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The Dog That Barks Doesn't Bite: Coverage and Compliance of Sectoral Minimum Wages in Italy

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DISCUSSION PAPER SERIES

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Sectoral Minimum Wages in Italy**

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ABSTRACT

The Dog That Barks Doesn't Bite: Coverage and Compliance of Sectoral Minimum Wages in Italy*

This paper provides a comprehensive portrait of the level and compliance to sectoral minimum wages in Italy between 2008 and 2015. The results show that minimum wages in Italy are relatively high both in absolute terms and relative to the median wage. However, non-compliance rates are not negligible: on average around 10% of workers are paid one fifth less than the reference minimum wage. Non-compliance is particularly high in the South and in micro and small firms and it affects especially women and temporary workers. Overall, wages in the bottom of the distribution appear to be largely unaffected by minimum wage increases. More effective enforcement practices are therefore needed to safeguard a level playing field for firms and ensure that minimum wage increases are effectively reflected into pay increases for workers at the bottom of the distribution.

JEL Classification: J08, J31, J52, J83

Keywords: minimum wages, collective bargaining, compliance

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1. Introduction

Minimum wages are back at the centre of the debate in many countries in the world. In some countries, the debates have focussed around the introduction of a national minimum wage. For instance, Germany, which did not have a national minimum wage, introduced one in 2015. Italy and South Africa are also discussing the opportunity to introduce a minimum wage at national level. In other countries where statutory minimum wages already exist, the debates after the crisis have turned around their level. For instance the conservative Government in the United Kingdom decided to increase by 2020 the minimum wage for adults to 60% of the median wage (currently it is around 50%). In the United States the fight for a 15\$ minimum wage gained some ground and some cities have passed a legislation in this sense. In Europe, unions and associations discuss since several years the possibility of introducing minimum wages at the local level to better take into account the costs of living (e.g. London living wage) or harmonize European wage policies through a EU-level minimum wage.

The research on the topic has mainly focused on the impact of minimum wages on employment (see, among many others, the seminal papers by Neumark and Wascher, 1992 and Card and Krueger, 1994) or on poverty (e.g. Sabia and Burkhauser, 2010 and MaCurdy, 2015), while more recently it also studied the effect on prices (Allegretto and Reich, 2015), profits (Draca et al. 2011) and productivity (Riley and Rosazza-Bondibene, 2015). Strikingly the aspect of compliance of the established minimum wage rates has been largely overlooked. Ashenfelter and Smith (1979) first investigated the patterns of minimum wage compliance in US noting that “*in the midst of numerous studies intended to establish the quantitative effects of the minimum wage law, it is remarkable that no one has bothered to establish that this law actually affects wage rates [...] presumably reflecting the belief that employers fully comply with this law*”. Ashenfelter and Smith (1979) found that compliance in the US in 1970s was substantial but not complete and concluded that “*the most useful future analyses of the effects [of the minimum wage] will incorporate a thorough analysis of the compliance issue.*” More than three decades after this seminal paper, compliance to the minimum wage as well as, more in general, the issue of the enforcement of labour regulations, is still rarely analysed (Ronconi, 2010). Only few, and often tentative, estimates of non-compliance to minimum wage regulations are available for some countries. Moreover, most analyses focus on minimum wages set at national level and disregard wage floors set by collective agreements which in several European countries are the most important wage setting institution.

Enforcement of and compliance with minimum wages are a crucial dimensions for their effective functioning. In some countries, especially where authorities seem to turn a blind eye¹, not complying with the minimum wage rate is the most straightforward channel of adjustment to minimum wage increases instead of firing workers or increasing productivity. Firms can use many channels to pay lower minimum wages (and hence lower taxes and social contributions). First, they may reduce the number of formal employees and increase the number of informal ones. Standard theoretical models show that in a dual labour market an increase in wages in the formal sector induces a displacement of workers towards the informal sector where lower wages can be paid. Empirical evidence for several developing and emerging economies shows that increases in the minimum wage are reflected in an increase of informal employment (see among many Comola and De Mello, 2011 for Indonesia or Gindling and Terrell, 2005 for Costa Rica). Second, in some countries, firms may reduce the number of regular employees and increase the number of non-regular ones who are not or poorly covered by the minimum wage legislation (either at national or sectoral level). This includes for instance, bogus self-employed or project workers who are hired in theory for a particular project or task with no predefined working time but often used as disguised standard employees (see for instance some evidence for Poland in Kamińska and Lewandowski, 2015). Third, firms may hire regular and fully formal employees paid at the minimum wage but ask them to work unpaid extra hours. In this case, firms would comply with the monthly or annual rate of the minimum wage but would not comply with the hourly rate. Fourth, since collective agreements define not only the base wage but also wages by occupation and levels, firms may assign workers to a lower level than the correct one in order to underpay them. Fifth, in complex wage setting institutions (e.g. where more than one minimum wage rate applies), employers, especially in micro and small firms where no professional HR or union exist, may refer to the wrong agreement and “inadvertently” pay less than the reference minimum wage or use the complex structure to pay less thanks to loopholes and misclassification: firms can apply a more convenient collective agreement when the sectoral classification is not clear or when several agreements are potentially applicable). Rani et al. (2013) do indeed find that in developing countries the rate of compliance is negatively related to the numbers of minimum wages. Finally, in those systems where wage floors are set at sectoral level by social partners and where there are no (or limited) rules to establish the representativeness of social partners which can sign legally binding agreements, employers can even set their own wage floors below the existing ones signing a

¹ Basu et al. (2010) show that, when competition, enforcement and commitment are not perfect, turning a blind eye can be an efficient, and credible, strategy for governments more interested in efficiency than in distribution.

“pirate” agreement with a complacent poorly representative union or a “yellow” union (a workers’ organisation set up or influenced by an employer).²

Most existing papers measuring non-compliance to minimum wages (either statutory or occupation/sectoral minimum wages) focus on developing countries. Rani et al. (2013) estimate non-compliance in 11 developing countries and they find that non-compliance ranges from 5% in Vietnam to 51% in Indonesia in the late 2000s. Kanbur et al. (2013) provide evidence for Chile over many years: the number of workers paid less than the minimum wage steadily increased from 15% in 1990 to 29% in 2006 and then fell back to 15% in 2009. In the case of South Africa, Bhorat et al. (2012) estimate an average violation of sectoral minimum wages of 44% in 2007 ranging from 9% among civil engineers to 67% among security workers. Bhorat et al. (2015) provide evidence for seven Sub-Saharan African countries and they find an average non-compliance of 58%, from 20% in Tanzania to 80% in Mali. Ye et al. (2015) find that compliance in China is quite high (only 3.5% of full-time workers earn less than the legal monthly minimum wage), but they find evidence for substantial non-compliance with overtime pay regulations (29% of the employees who work overtime are not paid any additional wage, and 70% are paid less than the legally-required 1.5 times the regular wage).

The evidence for developed countries is more limited. The US Bureau of Labor Statistics provides an official estimate of the share of workers paid less than the minimum but the sample is restricted to workers paid at hourly rates (58.5 percent of all wage and salary workers). In 2015 the share of workers paid less than the minimum in the US is 2.2%, down from the peak of 13.4% recorded in 1979, when these data were first published on a regular basis. The UK Low Pay Commission provides estimates for non-compliance in its annual reports. Since the introduction of the national minimum wage non-compliance has always been quite low, around 1% among all workers, but much higher for workers under 20 year old (from around 3.5% in 1999 to 8% in 2015). The German *Mindestlohn Kommission* in its first report on the new German minimum wage calculates that in 2015 2.7% of German workers were paid less than the minimum. In Japan, the Ministry of Labour found in 2014 that among inspected companies, 10.7% did not comply with the minimum wage regulation. Garnero et al. (2015) provide cross-country evidence for 17 EU countries between 2007 and 2009 and find an average non-compliance rate of about 3.5% but with considerable variations across countries: from 13% in Italy to less than 2% in Denmark among countries without a statutory minimum wage or from 7% in France to less than 1% in Bulgaria. Finally, Goraus and Lewandowski

² This is formally against the Article 2 of the ILO Convention 98 on the Right to Organise and Collective Bargaining. However, in the absence of clear and stringent rules on the representativeness of social partners, “pirate agreements” are legal as far as they respect the formal requirements of the law (see Tomassetti, 2016 for the case of Italy).

(2016) focus on ten Central and Eastern European countries and find that on average in 2003-2012, the share of workers paid less than the minimum wage ranged from 1.0% in Bulgaria, to 4.7% in Poland and Hungary, 5.6% in Latvia, and 6.9% in Lithuania.

This paper extends the analysis of non-compliance to sectoral minimum wages set by collective agreements in the case of Italy. In Italy wages are fixed by trade unions and employers' organisations at sectoral level and little is known about their level, coverage and compliance. The objective of this paper is therefore twofold: first, it provides a comprehensive and detailed portrait of sectoral wage floors in Italy by year, region, firm and workforce characteristics. Second, it estimates the degree of non-compliance to the current sectoral minimum wages using three data sources and looks not only at the share of underpaid workers but also at the size of underpayment.

The results show that sectoral wage floors in Italy are relatively high both in absolute terms and relative to the median wage. However, on average around 10% of workers are paid one fifth less than the reference minimum wage. Non-compliance is particularly high in the South and in micro and small firms and it affects especially women and temporary workers. Moreover, wages at the bottom of the distribution appear to be largely unaffected by increases in sectoral wage floors.

The remainder of this paper is organized as follows. Section 2 presents the institutional setting and provides a detailed statistical portrait of sectoral wage floors in Italy between 2008 and 2015. Section 3 presents and discusses the estimates of the number of workers paid less than the sectoral minimum wages and some robustness tests using alternative data sources. Section 4 concludes by discussing the results and the policy implications for Italy.

2. How are wages set in Italy?

In Italy there is no national or subnational statutory minimum wage but wage floors are fixed at sectoral level via collective agreements between trade unions and employers organisations. This system goes back to the early 20th century when the first company or territorial level collective agreements were introduced in manufacturing and agriculture while the first nationwide sectoral agreement was signed immediately after World War I (Giugni 1957). Currently, 819 sectoral collective agreements³ signed at national level cover practically all private-sector employees in Italy (96% according to data from the European Company Survey, 99% using data from the Structure of Earnings Survey) while trade union density (the number of members over the total number of employees) is below 30% in the private sector and employers' organisation density just above 50%.

³ Source: CNEL, *Notiziario dell'Archivio Contratti*, No. 24, December 2016.

Formally, a collective agreement in Italy applies only to workers of the signatory parties, i.e. to workers members of the signatory union(s) and firms members of the signatory employers' organisation(s). No formal extension mechanisms of the terms set in collective agreements to workers in firms not member of an employers' organisation are present in Italy while they are quite common in other European countries (almost automatic extensions are granted in Austria, Belgium, Finland, or France while in Germany extensions are granted under specific conditions). However, in Italy base wages fixed in collective agreements (*minimi tabellari*) are used by labour courts as a reference to determine if the firm complies with the Article 36 of the Italian Constitution which states 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*”. Base wages in collective agreements are therefore functional equivalent of sectoral minimum wages for all workers to which all firms have to comply.

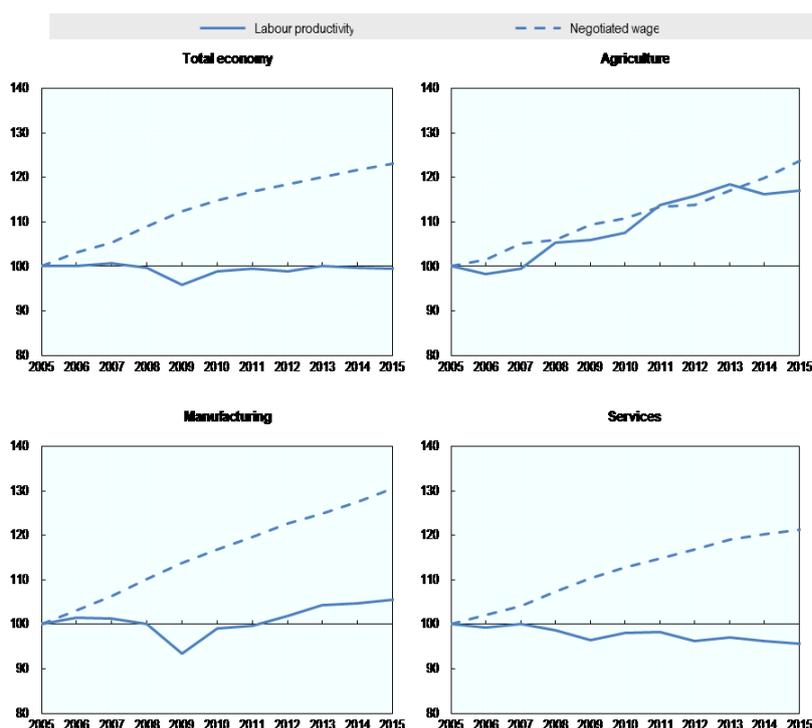
Collective agreements are therefore the most relevant wage setting institution in Italy but surprisingly very little is known about the level and the “bite” of negotiated wages, neither on average, nor across sectors, regions, firms' and workers' characteristics. Currently no comprehensive descriptive evidence on existing collective agreements in Italy is available. ISTAT publishes a monthly index of the evolution of negotiated wage levels but not their level or “bite” (i.e. the number of people covered or the level of the minimum wage compared to the median/average wage) across geographical areas or firms' types.

In Italy wages are fixed by trade unions and employers' organisations at sectoral level. ISTAT publishes a monthly index of the evolution of negotiated wage levels at a semi-aggregated level (NACE 2-digit level): Figure 1 compares the evolution of negotiated wages since 2005 to labour productivity growth in the same period and it shows that since 2005 negotiated wages increased steadily in all sectors, even between 2008 and 2014 when GDP in Italy decreased by around 9% and productivity growth was basically flat in all sectors excluding agriculture. Moreover, since negotiated wages are the same for the entire country, Italy well known regional variations in terms of economic development and cost of living (GDP per capita is around 43% lower in the south than in the north of Italy) are not taken into account during the negotiations nor the (often massive) differences between firms in the same sector (and there is no possibility to opt-out from the collective agreement in case of economic difficulties).

Moreover, given the weight of the black (informal) economy and the development of non-regular forms of work who are either not or poorly covered by collective agreements, some researchers and trade unionists are increasingly concerned that the actual coverage of negotiated wages is well

below the almost 100% figure provided by standard surveys. As discussed in the introduction, there are indeed many ways of bypassing negotiated wages and pay workers less than the sectoral minimum. The only evidence available for Italy estimated the share of workers paid less than the wage floors in Italy at 13% in the period 2007-2009, the highest in their sample of EU countries, compared to around 9 in Germany, 4% in Austria, 2-3% in Finland and Denmark (Garnero et al., 2015).

Figure 1. Negotiated wages and labour productivity by sector in Italy
Base 100 in 2005



Source: ISTAT Index of negotiated wages and labour productivity (value added per hour worked).

It is therefore not surprising that the Italian collective bargaining framework has come under pressure in recent years (even before the crisis) since some economists, labour lawyers and politicians see it as the source of excessive wage rigidities that limit flexibility in time of difficulties, hinder regional reallocation and contributes to the “secular stagnation” Italy is experiencing since 15 years. The employers’ association, *Confindustria*, has called for higher decentralisation in wage setting, giving greater importance to firm-level bargaining. The biggest company in Italy, FIAT, even exited *Confindustria* in 2009 (and it is still not a member) in order to freely bargaining a different establishment-level agreement (though the controversy was about work organisation rather than wages). Unions and employers’ organisations have generally only agreed to minor tweaks to the

current system (for instance, by additionally promoting firm-level bargaining through fiscal incentives or strengthening social partners representativeness).

2.1. A statistical portrait of sectoral minimum wages in Italy

In Italy there are currently 819 collective agreements which set thousands of wage floors for different sectors, occupations and levels. They go from the traditional ones such as those covering metal or chemical workers to more ‘exotic’ ones such as collective agreements for emotional coaches and sacristans.

In what follows we will focus on a sample of the most representative agreements (in terms of workers covered) that ISTAT collects for its database on collective agreements and contractual wages. ISTAT collects data on negotiated gross wages, therefore including tax and social security contributions paid by employees, in around 90 collective agreements (the most representative ones) and the data used in this analysis represent a specific extraction of the minimum value in each agreement (therefore the lowest occupational level excluding seniority or other pay elements defined in collective agreements such as wage supplements for night shifts or particular activities, or bonuses). These wage data represent wages before taxes and transfer and in many cases they also account for the presence in the agreement of a 13th and a 14th month which are not bonuses but represent just a delayed payment and are therefore part of the base wage. Moreover, they also account for the presence of arrears in the case of late renewal (*salari di competenza*). Bonuses related to individual performance or individual working conditions, supplementary payment agreed at the company or local level are not included. They may therefore seem nominally high but are in fact those needed to compare with actual wages received by workers as reported in surveys or administrative data.⁴ The ISTAT minimum wage data are classified by NACE rev. 2 at 2-digit codes using a mapping established by ISTAT (and by Nace rev. 1 before 2011).

In order to compute the Kaitz index, i.e. the level of the minimum wage compared to the median wage, the sectoral minimum wage data are then matched by NACE 2-digit codes to individual wage data from the Italian Labour Force Survey (LFS) between 2008 and 2015. The LFS collects net wage data and therefore in order to make individual wage data comparable to ISTAT minimum wage data, LFS net wages are converted to gross wages using income tax rate and social security contributions (as a % of net wages) for different levels of the average wage (from 1% to 200%) in the

⁴ An alternative source on minimum wage by sector is represented by the database collected by WageIndicator.org, but their coverage is less systematic than the one by ISTAT, negotiated hours of work are not indicated (and hence we would be able to consider full-time workers) and the mapping between branches and NACE code is not straightforward in the absence of a mapping as for ISTAT.

case of a single person without children from the OECD TaxBen model. We assume that this is the effective tax rates for all workers each month before tax adjustments and transfers done at the end of the year to take into account family composition and household total income. Individual wage data are further inflated to add the 13th and 14th months in sectors that also have include a 13th (all sectors) and a 14th month (around 40% of the agreements in the sample). Finally, only employees are considered (apprentices and domestic workers are excluded but also *co.co.pro*, casual work, and the like because of missing wage data in the LFS). Since LFS data may suffer from measurement error (more on this in the next section on the estimation of non-compliance), we also match the wage floors data to an employers' survey, the Structure of Earnings Survey and to administrative data from social security records (INPS). The pros and cons of these datasets and their specific features are discussed in the next section.

In 2015 gross minimum wages in collective agreements were on average 9.41 euros/hour including the 13th and the 14th month (if paid), 17.7% higher than in 2008 when they were around 8 euros per hour. Minimum wages ranged from 7.47 euros/hour to 13.89 euros/hours. Interestingly, the gap between the minimum of the minima (the lowest minimum) and the maximum remained broadly constant over time (1.87 in 2008 vs. 1.85 in 2015) showing that the negotiated minima evolved in a similar way in all sectors.

Table 1. Hourly sectoral minimum wages (euros/hour and Kaitz index), 2008-2015

Year	Hourly minimum wages (average across sectors)	Kaitz (% of the median)	Minimum of the minima	Maximum of the minima	Median LFS
2008	7.99	74.62	6.55	12.27	10.71
2009	8.22	74.88	6.65	12.43	10.97
2010	8.46	75.13	6.73	12.43	11.26
2011	8.91	78.35	6.89	12.49	11.37
2012	9.06	76.07	6.91	12.76	11.91
2013	9.22	76.20	7.12	13.04	12.10
2014	9.32	80.53	7.29	13.41	11.57
2015	9.41	79.95	7.47	13.89	11.77

Note: The Kaitz is computed as the average of the sectoral minimum wages over the national median.

Source: Author's calculation on ISTAT negotiated wages database and the Labour Force Survey.

Gross minimum wages in collective agreements are very high compared to the median wage as indicated by the so-called Kaitz Index (the ratio of the minimum to the median wage). They range between 74% and 80% using LFS wage data. As a reference, the minimum wage in France is 9.61 euros per hour in 2015, around 60% of the median, the highest Kaitz in the European Union (among OECD countries, the Kaitz index is 68% in Turkey and Chile where the importance of the informal

economy is also very high). High Kaitz indices reflect both high minimum wages negotiated in collective agreements as well as relatively compressed wage scale in Italy (the P90/P10 ratio of wages for full-time equivalent in 2014 was “just” 2.17 compared to an OECD average of 3.46 and P50/P10 is 1.50 compared 1.70 across OECD countries). The estimated Kaitz indices in Table A1 in the Annex using the Structure of Earnings Survey (SES) and social security data from INPS are 10-15% lower⁵ but still well above 60% of the median.

Table 2. Hourly sectoral minimum wages by sector (euros/hour and Kaitz index, 2015)

	Hourly minimum wages	Kaitz sectoral (% of the median in the sector)	Kaitz national (% of the national median)	Minimum of the minima	Maximum of the minima
A-B Agriculture and mining	7.70	94.29	59.44	7.53	13.89
C-D-E Manufacturing, electricity and water supply	9.47	79.88	73.11	7.66	11.03
F Construction	8.55	74.32	66.03	8.30	10.28
G Retail trade	8.43	76.44	65.11	8.43	8.43
H Transport	8.95	70.79	69.08	7.47	9.95
I Hotels and restaurants	8.41	89.04	64.92	8.41	8.41
J Information and communication	9.19	68.17	70.94	7.50	10.26
K Finance and insurance	12.95	69.86	99.97	12.93	12.95
L-N Real estate, professional and administrative activities	8.82	82.33	68.12	7.47	12.29
O Public administration	9.72	68.31	75.04	9.72	9.72
P Education	11.77	67.12	90.85	11.77	11.77
Q Health	9.29	71.60	71.69	8.25	9.65
R-U Arts, other activities, household and intl organisations	8.94	110.36	69.02	8.24	12.29

Source: Author's calculation on ISTAT negotiated wages database and LFS.

When looking at sectoral minimum wages by broad sectors (Nace 1-digit), wage floors are not surprisingly the lowest in agriculture and the highest in finance. The relative high value for the

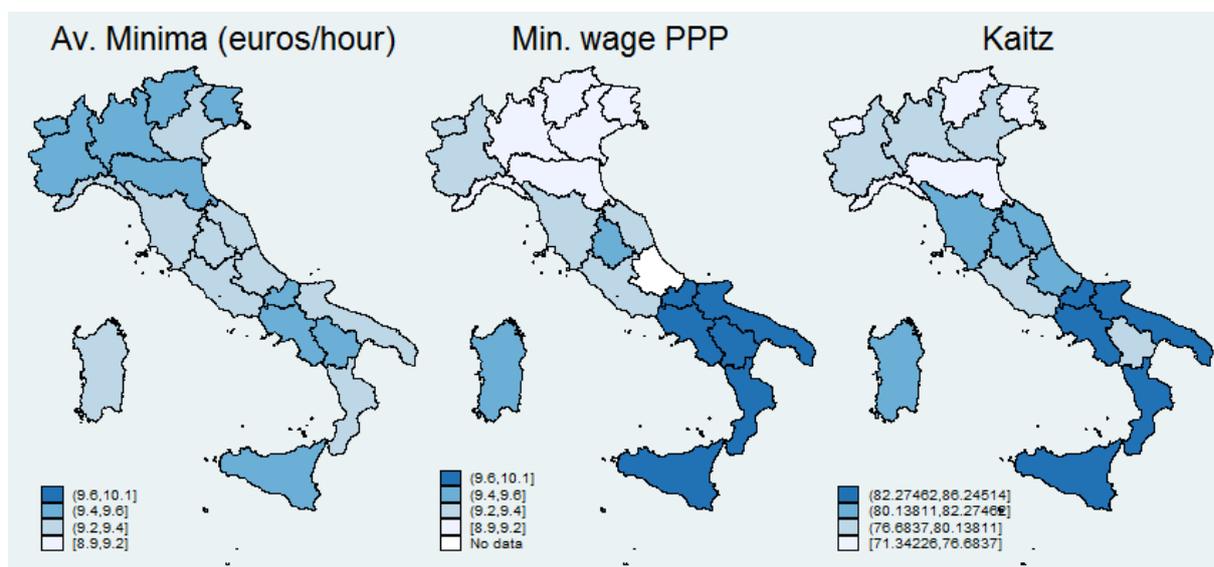
⁵ The differences in the estimated Kaitz indices using the LFS, SES or INPS may be driven by different sectoral composition (the LFS covers the entire economy, while SES excludes agriculture and public sector and small firms and INPS excludes the public sector) but also to reporting errors or biases (LFS wage data are self-reported by workers while SES and INPS are reported by employers). More on this in section 3.1.

education sector reflects the fact that in-class working hours are limited and “non in-class” working hours as for instance meetings with parents, meeting with the director, homework, etc. are not accounted for in the collective agreement. The sectoral Kaitz (sectoral minimum/sectoral median) is very high in agriculture and even beyond 100% in Arts and other activities. This means that the minimum is very close to (or above) the median, because many people are paid at the minimum wage level and the distribution is very compressed and/or the number of people paid less than the minimum is important.

As for the national average, Kaitz indices by sector using alternative data source are lower but reproduce the same patterns. Using SES, Kaitz indices range from 46% in education to 80% in hotels and restaurants, to 88% in real estate and professional activities with a (significant) correlation with LFS Kaitz estimation of 72%. INPS data Kaitz indices range from around 60 to 77% with a (significant) correlation with LFS Kaitz estimation of 67%.

Since wage floors are fixed at sectoral level for the entire country, they are the same in all areas and regions of the country with minimal differences due to the industrial composition of the region. However, as Figure 2 shows, their bite compared to median wage, as measured by the Kaitz index or their value in purchase power parity is very different reflecting the well-known regional differences between North and South in terms of economic development and cost of living.

Figure 2. Nominal minima, minima in PPP and Kaitz Index, by region (2015)



Source: Author’s calculation on ISTAT negotiated wages database and LFS. PPP computed using the purchasing power parity index in Italian regional capitals produced by ISTAT in 2009. Abruzzo is missing because the municipality of L’Aquila has not been included as it did not take part in the survey as a result of the effects of the earthquake.

Finally, the bite of the minimum wage is much stronger in micro and small firms which constitute the backbone of the Italian economy than in big firms. Interestingly nominal hourly wage floors are slightly lower in micro and small firms: somehow unions and employers partly reflect the sector composition in terms of firms size and hence productivity (among many others Bartelsman and Doms, 2000 have shown that the distribution of firm productivity and firm size are closely related) in negotiated wages but not enough to balance the lower median (reflecting the likely lower productivity). Hence the Kaitz index in micro firms is one third higher than in large firms.

Table 3. Hourly sectoral minimum wages by firm size (euros/hour and Kaitz index, 2015)

Firm size	Hourly minimum wages (average across sectors)	Kaitz (% of the median in the firm size class)	Kaitz national (% of the national median)	Minimum of the minima	Maximum of the minima	Median LFS
Less than 10 employees	9.01	90.93	76.58	7.47	12.95	9.91
11-15 employees	9.20	79.97	78.21	7.47	13.89	11.51
16-19 employees	9.45	80.00	80.33	7.47	12.95	11.82
20-49 employees	9.58	76.17	81.41	7.47	13.89	12.58
50-249 employees	9.72	72.96	82.62	7.47	13.89	13.33
250 or more employees	9.60	68.05	81.55	7.47	13.89	14.10

Source: Author's calculation on ISTAT negotiated wages database and LFS.

Overall, the data on sectoral minimum wages show that sectoral wage floors in Italy are quite high compared to the median wage, in particular in the South and in small firms. But given the importance of informality and the complexity of the system, how many workers are effectively covered by these minimum wages and how many are paid less than the negotiated minima?

3. An estimate of non-compliance in Italy

3.1. Measuring non-compliance: methodology and data

Non-compliance with the minimum wage is typically measured as the percentage of workers who are paid below the reference pay rate. However, as Bhorat et al. (2013) highlight, this is a fairly blunt measure, as it fails to measure the extent of the underpayment. Workers may just be paid some euros less than the minimum and this may also reflect measurement error rather than a real violation. On the opposite, other underpaid workers may in fact be paid well below the minimum. Bhorat et al. (2013) propose to use the Foster-Greer-Thorbecke (FGT) poverty measures to create a family of violation indices that go from the simple share of underpaid workers to the depth of the underpayment to the average shortfall per average shortfall per underpaid worker.

Formally, beyond the headcount indicator v_0 that takes a value of 1 if $w < w_{min}$ and of 0 when $w \geq w_{min}$ (where w is individual wage, w_{min} is the relevant minimum wage), the measure the depth of underpayment is defined as:

$$v_1 = \frac{(w_{min}-w)^\alpha}{w_{min}} \text{ if } w < w_{min}, 0 \text{ otherwise.}$$

where α is a parameter defining the aversion to underpayment. When $\alpha = 1$, v_1 is the gap between the actual wage and the minimum wage, expressed as a percentage of the minimum wage, with equal weights for all workers. For values of α greater than 1, workers who are more underpaid have higher weight. Finally, an average shortfall per underpaid worker is computed as v_1/v_0 .

In this paper we estimate non-compliance using the sectoral minima provided by ISTAT and individual wages from the Labour Force Survey (LFS). The Labour Force Survey is the most comprehensive data source for this kind of analysis in terms of sectors covered and because it does not focus only on the formal economy. Being declared by the worker himself (information on wages is available for around 70% of employees), wages and hours of work in principle are more likely to reflect the real wages earned and not those that should have been paid according to the rules. However, data in LFS on wages and hours worked may also be subject to measurement error (though, at least for wages, it would probably reduce the number of workers underpaid since respondents tend to overestimate wages at the bottom of the distribution).⁶ As Ritchie et al. (2016) underline, also sampling and weighting procedures in a survey can be a source of error when estimating non-compliance to the minimum wage.

To account for measurement error in the LFS we refer to the solutions used in the related literature: first, we allow for a margin of error so that wages “close-enough” to the minimum are not considered as non-compliant. In particular, when using LFS wages and hours of work, the threshold to compute the family of violation indices is of 85 per cent of the lowest minimum for each NACE 2-digit sector. This allows for a margin of error of 15 per cent (or in the extreme case where individual wages are underestimated and hours of work overestimated, a -7.5% margin of error for wages and +7.5% margin of error for hours of work). Second, we confirm the validity of the baseline estimations with LFS using alternative datasets. In particular, we use an employer survey (the Structure of Earnings Survey) and administrative data from social security (INPS).

Wages in the Structure of Earnings Survey are more likely to be precise than those in the LFS. However, being filled-in by the employer, the Structure of Earnings Survey (SES) is more likely to report only legal workers and wages and hours of work more in line with those fixed by the rules (the law and the reference collective agreement). Moreover, the SES focuses only on firms with more than

⁶ Previous studies have found that measurement error in wage and earnings data as reported in surveys is non-classical and mean reverting (Gottschalk and Huynh, 2010): wage (or incomes) at the bottom are overestimated while wages at the top are underestimated. To the extent that this is valid also for wages in the Italian Labour Force Survey this should underestimate the share of underpaid workers rather than overestimate it.

10 employees in the business sector, hence excluding agriculture and the public sector and therefore does not cover micro firms and the agriculture sector where non-compliance is likely to be more prevalent. Finally, the SES is available only for 2010.

Table 4. Comparison of the characteristics of the datasets used to estimate non-compliance in Italy

	Labour Force Survey	Structure of Earnings Survey Agriculture and public administration not included	INPS
Sectors covered	All	public administration not included	Private sector
Firm size	All	>10 employees	All
Black economy	yes	no	no
Precision of wage data	Wages declared by employee, subject to error	Wages declared by employer	Wages as declared to social security
Period of reference for wages	Monthly	Monthly/Annual	Annual
Workers covered	All	Employees	Employees
Hours of work	yes	yes	no

Channels of underpayment that can be identified using these sources

Informality	yes	not likely	no
Non-regular forms of work	partly	no	no
Unpaid extra hours	yes	not likely	no
Lower occupation	no	no	no
Mistake or loophole	yes	yes	yes
"Pirate" agreements	yes	yes	yes

We further test the robustness of the results using individual (gross) wages in *LoSai* (LONgitudinal SAMple INps), a random sample of individuals social security records from the Italian National Social Security Institute (*Istituto Nazionale della Previdenza Sociale* – henceforth INPS) for workers working in the private sector during the period 1985 to 2014. This corresponds to around 6% of the workforce or 1.1 million persons on average per year.⁷ In the case of INPS, data from collective agreements are merged by NACE rev. 1 at 2-digit codes. INPS data are by definition the most precise and reliable since they are administrative data used for pensions and social security benefits. However, the flip side is that they report only legal workers paying contributions to social security system in the private sector.⁸ Moreover, hours of work are not reported and hence the analysis can only be done comparing annual wages and therefore focusing only on workers working the entire year full-time and

⁷ Individuals are selected on the basis of their date of birth (all persons born the 1st or 9th of each month).

⁸ Or they report formally compliant wages just for pension and social security purposes while in fact workers are paid only “envelope wages” (in Italian *salari fuoribusta*) to avoid tax liabilities.

excluding the potential role of extra unpaid hours of work as a tool not to comply with wages set in collective agreements. Table 4 provides a summary of the features of each dataset.⁹

With respect to the potential channels of underpayment identified in the introduction, the LFS allow measuring the extent of minimum wage violation due to informality, non-regular forms of work (as long as the worker declares him or herself an employee), unpaid extra hours, “inadvertent” underpayment or the use of “pirate agreements” (agreements legally valid but signed with poorly representative or “yellow” unions).¹⁰ Given that we do not have detailed data by occupation and levels and we refer just to the minimum for each NACE 2-digit sector, we cannot measure underpayment through lower-than-appropriate job category assignment. With the SES, we are less likely to pick-up informal workers or unpaid extra hours. With INPS only mistakes, loopholes or pirate agreements are likely to be measured.

Table 5. Violation of hourly sectoral minimum wages, 2008-2015

Year	% of workers underpaid (v_0)	Depth of violation (v_1)	Average shortfall per underpaid worker (v_1/v_0)
2008	10.35	2.28	22.04
2009	10.48	2.30	21.98
2010	10.87	2.50	22.99
2011	11.77	2.63	22.37
2012	10.25	2.29	22.33
2013	10.88	2.45	22.52
2014	12.39	2.51	20.24
2015	11.99	2.47	20.64

Source: Author’s calculation on ISTAT negotiated wages database and LFS.

Table 5 summarises the family of violation indicators for Italy between 2008 and 2015. More than 10% of workers are paid less than the wage floor established in their reference collective agreement with a peak of 12% in 2012. The depth of violation, i.e. the average distance among the entire population from the minimum wage, ranges between 2.30 and 2.60 and, as expected, it is positively correlated with the share of underpaid workers. More interestingly the average shortfall per underpaid worker, i.e. the average distance from the minimum wage for workers paid less than the minimum wage ranges between 20% and 23%. Between 2008 and 2015 in Italy around one tenth of

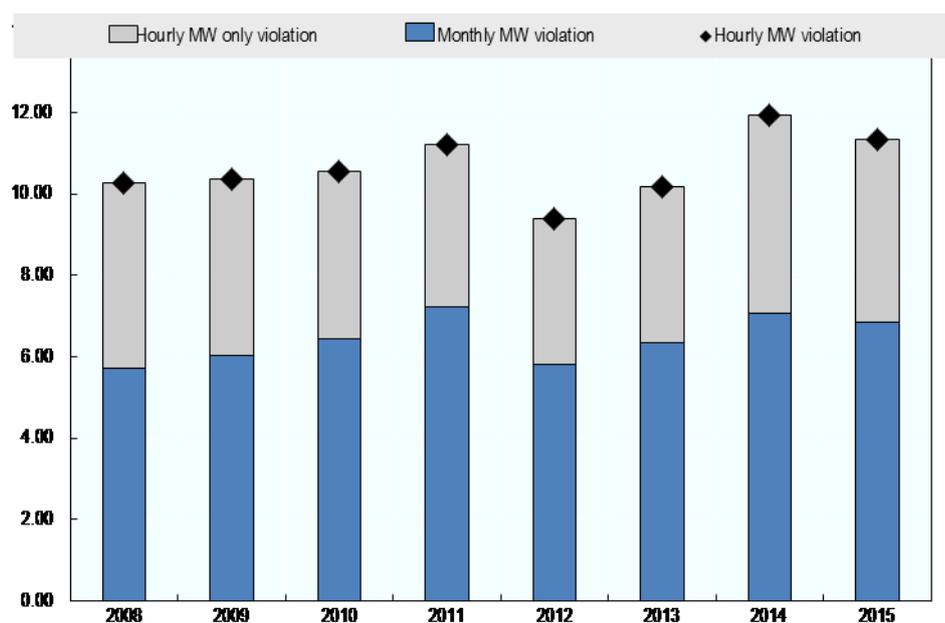
⁹ A comparison of the distribution of wages in the three datasets is shown in Figure A1 in the Annex.

¹⁰ Another source of potential underpayment comes from the increasing fragmentation of employers’ organisations. In the recent years there has been a series of divisions in the employers’ organisations (firms setting up alternative employers’ organisations to be freed from the agreement’s obligations, beyond the famous FIAT case). In the cases of retail trade and tourism sector, for instance, these divisions have allowed the exiting organisations to continue applying the previous agreement (with lower wages) waiting for a renewal that has not been signed yet.

the workers are paid less than the reference minima and on average they are paid between one fifth and one fourth less than what is established in collective agreements. The results in terms of the number of workers paid less than the minimum are in line with those previously found by Garnero et al. (2015). The results also show that the amount of underpayment per underpaid worker (the average shortfall) is not minor and comparable with estimates for Central and Eastern European countries by Goraus and Lewandowski (2016) who find that the average shortfall goes from around 10% in Estonia to 40% in Slovenia.

Focusing only on full-time workers working the entire month, we can disentangle the share of violations linked to an outright underpayment of the monthly minimum wage from underpayment via unpaid extra working hours.

Figure 3. Monthly vs. hourly only violations, 2008-2015



Source: Author's calculation on ISTAT negotiated wages database and LFS.

Note: the sample in this figure is restricted to full-time full-month employees. Hence the total number of underpaid workers is slightly different from those presented in the previous table which also cover part-time workers which are between 15% and 18% of the entire workforce in the years of analysis).

In Figure 3 we see that almost two thirds of the violations represent an underpayment compared to the agreed monthly minimum. Between 6% and 7% of workers in Italy receive a monthly wage lower than the one agreed in collective agreements. Fighting against this form of violation should be fairly easy because it would be enough to compare the monthly payslip (if existing) to the minimum in the reference agreement. On the contrary, around 4% receive a monthly wage in line with the minimum but are asked to work unpaid extra hours and therefore their hourly minimum is lower

than the agreed one. This kind of violation is certainly more complicated for labour inspectors to detect.

Violations occur in all industries (Table 6). Not surprisingly they are stronger in agriculture and mining, arts and other activities, hotels and restaurants. In the construction sector, the share of underpaid workers is lower than the average but the average shortfall per underpaid worker quite high (almost a quarter of the reference wage floor). Overall, a negative relationship emerges between the share of underpaid workers and the average shortfall per worker. In those industries where there are many underpaid workers, the average shortfall is relatively lower.

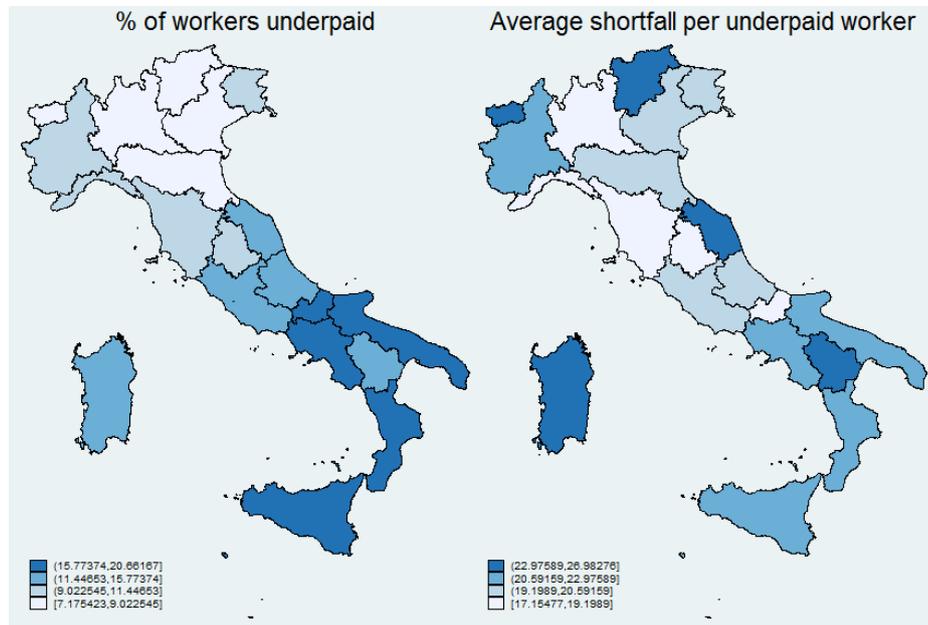
Table 6. Violation of hourly sectoral minimum wages, by industry in 2015

Industry	% of workers underpaid (v_0)	Depth of violation (v_1)	Average shortfall per underpaid worker (v_1/v_0)
A-B Agriculture and mining	31.63	7.11	22.48
C-D-E Manufacturing, elec. & water supply	10.12	2.05	20.23
F Construction	7.41	1.83	24.69
G Retail trade	11.81	2.83	23.99
H Transport	7.93	1.68	21.22
I Hotels and restaurants	20.66	4.87	23.58
J Information and communication	7.02	1.43	20.43
K Finance and insurance	10.24	2.42	23.65
L-N Real estate, professional & admin activities	15.48	3.39	21.91
O Public administration	4.15	1.29	31.24
P Education	15.07	2.56	16.97
Q Health	8.20	2.03	24.73
R-U Arts, other activities, household and int'l organisations	30.89	1.89	6.12

Source: Author's calculation on ISTAT negotiated wages database and LFS.

Violations of sectoral wage floors are much more prevalent in the South where minima are higher in real terms and compared to the sectoral median: Figure 4 shows that the share of underpaid workers ranges from around 8.5% of the workforce in the North-East to 18.5% in the South. Interestingly the average shortfall per underpaid worker shows no clear territorial divide. The probability of being underpaid is much higher in the South but the size of the violation is comparable between the North and the South.

Figure 4. Violation of hourly sectoral minimum wages, by region in 2015



Source: Author's calculation on ISTAT negotiated wages database and LFS.

We also look at the share and depth of violations across firm size and we find a negative linear relationship between firm size and the share of underpaid workers. The number of workers paid less than the minimum wage is very limited in large firms while it is very high in micro firms while the average shortfall is more similar across firms of different size.

Table 7. Violation of hourly sectoral minimum wages, by firm size in 2015

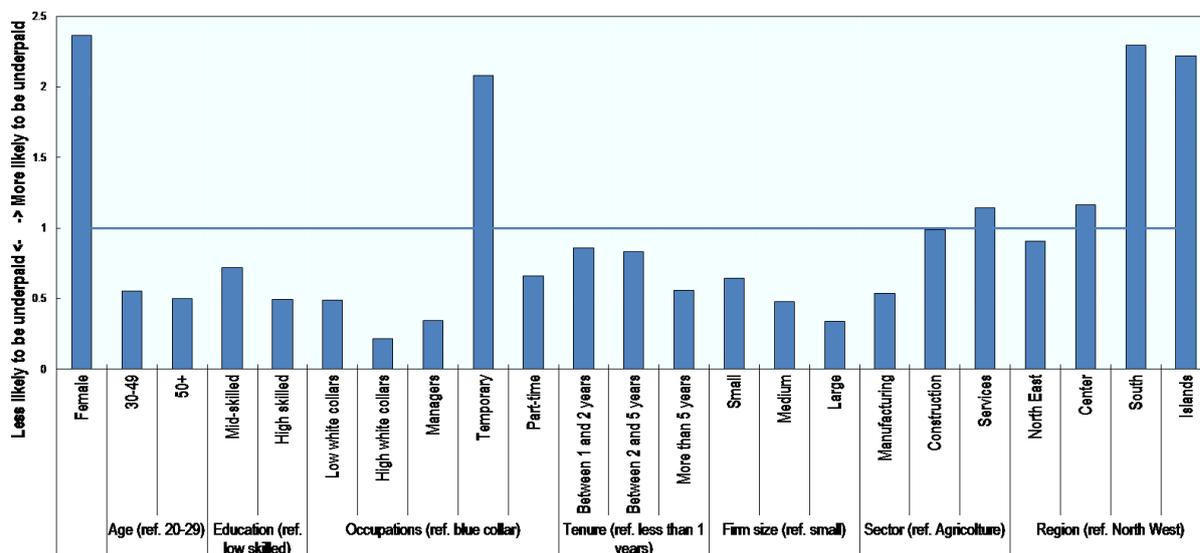
Firm size	% of workers underpaid (v_0)	Depth of violation (v_1)	Average shortfall per underpaid worker (v_1/v_0)
Less than 10 employees	18.79	3.15	16.78
11-15 employees	13.14	2.45	18.64
16-19 employees	11.48	2.35	20.47
20-49 employees	9.17	1.57	17.12
50-249 employees	6.05	0.97	16.00
250 or more employees	3.99	0.74	18.51

Source: Author's calculation on ISTAT negotiated wages database and LFS.

Finally, we also compute the probability of being paid less than the minimum wage by workforce characteristics using a logistic regression controlling for firm size, sector of work and region of residence. Conditional on being employed and all else being equal, Figure 5 shows that women are 2.5 times more likely to be underpaid, while prime age and older workers are 50% less likely to be paid less than the minimum wage compared to young workers (20-29 years old). Blue-collar workers are more likely to be paid less than the minimum as well as temporary workers (2 times

more). Interestingly, all else being equal, part-time workers are less likely to be paid less than the hourly minimum (probably it is more difficult to ask extra hours to part-time workers) while the probability of being paid less than the minimum goes down with tenure.

Figure 5. Probability of being underpaid (odds-ratios of a logistic regression, 2008-2015)



Source: Author's calculation on ISTAT negotiated wages database and LFS.

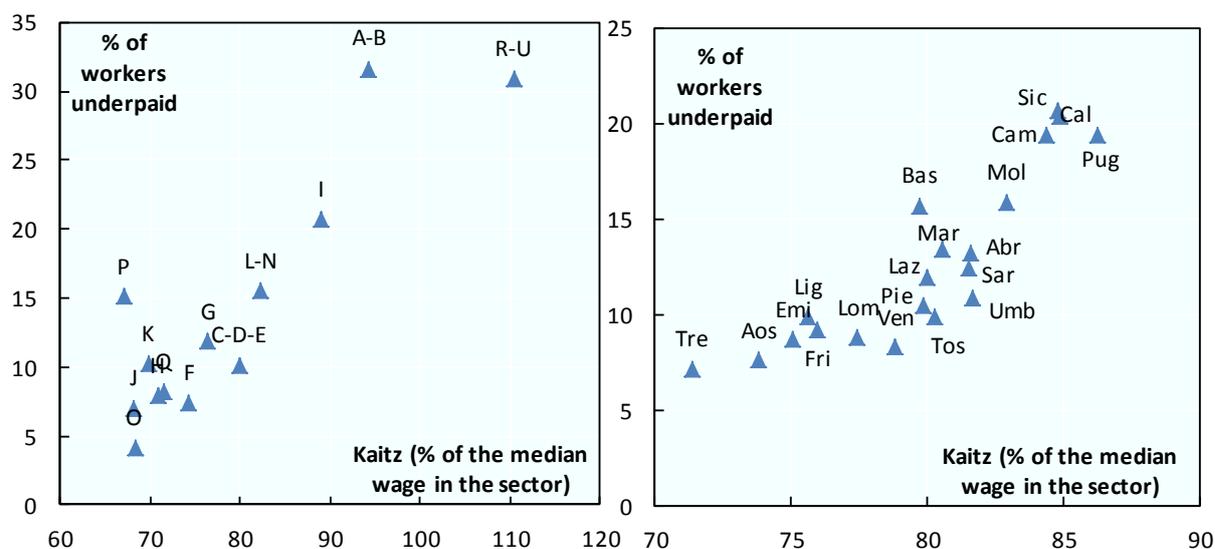
Note: all probabilities statistically significant at 1% level, except for construction which is not statistically different. If bar higher than 1 more likely to be underpaid, if bar lower than 1 less likely to be underpaid compared to the reference category.

3.2. Higher minima but also higher non-compliance?

Previous studies (Garnero et al., 2015, Goraus and Lewandowski, 2016, Rani et al. 2013) found a strongly positive correlation between the level of minimum wage and the share of underpaid workers. This means that higher minimum wages, either at national or sectoral level, also go together with higher violations. Figure 6 shows that a positive relation between a relatively higher sector minimum wage and a higher share of underpaid workers can also be found in Italy, both looking by industry and by region.

These simple correlations may just pick up a spurious relation, especially because the level of the minimum wage is not an exogenous variable. However, since wages are fixed at national level for each sector every two (or more) years, their level is largely orthogonal to the specific regional and firm size characteristics and economic conditions. Therefore in Table 8 we test the relationship between the Kaitz index and the share of underpaid workers, the depth of violation and the average shortfall per underpaid worker exploiting the variation over time of the bite of the minimum wage within region-specific firm size groups.

Figure 6. Correlation between share of underpaid workers and bite of the minimum wage, 2015



Source: Author's calculation on ISTAT negotiated wages database and LFS.

The regression results show a robust and significant correlation between the Kaitz index and both the share of underpaid workers and the depth of violation: when the Kaitz index increases by 1 percentage point, the share of workers paid less than the minimum increases between 0.2 and 0.3 percentage points (i.e. an increase of around 1.5-3%), and the depth of violation also increases by 0.04-0.06 percentage points (i.e. an increase of around 1.6-2.5%) both in hourly and monthly terms. On the contrary, no robust correlation is found when looking at the average shortfall per underpaid worker. These results show that the sectoral wage floors fixed at national level are broadly non-binding across region and firm size groups and there is no sign of the so-called “lighthouse effect” (Baltar and Souza, 1980 called “*efeito farol*” the phenomenon observed in some emerging economies where increases in the minimum wage for covered workers also lead to increases in the wages for uncovered workers). In Italy when the sectoral wage floor increases, wages in the bottom of the distribution appear to be largely unaffected leading to a mechanical increase in both the share of underpaid workers and the depth of violation (as the threshold has moved up).¹¹ Results are robust also when using INPS data (Table A2 in the Annex).¹² In the absence of effective enforcement, minimum wage increases are, therefore, not reflected into pay increases for workers at the bottom of the distribution.

¹¹ The wage distributions in LFS, SES and INPS also show no spike around the sectoral wage floors (Figure A2 in the Annex).

¹² If anything, they not only show that when the minimum wage relative to the median increases, the share of underpaid and the depth of violation increase, but also that the average shortfall per underpaid worker increases as if minimum wage increases for covered workers were compensated by lower wages for uncovered workers. A further test using SES data cannot be run as only a cross-section for 2010 is available.

Table 8. Non-compliance and the level of the minimum wage

	% of workers underpaid (v_0)				Depth of violation (v_1)				Average shortfall per underpaid worker (v_1/v_0)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Hourly wages		Monthly wages		Hourly wages		Monthly wages		Hourly wages		Monthly wages	
Kaitz index	0.16*** (0.04)	0.33*** (0.06)	0.37*** (0.01)	0.25*** (0.02)	0.04*** (0.01)	0.06*** (0.02)	0.06*** (0.00)	0.04*** (0.00)	0.11 (0.07)	-0.20 (0.13)	0.07** (0.03)	-0.00 (0.05)
Workforce characteristics	x	x	x	x	x	x	x	x	x	x	x	x
Region dummies		x		x		x		x		x		x
Firm size dummies		x		x		x		x		x		x
Time dummies		x		x		x		x		x		x
Firm size*region		x		x		x		x		x		x
Region*time dummies		x		x		x		x		x		x
Firm size*time		x		x		x		x		x		x
R-squared	0.58	0.82	0.59	0.76	0.45	0.73	0.39	0.60	0.05	0.26	0.06	0.28
Observations	3576	3576	3576	3576	3576	3576	3576	3576	3576	3576	3576	3576

Note: The Kaitz Index is the ratio of the minimum wage to the median wage by region, firm size groups over time.

Source: Author's calculation on LFS and ISTAT negotiated wages database. Workforce characteristics: gender, part-time, education (3 categories), age (3 categories), occupation (4 categories) and tenure (years).

3.3. Robustness tests

As discussed, in the case of Italy the Labour Force Survey is the most comprehensive data source for this kind of analysis but it may be subject to measurement and processing error. Therefore, we also test the robustness of the results using individual (gross) wages in the Structure of Earnings Survey for Italy and social security records by INPS (which on the opposite, being filled by employers are less likely to report underpayment). We consider workers to be underpaid if they are paid less than 95% of the reference minimum wage (since wages and hours are reported by employers they are less subject to measurement error, while they may on purpose underreport hours of work to keep them in line with established rules and hourly pay rates).

Table 9 shows the results using SES and INPS. As expected the estimates of non-compliance are lower using SES or INPS. The results for SES are 30% lower than those in the LFS for hourly wages in 2010 but this is mostly driven by composition effects. If one excludes micro firms, agriculture and public sector the estimates for LFS are just slightly above those with the SES (see Table A3 in the Annex for comparable LFS estimates based on the same sample as SES). Those for INPS cover only violations in annual wages and should therefore be compared to the estimates for violations in monthly wages shown in Figure 3: they are considerably lower than those estimated with the LFS (in 2014 2.7% of workers paid less than the monthly minimum wage compared INPS to 7% in

LFS), even when comparing the same sample (estimates for LFS excluding the public sector are in Table A2 in the Annex). This discrepancy is not surprising given that administrative data are rarely a good source to measure violations to labour market regulations. Interestingly, the estimated average shortfall per underpaid worker is also lower but still comparable (17% in SES vs. 22% in LFS using the hourly data).

Table 9. Violation of sectoral minimum wages using SES and INPS

Year	% of workers underpaid (v_0)	Depth of violation (v_1)	Average shortfall per underpaid worker (v_1/v_0)
SES (hourly)			
2010	7.76	1.43	18.43
INPS (yearly)			
2008	2.61	0.37	14.32
2009	2.46	0.35	14.35
2010	2.67	0.38	14.10
2011	2.54	0.36	14.24
2012	2.55	0.38	14.91
2013	2.67	0.40	15.11
2014	2.70	0.40	14.96

Source: Author's calculation on ISTAT negotiated wages database, Structure of Earnings Survey and LoSai data.

The same regional, industrial and firm size patterns highlighted above can be found in SES and INPS data (Table 10). Violations are more prevalent in the South and the Islands, in hotels and restaurants and in small and medium firms. Interestingly, the share of underpaid workers in agriculture in SES and INPS data is below the national average in contrast with LFS data suggesting an important presence of undeclared underpaid work captured (at least in part) by the LFS and not in employers' and administrative surveys.

In conclusions, the results obtained using the Structure of Earnings Survey confirm those obtained using the Labour Force Survey. The estimates using administrative data from social security records (INPS) are considerably lower because employers are highly unlikely to willingly report to the social security administration wages that do not comply with sectoral minima, but still not negligible. However, the main trends across sectors, regions and workforce groups are confirmed both with SES and INPS.

Table 10. Share of workers paid less than the minimum (v_1) using SES and INPS, by geographical area, sector and firm size

Geographical area			
INPS (annual, 2014)		SES (hourly, 2010)	
North West	1.76	North West	6.99
North East	1.64	North East	7.72
Center	2.59	Center	7.33
South	6.80	South	9.67
Islands	5.09	Islands	8.58

Sector			
INPS (annual, 2014)		SES (hourly, 2010)	
A-B-C Agriculture and mining	0.87	-	-
D-E Manufacturing, elec. & water supply	3.01	C-D-E Manufacturing, elec. & water supply	6.15
F Construction	1.73	F Construction	6.26
G Retail trade	1.90	G Retail trade	2.73
H Hotel and restaurants	4.15	H Transport	7.97
I Transports	1.99	I Hotels and restaurants	8.18
J Fin. Intermediation	4.39	J Information and communication	3.25
K Real estate	1.94	K Finance and insurance	2.92
		L-N Real estate, professional & admin activities	21.52
L-Q Education, health and others	3.51	P Education	6.65
		Q Health	7.91
		R-U Arts, other activities, household and intl organisations	13.18

Firm size			
INPS (annual, 2014)		SES (hourly, 2010)	
Less than 10 employees	6.02	-	-
11-15 employees	3.69		
16-19 employees	3.78	10-49	9.87
20-49 employees	2.68		
50-299 employees	2.05	50-249	6.60
300 or more employees	1.01	250+	7.20

Source: Author's calculation on ISTAT negotiated wages database, Structure of Earnings Survey and LoSai data from INPS.

4. Conclusions and policy recommendations

The analysis in this paper has shown that sectoral minimum wages in Italy are relatively high both in absolute terms and relative to the median. This is well above for instance the German statutory minimum wage of 8.50 euros and close to the French one at 9.61 euros in 2015. Moreover, sectoral wage floors have continued to increase in the last decade, even during the crisis, despite flat productivity growth.

The flip, and often overlooked, side of high sectoral minimum wages in Italy is the relatively high level of non-compliance. All employees in Italy should at least be paid the minima fixed by sectoral agreements, but the analysis in this paper has shown that on average around 10% of workers are paid 20% less than the sectoral minimum. Getting a precise estimate of underpaid workers is complex because of measurement and sampling errors but results using alternative employer surveys or social security data confirm the broad trends. Non-compliance is particularly high in the South and in micro and small firms. This is a major issue for the Government and social partners (not just unions but also for employers' organisation which wish to ensure a level-playing field across all firms).

These findings call for a reflection on the functioning of the Italian collective bargaining systems. Negotiated wages are high but do not appear to be binding and therefore they fail to ensure a level-playing field for firms and are not reflected in pay increases for workers at the bottom of the distribution. How can the government and the social partners increase compliance?

A move from rigid minima fixed for all firms and workers in the same sector to wage floors that better take into account local and firm specificities and economic conditions could contribute to increase in compliance. Such a shift however may increase the complexity of the system which may lead to opposite results. A higher presence of unions at the establishment level would also help in this respect by ensuring a more direct control on the workplace (however, many firms, especially the micro and small ones, would most probably still be left out). Without touching to the current institutional settings, which is complicated and often controversial, some practical and relatively cost-free actions could be taken by labour inspection authorities and social partners. Benassi (2011) provides a summary of the main approaches adopted across the world to improve compliance to minimum wages. First, effective labour inspections on site but also using available data and technology and sanctions are the most important tool to increase compliance. However, alternative, more original and relatively cost-limited strategies can also be pursued (even independently from the Government by social partners themselves). Beyond improving inspection activities, a number of options are recommended below to better enforce minimum wages in Italy:

- **Streamline the number of collective agreements.** The complexity of the system may be an important cause of non-compliance. Rani et al. (2013) found that in developing countries the rate of compliance is negatively related to the numbers of minimum wages. A smaller number of collective agreements and wage floors would make the Italian system more readable for both employers and workers.
- **Ensure that agreements are signed by representative unions and employers' organisations.** "Pirate agreements" signed with complacent poorly representative or "yellow"

trade unions undermine existing wage floors and allow paying wages, legally valid, below sectoral minima. To fight against this phenomenon, only representative trade unions and employers' organisations should be allowed to sign legally binding sectoral collective agreements.

- **Make the information on negotiated wages publicly and easily available.** It is currently very complicated to access information on negotiated wages. This is partly done (but it is not fully up-to-date) by the independently run website *WageIndicator.org* (*iltuosalarario.it* in Italian). The complete texts of (some) collective agreements can be found on the CNEL website, but they are far from easy to read and understand. Social partners should be asked to register all agreements (currently some have to be registered, some not) and provide clear information on the agreed pay scale. This information should then be made public on an institutional website in an easily readable manner to help employers who are underpaying by mistake but also workers who may not push for the correct salary as they lack info about their level.
- **Establish a helpline and/or an online form for employers and workers.** Partly related to the previous point, a hotline and/or an online form could be established to provide free and confidential advice to employers, employees and their representatives on wages and more general on employment rights and workplace conflict. Examples can be drawn from the United Kingdom¹³ and Germany¹⁴. In the UK the helpline received around 1,000 calls per week in 2006/07 and 670 in 2008/2009 but only around 50 per week concerning complaints of underpayment (HMRC data reported in Benassi, 2011). In Germany, calls to the helpline were around 4000 per week in the very first weeks of the application of the new minimum wage in January 2015 and then stabilised around 500 calls per week since mid-2015 (Mindestlohn Kommission, 2016).
- **Awareness campaigns.** Once these tools are available, an awareness campaign across the country could be launched to discuss the importance of compliance and present the tools available to employers and workers. Successful campaigns have been run in some developing countries but also in the United Kingdom¹⁵ and they led to an increase in awareness (a series

¹³ See <https://www.gov.uk/pay-and-work-rights> and <http://www.acas.org.uk/index.aspx?articleid=2042>

¹⁴ See <http://www.der-mindestlohn-wirkt.de/ml/DE/Ihre-Fragen/Mindestlohn-Hotline/artikel-mindestlohn-hotline.html>

¹⁵ Benassi (2011) reports that between October 2007 and March 2008, the UK Government undertook five campaigns, making use of different communication methods such as radio advertising, posters, leaflets, a publicity bus and the internet.

of campaign in 2007 and 2008 led to an increase of calls to the UK HMRC helpline by 400%, and in the knowledge of the minimum wage rates for different age groups from 10% to 70% according to the UK Low Pay Commission) and to a decrease in underpayment in Costa Rica (Gindling et al., 2014).

- **Name and shame.** Naming and shaming campaigns have been used in some developing countries (Indonesia and Brazil) but also in the United Kingdom¹⁶ to publicly disclose the names of firms not complying with the minimum wage regulation. Firms not complying to the minimum wage could also be expelled from the employers' organisation (as the employers' organisation *Confindustria* did in the case of firms paying the “*pizzo*”, protection money, to the Mafia) and suspended from public tenders and funds. Name and shame is a costless but potentially effective tool.

In conclusions, fighting non-compliance in Italy is essential to restore a level-playing field for firms and ensure effective pay increases for all workers. A series of relatively low-cost tools can be immediately mobilised by inspection authorities and social partners to increase compliance across the country.

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¹⁶ The most recent list of firms who have failed to pay their workers the National Minimum Wage in the United Kingdom can be found here <https://www.gov.uk/government/news/new-national-minimum-wage-offenders-named-and-shamed-february-2016>

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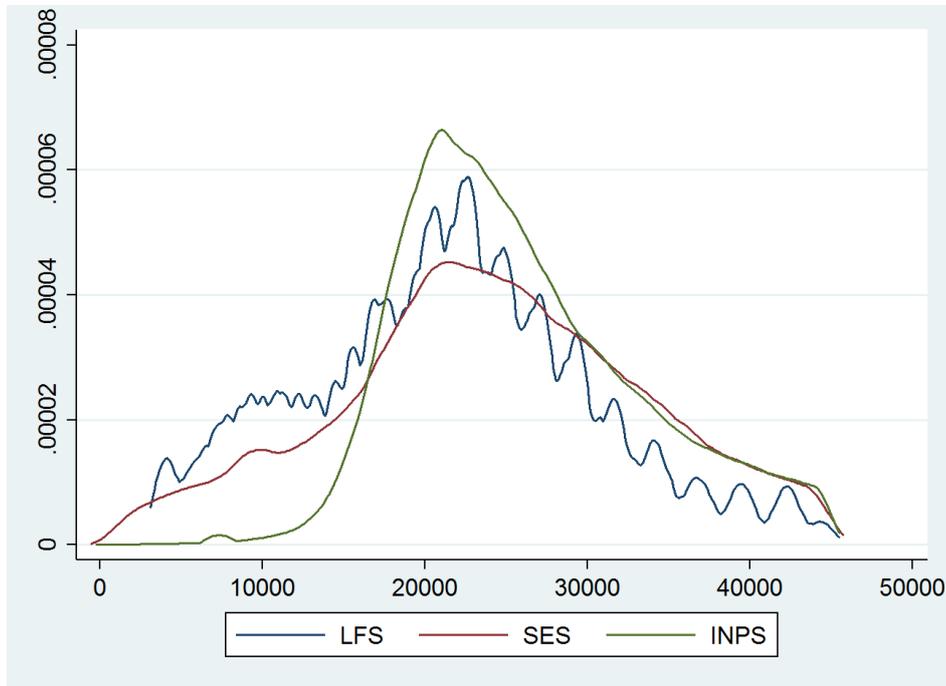
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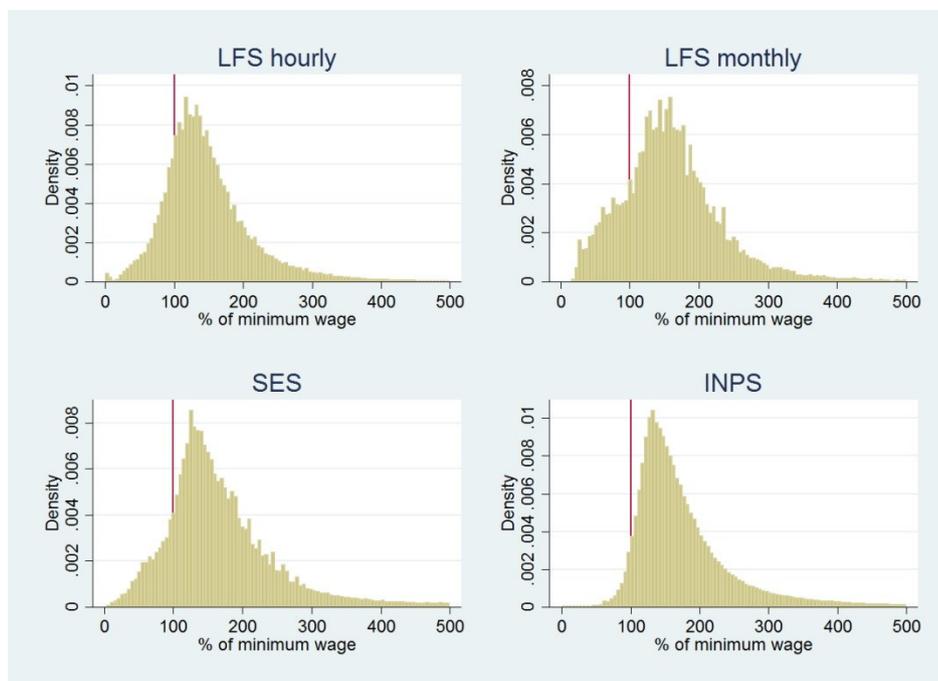
ANNEX

Figure A1. Distribution of monthly wages in LFS, SES and INPS, 2010



Source: Author's calculation on Labour Force Survey, Structure of Earnings Survey and LoSai INPS social security data.

Figure A2. Average distribution of wages by sector (sectoral minimum wages normalised to 100)



Note: The red bar represents the normalised sectoral minimum wage.

Source: Author's calculation on Labour Force Survey, Structure of Earnings Survey and LoSai INPS social security data.

Table A1. Hourly sectoral minimum wages (euros/hour and Kaitz index) using alternative datasets

Year	Hourly minimum wages (average across sectors)	Kaitz (% of the median)	Minimum of the minima	Maximum of the minima	Median
		SES (hourly)			
2010	8.83	66.86	6.99	12.43	13.21
		INPS (annual)			
2008	15,618.48	63.49	12,644.77	23,660.97	24,600
2009	16,044.67	63.67	13,219.31	23,968.28	25,200
2010	16,671.46	64.62	13,155.34	23,917.00	25,800
2011	16,999.96	63.91	13,334.37	24,083.63	26,600
2012	17,316.25	63.66	13,636.62	24,593.61	27,200
2013	17,629.66	63.88	13,803.80	25,141.04	27,600
2014	17,873.13	64.06	13,923.72	25,853.12	27,900

Source: Author's calculation on ISTAT negotiated wages database and the Structure of Earnings Survey and LoSai INPS social security data.

Note: The average hourly minimum and the minimum of the minima differ between LFS and SES in 2010 because SES does not cover agriculture and the public sector.

Table A2. Minimum wage violations and the Kaitz Index (minimum/median wage) using INPS data

	% of workers underpaid (v_0)		Depth of violation (v_1)		Average shortfall per underpaid worker (v_1/v_0)	
	(1)	(2)	(3)	(4)	(5)	(6)
Kaitz index	0.41*** (0.01)	0.41*** (0.01)	0.09*** (0.00)	0.07*** (0.00)	0.10*** (0.01)	0.12*** (0.03)
Workforce characteristics	x	x	x	x	x	x
Region dummies		x		x		x
Firm size dummies		x		x		x
Time dummies		x		x		x
Firm size*region dummies		x		x		x
Region*time dummies		x		x		x
Firm size*time dummies		x		x		x
R-squared	0.39	0.82	0.37	0.76	0.03	0.52
Observations	7234	7234	7234	7234	7234	7234

Source: Author's calculation on INPS and ISTAT negotiated wages database. Workforce characteristics: gender, age (3 categories) and occupation (4 categories).

Table A3. Share of underpaid workers (v_1) in LFS using samples comparable to SES and INPS

Year	Excluding micro firms, agriculture and public sector (comparable with SES)	Excluding public sector (comparable with INPS)
	Hourly wage	Monthly wages
2008	7.24	6.06
2009	7.50	6.40
2010	7.91	6.84
2011	8.75	7.47
2012	7.27	6.13
2013	7.87	6.69
2014	8.99	7.49

Source: Author's calculation on ISTAT negotiated wages database and the Structure of Earnings Survey and LoSai INPS social security data.