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RESEARCH PAPER

A research note on the determinants and consequences of outsourcing using German data

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Abstract Using German data from the Institute for Employment Research Establishment Panel, this paper constructs two main measures of outsourcing and examines their determinants and consequences for employment. There are some commonalities in the correlates of the two measures of outsourcing, as well as agreement on the absence of adverse employment effects across all industries. For one specification, however, some negative effects are reported for manufacturing industry, balanced by positive effects for the services sector for another. But there are no obvious indications of survival bias. This is because the association between outsourcing and plant closings is predominantly negative, albeit poorly determined.

Keywords Outsourcing · Organizational change · Employment change · Plant closings · Value added

JEL Classification F16 · J23

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Einige Bemerkungen zu den Bestimmungsgründen und Auswirkungen von Outsourcing auf Basis deutscher Daten

Zusammenfassung Auf der Basis der Daten des IAB-Betriebspanels werden in dem Papier zwei Outsourcing- Indikatoren gebildet und die Determinanten dafür sowie die Beschäftigungseffekte untersucht. Beide Indikatoren weisen Gemeinsamkeiten bei den Korrelationen mit anderen Variablen auf. In keinem Fall zeigen sich in unseren Regressionsmodellen für alle Wirtschaftszweige negative Beschäftigungseffekte. Bei einer Modellspezifikation werden jedoch negative Beschäftigungseffekte für das Verarbeitende Gewerbe, aber auch positive Beschäftigungseffekte für den Dienstleistungssektor bei einer anderen Modellspezifikation ermittelt. Wir finden auch keine Hinweise auf Verzerrungen, die durch das Überleben der Betriebe bestimmt sind. Dies liegt daran, dass für die Beziehung zwischen Outsourcing und Betriebsschließungen ein im Wesentlichen negativer Zusammenhang besteht, der allerdings nur schwach ausgeprägt ist.

1 Introduction

The practice of international outsourcing or offshoring of parts of the production process, especially to low-wage countries in Central and Eastern Europe, is very much in vogue. For the West German manufacturing sector in particular, it has been found that *firms* which have outsourced part of their production and services to foreign firms are larger and more productive, pay higher wages and have a higher export share (Wagner 2009). Research on the correlates and consequences of outsourcing using *establishment* data is uncommon in the literature, which indeed has mostly relied upon industry-level data in discussing the phenomenon in

an international trade context (see Amiti and Wei 2005; Feenstra and Hanson 1999; Hijzen et al. 2005).[1,2] In any event, the backdrop to our study is, therefore, a continuing paucity of studies using German micro data of any kind, with the notable exceptions of papers by Becker et al. (2005a, 2005b), Becker and Muendler (2008), Görzig et al. (2005), and Wagner (2009). And, returning to the international context, there are only a few investigations that distinguish between the manufacturing and the service sectors. Abramovsky and Griffith (2006) consider the impact of information and communication technology as an influential factor in the firm's business service outsourcing decision. Our distinction between manufacturing and service reveals some interesting preliminary insights in this regard.

But more generally, the present treatment takes a different track in examining the determinants and consequences of outsourcing. Specifically, it uses German data from the Institute for Employment Research (*Institut für Arbeitsmarkt- und Berufsforschung*, or IAB) Establishment Panel to investigate the role of plant characteristics in determining (two measures of) outsourcing and the role of outsourcing in employment change and plant survival. The consideration of plant survival assists our understanding of the effects of outsourcing on employment since it may either encourage the persistence of firms or indicate subsequent market difficulties. Our empirical discussion of outsourcing and plant closure does not point to any obvious survival bias.

2 Measuring outsourcing at establishment level

The IAB Establishment Panel was initiated in 1993 (1996 for eastern Germany). It contains around 16,000 establishments. Data are collected in personal interviews with the owners or senior managers of the establishment by professional interviewers. The questions cover such themes as the number of employees and their qualifications, the number of temporary and agency workers, working hours (every second year since 2002), coverage by a collective agreement at industry or firm level, establishment sales turnover, the expected development of turnover, the share of sales attributed to intermediate inputs and external costs (which we use to construct our first measure of outsourcing), export share, the share of total investment (comprising both expansion investments and, until 2007, investments in information and communications technology), the total wage bill, profit sharing (irregularly in the five surveys since 1998 but comparably since 2000), together with the technological status of the establishment (except in 2004), its legal status and corporate form, age, and overall economic performance, reorganization measures undertaken and process/product innovations introduced (every third year), and company further training activities (every other year). Since 2000 the works council status of the plant has been asked every year after an hiatus in the 1990s, and (for 2006 alone) the quality of the works council from the perspective of the manager respondent. Further, the second outsourcing variable used in the present exercise is taken from a question on major organizational change including whether or not the establishment had increased its purchases of products/services from outside sources over the course of the preceding two years. This question was initiated in 1998 and has been asked every third year from 2001. These variables have been used to construct regressors in dynamic labor demand equations in the usual manner (e.g. Bellmann and Pahnke 2006; Addison et al. 2008).

As we have intimated, the key outsourcing measures contained in the IAB Panel pertain to the *share of sales attributed to intermediate inputs and external costs* (in the year preceding the survey)[3] and organizational change over the course of the preceding two years involving *a greater acquisition of goods and services* (i.e. from outside the firm).[4] Specifically, the former share is converted to an absolute (Euro) value and then expressed as a share of value added. We note parenthetically that we also experimented with using the answers to this question directly, expressing the derived value of externally sourced inputs as a percentage of the total wage bill after Görg and Hanley (2005). Unfortunately asking respondents to estimate a 'share of X in Y' variable is problematic, leading as it does to back-of-the-envelope calculations on the part of the respondent. Not surprisingly the results of using such measures are mixed; examples are available from the authors upon request.

[1] For studies using micro data, however, see Görg et al. (2008a, 2008b), and Görg and Hanley (2005, 2007). Whereas these studies focus on *international outsourcing*, Girma and Görg (2004) and Görg and Hanley (2004) consider the determinants and effects of *outsourcing in general* (see also Görzig et al. 2005; Ohnemus 2009; Broedner et al. 2009).

[2] The problem with *firm-level data* is that the effect of acquiring establishments from other firms may counteract any observed tendency toward outsourcing on the part of the (acquiring) firm.

[3] The actual survey question is as follows: "What share of sales was attributed to intermediate inputs and external costs [in the previous year], i.e. all raw materials and supplies purchased from other businesses and institutions, merchandise, wage work, external services, rents and other costs (e.g. advertising and agency expenses, travel costs, commissions, royalties, postal charges, insurance premiums, testing costs, consultancy fees, bank charges, contributions to chambers of trade and commerce and professional associations)?

[4] Readers familiar with the IAB Firm Panel should note that another question in the survey (Q2) seemingly offers a more direct measure of outsourcing since it asks whether parts of the establishment were *closed down* or *relocated in other company units* or *hived off and operated as separate independent businesses*. Unfortunately, there are problems in using this question—as well as a separate follow-up *insourcing* question (Q3)—by reason of a low response rate as well as certain inconsistencies involving the responses of single-plant firms. On closer inspection, it emerges that Q2 was never intended to inform on the outsourcing question.

We used the value of externally sourced inputs as a share of value added in both levels and differences, while recognizing that changes in the ratio need not necessarily represent changes in outsourcing but may instead reflect changes in either input or output prices—as well as how establishments manage their inventories of finished goods.

Our second measure of outsourcing is in principle unaffected by changes in either input or output prices since it merely inquires of the manager respondent whether or not there was increased reliance on bought-in products and services over a two-year interval. This measure although innovative has the downside that we do not know the magnitudes in question (viz. the degree of outsourcing) merely the directional influence.

By way of summary, our two broad measures of outsourcing are not without blemish. The virtue of the former measure is that we can observe the current level of outsourcing, even if we must remain cautious about measured changes in outsourcing derived from differences in levels. The second measure allows us to identify outsourcing establishments without conveying any information about the extent of the process. Expressed differently, given the non-contiguous timing of the surveys, we cannot use information on increased reliance on outsourcing from the organizational change question to identify an acceleration or deceleration of outsourcing over time.

We use a common set of covariates for the determinants and consequences of outsourcing. These comprise sales per employee (measured in units of thousand euro (kEUR)), the share of sales attributable to exports, expectations of rising future sales, dummies for investment in information and communication technology and investment in production facilities, an advanced state of technology dummy constructed from a five-element question where the management respondent is asked to assess the plant's overall state of on technology relative to other establishments in the same industry, number of employees, wages per employee (kEUR), the shares of high-skilled workers and workers on fixed-term contracts, the separation or labor turnover rate, works council presence,[5] coverage by a collective agreement at either sectoral or plant level, and whether the plant was located in western (as opposed to eastern) Germany. In addition, a number of plant characteristics were included, namely, dummies indicating if the plant was established before 1990, whether it was a single-establishment firm, and the exact legal form of the enterprise.[6] Finally, our regressions include in excess of 30 industry dummies, where the exact number depends on the dependent variable. We restricted our sample period mainly to the interval 2002–2004, extended to 2006 for the survival component of the analysis.[7] (Variable definitions and descriptive statistics are provided in Tables 7 and 8, respectively.)

3 Findings

Results on the determinants of outsourcing are provided in Tables 1 and 2. Table 1 presents logit results for the 'organizational change' measure, namely, expanded usage of bought-in products over the two-year interval ending on June 30, 2004. (Marginal effects of the covariates on the indicator variable appear alongside the coefficient estimates.) Plants with increasing recourse to outsourcing can be seen to be disproportionately export-led, to have made investments in information and communications technology, to have expectations of expanded business volume over the course of the current year, and to be located in western Germany. They also record higher labor turnover. Outsourcing is also higher in limited liability corporations than other legal forms, but single-plant enterprises clearly engage in less outsourcing. Despite the importance of investments in information and communications technology—here corroborating the results obtained by Abramovsky and Griffith 2006—there is no indication that the technological status of the plant matters, or that mature plants outsource more. On this measure, neither industrial relations institution (viz. works councils and collective bargaining coverage) nor workforce characteristics seem to influence outsourcing.[8]

Material on the other measure of outsourcing is contained in Table 2. The first two columns give results for the ratio of externally sourced inputs to value added in levels form for 2002 and 2004. The third column presents findings for changes in that ratio between 2002 and 2004. Beginning with the levels results, the first observation to make is that, with the exception of number of employees, no variable is consistently statistically significant. Second, while a number of variables achieve statistical significance in either year—examples include investments in production facilities, state-of-the-art technology (not surveyed in 2004), location in western Germany, share of fixed-term contract workers, and single-firm establishments—there are also some sign reversals (e.g. export share in 2004 where the coefficient estimate

[5] Since works councils may only be formed in establishments with at least five permanent employees, our sample excludes plants employing fewer than this number of employees.

[6] We distinguish between sole traders (the omitted category), partnerships, limited liability corporations, companies limited by shares, public corporations/foundations, and other legal forms (e.g. cooperatives).

[7] We also investigated other time intervals (e.g. 1999–2001). Results are available from the authors upon request.

[8] In addition to the estimates presented in Tables 1 and 2, we examined the determinants of outsourcing by sector. The results for services and manufacturing were very similar with the major exception of the export share variable which was statistically significant for manufacturing industry alone.

Table 1 The determinants of outsourcing, organizational change measure: expanded use of bought-in products and services, 2002–2004, logit model

Variable	Coefficient (s.e.)	Elasticities (s.e.)
Sales per employee	−0.0001 (0.0003)*	−0.072 (0.044)
Export share	0.007 (0.002)***	0.047 (0.016)***
Increasing sales expected	0.278 (0.110)**	0.048 (0.018)***
Investments in ICT	0.369 (0.127)***	0.165 (0.057)***
Investments in production facilities	0.139 (0129)	0.061 (0.056)
State-of-the-art technology	−0.114 (0.106)	−0.069 (0.065)
Number of employees	0.075 (0.068)	0.237 (0.166)
Wages per employee	0.080 (0.068)	0.133 (0.111)
Share of high-skilled workers	0.251 (0.219)	0.145 (0.126)
Separation rate	0.653 (0.372)*	0.033 (0.019)*
Share of fixed-term workers	−0.041 (0.490)	−0.001 (0.016)
Works council	0.231 (0.145)	0.061 (0.038)
Collective agreement	−0.072 (0.116)	−0.033 (0.053)
Western Germany	0.315 (0.127)**	0.163 (0.065)**
Establishment founded before 1990	0.103 (0.118)	0.055 (0.063)
Single-establishment firm (without subsidiaries)	−0.280 (0.117)**	−0.190 (0.080)
Legal form (omitted category: sole trader)		
Partnership	0.223 (0.225)	0.019 (0.018)
Limited liability corporation	0.301 (0.174)*	0.161 (0.092)*
Company limited by shares	0.036 (0.274)	0.001 (0.010)
Public corporation	−0.446 (1.116)	−0.002 (0.004)
Other legal form	−0.391 (0.523)	−0.006 (0.008)
Log likelihood	−1526.244	
LR Chi-square (d.f.)	340.57***	
Pseudo R^2	0.1077	
N	4504	

Notes: Right-hand side variables are base-year (2002) characteristics. The model also includes 31 industry dummies
*, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively. Robust standard errors are in parentheses

changes from positive and statistically insignificant to negative and statistically significant). Third, there are few commonalities with Table 1; for example, expectations of higher sales in 2002 and a higher export share in 2004 are now associated with a *reduced* ratio of externally sourced inputs to value added. For their part, the results in the third column of the table indicate almost no statistically significant determinants of (changes in) the outsourcing ratio—and a disappointingly low coefficient of determination. The sole exceptions are companies limited by shares and the share of high-skilled employees, where the associations are positive and negative, respectively.

Summarizing our findings with respect to the determinants of outsourcing, there are few signs from the evidence on changes in outsourcing at least that the phenomenon is associated with reduced sales per employee, technological sluggishness, or low-wage firms. Although there is some supporting evidence from the analysis in levels of variables (e.g. the positive influence of state-of-the-art technology and investments in production facilities), there are also some contrary indications (the negative and marginally statistically significant coefficient estimate for wages per employee in 2004). On balance, then, we might have expected to draw on more direct evidence than we have uncovered (i.e. beyond the positive associations with export share, expected sales, and investments in information and communications technology and here only for one of the outsourcing measures). And, although outsourcing might be viewed as an alternative form of workforce flexibility, note that the inverse association between the share of fixed-term workers and outsourcing was never statistically significant in the change in outsourcing equations (only for outsourcing in levels for 2002).

What of the consequences of outsourcing? To examine this question our principal focus is upon (two-year) changes in employment. But since employment changes can only be observed for survivors, we shall also consider a possible employment effect operating through plant closings. Table 3 contains OLS estimates of the effect of outsourcing on the change in employment between 2002 and 2004. Column (1) gives results for the organizational change measure of outsourcing, column (2) for the ratio of externally

Table 2 The determinants of outsourcing, ratio of externally sourced inputs to value added measure in levels (2002, 2004) and changes in levels (2002–2004), OLS estimates

Variable	(1)	(2)	(3)
Sales per employee	0.0005	0.002**	−0.00002
	(0.0004)	(0.001)	(0,0001)
Export share	0.002	−0.007**	−0.002
	(0.005)	(0.003)	(0.006)
Increasing sales expected	−0.301*	−0.066	0.430
	(0.163)	(0.215)	(0.263)
Investments in ICT	−0.005	−0.266	0.038
	(0.238)	(0.211)	(0.311)
Investments in production facilities	0.381*	0.275	−0.267
	(0.214)	(0.203)	(0.308)
State-of-the-art technology	0.301*		−0.141
	(0.173)		(0.258)
Number of employees	0.141*	0.231**	−0.122
	(0.089)	(0.107)	(0.127)
Wages per employee	−0.089	−0.206*	0.020
	(0.103)	(0.106)	(0.106)
Share of high-skilled workers	0.289	−0.205	−1.168**
	(0.349)	(0.404)	(0.522)
Separations rate	0.030	0.243	−0.060
	(0.536)	(0.170)	(0.764)
Share of fixed-term workers	−0.950**	−0.190	0.257
	(0.390)	(0.661)	(0.573)
Works council	−0.432	−0.115	0.488
	(0.287)	(0.305)	(0.364)
Collective agreement	−0.039	0.001	0.085
	(0.248)	(0.212)	(0.304)
Western Germany	−0.057	0.310*	0.170
	(0.232)	(0.173)	(0.332)
Establishment founded before 1990	−0.006	−0.116	−0.094
	(0.210)	(0.168)	(0.312)
Single-establishment firm (without subsidiaries)	−0.461*	−0.281	−0.111
	(0.252)	(0.232)	(0.338)
Legal form (omitted category: sole trader)			
Partnership	0.423	−0.703***	−0.687
	(0.426)	(0.243)	(0.518)
limited liability corporation	−0.219	0.082	0.063
	(0.254)	(0.270)	(0.378)
Company limited by shares	−1.261***	0.848	2.939**
	(0.438)	(0.768)	(1.143)
Public corporation	−0.644	−0.638	−0.080
	(0.411)	(0.414)	(0.450)
Other legal form	1.548	−0.694*	−2.380
	(1.432)	(0.362)	(2.176)
R^2	0.07	0.08	0.02
N	5,027	5,643	3,495

Notes: See Table 1. The dependent variable in columns (1) and (2) is given by the ratio of externally sourced inputs to value added in 2002 and 2004, respectively, and in column (3) by the 2002–2004 change in the ratio. The right-hand side variables are measured as of 2002, 2004, and 2002, respectively

*, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively. Robust standard errors are in parenthesis

Table 3 The effect of outsourcing on employment change, 2002–2004, OLS estimates

Variable	Specification		
	(1)	(2)	(3)
Expanded use of bought-in products and services, 2002–2004	0.009		
	(0.014)		
Ratio of externally sourced inputs to value added, 2002		0.001	
		(0.0004)	
Change in ratio of externally sourced inputs to value added, 2002–2004			−0.001
			(0.001)
Sales per employee	−2.83e-06	−4.05e-06	4.48e-07
	(6.03e-06)	(6.06e-06)	(5.75e-06)
Export share	−0.00005	−6.05e-06	−0.00003
	(0.0002)	(0.0002)	(0.0003)
Increasing sales expected	0.058***	0.057***	0.055***
	(0.010)	(0.011)	(0.011)
Investments in ICT	0.050***	0.052***	0.050***
	(0.010)	(0.011)	(0.011)
Investments in production facilities	0.038***	0.040***	0.037***
	(0.010)	(0.010)	(0.011)
State-of-the-art technology	0.017*	0.018*	0.013
	(0.009)	(0.010)	(0.010)
Establishment size 21–100	−0.007	−0.008	−0.004
	(0.012)	(0.012)	(0.012)
Establishment size 101–1,000	−0.053***	−0.063***	−0.048***
	(0.016)	(0.017)	(0.017)
Establishment size 1,001 and more	−0.056**	−0.069***	−0.040
	(0.022)	(0.031)	(0.033)
Wages per employee	−0.007	−0.007	−0.011
	(0.006)	(0.006)	(0.006)
Share of high-skilled workers	−0.022	−0.019	−0.008
	(0.019)	(0.019)	(0.020)
Separations rate	0.058	0.059	−0.023
	(0.037)	(0.038)	(0.079)
Share of fixed-term workers	0.092**	0.110**	0.119**
	(0.050)	(0.044)	(0.046)
Works council	−0.007	−0.001	−0.013
	(0.013)	(0.013)	(0.014)
Collective agreement	−0.011	−0.012	−0.003
	(0.010)	(0.010)	(0.011)
Western Germany	0.028***	0.029***	0.027**
	(0.010)	(0.011)	(0.011)
Establishment founded before 1990	−0.014	−0.010	−0.012
	(0.010)	(0.010)	(0.010)
Single-establishment firm (without subsidiaries)	−0.012	−0.016	−0.006
	(0.011)	(0.011)	(0.012)
Legal form (omitted category: sole trader)			
Partnership	0.003	0.002	−0.006
	(0.017)	(0.018)	(0.018)
Limited liability corporation	0.015	0.015	0.007
	(0.013)	(0.013)	(0.014)
Company limited by shares	0.006	0.003	−0.006
	(0.024)	(0.025)	(0.027)
Public corporation	0.087	0.055	0.064
	(0.068)	(0.073)	(0.083)
Other legal form	−0.013	−0.023	0.007
	(0.035)	(0.037)	(0.039)
R^2	0.05	0.06	0.07
N	4,541	4,313	3,495

Notes: See Table 1. The model includes 35 industry dummies

*, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively. Robust standard errors are in parentheses

sourced inputs to value added in 2002, and column (3) for the change in this ratio between 2002 and 2004. As is apparent, the effects of outsourcing are always statistically insignificant.[9] As far as the other arguments are concerned, employment change is negatively associated with establishment size, while it is positively associated with the dummies capturing investments in information and communications technology and investment in production facilities, expectations of increased sales, advanced technology, location in western Germany and, interestingly, with the share of fixed-term contract workers.

Tables 4 and 5 provide disaggregated results for services and manufacturing, respectively. For services, although the outsourcing coefficient estimates are unchanged (albeit statistically insignificant) for the ratio measures, we obtain a *positive* and statistically significant coefficient estimate for the organizational change measure of outsourcing. This is the first estimate of which we are aware that points to rising employment in association with outsourcing in this sector. The influence of the other regressors is broadly as observed for industry as a whole.

The results for manufacturing are differentiated from those obtained for services. Specifically, we obtain statistically significant negative coefficient estimates for the change in the ratio of externally sourced inputs to value added, but not for this ratio and for the organizational change measure. The rest of the results are also somewhat different from before. For example, the share of workers on fixed-term contracts is statistically significant, whereas the variable for the establishment founded before 1990 becomes negatively significant at the 10% level. There is also some suggestion that the very largest firms and not just larger firms have lower employment growth rates than their smaller counterparts.

As a final exercise, we sought to determine whether our outsourcing measures had any effect on plant closings.[10] Since the latest (publicly) available survey refers to 2006, this exercise amounts to examining the effects of outsourcing on plant failures over the interval 2004–2006. Using the IAB panel we can identify plant closings in the following manner. As of 2006, we have data on the 'current' state of each establishment that participated in 2004. Of course not all plants 'missing' from the survey in 2006 are deaths: some are establishments where the interviewer is unable to figure out what had happened to them, while other plants will simply be those that have been self-rotated out of the sample. Additional information from the German Federal Employment Agency *establishment file* was then used to check on whether a 2004 participant was still extant in 2006. The file contains information on each German establishment with at least one employee covered by social insurance, and is used to draw the sample for the Establishment Panel. The establishment identifiers of plants with missing data on survival in the panel were compared with the establishment identifiers in the file. A missing establishment was adjudged to have failed if no match could be found in the file. Alternatively put, former missing observations for which a match was found were added back in as survivors. In this way, we were able to obtain virtually complete information on survivals/deaths of all plants that were part of the Establishment Panel in 2004. After all such calculations, we arrive at a total of 199 plant failures for all industries as of 2006 for the organizational change measure of outsourcing. Corresponding plant failures for the ratio of externally sourced inputs to value added are 185 and 120 for the levels and change measures, respectively.

The probability of failure was modeled using a logistic regression in which the RHS variables are identical to those used in the employment change equations. The dependent variable is assigned the value of 1 for those plants that failed between 2004 and 2006, 0 otherwise. All regressors have values set at the time of the 2004 wave.

The logit results are presented in summary form in Table 6. Beginning with the organizational change measure of outsourcing, we see that all the point estimates are negative, although none achieves statistical significance at conventional levels. The same results obtain for the change in the ratio of externally sourced inputs to value added between 2002 and 2004, that is, all coefficients are again negative and insignificant. For the level of externally sourced inputs in 2004, however, two out of three coefficient estimates are positive (for all sectors and for services). The results for manufacturing are opposite in sign but remain statistically insignificant. Although one might conclude from this evidence that outsourcing might weakly indicate a solution to problems of survivability rather than hinting at a source of competitive difficulty, we would instead incline to the view that there is nothing in the data to suggest that the employment change results reported earlier in Table 3 are subject to survivor bias.

4 Conclusions

The results of this investigation into outsourcing and its employment consequences are mixed and may be summarized as follows. First, across all industries, there is no convincing evidence that outsourcing costs jobs. Second, however, behind this latter result is the appearance of disparate effects for services on the one hand and manufacturing on the

[9] Our results are in line with a consensus that has emerged from empirical studies on offshoring surveyed by Geishecker et al. (2008) and Crinó (2009), as well as the recent investigation by Wagner (2009) who reports employment effects that are either broadly neutral or even modestly benign.

[10] See Wagner (1994) and Heckmann (2009) for an overview of the relevant German literature.

Table 4 The effect of outsourcing on employment change in the services sector, 2002–2004, OLS estimates

Variable	Specification		
	(1)	(2)	(3)
Expanded use of bought-in products and services, 2002–2004	0.057**		
	(0.028)		
Ratio of externally sourced inputs to value added, 2002		0.001	
		(0.001)	
Change in ratio of externally sourced inputs to value added, 2002–2004			−0.001
			(0.0005)
Sales per employee	5.45e-06	4.00e-06	8.66e-06
	(6.52e-06)	(6.55e-06)	(6.23e-06)
Export share	−0.0003	−0.0002	−0.001
	(0.001)	(0.0006)	(0.0006)
Increasing sales expected	0.061***	0.060***	0.060***
	(0.016)	(0.017)	(0.018)
Investments in ICT	0.042***	0.043***	0.038**
	(0.016)	(0.016)	(0.017)
Investments in production facilities	0.019	0.020*	0.023
	(0.015)	(0.016)	(0.016)
State-of-the-art technology	0.001	−0.0001	0.002
	(0.015)	(0.015)	(0.016)
Establishment size 21–100	−0.002	−0.001	0.007
	(0.017)	(0.017)	(0.018)
Establishment size 101–1,000	−0.061**	−0.068**	−0.046*
	(0.025)	(0.026)	(0.028)
Establishment size 1,001 and more	−0.032	−0.040	−0.001
	(0.055)	(0.057)	(0.068)
Wages per employee	−0.003	−0,002	−0.002
	(0.008)	(0.008)	(0.008)
Share of high-skilled workers	0.003	0.004	0.021
	(0.026)	(0.028)	(0.030)
Separations rate	0.101	0.122	−0.025
	(0.052)	(0.053)	(0.064)
Share of fixed-term workers	0.106	0.121**	0.191***
	(0.058)	(0.059)	(0.065)
Works council	−0.005	0.002	−0.0002
	(0.021)	(0.022)	(0.023)
Collective agreement	−0.003	−0.011	−0.015
	(0.015)	(0.016)	(0.017)
Western Germany	0.035**	0.038**	0.038**
	(0.016)	(0.017)	(0.017)
Establishment founded before 1990	−0.003	0.005	0.008
	(0.015)	(0.016)	(0.016)
Single-establishment firm (without subsidiaries)	−0.019	−0.021	−0.012
	(0.017)	(0.017)	(0.018)
Legal form (omitted category: sole trader)			
Partnership	−0.013	−0.024	−0.028
	(0.024)	(0.025)	(0.026)
Limited liability corporation	0.021	0.023	0.006
	(0.019)	(0.020)	(0.021)
Company limited by shares	0.032	0.032	−0.032
	(0.037)	(0.039)	(0.043)
Public corporation	0.082	0.040	0.051
	(0.079)	(0.086)	(0.103)
Other legal form	−0.022	−0.042	−0.029
	(0.043)	(0.045)	(0.046)
R^2	0.07	0.06	0.06
N	2,018	1,880	1,493

Notes: See Table 1. The model includes 18 industry dummies

*, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively. Robust standard errors are in parentheses

Table 5 The effect of outsourcing on employment change in the manufacturing sector, 2002–2004, OLS estimates

Variable	Specification		
	(1)	(2)	(3)
Expanded use of bought-in products and services, 2002–2004	−0.012		
	(0.015)		
Ratio of externally sourced inputs to value added, 2002		0.001	
		(0.001)	
Change in ratio of externally sourced inputs to value added, 2002–2004			−0.002*
			(0.001)
Sales per employee	−0.0001***	−0.0001***	−0.0001***
	(0.0003)	(0.00002)	(0.00002)
Export share	0.0001	0.0001	0.0002
	(0.0003)	(0.0003)	(0.0003)
Increasing sales expected	0.056***	0.054***	0.053***
	(0.014)	(0.014)	(0.014)
Investments in ICT	0.057***	0.059***	0.059***
	(0.014)	(0.014)	(0.014)
Investments in production facilities	0.055***	0.056***	0.048***
	(0.014)	(0.014)	(0.014)
State-of-the-art technology	0.029**	0.032***	0.020
	(0.012)	(0.012)	(0.012)
Establishment size 21–100	−0.012	−0.019	−0.011
	(0.015)	(0.018)	(0.016)
Establishment size 101–1,000	−0.044**	−0.059***	−0.043*
	(0.022)	(0.023)	(0.023)
Establishment size 1,001 and more	−0.040	−0.058**	−0.030
	(0.038)	(0.039)	(0.039)
Wages per employee	−0.011	−0.012	−0.021**
	(0.009)	(0.009)	(0.009)
Share of high-skilled workers	−0.041	−0.044	−0.047
	(0.026)	(0.027)	(0.027)
Separations rate	−0.021	−0.044	−0.024
	(0.055)	(0.056)	(0.059)
Share of fixed-term workers	0.050	0.062	0.036
	(0.065)	(0.067)	(0.085)
Works council	−0.009	0.001	−0.019
	(0.017)	(0.018)	(0.018)
Collective agreement	−0.011	−0.009	0.010
	(0.013)	(0.013)	(0.014)
Western Germany	0.023*	0.023	0.021
	(0.014)	0.014	(0.015)
Establishment founded before 1990	−0.024*	−0.025*	−0.032**
	(0.013)	(0.013)	(0.014)
Single-establishment firm (without subsidiaries)	−0.013	−0.014	−0.005
	(0.015)	(0.015)	(0.016)
Legal form (omitted category: sole trader)			
Partnership	0.028	0.025	0.015
	(0.024)	(0.024)	(0.025)
Limited liability corporation	0.010	0.009	0.011
	(0.017)	(0.018)	(0.018)

Table 5 (*Continued*)

Variable	Specification		
	(1)	(2)	(3)
Company limited by shares	−0.021	−0.024	0.012
	(0.033)	(0.034)	(0.036)
Public corporation	0.043	0.044	0.040
	(0.155)	(0.155)	(0.144)
Other legal form	0.025	0.034	0.126
	(0.068)	(0.073)	(0.089)
R^2	0.08	0.08	0.09
N	2,523	2,433	2,002

Notes: See Table 1. The model includes 17 industry dummies *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively

Table 6 Logit estimates of the effect of outsourcing on plant closings, 2004–2006, summary results

Outsourcing measure		Sector		
		All industries	Manufacturing	Services
Expanded use of bought-in products and services, 2002–2004	Coefficient (s.e.)	−0.162	−0.206	−0.164
		(0.281)	(0.357)	(0.473)
	elasticity (s.e.)	−0.017	−0.029	−0.011
		(0.030)	(0.051)	(0.031)
	Observations	5,551	2,662	2,772
Ratio of externally sourced inputs to value added, 2002	Coefficient (s.e.)	0.0002	−0.047	0.006
		(0.010)	(0.025)	(0.009)
	elasticity (s.e.)	0.0004	−0.090	0.017
		(0.023)	(0.048)	(0.025)
	Observations	5,282	2,561	2,609
Change in the ratio of externally sourced inputs to value added, 2002–2004	Coefficient (s.e.)	−0.004	−0.007	−0.002
		(0.013)	(0.016)	(0.018)
	elasticity (s.e.)	0.0003	0.001	−0.0002
		(0.001)	(0.002)	(0.001)
	Observations	3,224	1,701	1,405

Note: The fitted equations include the full set of regressors used in the previous tables. Standard errors are in parentheses

other, and in each case consistent with the aggregate findings these different results derive from different outsourcing measures. These respective (positive and negative) results for the two sectors offer sustenance to the more enthusiastic opponents and supporters of outsourcing alike. But if so, it remains rather thin gruel. Third, it appears that we can reject the notion that the employment consequences are benign by reason of survival bias. That is to say, there are no signs that outsourcing aggravates plant closings.

Further research is required. One limitation of our study is that we were unable formally to account for the possible endogeneity of certain right-hand variables, perhaps most notably investments in ICT. This deficit needs to be tackled with new data sets. Another issue is the impact of outsourcing on productivity and not just employment, tracking similar such studies for Ireland, Italy, Austria, the U.K. and the U.S.A.[11] The IAB Establishment Panel is integral to this end because it permits the construction of the relevant time series. Information on *insourcing* has also been observed since 2008. Use of these new data would allow us to determine potential structural breaks in outsourcing or complementarity between the two forms. Finally, the research effort should also be widen to accommodate differences between domestic outsourcing on the one hand and international outsourcing/offshoring on the other.

Executive summary

Despite the practice in many western European nations of international outsourcing or offshoring parts of their production processes to low-wage countries being very much in vogue, research on the correlates and consequences of outsourcing using establishment data is still sparse. In this

[11] Daveri and Jona-Lasinio (2008); Geishecker and Görg (2008a, 2008b); Geishecker et al. (2008, 2010); Görg (2005); Girma and Görg (2004); Görg et al. (2008a, 2008b); Görg and Hanley (2003, 2005, 2007); Pfaffenrmayr (1999).

study, German data from the Institute for Employment Research Establishment Panel are used to examine the determinants and consequences of outsourcing. Summarizing our findings with respect to the determinants of outsourcing, there are few overt signs that the phenomena is associated with reduced sales per employee, technological sluggishness, or low wages in offshoring firms. Further, although outsourcing might be viewed as an alternative form of workforce flexibility, our results are not in line with this hypothesis either.

Our findings with respect to the employment consequences are mixed and may be summarized as follows. First, across all industries, there is no convincing evidence that outsourcing costs jobs. Second, some negative effects are reported for manufacturing industry, balanced by positive effects for the service sector. If the results for these two sectors are to be taken as offering sustenance to the more enthusiastic opponents and supporters of outsourcing, it is evidently rather thin gruel. Third, it appears that we can reject the notion that the employment consequences are benign simply by reason of survival bias; that is, there are no signs that outsourcing aggravates plant closings.

Further research is nonetheless required. One limitation of our study is that we are unable formally to account for the possible endogeneity of certain right-hand variables, perhaps most notably investments in ICT. This deficit needs to be tackled with new data sets. Another issue is the impact of outsourcing on productivity and not just employment, taking a cue from extant studies for Ireland, Italy, Austria, the U.K. and the U.S.A. Here the IAB Establishment Panel is integral to this end because it now permits the construction of the relevant time series. Information on *insourcing* has also been observed since 2008. Use of these new data would allow us to determine potential structural breaks in outsourcing or complementary between the two forms. Finally, the research effort should also be widened to accommodate differences between domestic outsourcing on the one hand and international outsourcing/offshoring on the other.

Kurzfassung

Obwohl in vielen westeuropäischen Ländern internationales *outsourcing* oder *offshoring* in Niedriglohnländer Teil des Produktionsprozesses ist, sind Forschungserkenntnisse über die Korrelationen und Konsequenzen von *outsourcing* basierend auf Betriebsdaten rar. Im vorliegenden Artikel wurden deutsche Daten des IAB-Betriebspanels genutzt, um die Determinanten und Konsequenzen von *outsourcing* zu untersuchen. Zusammenfassend zeigen die Ergebnisse bezüglich der Determinanten von *outsourcing* dass nur wenig darauf hinweist, dass *outsourcing* mit Lohnsenkung, technischer Stagnation oder Niedriglöhnen in den Unternehmen, die Niederlassungen im Ausland aufbauen, verbunden ist. Außerdem wiedersprechen unsere Ergebnisse den Hypothesen, dass *outsourcing* als eine alternative Form der Arbeitsflexibilität betrachtet werden kann.

Unter Beachtung der Konsequenzen für die Arbeitnehmer zeigen unsere Ergebnisse folgendes: Erstens kann über alle Branchen hinweg nicht festgestellt werden, dass durch *outsourcing* Arbeitsplätze verloren gehen. Zweitens werden leicht negative Einflüsse im Verarbeitenden Gewerbe durch positive Effekte im Dienstleistungssektor ausgeglichen. Wenn jedoch die Ergebnisse in diesen beiden Sektoren als Grundlage für enthusiastische Gegner und Befürworter von outsourcing genutzt werden, bewegen sich diese auf dünnem Eis. Drittens scheint es, dass unsere Ergebnisse die Auffassung zurückweisen, dass die Beschäftigungseffekte nur auf einem *survival bias* beruhen. So deuten die Ergebnisse nicht darauf hin, dass *outsourcing* die Schließung von Betrieben und Fabriken verstärkt.

Weitere Forschung ist dennoch von Nöten. Eine Begrenzung unserer Studie besteht darin, dass es unmöglich ist, die Endogenität bestimmter Determinanten des outsourcing zu kontrollieren, wie beispielsweise Investitionen in IKT. Dieses Defizit muss mit neuen Datensätzen angegangen werden. Ein weiteres Problem ist der Einfluss von *outsourcing* auf die Produktivität und nicht allein auf Beschäftigung, worauf Studien in Italien, Australien, U.K. und den U.S.A. hinweisen. Das IAB-Betriebspanel stellt diesbezüglich eine wesentliche Grundlage dar. Informationen über *insourcing* sind darin ebenfalls seit 2008 enthalten. Die Nutzung dieser neuen Daten erlaubt es potentielle strukturelle Brüche in *outsourcing* oder in der Komplementarität zwischen diesen beiden Formen festzustellen. Abschließend müssen die Forschungsanstrengungen erweitert werden, um die Unterschiede zwischen inländischem *outsourcing* auf der einen Seite und internationalem *outsourcing* bzw. *offshoring* auf der anderen Seite berücksichtigen zu können.

Appendix

Table 7 Description of the variables

Variable	Definition
Expanding outsourcing in the last two years	1/0 dummy: 1 if the establishment said to have been expanding "in buying products and services from outside sources in the last two years."
Ratio of externally sourced inputs to value added	Ratio of externally sourced inputs to value added.
Change in the ratio of externally sourced inputs to value added	Change in the ratio of externally sourced inputs to value added.
Sales per employee	Volume of sales per employee (In Euros.)
Export share	Share of exports in volume of sales.
Increasing sales expected	1/0 dummy: 1 if sales are expected to increase; 0 if "sales stay approximately at the same."
Total of all investments	Approximate sum of all investments (in the establishment or in the firm?) (In Euros.)
Investments in ICT	1/0 dummy: 1 if establishment invested in EDP/ICT; 0 if no investments or investments in other areas.
Investments in production facilities	1/0 dummy: 1 if establishment invested in production facilities, furniture and office equipment; 0 if no investments or investments in other areas.
Wages per employee	Gross wages per employee (June) (In Euros.)
State-of-art technology	1/0 dummy: 1 if the overall technical state of the plant and machinery, furniture and office equipment of the establishment in comparison to other establishments in the same industry is assessed as belonging to the two highest categories on a scale from one to five (viz. "obsolete" to "state-of-the-art"); 0 otherwise.
Works council	1/0 dummy: 1 if works council is present; 0 otherwise.
Collective agreement	1/0 dummy: 1 if there is either a company or industry-wide wage agreement; 0 otherwise.
Western Germany	1/0 dummy: 1 if plant located in western Germany; 0 otherwise.
Number of employees	Number of employees in the current year (In logs.)
Share of separations	Number of separations as a percentage of total employment.
Share of high-skilled employees	Share of high skilled in total employment.
Share of fixed-term employees	Share of fixed-term contract workers in total employment.
New establishment	1/0 dummy: 1 if establishment/firm created before 1990; 0 otherwise.
Single establishment firm (without subsidiaries)	1/0 dummy: 1 if single establishment firm; 0 otherwise.
Partnership	1/0 dummy: 1 if partnership (limited partnership, general partnership, partnership under legal code); 0 otherwise.
Limited liability corporation	1/0 dummy: 1 if limited liability company or limited commercial partnership with a limited company as partner; 0 otherwise.
Company limited by shares	1/0 dummy: 1 if company limited by shares (public limited company, partnership limited by shares; 0 otherwise).
Public corporation	1/0 dummy: 1 if public corporation, public law foundation, institution, authority or office; 0 otherwise.
Other legal form	1/0 dummy: 1 if other legal form; 0 otherwise.

Table 8 Descriptive statistics

Variable	*N*	Mean	St. Dev.
Expanding outsourcing in the last two years	15333	0.110	0.313
Ratio of externally sourced inputs to value added	10624	2.421	6.578
Change in the ratio of externally sourced inputs to value added	7768	−0.082	6.841
Sales per employee (kEUR)	12979	166.292	572.729
Export share	14501	9.375	20.362
Increasing sales expected	17347	0.225	0.418
Investments in ICT	14732	0.524	0.499
Investments in production facilities	14732	0.500	0.500
Wages per employee (kEUR)	13384	1.963	1.004
State-of-the-art technology	9272	0.686	0.464
Works council	18708	0.337	0.473
Collective agreement	18717	0.535	0.499
Western Germany	18753	0.673	0.469
Number of employees (log.)	18753	3.723	1.480
Share of separations	18714	0.066	0.274
Share of high-skilled employees	18751	0.659	0.268
Share of fixed-term employees	18699	0.043	0.115
New establishment	18578	0.597	0.491
Single establishment firm (without subsidiaries)	18512	0.724	0.447
Partnership	18510	0.075	0.263
Limited liability corporation	18510	0.635	0.481
Company limited by shares	18510	0.055	0.227
Public corporation	18510	0.006	0.078
Other legal form	18510	0.021	0.143

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