

Are working conditions of contract workers always bad? Firm level evidence on contracting out

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Abstract

Contracting out has always been an important way of firm cooperation. Recently, however, concerns emerge that the deployment of workers on the basis of contract work polarizes labor markets, because the contract workers are systematically worse off than they would be in the situation when employed in the client firm. We investigate this presumption using firm level data including direct evidence on working conditions of contract workers based on a comprehensive sample of contracted services. We show that the working conditions are considerably different across business functions in the client firms. Conclusions from existing studies investigating only certain contracted services are therefore likely to be incomprehensive. Furthermore, we find competition among contracting firms to be the important determinant for working conditions of contract workers.

Keywords: Contracting out, Wage Inequality, Market Structure, Regional Economics

JEL: J31, J53, L24, D43, R23

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1 Introduction

Contracts for work or services provide firms with the possibility to cooperate with each other. This type of firm cooperation got into the focus of public and academic debate under the terms *contracting out* or *outsourcing*. Contracting out as form of division of labor has become increasingly important due to growing (international) trade flows driven by globalization together with the increased use of digital technologies (Abramovsky and Griffith 2006). Firms' cooperation arguably leads to an overall higher productivity of the economy (Dustmann et al. 2014). Against this, there are concerns that the deployment of workers on the basis of contracts for work or services could lead to a polarization of the labor market, so that working conditions of contract workers are systematically worse than they would be in the situation when employed in the firm which demands manpower. In public debates in particular the outsourcing case is debated: firms which increasingly outsource parts of their core workforce in order to then let products and services be manufactured from the same or similar external contract workers under poorer working conditions.

In this paper, we evaluate whether contract work is always associated with worse working conditions compared to the alternative conditions when labor is provided by being directly employed in the firm that demands the service. The demand for contract work is the result of a make-or-buy decision, so that a firm contracts out if costs are less than in the case of providing the service internally. The costs of contract work are determined by its prices. Our core conceptual argument is that prices for contract work are set on a market for contract work and that the price of contract work reflects the working conditions of the worker providing the contracted service. As a result, the price for contract work and therefore the working conditions of contract workers will depend on the costs of internal service provision in the client firm and the degree of competition between the contracting firms. If many contracting firms compete for a service contract, prices will be lower and thus working conditions will be worse, *ceteris paribus*, compared to the case where there is a monopoly of one contracting firm.

The empirical analysis in this paper firstly investigates how heterogeneous the working conditions of contract workers are. Secondly, we evaluate the importance of market conditions for the working conditions of contract workers. We use information from a German firm survey conducted among representatives of the firm's management. The data contain the working conditions of workers who provide contracted services at a workplace of the client firm (on-site contracting out). The data comprise information for which business function of the client firm the contracted service is provided. We consider this information to be crucial because we suppose that for each business function there exists a separate contract work market. We use a region specific index in order to measure the degree of competition among contracting firms. We identify the costs of internal service provision by characteristics of the client firm.

So far there is little evidence on the effect of contracting out on working conditions. For an empirical analysis, information on workers' actual conditions being employed in a contracting firm and information on their counterfactual working conditions would they be employed in the client firm is needed. Yet, existing data sets rarely provide a direct measure for contract work or an indicator for

contract workers. Furthermore, the working conditions of a contracted worker would she be employed in the client firm naturally cannot be observed but must be constructed which requires sufficient information on the individual level. To our knowledge up to now there are only two studies which investigate the effects of contracting out on working conditions using quantitative data. The US study by Dube and Kaplan (2010) indirectly defines contract workers if the person works for an employer that provides labor services mainly as an intermediate input to a primary firm (client firm). The effect of contract work on wages is calculated by the wage difference of workers switching employment from a contracting firm to a client firm thereby remaining in their occupation. Based on German data, Goldschmidt and Schmieder (2017) use the movement of a group of employees from one establishment to another in the same region remaining in their occupation as an indirect measure for outsourcing. Applying an event study approach they then compare wages of workers before and after the outsourcing event.

This paper contributes to the existing studies on the effect of contracting out on working conditions of contract workers by using firm level data. The empirical approach in this paper extends the existing analyses in three ways. Firstly, we conclusively identify contract workers as we have direct information on working conditions of contract workers in comparison to workers in client firms available. Secondly, we observe a representative sample of the variety of contracting out incidences in German firms. We therefore observe the entire distribution of working conditions in contrast to existing studies which cover only low-wage occupations.⁴ Thirdly, unlike the existing studies our analysis is not confined to outsourcing events but to the more general case of contracting out (which entails outsourcing). Yet, the focus of our analysis is on onsite contracting out (like Goldschmidt and Schmieder, 2017), which does not entail contract work provided at workplaces outside the client firm.

In our empirical analysis, we show that heterogeneity in contract workers' wages is significantly related to the type of business function the contracted service is provided for. Analyses considering contracting out only for a selection of business functions therefore underestimate the variation in working conditions and thus might draw only incomplete conclusions concerning the relationship between contracting out and the inequality of working conditions. Furthermore, we find that a decreasing degree of competition on the contract work market increases the wage level of contract workers, *ceteris paribus*. Differentiating between types of business functions for which the contracted service is provided reveals that the positive impact of lower competition on the contract work market is higher for core business functions compared to supportive business functions. Finally we show that the relevance of competition in the contract work market also comes from the difference between tradeable and non-tradeable contracted services such that wage levels increase with decreasing competition level only for non-tradeable services.

The next section provides information on the institutional background and conceptual framework for costs of contract work versus internal service provision. Section 3 presents the data and descriptive evidence of contracting out in Germany while Section 4 investigates heterogeneities in outsourcing.

⁴ Dube and Kaplan (2010) consider janitors and service guards and Goldschmidt and Schmieder (2017) consider occupations constitutive for logistics, cleaning, security and catering industries.

In Section 5 we provide suggestive evidence that competition in the market for contract work has a significant impact on wage levels, especially for non-tradeable processes. Finally Section 6 concludes.

2 Institutional Background and Conceptual Framework

In Germany, contracting out is a legally defined way of between firm cooperation. Firms contract about the supply of a specific service or good.⁵ Contracts cease either when the good is delivered or in the case of services after a predetermined period. Contract workers represent the part of the workforce of the contracting firm which is directly deployed to supply the service or good demanded by the client firm. Contract work may either be supplied at a workplace of the contracting firm (offsite contracting out) or at a workplace of the client firm (onsite contracting out).

The starting point of our analysis is the situation in which a firm has decided to contract out. We assume that firms are minimizing their costs and that this rationale also applies for the decision whether or not to contract out. Firms which have contracted out must therefore have faced higher costs of internal provision of the good or service ($c_{internal}$) compared to the costs of contracting out (c_{market}). In the situation of contracting out we therefore observe a cost advantage $M = c_{internal} - c_{market} > 0$ when producing a good or supplying a service by workers employed outside the firm.

The theoretical and empirical questions is: Does the cost advantage M always lead to worse working conditions of contract workers compared to the situation when they were employed at the client firm? Theoretically, we can distinguish two types of relationship between the cost advantage M and working conditions of contract workers. First, the contracting firm is more efficient in producing the contracted service than the client firm. In the case of remuneration based on a worker's marginal productivity, wages in the contracting firm would be higher than in the client firm. Second, the contracting firm is at most equally efficient in producing the contracted service as the client firm but accomplishes higher employer power leading to lower wages in negotiations with their workers than in the client firm.

Sketch of a theory:

Firm's output Y is produced by the input factors: capital K , labor L , and goods and services supplied by contract work CW .

$$Y = f(K_1, K_2, \dots, K_n, L_1, L_2, \dots, L_n, CW_1, CW_2, \dots, CW_n)$$

Each input factor is subdivided in N compartments which are deployed for a specific business function n . We assume for simplicity that the number of business functions is fixed for each firm.

⁵ Contracting out differs from purchases. Goods and services which are transacted by contracting out have a higher specificity than in the case of purchasing.

The production process is modelled by the CES function

$$Y = \left[a(K \times L)^{\frac{\sigma-1}{\sigma}} + bCW^{\frac{\sigma-1}{\sigma}} \right]^{\frac{\sigma}{\sigma-1}}$$

where K, L and CW denote vectors of the respective input factors to supply the business functions existing in a firm. For simplicity we assume that the firm output is generated by an input product $K \times L$ and contract work CW . a and b denote the shares of the two inputs where $a \in (0,1)$, $b \in [0,1)$, and $a + b := 1$. This ensures that Y can only be produced if some amount of the input product $K \times L$ is used.

The price of capital input is a function of interest rate r and an efficiency parameter a_K which is the higher the less implementation costs are associated with using input factor K_n . For example, introducing a new technology might involve adjustment costs among the labor force, or there might be risk that the technology is outdated before its amortization.

$$K_n = \frac{1}{a_{K,cl}} f(r)$$

The price of labor input is the wage w_{cl} in the client firm and other organization costs p_{cl} accruing from labor input in the client firm, such as personnel management costs, costs of further education, hiring and firing costs, etc. a_L denotes a parameter measuring the efficiency of a firm's labor input.

$$L_n = f(w_{cl}) + \frac{1}{a_{L,cl}} f(p_{cl})$$

Analogously, the price of the input contract work is determined by wages, organization costs, labor input efficiency, and capital efficiency in the contracting firm, w_{ct} , p_{ct} , $a_{L,ct}$ and $a_{K,ct}$:

$$CW_n = f(w_{ct}) + \frac{1}{a_{L,ct}} f(p_{ct}) + \frac{1}{a_{K,ct}} f(r) + \mu$$

When using CW additional transaction costs μ accrue. These costs arise from the fact that the good or service is produced on the market instead of within the hierarchy of the client firm. Costs $\mu \in [0, c]$ arise, for example, when the supplied good or service does not meet the quality criteria demanded by the client firm. μ is zero in the case where the client firm manages to create a situation without any transaction costs associated with the market provision of the contracted good or service.

Wages w are determined by an ex-post wage-bargaining model, in which an asymmetric Nash bargaining is to be maximized:

$$(p - w)^{1-\alpha} (w - b)^\alpha,$$

where b is the leisure value of worker, p is the marginal productivity of labor in the firm, and α measures the degree of a worker's bargaining power. Wages are then determined in the following way:

$$w = \alpha p + (1 - \alpha)b,$$

assuming that there is some ex-post efficiency, such that $p \geq b$, which is shared between the firm and employer with shares α and $1 - \alpha$.

Output in the economy of good or service Q_i is produced by the weighted sum of firm output Y_i . For simplicity we assume that a good or service Q_i is either produced by one firm or by a cooperation between two firms:

$$Q_i = \gamma_i Y_{i,client} + (1 - \gamma_i) Y_{i,contractor} ,$$

and output in the whole economy piles up to:

$$Q = \sum_i \gamma_i Y_{i,client} + (1 - \gamma_i) Y_{i,contractor}$$

A firm can take one of two roles in producing Q_i : the role of the *client* or the role of the *contractor*. Note that a firm can be the *client* for good or service Q_i and the *contractor* for another good or service Q_j . γ denotes the degree of cooperation among firms producing good or service Q_i . In the cases of $\gamma = 1$ there is no cooperation between firms; in the case of $\gamma = 0$ there is a maximal degree of cooperation between firms.

In order to examine the make-or-buy decision, the client firm compares costs of the internal provision of the good or service with the costs when the good or service is provided by the contracting firm. Input costs in the case of internal provision ($Q_i = Y_{i,client}$) are:

$$c_{internal} = \frac{1}{a_{K,cl}} f(r) + f(w_{cl}) + \frac{1}{a_{L,cl}} f(p_{cl})$$

$$c_{internal} = \frac{1}{a_{K,cl}} f(r) + \alpha_{cl} p_{cl} + (1 - \alpha_{cl})b + \frac{1}{a_{L,cl}} f(p_{cl})$$

In the case of maximal cooperation ($Q_i = Y_{i,contractor}$) input costs are:

$$c_{market} = CW = f(w_{ct}) + \frac{1}{a_{L,ct}} f(p_{ct}) + \frac{1}{a_{K,ct}} f(r) + \mu$$

$$c_{market} = CW = \frac{1}{a_{K,ct}} f(r) + \alpha_{ct} p_{ct} + (1 - \alpha_{ct})b + \frac{1}{a_{L,ct}} f(p_{ct}) + \mu$$

To be continued

The literature has already investigated some determinants and reasons for outsourcing, where all of them can be broken down to cost reasons (cf. the overview articles by Abraham and Taylor, 1996; Houseman, 2001; Berlingieri, 2014; Bernhardt et al., 2016).

First, avoiding fluctuations in production can be a reason for outsourcing. Fluctuations in the demand for goods are associated with costs for firms. In the event of backlogging orders, firms lose revenue if they are unable to meet demand. Conversely, spare production capacity in weak economic situation

leads to opportunity costs in production. By contracting out, the number of workers can be promptly adjusted to the current situation, thereby providing greater flexibility in personnel policy to the firm.

Second, outsourcing processes can aim at reducing production costs. This may relate both to the reduction of costs of work organization, which increase, for example, for personnel management and coordination, and to wage costs. The reduction of labor costs through outsourcing is possible when the external provision of services is cheaper than the labor costs which would incur in the case of internal production due to different wage levels (i.e. collective bargaining).

Third, the introduction of new technologies in the firm can involve high investment costs. Especially when special services or specialists are only needed temporarily. Cost-intensive investments in the firm can be avoided by outsourcing processes to other firms that have specialized in certain services or technologies. On the other hand, adapting technical innovations in a firm (especially in the field of digital information and communication technologies) facilitate outsourcing (Acemoglu et al., 2010; Abramovsky and Griffith, 2006; Bartel et al., 2014). In particular, the increased implementation of information and communication technologies reduces transaction costs (adjustment costs, monitoring costs, search costs) related to contracting out (Williamson, 2010). In addition to the working conditions of contract workers, the working conditions of remaining employees in the client firm may also change when processes are outsourced. For example, Cortes and Salvatori (2016) show for the UK that increased outsourcing of processes which require cognitive skills leads to increased specialization at the job level. A study by Crinò (2010) concludes for the US labor market that outsourcing services to external firms increases employment in occupations with a high qualification level.

3 Contracting out in German Firms

For our analyses we use own survey information and additional information from administrative records. In order to investigate the prevalence and intensity of contracting out, we conducted computer-assisted telephone interviews with managers, personnel managers or heads of purchasing departments in 8.457 German firms with at least one dependent employee. The interview resulted in a representative dataset with information about contracting out practices of firms based in Germany. These data allow us to investigate the reasons, organizational procedures and working conditions associated with contracts for work and services.

The first part of the questionnaire (basic module) collects standard firm characteristics as well as basic information on the prevalence of domestic outsourcing. The firms are asked whether certain processes exist in the company, and if so, whether they outsource each of them completely, partially or not at all.

If at least one process is partially outsourced, the interview proceeds with its second part (in-depth module) which focusses on the entrepreneurial rationale behind contracting out and the working conditions of contract workers. While all firms completed the basic module, access to the in-depth module was randomized according to the firm's outsourcing pattern collected in the basic module.

For this purpose, the processes mentioned in the basic module were divided into core and support business functions. Core processes can be defined as activities that contribute directly to the added value of the company, i.e. the production of a good or the provision of a service. In contrast, supporting processes are auxiliary activities that only indirectly contribute to value added. Hence, the entrepreneurial rationale may differ between core and support business functions, and in order to increase reliability of answers, respondents were primed to think about only one of their outsourcing processes.

In order to investigate the working conditions of contract workers, firms were asked specifically about whether the outsourced process is carried out on their own firm's premises (onsite contracting out). Only in this case, we asked them to assess the working conditions of contract workers as this onsite situation allows to make a direct comparison.

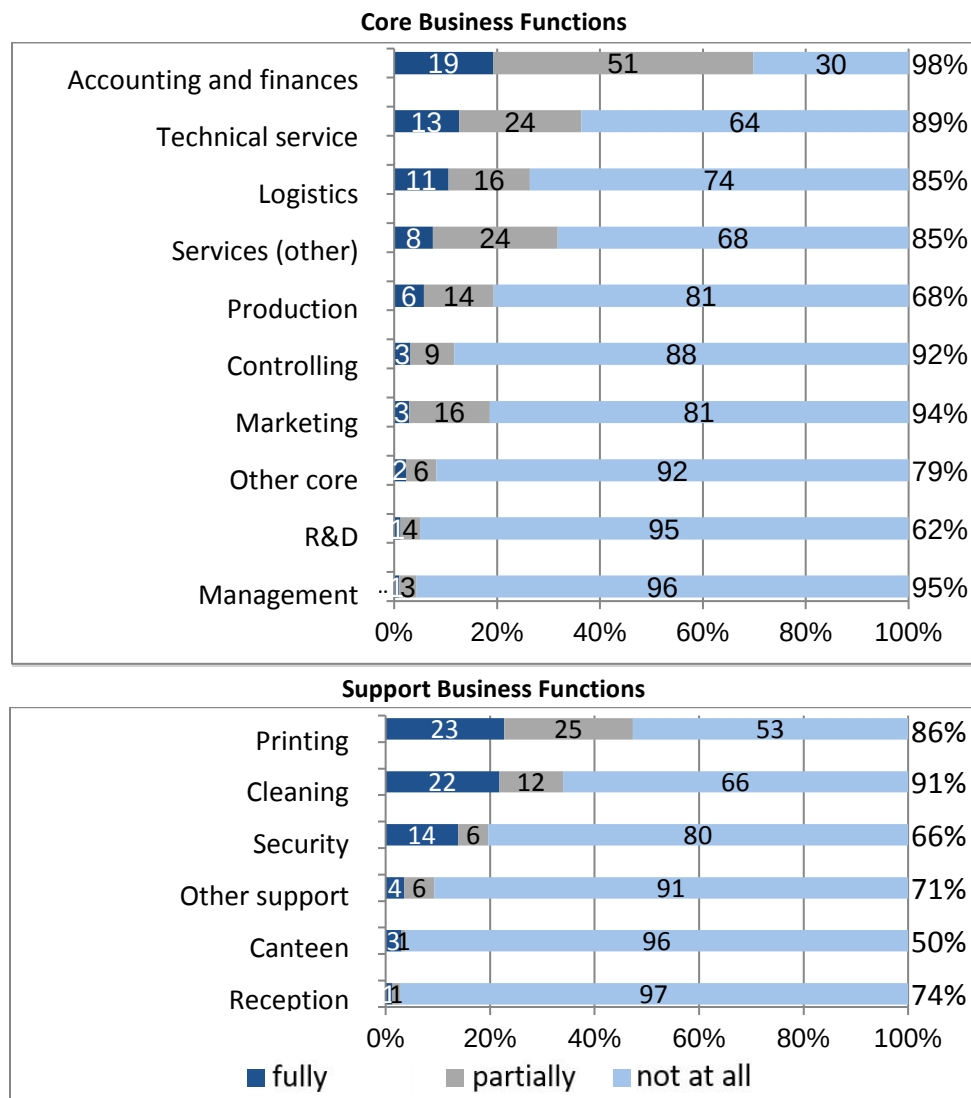
For the main analysis we add information on the level of labor market regions from the INKAR database. This database is provided by the Federal Institute for Research on Building, Urban Affairs and Spatial Development and contains various regional indicators. To construct specialization rates of industries we use the SIAB data, the Sample of Integrated Labour Market Biographies which is provided by the Institute for Employment Research (IAB). Regional Herfindahl-Indices are calculated based on the Mannheim Enterprise Panel (MUP). This dataset provided by ZEW contains the universe of economically active firms in Germany with their revenues, which allow us to calculate market concentration indicators. The survey data was collected in 2016⁶. We use information from other databases for the same year or the nearest year available.

Using our new survey data, we are able to give a comprehensive overview of contracting out by German firms. The extent to which German firms use contracts for work and services is vast, as 91% of firms contract out parts of their business functions at least partially. More than half of them contract out core as well as support business functions.

There is however heterogeneity in contracting out when looking at the different processes. Figure 1 depicts how often different processes are contracted out fully, partially or not at all, given that they exist in the firm (percentages denoted on the right side to the bars). A process that is existing in nearly all firms is accounting and finances (98%). Only 30% provide this process internally, 51% contract it out partially and 19% report full outsourcing of this process. R&D on the other hand is a process that exists only in 62% of the firms and 95% of them declare it not to be outsourced at all. Hence, there are huge differences in outsourcing rates of the various processes, both in core and support business functions.

⁶ For a detailed discussion on the underlying contact database, stratification, representatives and the questionnaire, please refer to the underlying report.

Figure 1 - Share of Firms Contracting Out Processes fully, partially or not at all



Own calculations based on survey data, N=8.457. Percentages on the right side to the bars indicate the share of firms which report the specific business function to be existing. Remaining numbers within each bar sum up to 100 and refer to the shares of firms that contract out fully, partially or not at all a specific business function, given that the process exists.

If firms outsource any core business function, 55% declare that at least some of the work is done by contract workers working on the firm's premises. Hence, given that firms outsource at least one process, more than half of them have experience with on-site contract work. Behind this average rate of on-site contract work there is heterogeneity with regards to firm characteristics. Whilst some industries such as the hospitality sector have a higher on-site rate, other industries such as the health care sector, are below average. Further, on-site contracting out is more prevalent in medium sized to large firms as well as in firms with a works council. Contracting out processes on-site is of particular

interest, as it enables a direct comparison of the core workforce to the contract workers and improves assessability of the working conditions of contract worker.

Table 1 - Share of client firms using onsite contract work, by firm characteristics

Firm characteristics	On-site-Rate
Sector	
Manufacturing	57
Construction	54
Commerce; Maintenance and repair of vehicles	53
Logistics	52
Hospitality	68
Information and Communication -J	50
Finance and InsuranceK	55
Freelance, Scientific and Engineering Services	54
Other Economic Services	59
Health Care	47
Arts, Entertainment and Recreation	69
Other Services	62
Firm size	
< 20 employees	54
20 to 49 employees	63
50 to 249 employees	70
> 250 employees	63
Firm has works council	
Yes	79
No	54
Total average	55

Own calculations based on survey data, N=7.865. Percentages indicate the share of firms that report that work of their outsourced business functions is at least partially provided on their firm's premises.

4 Heterogeneity in Working Conditions of On-Site Contract Work

In the first part of the analysis, we use direct assessments to check whether the working conditions of contract workers are generally worse than those of comparable core employees. We asked managers, personnel managers or heads of purchasing departments to assess whether the working conditions of contract workers are “better”, “equal” or “worse” when comparing them with the counterfactual worker employed at their firm. In addition to the level of wages that we use for the further analyses, the working conditions covered include a number of other features, such as the existence of a collective agreement, a works council, voluntary benefits from the employer or access to further training.

Given that respondents are asked to assess working conditions of employees from a firm other than their own, whose – by the nature of contracting out – knowledge cannot be taken as granted, the share of more than 60% of responses is fairly high. We code the variable such that it is equal to 1 if working conditions for contract workers are better, and 0 otherwise⁷.

As the variable implicitly includes the comparison to a counterfactual worker at the own firm, it is necessary to control for the firm baseline in working conditions. This baseline represents the cost for the internal provision of the service for which we control by including a set of firm characteristics, such as firm size, sector, and whether the firm is subject to a collective agreement or pays above collective agreement (high paying firm), has a works council and faces high competition.

Specifically, we estimate

$$WorkingCond_i = \alpha ProcessType_i + \gamma_1 X_i + u_i$$

where $WorkingCond_i$ is a dummy variable indicating that the working conditions of contract workers are better than if the process were done in-house. In order to capture the costs for an internal provision of the service we include a set of firm controls X_i , such as firm size, sector, and whether the firm is subject to a collective agreement or even pays above collective agreement. We also include information on the types of processes which are contracted out and are interested in their impact on working conditions, hence α .

The entrepreneurial rationale for contracting out may differ between core and support business functions as they contribute diversely to the value chain of a firm. While core processes contribute directly to the added value of the company, i.e. the production of a good or the provision of a service, supporting processes are auxiliary activities that only indirectly contribute to value added. Existing studies that find negative wage effects of outsourcing, focus on occupations in food, cleaning, security and logistics (FCSL) (see Goldschmidt and Schmieder (2017) and Dube and Kaplan (2010)). Apart from logistics, these occupations cover processes which can be assigned to support business functions. In column 1 of Table 2 we include a variable indicating whether a specific process is a core business function. The coefficient indicates a higher probability of observing better working conditions once the process is considered to be at the core business of the firm. Interpreting the coefficient for the baseline category of support business functions indicates that contract workers in auxiliary processes have a lower probability to be better off when outsourced and would have higher wages if they were directly employed by the client firm. This is in line with the results by Dube and Kaplan (2010) who find a wage penalty for outsourced workers ranging from 4% to 24% in the US and Goldschmidt and Schmieder (2017) who estimate a reduction of wages by 10% to 15% in Germany.

⁷ 0 includes “equal”, “worse”, and “I don’t know”, while refusals are coded as missing. We change this definition for further robustness checks and recode “I don’t know” from 0 to be missing. This decreases the number of observations, but does not affect estimation results.

Table 2 – Effect of core business functions on working conditions

<i>Dep. var: working conditions (wages) for outsourced workers are better</i>	(1)	(2)	(3)
<i>core business function</i> (Base category: supportive business function)	0.157***	0.157***	0.155***
<u><i>Client firm controls:</i></u>			
<i>firm is subject to collective agreement</i>		0.021	0.021
<i>firms has works council</i>		0.030	0.031
<i>firm pays above collective agreement</i>		-0.047*	-0.050**
<i>firm faces high competition</i>		0.036*	0.035
<u><i>Client firm size:</i></u>			
(Base category: 50 to 249 employees)			
<20 employees		0.066**	0.055*
20 to 49 employees		0.009	0.001
>250 employees		-0.005	-0.001
<u><i>Sectors of client firm:</i></u>			
(Base category: ICT, finance and insurance)			
<i>manufacturing</i>			-0.030
<i>construction</i>			-0.023
<i>commerce, logistics, hospitality</i>			0.042
<i>freelance, scientific and engineer. services</i>			-0.039
<i>other services</i>			0.063
<i>Constant</i>	0.046***	-0.014	-0.006
<i>R-Square</i>	0.043	0.055	0.067
<i>N</i>	1081	1081	1081

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$, Linear Probability Model

On the other hand, contract workers who are substituting parts of the firm's core business seem to be better off being outsourced rather than directly employed. This suggests that the negative results for FCSL services may not be valid when extended to outsourcing of other processes.

In column 2 of Table 2 we add firm controls and see that if a firm pays above collective agreement and hence has a relatively high wage level, it has a lower probability of reporting even better working conditions for the contract workers. On the contrary, small firms which usually have a lower wage level, show a higher probability of reporting better wages for contract workers than medium sized firms. Hence, when comparing the contract worker with a counterfactual own employee, the characteristics of the own firm play a role and need to be controlled for. The coefficient for the core business indicator does not change in magnitude nor significance also when controlling for sector fixed effects (Column 3).

To examine the process level more in detail, the next step is to include dummy variables for each process separately and including no constant in order to estimate coefficients for all processes without a baseline comparison. Column 1 in Table 3 shows heterogeneous effects for the different

processes. If R&D – one of the main strategic core business functions – is outsourced, we observe a higher probability that contract workers have higher wages than if they were directly employed by the client firm. Only core processes show a significant higher probability for higher wages of contract workers, while for support business functions there is no indication of higher wages. Given that previous studies find negative wage effects, we recode the dependent variable to be one if firms report that contract workers have worse working conditions and zero if working conditions are equal or better. Accordingly, column 2 in Table 3 reports the probability that firms report lower wages of each process. In line with the literature, the support business functions cleaning, security and the core business function logistics show significant coefficients with a relatively high magnitude thereby indicating lower wages of contract workers. The fourth FCSL service, outsourcing the canteen, shows no significant difference.

Table 3 – Individual business functions and working conditions

<i>Dep. var: working conditions (wages) for outsourced workers are...</i>	<i>better</i>	<i>worse</i>
<i>R&D - core</i>	0.394***	-0.017
<i>production - core</i>	0.016	0.210***
<i>management - core</i>	0.437**	-0.033
<i>accounting and finances - core</i>	0.175***	0.055
<i>controlling - core</i>	0.271***	0.053
<i>marketing - core</i>	0.128	0.069
<i>technical service - core</i>	0.172***	0.077**
<i>services (other) – core</i>	0.147***	0.095*
<i>logistics - core</i>	-0.003	0.132**
<i>other - core</i>	0.110	0.165
<i>canteen - support</i>	0.190	0.184
<i>cleaning - support</i>	-0.039	0.344***
<i>security - support</i>	-0.033	0.225***
<i>printing - support</i>	0.035	0.158***
<i>reception - support</i>	0.197	0.204
<i>other - support</i>	-0.022	0.088
<u><i>Client firm controls</i></u>	Yes	Yes
<u><i>Client Sectors FE</i></u>	Yes	Yes
<i>R-Square</i>	0.240	0.269
<i>N</i>	1081	1081

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$, Linear Probability Model without constant

The observed heterogeneities on the process level are not strictly definable to core or support business functions. Since contract workers in production are also more likely to have lower wages, our differentiation of processes into core and support may not fully capture some underlying explanation. Considering the occupations in those processes that are attributed to more negative working conditions, it seems that these are mainly manual tasks. Testing whether the task structure can explain some variation in working conditions is future work for this paper.

Comparing our results to the existing literature, we can contribute in various ways. We have direct measure of contracting out incidences and do not have to rely on indirect proxies for outsourcing. We can extend the analysis to outsourcing of a variety of business functions as compared to just a few specific support business functions. The negative effects on wages that we find in our analysis for support business functions are in line with the existing studies on outsourcing.

5 The Impact of Competition among Contracting Firms on Working Conditions

In the third part of the analysis, we examine further explanatory factors for differences in the working conditions of contract workers compared to the situation in which the same person would be directly employed by the contracting firm. Contracting out as the result of a make-or-buy decision, will be observed if its costs are less than in the case of providing the service internally. The costs of contract work are determined by its prices. Our core conceptual argument is that prices for contract work are set on a market for contract work and that the price of contract work reflects the working conditions of the worker providing the contracted service. As a result, the price for contract work and therefore the working conditions of contract workers will depend on the costs of internal service provision in the client firm and the degree of competition between the contracting firms.

The difference in costs between producing a product or service internally or externally is therefore determined by the market structure for external service provision. If firms that offer contract work are highly specialized, the result is a supply monopoly. Employees in these firms should therefore have better working conditions compared to the situation in which they perform the same activity as part of the core workforce of the non-specialized client. Conversely, a monopsony situation can arise if contractors only have a few customers. This market situation can lead to an adjustment of the working conditions by competing contractors, so that, for example, the wages of the employees in the contracting firm are lower than they would be if they were directly employed by the client.

Hence, if many contracting firms compete for a service contract, prices will be lower and thus working conditions will be worse, *ceteris paribus*, compared to the case where there is a monopoly of one contracting firm.

We construct a competition index H_{rp} for a certain process p in region r by weighting sector s 's Herfindahl-Index in region r with the specialization measure that sector s has for a certain process p : $H_{rp} = \sum_1^S H_{rs} * w_{sp}$. Where the specialization measure is calculated as the share of employees in a sector that work in occupations which we defined to be specialized for a certain process heuristically, $w_{sp} = \frac{N_{sp}}{N_s}$ (see also Appendix).

In order to examine to what extent the working conditions of the contract workers depend on the market structure among contractors we estimate the following baseline model

$$WorkingCond_i = \theta H_{rp} + \gamma_1 X_i + \gamma_2 X_r + u_i$$

where $WorkingCond_i$ again is a dummy variable indicating that the working conditions of contract workers are better than if the process were done in-house. H_{rp} is an indicator for the competition (Herfindahl-Index) between contractors providing process p in region r . H_{rp} ranges from 0 to 1 and is decreasing in competition. Hence, a low value indicates high competition, a high value low to no competition. In order to capture the costs for an internal provision of the service we again include a set of firm controls X_i . As we exploit regional variation in firm competition we include further region specific controls X_r , such as the share of unemployed individuals, GDP per capita, rural vs. urban.

The coefficient of interest is θ , the effect of the regional competition between contracting firms on the working conditions of contract workers. The results of the baseline estimation can be found in column 1 of Table 2 Table 3. We find that firms are more likely to report better working conditions for contract workers when the regional competition among contractors is lower. If competition decreases by one standard deviation, the probability for higher wages in contract work increases by 2.8 percentage points. This result supports our hypothesis that higher competition involves lower wages for contract workers. This effect remains constant in magnitude and significance when including firm and sector fixed effects (Column 2) as well as regional control variables (Column 3).

Table 4 – Effect of competition on working conditions

<i>Dep. var: working conditions (wages) for outsourced workers are better</i>	(1)	(2)	(3)	(4)	(5)
<i>regional HHI</i>	0.327**	0.320**	0.282**	-0.200	0.076
<i>(decreasing in competition)</i>	(0.135)	(0.134)	(0.138)	(0.124)	(0.242)
<i>core business fct.</i>				-0.004	
				(0.077)	
<i>core business fct.</i>				0.493**	
<i># regional HHI</i>				(0.232)	
<i>non_tradeable</i>					-0.207**
					(0.088)
<i>non_tradeable=1</i>					0.551*
<i># regional HHI</i>					(0.284)
<i>Client firm controls:</i>					
<i>firm is subject to CA</i>		0.019	0.017	0.011	0.017
		(0.025)	(0.025)	(0.025)	(0.025)
<i>firms has works council</i>		0.023	0.021	0.023	0.026
		(0.021)	(0.021)	(0.020)	(0.021)
<i>firm pays above CA</i>		-0.038	-0.042*	-0.050**	-0.043**
		(0.025)	(0.025)	(0.025)	(0.025)
<i>firm faces high competition</i>		0.022	0.023	0.025	0.025
		(0.023)	(0.023)	(0.022)	(0.023)
<i>Regional controls:</i>					
<i>urban region</i>			0.024	0.004	0.016

			(0.029)	(0.028)	(0.029)
<i>GDPpc</i>			-0.002**	-0.002**	-0.002**
			(0.001)	(0.001)	(0.001)
<i>unemployment rate</i>			0.003	0.004	0.003
			(0.006)	(0.006)	(0.006)
<i>open positions per unemployed</i>			0.003*	0.003*	0.003*
			(0.002)	(0.002)	(0.002)
<i>Client Firmsize dummies</i>	No	Yes	Yes	Yes	Yes
<i>Client Sector dummies</i>	No	Yes	Yes	Yes	Yes
<i>Constant</i>	-0.041	-0.023	0.041	-0.109	0.179
	(0.042)	(0.096)	(0.097)	(0.093)	(0.120)
<i>R-Square</i>	0.007	0.032	0.040	0.080	0.047
<i>N</i>	957	957	957	957	957

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$, Linear Probability Model

As shown in the previous section, working conditions also depend on the type of outsourced process. In order to test whether competition affects core processes differently than support businesses, we include this process-specific variable as X_p to the model and estimate

$$WorkingCond_i = \theta H_{rp} + \beta X_p H_{rp} + \gamma_1 X_i + \gamma_2 X_r + u_i$$

Column 4 in Table 3 includes the indicator for core business functions from the previous section interacted with the regional competition index. This allows to test whether competition differently affects working conditions for core vs. support business functions. The coefficient of 0.453 is marginally significant and, considering the coefficients of the main terms, indicates that the probability of observing better working conditions is increasing when competition decreases for outsourced core business functions. A decrease in competition of one standard deviation increases the probability for better working conditions by 2.9 percentage points.

Regional competition should be of high relevance especially for non-tradeable processes. By definition, outsourcing of such processes relies heavily on local contractors, thereby stressing the regional dimension. Hence, for non-tradeable business functions the regional competition among contracting firms should have an even higher effect on determining the working conditions of contract workers. We therefore include an indicator for whether the process is non-tradeable and interact it with the regional competition index in Column 5. The coefficient on the interaction term is 0.551 and significant at the 5% percent level. A one standard deviation decrease in competition increases the probability to observe better working conditions for contract workers by 7.1 percentage points if a process is non-tradeable. The results suggest that outsourcing in regions with high competition among contractors increases the probability of observing worse working conditions for contract workers especially for non-tradeable processes.

In summary, decreasing competition leads to an increase in the probability of better working conditions of contract workers. This supports our hypothesis that higher competition involves lower wages for contract workers and vice versa. The effects are intensified by the types of processes that

are contracted out. Contract workers in core businesses have better chances for higher wages if competition declines. Especially workers in non-tradeable processes gain from a decline in regional competition.

6 Conclusion

Empirical studies on the consequences of contracting out for labor markets are very rare. This has mostly to do with the demanding data requirements in this field. Nevertheless, contracting out, and especially the increase in outsourcing decisions of firms, are publicly debated. The major concern is that working conditions of contract workers are systematically worse than they would be in the situation when directly employed in the client firm. It is presumed that, in particular, workers at the bottom of the wage distribution are affected by firms' increasing outsourcing activities which will then lead to increasing labor market inequality. This paper sheds light on this debate by investigating how bad working conditions are for contract workers. We therefore provide a theoretical framework on wage determination in a setting of contracting out is taking place. We then first describe how diverse working conditions in different parts of the contract work sector are. Second, we investigate the importance of competition in the contract work market for working conditions.

Contracting out is a firm-based make-or-buy decision which is made on the level of business functions. Whether a firm contracts out services in a business function, or the entire business function, depends on the price for contract work in that business function and on the costs of providing the service internally. In order to empirically investigate whether the conditions in the contract work markets translate into differences in working conditions of contract workers, we base our analysis on firm level data and on information on the level of business functions. Besides firm characteristics which identify the costs of internal service provision, we, in particular use, regional information on the level of competition between contracting firms providing services for a specific business function.

Our empirical results show, first that the business function for which the contracted service is provided is an important source of variation in contract workers' working conditions. Studies on the working conditions of contract workers which base their analysis only on a specific set of business functions might therefore overlook some of the variation in working conditions. Existing studies have so far only studied contract work in the lower part of the wage distribution. However, especially for policy conclusions concerning wage inequality, it is also important to incorporate the impact of contracting out at higher parts of the wage distribution.

The importance of business functions is also documented regarding the influence of the contract work market structure on working conditions. The higher the competition among contracting firms the worse the working conditions for contract worker are, which holds especially in the case of core business functions. Conceptualizing contracting out activities as a way of labor division between firms, the degree of competition on contract work markets might reflect the degree of specialization of these markets. In a coming analysis we will therefore investigate whether the degree of skill specialization in certain contract work markets has an impact on working conditions.

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Appendix

A 1: Constructing the competition index

For constructing the competition index, we use the Herfindahl index which is a measure of the size of firms related to the industry. Increases in the index indicate an increase in market power and a decrease in competition. It ranges from 0 to 1, where 1 is a single monopolistic producer or provider of services within an industry. Our Herfindahl index is calculated based on the Mannheim Enterprise Panel (MUP). This dataset provided by ZEW contains the universe of economically active firms in Germany with their revenues and firm location, which allows us to calculate regional market concentration indicators on sectoral level, H_{rs} . Specifically, we calculate the Herfindahl index for 3 and 4 digit industries, separately for all 141 labor market regions in Germany (Kosfeld and Werner, 2012). In order to transfer the sectoral information to process-specific information, p , we follow two steps:

Step 1: Allocating occupations to business functions

We heuristically assign occupations to business function, driven by the question “Can this occupation provide goods or services related to one of our specific business functions?”. We therefore link each process to those occupations which are most likely to be involved, if this business function is contracted out. This allocation step is performed by four different researchers, which allows us to later check the relevance of the established relations. We use 3-digit occupations from the KldB 1988.

Step 2: Identifying specialized industries

Using the assigned occupations from Step 1, we can calculate the share of employees within each sector who work in occupations specialized to provide process p . This share can be interpreted as a measure of how specialized sector s workforce is to provide process p and is calculated the following way: $w_{sp} = \frac{N_{sp}}{N_s}$. To construct specialization rates of industries we use the SIAB data, the Sample of Integrated Labour Market Biographies which is provided by the Institute for Employment Research (IAB). Given that we have four different assignments in step 1, we also have four resulting specialization measures, which we can use for robustness checks.

Step 3: transfer sectoral competition to process-specific competition

In the last step we use the specialization measure of sector s for providing process p from step 2, w_{sp} , to weight the sectors' regional Herfindahl indices. Summing over all sectors provides us with a regional competition index for the provision of process p , $H_{rp} = \sum_1^S H_{rs} * w_{sp}$. Herfindahl indices of sectors that are highly specialized in the provision of process p have a higher weight in the overall competition index for this specific process.

Given that we have four different specialization measures deriving from the first heuristic part in constructing the competition index, we also have four different classifications of the regional

competition index for each process. We then merge this indicator to our survey data, using the firm location and information on the specific process which is contracted out on the firm's premises.

Figure 2 displays the competition indicators, separately for core and support business functions. T-testing reveals no significant differences in means between core and support business functions, but competition in support business functions has a higher variance than in core business functions.

The ranking of firms according to the competition index in their outsourced process can be considered stable over the four heuristic allocations. Spearman correlation coefficients are between 0.6424 and 0.9665 indicating a strong to very strong rank perseverance.

Figure 2- regional competition index (HHI) pooled for all processes, according to 4 different classifications, calculated on 3-digit industry codes (Panel A) and on 4-digit industry codes (Panel B)

