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Agar Brugiavini

The impact of domestic outsourcing on wages: Mechanisms and evidence from Italian Administrative data

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The impact of domestic outsourcing on wages: mechanisms and evidence from Italian Administrative data *

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Abstract

This paper contributes to the literature on the wage effects of domestic outsourcing. Building on Goldschmidt and Schmieder (2017), we define outsourcing events as the transfer of workers from a parent company to a subsidiary firm acting in certain sectors, where the subsidiary provides labour services to the parent or other clients. Our analysis extends beyond the traditionally studied sectors – logistics, cleaning, security, and food services - and cover also knowledge-intensive services, such as IT, consulting and advertising since domestic outsourcing spans along the entire productive structure. By exploiting employer-employee matched administrative data on the private sector in Italy for the 2010-2019 period, we focus on matched pairs of outsourced and in-house workers and estimate a set of two-way fixed-effects models, finding that outsourced workers experience significant wage penalties after the outsourcing event. Furthermore, carrying out AKM regression, we find that, unlike in-house workers, outsourced employees do not appear to benefit from firms' rent-sharing. Finally, we observe that both the extensive – being employed or not – and the intensive (weeks worked per year) margins partially explain the wage penalties associated with domestic outsourcing.

Keywords:

Domestic outsourcing, wages, labour market margins, collective bargaining, Italian labour market

JEL codes

J31, J53, L24

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L'impatto dell'outsourcing domestico sui salari: meccanismi e evidenze dai dati amministrativi italiani[1]

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Abstract

Questo articolo contribuisce alla letteratura sugli effetti salariali dell'outsourcing domestico. Basandoci su Goldschmidt e Schmieder (2017), definiamo gli eventi di outsourcing come il trasferimento di lavoratori da un'azienda madre a un'impresa controllata che opera in determinati settori, dove la controllata fornisce servizi di manodopera alla madre o ad altri clienti. La nostra analisi si estende oltre i settori tradizionalmente studiati – logistica, pulizie, vigilanza e servizi di ristorazione collettiva – e copre anche i servizi a forte intensità di conoscenza, come IT, consulenza e pubblicità, poiché l'outsourcing domestico si estende lungo l'intera struttura produttiva. Utilizzando dati amministrativi che abbinano lavoratori e datori di lavoro nel settore privato italiano per il periodo 2010-2019, ci concentriamo su coppie abbinate di lavoratori esternalizzati e interni e stimiamo una serie di modelli a effetti fissi bidirezionali, rilevando che i lavoratori esternalizzati subiscono penalità salariali significative dopo l'evento di outsourcing. Inoltre, effettuando una regressione AKM, scopriamo che, a differenza dei lavoratori interni, quelli esternalizzati non sembrano beneficiare della ripartizione degli extra-profitti (rent-sharing) da parte delle imprese. Infine, osserviamo che sia il margine estensivo – essere o meno occupati – sia quello intensivo (settimane lavorate all'anno) spiegano in parte le penalità salariali associate all'outsourcing domestico.

Parole chiave:

Outsourcing domestico, salari, margini del mercato del lavoro, contrattazione collettiva, mercato del lavoro italiano

Codici JEL

J31, J53, L24

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1 Introduction

Domestic outsourcing is a central feature of the contemporary organisation of production, characterised by the fragmentation of production activities and of the workforce performing those tasks. Rather than internalising all stages of production, the leading firm opts to subcontract activities from the market, procuring them from either specialised firms or autonomous workers (Weil 2014). Within this context, labour input employed by the outsourced firm contributes to the final production of the leading firms.

Traditionally, in the economic literature, the choice to rely on subcontracting has been supported on the premises of a Coasian perspective (Coase 1937) and relative comparative advantages: the leading firm may decide to outsource ancillary functions while focusing internally on core ones. Importantly, coordination costs and asymmetric information on the content and cost of activities have shrank thanks to ICT pervasiveness.

Nonetheless, low attention has been paid to the effects of such practices on work and employment, even if some recent contributions in sociology of work and labour economics have dealt with such effects of outsourcing. The available evidence agrees on the negative relationship between outsourcing and working conditions, both in terms of labour compensation (e.g., Dube and Kaplan 2010; Fana, Giangregorio, and Villani 2024; Goldschmidt and Schmieder 2017; Goos et al. 2025; Weil 2014) and non-pecuniary aspects of job quality (Battistelli and Campanella 2020; Doellgast and Pannini 2015; Flecker 2010; Mori 2017).

Consistent with such growing strand of the literature, this paper provides new evidence of the wage penalty due to outsourcing events, exploiting longitudinal administrative employer-employee data covering the universe of firms and workers employed in the private sector in Italy, provided by the VisitINPS program.[1] The matched employer-employee data allow us to apply - and expand - the Goldschmidt and Schmieder (2017) approach for the identification of outsourced workers. To improve the precision of the wage penalty estimates and avoid possible selection bias, we consider matched pairs of outsourced and in-house workers and estimate a set of standard two-way fixed-effects and corresponding event-study specifications. Lastly, to understand whether the wage penalties are a specific

[1] See for details the website: https://www.inps.it/it/it/dati-e-bilanci/attivit–di-ricerca/programma-visitinps-scholars.html.

feature of some particular low-productive and low-paying firms, we follow Goldschmidt and Schmieder (2017) and Drenik et al. (2023) and estimate firms and workers fixed effects using AKM model (Abowd, Kramarz, and Margolis 1999).

We contribute to the literature from various perspectives. First, we provide new evidence of worker-level wage effects of domestic outsourcing in Italy, extending and complementing the analyses by Daruich et al. (2024), based on a stricter definition of outsourcing – business unit transfer as the reason of job separation – which differs from that adopted in this paper following Goldschmidt and Schmieder (2017).

As a second main novelty of our study, we provide estimates of the outsourcing wage penalty by broadening the focus of the analysis beyond traditionally low value added sectors (food, cleaning, logistics, security; henceforth FCLS). As a matter of fact, professional services such as IT, engineering, advertising, accounting are widely outsourced but often neglected from the analysis as if outsourcing pertained only low support activities. Furthermore, we present other layers of heterogeneity, namely worker's gender and experience.

The further original contribution of this paper is to provide evidence on three main channels through which the wage penalty associated with outsourcing arises: adjustments along the intensive and the extensive labour market margins (while Daruich et al. (2024) only considered the role played by the extensive margin), as well as the application of "weaker" collective bargaining agreements following the outsourcing event. To the latter purpose, we define a list of weak CBAs using the national archive of Italian CBAs.

Focusing on the Italian case is relevant since productive fragmentation in Italy has a long lasting tradition. Here subcontracting has historical roots and has often been used as a mechanism to maintain competitiveness and reduce labour costs by worsening monetary and non-pecuniary working conditions of outsourced workers. During the early decades of the Republic (i.e., after the end of the Second World War), work arrangements such as home-based women's labour served as a way to lower production costs and absorb labour without strengthening in-house employment structures (Betti 2024; Reyneri 2017). From the 1960s and 1970s fragmentation was also leveraged to limit the organisational

power of the industrial workforce in response to strong union mobilisation (Bologna 2023; Locke 1990). From the 1990s onward, the regulatory and policy environment increasingly institutionalised and incentivised subcontracting practices. For instance, the wage policy embedded in the "1993 agreements" between firms' associations and trade unions limited nominal adjustments to second-level (i.e., firm-level) bargaining. This effectively tied wage growth to direct employment relationships, reducing incentives to maintain in-house less productive salaried staff. This trend continued with the liberalisation of temporary work agencies in 1997 (through the so-called *Pacchetto Treu*) and was further supported by the so-called *Legge Biagi* (D.Lgs. 276/2003), which simplified the legal framework for outsourcing and the use of external contractors (Battistelli and Campanella 2020). Together, these developments created a legal and institutional environment that eased widespread outsourcing and fragmentation of production, shaping the contemporary Italian labour market.

According to figures provided by the Italian Statistical Institute (ISTAT 2015; ISTAT 2019), around two-thirds of Italian manufacturing firms contract out legal, accounting, and financial services from external providers; half of them declares a substantial reliance on outsourcing for transport, distribution, and warehousing services and about 41% report outsourcing ICT services. The 2010 annual report by the *International Facility Management Association* (IFMA Italia — Centro Studi 2010) refers to around 566,000 workers employed in outsourced sectors already in 2010. The available evidence suggests that also in the Italian case the recent liberalisation of outsourcing practices led to a worsening of the working conditions of affected workers (Daruich et al. 2024; Dorigatti and Mori 2016).

In line with relevant literature (e.g., Daruich et al. 2024; Drenik et al. 2023; Dube and Kaplan 2010; Fana, Giangregorio, and Villani 2024; Goldschmidt and Schmieder 2017; Goos et al. 2025), we find an overall annual penalty of approximately 12%, mostly affecting workers employed in Low knowledge Intensive services after the outsourcing event. Outsourcing wage penalties do not differ by male and female workers, but younger workers are stronger affected, with around 3 percentage points additional penalty. Overall, we find that the the outsourcing wage gap is driven by both a reduction in unitary wages (i.e., full-time equivalent weekly wages) and labour market intensity since outsourced workers

tend to be employed fewer hours. In addition, as concerns the extensive margin, we find that they are characterised by higher unemployment risk (i.e., by the risk of spending a whole year without an employment spell in the private sector after the outsourcing event). A further mechanism driving the wage penalty is related to collective bargaining power, since we find that, after outsourcing, workers tend to be employed under weaker collective contracts.

Lastly, we observe that outsourced workers do not enjoy any firm-pay premia, differently to in-house workers, and this is true along the entire productivity distribution. In other words, relating outsourced and in-house firm fixed-effects, we find that outsourced workers are paid the competitive price, suggesting Italian firms rely on outsourcing to avoid sharing rents and, thus, cutting labour costs.

The remaining of the paper is structured as follows. Section 2 discusses the definition of outsourcing adopted in this paper; Section 3 presents the data sources and relevant descriptive evidence; Section 4 defines the econometric strategy, and Section 5 presents the results of the main estimates and inquires into the mechanisms behind them. Section 6 shows AKM- based estimates of rent sharing differences between the two groups of workers. Section 7 concludes.

2 Outsourcing definitions

Domestic outsourcing relates to the organisation of production and its degree of fragmentation. It is conceptually easy to understand: it consists in firms contracting out some production activities to external providers, being them firms or autonomous workers located in the same county (Weil 2014). The phenomenon encompasses both new shifts from internal provision to external purchasing and established and ongoing practices. A firm may decide to subcontract an activity provided internally until the event. Conversely, a firm may buy from the market a given activity – part of the production process – since the beginning of her operations. Furthermore, outsourcing covers both the external provision of intermediate inputs that could otherwise be produced in-house and the outsourcing of services, which primarily involve human labour. This latter is the specific focus of the present work.

When it comes to its empirical operationalisation, domestic outsourcing presents several complexities. At the macro level, the quantification of productive fragmentation can be captured using a vertical integrated perspective across economic sectors (Pasinetti 1973). Tracing value chain embeddness at the firm level is much more complicated because information related to the acquisition of intermediate inputs, embodied labour and its composition is not often available even in administrative data sources such as balance sheet data.[2]

The renewed interest in the topic fostered the development of techniques suitable for the analysis of its effects on the labour force. Nonetheless, an avoidable trade-off occurs between the possibility to identify clear causal relationships in the empirical analyses and the comprehensive understanding of the phenomenon at hand.

Goldschmidt and Schmieder (2017) (henceforth, GS) are the first in exploiting matched employer-employee administrative data to identify outsourcing practices and their impact on wages. More precisely, they define outsourcing as the flow of workers from firm A to firm B, where the industry in which the latter operates belongs to a given list of economic activities, namely food, cleaning, logistics and security (FCSL) services. Within this setting, a worker is identified as outsourced when she belongs to a flow of workers from firm A – the predecessor – to firm B — the successor – operating in one of the FCSL sectors. The specific conditions to be met for a flow to be identified as an outsourcing event and adopted in this article are discussed more in detail in Section4.

Defining outsourcing *à la* GS only captures new outsourcing events occurring in a given period. This methodology is silent about the stock of outsourced workers already providing services to the predecessor firm or more broadly existing in the economy. Other studies, like Drenik et al. (2023), exploit an original administrative database which links information on temporary employment agency workers with the user firm. This way, authors capture all individuals outsourced and formally employed by temporary work agencies in a given period. However, also in this case, outsourcing through other channels – i.e., commercial

[2]It is noteworthy that the quantification of the phenomenon in terms of its employment dimension cannot be computed using information from established surveys like the European Union Labour Force Survey (EU-LFS). Specifically, within EU-LFS individuals are asked to report their occupation and the "the economic activity of the establishment where the work is performed" (Eurostat 2021) instead of the economic activity characterising the formal employer.

relations between firms – is excluded from the analysis. Furthermore, it has to be noted that the focus of the present paper, domestic outsourcing of labour to certain service sectors, excludes events related to the subcontracting within manufacturing sectors as well as services subcontracted internationally.

Nonetheless, regardless of the methodologies used to identify outsourcing practices (as event or broader phenomenon), as mentioned in the Introduction, literature findings point to the same direction: subcontracting is detrimental for affected workers and last several years after the event (Daruich et al. 2024).

3 Data and Descriptive Evidence

3.1 Data

We use administrative data on the universe of firms and individuals employed in Italy provided by the Italian National Social Security Institute (INPS). Specifically, we use administrative matched employer-employee data in combination with detailed information on workers education drawn from *Comunicazioni Obbligatorie* (COB- henceforth). Since this last set of information is available only from 2010, the final matched employer-employee dataset focuses on the period 2010-2019. The restriction on the time span under study enables us to avoid confounding effects due to the impact of Covid that may affect in-house and outside workers differently.

This dataset allows us to observe all employment spells in the private sector as well as individuals' transitions across firms and contractual statuses which are relevant for the identification strategy. Employment related information covers, for each employment spells occurred during the year, gross earnings, the contractual arrangement (permanent vs temporary, and part-time vs full-time), worked weeks, and full-time equivalent (FTE) worked weeks,[3]. The dataset thus allows us to compute FTE weekly wages, that is our measure of unitary wages (hourly wages are not recorded in INPS archives), and to observe individual transitions across contractual arrangements and firms, crucial to identify outsourcing events. Information also covers main socio-demographic characteristics such as gender, age,

[3]FTE worked weeks in the job spell are based on the difference between the contractual hours and the full-time working hours in the employment spell

nationality, education and occupation retrieved from the COB dataset. On the firm side, administrative data cover detailed industry code (at three-digits Nace Rev 2.2), number of employees, firm-level wage bill, and years of activity. Finally, we match social security data with balance-sheets information from the Orbis database provided by Bureau van Dijk to get annual firm's value-added.

In case of multiple worker's job spells with the same employer within the same year, we keep the spell with the highest earnings, such that we end up with one single worker-firm pair in the same year. We restrict the universe of private employees selecting all individuals who have worked at least once in firms subcontracting some productive functions to other firms between 2010 and 2019. Such a sample covers 20,277,454 workers.

Exploiting this source of data, we follow the GS approach in identifying the worker-employer pair in each year t and trace all the firm-transitions from year t to year $t+1$. As detailed in Section 4, transition flows are classified as an outsourcing flow if the destination firm operates in sectors whose main activity is to provide labour services to other firms. Consequently, workers are defined as outsourced if they are involved in this transition event whatever the sector of origin.

Unlikely GS and most of the literature, we do not restrict the analysis only to food, security, cleaning and logistics (henceforth, FSCL) activities as sector of destination. Following Fana, Giangregorio, and Villani (2024), we expand the set of industries which are potentially exposed to outsourcing, including sectors like IT or programming services. In this case, the incentive to subcontract high-tech or high-value administrative services may differ from that related to the outsourcing of FSCL activities (e.g., Bergeaud et al. 2021; Fana, Giangregorio, and Villani 2024), and outsourcing might neither necessarily nor exclusively reflect cost-cutting strategies but rather might be due to firms' efforts to expand internal capabilities by accessing specialised expertise that would be difficult to develop in-house. Table A1 in the Appendix reports the list of industries included in the outsourcing definition.

3.2 Descriptive evidence

Using the transition flow approach over the period 2010-2019, we summarises, both in absolute and relative terms, the distribution of workers employed in firms outsourcing activities between 2010 and 2019, distinguishing between in-house and outsourced ones. As reported in Table 1, the annual share of outsourced workers increases slightly over time, reaching 2.64% in 2019.

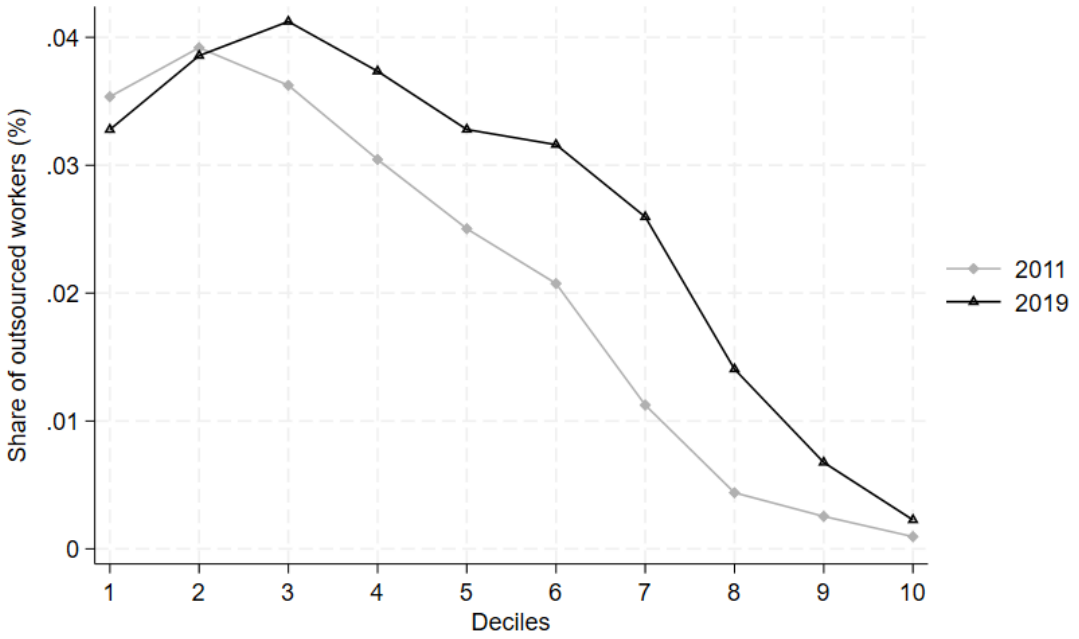
Table 1: In-house and Outsourced workers over time

Year	**In-house**		**Outsourced**		% (row)
	N.	%	N.	%	
2010	1,415,622	7.15	25,172	5.16	1.75
2011	1,785,342	9.72	37,587	8.13	2.06
2012	2,042,000	11.11	46,099	9.97	2.21
2013	2,039,567	11.10	48,725	10.53	2.33
2014	2,051,621	11.17	50,831	10.99	2.42
2015	2,083,655	11.34	52,958	11.45	2.48
2016	2,088,350	11.37	55,142	11.92	2.57
2017	2,110,032	11.48	57,638	12.46	2.66
2018	2,089,584	11.37	57,183	12.36	2.66
2019	2,083,970	11.34	56,376	12.19	2.63
Total	19,789,743	100.00	487,711	100.00	2.46

Note: Outsourced workers are defined according to the procedure detailed in Section 2. A worker is classified as outsourced if she experiences at least one transition flow during the considered period. Conversely, in-house workers are those who do not experience outsourcing events.

As expected, outsourced workers concentrate at the bottom of the wage distribution: the share of outsourced workers in bottom deciles ranges between 3 and 4% while such a share shrinks to less than 1% in top deciles (Figure 1). By overlapping the distribution of workers in 2011 with the same distribution in 2019, Figure 1 highlights that the practice of outsourcing widened at the mid and top of the wage distribution. The line in 2011 lies below the 2019 one, when a relatively higher share of workers lies around the median and top 80%. This stylised fact reinforces the choice to study outsourcing beyond traditionally low value added sectors as workers in the upper tail of the wage distribution are generally employed in high-tech services like IT, data-scientists, and consulting services, which are often subcontracted.

Figure 1: Outsourcing along the wage distribution

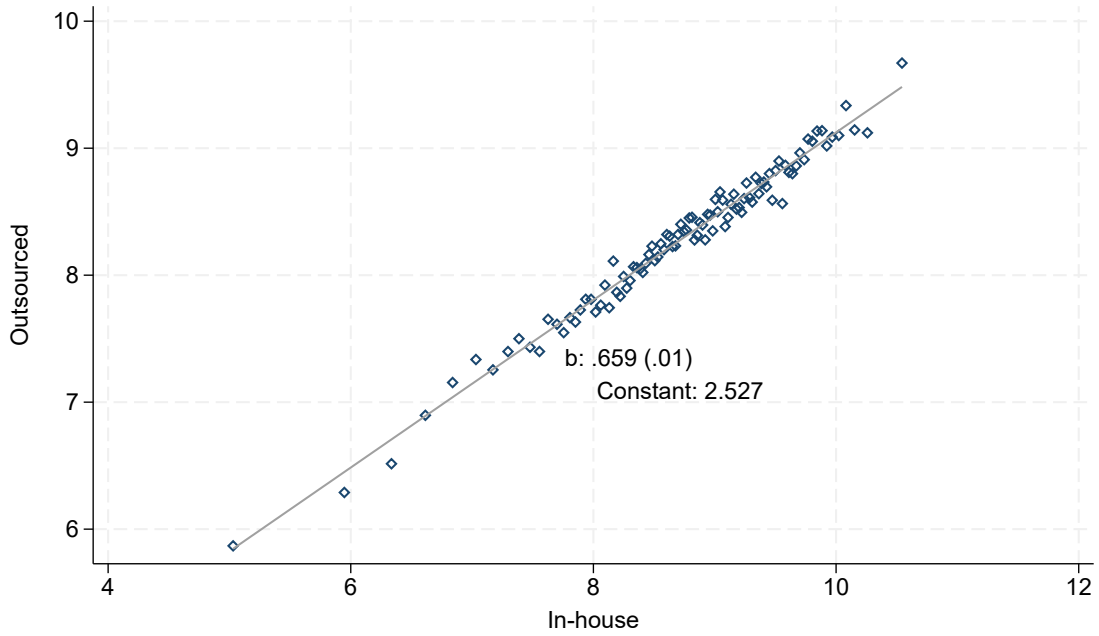


Note: The figure plots the distribution of outsourced workers (as share of total employment) along the wage distribution in 2011 (light grey) and 2019 (dark grey).

Finally, we descriptively present the correlation between workers experiencing outsourcing events and those remaining employed in-house (Figure 2). If no wage difference existed between the two groups, the slope of the fitted line should equal one. Slopes lower than one as it is in our case highlight a wage difference in favor of in-house workers. According to our data, after the event outsourced workers approximately earn on average 17,000 euros gross per year compared to 26,000 of in-house colleagues in the predecessor firm, as reported in Figure 2.[4]

[4]The corresponding weekly wage difference is 124 euros, from 495 to 371 euros.

Figure 2: Outsourced vs in-house (log) wages



Note: The figure presents a binscatter plot of the (log) annual wages of outsourced and non-outsourced workers in the year before the outsourcing event. The black line is a linear fit and each dot represents the average earnings of outsourced and in-house workers within the firm the year before the outsourcing event.

As mentioned, the outsourcing measure à la GS identifies only a specific form of subcontracting, that is through observable worker transitions from the lead firm to an external contractor. While this approach captures a subset of outsourcing activity, it likely represents only a limited part of the broader outsourcing landscape. In sectors such as legal services (69.1 NACE Rev 2.2), management consultancy (70.2), and architectural and engineering services (71.1), firms often procure specialised services directly from external providers without ever internalising them first. The same applies to business support activities, e.g., cleaning, logistics. Consequently, the event approach provides a lower bound on the spread of outsourcing in the economy.

Furthermore, firms may subcontract professional services to autonomous workers. Such form of subcontracting may have heterogeneous impacts on labour income. On the one hand, one might expect that liberal professionals do not suffer from low pay. On the other hand, instead, when the firm converts a direct employee contract into a self-employment arrangement as a form of outsourcing, the penalty may harsh whenever this conversion is adopted to reduce labour cost through fake self-employment arrangements. However,

notice that autonomous workers are not covered by our administrative database; therefore, this practice cannot be investigated in our analysis.

4 Econometric Approach

Exploiting employer-employee panel data, we estimate the causal effect of outsourcing on wages adopting a matching procedure between in-house and outsourced workers and running difference-in-differences models. After establishing that such a wage penalty exists, we investigate the underlying mechanisms – highlighting the roles played by intensive and extensive labour market margins and by contractual bargaining – and analyse its heterogeneity across several dimensions: the knowledge intensity of the destination sector, worker gender, and experience.

Identification of outsourcing events

The identification strategy is based on GS outsourcing event approach. We start by identifying all worker-employer pairs in each year t and trace all workers flows between t and $t+1$ occurring from firm A, called the *predecessor* to firm B - the *successor*. No restriction is imposed on the economic activity of the predecessor which can therefore operate within the primary sector, the manufacturing or service industries.

For a flow to be considered as an outsourcing event, few conditions must apply. First, the flow must represent less than 30% of the firm's total employment and must involve at least 10 workers. Constraining the flow not to exceed more than 30% of the workforce avoids including firm dismissal or the acquisition of a large share of its operation by other firms. Second, the flow must not lead to a shrink of more than 50% in the employment of the *predecessor*. Third, to ensure that the flow corresponds to a form of productive fragmentation, we impose that the entire flow is received by one single firm. Fourth, we require the successor firm to operate in a specific set of industries, defined at three digits level, whose core business is defined as "provision of labour services" to other firms. Finally, to guarantee that these conditions are meaningful, the population is restricted to firms employing at least 50 employees.

Differently from Goldschmidt and Schmieder (2017) and Drenik et al. (2023), we do not focus on *on site outsourcing* since we do not observe whether the successor firms provide their services to the corresponding leading firms. As already discussed, and unlikely the traditional approach *à la* GS who focused only on a set of low value added services, we extend the list of possible outsourced industries (see Section 3.1).

Once defined the outsourcing event, the treatment group covers all workers involved at least once in such an event. For each worker, the first outsourcing event represents the indicator variable of interest taking value equal to 1 if the worker belongs to the outsourcing flow and 0 otherwise. Henceforth, a worker becomes as a treated in our empirical setting from the first outsourcing event onward. Nonetheless, a worker may be involved in more than one event over time. We do not investigate effects related to multiple outsourcing events suffered by an individual. However, if an outsourcing wage penalty exists, it should be reinforced in a multiple event situation, therefore our estimates should be interpreted as the lower bound for such a penalty. Also note that, since the eligible events for the identification are only those spurring from a predecessor to a firm classified as outsourced, all flows in the opposite direction are not accounted for since they represent the opposite phenomenon, internalisation processes.

The corresponding control group consists of all workers who remained employed in the predecessor firm throughout the entire period and were not affected by any type of transition. Thus, the control group is composed solely by stayers in the predecessor firm, allowing us to exclude any wage dynamics resulting from job-to-job transitions. Based on this characterization, we compare the wages of workers who experienced an outsourcing event with those of their colleagues in the predecessor firm. This comparison allows us to estimate the counterfactual wage dynamics -— that is the wage path the treated workers would have likely followed had they not experienced the outsourcing event.

Since we aim at comparing wage trajectories between the two groups of workers, starting from the sample described in Section 3.2 we further restrict our sample focusing on outsourcing events occurred between 2013 and 2015. Accordingly, having available data from 2010 and 2019, we can accommodate for three lags and five leads.

Matching procedure

To ensure the highest comparability between the treated and control groups, we match each treated worker in t with a control worker who never experienced an outsourcing event and shared the same sociodemographic characteristics (age, gender and educational attainment), contractual arrangement (working time and type of contract) and region of work. We also impose that the control group belongs to the same wage quintile of the outsourced wage distribution before the outsourcing event. Methodologically, we perform a one-to-one matching without replacement, using a caliper with a bandwidth of 0.5 on continuous variables. After the matching procedure, the final sample counts approximately 268,000 individuals equally split between the treated and control groups. Table 2 reports the validity of the matching procedure.

Table 2: Differences between in-house and outsourced workers' characteristics – unmatched vs matched samples

	Pre-matching			**Post-matching**		
	In-house	Outsourced	Difference	In-house	Outsourced	Difference
Age	40.05	41.68	-1.621***	44.31	44.89	-0.582***
Gender	0.571	0.495	0.076***	0.446	0.458	-0.0124***
Full-time	0.676	0.511	0.165***	0.444	0.463	-0.0197***
Permanent contract	0.769	0.726	0.0434***	0.885	0.899	-0.0137***
Education <= primary	0.510	0.805	-0.295***	0.849	0.862	-0.0132***
Education - secondary	0.379	0.173	0.206***	0.141	0.125	0.0162***
Education - tertiary	0.111	0.0216	0.0894***	0.01	0.013	-0.003***
Gross annual earnings	26093.55	17725.15	8368.4***	12782.96	12469.65	313.30***
N. of workers	19,789,743	487,711		134,331	134,331	

Note: differences represent the t-test, *** p<.01, ** p<.05, * p<.1.

In the original unmatched sample, outsourced workers are slightly older (around 1 year) compared to in-house colleagues. Gender composition is more evident, with higher share of men among in-house workers, signaling a larger presence of women among outsourced workers. In terms of contract characteristics, and in line with expectations, outsourced workers are more likely to be employed part-time, and are characterised by a lower share of permanent contracts compared to the in-house counterpart. Lastly, outsourced workers seem to be less educated than in-house workers. However, such differences shrank to around

zero after the matching procedure confirming the validity of the matching algorithm.[5]

Empirical Specification

To estimate the outsourcing wage penalty, relying on our matched sample, we first fit the following TWFE model with both workers and firm fixed effects, similarly to Drenik et al., (2023):

$$y_{i,t} = \alpha_i + \beta O_{i,t} + \psi_{J_{i,t}} + X_{i,t}\theta + \varepsilon_{i,t} \tag{1}$$

where $y_{i,t}$ is the (log) annual wage of worker i in year t, while O is an indicator of whether the worker i has been outsourced in t or not. The set of controls includes age, industry and year fixed effects. This specification includes both worker (α_i) and firm ($\psi_{J_{i,t}}$) fixed effects and allows to compare the potential wage penalty between in-house and outsourced workers in the same workplace. Standard errors are clustered at the worker level.

The β coefficient identifies the causal effect of outsourcing under a parallel trend assumption (Wooldridge 2021), such that differences in outcomes between outsourced and in-house workers would have remained constant absent the outsourcing event. To maximize the likelihood of meeting this assumption, we exploit the panel structure covering all the years available i.e., before and after the outsourcing event, and rely on the outcomes of the matching algorithm. Our estimates are therefore run on highly comparable pairs of treated and control workers.

Following Drenik et al. (2023), the baseline model reports the outsource wage penalty controlling only for year-dummies (m1), and subsequently adds age and industry fixed-effects (m2). Firm and worker fixed-effects are included in (m3). However, it should be noticed that if one is not interested in the effects of α_i and $\psi_{J_{i,t}}$ *per se*, unbiased estimates of β can be obtained by first-differentiating within each worker-firm combination (spell - m4) (Abowd, Kramarz, and Margolis 1999; Andrews, Schank, and Upward 2006). This is because for each spell (worker-firm combination) neither α_i nor $\psi_{J_{i,t}}$ varies. For the sake of

[5]It has to be noticed that out one-to-one matching procedure, while improving the consistency between treated and control groups, leads to a large reduction (approximately -70%) in the number of post-matching outsourced workers. In particular the post-matched sample is composed by a higher share of low-paid workers, among both treated and control groups.

interpretation, we compare the full TWFE model (m3) with the spell-specification (m4).[6]

To dig into the time dynamics and provide evidence of parallel trend, we also estimate the event-study specification of eq.1 allowing for the outsourcing event to be heterogeneous across units:

$$y_{i,t} = \alpha_i + \delta_t + \sum_j \beta \ (O_i * D_{t-j}) + \varepsilon_{i,t} \tag{2}$$

where D_{t-j} is an indicator variable for the j periods relative to the outsourcing event occurring in t. We consider $j \in [-3; +5]$ and omit $j = -1$ as the reference period. Recent literature extensively discuss the potential bias of standard event-study in case of staggered adoption (e.g., Callaway and Sant'Anna 2021; De Chaisemartin and d'Haultfoeuille 2020; Goodman-Bacon 2021). The bias emerges because of the *forbidden comparison* i.e., compare (late) treated units with already treated ones. In our case, however, the control group is made by always never-treated workers. As discussed, in the matching procedure the control group is made by in-house workers who do not experience any transition flow. It follows that our estimates are unlikely to suffer significant bias.

5 Main results

This section presents the estimates of the wage penalties spurring from an outsourcing event. We start by presenting key findings from the baseline models and potential mechanisms driving them, distinguishing between the role played by intensive and extensive labour market margins, and by collective bargaining. Afterwards, we explore heterogeneities of this effect by workers' characteristics, namely gender, sector of employment after the event and age at labour market entrance.

5.1 Wage penalty

Table 3 reports the results of the main specifications on the annual outsourcing wage penalty. Note that, as a standard in TWFE models, we only consider yearly individual ob-

[6] In the spell-specification, therefore, the panel unit is the worker-firm combination, with standard errors clustered at the spell-level.

servations with positive earnings. As expected, and in line with existing evidence (Daruich et al. 2024; Drenik et al. 2023; Dube and Kaplan 2010; Fana, Giangregorio, and Villani 2024; Goldschmidt and Schmieder 2017), we find a significant and substantial wage loss for outsourced workers of at least 8% per year across all specifications. Evidence from the full specification (m3), which includes both worker and firm FE, shows a wage penalty of 11.7%, slightly lower than the spell-model (12.8%). These results suggest that Italian workers experiencing an outsourcing event are subject to a strong and significant loss in annual earnings compared to their in-house colleagues with similar characteristics.

Table 3: Annual outsourcing wage penalty - TWFE estimates

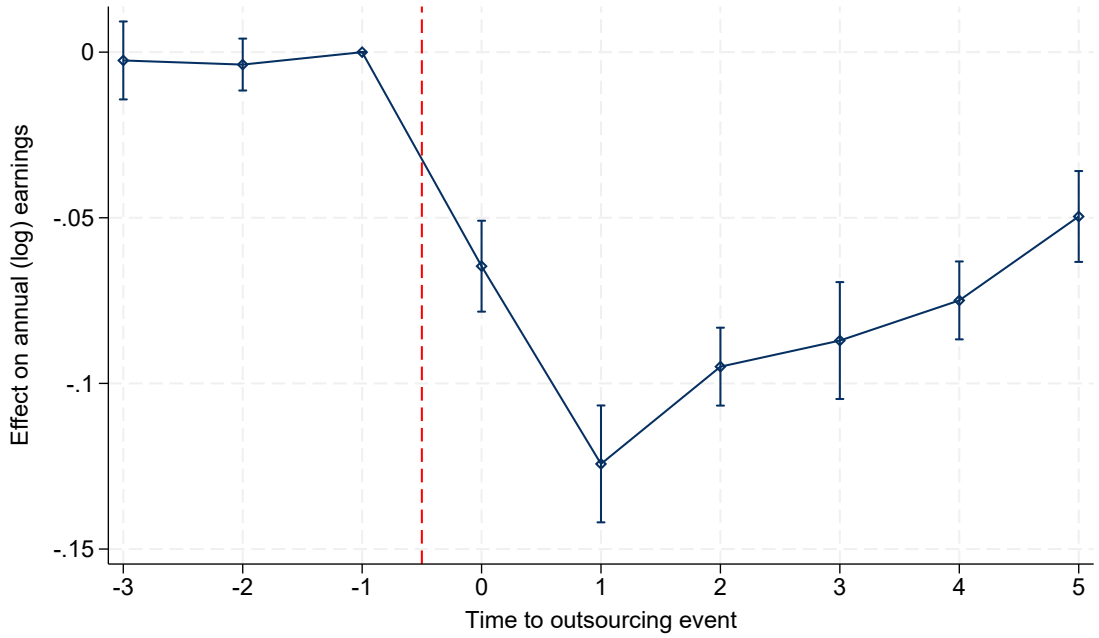
	Outcome: (log) annual wage			
	(1)	(2)	(3)	(4 - spell)
Outsourced	-0.082***	-0.079***	-0.117***	-0.129***
	(0.0095)	(0.0088)	(0.0101)	(0.0282)
Year FE	Yes	Yes	Yes	Yes
Age	No	Yes	Yes	Yes
Industry FE	No	Yes	Yes	Yes
Worker FE	No	Yes	Yes	-
Firm FE	No	No	Yes	-
N of Individuals	268,662	268,662	268,662	268,662
R-squared	0.006	0.163	0.763	0.14

Note: column (1) includes only year fixed effects; in column (2) adds age, industry dummies, and worker fixed effects; column (3) adds firms fixed effects. Column (4) is the spell-model, where the panel units are the worker-firm combinations. *** p<.01, ** p<.05, * p<.1.

Figure 3 shows the wage penalty pattern resulting from the event study approach. This finding supports the plausibility of the parallel trend assumption, lending credibility to the identification strategy. Coherently with the TWFE model, the figure also shows that annual earnings decline sharply following the outsourcing event, with the wage penalty reaching approximately 13% one year after treatment. The negative effect persists over time, although it gradually attenuates, stabilizing at around -5% relative to comparable in-house workers five years after the outsourcing event. The attenuation in the outsourcing penalty over time may be driven by several mechanisms, among which the probability of being employed after the event (remind that those with zero earnings for a whole year are not included in the estimate). As shown by Daruich et al. (2024), once the extensive

margin is accounted for, the wage penalty dramatically surges (for the analysis of the effect of outsourcing on unemployment risk see Section 5.4). We can therefore consider our estimated penalty as a lower bound of the adverse effect of outsourcing on annual wages.[7]

Figure 3: Outsourcing wage penalty - Event study



Note: The figure plots the event-study estimates on log-annual earnings according to Equation 2, where the reference period is -1.

5.2 Intensive margin

An annual wage penalty among those who remain employed may be due to a reduction in unitary wages (i.e., FTE weekly wages in our setting), associated with the use of weaker collective bargained contracts, and/or a reduction in work intensity along the year, related to a decrease in worked weeks or working time.

For instance, if outsourced workers have lower work intensity – i.e., work less compared to the in-house colleagues – this mechanism may explain at least part of the annual wage difference. To account for this possible explanatory mechanism, we replicate model in Equation 1 using as main outcome variable the FTE weekly wage.

[7]It is worth recalling that our sample excludes autonomous workers, whose compensation may be even lower than employees. The phenomenon of bogus self-employment is widespread in Italy and used as a form of labour fragmentation and wage compression (Raitano 2018).

According to our data, outsourced individuals work on average around 2 FTE weeks less than in-house counterpart on a yearly base, as shown by applying the same TWFE models to working weeks per year as main outcome variables (see Table A2 in the Appendix). Table 4 presents the estimated outsourcing penalty based on the two-way fixed effects (TWFE) model for our proxy of unitary wages, i.e., FTE weekly wages. As expected, the wage losses associated with outsourcing halves (5.9% in the full specification) compared to annual earnings but they remain both statistically significant and substantial in magnitude. In other words, the intensive margin seems to explain a relevant part of the outsourcing annual wage penalty.

Table 4: Outsource wage penalty on the full-time weekly wage - TWFE estimates

	(1)	(2)	(3)	(4 - spell)
Outsourced	-0.068***	-0.041***	-0.059***	-0.074***
	(0.004)	(0.003)	(0.005)	(0.013)
Year FE	Yes	Yes	Yes	Yes
Age	No	Yes	Yes	Yes
Industry FE	No	Yes	Yes	Yes
Worker FE	No	Yes	Yes	-
Firm FE	No	No	Yes	-
N of Individuals	267,915	267,915	267,915	267,915
R-squared	0.03	0.52	0.68	0.07

Note: column (1) includes only year fixed effects; in column (2) adds age, industry dummies, and worker fixed effects; column (3) adds firms fixed effects. Column (4) is the spell-model, where the panel units are the worker-firm combinations. *** p<.01, ** p<.05, * p<.1.

5.3 Collective agreements

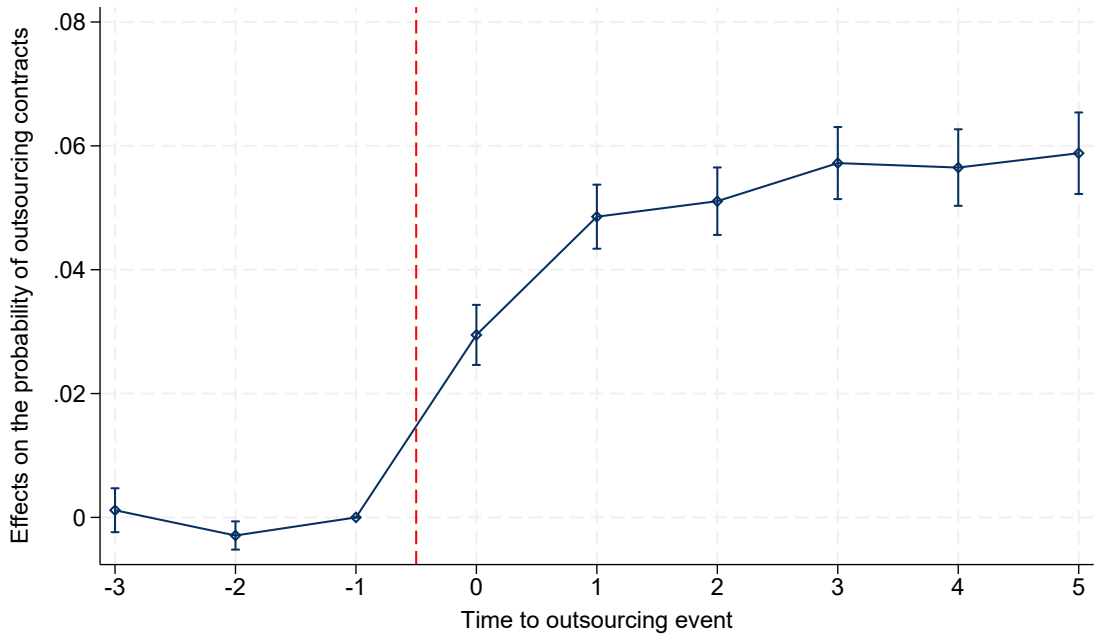
To deepen our analysis of the mechanisms behind the wage penalty, we test whether bargaining power differs between outsourced and in-house workers. Differences in bargaining power between outsourced and in-house workers has been proven to be a relevant mechanism behind the difference in working conditions – pecuniary and non-pecuniary – between the two groups of workers (see Appelbaum 2017; Fana, Giangregorio, and Villani 2024; Weil 2014).

In our setting, bargaining power is proxied by the collective bargaining agreement (CBA)

under which a worker is employed. in Italy, CBAs specify hourly wages by detailed occupation and job title within a specific economic sector, as well as key aspects of working time (regular and supplementary hours) and work organization (shifts and leave arrangements). Importantly, CBAs can be understood as the outcome of the balance of power between firms and workers within a given economic sector.

For the purposes of our analysis, we draw on the archive of Italian CBAs stored by the National Council for Economics and Labour (CNEL) to identify the CBAs currently in use across outsourced services. The archive specifies, for each CBA, the economic sector to which it applies. Interestingly, multiple CBAs often coexist within the same sector, granting firms a choice among different agreements. Focusing on those CBAs applicable to outsourced activities, we classify an agreement as *weak* if it meets at least one of the following criteria: it is formally associated with a subcontracted service; it is designed for cooperatives; it has been signed by trade unions that are not considered representative in terms of membership.[8]

Figure 4: Probability of employment under weak CBA



Note: The figure reports event-study results on the probability of being employed under a weak CBA, obtained from equation 4. Time -1 omitted and taken as reference. 95% confidence intervals based on standard errors clustered at the worker level.

[8]The full list of *weak* CBAs is presented in Table A3.

Noteworthy, an interesting result is that workers exposed to outsourcing are substantially more likely to transit into weaker CBA compared to non-outsourced workers (Figure 4). This finding is consistent with a reduction in workers' bargaining power following outsourcing. While Legislative Decree No. 276/2003 (the Biagi Law) formally allows contractors to apply collective agreements different from those of the lead firm by repealing the equal treatment principle established under Article 3 of Law No. 1369/60 (Art. 85), the observed shift toward less protective contracts suggests that outsourced workers have limited ability to counteract this institutional flexibility. For instance, if these workers retained strong bargaining power, one would not expect such a systematic movement toward weaker CBAs. Moreover, the regulation of contract changes further weakens workers' outside options by allowing new contractors to disregard previously accrued rights and collective agreements. Taken together, these provisions plausibly operate through a "bargaining contract" channel: outsourcing relocates workers into organizational settings with lower collective strength, facilitating the adoption of inferior contractual arrangements.

5.4 Extensive margin

To take into account the extensive margin, we consider the original matched sample expanded by all the years with zero earnings (i.e., unemployment spells during at least one year) observed over the available period.[9] Using the indicator variable for being employed or not in a given year t, we run the following linear-probability model with worker and time fixed effects:

$$y_{i,t} = \alpha_i + \beta O_{i,t} + X_{i,t}\theta + \varepsilon_{i,t} \tag{3}$$

where $y_{i,t}$ is our worker-level employment indicator in year t, and O is our treatment dummy equals to one if the worker experienced an outsourcing event and 0 if she works as an in-house employee. Matrix $X_{i,t}$ include age and year fixed effects.

[9] If an individual is observed in 2012 and 2014, but not in 2013, this means that it was not employed (in the private sector) during that year. To complete the series, we add the missing year 2013 and flag the worker as unemployed. Furthermore, we have to acknowledge that missing data could also be related to the transition to self-employed, rather than unemployment. Self-employed spells are not recorded in the data so we cannot observe them. If this is the case, the estimated probability of employment represents a lower bound. However, other evidence (Daruich et al. 2024) suggest that this might not be the case, so our findings are not harshly downward biased.

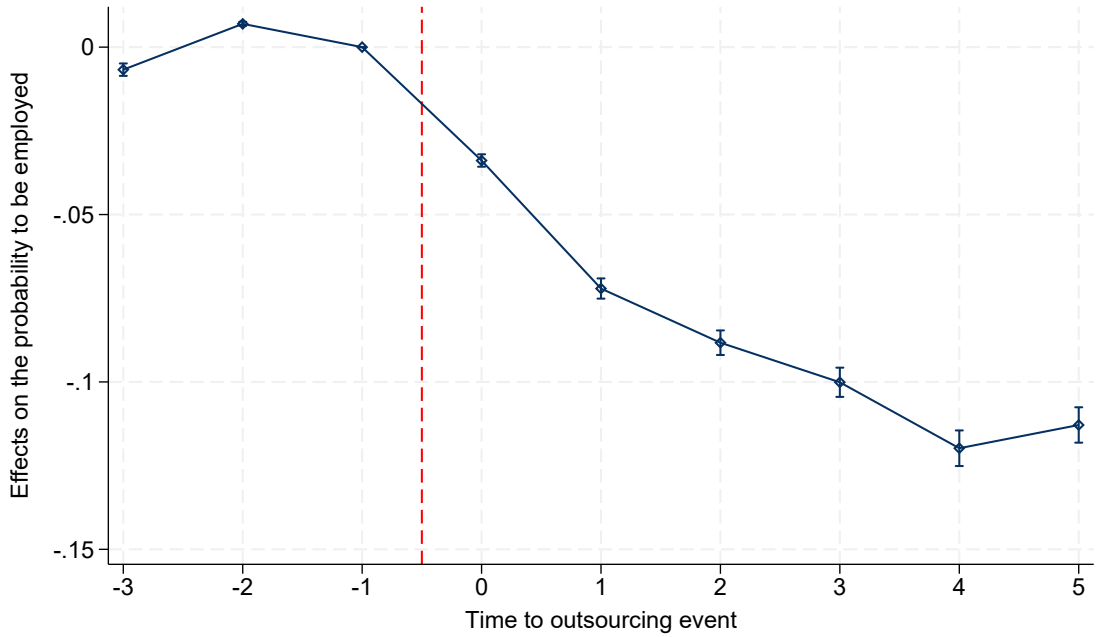
To provide an idea of the temporal evolution of the estimated likelihood of employment following the event, we also estimate the following event-study model:

$$y_{i,t} = \alpha_i + \sum_j \beta O_i * D_{i,t-j} + \gamma O_i + \sum_j \delta_j * D_{i,t-j} + \varepsilon_{i,t} \tag{4}$$

where $D_{i,t-j}$ are all the time-to-event dummies. More precisely, we include all dummies for three years of lags i.e., three years before the first outsourcing event, and five years of leads. Equation 4 is estimated omitting j = -1, such that the effects are interpreted as the evolution of the outcome for outsourced workers compared to in-house relative to the outcome one year before the outsourcing event.

Figure 5 plots the estimated probability of being employed over time with respect to the outsourcing event.

Figure 5: Extensive margin - probability of employment



Note: The figure reports event-study results on probability of employment obtained from equation 4. Time -1 omitted and taken as reference. 95% confidence intervals based on standard errors clustered at the worker level.

The resulting estimates suggest that an outsourcing event increases the likelihood of unemployment, in line with Daruich et al. (2024), with an immediate drop in employment probability the year after the outsourcing event. This negative effect reinforces over time,

up to 5 years, when outsourced workers' probability of employment is 10% lower compared to in-house peers one year before the outsourcing event. As discussed with respect to findings shown in Figure 3, the higher probability of unemployment following the outsourcing event may thus represent an additional potential mechanism behind the estimated wage loss over time. In other words, part of the whole outsourcing wage penalty may be due to higher chances of becoming unemployed after the outsourcing event. Therefore, focusing only on those working in a certain year may bring to an underestimation of the penalty. This result also suggests that outsourcing Italian firms tend to transfer their entrepreneurial risk and the volatility of demand for their services onto workers (Emanuele et al. 2012; Frade and Darmon 2005).

5.5 Heterogeneity and Robustness

The estimated outsourcing wage penalty may not be homogeneous across workers. Differences in workers' attributes and sectoral characteristics may shape both firms' incentives to outsource and workers' ability to absorb the associated wage losses. We therefore explore heterogeneity along three key dimensions: gender, potential experience (as captured by the age at labour market entry), and type of sector of employment.

First, outsourcing may have differential effects by gender. Women often face weaker bargaining positions in the labour market and are overrepresented in occupations and sectors more exposed to subcontracting and non-standard employment arrangements. As a result, outsourcing may exacerbate pre-existing gender wage gaps if firms use outsourcing strategically to further compress wages for groups with lower outside options. Consistent with this view, recent evidence suggests that the adverse wage effects of outsourcing and subcontracting are more pronounced for female workers (Fana, Giangregorio, and Villani 2024).

Second, the impact of outsourcing may vary with workers' experience. Workers with a longer tenure may be more vulnerable to outsourcing due to their lower outside options compared to the tenured current job. To examine this dimension, we assess heterogeneity by age at labour market entry, distinguishing between workers who entered before and after age 25.

Third, as anticipated in Section 3.1, the consequences of outsourcing are likely to depend on the sectoral context and the nature of production. In less knowledge-intensive sectors, such as cleaning, security, and basic logistics, outsourcing is often motivated by cost-cutting considerations, with firms seeking to reduce labour costs. In these settings, outsourcing is expected to be associated with larger wage penalties. By contrast, in knowledge-intensive sectors, outsourcing may serve different purposes, such as accessing specialized expertise, increasing flexibility, or complementing internal production rather than replacing it. In such cases, the wage effects of outsourcing might be smaller or even not existing at all (Fana, Giangregorio, and Villani 2024). We therefore allow the outsourcing penalty to differ between Knowledge-Intensive Sectors (KIS) and Less Knowledge-Intensive Sectors (LKIS).

To empirically assess these sources of heterogeneity, we replicate the baseline specification in Equation 1 interacting the treatment dummy by dummies for gender, age class at entry in the labour market, and distinguishing between Knowledge Intensive Sectors (KIS) and Less Knowledge Intensive Sectors (LKIS).

Finally, as a robustness check, we replicate the main analyses using the commonly adopted definition of outsourcing destination sectors, focusing on FCSL. This classification allows us to verify whether our findings are not driven by the broader definition of outsourcing destinations and remain robust when focusing on sectors traditionally associated with subcontracting. Furthermore, it allows us to provide a comparable estimate of the Italian case with those existing in the literature.

Table 5 reports the obtained estimates, where each panel focuses on a specific type of heterogeneity.

Table 5: Heterogeneities in Outsource wage penalty

Outcome: (log) annual wage				
	(1)	(2)	(3)	(4 - spell)
Panel A. Gender				
Outsourced	-0.181***	-0.101***	-0.118***	-0.132***
	(0.125)	(0.0079)	(0.0109)	(0.0349)
Outsourced*Male	0.219***	0.042***	-0.000	0.002
	(0.0153)	(0.0107)	(0.0106)	(0.0576)
Panel B. Age at Entrance on LM				
Outsourced	0.029*	-0.046***	-0.101***	-0.135***
	(0.0159)	(0.009)	(0.115)	(0.043)
Outsourced*Age$_{\leq 25}$	-0.146***	-0.054***	-0.027***	0.006
	(0.0184)	(0.0112)	(0.0091)	(0.0562)
Panel C. KIS vs LKIS Industry				
Outsourced	-0.073***	-0.107***	-0.121***	-0.137***
	(0.010)	(0.006)	(0.010)	(0.0278)
Outsourced*KIS	-0.065**	0.076***	0.115***	0.064*
	(0.030)	(0.019)	(0.039)	(0.043)
Year FE	Yes	Yes	Yes	Yes
Age	No	Yes	Yes	Yes
Industry FE	No	Yes	Yes	Yes
Worker FE	No	Yes	Yes	-
Firm FE	No	No	Yes	-
N of Individuals	268,662	268,662	268,662	268,662
R-squared (A)	0.097	0.653	0.763	0.013
R-squared (B)	0.014	0.652	0.763	0.013
R-squared (C)	0.02	0.62	0.71	0.012

Note: column (1) includes only year fixed-effects; in column (2) adds age, industry dummies, and worker fixed effects; column (3) adds firms fixed effects. Column (4) is the spell-model, where the panel units are the worker-firm combinations. In Panel C. industry FE are removed because of our KIS and LKIS definition. *** p<.01, ** p<.05, * p<.1.

As reported in Panel A, outsourcing wage penalty seems to not differ across men and women, at least in the full specification. In other words, subcontracting negatively affects men and women in the same way in our preferred specifications. On the contrary, Panel B reports that workers entering on the labour market earlier i.e., before 25 years old, suffer stronger wage penalties (around 3pp). Lastly, Panel C confirms that outsourcing penalties are concentrated in Less Knowledge Intensive Sectors, as those employed in KIS activities once outsourced suffer a significant lower wage penalty in the spell model and no penalty in the full-specification of TWFE (column 3).

Finally, Table 6 reports the results of the robustness exercise, restricting our model to the

FCSL sectors, a subsection of the LKIS activities. This exercise enables us to establish whether our findings are driven by the expansion of the sectors classified as outsourced, and compare our estimates with the ones existing in the literature for other countries.

Table 6: Outsource wage penalty defined on the FCSL sectors

	Outcome: (log) annual wage			
	(1)	(2)	(3)	(4 - spell)
Outsourced	-0.094***	-0.161***	-0.149***	-0.140***
	(0.010)	(0.007)	(0.008)	(0.008)
Year FE	Yes	Yes	Yes	Yes
Age	No	Yes	Yes	Yes
Industry FE	No	Yes	Yes	Yes
Worker FE	No	Yes	Yes	-
Firm FE	No	No	Yes	-
N of Individuals	268,662	268,66	268,662	268,662
R-squared	0.006	0.62	0.71	0.02

Note: column (1) includes only year fixed effects; in column (2) adds age, industry dummies, and worker fixed effects; column (3) adds firms fixed effects. Column (4) is the spell-model, where the panel units are the worker-firm combinations *** p<.01, ** p<.05, * p<.1.

According to the estimates, the wage penalty associated with the outsourcing event towards one of the FCSL sectors is around 14 and 15% (in the full-specifications), quite close to the magnitude established in previous studies like Goldschmidt and Schmieder (2017) for Germany, Dube and Kaplan (2010) for the US, and Fana, Giangregorio, and Villani (2024) for France. The inclusion of additional KIS sectors in our analysis slightly reduces the average wage penalty relative to the FCSL, supporting our empirical strategy, as it does not bias the main findings. By contrast, the evidence shows that excluding sectors primarily providing labour services through subcontracting arrangements with lead firms leads to an underestimation of the phenomenon and its detrimental effects for a larger than thought share of workers.

6 Outsourcing, firm-premia, and productivity levels

The presence of a wage penalty for outsourced workers contrasts with the benchmark of a fully competitive labour market, in which observationally equivalent workers within the same firm should receive a common wage. In imperfect labour markets, however, wages

may reflect bargaining frictions and rent-sharing rather than marginal productivity alone. When firms possess greater bargaining power, outsourcing can be used as a mechanism to weaken workers' outside options, allowing firms to reduce wages or to limit the extent of rent-sharing for outsourced workers. Conversely, when workers have stronger bargaining power, firms may face greater constraints in fragmenting production and may be forced to share rents more evenly across outsourced and in-house employees.

To investigate these mechanisms, we follow Goldschmidt and Schmieder (2017) and Drenik et al. (2023) and study differences in access to firm-level wage premia using AKM model (Abowd, Kramarz, and Margolis 1999). [10] While Equation 1 includes worker and firm fixed effects as controls to estimate wage differentials associated with outsourcing, the analysis in this section focuses on decomposing wages into worker and firm components and comparing the resulting firm effects across employment arrangements.

Specifically, we estimate the following AKM specification separately for outsourced and in-house workers:

$$y_{i,t} = \alpha_i + \psi_{J_{i,t}} + X_{i,t}\theta + \varepsilon_{i,t} \tag{5}$$

where $y_{i,t}$ denotes log wages of worker i employed at firm $J_{i,t}$ in period t. α_i captures time-invariant worker heterogeneity, and $\psi_{J_{i,t}}$ denotes firm fixed effects. X includes age, age squared, education, and year fixed effects.

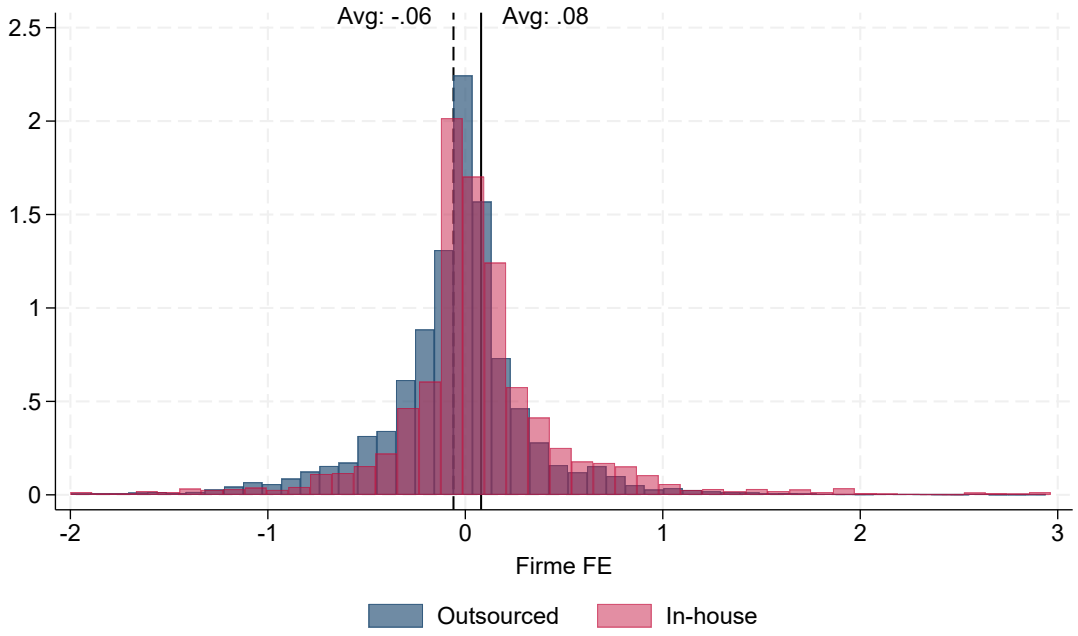
The estimation of the AKM model requires sufficient worker mobility across firms to separately identify worker and firm fixed effects. We therefore restrict the estimation to the largest connected set of the worker–firm mobility network in each sample. When estimating the AKM model separately for outsourced and in-house workers, worker mobility is therefore exploited within each subsample of employment spells. As a consequence, the estimated firm effects capture work-arrangement specific premia, even for the same firm employing both outsourced and in-house workers. In other words, outsourced workers and

[10] Our methodology differs from the one adopted by Drenik et al. (2023) as in their study, outsourced workers are those formally employed by temporary agencies but perform their duties at the leading firms' premises. In our case, we identify outsourced workers through flows form the leading to the daughter firm, without knowing where the affected workers perform their duties.

in-house colleagues within the same firm ID might have different firm premia, reflecting differences in productivity, rent-sharing, or bargaining environments.

To facilitate comparison across samples, we normalise the estimated firm effects in both groups to a common reference sector (Food and Restaurants - sector code 56). In Figure 6 we compare the distributions of firm wage premia for outsourced and in-house workers.

Figure 6: Firm Effects by outsourced and in-house worker



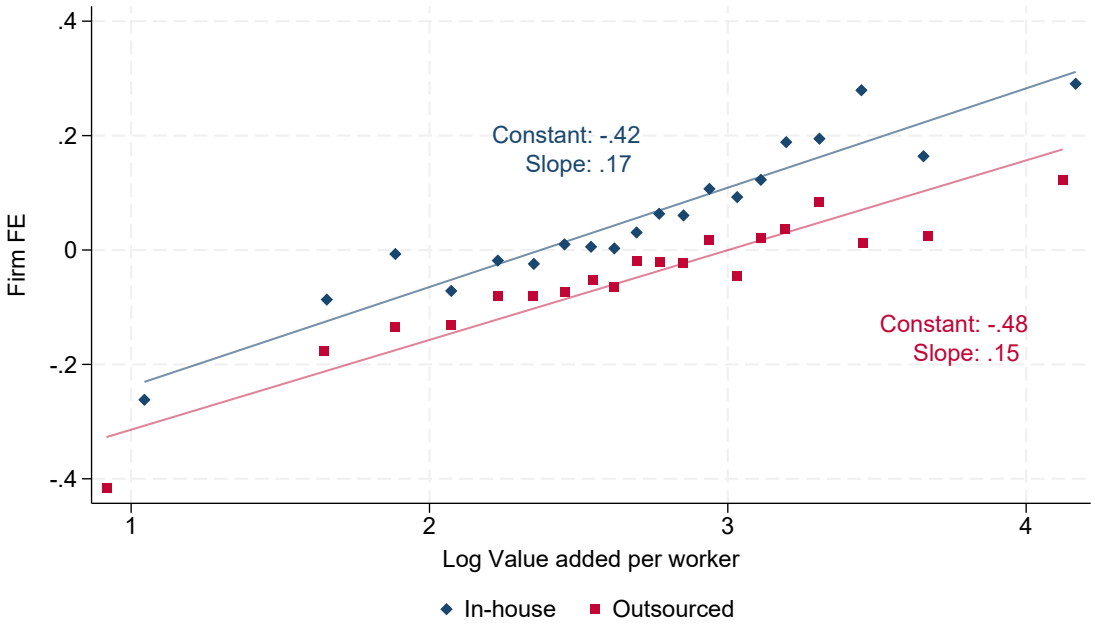
Note: The figure plots the Firm Effects estimated by the AKM model separately for outsourced and in-house workers. The dashed line represents the average for outsourced workers; solid line corresponds to the average in-house worker effects. Standard statistical tests on the mean difference rejects the hypothesis of equality.

In line with Drenik et al. (2023) and the TWFE model presented in Section 5.1, we observe a significant difference of around 0.14 log-points in favour of in-house workers, confirming higher firm-pay premia for this group.[11]

To understand whether this difference may depend on the productivity of the specific firm, we plot the AKM effects versus the (log) value-added per worker of each firm. Results are presented in Figure 7 and seem to suggest that outsourced workers receive lower firm-pay premia along the entire productivity distribution.

[11]The corresponding workers FE are presented in Figure A1 in the Appendix.

Figure 7: Firm Effects by outsourced and in-house workers



Note: The figure plots the Firm Effects estimated by the AKM model separately for outsourced and in-house workers on the (log) value added per worker obtained matching our employer-employee information with Orbis data. Constant and slope are obtained by regressing Firm FE on log value added per worker.

This evidence seems to suggest that outsourced workers do not enjoy any firm-pay premia compared to in-house workers, regardless of the firm's productivity level. In other words, outsourced workers are paid the competitive price, non-participating to the firm rent-sharing. These findings can also be interpreted such that outsourced returns are completely different to those received by the in-house colleagues. To confirm this intuition, we relate the firm FE of outsourced workers with those of in-house by means of an OLS model building on estimated firm FE from the AKM model:

$$\Psi_J^O = \alpha + \gamma \Psi_J^{Inh} + \epsilon_J \tag{6}$$

where Ψ_J^O are the firm FE for the outsourced workers, while Ψ_J^{Inh} are the firm FE of in-house workers. Therefore, the parameter of interest – γ – may range between two possible extreme benchmarks: perfect competition and full equivalent pay-premia. In the first case, we should expect a null coefficient, while the latter should be equal to 1. In line with the

previous intuition, the estimated coefficient is close to 0 (0.020 - SE: 0.004) and statistically non-significant. This result suggests that Italian firms outsource workers to avoid sharing rents and/or pay any premia to this group of workers, reducing and cutting labour costs and employment input (Daruich et al. 2024). Taken together all these evidence support the idea of outsourcing as competitive strategy based on cost reduction.

7 Conclusions

Domestic outsourcing is a key feature of contemporary production processes and the economic literature and empirical evidence is expanding accordingly. This paper focused on the peculiar case of Italy, which has a long lasting tradition in productive fragmentation, taking advantage of the matched employer-employee administrative dataset drawn from INPS records for the period 2010–2019. Building on the identification strategy of Goldschmidt and Schmieder (2017), and extending it to encompass both low value-added and knowledge-intensive service sectors, we have produced a set of findings that speak to the breadth and severity of the outsourcing wage penalty in the Italian labour market.

Our baseline estimates establish that outsourced workers suffer an annual wage penalty of approximately 12% relative to comparable in-house colleagues. This magnitude is consistent with estimates from Germany (Goldschmidt and Schmieder 2017), the United States (Dube and Kaplan 2010), France (Fana, Giangregorio, and Villani 2024), and the broader emerging cross-country literature (Goos et al. 2025), suggesting that the adverse wage consequences of productive fragmentation are a pervasive feature of contemporary labour markets rather than an artifact of a particular institutional context. Our robustness exercise, which restricts the outsourcing definition to the traditional food, security, cleaning and logistics sectors, yields a penalty of 14–15%, squarely in line with prior estimates and confirming that the extension to knowledge-intensive sectors does not inflate the overall average but rather captures a genuine, if somewhat mitigated, penalty for a broader group of workers.

The event-study results lend credibility to the identification strategy by confirming the absence of pre-trends, while also revealing important temporal dynamics. The wage penalty is sharpest in the immediate aftermath of the outsourcing event, reaching approximately 13%

one year after the transition, and attenuates gradually over the subsequent years. However, this attenuation should not be interpreted as evidence that outsourcing inflicts only transitory damage because of two main considerations. First, as highlighted by Daruich et al. (2024), survival bias plays a significant role: workers who exit employment altogether are excluded from the wage regressions, so that the apparent convergence in wages partly reflects the selective attrition of the most adversely affected workers. Second, the extensive margin analysis confirms that outsourced workers face a substantially higher risk of unemployment that strengthens over time, reaching a ten-percentage-point gap in employment probability five years after the event. Taken together, these findings imply that our estimated wage penalty is best read as a lower bound on the total welfare cost of outsourcing for affected workers.

Beyond the headline wage effect, the paper contributes a richer account of the mechanisms through which the penalty operates. Firstly, we focus on the intensive-margin, defined as full-time-equivalent weekly wage – thus depurating the wage effect from the influence due to changes in the number of worked hours and weeks per year –, and observe a significant reduction in the outsource wage-penalty, signaling that work-intensity is able to explain, at least partially, why outsourced workers earn less in a year compared to their in-house colleagues. Secondly, we consider the extensive margin, and in particular the probability of being employed which is reduced by approximately 10%. Lastly, outsourced workers might have lower bargaining power compared to in-house, resulting in lower wages. To test this mechanism, we proxy bargaining power with collective bargaining agreement (CBA): the probability of being employed under a weak CBA increases significantly (6%) after the outsourcing event. In the Italian industrial relations system, where wage setting is mostly determined by sectoral bargaining, a downward shift in the quality of the applicable contract can itself constitute a mechanism of wage compression independent of any change in the worker's productivity or effort. This finding is consistent with Weil (2014) broader argument that productive fragmentation systematically weakens the institutional infrastructure through which workers claim a share of firm rents.

The AKM analysis provides a further layer of evidence on this rent-sharing dimension. Across the entire productivity distribution, outsourced workers are associated with signif-

icantly lower firm wage premia than their in-house counterparts, and the correspondence between the firm effects of the two groups is near zero. This implies that the wage penalty is not simply a reflection of outsourced workers being sorted into lower-productivity firms: even within firms of comparable value-added per worker, outsourcing forecloses access to the firm-level wage premium that would otherwise accrue to directly employed staff. This pattern is consistent with the view that domestic outsourcing operates, at least partly, as a mechanism through which firms subcontract not only production but also their exposure to labour bargaining.

The heterogeneity analysis show that the outsourcing wage penalty is concentrated almost entirely in less knowledge-intensive sectors: workers outsourced into KIS activities do not suffer any penalty compared to their in-house colleagues. This result might suggest that outsourcing in high-tech and professional service sectors may serve complementary functions – access specific highly valued skills that would be too costly to develop internally – rather than functioning primarily as a cost-reduction tool. The labour market consequences of outsourcing are thus not uniform across the productive structure. Furthermore, the heterogeneity exercise shows that workers with a higher experience, i.e., those who entered the labour market before age 25, suffer larger penalties (by around 3 percentage points) compared to older workers. On the contrary, we do not observe any difference by gender.

Overall, the paper contributes to the growing literature on outsourcing enriching the landscape with original evidence for Italy and by expanding the focus of the analysis beyond traditionally low value added sectors. Finally, we provide original evidence of possible main channels behind the existing outsource wage penalty which could be further investigated by future research.

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A Appendix

A.1 Tables

Table A1: List of sectors classified as outsourced

NACE Rev.2 3d	Description
52.1	Warehousing and storage
52.2	Support activities for transportation
53.2	Other postal and courier activities
56.2	Event catering and other food service activities
56.3	Beverage serving activities
62	Computer programming, consultancy and related activities
63.1	Data processing, hosting and related activities; web portals
68.2	Rental and operating of own or leased real estate
68.3	Real estate activities on a fee or contract basis
69.1	Legal activities
69.2	Accounting, bookkeeping and auditing activities; tax consultancy
70.1	Activities of head offices
70.2	Management consultancy activities
71.1	Architectural and engineering activities and related technical consultancy
71.2	Technical testing and analysis
73.1	Advertising
73.2	Market research and public opinion polling
74.1	Specialised design activities
74.3	Translation and interpretation activities
74.9	Other professional, scientific and technical activities n.e.c.
77.4	Leasing of intellectual property and similar products, except copyrighted works
78.1	Activities of employment placement agencies
78.2	Temporary employment agency activities
78.3	Other human resources provision
80.1	Private security activities
80.2	Security systems service activities
80.3	Investigation activities
81.1	Combined facilities support activities
81.2	Cleaning activities
81.3	Landscape service activities
82.1	Office administrative and support activities
82.2	Activities of call centres
82.3	Organisation of conventions and trade shows
82.9	Business support service activities n.e.c.

Note: The Table reports the list of NACE rev 2.2 3-digits economics sectors classified as outsourced, following Fana, Giangregorio, and Villani (2024).

Table A2: Work intensity - working weeks and days per year

	Working weeks per year			
	(1)	(2)	(3)	(4 - spell)
Outsourced	-0.159	-1.346***	-1.660***	-1.306***
	(0.097)	(0.110)	(0.185)	(0.498)
Year FE	Yes	Yes	Yes	Yes
Age	No	Yes	Yes	Yes
Industry FE	No	Yes	Yes	Yes
Worker FE	No	Yes	Yes	-
Firm FE	No	No	Yes	-
N of Individuals	268,662	268,662	268,662	268,662
R-squared	0.01	0.28	0.37	0.02

Note: column (1) includes only year fixed effects; in column (2) adds age, industry dummies, and worker fixed effects; column (3) adds firms fixed-effects. Column (4) is the spell-model, where the panel units are the worker-firm combinations. *** p<.01, ** p<.05, * p<.1.

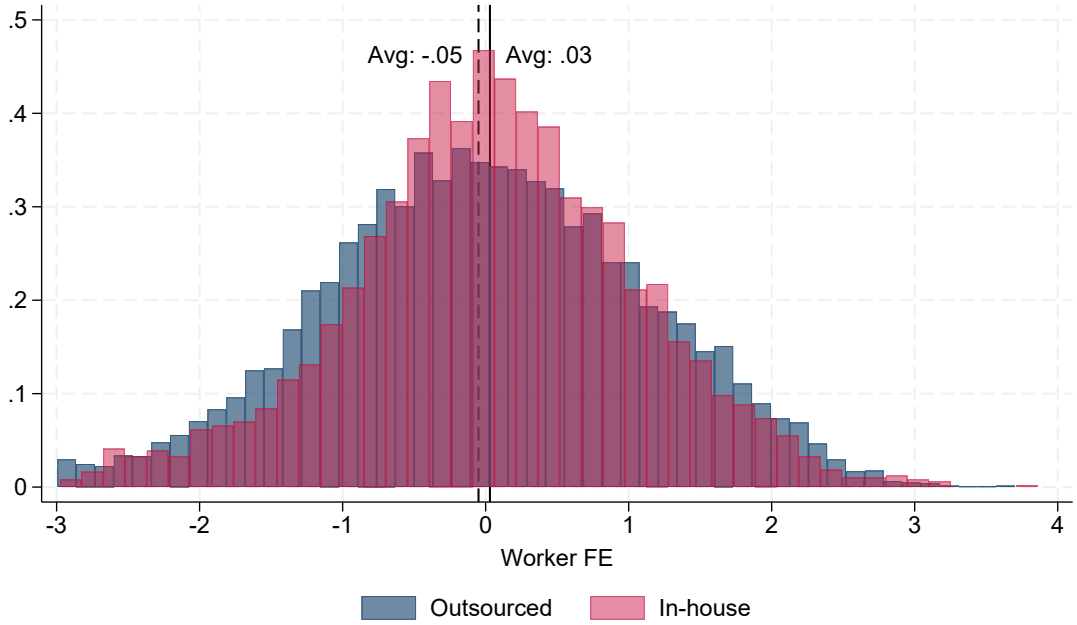
Table A3: List of *weak* CBAs

Code	CNEL Contract Title	Union Parties
H681	National Collective Labour Agreement for employees and worker-members of companies operating in Operational Marketing Services and related activities.	CIU
H685	National Collective Labour Agreement for employees of service centres, companies providing IT and telecommunications services, call centres, outsourcing companies, administrative services agencies, companies of professionals, and arts...	CONFAIL; UPLA CONFCONTRIBUENTI
I14C	National Collective Labour Agreement for workers of companies, including cooperatives, operating in the sector of Road Haulage, Shipping and Goods Handling, Logistics and Related Activities, carried out, including through temporary agency work, for third parties by road, air and sea.	CONFIAL
I855	National Collective Labour Agreement for airport management and outsourced services for personnel of companies and for employees and/or worker-members of ground handling cooperatives in air transport and airport activities.	FISMIC CONFSAL
K511	National Collective Labour Agreement for employees of companies providing cleaning services and integrated/multi-services.	FILCAMS CGIL; FISASCAT CISL; UILTRASPORTI UIL
K519	National Collective Labour Agreement for employees of companies providing cleaning services, integrated services, and multi-services.	CONFSAL SIA
K553	(Agreement for) Cooperatives providing cleaning services, porterage, environmental hygiene, auxiliary services, as well as supplementary and multi-services to various product sectors.	USIPE; SEL
K554	(Agreement for) Employees of SMEs and members/employees of cooperatives providing cleaning services, porterage, environmental hygiene, auxiliary services, as well as supplementary multi-services to various product sectors.	ALPPI; FENALPI; CONFLAVORATORI CONFSAL; CONFAIL; FASPI CONFSAL
K575	National Collective Labour Agreement for the Multi-Services Sector.	CONFLAP
K715	National Collective Labour Agreement for employees of private companies engaged in the distribution, delivery, and postal services, including outsourced activities.	CONFINTESA
K721	National Collective Labour Agreement for companies providing outsourced postal services.	SLC CGIL; SLP CISL; UIL POST
V181	National Collective Labour Agreement for Employees of Companies carrying out outsourced contract processing/services (facon) operating as subcontractors.	CISAL TERZIARIO; CISAL
V903	(Agreement for) Employees of companies, including cooperatives, engaged in the transformation and installation of products made of glass, wood, ceramics, rubber, iron, plastic, crystal, paper, fabric, including outsourced and temporary agency work.	CONFIAL

Source: National Archive of CBAs administered by CNEL. Authors' translation from Italian.
Note: Column 1 reports the alphanumeric code of each CBA, which serves as a unique identifier. Column 2 provides a description of the economic activities to which the CBA applies. Column 3 lists the signatory trade unions.

A.2 Figures

Figure A1: Workers Effects by outsourced and in-house workers



Note: The figure plots the Workers Effects estimated by the AKM model separately for outsourced and in-house workers. Dash line represents the average of outsourced workers; solid line corresponds to the in-house worker effects average. Standard statistical tests on the mean difference rejects the hypothesis of equality.