers
logistics	743	Stowers, furniture packers
logistics	744	Stores, transport workers

Table A-4: Daughter Establishment Industry Codes

Type	Valid Years	Industry Code	Label
food	1975-1998	703	Restaurants
food	1999-2009	55301	Restaurants with service
food	1999-2009	55302	Self-service restaurants
food	1999-2009	55303	Cafes
food	1999-2009	55305	Snack bars
food	1999-2009	55404	Refreshment stalls
food	1999-2009	55510	Canteens
food	1999-2009	55520	Catering
cleaning	1975-1998	721	Industrial cleaning
cleaning	1999-2009	74701	Cleaning of buildings, rooms and equipment
cleaning	1999-2009	74703	Cleaning of means of transport
security	1975-1998	861	Security and storage activities; courier services
security	1999-2009	74602	Security activities
Logistics	1975-1998	651	Carriage of goods by motor vehicles
Logistics	1975-1998	670	Forwarding agencies, storage and refrigeration
Logistics	1999-2002	60241	Short-distance freight transport by road
Logistics	1999-2002	60242	Long-distance freight transport by road
Logistics	1999-2002	60244	Freight transport by road, other
Logistics	2003-2009	60245	Commercial freight haulage
Logistics	2003-2009	60246	Road haulage
Logistics	2003-2009	63110	Cargo handling
Logistics	1999-2009	63121	Storage and warehousing
Logistics	1999-2009	63122	Refrigerated warehouses
Logistics	1999-2009	63211	Car parks and garages
Logistics	1999-2009	63401	Freight forwarding
Logistics	1999-2009	63402	Group consignments by sea
Logistics	1999-2002	63403	Other transport agencies
Logistics	2003-2009	63404	Other logistics services
Temp	1975-1998	865	Labour recruitment and provision of personnel
Temp	1999-2002	74501	Labour recruitment
Temp	1999-2002	74502	Provision of personnel

Table A-5: Business Service Firm Industry Codes

Type	Valid Years	Industry Code	Label
food	1999-2009	55510	Canteens
food	1999-2009	55520	Catering
cleaning	1975-1998	721	Industrial cleaning
cleaning	1999-2009	74701	Cleaning of buildings, rooms and equipment
cleaning	1999-2009	74703	Cleaning of means of transport
security	1975-1998	861	Security and storage activities; courier services
security	1999-2009	74602	Security activities
Logistics	1975-1998	651	Carriage of goods by motor vehicles
Logistics	1975-1998	670	Forwarding agencies, storage and refrigeration
Logistics	1999-2002	60241	Short-distance freight transport by road
Logistics	1999-2002	60242	Long-distance freight transport by road
Logistics	1999-2002	60244	Freight transport by road, other
Logistics	2003-2009	60245	Commercial freight haulage
Logistics	2003-2009	60246	Road haulage
Logistics	2003-2009	63110	Cargo handling
Logistics	1999-2009	63121	Storage and warehousing
Logistics	1999-2009	63122	Refrigerated warehouses
Logistics	1999-2009	63211	Car parks and garages
Logistics	1999-2009	63401	Freight forwarding
Logistics	1999-2009	63402	Group consignments by sea
Logistics	1999-2002	63403	Other transport agencies
Logistics	2003-2009	63404	Other logistics services
Temp	1975-1998	865	Labour recruitment and provision of personnel
Temp	1999-2002	74501	Labour recruitment
Temp	1999-2002	74502	Provision of personnel

Table A-6: The Effects of Outsourcing on Log Daily Wages - Alternative Comparison Groups

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Match within state	Match within county	Match on county unemp. rate	Match on Emp. growth and estab. wage	Match within estab.	Match within estab. and occupation	OLS without Matching	Controlling for Fulltime Status	Complete Outsourcing 90+ % of OS-occup.	No tenure restrict.
Panel A: Effect of On-site Outsourcing on Workers										
Post-OS short-run	-0.057*** (0.0042)	-0.058*** (0.0077)	-0.058*** (0.0052)	-0.061*** (0.0049)	-0.069*** (0.0048)	-0.043*** (0.0057)	-0.053*** (0.0041)	-0.055*** (0.0047)	-0.053*** (0.0043)	-0.052*** (0.0048)
Post-OS long-run	-0.083*** (0.0074)	-0.086*** (0.012)	-0.090*** (0.0087)	-0.090*** (0.0080)	-0.11*** (0.0069)	-0.072*** (0.0079)	-0.091*** (0.0068)	-0.088*** (0.0075)	-0.082*** (0.0076)	-0.083*** (0.0072)
Observations	364865	92068	420693	484256	606740	217858	352343211	517641	353251	631662
Panel B: Effect of On-site Outsourcing on Jobs										
Post-OS short-run	-0.055*** (0.0042)	-0.058*** (0.0073)	-0.055*** (0.0056)	-0.059*** (0.0051)	-0.067*** (0.0050)	-0.050*** (0.0060)	-0.056*** (0.0037)	-0.054*** (0.0048)	-0.053*** (0.0042)	-0.054*** (0.0048)
Post-OS long-run	-0.10*** (0.0072)	-0.12*** (0.013)	-0.094*** (0.0091)	-0.10*** (0.0076)	-0.13*** (0.0075)	-0.097*** (0.0098)	-0.099*** (0.0069)	-0.10*** (0.0078)	-0.10*** (0.0075)	-0.096*** (0.0073)
Observations	299108	75267	349496	398122	498892	176249	29145306	429830	287113	510902

Notes: (*p<.1, **p<.05, ***p<.01) Standard errors, in parentheses, are clustered at the outsourcing establishment level. Time periods are 5 yrs pre-OS; 4 yrs short-run; 6 yrs long-run. All regressions include year dummies and individual fixed effects. Columns (1)-(7) use alternative control groups to estimate the effect: in Column (1), we match outsourced workers to non-outsourced workers in the same state, in column (2) in the same county. In columns (3) and (4) we include the county unemployment rate and the establishment growth rate and mean wages as additional matching variables. In columns (6) and (7) we construct a control group of comparable outsourced workers within the outsourcing establishment. Column (8) shows estimates where rather than using matching we use all workers in non-outsourcing establishments as controls and control for interactions of occupation by industry by year dummies. Column (9) corresponds to our baseline estimates but adds fulltime status as a control variable. Column (10) is the baseline but restricted to outsourcing events where more than 90 percent of the OS-occupations are outsourced and Column (10) drops the tenure restriction.

Table A-7: The Effects of Outsourcing on Log Daily Wages - by Subgroups

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Low Education	High Education	Low Tenure	High Tenure	Fulltime before OS	Parttime before OS	Men	Women
Panel A: Effect of On-site Outsourcing on Workers								
Post-OS short-run	-0.056*** (0.0048)	-0.049*** (0.0097)	-0.046*** (0.0068)	-0.059*** (0.0077)	-0.051*** (0.0046)	-0.063*** (0.011)	-0.054*** (0.0057)	-0.059*** (0.0057)
Post-OS long-run	-0.085*** (0.0077)	-0.067*** (0.016)	-0.065*** (0.0087)	-0.089*** (0.011)	-0.078*** (0.0077)	-0.11*** (0.016)	-0.083*** (0.0079)	-0.087*** (0.0079)
Observations	484604	28679	304291	198992	406191	101675	284714	232947
Avg Outcome Var for workers at t-1	4.13	4.43	4.30	4.21	4.33	3.68	4.21	4.10
Panel B: Effect of On-site Outsourcing on Jobs								
Post-OS short-run	-0.054*** (0.0050)	-0.043*** (0.0091)	-0.046*** (0.0070)	-0.055*** (0.0078)	-0.048*** (0.0049)	-0.069*** (0.012)	-0.055*** (0.0059)	-0.057*** (0.0060)
Post-OS long-run	-0.098*** (0.0078)	-0.075*** (0.015)	-0.078*** (0.0088)	-0.097*** (0.012)	-0.086*** (0.0088)	-0.13*** (0.014)	-0.094*** (0.0087)	-0.11*** (0.0098)
Observations	404611	22407	234123	155473	333126	93554	236472	193477
Avg Outcome Var for workers at t-1	4.13	4.43	4.30	4.21	4.33	3.68	4.21	4.10

Notes: (*p<.1, **p<.05, ***p<.01) Standard errors, in parentheses, are clustered at the outsourcing establishment level. Uses matched sample of OS and non-OS workers. Time periods are 5 yrs pre-OS; 4 yrs short-run; 6 yrs long-run. All regressions include year dummies and individual fixed effects. Columns (1) and (2) show estimates for workers with 10 or less years of schooling and more than 10 years of schooling. Columns (3) and (4) show the effect separately for workers with up to 5 and more than 5 years of tenure at the outsourcing employer. Columns (5) and (6) show the effects separately for workers who were employed fulltime and parttime in the year prior to outsourcing. Columns (7) and (8) report the effects by gender.

Table A-8: The Effects of Outsourcing on Log Daily Wages - Outsourcing to Temp Agencies

	(1)	(2)	(3)
	FCSL workers outsourced to Temp.	Fulltime workers outsourced to Temp.	Parttime workers outsourced to Temp.
Panel A: Effect of On-site Outsourcing on Workers			
Post-OS short-run	-0.100*** (0.021)	-0.16*** (0.019)	-0.093*** (0.018)
Post-OS long-run	-0.26*** (0.071)	-0.14*** (0.018)	-0.17*** (0.066)
Observations	9663	85443	12095
Avg Outcome Var for OS workers at t-1	4.07	4.42	3.96
Panel B: Effect of On-site Outsourcing on Jobs			
Post-OS short-run	-0.096*** (0.017)	-0.15*** (0.016)	-0.092*** (0.022)
Post-OS long-run	-0.25*** (0.056)	-0.16*** (0.023)	-0.27** (0.12)
Observations	7554	63441	9413
Avg Outcome Var for OS workers at t-1	4.07	4.42	3.96

Notes: (*p<.1, **p<.05, ***p<.01) Standard errors, in parentheses, are clustered at the outsourcing establishment level. Uses matched sample of OS and non-OS workers. Time periods are 5 yrs pre-OS; 4 yrs short-run; 6 yrs long-run. All regressions include year dummies and individual fixed effects. Column (1) shows the effects for workers in food, cleaning, security and logistics occupations who are outsourced to temp agencies. Column (2) shows the effects for workers in any occupation working fulltime prior to outsourcing, who are outsourced to temp agencies. Column 3 shows the effect of workers in any occupation working parttime prior to outsourcing who are outsourced to temp agencies.

Table A-9: The Effects of Outsourcing on Log Daily Wages for Other Occupations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Accounting	IT	Advertising	Office	Other Assistants	Consultants	Phone Operator
Working for Business	-0.0371**	-0.0182**	-0.0622**	-0.0176**	-0.248**	-0.0783**	-0.00950
Service Firms	(0.00345)	(0.00157)	(0.00788)	(0.00114)	(0.00195)	(0.00489)	(0.0110)
Constant	4.222**	4.325**	4.157**	3.971**	3.830**	4.395**	3.744**
	(0.00627)	(0.00417)	(0.0124)	(0.00187)	(0.00330)	(0.00845)	(0.0166)
Observations	109282	419998	42477	1198699	279541	135429	12916
R^2	0.153	0.177	0.124	0.200	0.119	0.134	0.069

Notes: Standard errors in parentheses. *p<.05, **p<.01.

Table A-10: The Effects of Outsourcing on Establishment Wage Premia

	(1)	(2)	(3)	(4)	(5)	(6)
	All OS	Food	Cleaning	Security	Logistics	Temp
Panel A: OLS						
Working for Business Service Firm	-0.12*** (0.00021)	-0.13*** (0.00090)	-0.10*** (0.00028)	-0.26*** (0.00058)	-0.066*** (0.00026)	-0.33*** (0.00039)
Observations	33744965	1205601	10057326	3014162	19467876	11628470
OS Workers	1316240	33321	616064	171077	513344	529642
Mean Outcome for OS workers	-.12	-.15	-.16	-.26	-.03	-.34
Panel B: Individual Fixed Effects						
Working for Business Service Firm	-0.069*** (0.00038)	-0.051*** (0.0023)	-0.067*** (0.00075)	-0.20*** (0.0022)	-0.041*** (0.00044)	-0.33*** (0.00063)
Observations	33744965	1205601	10057326	3014162	19467876	11628470
OS Workers	1316240	33321	616064	171077	513344	529642
Mean Outcome for OS workers	-.12	-.15	-.16	-.26	-.03	-.34

Notes: (*p<.1, **p<.05, ***p<.01) Standard errors, in parentheses, are clustered at the worker level. Dependent variable is the AKM effect of the establishment at which each worker is employed. Column 1 includes only workers in food, cleaning, security or logistics occupations; columns 2-5 include only workers in the occupation indicated by the column heading. For food workers, the independent variable has a value of 1 if the worker is employed by a firm that provides food services to other companies (defined analogously for other occupations). Column 6 is restricted to individuals in any occupation who have worked in the same occupation at both a temp agency and in another industry; the independent variable has a value of 1 if the workers is employed by a temp agency. All regressions control for year indicator variables, age, age squared and age cubed interacted with education dummies; Panel B also controls for individual fixed effects. Samples are restricted to workers age 25-55, working at establishments with at least 50 workers, and excluding East Germany before 1997. Food workers employed at restaurants and hotels are omitted.

Table A-11: The Evolution of the West German Wage Structure from 1985 to 2008 for Women

	Wage Structure 1985	Wage Structure 2008	Change from 1985 - 2008	Percent of Change explained by Counterfactual
Panel A: Observed				
Total Variance of Log Wages	0.157	0.225	0.068	
Variance of Estab Effects	0.0471	0.0703	0.0233	
$2 \times \text{Cov}(\text{person, estab effect})$	-0.0099	0.0321	0.0419	
85-15 log wage percentile gap	0.761	0.993	0.233	
85-50 log wage percentile gap	0.341	0.429	0.088	
50-15 log wage percentile gap	0.420	0.565	0.145	
Panel B: Counterfactual I: DFL Reweighting of CSL Workers				
Total Variance of Log Wages	0.157	0.220	0.063	7.0%
Variance of Estab Effects	0.0471	0.0687	0.0216	7.1%
$2 \times \text{Cov}(\text{person, estab effect})$	-0.0099	0.0284	0.0383	8.7%
85-15 log wage percentile gap	0.761	0.980	0.220	5.6%
85-50 log wage percentile gap	0.341	0.427	0.086	2.1%
50-15 log wage percentile gap	0.420	0.553	0.134	7.8%
Panel C: Counterfactual II: Adjusting Wage and AKM Effect of Additional Outsourced Workers				
Total Variance of Log Wages	0.157	0.222	0.065	3.9%
Variance of Estab Effects	0.0471	0.0687	0.0217	6.8%
$2 \times \text{Cov}(\text{person, estab effect})$	-0.0099	0.0315	0.0414	1.3%
85-15 log wage percentile gap	0.761	0.985	0.225	3.4%
85-50 log wage percentile gap	0.341	0.428	0.087	0.7%
50-15 log wage percentile gap	0.420	0.558	0.138	5.0%
Percent working in CLS occupations	0.066	0.055	-0.011	
Percent outsourced	0.017	0.058	0.041	

Notes: Sample are all fulltime female workers in West Germany, excluding workers in food occupations or food industries. Panel A shows the observed wage structure in 1985 and 2008 as well as the estimated components due to the variance of establishment effects and the covariance of establishment with person effects. Panel B shows the counterfactual where workers in cleaning, security and logistics (CSL) occupations in 2008 are reweighted in order to keep them at the same percentiles of the AKM distribution as in 1985 using DFL reweighting (see text). Panel C shows the counterfactual where a random fraction of workers in CSL business service firms and temp agencies are 'insourced' in 2008 by adding 10 log points to their log wage and establishment effect. The fraction to be insourced is picked so that the fraction of outsourced workers remains at the 1985 level.

Table A-12: The Effects of BSF Employment Share in an Occupation on Occupation Wages at the County Year level

	(1)	(2)	(3)	(4)	(5)
	All FCSL Workers	Food	Cleaning	Security	Logistics
Working for Business Service Firm	-0.20** (0.012)	-0.30** (0.010)	-0.22** (0.0095)	-0.073** (0.012)	-0.063** (0.0084)
Observations	7800	7800	7800	7800	7800

Notes: (*p<.05, **p<.01) Standard errors are clustered at the county level. Regressions show the estimates from regressing average daily wages in food, cleaning, security and logistics (FCSL) occupations in a county and year cell on the share of workers working in a business service firm corresponding to the occupation in the same year.

Table A-13: The Effect of Proxies for Wage Premia on the Probability of Outsourcing

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: All Establishments								
Log Establishment Size	0.0084*** (0.00016)						0.0078*** (0.00021)	
Log Avg Establishment Wage		0.00044 (0.00032)					0.00034 (0.00032)	
AKM Effect			0.0025*** (0.0006)				0.0018** (0.0007)	0.0018*** (0.0006)
AKM Effect interacted with Year								0.00012** (0.00006)
Wage Premium to FSCL workers over BSF firms				0.0015*** (0.0003)			0.0012*** (0.0004)	
Observations	2086507	2086505	2086507	1769077			1769077	2086507
Mean of Dep Var	.012	.012	.012	.014			.014	.012
Mean of Indep Var	4.788	4.285	1.46	1.162			.	1.46
Panel B: Establishment Survey								
Log Establishment Size	0.012*** (0.00073)						0.0113*** (0.000672)	
Log Avg Establishment Wage		0.0042* (0.0022)					0.00188 (0.0021)	
AKM Effect			0.0038 (0.0037)				0.0029 (0.0034)	
Collective Agreement				0.0091*** (0.0013)			0.0033*** (0.0013)	
Pay Wages Above Standard					0.0029** (0.0014)		0.0021 (0.0016)	
Wage Premium to FSCL workers over BSF firms						0.0033** (0.0015)	0.0030** (0.0014)	
Observations	68624	68624	68624	68577	68595	57662	57662	
Mean of Dep Var	.02	.02	.02	.02	.02	.03	.03	
Mean of Indep Var	5.36	4.34	1.41	.81	.34	1.42	.	

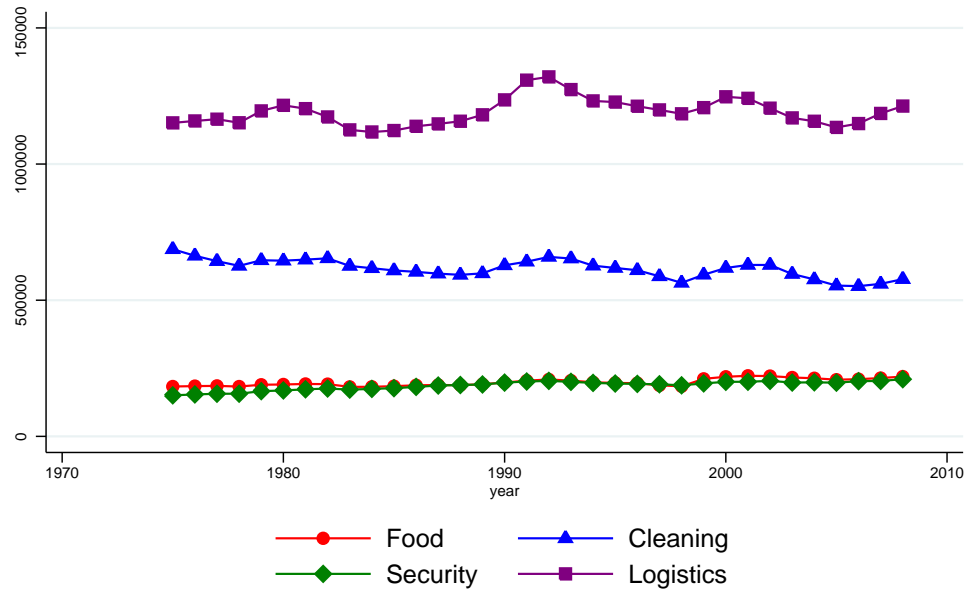
Notes: (*p<.1, **p<.05, ***p<.01) Standard errors, in parentheses, are clustered at the establishment level. All regressions exclude East Germany before 1997 and establishments with less than 50 workers. Panel B includes only establishments included in the IAB Establishment Panel Survey. All regressions control for state dummies, year dummies, and 3 digit industry dummies. Dependent variable = 1 if the establishment was involved in either a general outsourcing event or an on-site outsourcing event in the following year, and 0 otherwise. “Collective Agreement”=1 if the establishment responded that they were bound by a collective agreement. “Pay Wages Above Standard”=1 if the establishment responded that they pay salaries and wages above the collectively agreed scale. “Wage Premium to FSCL workers over BSF firms” is the ratio of the average wage paid to Food, Security, Cleaning and Logistics workers at the establishment to the average wage paid to Food Security, Cleaning and Logistics workers employed by business services firms or temp agencies in the same county and year.

Table A-14: The Effects of On-Site Outsourcing on Log Daily Wages - Alternative Outsourcing Definitions

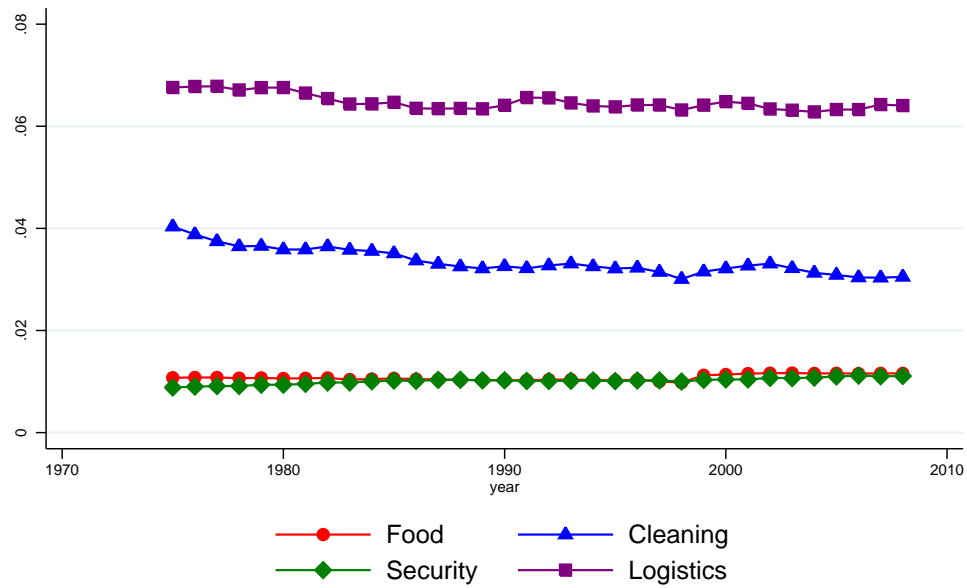
	(1)	(2)	(3)	(4)
	Minimum Mother Empl: 100 workers	Minimum Flow: 20 workers	Mother does not shrink more than 20 percent	Flow is less than 10 percent of mother emp. in prev. year
Panel A: Effect of On-site Outsourcing on Workers				
Post-OS short-run	-0.066*** (0.0052)	-0.054*** (0.0076)	-0.055*** (0.0048)	-0.056*** (0.0048)
Post-OS long-run	-0.097*** (0.0083)	-0.084*** (0.0088)	-0.086*** (0.0078)	-0.086*** (0.0077)
Observations	427421	251621	5169653	517135
Panel B: Effect of On-site Outsourcing on Jobs				
Post-OS short-run	-0.065*** (0.0061)	-0.055*** (0.0091)	-0.056*** (0.0050)	-0.055*** (0.0049)
Post-OS long-run	-0.012*** (0.0092)	-0.010*** (0.012)	-0.098*** (0.0080)	-0.097*** (0.0079)
Observations	339219	180234	428549	429246

Notes: (*p<.1, **p<.05, ***p<.01) Standard errors, in parentheses, are clustered at the outsourcing establishment level. Uses matched sample of OS and non-OS workers. Time periods are 5 yrs pre-OS; 4 yrs short-run; 6 yrs long-run. All regressions include year dummies and individual fixed effects.

Figure A-1: Workers in FCSL Occupations By Year



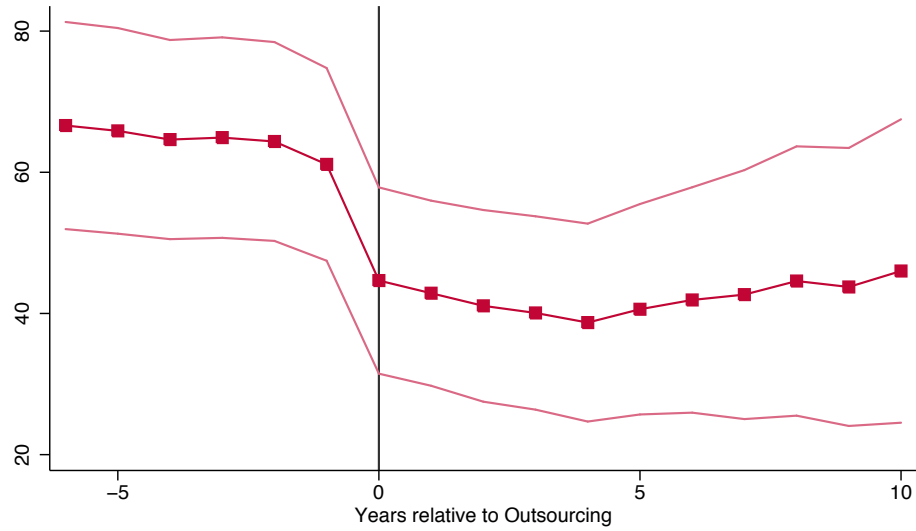
(a) Number of FCSL Workers



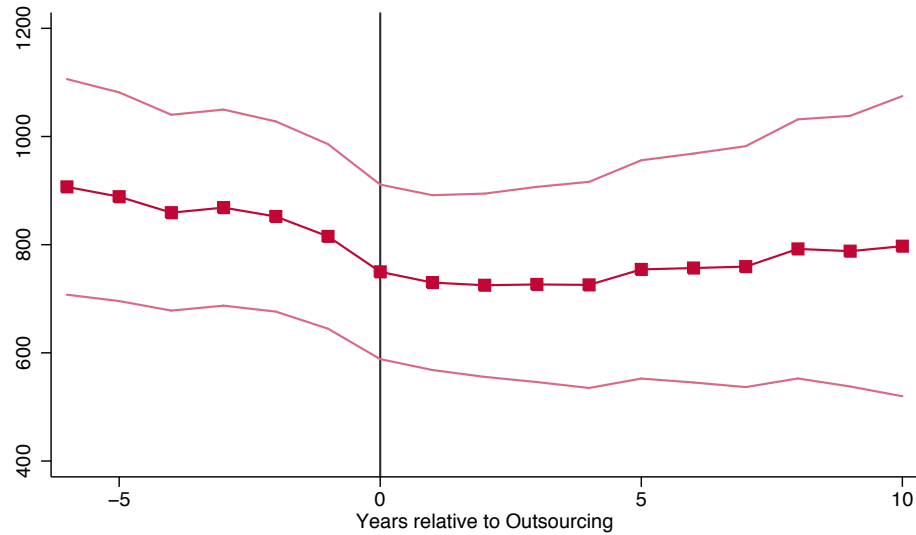
(b) FCSL Workers as Share of Total Workforce

Notes: Includes West Germany only. Food category excludes workers in food occupations who are employed by restaurants and hotels.

Figure A-2: Characteristics of Outsourcing Establishments, before and after outsourcing



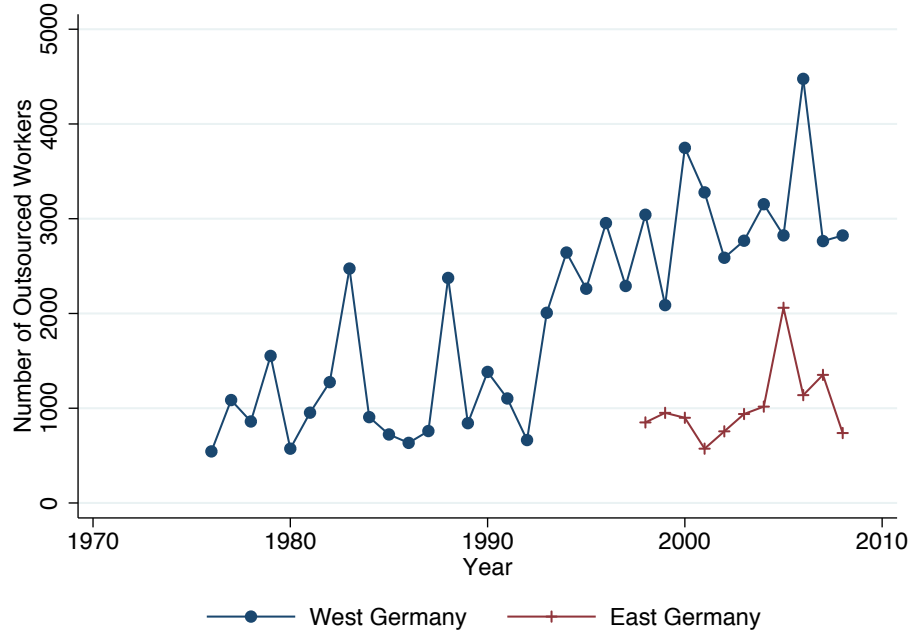
(a) Number of workers in occupations of outsourcing-type



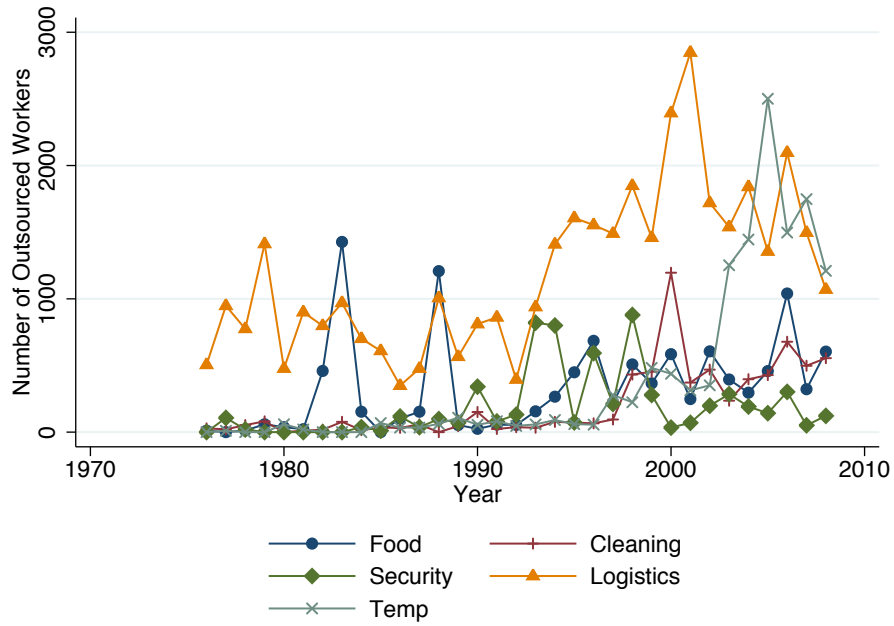
(b) Total Number of Workers

Notes: Graphs show average characteristics of outsourcing establishments, in each year before and after outsourcing. The first graph shows the number of workers in occupations of outsourcing type; for example, for a firm that outsources to a foodservices firm, the dependent variable would be the number of workers in food occupations, such as waiter and cook.

Figure A-3: Outsourced Workers by Year



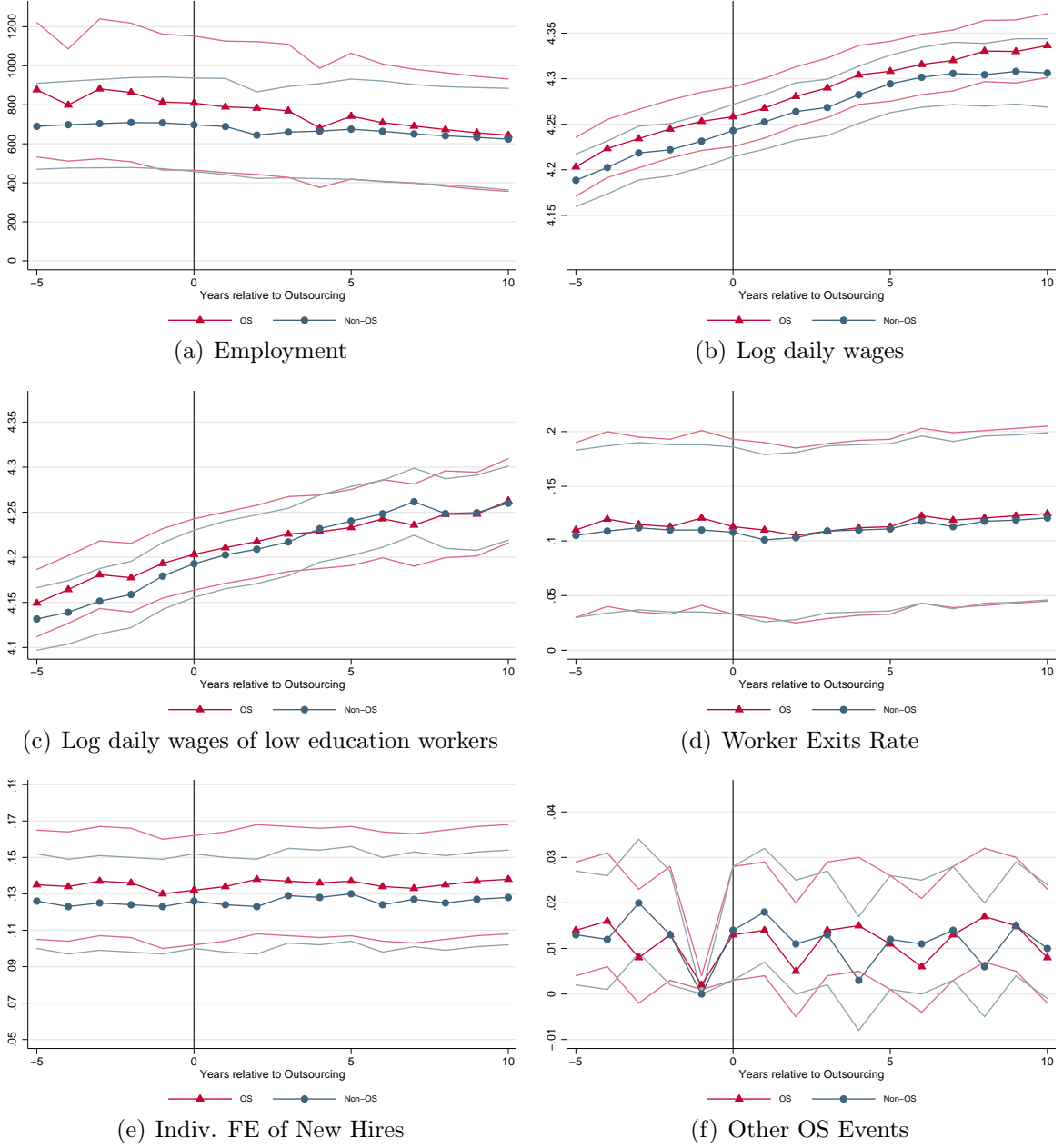
(a) Number of Outsourced Workers in East and West Germany



(b) Number of Outsourced Workers by Daughter Type

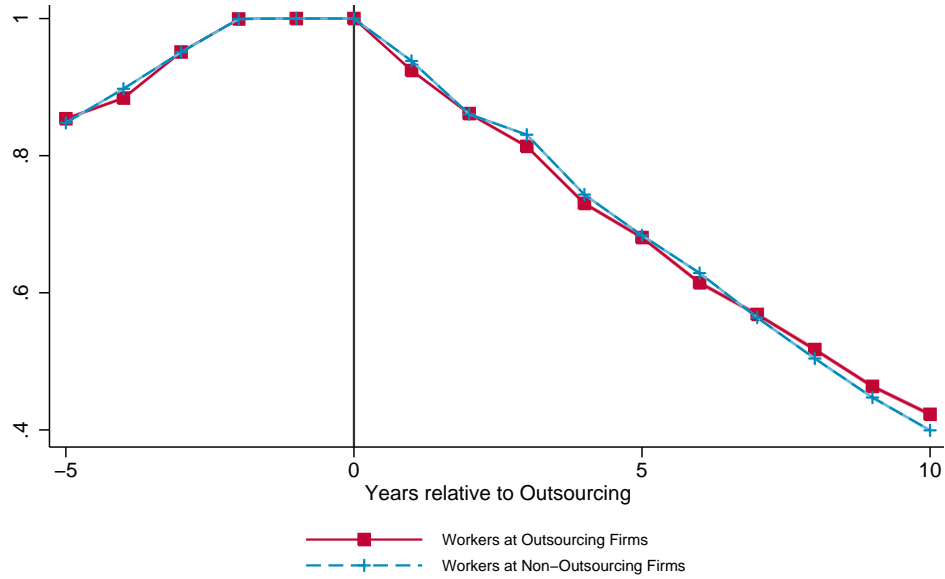
Notes: Own Calculations, using method tracking flows of workers as described in the text.

Figure A-4: Comparing Outsourcing to Matched Non-Outsourcing Establishments

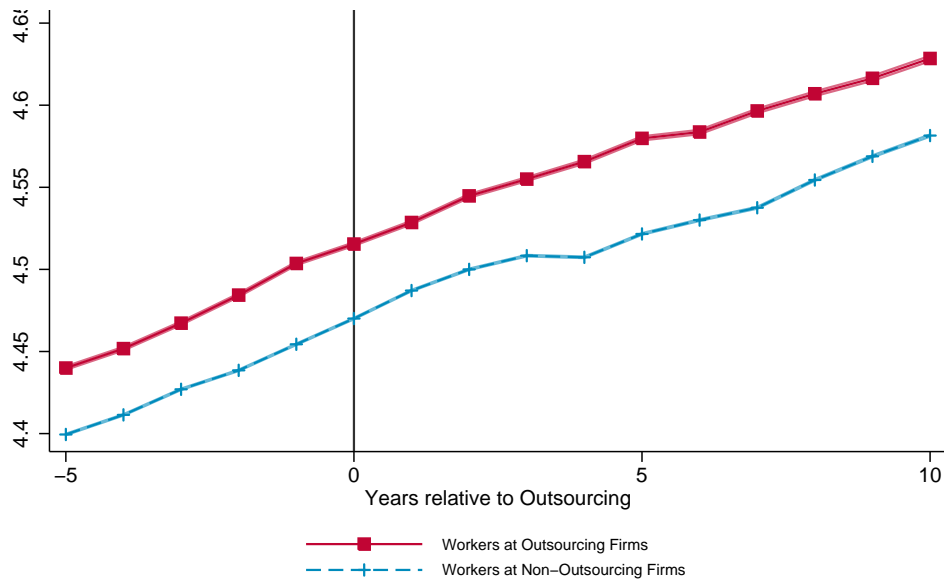


Notes: The figures compares establishments with an on-site outsourcing event between year -1 and 0 to a matched control group of establishments that do not outsource at the same time. The two groups are restricted to a balanced panel, i.e. all establishments are observed for all years between -5 and 10 (the unbalanced panel looks very similar). Comparison establishments are drawn from the same year and 3 digit industry cells and matched via propensity score matching based on the average wage, total employment, employment in service jobs and employment in the outsourced occupations in the year prior to the outsourcing event. The workers who are outsourced between year -1 and 0 are not included in the calculation of the outcome variables.

Figure A-5: Workers Who Remained at Outsourcing Firms



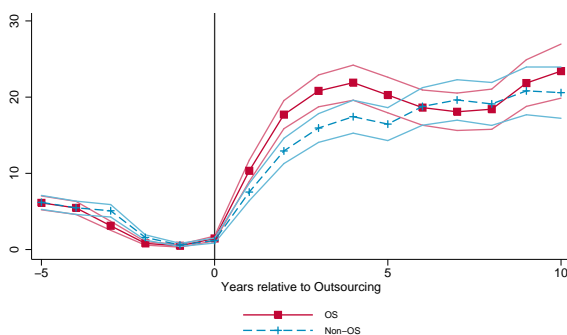
(a) Employment



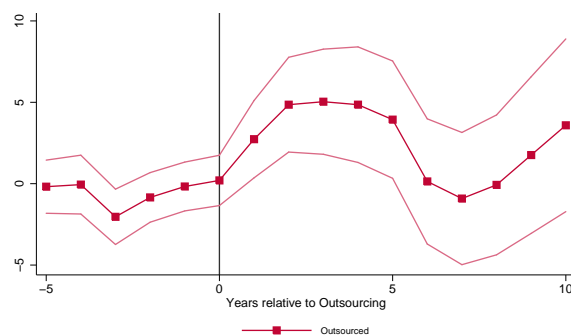
(b) Log Daily Wage

Notes: The figures show mean daily wage and employment for workers who were employed by firms involved in an on-site outsourcing event in the year before outsourcing (time -1), who remained at that firm after outsourcing (time 0). The comparison group is made up of all workers at the same establishment as the matched non-outsourced workers who are also at that firm at time -1 and 0 (using the propensity-score matched group of outsourced and non-outsourced workers described in the text). Bands represent 95 percent confidence intervals.

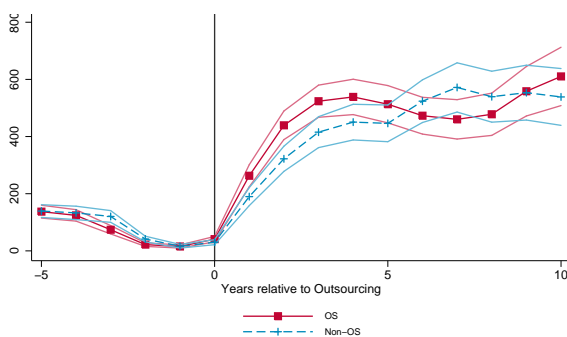
Figure A-6: Employment Outcomes of Outsourced and Non-Outsourced Workers Before and After Outsourcing



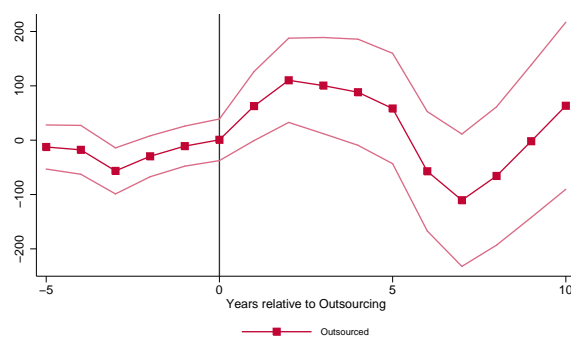
(a) Days per Year Receiving UI Benefits - Means



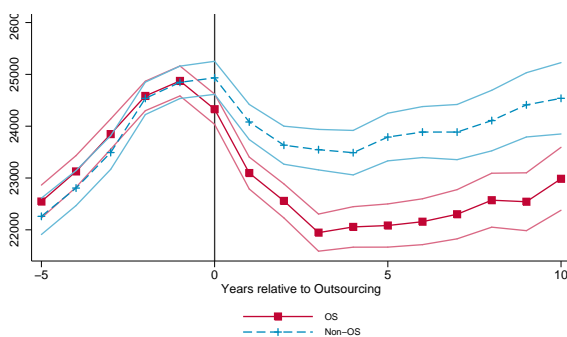
(b) Days per Year Receiving UI Benefits - Regression Adjusted



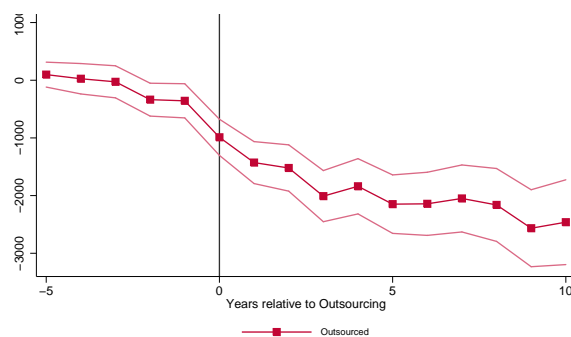
(c) Total Yearly UI Benefits Received - Means



(d) Total Yearly UI Benefits Received - Regression Adjusted



(e) Total Yearly Income - Means



(f) Total Yearly Income - Regression Adjusted

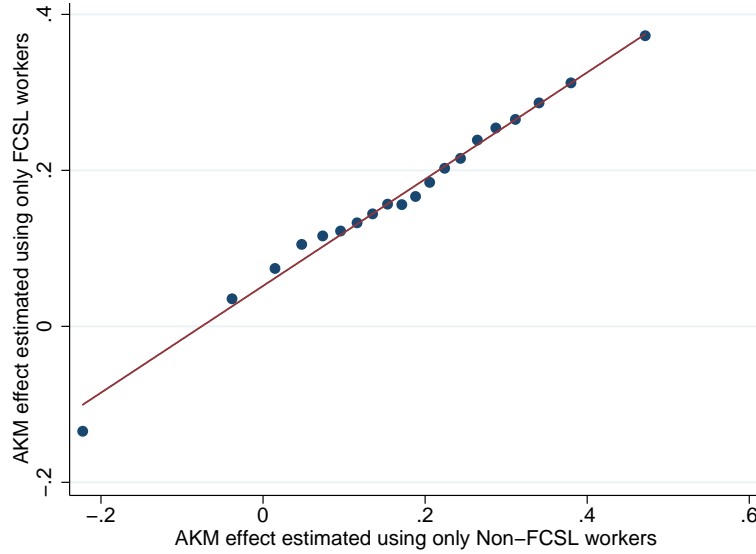
Notes: The figures follow two group of workers who in year $t=-1$ are employed at an establishment that outsources part of its workforce in year $t=0$. The first group are all the outsourced workers, while the second group is a control group of workers who are working in the same industry and occupation with similar tenure and establishment size in the year prior to outsourcing, and have similar wages 2 and 3 years prior to outsourcing as the outsourced workers. The figures on the left show average characteristics of the workers in the two groups before and after the outsourcing event, while the figures on the right show regression-adjusted estimates, controlling for individual fixed effects and year dummy variables.

Figure A-7: Comparing Wages for Outsourced and Non-outsourced Workers using Balanced Panels



Notes: The figures follow two group of workers: the first is a group of workers who are outsourced between year $t=-1$ and $t=0$, while the second group is a control group of non-outsourced workers. The control group was chosen by finding workers employed in the same industry and occupation with similar tenure and establishment size in the year prior to outsourcing, and have similar wages 2 and 3 years prior to outsourcing as the outsourced workers. The figure shows log daily wages of the workers in both groups. Panel a) restricts the data to a balanced panel of individuals observed in each year from 3 years before to 5 years after the event. Panel b) from 5 years before to 7 years after and panel c) from 5 years before to 10 years after. Panel d) shows the corresponding regression estimates restricting the sample to individuals who remain at the establishment where they are in $t=0$ after the event.

Figure A-8: Comparing Estimated Wage Premia (AKM Effects) based on FCSL and Non-FCSL workers

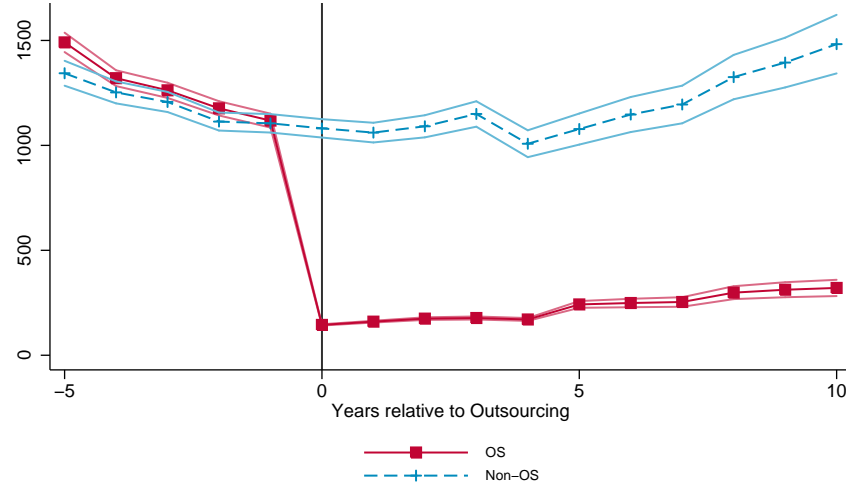


Notes: The figure shows a binned scatter plot of AKM effects estimated using food, cleaning, security and logistics (FCSL) workers and non-FCSL workers. Both sets of AKM effects are normalized to have a mean of zero in the overall establishment distribution. Each dot corresponds to 1/20th of the observations. Sample is restricted to all German establishments with at least 50 employees. The regression coefficient of the simple regression is 0.68 (SE: 0.0011).

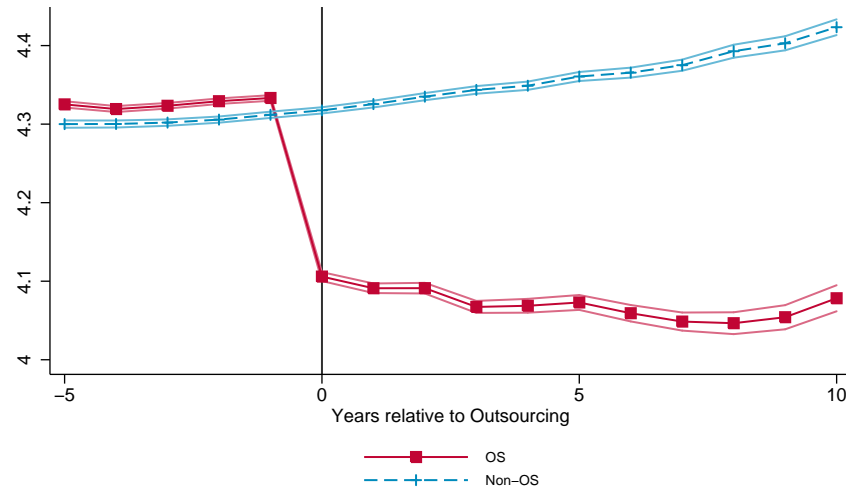
To correct for the downward bias from measurement error, we took all workers who are not in FCSL occupation and divided them into two equal sized random samples (on the worker level, not the employment spell level, so that worker histories stay together). We then estimate the AKM model separately for each sample and keep the predicted establishment FE, call these EFE1 and EFE2. If measurement error of the establishment FE in the AKM model is only due to small sample imprecision or due to measurement error of individual wages where the error is IID across individuals, then the measurement error of EFE1 and EFE2 is uncorrelated. We then regress the predicted AKM effect estimated using FCSL worker only on EFE1, but instrument EFE1 with EFE2. Since the measurement error of EFE1 and EFE2 is uncorrelated given the above assumptions this gives an unbiased estimate for the slope coefficient.

The measurement bias corrected regression coefficient (using split sample IV to correct for measurement error in the RHS variable) is 0.77 (SE: 0.0013). All standard errors clustered on the establishment level.

Figure A-9: Establishment Characteristics of Outsourced and Non-outsourced Jobs before and after Outsourcing



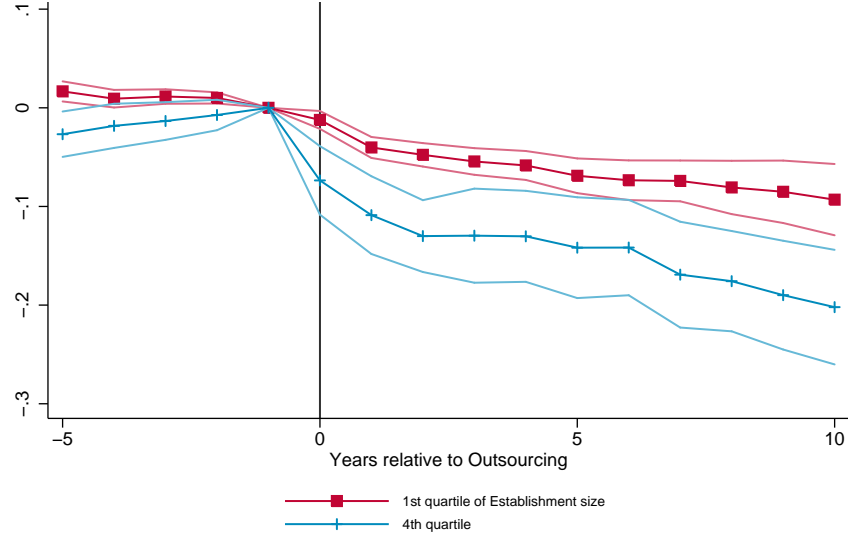
(a) Size of Employer (Establishment)



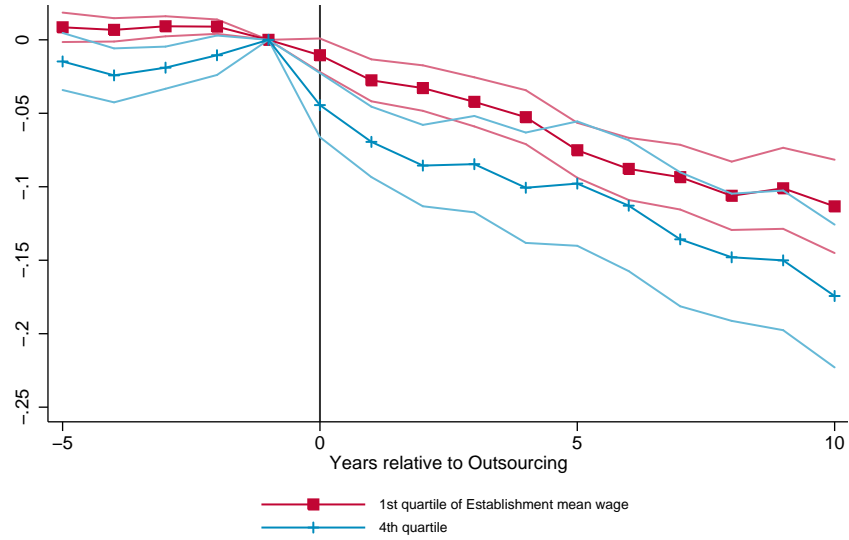
(b) Average Log Wage of Coworkers

Notes: Sample restricted to workers who are at the same establishment as in time $t=-1$ in all years before outsourcing, and in the same establishment as in time $t=1$ in all years after outsourcing. The figures follow two group of workers: the first is a group of workers who are outsourced between year $t=-1$ and $t=0$, while the second group is a control group of non-outsourced workers. The figures show average characteristics of the establishments where the workers in the two groups are working before and after the outsourcing event.

Figure A-10: The Effects of Outsourcing by Characteristics of Outsourcing Firm



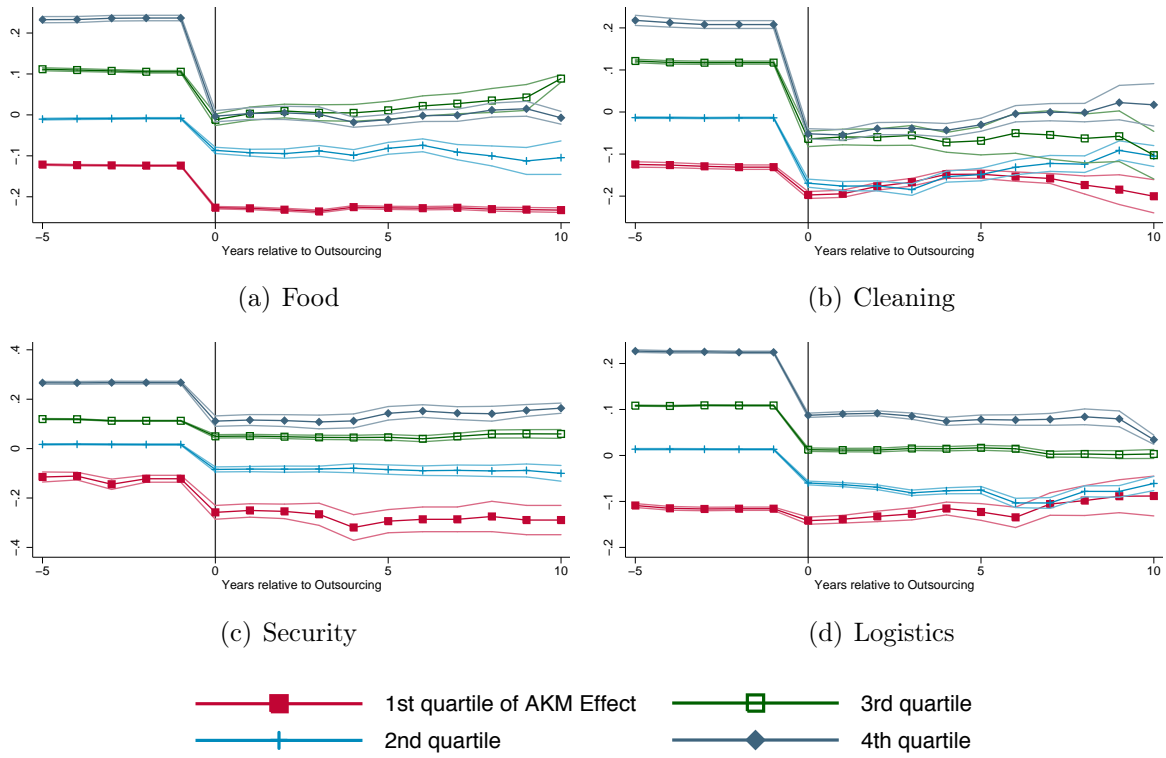
(a) Log Wage by Size of Outsourcing Establishment (1st vs. 4th Quartile)



(b) Log Wage by Mean Wage of Outsourcing Establishment (1st vs. 4th Quartile)

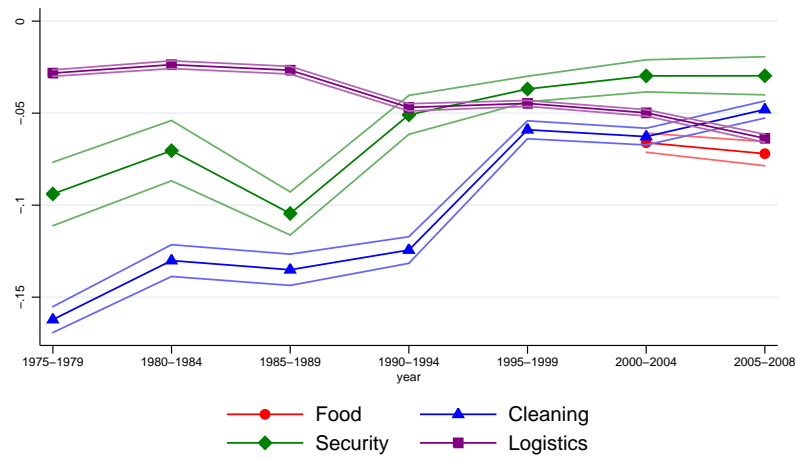
Notes: The figures show regression estimates of the effects of being outsourced on log wages before and after the outsourcing event. The regression is based on equation (2) in the paper where outsourcing is interacted with characteristics of the outsourcing establishment. The omitted category is year -1. The bands are 95 percent confidence intervals (SE clustered on the level of the outsourcing establishment). The sample is restricted to workers who are at the same establishment as in time $t=-1$ in all years before outsourcing, and in the same establishment as in time $t=1$ in all years after outsourcing.

Figure A-11: Change in AKM Effect by Pre-Outsourcing AKM Effect Quartile



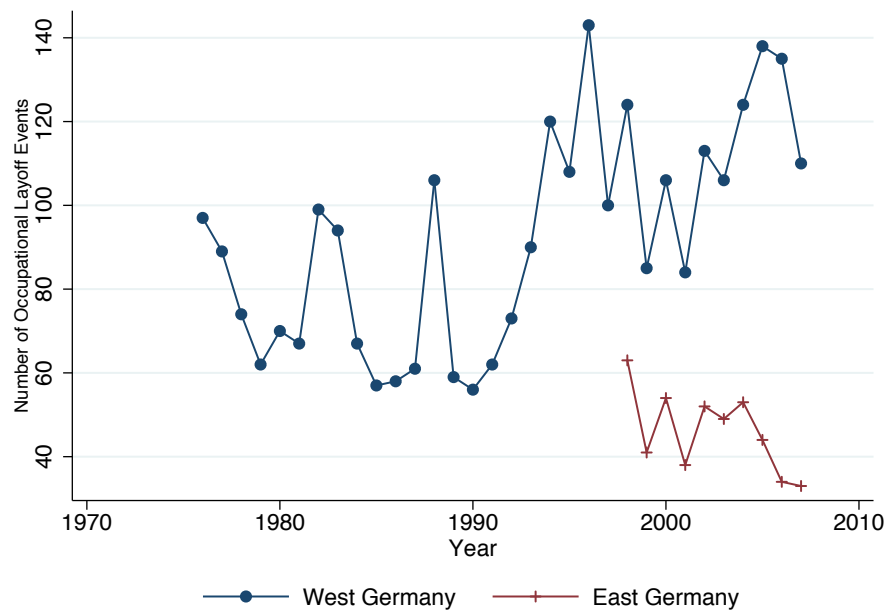
Notes: Figures show the average AKM effect of the establishments that employ each (on-site) outsourced worker in each year, by outsourcing type. Sample divided into quartiles of AKM effect of outsourcing (mother) establishment.

Figure A-12: The Effect of Working at a Business Services Firm on Log Daily Wages by Time Period

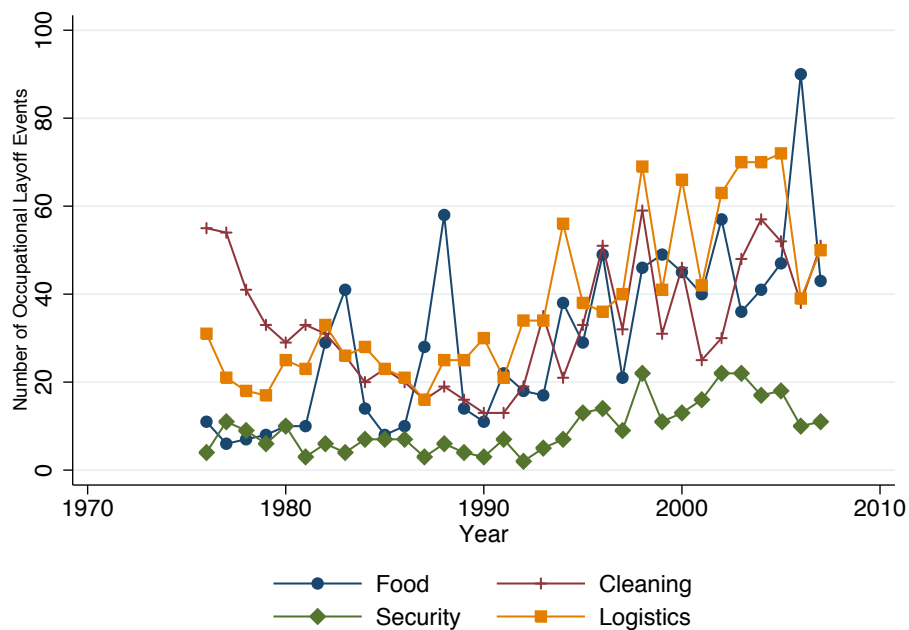


Notes: Each point is the estimated coefficient from a separate regression of log wages on an indicator variable which equals one if the worker is employed at a business services firm and zero otherwise for the corresponding time period (on the x-axis). All regressions include individual fixed effects and year dummy variables. Before 1999, industry codes did not differentiate between restaurants and food business services industries, such as canteens and catering. Excludes food workers employed in the restaurant and hotel industries.

Figure A-13: Frequency of Occupational Layoff Outsourcing Events by Year



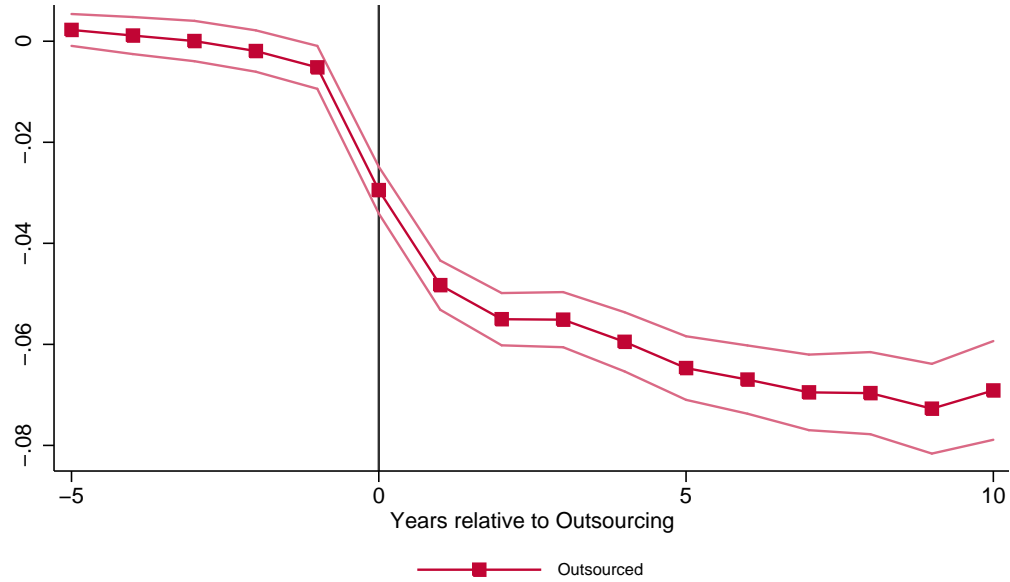
(a) Number of Outsourcing Establishments in East and West Germany



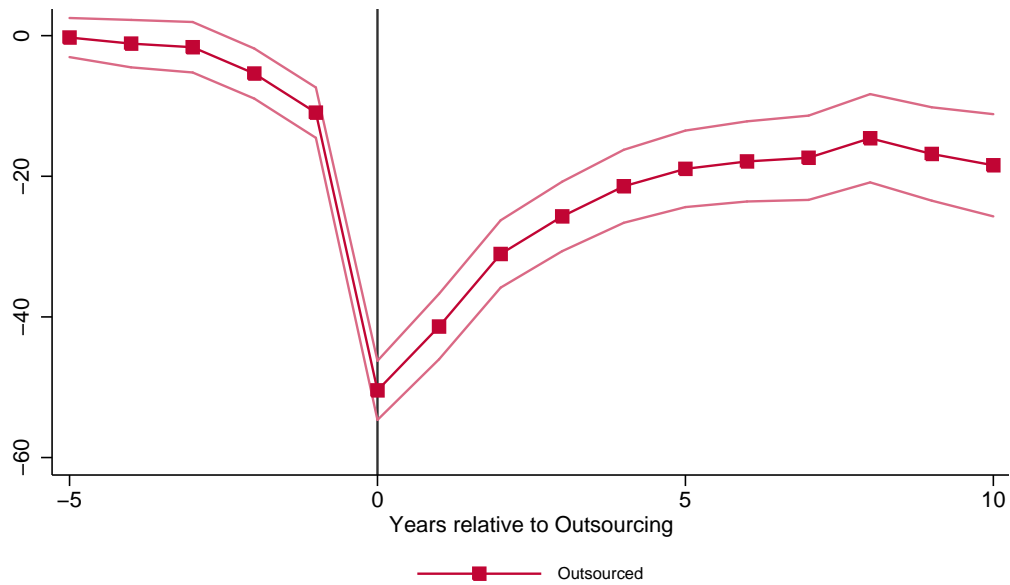
(b) Number of Outsourcing Establishments by Type of Outsourcing

Notes: Own Calculations

Figure A-14: Regression Estimates of the Effects of being Outsourced on Employment Outcomes, using Occupational Layoff Outsourcing



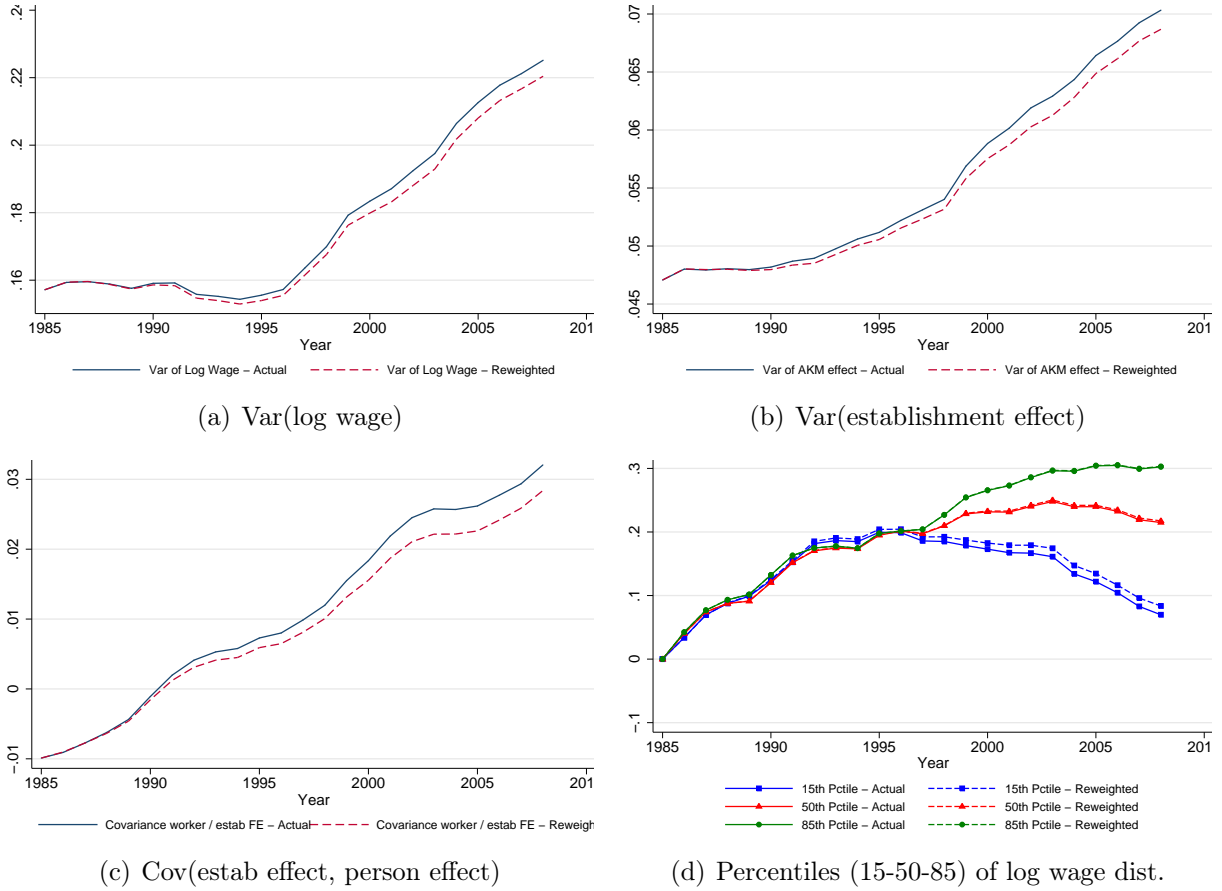
(a) Log Daily Wage



(b) Days Working Per Year

Notes: The figures show regression estimates of the effects of being outsourced on wages and employment before and after the outsourcing event, using the matched sample of outsourced and non-outsourced workers and the occupational layoff definition of outsourcing, described in the text. All regressions include individual fixed effect and year dummies. Bands represent 95 percent confidence intervals.

Figure A-15: The Evolution of the West German Wage Structure for Women



Notes: The figures show how the variance of log wages and its components has evolved over time. The Figure replicates Figure 11 in the main paper for women. Panel (a) shows the variance of log wages, panel (b) shows the variance of the estimated establishment effect (AKM effect) over time, and panel (c) the covariance between establishment effects and the individual fixed effect. Panel (d) shows percentiles of the log wage distribution. The solid line is the actual evolution over time, while the dashed line shows the counterfactual evolution if outsourcing had remained constant at the 1985 level, where the counterfactual is constructed using DFL reweighting (see text).

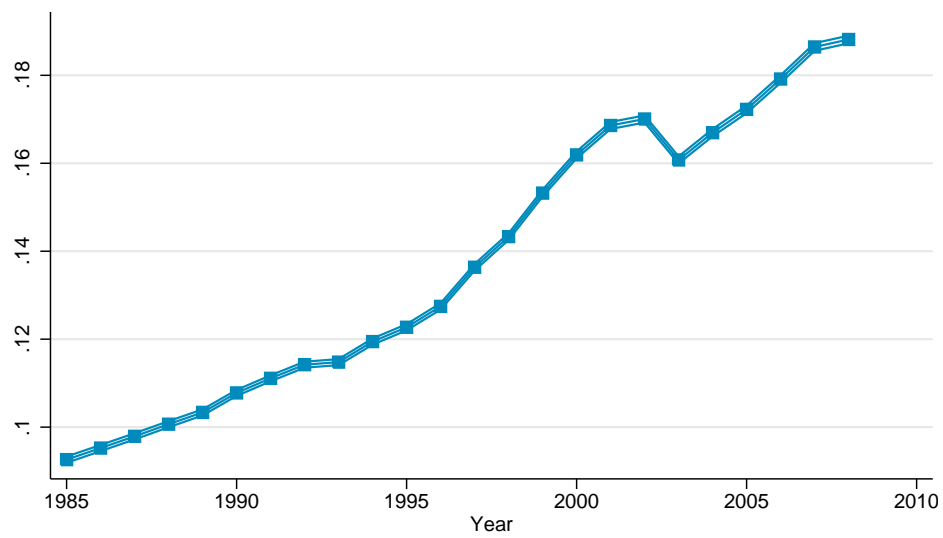
Figure A-16: The Frequency of the term 'Outsourcing' on Google Books Analysis Site Ngram over Time



(a) Search hits for the term 'outsourcing' on Google Ngram

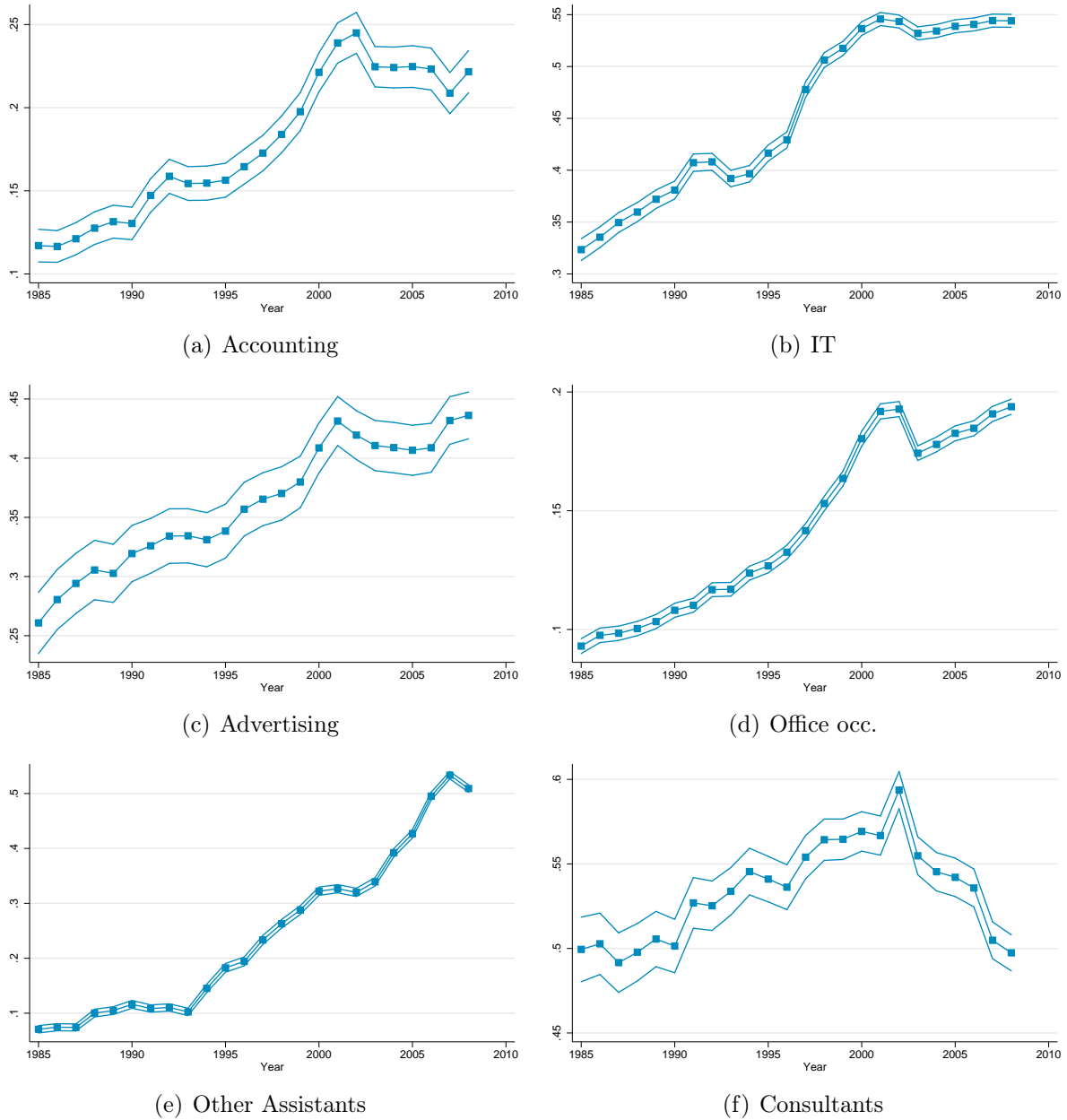
Notes: The figures shows how often the term 'outsourcing' appears in all books in the Google Books database by year. Accessed October 16, 2014.

Figure A-17: Share of all Worker Working for Business Service Firms



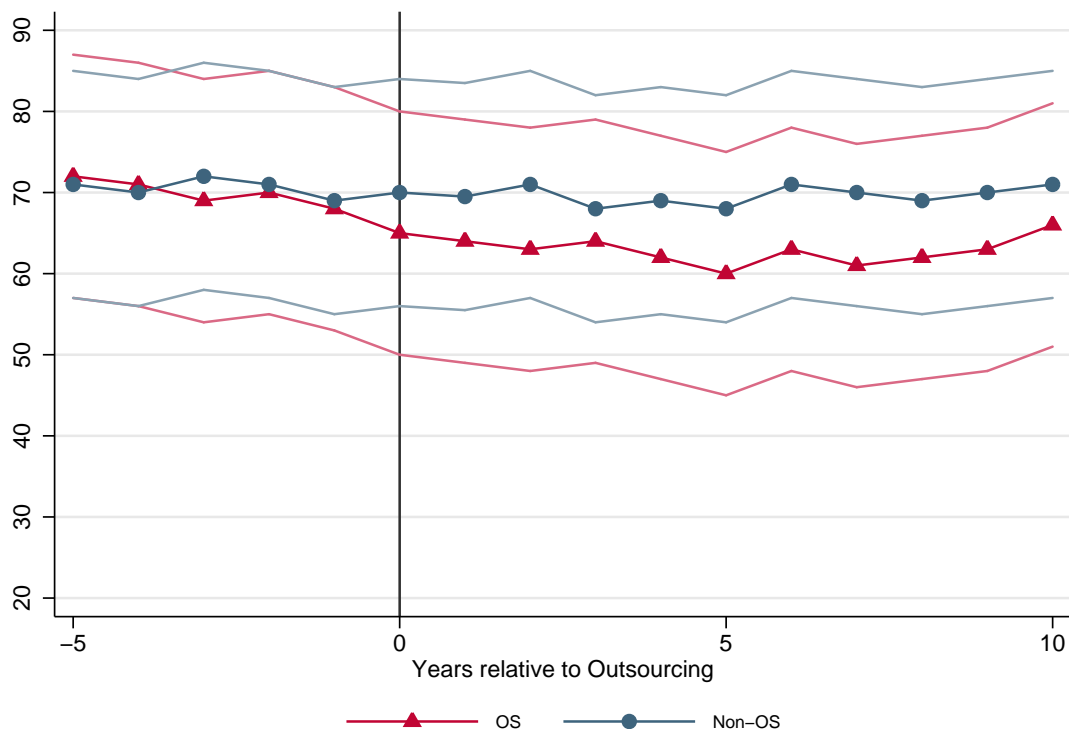
Notes: The figure shows the share of all full-time male workers in West Germany who are working for a business service firm. Industry codes change between 2002 and 2003 which explains the kink in that year.

Figure A-18: Share of Workers Working for Business Service Firms in Selected Occupations



Notes: The figure shows the share of all full-time male workers in West Germany who are working for a business service firm in selected occupations. Industry codes change between 2002 and 2003 which explains the kink in that year.

Figure A-19: Total Number of Workers in OS-Occupations, before and after Outsourcing to New Establishments



Notes: The figure compares establishments with an on-site outsourcing event between year -1 and 0 to a matched control group of establishments that do not outsource at the same time, but it restricts to outsourcing events where the daughter is a new establishment. The figure shows the combined number of workers in the outsourcing occupations (e.g. cleaners for cleaning type outsourcing events) who are working in the mother and daughter at each point in time for the outsourcing establishments. For the control group the figure simply shows the workers in the respective occupations in the control establishment.