UNIVERSITÀ CATTOLICA DEL SACRO CUORE
Dipartimento di Economia e Finanza

Working Paper Series

Losing control? Unions' Representativeness, "Pirate" Collective Agreements and Wages

Claudio Lucifora, Daria Vigani

Working Paper n. 87

March 2020

UNIVERSITÀ
CATTOLICA
del Sacro Cuore

Losing control? Unions' Representativeness, "Pirate" Collective Agreements and Wages

Claudio Lucifora
Università Cattolica del Sacro Cuore

Daria Vigani
Università Cattolica del Sacro Cuore

Losing control? Unions' Representativeness, "Pirate" Collective Agreements and Wages

Claudio Lucifora[*][1] and Daria Vigani[†][2]

[1]Università Cattolica di Milano, IZA and CNEL
[2]Università Cattolica di Milano

Abstract[1]

This paper documents the evolution of sector-level collective agreements in Italy and estimates the wage effects of the diffusion of non-representative agreements, often signed by unknown organisations – i.e. "pirate" agreements. Using employer-employee data from Social Security Archives, we find evidence of a significant dumping effect on wages associated with different types of non-representative agreements (-15% with respect to regular collective agreements). We show that half of the wage differential associated with "pirate" agreements is due to selection effects. Also, heterogeneous effects are found across firm size and industry affiliation. Finally, we show that firms with non-representative agreements are also less likely to comply with negotiated

minimum wages set in representative collective agreements.

JEL classification: J52, J31, J41
Keywords: collective bargaining, collective agreements, representativeness, wage differentials

1   Introduction

In most European countries wages are set through collective agreements, which are bargained between employers' organizations and trade unions at different levels of centralization. In countries where industry-wide agreements are common, collective bargaining determines wage levels and working conditions (such as, working time, training and other provisions) for most workers in the sector, through mandatory or *de facto* extensions. Typically, when the provisions of a collective agreement are extended beyond the boundaries of the firm, the representativeness of the negotiating parties is a necessary condition for the agreements to be recognized by firms operating in that industry. Since the mid-nineties, however, the representativeness of trade unions has fallen dramatically, as membership has halved and collective agreements cover a much smaller share of workers (OECD, 2018). Also employers' associations have experienced a progressive erosion of their representativeness and falling coverage, as firms were dropping out from the main associations (Traxler, 2004). Regulatory uncertainty about measurement of social partners' representativeness also contributed to this trend. The Italian system of industrial relations also experienced similar patterns. In particular, over the last decade, uncertainty about the rules governing social partners' representativeness in collective bargaining, coupled with the fragmentation of unions and employers' associations, led to a massive increase in the number of sector-level collective agreements, most of which are signed by unknown organizations (i.e. the so-called "pirate" agreements). Firms have also been shopping for collective agreements negotiated outside the boundaries of their main economic activity, simply to save on labor costs. Periodical reports by the National Council of Economics and Labor (CNEL) document an almost three-fold increase in the number of national collective agreements from 2005 onward (from less than 300 in 2005 to almost 900 in 2019), with less than one-third of currently filed collective agreements signed by the main unions and employers' associations.

In this paper, we document the patterns and evolution of sector-level collective agreements in Italy and investigate the wage effects associated with the increase in non-

representative collective agreements, either signed by unknown social partners – "pirate" agreements –, or misplaced with respect to the main economic activity of the firm – "mismatch" agreements. We argue that the lack of a comprehensive and coherent regulation of social partners' representativeness paved the way to collective agreement dumping, and to a "race-to-the-bottom" in negotiated minimum wages and other provisions.

While the lower minimum wage levels may have partially attenuated the negative impact of the financial crisis on employment levels, the effects of the increased fragmentation of collective bargaining and the weakening of work standards are still largely unexplored, along with their potential consequences on both job quality and industrial relations.

The evidence we study here bears important implications for the experience of European countries in which collective bargaining used to play an important role but, since the start of the crisis, has been increasingly under pressure. In particular, the downward rigidity of wage levels associated with the length of multi-period agreements, the scarce resilience to economic downturns and the low adaptability of contract provisions to structural change, all contributed to a growing dissatisfaction with the labor market performance associated to sector-level collective bargaining, pushing firms to deliberately opt out from higher-level agreements (Eurofound, 2010).

Our study contributes to the literature in a number of ways. First, we describe the institutional weakness and regulatory uncertainty that, in the Italian context, paved the way to the uncoordinated increase in the number of national collective agreements, and we document their distribution across agreement types and industries. Second, we use a large matched employer-employee longitudinal dataset to estimate the wage differential associated with non-representative collective agreements, both along the wage distribution as well as across selected industries. In the empirical analysis, we account for the non-random allocation of workers across firms and collective agreements, and estimate fixed-effect models to control for workers and firms unobserved heterogeneity. Finally, we complement the above data with information on minimum wages, defined in a number of collective agreements signed by the most representative social partners, to compute firms' minimum wage non-compliance.

We find that the wage levels of workers covered by a "pirate" collective agreement are on average 15% lower compared with those of workers employed under a representative collective agreement. We show that half of the wage differential associated with "pirate" agreements is due to selection effects, i.e. low-productivity workers more likely to be employed in firms who apply a "pirate" agreement. Also "mismatched" collective agreements are associated with a negative wage differential which is smaller in magnitude (-5%), and almost entirely accounted for by firms' unobserved heterogeneity. In general, wage levels in firms with non-representative agreements are driven downwards by lower negotiated minimum wages and weaker labor standards in terms of variable pay, overtime premia and other economic provisions. Firms with a "pirate" collective agreements also have a

8% higher probability of not complying with the minimum wages – particularly for the least skilled employees – set in regular collective agreements. Significant differences also exist by job title, firm size and industry affiliation both in terms of diffusion of "pirate" agreements, as well as wage penalties.

Our paper also contributes to the more general debate concerning the economic effects of social partners' representativeness in wage bargaining. While much empirical research has been devoted to the effects of unions and collective bargaining on labor market outcomes, less attention has been devoted to the implications of bargaining pluralism and freedom of association relative to collective agreement dumping, employer's non-compliance and other unfair bargaining practices of firms.

The rest of the paper is organized as follows. In the next section, we review the relevant literature. Section 3 we briefly describe the institutional setting. Sections 4 and 5 present the main dataset and discuss descriptive evidence on non-representative agreements and wage differentials, as well as the empirical strategy adopted. In Section 6 we present the main results, while concluding remarks are provided in Section 7.

2 Representativeness and collective bargaining: a review of the evidence

From a theoretical perspective collective bargaining represents an important feature of labor market equilibrium, affecting both monetary and non-monetary aspects of labor relations, as well as employment levels. Typically, the effects of collective bargaining strongly depend on how it is organized, on the degree of competition in the local labor market and the presence of monopsony power. Under different configurations, collective bargaining can introduce distortions in the allocation of factors, or can improve labor market efficiency by redistributing rents and solving coordination problems (Visser, 2013).

According to the early work of Calmfors and Driffill (1988), a hump-shaped relationship links the (de)centralization of wage-setting institutions and labor market performance. In that context, the worse configuration is the intermediate one, since it combines weak market discipline and low corporatism. While the hump-shaped hypothesis was later shown to lack robust empirical relevance (Bassanini et al., 2010), the strategic features underlying social partners interactions, when bargaining occurs at the level of the industry or region, are still a key element of most bargaining models. In particular, when collective bargaining takes place at the industry-wide level, setting the standards for all firms in a sector, bargained wages are unlikely to respond to firms' productivity and the allocation of workers may be inefficient.

More recently, a number of contributions revived the debate opposing the efficiency of firm-level bargaining with industry-wide collective agreements (Boeri, 2014; Boeri and

Burda, 2009; Jimeno and Thomas, 2013). In particular, Jimeno and Thomas (2013) show, in the context of a search and matching model, that when firms' productivity levels are heterogeneous, equilibrium (un)employment is likely to be (higher) lower under sector-level bargaining relative to firm-level bargaining. In other words, when sector-level wages deviate from firm-specific productivity, whenever the value of a job falls below a given productivity threshold, workers cannot be profitably employed anymore. Conversely, under firm-level bargaining, since wage levels are more likely to reflect firm's productivity, even low productivity jobs can be preserved. Moreover, the lower expected profits associated with low-productivity jobs, under sector-level bargaining, also reduce the incentives to open vacancies relative to firm-level bargaining, which translates into lower hiring rates. Boeri (2015) has further explored the implications of multilevel bargaining systems, where the "two-tier" effects of sector-level and firm-level agreements become additive, thus combining the wage rigidity of sector-level bargaining with the firm-specific bargaining power of decentralized systems. Multilevel bargaining results in higher wage levels and a lower resilience to economic shocks.

Notice that in all these models, sector-level collective agreements impose externalities on less productive firms, destroying jobs and employment opportunities. In such context, bargaining clauses that allow low-productivity firms to "optimally" opt out from higher-level agreements and pay a lower wage can achieve a more efficient allocation of jobs, lower unemployment rate but at a higher wage inequality.

This trade-off between wage inequality and unemployment has been extensively studied in the collective bargaining literature investigating the strategic behavior of social partners and their objectives. What has received less attention is the political economy aspect of collective bargaining, that is: if sector-level bargaining generates such inefficient equilibrium allocations, why is it so diffused in many European countries? The traditional explanation is related to trade unions' preferences for egalitarian wage schedules and lower inequality. Under sector-level bargaining, firms and unions typically bargain over industry-specific wage levels that apply to all workers irrespective of the firm they are employed in, or *vis-à-vis* local labor market conditions. Thus, bargained wages are equalized across firms, "undercutting" of labor standards is prevented and earnings are relatively insulated from business cycle fluctuations (Freeman and Medoff, 1984). Yet why should firms agree to a common wage schedule for the whole sector, knowing that it is less efficient and likely to generate lower profits? Boeri and Burda (2009) argue that there are complementarities among labor market institutions, so that sector-level bargaining arises endogenously when employees are protected from dismissal by employment protection legislation.

Firms' strategic interactions, to reduce competition by raising rivals' overall labor costs, might be an alternative mechanism. In such context, incumbent firms might find profitable to bargain a wage level high enough to keep competitors out of the industry,

but not too high to prevent them from making profits. In Haucap et al. (2001) the industry is modeled as being composed by a fixed number of large firms and a competitive fringe of small firms. Wage determination follows a Cournot-Nash behavior with wages set at a "critical" level to keep entrants out. Any reduction in the sector-level wage is associated with a discrete jump in supply from entrants, thus leading to a drop in profits. This set-up also explains the common practice of extending the provisions of collective agreements beyond the signatory parties – either mandated by governments or simply through a "de facto" extension – to all incumbent firms in an industry, and why firms resist any undercutting in wages or labor standards. The issue of compliance with wages and labor standards mandated by collective agreements is, of course, key to the above set-up (Ashenfelter and Smith, 1979). Garnero and Lucifora (2019) show that firms non-compliance behavior – such as undercutting negotiated minimum wage levels or applying "pirate" collective agreements – is related to the probability of detection and the sanctioning costs which firms internalize in their optimizing decisions. However, Governments often "turn a blind eye", either softening monitoring or not sanctioning irregular practices, as a way to grant flexibility to, otherwise rigid, wages and preserve low productivity jobs.

The labor market effects of sector-level collective bargaining and extension clauses, to all workers in the industry, have been also extensively investigated in the empirical literature. A number of empirical studies have focused on the rigidity of sector-level wage bargaining (Avouyi-Dovi et al., 2013), on the distribution of wages (Cardoso and Portugal, 2005) and on rent sharing (Card et al., 2013; Devicienti et al., 2018). Other studies looked into the role played by collective bargaining systems in shaping employment and unemployment dynamics (Brändle and Goerke, 2018; Bryson and Dale-Olsen, 2008; DiNardo and Lee, 2004; Martins, 2014) as well as employer-specific wage differentials (Gürtzgen, 2009; Martins, 2009; Rusinek and Rycx, 2013). In general, most empirical studies find that under sector-level collective agreements wages are less resilient to economic shocks and more likely to translate into employment adjustments or working hours reductions (Izquierdo et al., 2017; Ronchi and Di Mauro, 2017). In particular, evidence from the European Central Bank's "Wage Dynamics Network" survey (WDNS) shows that countries characterized by sector-level and two-tier bargaining – such as France, Greece, Italy, Portugal and Spain – entered the financial crisis with significant downward wage rigidity. Wage inflexibility initially determined a disproportionately high adjustment in employment levels and growing unemployment rates. Countries under the European financial assistance program were strongly encouraged to reform their collective bargaining structure – Greece, Spain and Portugal did it – to gain resilience in wage levels face to high unemployment (Díez-Catalán and Villanueva, 2015). Other countries – such as Germany – during the crisis increased the decentralization of collective bargaining, which reduced unit labor costs dynamics to the benefit of employment levels and little or no increase in

unemployment (Dustmann et al., 2014). In particular, Baumgarten and Lehwald (2019) show how import exposure over the crisis increased the probability of German firms dropping-out from industry-wide collective agreements. Despite mounting pressure from international institutions, Italy did not reform its structure of bargaining, which remains virtually unchanged from the early '90s. Confronted with its rigidity, the limited diffusion of firm-level bargaining, as well as industrial crises and high unemployment, the system of industrial relations went through a progressive fragmentation of social partners and dramatic increase in the number of collective agreements (European Commission, 2016).

3 Industrial relations in Italy

The whole system of industrial relations in Italy is centered around the role of the most representative employers and workers' organizations, that operate within a relatively weak legal regulation to set both the structure of collective bargaining and the regulation of collective agreements. Trade union density has experienced a moderate decline since the 1990s, and it is estimated to be around 30-40% in the private sector (Visser, 2015), while employers organization density is around 50%, though lack of information make any estimate about membership and representativeness more uncertain.

3.1 Collective bargaining

Collective bargaining in Italy is characterized by a two-tier structure. The first tier (*Contratti Collettivi Nazionali di Lavoro* - CCNL) sets minimum wages schedules and work standards at the sector-level, and is targeted to preserve the purchasing power of wages (i.e. targeted to inflation). The second tier, at the decentralized level (firm or local), negotiates additional components of wages and other regulatory aspects, and is linked to firm's economic performance.

A collective agreement in Italy is only binding for the social partners signing the contract, while there are no formal extension mechanisms to workers employed in firms that are not associated to an employers' organization. An indirect extension clause, however, exists (a *de facto erga omnes* extension), as Labor Courts often use the wage minima determined in collective agreements (signed by the comparatively most representative social partners) as reference with the provision of Art. 36 of the Italian Constitution, stating that "workers have the right to a remuneration commensurate to the quantity and quality of their work and in any case such as to ensure them and their families a free and dignified existence". Firm-level agreements, in general, are not allowed to deviate from minimum standards set in the national collective agreements in a way which would be unfavorable to employees (i.e. the so-called favorability principle applies as national collective agreements cannot be derogated *in pejus*). Later framework agreements introduced the

possibility for local-level bargaining to derogate from higher-level agreements (Art. 8 Decree N. 138/2011, converted into Law N. 148 of 2011) in areas of economic distress to preserve employment levels, improve job quality, fight undeclared work, etc.. (D'Amuri and Giorgiantonio, 2014). Even if, formally, wages set in sector-level collective agreements cannot be derogated, in practice there is a high rate of employers' non-compliance. Even leaving aside irregular employment and workers hired in the informal sector, firms often force employees to work unpaid extra hours, they assign workers to lower occupational levels to underpay them, and when different collective agreements are potentially applicable they resort to loopholes and misclassification to pay lower wages. Finally, "pirate" collective agreements, signed by unknown employers and trade unions, often set minimum wage levels and other work standards below the existing ones.

## 3.2 Actors, representativeness and collective agreements

Within the aforementioned collective bargaining structure, that lies on mutual recognition by social partners, there are no clear and certified rules governing who is entitled to bargain. Unlike in the public sector, where since the late 1990s representativeness criteria for trade unions' are clearly stated (DLgs No. 396/1997 and 165/2001, Art. 43), in the private sector there are no certified rules on partners' representativeness. In the present context, regulatory uncertainty, fragmentation of social partners and the lack of transparency for the assessment of representativeness in collective bargaining contributed to increase tensions between employers and trade unions. As a result, a number of large Italian companies (FCA-Fiat Chrysler Auto, Marcegaglia, Luxottica, just to name a few) have dropped their membership with their respective employers' organizations to gain further flexibility compared to national sector-level agreements, or in order to sign company-level agreement with different provisions. Since then, a lively debate concerning the need of certified parameters to assess representativeness of social partners led to a number of framework agreements signed by the main trade unions and employer organizations (June 2011, May 2013 and January 2014). These agreements establish that a trade union needs to reach a 5 percent membership threshold to be considered as *representative* and able to take part in national collective bargaining, whereas an agreement is binding if signed by unions representing at least 50%+1 of the relevant workforce (Leonardi et al., 2017). Conversely, there are no rules, nor agreements reached, on how to assess representativeness of employers' organizations.

Within the present legal framework, each self-proclaimed "representative" association, by exploiting loopholes and misclassification in the regulation, can negotiate and sign a national collective agreement – that is successively filed within the CNEL's archive –, even in industries already covered by other pre-existing collective agreements. This uncertainty about social partners' representativeness in collective bargaining and which

agreement should a firm apply, contributed to an unprecedented increase in sector-level collective agreements signed by smaller unions, without real representation, and by compliant employers organizations.

The total number of national collective agreements currently registered at CNEL is approximately 885, almost three times more compared to 2005 (i.e. when less than 300 agreements were registered). The left panel of Figure 1 reports the evolution of the total number of collective agreements from 2005 to 2014. The breakdown shows an uneven growth across industries, with Retail trade, Construction and Personal services being the industries with the largest increases (right panel of Figure 1).

Figure 1 Number and sector-level distribution of collective agreements
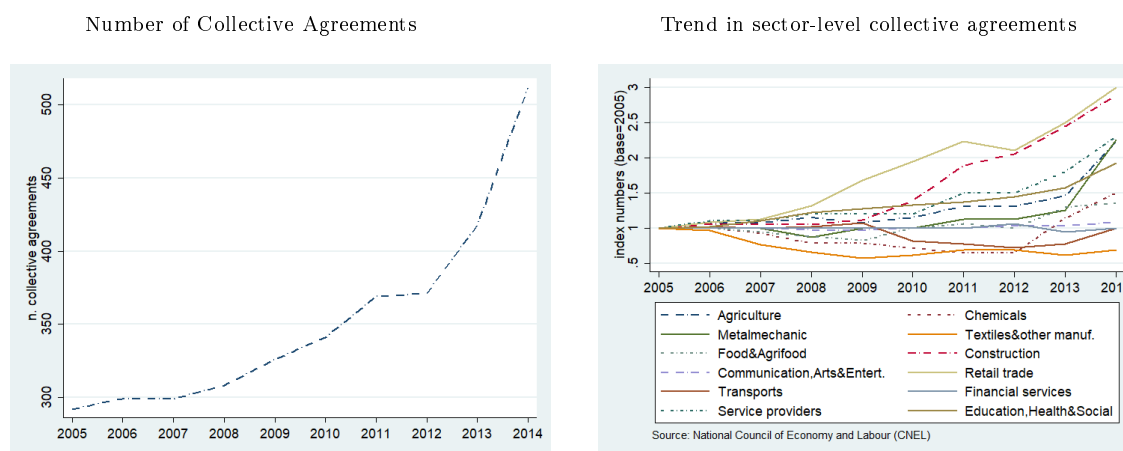
This rise in the number of "pirate" collective agreements was mainly driven by the intention to deviate from the economic and regulatory provisions of regular national collective agreements, signed by the main union confederations (CGIL, CISL and UIL) and the largest employers' associations (Confindustria, Confapi, Confcommercio, Confesercenti, CNA and few others) represented at CNEL. Notice that, while there is much speculation about which have been the main driving factors behind the increase in the number of collective agreements and the diffusion of "pirate" collective agreements, it should be remembered that in the period under investigation the Italian economy was severely hit by negative demand shocks affecting firms' survival rates and their need to adjust labor costs to preserve employment. In particular, firms with more than 15 employees, due to the high firing costs (Art. 18 of the *Statuto dei lavoratori*), massively resorted to several different margins of adjustments, such as: fixed-term labor contracts, short-time insurance schemes (i.e. Cassa Integrazione Guadagni - CIG), delayed renewal of expired collective agreements and also to "pirate" collective agreements.

4 Data and descriptive statistics

Data are drawn from longitudinal matched employer-employee administrative archives collected by the Italian Social Security Institute (INPS). Our sample is based on the working histories of a 1/90 random sample of private sector employees, and the firms they are employed in, over the period 2005-2014. The data contain information on demographic characteristics, gross annual earnings for each job spell, working weeks/days, type of contract and occupation, and firms' attributes. Moreover, we have information on the specific collective agreement that the firm applies. In practice, firms are required to file (monthly) a contributory statement indicating the numerical code associated to each of the coded collective agreement. Notice that unknown collective agreements, signed by non-representative unions and employers' organizations, are coded by INPS with the label "different contract". Out of the total number of collective agreements registered with CNEL, only 34% are registered and coded by INPS. While this indicates that the majority of the collective agreements are to be considered as "pirate" agreements, yet the agreements coded by INPS cover approximately 99% of existing firms and 98% of employees, suggesting that "pirate" agreements only concern a small share of employees.

In the empirical analysis, we focus on a sample of employees aged 20 to 60, working in the private sector (with a private sector collective agreement), with positive earnings between 2005 and 2014. Employees' wages are defined as gross weekly earnings (alternatively, we also use daily earnings). Individuals with multiple job spells, within the same year, enter the sample with the most representative spell in terms of weeks. Our final sample consists of 1,474,891 workers (9,078,834 observations) and 1,036,408 firms. The average worker is a 39-year-old blue collar, employed with a full-time open-ended contract and working in a very small firm, with up to 15 employees (see Table A1 in the Appendix). We also complement the above data with information on collective agreements drawn from the CNEL's archives (Archivio Nazionale dei contratti collettivi di lavoro - https://www.cnel.it/Archivio-Contratti), and with the minimum wage as defined in the collective agreements signed by the main unions and employers' organization.

In order to investigate the wage effects associated with non-representative collective agreements, we classify the agreements employers' use according to different criteria. The first criterion considers whether or not the collective agreement applied by the firm is signed by main employers and trade unions organizations and coded by INPS. The criterion of the main signatory parties – i.e. "comparatively most representative" agreement *comparativamente più rappresentativo sul piano nazionale* – is conventionally used by the supervising bodies (INPS, INL and Ministry of Labor) for the correct application of collective agreements in terms of social security contributions, health and safety standards,

anti-corruption and anti-laundering measures, etc. Notice that collective agreements not coded by INPS are, by definition, unknown and classified as *"pirate" agreements*. The second criterion refers to sector-level collective agreements that employers use for their employees, but are negotiated outside the firm's main economic activity. These agreements, while being signed by representative social partners and coded by INPS, are misaligned with respect to the firm's type (i.e. large industrial firms, SMEs, cooperatives and craft-work firms) or the industry in which the firm is operating. In other words, these are collective agreements that employers select and apply just to save on labor costs. An example would be a large firm that applies the collective agreement of craft-work firms (while not being registered as craft-work enterprise), or a firm operating in the metalwork industry and applying the collective agreement of the retail trade industry. To this end, we use 2-digit NACE rev.1 classification of economic activity to define 12 sectors, based on the 12 contractual sectors defined by CNEL and delimiting the scope of collective agreements. Based on the above criteria, we group the collective agreements according to three main categories:

1) *Most Representative Collective Agreements (MRCA)* - these are collective agreements signed by the "comparatively most representative" social partners within the relevant industry, firm's type and occupational categories covered;

2) *Mismatch Collective Agreements(MCA)* - these include sector-level collective agreements that are negotiated outside the boundaries of the firm's main economic activity (resulting from firms' "shopping" to select the most convenient collective agreement in terms of labor costs), and a residual fraction of agreements signed by smaller and less representative social partners;

3) *"pirate" agreements, (*PCA*)* - these are collective agreements signed by unions and employers' organizations that are unknown to INPS, or refer to situations in which the worker is employed without any contract.

As an illustrative example, in Table A2 in the Appendix, we provide a list of all collective agreements – in a selected number of industries – classified as *MRCA*, or alternatively *MCA* and *PCA*, along with the share of firms and workers covered.

[Table 1 near here]

Following the above definitions, Table 1 presents the distribution of the different types of collective agreements within each sector of economic activity for the most recent year, 2014. Overall, 75% of workers are employed with a *MRCA*, while *MCA* and *PCA* cover respectively 23.5% and 1.3% of the employees. *MRCA* cover more than 70% of workers in all but three industries: Agriculture, Construction and Media, communication& art. However, while in the Construction industry the share of workers covered by *MRCA* is well above 50%, in Agriculture and Media, communication& art the share of *MRCA* is

11

much lower (47% and 37%, respectively). Notice that the Media, communication& art industry is typically characterized by significant heterogeneity in the range of economic activities across firms and by a huge number of collective agreements (currently 40). Conversely, the relevant fraction of MCA found in agriculture is mainly consisting of collective agreements that fall outside the boundaries of the industry, i.e. agreements in the *Food & Agrifood* industry.

A first descriptive evidence on the wage differential between regular collective agreements ($MRCA$) and a non-representative agreement ($NRCA$) – either PCA or MCA – is presented in Figure 2. We compute the wage differential, at different quantiles of the wage distribution, estimating simple quantile regressions separately for manufacturing, trade and other services sectors, and controlling for a set of job and firm characteristics. The evidence shown reports the percent deviation taking as reference the level of wages set in regular collective agreements (i.e. red dotted-line).

Figure 2 Differentials between $MRCA$, MCA and PCA along the earnings distribution
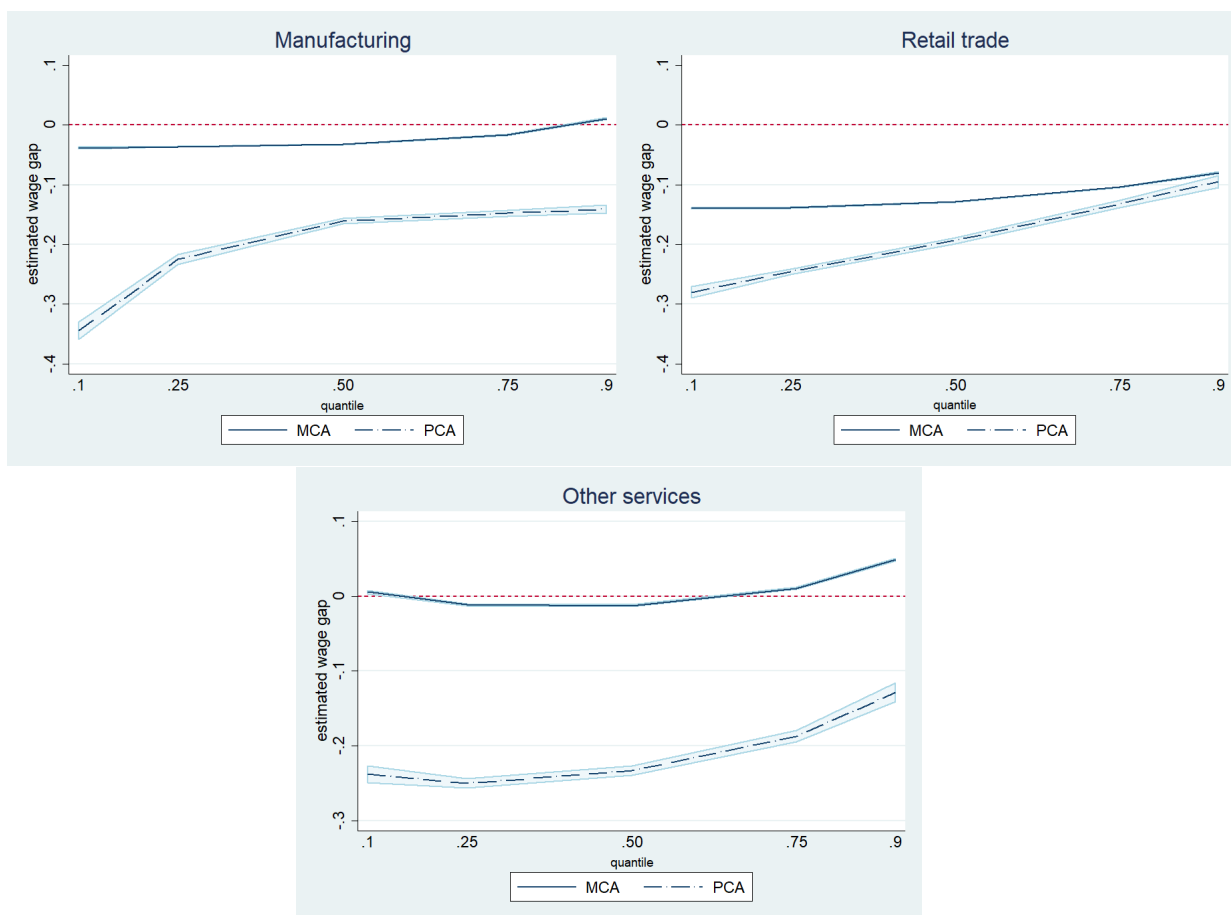
A negative wage differential for PCAs is estimated across all groups. Wage penalties are particularly pronounced at the bottom of the wage distribution and slowly converge as we move up the quantiles. Interestingly, at lower quartiles, all groups exhibit sizable wage penalties associated with PCAs, suggesting that such agreements deviate signifi-

cantly in terms of minimum wage standards. Conversely, estimated wage differentials between *MCA* and *MRCA* in Manufacturing and Other services sectors are much smaller in magnitude, and turn even positive in the upper tail of the distribution. Negative and considerable wage penalties are instead associated with lack of representativeness in Retail Trade industries, irrespective of the type of agreement.

5   Empirical strategy

In the empirical analysis, to estimate the wage differential associated with a broadly defined non-representative collective agreement (*NRCA*), we specify and estimate a simple earnings equation, for the 2005–2014 period. In the baseline specification, we regress the log of weekly nominal gross wages on a rich set of controls for worker, job and firm characteristics, a binary variable indicating whether the worker is covered by a non-representative agreement. We also include time and worker fixed-effects, to control, respectively, for common time shocks and time-invariant individual unobserved heterogeneity. In practice, we specify the following earnings equation:

$$logY_{it} = \beta \text{NRCA}_{it} + X'_{it}\gamma + \alpha_i + \delta_t + \epsilon_{it} \qquad (1)$$

where $logY_{it}$ is the log of weekly nominal gross wages of worker i in year t; NRCA_{it} is a dummy variable that takes value 1 when the worker is covered by a non-representative collective agreement; X_{it} is a vector of demographic, job and firm characteristics (age and its square, regional dummies for place of work, occupational dummies, a dummy for part-time work, type of contract, firm size and industry-level dummies); α_i and δ_t are, respectively, worker and time fixed-effects while ϵ_{it} is the error term. In our preferred specification standard errors are clustered at the worker level, to account for serial correlation within i. In alternative specifications, we cluster errors at the firm and job-match level (i.e. for each worker-firm pair), as errors may be correlated across individuals within the same firm or specific job-match (see Table A5 in the Appendix).

Notice that, if low productivity workers are more likely to be employed in (and covered by) firms that apply a non-representative collective agreement, positive selection in the unobservables would tend to overestimate the effect of *NRCA* on earnings and simple least squares estimates would be biased. To account for this selection effect in the unobservables, we always include in our preferred specification of equation (1) worker fixed-effects. In alternative specifications, we also estimate our wage equation with both individual and firm fixed-effects, as well as including job-match fixed effects (see Table A4 in the Appendix). Finally, time-varying shocks that affect both wages and the probability of being covered by *NRCA* may represent an additional threat to our empirical strategy. For example, an industry-specific (negative) shock could affect both workers'

13

reservation wages and firms' ability to pay, along with the (higher) probability of applying a non-representative agreement. Lacking a valid instrument, we address the above issue augmenting the richest specification of equation (1) with industry-year fixed effects (see Table A4).

Using equation (1) as our preferred specification, we first estimate the gross earnings differential for workers covered by any type of *NRCA* compared to those covered by *MRCA*. Second, to disentangle the *"mismatch" effect* of sector-level collective agreements that are negotiated outside the firm's main sector of economic activity (*MCA*), from the *"pirate" effect* of agreements signed by unknown unions and employers organizations, we estimate equation (1) including both MCA_{it} and PCA_{it} dummies. Third, we explore heterogeneity in collective agreements' wage differential and estimate equation (1) separately by gender, industry, firm size and job title (blue and white-collars). Finally, we investigate the effect of *MCA* and *PCA* on other labor market margins such as firms' compliance with negotiated minimum wage levels.

6   Results

6.1   The wage effects of "pirate" collective agreements

In this section, we report the estimates of earnings differentials for employees covered by non-representative collective agreements compared to other workers. The main set of results are obtained fitting different specifications of our baseline model (equation (1)) and estimated both by simple OLS and by linear fixed-effect estimator. The main results are shown in Table 2, where we report the coefficient estimates of our variables of interest: a *NRCA* dummy which pools both types of non-representative agreements (columns 1 and 3), and separate dummies for *MCA* and *PCA* (columns 2 and 4). In the main specification, we include demographic controls, job and firm characteristics, as well as regional dummies for place of work and year fixed effects. Our overall estimates of the pooled *NRCA* dummy show a gross earnings differential of about -5%, suggesting that employees covered by any non-representative collective agreements receive lower wages compared with employees covered by a regular agreement. When the coefficients of *MCA* and *PCA* are estimated separately, the wage gap associated with "pirate" agreements is three times larger (-15%) compared to *MCA* (-4.6%), supporting the idea that wage levels and other provisions negotiated in "pirate" agreements significantly deviate from regular collective agreements. Also, it indicates that firms that apply sector-level agreements negotiated in a different industry from their main activity do so to pay lower wages.

[Table 2 near here]

14

Results from the fixed-effects estimator confirm the above findings. Employees who move from being covered by a representative collective agreement to a non-representative agreement earn lower wages: the estimated differential associated with the $NRCA$ dummy is -4%. When the effects of the different agreements (MCA and PCA) are estimated separately, the wage penalties are -3.7% and -8% respectively. Hence, consistent with the hypothesis that low productivity workers are more likely to be employed in firms that apply "pirate" collective agreements (*positive selection*), we find evidence that OLS estimates are biased upwards and overestimate the effect of "pirate" agreements on earnings.

Overall the above results confirm that regulatory loopholes concerning both social partners' representativeness and the (correct) application of collective agreements have allowed firms to engage in collective agreements' dumping by either lowering work standards or selecting agreements that offer lower costs.

Some degree of heterogeneity in the earnings differentials associated to $NRCA$ is also found across several dimensions.

[Table 3 near here]

In Table 3, we show that large wage gaps are associated with MCA and PCA across all groups, with males, blue-collar workers and those employed in smaller firms suffering the largest penalties. In particular, we report a gradient in firm's size earnings differentials ranging from -9% (PCA in firms with up to 15 employees) to -2% (MCA in larger firms). Not surprisingly blue-collar workers show the largest earnings differential, since the dumping effects of "pirate" agreements mainly affects low-skilled workers with poor bargaining power and their work provisions, such as variable pay, overtime compensation, allowances for shift-work and sick leave, annual leave etc.[2]

Figure 3 Heterogeneity - by industry

---
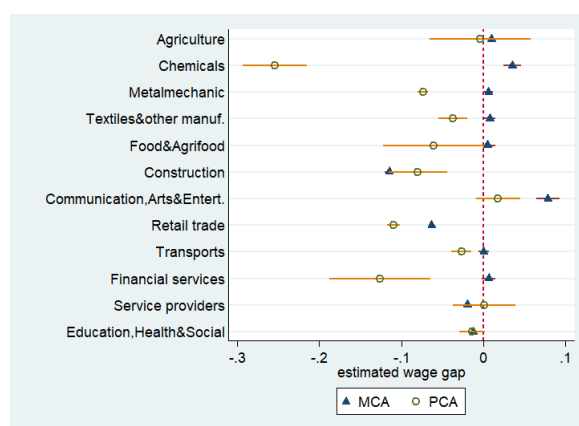
[2]As an example, consider that in the collective agreements signed by the main trade unions (CGIL, CISL, UIL and UGL), overtime work is compensated with a 20 to 25% premium for the first 2-3 hours and 30 to 50% for the following hours, while in most $NRCA$ overtime compensation does not exceed 15% of the base pay.

Also sizable earnings differentials by collective agreements' type are estimated across different industries. Results obtained estimating equation (1) separately by industry, along with 95% confidence intervals, are reported in Figure 3. We find that "pirate" agreements in industries such as Chemicals, Retail trade and Financial services exhibit wage penalties close to 15% on average, while Metalwork, Textile, Transport and Service providers show smaller penalties.

6.2 Firms' non-compliance

The increase in the number of "pirate" agreements and the progressive erosion of bargaining power, as previously discussed, also brought forward an increase in firms' non-compliance with *MRCAs'* sector-level minimum wages. While in the previous analysis we investigated the overall effects of *NRCA* on earnings levels, here we compare wages at the bottom of the distribution with the minimum wage determined in the most representative collective agreements (*minimi tabellari*). In particular, while *NRCA* most often deviate from a number of provisions offered by the most representative collective agreements (such as with variable pay, overtime compensation, allowances for shift-work and sick leave, annual leave, etc.), another margin of non-compliance found in "pirate" agreements is that a non-negligible share of employees, within the firm, is paid less than the minimum wage set in sector-level collective agreements for the lowest occupational category (the so-called *minimum minimorum*). It is useful to recall, as discussed in the introductory sections, that firms are mandated by law (for the purpose of social contributions and fiscal benefits) to pay the minimum wage levels set in collective agreements negotiated by the most representative unions and employers' organizations. Notice that in this context, firms' non-compliance is targeted specifically to low paid workers (low-skilled and less-experienced), with strong implications for the diffusion of working poverty. Recent empirical evidence for Italy shows that around 15% of workers are paid less than the minimum wage set in *MRCA*, and that non-compliance tends to be higher in those sectors where the "bite" of the negotiated minimum wage is higher compared to median wages – i.e. the Kaitz index (Garnero, 2018; Garnero and Lucifora, 2019). In this section, we use data on negotiated minimum wages, drawn from 90 collective agreements regularly monitored by ISTAT[3], to investigate the relationship between firms' non-compliance behaviour and "pirate" agreements (see Garnero and Lucifora (2019)).

In practice, using a fixed-effect linear probability model (LPM), we estimate the likelihood that workers covered by a *NRCA* (and *MCA*, *PCA* respectively) receive a wage below the minimum wage threshold set in the relevant sector-level collective agreement.

---

[3]ISTAT collects information on negotiated wages before taxes and transfers (also including 13th or 14th monthly payment, while performance-related-pay, seniority or other type of payments are not included). Minimum wage levels are classified according to 2-digit NACE rev.1, which we use in the matching with the INPS data.

We then replicate the above estimation separately for large and small firms (up to 15 employees).[4]

[Table 4 near here]

Overall, non-representative collective agreements are associated with a 3% increase in the probability of non-compliance with the sector-level negotiated minimum wages for the least-skilled occupation, that rises to 8% when the worker is covered by a *"pirate"* agreement. The probability of firm's non-compliance is evenly distributed between small and large firms, with estimated non-compliance of comparable magnitudes.

6.3   Sensitivity analysis

We perform a number of sensitivity analyses to check the robustness of our main findings against alternative specifications and samples. First, if the type of collective agreement is correlated with the assignment of workers into specific jobs (e.g. firms might hire workers with lower occupational levels to save on labor costs), then controlling for part-time, type of occupation or type of contract might bias upward the *NRCA* coefficient. To address this concern, we estimate equation (1) removing the set of controls for job type, and find consistent results (col. 3-4, Table A3).

Second, we replace weekly with daily earnings as dependent variable, since paid weeks refer to weeks in which the employee has worked at least one day. We re-estimate our baseline model with log daily wages and show that the wage differentials associated with non representative collective agreements are comparable (col. 5-6).

Third, we assess the sensitivity of our estimates to a specific event – i.e. FCA decision, in 2011, to opt out of the national metalwork collective agreement to sign a stand-alone firm-level agreement (up to 86,000 covered employees) –, and re-estimate our baseline model excluding all firms in the metalwork industry. Results without metalwork firms (col. 7-8, Table A3) show a larger estimated coefficient on *PCA*, suggesting that "pirate" agreements in the industry (such as FCA's) offer wage levels in line with regular agreements.

Fourth, to account for selection effects and unobserved heterogeneity at the firm and job-match level we estimate equation (1) including both individual and firm fixed effects, as well as with fixed effects for each worker-firm pair (job match). This way we are able

---

[4]Since the inclusion of individual fixed effects does not provide consistent estimates for binary choice models with panel data, given that unobserved time-invariant heterogeneity is likely to be a relevant issue in our model, we estimate minimum wage compliance through a linear probability model. While a viable alternative could be that of estimating a conditional logit fixed-effects (CLFE) model, such option is not ideal in our case due to the computationally intensive requirements with big data, and the strong reliance on functional forms. We also experimented a random-effects logit model. Results, not reported here, are comparable.

to account for possible sorting of firms into non-representative agreements, also allowing productivity to depend on how workers and firms are matched. Thus, we identify the effect on earnings differentials for a selected group of employees who move from a regular collective agreement to a non-representative agreement within the same firm (i.e. firm is switching the type of collective agreement). Moreover, lacking a valid instrument, we attempt to control for time-varying shocks that affect both workers' wages and their likelihood of being covered by $NRCA$ by including industry-year fixed effects to our richest specification. Results from these exercises are presented in Table A4 in the Appendix, along with baseline estimates for comparison purposes. The estimated coefficient on the PCA dummy gets relatively smaller in magnitude once unobserved heterogeneity is controlled for (-5%), but it remains strongly significant (col. 3-4). Conversely, negative wage differentials associated with "contractual shopping" behaviors seem to be mainly driven by sorting mechanisms – lower-productivity lower-paying firms are more likely to enforce MCA to save on labor costs. When firm and job-match fixed effects are added to the baseline specification, the coefficient of the MCA dummy shows that workers who cease to be covered by a regular collective agreement and move to a MCA within the same firm do not experience any wage penalty. Results from the most flexible specification, including industry-year fixed effects, are virtually unchanged (col. 5-6).

Finally, in our baseline model we have clustered standard errors within i, however, since errors might also be correlated across workers within the same firm (or worker-firm pair), we replicate our estimation exercise using alternative clustering rules. Results are consistent (Table A5), even though standard errors clustered at the firm and job-match level are slightly larger than those at the individual level, suggesting that part of the residual variance is shared across workers.

7 Conclusions

We document the dramatic increase in the number of sector-level collective agreements, occurred in Italy in recent years, with particular reference to those agreements signed by unknown organizations – i.e. the so-called "pirate" agreements. The diffusion of "pirate" agreements paved the way to a "race-to-the-bottom" in negotiated minimum wages and other collective bargaining provisions. This unregulated change in the structure of collective bargaining is the result of different factors, ranging from unions and employers' associations fragmentation, regulatory uncertainty about social partners' representativeness, as well as firms deliberately opting out from the system of collective bargaining. These trends are shared by a number of other European countries in which opt-out clauses and a growing decentralization of bargaining have eroded the relevance of sector-level agreements in the regulation of labor contracts.

In this paper, we use a matched employer-employee longitudinal dataset, drawn from

the INPS archives, to investigate the issue of collective agreement representativeness and estimate the wage effects of the diffusion of "pirate" agreements. We find evidence of a significant dumping effect on wages associated with different types of non-representative collective agreements, relative to other firms with regular collective agreements. An average wage penalty of 15% is estimated for employees covered by a "pirate" agreement, half of which is accounted for by selection effects, that is low productivity individuals more likely to be employed in firms adopting "pirate" collective agreements. Differences by firm size and industry affiliation exist both in the diffusion of "pirate" agreements, as well as in the magnitude of the wage penalties: large firms in non-manufacturing industries are found more likely to apply a "pirate" agreement, but show a relatively smaller wage penalty compared to small firms.

We also show that "shopping" behaviors adopted by firms to select the most convenient collective agreement in terms of labor costs are associated with lower wages, with workers covered by MCA earning on average 4% less than workers employed under regular collective agreements. However, such negative differential appears to be driven by workers sorting into lower-productivity and lower-paying firms or sorting into worse matches.

Finally, we find that firms with non-representative agreements are also less likely to comply with the negotiated minimum wages set in collective agreements signed by the most representative social partners, suggesting that at least part of the dumping effect of "pirate" agreements goes through lower minimum wages and weaker labor standards.

A related argument for the debate is whether the uncoordinated evolution of the structure of collective bargaining which we have documented here, along with the diffusion of "pirate" collective agreements, is desirable to achieve a more efficient wage-employment trade-off compared to the current setting of national collective agreements. In other words, our findings raise the issue for the policymakers as to whether the wage flexibility necessary to increase the resilience of the Italian labor market to economic shocks has to be regulated and left with the responsibility of the most representative social parties, or should it be left unregulated to the market and to the dumping effects of "pirate" agreements, as it is the case now.

References

Ashenfelter, O. and Smith, R. (1979), 'Compliance with the minimum wage law', *Review of Economics and Statistics* **87**(3), 333–350.

Avouyi-Dovi, S., Fougère, D. and Gautier, E. (2013), 'Wage rigidity, collective bargaining, and the minimum wage: evidence from French agreement data', *Review of Economics and Statistics* **95**(4), 1337–1351.

Bassanini, A., Garnero, A., Marianna, P. and Martin, S. (2010), 'Institutional determinants of worker flows', *OECD Social, Employment and Migration Working Papers* (WP No.107).

Baumgarten, D. and Lehwald, S. (2019), 'Trade Exposure and the Decline in Collective Bargaining: Evidence from Germany', *CESifo Working Papers* (WP No.7754).

Boeri, T. (2014), 'Two-tier bargaining', *IZA Discussion Paper* (DP No.8358).

Boeri, T. (2015), 'Perverse effects of two-tier wage bargaining structures', *IZA World of Labor* . doi: 10.15185/izawol.101.

Boeri, T. and Burda, M. (2009), 'Preferences for collective versus individualised wage setting', *The Economic Journal* **119**(540), 1440–1463.

Brändle, T. and Goerke, L. (2018), 'The one constant: a causal effect of collective bargaining on employment growth? Evidence from German linked-employer-employee data', *Scottish Journal of Political Economy* **65**(5), 445–478.

Bryson, A. and Dale-Olsen, H. (2008), 'A tale of two countries: unions, closures and growth in Britain and Norway', *CEP Discussion Paper* (DP No.867).

Calmfors, L. and Driffill, J. (1988), 'Bargaining structure, corporatism and macroeconomic performance', *Economic policy* **3**(6), 13–61.

Card, D., Heining, J. and Kline, P. (2013), 'Workplace heterogeneity and the rise of West German wage inequality', *The Quarterly journal of economics* **128**(3), 967–1015.

Cardoso, A. R. and Portugal, P. (2005), 'Contractual wages and the wage cushion under different bargaining settings', *Journal of Labor Economics* **23**(4), 875–902.

D'Amuri, F. and Giorgiantonio, C. (2014), 'Diffusion and outlook of firm-level bargaining in Italy', *Questioni di Economia e Finanza - Occasional Papers* (No.21).

Devicienti, F., Fanfani, B. and Maida, A. (2018), 'Collective Bargaining and the Evolution of Wage Inequality in Italy', *British Journal of Industrial Relations* .

Díez-Catalán, L. and Villanueva, E. (2015), 'Contract staggering and unemployment during the great recession: evidence from Spain', *Banco de España working paper* (WP No.1431).

DiNardo, J. and Lee, D. S. (2004), 'Economic impacts of new unionization on private sector employers: 1984–2001', *The Quarterly Journal of Economics* **119**(4), 1383–1441.

Dustmann, C., Fitzenberger, B., Schönberg, U. and Spitz-Oener, A. (2014), 'From sick man of Europe to economic superstar: Germany's resurgent economy', *Journal of Economic Perspectives* **28**(1), 167–88.

Eurofound (2010), 'Derogation clauses on wages in sectoral collective agreements in seven European countries', *Publication Office of the European Union, Luxembourg* .

European Commission (2016), 'Country Report Italy', *Publication Office of the European Union, Luxembourg* . `http://ec.europa.eu/info/sites/info/files/cr_italy_2016_en.pdf`.

Freeman, R. and Medoff, J. (1984), 'What Do Unions Do', *N.Y. Basic Books* .

Garnero, A. (2018), 'The dog that barks doesn't bite: coverage and compliance of sectoral minimum wages in Italy', *IZA Journal of Labor Policy* **7**(1), 3.

Garnero, A. and Lucifora, C. (2019), 'Turning a blind eye? Compliance to minimum wages and employment', *CoBExt Working Paper* .

Gürtzgen, N. (2009), 'Rent-sharing and collective bargaining coverage: Evidence from linked employer–employee data', *Scandinavian Journal of Economics* **111**(2), 323–349.

Haucap, J., Pauly, U. and Wey, C. (2001), 'Collective wage setting when wages are generally binding: An antitrust perspective', *International Review of Law and Economics* **21**(3), 287–307.

Izquierdo, M., Jimeno, J. F., Kosma, T., Lamo, A., Millard, S., Rõõm, T. and Viviano, E. (2017), 'Labour market adjustment in Europe during the crisis: microeconomic evidence from the Wage Dynamics Network survey', *European Central Bank Occasional Paper Series* (OP No.192).

Jimeno, J. F. and Thomas, C. (2013), 'Collective bargaining, firm heterogeneity, and unemployment', *European Economic Review* **59**, 63–79.

Leonardi, S., Ambra, M. C. and Ciarini, A. (2017), Italian collective bargaining at a turning point, *in* S. Leonardi and R. Pedersini, eds, 'Multi-employer bargaining under pressure: decentralisation trends in five European countries', ETUI, Brussels.

Martins, P. (2014), '30,000 minimum wages: The economic effects of collective agreement extensions', *IZA Discussion Paper* **DP No.8540**.

Martins, P. S. (2009), 'Rent sharing before and after the wage bill', *Applied Economics* **41**(17), 2133–2151.

OECD (2018), 'The role of collective bargaining systems for good labour market performance', *OECD Employment Outlook* **Chapter 4**, 73–122.

Ronchi, M. and Di Mauro, F. (2017), 'Wage bargaining regimes and firms' adjustments to the Great Recession', *European Central Bank Working Paper Series* (WP No.2051).

Rusinek, M. and Rycx, F. (2013), 'Rent-Sharing under Different Bargaining Regimes: Evidence from Linked Employer–Employee Data', *British Journal of Industrial Relations* **51**(1), 28–58.

Traxler, F. (2004), 'Employer associations, institutions and economic change: a crossnational comparison', *Industrielle Beziehungen: Zeitschrift für Arbeit, Organisation und Management* **11**(1/2), 42–60.

Visser, J. (2013), Wage Bargaining Institutions–from crisis to crisis, Technical report, Directorate General Economic and Financial Affairs (DG ECFIN), European Commission.

Visser, J. (2015), 'Institutional characteristics of trade unions, wage-setting, state intervention and social pacts (ICTWSS), an international database', *Amsterdam Institute for Advanced Labour Studies (AIAS)* .

8 Tables

Table 1 National collective agreements: *MRCA, MCA, PCA* by industry (2014)

Industry	MRCA	MCA	PCA
Manufacturing			
Agriculture	0.472	0.519	0.009
Chemicals	0.777	0.217	0.006
Metalwork	0.881	0.081	0.038
Textiles & other manuf.	0.777	0.214	0.009
Food & Agrifood	0.867	0.132	0.001
Construction	0.647	0.352	0.001
Retail trade	0.757	0.234	0.009
Other Services			
Transports	0.764	0.220	0.016
Financial services	0.888	0.110	0.001
Service providers	0.782	0.215	0.002
Education, Health & Social work	0.715	0.270	0.015
Communication, Art & Entert.	0.371	0.615	0.014
Total	0.752	0.235	0.013

Note: Figures reported are row percentages.

Table 2 Estimated earnings differentials: *NRCA*

	OLS		Fixed-effect	
NRCA	-0.0490***		-0.0393***	
	(0.0005)		(0.0006)	
MCA		-0.0462***		-0.0368***
		(0.0005)		(0.0006)
PCA		-0.155***		-0.0819***
		(0.0030)		(0.0021)
Worker FE			✓	✓
R^2	0.433	0.433	0.815	0.815
N	9,078,834	9,078,834	8,911,350	8,911,350

Robust standard errors in parentheses, clustered at the worker level. Significance: * p<.1, ** p<.05, *** p<.01. Each model includes the full set of controls for age (quadratic), regional dummies for place of work, occupation (white collar, blue-collar, apprentice), part-time, type of contract (open-ended, fixed-term and seasonal), firm's number of employees ($\leq 15, 16-50, 51-300, > 300$) and industrial sector (ATECO-2002 recoded into 10 categories according with CCNL sectors).

Table 3   Heterogeneity - by gender, firm size and occupation

	Gender		Occupation		Firm size	
	Female	*Male*	*Blue-collar*	*White-collar*	*Up to 15*	*>15*
MCA	-0.0299***	-0.0400***	-0.0500***	-0.00492***	-0.0485***	-0.0214***
	(0.0010)	(0.0008)	(0.0008)	(0.0011)	(0.0011)	(0.0008)
PCA	-0.0704***	-0.0863***	-0.103***	-0.0232***	-0.0927***	-0.0706***
	(0.0038)	(0.0025)	(0.0026)	(0.0033)	(0.0070)	(0.0022)
Worker FE	✓	✓	✓	✓	✓	✓
R^2	0.764	0.837	0.713	0.878	0.748	0.855
N	3,431,505	5,479,845	5,266,604	3,545,575	3,452,551	5,269,753

Robust standard errors in parentheses, clustered at the worker level. Significance: * p<.1, ** p<.05, *** p<.01. Results are obtained using the full set of controls.

Table 4   Minimum wage compliance (Linear probability model)

	Baseline		Firm size			
			Up to 15		>15	
NRCA	0.0314***		0.0276***		0.0269***	
	(0.000614)		(0.00124)		(0.000794)	
MCA		0.0285***		0.0267***		0.0222***
		(0.000625)		(0.00125)		(0.000815)
PCA		0.0803***		0.0765***		0.0737***
		(0.00232)		(0.00762)		(0.00248)
Worker FE	✓	✓	✓	✓	✓	✓
R^2	0.792	0.792	0.803	0.803	0.808	0.808
N	8,911,350	8,911,350	3,452,551	3,452,551	5,269,753	5,269,753

Robust standard errors in parentheses, clustered at the worker level. Significance: * p<.1, ** p<.05, *** p<.01. Results are obtained using the full set of controls.

9 Appendix

Table A1 Sample descriptive statistics

Variables	Total sample	Males	Females
Average			
Age	38.81	39.27	38.08
Median	(38)	(39)	(38)
Weekly earnings	453.85	477.94	415.55
Median	(400)	(416)	(375)
Share			
Female	0.398		
Part-time	0.222	0.107	0.404
Open-ended contract	0.825	0.840	0.802
Fixed-term contract	0.161	0.149	0.179
Seasonal contract	0.013	0.01	0.019
White-collar	0.358	0.264	0.508
Blue-collar	0.598	0.696	0.443
Apprentice	0.043	0.040	0.049
Firm size (1-15 employees)	0.401	0.390	0.418
16-50 employees	0.165	0.177	0.146
51-300 employees	0.191	0.199	0.178
300+ employees	0.243	0.234	0.258
Industry			
Agriculture	0.006	0.006	0.005
Chemicals	0.034	0.041	0.025
Metalwork	0.148	0.194	0.074
Textiles & other manuf.	0.066	0.057	0.079
Food & Agrifood	0.033	0.033	0.033
Construction	0.113	0.170	0.023
Retail trade	0.381	0.298	0.514
Transports	0.057	0.076	0.027
Financial services	0.037	0.031	0.046
Service providers	0.024	0.030	0.014
Education,Health & Social work	0.054	0.019	0.109
Communication,Arts & Entert.	0.047	0.045	0.051
Share of workers covered by *PCA*	0.016	0.017	0.015
Obs.	9,078,834	5,573,876	3,504,958

Table A2 National collective agreements by industry (Metalwork, Chemical and Transports): Selected *MRCA*, *MCA* and *PCA* (2014)

Collective agreement	Employers' Associations	Trade Unions	Workers		Firms	
			%	Cum.	%	Cum.
METALWORK						
Industries	CONFINDUSTRIA;FEDERMECCANICA; Assistal	Fiom-CGIL;Fim-CISL;Uilm-UIL	58.75	58.75	40.08	40.07
S.M.I.	UNIONMECCANICA CONFAPI	Fiom-CGIL;Fim-CISL;Uilm-UIL	15.45	74.20	20.43	60.50
Artisans	CNA;CONFARTIGIANATO; Casartigiani;CLAAI	Fiom-CGIL;Fim-CISL;Uilm-UIL	13.88	88.08	31.38	91.88
MCA			8.08	96.17	7.94	99.82
PCA			3.83	100.00	0.18	100.00
CHEMICALS						
CHEM/PHARMA Industries	FEDERCHIMICA;FARMINDUSTRIA	Filctem-CGIL;Femca- CISL;Uiltec-UIL	35.99	35.99	21.35	21.34
CHEM/PHARMA S.M.I.	UNIONCHIMICA CONFAPI	Filctem-CGIL;Femca-CISL;Uiltec-UIL	3.08	39.07	5.71	27.05
PLASTICS/RUBBER:Industries	CONFINDUSTRIA;FEDERAZIONE G&P; ASS.IT.PNEUMATICI	Filctem-CGIL;Femca-CISL;Uiltec-UIL	27.92	66.99	25.25	52.30
PLASTICS/RUBBER:S.M.I.	UNIONCHIMICA CONFAPI	Filctem-CGIL;Femca-CISL;Uiltec-UIL	6.08	73.07	9.44	61.74
CHEM&others:	FEDARCOM;CIFA	Fesica-CONFSAL;Fisals-CONFSAL; CONFSAL	2.72	75.8	7.47	69.22
S.M.I.Coop,Artisans ENERGY&OIL	CONFINDUSTRIA ENERGIA	Filctem-CGIL;Femca-CISL;Uiltec-UIL	1.93	77.73	1.00	70.22
MCA			21.69	99.41	29.60	99.82
PCA			0.59	100.00	0.18	100.00
TRANSPORTS						
TRANS&LOGISTICS	AITE;AITI;Assoespressi; Assologistica;Fedespedi; Trasportounito FIAP;FISI; CONFETRA;FEDIT;ANITA; FAI;Assotir;Federtraslochi; Federlogistica;FIAP;UNITAI; Conftrasporto;CNA-FITA; Confartigianato TRASPORTI; SNA-Casartigiani;CLAAI	Filt-CGIL;Fit-CISL;Uiltrasporti-UIL	46.47	46.47	54.71	54.69
TRANSPORTS: S.M.I., Artisans and Coop	Federimprenditori	FAMAR;CONFAMAR	2.07	48.54	3.74	58.43
PUBLIC TRANS. workers	ASSTRA;ANAV	Filt-CGIL;Fit-CISL;Uiltrasporti-UIL	15.45	63.99	4.62	63.05
CAR RENTAL	UNCI	FAST Confsal;FAST Noleggio Confsal	3.49	67.48	6.03	69.08
CABLEWAYS	ANEF	Filt-CGIL;Fit-CISL;Uiltrasporti-UIL; SAVT	1.05	68.54	1.15	70.23
AIR Transport	Assaereo;Assaeroporti; Assohandlers;Assocontrol;Assocatering	Filt-CGIL;Fit-CISL;Uiltrasporti-UIL UGL-Trasporti	6.23	74.77	2.58	72.83
PORTS: port workers	Assiterminal;Assologistica; Assoporti;FISE-Uniport	Filt-CGIL;Fit-CISL;Uiltrasporti-UIL	1.67	76.43	0.88	73.69
MCA		21.99	98.42	25.50	99.17	
PCA			1.58	100.00	0.83	100.00

Table A3 Estimated wage gaps for NRCA: alternative specifications

	Baseline		No job characteristics		Log(daily wages)		Excluding metal industry	
NRCA	-0.0393***		-0.0385***		-0.0508***		-0.0416***	
	(0.0006)		(0.0006)		(0.0006)		(0.0007)	
MCA		-0.0368***		-0.0358***		-0.0515***		-0.0397***
		(0.0006)		(0.0006)		(0.0006)		(0.0007)
PCA		-0.0819***		-0.0831***		-0.0389***		-0.100***
		(0.0021)		(0.0021)		(0.0019)		(0.0028)
Worker FE	✓	✓	✓	✓	✓	✓	✓	✓
R^2	0.815	0.815	0.810	0.810	0.775	0.775	0.812	0.812
N	8,911,350	8,911,350	8,911,350	8,911,350	8,911,222	8,911,222	7,561,354	7,561,354

Robust standard errors in parentheses, clustered at the worker level. Significance: * p<.1, ** p<.05, *** p<.01. Results are obtained using the full set of controls, except for col. 3-4.

Table A4 Estimated wage gaps for NRCA: unobserved heterogeneity

	Baseline		Match effects		Industry-year FE	
NRCA	-0.0393***		-0.0102***		-0.0107***	
	(0.0006)		(0.0011)		(0.0011)	
MCA		-0.0368***		-0.0011		-0.0015
		(0.0006)		(0.0011)		(0.0011)
PCA		-0.0819***		-0.0516***		-0.0532***
		(0.0021)		(0.0027)		(0.0027)
Worker FE	✓	✓	✓	✓	✓	✓
Firm FE			✓	✓	✓	✓
Job-match FE			✓	✓	✓	✓
Industry-year FE					✓	✓
R^2	0.815	0.815	0.891	0.891	0.892	0.892
N	8,911,350	8,911,350	7,958,305	7,958,305	7,958,305	7,958,305

Robust standard errors in parentheses, clustered at the worker (col. 1-2) and worker×firm (col. 3-6) level. Significance: * p<.1, ** p<.05, *** p<.01. Results are obtained using the full set of controls.

Table A5 Estimated wage gap for NRCA: alternative clustering of the std errors

	Baseline		Match Effects	
NRCA	-0.0393***		-0.0102	
	(0.0005)		(0.0069)	
MCA		-0.0368***		-0.0011
		(0.0005)		(0.0027)
PCA		-0.0819***		-0.0516**
		(0.0019)		(0.0222)
Worker FE	✓	✓	✓	✓
Firm FE			✓	✓
Job-match FE			✓	✓
Std err. clustering	Worker×Firm	Worker×Firm	Firm	Firm
R^2	0.891	0.891	0.891	0.891
N	7,958,305	7,958,305	7,958,305	7,958,305
N. clusters	1,725,443	1,725,443	716,434	716,434

Robust standard errors in parentheses, clustered at the worker×firm (col.1-2) and firm level (col. 3-4). Significance: * p<.1, ** p<.05, *** p<.01. Results are obtained using the full set of controls.

Working Paper del Dipartimento di Economia e Finanza

1. L. Colombo, H. Dawid, *Strategic Location Choice under Dynamic Oligopolistic Competition and Spillovers*, novembre 2013.
2. M. Bordignon, M. Gamalerio, G. Turati, *Decentralization, Vertical Fiscal Imbalance, and Political Selection*, novembre 2013.
3. M. Guerini, *Is the Friedman Rule Stabilizing? Some Unpleasant Results in a Heterogeneous Expectations Framework*, novembre 2013.
4. E. Brenna, C. Di Novi, *Is caring for elderly parents detrimental to women's mental health? The influence of the European North-South gradient*, novembre 2013.
5. F. Sobbrio, *Citizen-Editors' Endogenous Information Acquisition and News Accuracy*, novembre 2013.
6. P. Bingley, L. Cappellari, *Correlation of Brothers Earnings and Intergenerational Transmission*, novembre 2013.
7. T. Assenza, W. A. Brock, C. H. Hommes, *Animal Spirits, Heterogeneous Expectations and the Emergence of Booms and Busts,* dicembre 2013.
8. D. Parisi, *Is There Room for 'Fear' as a Human Passion in the Work by Adam Smith?*, gennaio 2014.
9. E. Brenna, F. Spandonaro, *Does federalism induce patients' mobility across regions? Evidence from the Italian experience*, febbraio 2014.
10. A. Monticini, F. Ravazzolo, *Forecasting the intraday market price of money*, febbraio 2014.
11. Tiziana Assenza, Jakob Grazzini, Cars Hommes, Domenico Massaro, *PQ Strategies in Monopolistic Competition: Some Insights from the Lab*, marzo 2014.
12. R. Davidson, A. Monticini, *Heteroskedasticity-and-Autocorrelation-Consistent Bootstrapping,* marzo 2014.
13. C. Lucifora, S. Moriconi, *Policy Myopia and Labour Market Institutions*, giugno 2014.
14. N. Pecora, A. Spelta, *Shareholding Network in the Euro Area Banking Market,* giugno 2014.
15. G. Mazzolini, *The economic consequences of accidents at work*, giugno 2014.
16. M. Ambrosanio, P. Balduzzi, M. Bordignon, *Economic crisis and fiscal federalism in Italy*, settembre 2014.
17. P. Bingley, L. Cappellari, K. Tatsiramos, *Family, Community and Long-Term Earnings Inequality*, ottobre 2014.
18. S. Frazzoni, M. L. Mancusi, Z. Rotondi, M. Sobrero, A. Vezzulli, *Innovation and export in SMEs: the role of relationship banking,* novembre 2014.
19. H. Gnutzmann, *Price Discrimination in Asymmetric Industries: Implications for Competition and Welfare,* novembre 2014.
20. A. Baglioni, A. Boitani, M. Bordignon, *Labor mobility and fiscal policy in a currency union*, novembre 2014.
21. C. Nielsen, *Rational Overconfidence and Social Security*, dicembre 2014.
22. M. Kurz, M. Motolese, G. Piccillo, H. Wu, *Monetary Policy with Diverse Private Expectations*, febbraio 2015.
23. S. Piccolo, P. Tedeschi, G. Ursino, *How Limiting Deceptive Practices Harms Consumers*, maggio 2015.
24. A.K.S. Chand, S. Currarini, G. Ursino, *Cheap Talk with Correlated Signals*, maggio 2015.
25. S. Piccolo, P. Tedeschi, G. Ursino, *Deceptive Advertising with Rational Buyers*, giugno 2015.

26. S. Piccolo, E. Tarantino, G. Ursino, *The Value of Transparency in Multidivisional Firms*, giugno 2015.
27. G. Ursino, *Supply Chain Control: a Theory of Vertical Integration*, giugno 2015.
28. I. Aldasoro, D. Delli Gatti, E. Faia, *Bank Networks: Contagion, Systemic Risk and Prudential Policy*, luglio 2015.
29. S. Moriconi, G. Peri, *Country-Specific Preferences and Employment Rates in Europe*, settembre 2015.
30. R. Crinò, L. Ogliari, *Financial Frictions, Product Quality, and International Trade*, settembre 2015.
31. J. Grazzini, A. Spelta, *An empirical analysis of the global input-output network and its evolution,* ottobre 2015.
32. L. Cappellari, A. Di Paolo, *Bilingual Schooling and Earnings: Evidence from a Language-in-Education Reform*, novembre 2015.
33. A. Litina, S. Moriconi, S. Zanaj, *The Cultural Transmission of Environmental Preferences: Evidence from International Migration*, novembre 2015.
34. S. Moriconi, P. M. Picard, S. Zanaj, *Commodity Taxation and Regulatory Competition*, novembre 2015.
35. M. Bordignon, V. Grembi, S. Piazza, *Who do you blame in local finance? An analysis of municipal financing in Italy,* dicembre 2015.
36. A. Spelta, *A unified view of systemic risk: detecting SIFIs and forecasting the financial cycle via EWSs*, gennaio 2016.
37. N. Pecora, A. Spelta, *Discovering SIFIs in interbank communities*, febbraio 2016.
38. M. Botta, L. Colombo, *Macroeconomic and Institutional Determinants of Capital Structure Decisions,* aprile 2016.
39. A. Gamba, G. Immordino, S. Piccolo, *Organized Crime and the Bright Side of Subversion of Law*, maggio 2016.
40. L. Corno, N. Hildebrandt, A. Voena, *Weather Shocks, Age of Marriage and the Direction of Marriage Payments,* maggio 2016.
41. A. Spelta, *Stock prices prediction via tensor decomposition and links forecast,* maggio 2016.
42. T. Assenza, D. Delli Gatti, J. Grazzini, G. Ricchiuti, *Heterogeneous Firms and International Trade: The role of productivity and financial fragility*, giugno 2016.
43. S. Moriconi, *Taxation, industry integration and production efficiency*, giugno 2016.
44. L. Fiorito, C. Orsi, *Survival Value and a Robust, Practical, Joyless Individualism: Thomas Nixon Carver, Social Justice, and Eugenics*, luglio 2016.
45. E. Cottini, P. Ghinetti, *Employment insecurity and employees' health in Denmark*, settembre 2016.
46. G. Cecere, N. Corrocher, M. L. Mancusi, *Financial constraints and public funding for eco-innovation: Empirical evidence on European SMEs,* settembre 2016.
47. E. Brenna, L. Gitto, *Financing elderly care in Italy and Europe. Is there a common vision?*, settembre 2016.
48. D. G. C. Britto, *Unemployment Insurance and the Duration of Employment: Theory and Evidence from a Regression Kink Design*, settembre 2016.
49. E. Caroli, C.Lucifora, D. Vigani, *Is there a Retirement-Health Care utilization puzzle? Evidence from SHARE data in Europe*, ottobre 2016.
50. G. Femminis, *From simple growth to numerical simulations: A primer in dynamic programming*, ottobre 2016.
51. C. Lucifora, M. Tonello, *Monitoring and sanctioning cheating at school: What works? Evidence from a national evaluation program*, ottobre 2016.

52. A. Baglioni, M. Esposito, *Modigliani-Miller Doesn't Hold in a "Bailinable" World: A New Capital Structure to Reduce the Banks' Funding Cost*, novembre 2016.
53. L. Cappellari, P. Castelnovo, D. Checchi, M. Leonardi, *Skilled or educated? Educational reforms, human capital and earnings,* novembre 2016.
54. D. Britto, S. Fiorin, *Corruption and Legislature Size: Evidence from Brazil*, dicembre 2016.
55. F. Andreoli, E. Peluso, *So close yet so unequal: Reconsidering spatial inequality in U.S. cities*, febbraio 2017.
56. E. Cottini, P. Ghinetti, *Is it the way you live or the job you have? Health effects of lifestyles and working conditions,* marzo 2017.
57. A. Albanese, L. Cappellari, M. Leonardi, *The Effects of Youth Labor Market Reforms: Evidence from Italian Apprenticeships*; maggio 2017.
58. S. Perdichizzi, *Estimating Fiscal multipliers in the Eurozone. A Nonlinear Panel Data Approach*, maggio 2017.
59. S. Perdichizzi, *The impact of ECBs conventional and unconventional monetary policies on European banking indexes returns*, maggio 2017.
60. E. Brenna, *Healthcare tax credits: financial help to taxpayers or support to higher income and better educated patients? Evidence from Italy*, giugno 2017.
61. G. Gokmen, T. Nannicini, M. G. Onorato, C. Papageorgiou, *Policies in Hard Times: Assessing the Impact of Financial Crises on Structural Reforms*, settembre 2017.
62. M. Tettamanzi, *E Many Pluribus Unum: A Behavioural Macro-Economic Agent Based Model,* novembre 2017.
63. A. Boitani, C. Punzo, *Banks' leverage behaviour in a two-agent New Keynesian model*, gennaio 2018.
64. M. Bertoni, G. Brunello, L. Cappellari, *Parents, Siblings and Schoolmates. The Effects of Family-School Interactions on Educational Achievement and Long-term Labor Market Outcomes,* gennaio 2018.
65. G. P. Barbetta, G. Sorrenti, G. Turati, *Multigrading and Child Achievement,* gennaio 2018.
66. S. Gagliarducci, M. G. Onorato, F. Sobbrio, G. Tabellini, *War of the Waves: Radio and Resistance During World War II,* febbraio 2018.
67. P. Bingley, L. Cappellari, *Workers, Firms and Life-Cycle Wage Dynamics*, marzo 2018.
68. A. Boitani, S. Perdichizzi, *Public Expenditure Multipliers in recessions. Evidence from the Eurozone*, marzo 2018.
69. M. Le Moglie, G. Turati, *Electoral Cycle Bias in the Media Coverage of Corruption News*, aprile 2018.
70. R. Davidson, A. Monticini, *Improvements in Bootstrap Inference*, aprile 2018.
71. R. Crinò, G. Immordino, S. Piccolo, *Fighting Mobile Crime*, giugno 2018.
72. R. Caminal, L. Cappellari, A. Di Paolo, *Linguistic skills and the intergenerational transmission of language,* agosto 2018.
73. E. Brenna, L. Gitto, *Adult education, the use of Information and Communication Technologies and the impact on quality of life: a case study,* settembre 2018.
74. M. Bordignon, Y. Deng, J. Huang, J. Yang, *Plunging into the Sea: Ideological Change, Institutional Environments and Private Entrepreneurship in China,* settembre 2018.
75. M. Bordignon, D. Xiang, L. Zhan, *Predicting the Effects of a Sugar Sweetened Beverage Tax in a Household Production Model,* settembre 2018.
76. C. Punzo, L. Rossi, *The Redistributive Effects of a Money-Financed Fiscal Stimulus*, gennaio 2019.
77. A. Baglioni, L. Colombo, P. Rossi, *Debt restructuring with multiple bank relationships*, gennaio 2019.

78. E. Cottini, P. Ghinetti, S. Moriconi, *Higher Education Supply, Neighbourhood effects and Economic Welfare,* febbraio 2019.
79. S. Della Lena, F. Panebianco, *Cultural Transmission with Incomplete Information: Parental Perceived Efficacy and Group Misrepresentation,* marzo 2019.
80. T. Colussi, Ingo E. Isphording, Nico Pestel, *Minority Salience and Political Extremism*, marzo 2019.
81. G. P. Barbetta, P. Canino, S. Cima, *Let's tweet again? The impact of social networks on literature achievement in high school students: Evidence from a randomized controlled trial*, maggio 2019.
82. Y. Brilli, C. Lucifora, A. Russo, M. Tonello, *Vaccination take-up and health: evidence from a flu vaccination program for the elderly*, giugno 2019.
83. C. Di Novi, M. Piacenza, S. Robone, G. Turati, *Does fiscal decentralization affect regional disparities in health? Quasi-experimental evidence from Italy,* luglio 2019.
84. L. Abrardi, L. Colombo, P. Tedeschi, *The Gains of Ignoring Risk: Insurance with Better Informed Principals,* luglio 2019.
85. A. Garnero, C. Lucifora, *Turning a Blind Eye? Compliance to Minimum Wages and Employment,* gennaio 2020.
86. M. Bordignon, M. Gamalerio, E. Slerca, G. Turati, *Stop invasion! The electoral tipping point in anti-immigrant voting,* marzo 2020.
87. D. Vigani, C. Lucifora, *Losing control? Unions' Representativeness, "Pirate" Collective Agreements and Wages,* marzo 2020.