The Extent of Rent Sharing along the Wage Distribution

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Abstract

The relationship between rent sharing and wages has been generally evaluated at the average wages. This paper use a unique employer-employee panel database to investigate the extent of rent sharing along the wage distribution in Italy. We apply quantile regression techniques and we carefully control for national level bargaining, sorting and endogeneity. Our findings show that the extent of rent-sharing decreases along the wage distribution, suggesting that unskilled workers benefit the most from firms' rents, probably due to the role of unions.

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Keywords: Rent Sharing, Sorting, Wage Distribution, Quantile Regressions.

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1. Introduction

In competitive labour market models there is not a relation between profits and wages at the firm level, since firms are wage-takers and face a horizontal labour supply. However, non-competitive theories such as efficiency wages models and bargaining theories, predict that there might be a positive relationship between wages and profits. In particular, rent sharing models underline that wages result from a bargain between the employer and the employees which generates a long-run positive relation between wages and profits. In this setting, wages are determined by workers' outside options, by quasi-rent (firm profits evaluated at the opportunity cost of labour) and by relative bargaining power of the parties involved (Hildreth and Oswald, 1997).

At the empirical level many papers have tested the existence and extent of rent sharing (Abowd and Lemieux, 1993, Van Reenen, 1996, Margolis and Salvanes, 2001, Martins, 2009, Card et al., 2011, etc.). However, these analyses have been generally carried out taking into account average wages. In such a way it is not possible to have an insight of the distributional consequences of rent sharing, i.e. it is not possible to take into account the difference in the degree of rent sharing for workers located at different points of the wage distribution.

Aim of this paper is to evaluate the degree of rent sharing along the overall wage distribution in order to get a better understanding of the relationship between profits and wages. There might be different reasons for which rent sharing is not uniform along the workers' wage distribution. On the one hand, it might be argued that if bargaining at the firm level is mainly organized by unions, low and median skilled workers might enjoy a higher degree of rent sharing than high skilled workers. On the other hand, if bargaining within firms occurs mainly at the individual level, rent sharing might favour more high skilled workers through performance pay schemes that are more developed among this kind of workers (Lemiuex et al., 2009). Hence, given the ambiguous theoretical predictions the analysis of rent sharing along the wage distribution is mostly an empirical issue, and to the best of our knowledge this is the first paper that addresses this issue.

In our analysis we make use of a unique employer-employee panel database from 1996 to 2003 for Italy, constructed by merging the INPS (the Italian Social Security Institute) employer-employee panel database with the AIDA (provided by Bureau Van Dick) database that contains detailed information on the balance sheets of the Italian

capital-owned firms. We carry out an empirical analysis taking into account all the issues which has been proved to be relevant when addressing the relationship between rents and wages. In particular, we begin by estimating the impact of quasi-rents on wages using cross sectional quantile regressions, controlling for workers' and firms observed heterogeneity.

Results show that the impact of rent sharing is slightly increasing along the wage distribution, with elasticities running from 4% at the 10th percentile to 5.3% at the 90th percentile. We then introduce in the estimation a proxy of the impact of the first (national) level of bargaining, which is very important in the wage setting. More specifically, to control for the first level of bargaining we use the minimum wage that allows us to exactly control for the kind of national contract applied to each worker and, within the contract, for the exact level ('livello di inquadramento') the worker belongs to. This is a more accurate measure for first level bargaining than the use of average industrial wages as generally done in the literature. The introduction of the minimum wage in the estimation reduce the rent sharing elasticity estimates of around 30%, a percentage which is basically constant along the wage distribution (estimates runs from 2.8% at the 10th percentile to 3.8% at the 90th percentile). This finding points out that, on the one hand, most of the rent sharing take place within firms (as also shown in Van Reenen, 1996) and, on the other hand, that the minimum wage uniformly impacts the wage distribution.

We also control for the sorting of workers that can affect the relationship between profits and wages (Card, Devicienti and Maida, 2010, Arai and Heyman, 2001, Margolis and Salvanes, 2001, Martins, 2009). By applying quantile fixed effects estimates that explicitly takes into account the individual unobserved heterogeneity (Canay, 2011), results significantly change. In particular, the impact of rent sharing is significantly reduced along all the wage distribution, with the strongest reduction concerning the upper tail. This means that skilled workers sort into high profitable firms and that not taking into account this issue could bring to misleading estimates of the relationship between profits and wages. As a consequence, taking sorting into account produce coefficients that are basically flat along the wage distribution. Furthermore, and as shown by previous literature (Card et al, 2011, van Reenen, 1996), endogeneity is a serious concern when addressing the issue of rent sharing. Also, the attenuation bias of the cross-sectional estimation could be even exacerbated by a fixed effects strategy (Nickell, 1981). Therefore, we apply IV quantile fixed effect estimation

techniques (Galvao, 2011, Galvao and Montes-Rojas, 2010). As instrument we exploit the idea developed in Card, Devicienti and Maida (2011) by using a weighted average of the real sales per employee in other provinces of Italy, but in the same 3-digit industry, with weights equal to the inverse of the distance between provinces. The idea is that real sales per employee in the same narrowed defined industry –which represents industry demand shocks -, affect the profitability of the firms. On the other hand, these sales relate to firms in other provinces of Italy and therefore they are uncorrelated with local labour market conditions. By applying IV to our specification results substantially change. In fact, and consistently with the related literature, elasticities estimates increase along all the wage distribution and by a large amount, thus pointing out that there was a severe degree of underestimation in previous fixed effects techniques. In particular, the elasticity of wages with respect to rent is equal to 5.4% at the 10th percentile, 4.4% at the median and 3.4% at the highest percentile, thus highlighting that the degree of rent sharing is decreasing along the wage distribution. Further, the "Lester" range of variation in wages between unprofitable and profitable firm runs from 18% at the 10th percentile to 11% at the 90th percentile consistently -to some extent- with the findings of Card et al. (2011) for the average wages.[3]

As possible explanation for this decreasing pattern of rent sharing along the wage distribution, one might argue that in Italy the bargaining takes place mainly at the firm level, and not at the individual level, and hence unions may play a crucial role. In this framework, it would be not surprising that unions would bargain higher rent sharing for low and medium skilled workers with respect to the high skilled ones. This is consistent with the findings in Bagger et al. (2011), where it is shown that worker's bargaining power decreases with its education level.

The structure of the paper is as follows. In Section 2 we review the theoretical as well as the empirical literature concerning the relationship between profits and wages. In Section 3 we describe the data we use throughout the empirical analyses. Section 4 discusses the empirical specification and presents the main results. Section 5 concludes.

[3] The "Lester" range is defined as the elasticity of wages with respect to quasi-rent multiplied by four times the ratio between the standard deviation of quasi-rent and mean quasi-rent. It gives us a measure of how much the wage of a worker increases moving from a firm at the bottom of the profit distribution (two standard deviation below the mean) to a firm at the top of the profit distribution (two standard deviations above the mean). Lester (1952).

2. Related Literature

Standard competitive theories predict that there is no relationship between wages and profits at firm level, since wages are determined by labour market conditions and firms have no incentives to pay wages over the level set in the labour market. However, non-competitive theories underline that such a relationship can actually exists, i.e. that firms may indeed pay a wage over the level set in the labour market because of different reasons. For instance, it is possible that firms pay higher wages than those set in the competitive labour market due to efficiency wage arguments (see Shapiro and Stiglitz, 1984, Krueger and Summers, 1988). Also, according to bargaining theories, profits and wages can move together since employer and employee bargain on wages. More specifically, in a bargaining framework, wages at firm level are determined by workers' outside options, by the quasi-rent (firm profits evaluated at the opportunity cost of labour) and by the relative bargaining power of the parties involved (Hildreth and Oswald, 1997).[4]

As for the empirical evidence, many works studied the existence and the extent of rent sharing in different countries, using various methodologies and data at different levels. Hildreth and Oswald (1997) and Blanchflower, Oswald and Sanfey (1996) -by using respectively firm level (for UK) and industry level data matched with individual data (for US)- provide evidence in favour of an important positive relationships between profits and wages, controlling for observed work heterogeneity and firm characteristics and applying GMM techniques (or using lagged values of profits) to control for the endogeneity of profits.

Other papers used instrumental variables techniques to control for the endogeneity of profits, while using firm level data to take into account firm heterogeneity. For instance Abowd and Lemieux (1993), for the case of Canada, use instruments related to the international performance, namely the industry import and export prices, finding a very large degree of underestimation in the extent of rent sharing when not controlling for the endogeneity between profits and wages. Van Reenen (1996) analyzes the case of UK using different measures for profits (net profits per head, quasi-rents and Tobin Q),

[4] It is worth noting that also within a modified version of the competitive model it is possible that wages and profits are positively correlated. In particular, in presence of short-run frictions, such that firms face an upward sloping labour supply curve, positive demand shocks might bring to a raise in total firm profits and wages (Hildreth and Oswald, 1997). However, in the long-run, wages adjust to the competitive level, unless there are mechanisms that prevent this adjustment. Hence, a test for rent sharing cannot rest on the evidence of a short-run correlation between profits and wages.

and past innovations as instruments. His findings suggest substantial amount of rent sharing in UK, and a severe underestimation when not controlling for endogeneity.

More recently, various papers have made use of matched employer-employee panel data in order to control for the unobserved worker heterogeneity. Margolis and Salvanes (2001) investigate the case of France and Norway. They apply IV techniques using as instruments sales and operating subsidies, finding relevant rent sharing only in the case of Norway. For the case of France they show that when taking into account the unobserved individual characteristics in the IV estimation, rent sharing estimates turn out to be not significant. Similarly, using employer-employee data Arai (2003) analyzes the case of Sweden. He uses time-average of lagged values of profits and controls for observable firm characteristics to check the relevance of both the rent sharing and of other theories (based on efficiency wages and short-run labour market frictions). He finds out robust evidence of rent sharing in line with bargaining theories, which does not differ across different workers' categories.[5] In another related paper Arai and Heyman (2001) make use of a larger employer-employee matched dataset and apply instrumental variable techniques. They use different instruments such as lagged values of profits, demand elasticity (based on predicted response in sales due to higher prices) and measures indicating the degree of competition in the product market. Their findings confirm that rent sharing is underestimated when not controlling for endogeneity and greater estimates are provided when demand elasticity is used as instrument. Further, they point out that white collar extract more rents than blue collar.

Another interesting related paper is Guertzgen (2009), which focuses on how rent sharing is affected by the different levels of bargaining in Germany, using firm-worker level data and GMM techniques. He shows that rent sharing is higher where there is no union sector coverage and in presence of firm-specific contracts. Moreover, he looks at differences among workers' groups finding out that only for blue collars rent sharing actually disappears under centralized contracts. Also Rusinek and Rycx (2008) analyze the impact of different levels of bargaining (industry and firm level) on the extent of rent sharing, using an employer-employee database for Belgium, a country where the relative importance of industry and firm level agreements (the degree of centralization) differs significantly across industries. Their results show that, after controlling for the endogeneity of profits and heterogeneity among workers and firms, there is a higher

[5] However, it is worth noting that results of this analysis could be affected by the very small sample size compared with other studies that use employer-employee data.

degree of rent sharing in decentralized industries. Moreover, in centralized industries, rent sharing is observed only for workers covered by a firm agreement.

Finally, Martins (2009) make use of a matched employer-employee panel data to derive evidence of rent sharing for Portugal in the period 1993-1995. His findings strongly support the need of taking into account the role of both the unobserved individual and firm heterogeneity, since IV estimates (as instruments: the interaction between the exchange rate and the share of total exports in sales) could be biased when these features are neglected (see Martins, 2007, for a survey of the empirical results and methodologies applied).

As for Italy there is a lack of empirical evidence concerning rent sharing. One of the few exceptions is the very recent paper of Card, Devicienti and Maida (2011) that analyzes the degree of rent sharing and tests the hold up hypothesis for Italy in the region of Veneto for the period 1995-2001. By using INPS-AIDA matched employer-employee data, they perform an accurate analysis taking into account all the relevant issues to be addressed to identify the extent of rent sharing (the sorting of workers and firms and the endogeneity of profits). Their findings show that there is evidence of a substantial degree of rent sharing in Veneto, and that profits are shared with workers after capital costs are fully deducted from profits. Another work on the Italian case is Pistoresi and Strozzi (2001), who make use of a factor dynamic analysis to analyze the extent of rent sharing in Italy within the microsectors of the Italian basic metal industry through the period 1983–98. Their main findings are that rent sharing in Italy arises only at the centralized level of wage bargaining, while decentralized wage negotiations do not lead to any degree of rent sharing between unions and employers.[6]

These papers are different from ours, since we make use of a unique database for the whole Italian economy and analyze the period from 1997 to 2003, thus being able to shed lights on more recent wage dynamics. Moreover, we look at the extent of rent sharing along the wage distribution, which have not been previously investigated.

[6] Other papers that address issues similar to rent-sharing for Italy are Pencavel, Pistaferri, and Schivardi (2006) who investigate differences in wages between capital-owned and worker-owned firms and Guiso, Pistaferri and Schivardi (2005) who focus on risk sharing and analyze the response in wages to firms specific shocks in value added, distinguishing by temporary and permanent shocks.

3. Data Description

We use a panel version of the administrative database provided by INPS (Italian Social Security Institute) and elaborated by ISFOL.[7] It is a matched employee-employer dataset, constructed by merging the INPS employee information database for the period 1985-2003 with the INPS employer information database.[8] The database contains individual information such as age, gender, occupation, workplace, date of beginning and end of the current contract (if any), the kind of national contract and the related minimum wage, the social security contributions, the worker status (part-time or full-time), the real gross yearly wage and the number of worked weeks and days. We then have some information concerning the firm such as the plant location (province), the number of employees and the sector (Ateco91). We focus on male and female prime-age workers, aged between 25 and 49 (when they first enter in the database), working in the industrial and service sectors, both part-time (converted in full-time equivalent) and full-time, employed in standard labour market contracts: blue collar and white collar workers.[9]

We merge the INPS dataset with detailed data on the balance sheets of the (capital-owned) firms where workers are employed, which come from the AIDA database from 1996 until 2003. AIDA is a database on Italian firms provided by Bureau Van Dijk that contains information on the balance sheet of the firms such as value added, profits, sales, production and costs of production.[10] As main independent variable we use quasi-rent per worker as in Van Reenen (1996) and Card et al. (2011).[11] We also use real sales per employee in order to carry out IV estimates.

The two databases are merged by using as key variable the tax code or the VAT number (*codice fiscale* or *partita IVA*) of the company. The number of records matched with respect to the total number of records in the INPS database is around 47%.

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[7] ISFOL stands for "Institute for the Development of Vocational Training". The sample scheme has been set up to follow individuals born on the 10th of March, June, September and December and therefore the proportion of this sample on the Italian employees' population is approximately of 1/90.

[8] For the information on employers we also make use of the ASIA ("Italian Statistical Archive of Operating Firms") database, provided by ISTAT. This database has been used since 1999, because the INPS employer database was not available after 1998. The two databases provide the same set of information (firm size and sector).

[9] The sample includes also managers. However, since they account for a relatively small fraction of workers in the sample (only about 1%, because most of the managers are not covered by the INPS database) we include this category within the white collars.

[10] Data have been deflated using the valued added deflator for value added, profits, sales, production and costs of production. The value added deflator comes from our elaboration of ISTAT data on regional economical accounts and is defined at the sectoral and regional level. The base year is 2002.

[11] Rent per worker evaluated at the opportunity cost of labour, which is defined as the revenue per worker (operative income –which equals to net profits- plus the wage bill), minus the alternative wage that we proxy with the average industrial wage (Van Reenen, 1996).

However, it is worth noting that AIDA contains capital-owned firms with total value of production equal or higher than 950.000 euro while INPS data contain workers employed in all kinds of companies no matters the legal status and the amount of the total value of production. Therefore, the share of non-matched records is due to those workers who are employed in other kind of firms or in capital-owned firms with total value of production less than 950.000 euro. After the merge, the panel version has been constructed considering only one observation per year for each worker. For those workers who display more than one observation per year we selected the longest available contract in terms of weeks worked. We then eliminated those extreme observations below (above) the 1st (99th) percentile of the wage and profits per employee distribution and the observations where the difference in the firm size reported in AIDA and the one reported in INPS exceeds 200 (in this way the correlation between the firm size reported in AIDA and the firm size reported in INPS is equal to 99.97). We also dropped those observations for which the growth rate of the wage from year to year was higher than 100% or less than -50% and where the growth rate of profits per employee was higher than 300% or less than -300%. We further eliminate the observations above the 99th percentile of the distribution of the difference between wages and minimum wages in order to drop out other possible outliers of the analysis. We finally restrict the sample to the 26 major national contracts, to have enough variability within each contract cell.[12] Table A1 in the appendix shows the characteristics of the merge.

We end up with an employer-employee panel database constituted by 47,403 workers for 186,717 observations for the period 1996-2003. As dependent variable in our regressions we use the (log) real gross weekly wage in euro.[13] Table 1 shows the descriptive statistics of the variables of the analysis. The variables of interest are in logarithms.

[12] The high reduction in the number of observations which can be noted from Table A1 concerns the availability of the minimum wage. Moreover, we drop those workers who are present only one year in the database.

[13] Wages have been deflated using as deflator the National Consumer Price Index (FOI index, *Indice dei Prezzi al Consumo per le Famiglie di Operai e Impiegati*, ISTAT). The base year is 2002.

Table 1: Descriptive Statistics of the Variables of the Analysis				
Variable	**Mean**	**Std. Dev.**	**Min**	**Max**
Log Real Weekly Wage	5.99	0.28	5.23	7.01
Log Annual Minimum Wage	5.53	0.12	5.22	6.22
Age	36.65	9.72	15	69
Age Squared	1,437.63	755.89	225	4,761
Blue Collars	0.63	0.48	0	1
White Collars and Manager	0.37	0.48	0	1
Log Firm Size	4.41	1.51	0	9.65
Log Quasi-Rent per Employee	2.72	0.96	-6.95	5.14
Log Real Sales per Employee	5.19	0.76	-3.60	7.99
Log Real Sales per Employee other provinces (instrument)	5.33	0.50	3.08	6.81
Tenure 0-1	0.35	0.48	0.00	1.00
Tenure 2-9	0.48	0.50	0.00	1.00
Tenure >9	0.17	0.37	0.00	1.00
dNorth East	0.30	0.46	0	1
dNorth West	0.42	0.49	0	1
dCentre	0.16	0.37	0	1
dSouth	0.08	0.28	0	1
dIsland	0.03	0.17	0	1
Sectors	38.09	17.20	15	93
Number of Contracts	26.00			
Number of Observations	186,717			
Number of Workers	47,403			
Source: Panel ISFOL on INPS-AIDA data.				

4. Econometric Analysis

4.1 Econometric Strategy

In this section we aim at analyzing the impact of rents on wages. Since our focus concerns the relationship between rents and wages along the wage distribution, we perform quantile regression (koenker and Bassett, 1978). We use the INPS-AIDA employer-employee database from 1996-2003 and the baseline specification is the following:

$$\ln(w_{\theta(i,t)}) = \alpha_\theta + \chi_\theta * \ln MW_{c(i,t)} + B'_\theta * I\_Char_{i,t} + \beta_\theta * \ln Firmsize_{j(i,t)} +$$
$$+\gamma_{1,\theta} * \ln Quasi\,\mathrm{Re}nts_{j(i,t)} + \phi_{s,\theta} + \lambda_{a,\theta} + \delta_{t,\theta} + \varepsilon_{i,t,\theta}$$

where θ refers to the percentile, i to individuals, $j(i,t)$ to the firm where the worker i is employed at time t, $c(i,t)$ to the national contract (along with its level) the worker is subject to, s to industry. The dependent variable in our regressions is the (log) real gross weekly wage. The term $I\_Char_{i,t}$ is the set of observed individual characteristics (age, age squared, tenure and occupation dummy). $MW_{c(i,t)}$ is the

national contract minimum wage that controls for first level bargaining. $QuasiRents_{j(i,t)}$ is quasi-rent per employee. $Firmsize_{i,t}$ is the proxy for firm heterogeneity, while φ_s, λ_a, δ_t are industry, area (five macro-areas in Italy: Northwest, Northeast, Centre, South and Islands) and time dummies respectively. All the variables of interest are in logarithms and therefore we estimate elasticities.

In the first specification, as benchmark estimates, we perform cross-sectional quantile estimates in order to get the impact of rents on wages by taking into account only the individual and firm observed heterogeneity. Then in a second regression, we include the minimum wage related to the specific contract (and within the contract to the specific level) the worker belongs to in order to control for the national level of bargaining in Italy. By this means we are able to see how much of the imputed extent of rent sharing is actually due to the first level (national level) of bargaining and how much is due to second level (firm level) bargaining. This is a very important concern in the general assessment of the degree of rent sharing and using the minimum wages specific for each workers contract turns out to be a very high accurate measure for controlling for first level bargaining compared to previous used measures such as average industrial wages.

Since an important concern in our analysis is also to tackle the issue of the unobserved individual heterogeneity that can bias the cross sectional estimates, we carry out quantile fixed effects estimates (Canay, 2011). In fact the sorting of workers has been proved in the literature to be very important in affecting the relationship between rents and wages since high skilled workers might sort into high profitable firms (Card, Devicienti and Maida, 2010, Martins, 2009, Arai and Heyman, 2001, Margolis and Salvanes, 2001).

Finally, in order to control also for the issue of the endogeneity between profits and wages (due to simultaneous determination and to possible measurements errors in variables) we also apply an IV strategy. It is in fact worth to remind that in the case of endogeneity the (attenuation) bias in the cross-sectional estimates can be severe and also aggravated by a fixed effects strategy (Card, Devicienti and Maida, 2011). This also has been proved to be a very important concern in the literature and results have generally confirmed a severe underestimation of the impact of rents on wages when no taking into account endogeneity (Van Reenen, 1996). Therefore we use a very recently developed estimation strategy of IV quantile fixed effects estimates (Galvao, 2011, and

Galvao and Montes-Rojas, 2010), which is an extension of the IV quantile procedure of Chernozhukov and Hansen (2008) that allows for the inclusion of fixed effects as introduced in Koenker (2004).[14] As instrument we exploit the idea developed in Card, Devicienti and Maida (2010) by using a weighted average of the firm sales per employee in other provinces of Italy but in the same three-digit industry of the considered firm. The weights are the inverse of the distance between provinces. The idea is that industry sales, which represent industry demand shocks, affect the profitability of the firms while, at the same time, they are not correlated with local labour market conditions since they concern firms in other provinces of Italy.

4.2 Results

Table 2 shows the cross-sectional quantile estimates of the impact of profits per employee on workers' wages. In this specification we just control for individual and firm observed heterogeneity and therefore these estimates represent the benchmark estimates we use throughout the paper in order to compare our later results. As we can see the impact of rent sharing is not uniform along the wage distribution. In fact it is slightly increasing: it runs from 4% at the 10th percentile to 5.3% at the 90th percentile. This seems to suggest that rents are shared differently between workers located at different points of the wage distribution.[15] Moreover, the "Lester" range of variation in wages between unprofitable and profitable firm is around 14% at the bottom quantile and around 18% at the highest one.[16]

These estimates do not take into account the relevance of the first national level of bargaining that is likely to affect the degree of rent sharing. Therefore we run the same estimates using the minimum wage as a proxy for the first level of bargaining. This measure allows us to carefully control for the first level of bargaining and it represents

[14] For a detailed description of the procedures applied see the appendix in Matano and Naticchioni (2012) and Canay (2011), Galvao (2011) and Galvao and Montes-Rojas (2010).

[15] As for the control variable in the estimation, the age shows a concave pattern, which is increasing along the wage distribution; the gender wage gap is higher at the highest percentiles; the return to tenure is positive and decreasing along the wage distribution and the occupation dummy is positive and increasing, highlighting higher wages for higher occupation categories. The firm size has a basically constant impact along the wage distribution.

[16] The "Lester" range is defined as the elasticity of wages with respect to quasi-rent multiplied by four times the ratio between the standard deviation of quasi-rent and mean quasi-rent. It gives us a measure of how much the wage of a worker increases moving from a firm at the bottom of the profit distribution (two standard deviation below the mean) to a firm at the top of the profit distribution (two standard deviations above the mean). Lester (1952). In our case our measures for the Lester range represent a proxy that can give an idea of the magnitude of the impact of rent sharing on wages, since we are taking into account quantiles rather than average wages.

a better measure than the use of average industrial wages, since wages are defined within contracts rather than within industries. Table 3 shows the results of these cross-sectional quantile regressions.

Table 2: Quantile Regressions of Wages on Quasi Rents.					
	q10	**q25**	**q50**	**q75**	**q90**
Ln Quasi Rent	0.040***	0.046***	0.050***	0.052***	0.053***
Gender	-0.103***	-0.125***	-0.163***	-0.200***	-0.221***
Age	0.019***	0.021***	0.024***	0.025***	0.029***
Age Squared	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
Tenure 2-9	0.077***	0.071***	0.062***	0.050***	0.041***
Tenure >10	0.128***	0.115***	0.095***	0.075***	0.057***
White Collar and Manager	0.161***	0.184***	0.234***	0.304***	0.358***
ln Firm Size	0.019***	0.019***	0.019***	0.019***	0.017***
Const	5.184***	5.221***	5.317***	5.413***	5.496***
Area, Time and Sector dummies	yes	yes	yes	yes	yes
N. Observations	186,717	186,717	186,717	186,717	186,717
N. Individuals	47,403	47,403	47,403	47,403	47,403
R squared	0.36	0.39	0.42	0.43	0.43

Notes: ***,** and * denote significance at 1%, 5% and 10% respectevely.

The results of these estimates turn out to be very interesting. In fact it can be seen that, first of all, the impact of minimum wage is positive and increasing along all the wage distribution and its elasticity is higher than 1, meaning that an increase in the minimum wage implies a more than proportional increase in the corresponding worker's wage, which is also higher the higher is the occupational category considered. Moreover, taking into account first level of bargaining, implies a reduction in the degree of rent sharing and the extent of it is around 30% for all wage percentiles. In particular, elasticity estimates turn out to be equal to 2.8% at the 10th percentile, 3.5% at the median and 3.8% at the 90th percentile. This finding highlights that most of the rent

sharing (around 70%) is actually the outcome of a bargaining between the employer and the employee, which suggest the relevance of studying this relationship at the firm level (Van Reenen, 1996). It is also worth noting that when introducing the minimum wage in the estimation, also coefficients for many of the other covariates are highly reduced in magnitude and the reduction is even higher compared to the one that affects the rent sharing coefficient. In particular, age (which can be taken as a proxy of the experience) and tenure are reduced by more than 50%, especially at the highest percentiles. Also the occupation dummy does not show the same important effect as in previous estimates, and in particular, again, at the highest percentiles. Finally, the gender wage gap turns out to be significantly reduced. This means that the introduction of the minimum wage is able to capture a large part of the impact of the individual control variables on wages, in particular for what concern those variables that are related to career profiles (such as age, tenure and occupation), whose effect turns out to be significantly captured by the use of the minimum wage. Nonetheless, the fact that the estimates for rent sharing are reduced by not such an amount re-marks that rent sharing is a phenomenon that essentially takes place within firms (according also to van Reenen, 1996).

However, these estimates are likely to be biased because they do not take into account the sorting of workers, i.e. the fact that high skilled workers might sort into high profitable firms. Therefore we run quantile fixed effects estimates (Canay, 2011), which allows us to introduce fixed effects in the estimation that capture time invariant workers' characteristics such as ability and education. Table 4 shows the results. As we can see, estimates significantly change when we take into account the individual unobserved heterogeneity. In fact, coefficients are highly reduced in magnitude and become basically flat along the wage distribution. Hence, the highest reduction concerns the upper tail of the wage distribution where coefficients estimates are now reduced by 60% (compared with a 46% decrease in the lowest tail of the wage distribution).

Table 3: Quantile Regressions of Wages on Quasi Rents with Control on First Level of Bargaining.					
	q10	**q25**	**q50**	**q75**	**q90**
Ln Quasi Rent	0.028***	0.032***	0.035***	0.037***	0.038***
Ln Minimum Wage	1.369***	1.480***	1.611***	1.696***	1.685***
Gender	-0.055***	-0.064***	-0.084***	-0.111***	-0.139***
Age	0.008***	0.008***	0.008***	0.009***	0.010***
Age Squared	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
Tenure 2-9	0.038***	0.029***	0.018***	0.009***	0.006***
Tenure >10	0.071***	0.054***	0.036***	0.022***	0.012***
White Collar and Manager	0.034***	0.037***	0.050***	0.071***	0.103***
ln Firm Size	0.018***	0.018***	0.018***	0.015***	0.011***
Const	-2.239 ***	-2.799***	-3.413***	-3.731***	-3.482***
Area, Time and Sector dummies	yes	yes	yes	yes	yes
N. Observations	186,717	186,717	186,717	186,717	186,717
N. Individuals	47,403	47,403	47,403	47,403	47,403
R squared	0.36	0.39	0.42	0.43	0.43
Notes: ***,** and * denote significance at 1%, 5% and 10% respectevely.					

These results are consistent with previous empirical evidence that shows that taking into account the sorting of workers entails a high reduction in the estimated degree of rent sharing (see for instance Card et al., 2011, Martins 2009).

Table 4: Quantile Fixed Regressions of Wages on Quasi Rents.					
	q10	**q25**	**q50**	**q75**	**q90**
Ln Quasi Rent	0.015***	0.013***	0.013***	0.014***	0.015***
Ln Minimum Wage	0.974***	0.978***	0.993***	1.016***	1.037***
Age	0.008***	0.007***	0.006***	0.004***	0.003***
Age Squared	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
Tenure 2-9	0.036***	0.022***	0.009***	0.0000	-0.011***
Tenure >10	0.041***	0.021***	0.005***	-0.007***	-0.025***
White Collar and Manager	0.029***	0.031***	0.030***	0.029***	0.034***
ln Firm Size	0.014***	0.014***	0.014***	0.014***	0.013***
Const	0.374***	0.442***	0.443***	0.390***	0.357**
Area, Time and Sector dummies	yes	yes	yes	yes	yes
N. Observations	186,717	186,717	186,717	186,717	186,717
N. Individuals	47,403	47,403	47,403	47,403	47,403
R squared	0.35	0.38	0.40	0.41	0.41

Notes: ***,** and * denote significance at 1%, 5% and 10% respectevely.

To characterize further the evidence on the sorting of workers into high profitable firms we also present a descriptive statistic of the percentage of workers, classified by their belonging to each of the quartiles of the wage distribution, who are sort into firms distinguished by their profits (quartile) level (Table 5). In other words we divide observations in cells according to the quartiles of the firm profits distribution and then we look at the percentage of workers within each cell who belong to a specific quartile of the wage distribution. Table 5 clearly shows and confirms our findings related to the sorting of workers into high profitable firms. In fact, if we look at the 4th row, where there are the highest profitable firms (those into the 4th quartile of the profit distribution), the percentage of workers who belong to the first quartile of the wage distribution (lowest paid workers) is 11%, while the same percentage in the least profit firms (1st quartile, 1st row) is equal to 42.88%, three times the previous value. On the other hand, looking at the highest paid workers (column (4)), these are relatively more

concentrated into the highest profit firms (40.68%), while their presence into the lowest profit firms is relatively low (12.73%). Moreover these percentages show a monotonic pattern. As for the workers in the middle quartiles (2nd and 3rd) differences are not so striking, but still present: those in the second quartile are relatively more concentrated into the lowest profits firms (27%, 28% with respect to 25% and 18% into the highest profits firm), while those in the third quartile are relatively more concentrated into the highest profit firms (around 29% against 17% and 24% for low profit firms). Thus this picture clearly underline and confirm our findings in terms of the sorting of workers into high profitable firms in Italy.

Table 5: Distribution of Workers' Wages by Profits Quartiles.

Profit Distribution (quartiles)	Wage Distribution (quartiles)			
	1	2	3	4
1	42.88	27.02	17.37	12.73
2	28.28	28.52	24.15	19.06
3	17.80	25.68	28.98	27.53
4	11.03	18.79	29.50	40.68

Source: Panel ISFOL on INPS-AIDA data.

Finally, we present the IV estimates since, as already pointed out, the endogeneity between rents and wages can cause a severe degree of underestimation of the degree of rent sharing which can be also worsened by a fixed effects strategy (Card et al., 2011). Table 6 presents these results. The estimation has been carried out simultaneously on three percentiles (10th, 50th, 90th) due to computational reasons. Moreover, since in this procedure is not possible to test the weakness of the instrument, we have decided to carry out a standard IV fixed effects estimation -on the average- (see table A2) and look at the F-statistics of the first stage. The F-value for the instrument in the first stage is significant and higher than the threshold value of 10, confirming that the instrument chosen is not weak.[17]

[17] In table A2 we report all these estimation carried out on the average wages. It is worth noting that all estimates are quite close to those of the median and, in particular, those of the IV estimation (column (4)) shows that the elasticity with respect to wages is equal to 4.1% relative to 4.4% for the median, whereas the median of wages is lower than the mean wage, thus confirming the decreasing pattern of rent sharing.

Table 6: IV Quantile Fixed Effects Regressions of Wages on Quasi Rents.			
	q10	**q50**	**q90**
ln Quasi Rent	0.054***	0.044***	0.034***
ln Minimum Wage	0.951***	0.943***	1.014***
Age	0.007***	0.005***	0.001***
Age Squared	-0.000***	-0.000***	-0.000***
Tenure 2-9	0.042***	0.009***	-0.015***
Tenure >9	0.042***	0.005***	-0.030***
White Collar and Manager	0.024***	0.028***	0.033***
ln Firm Size	0.015***	0.016***	0.015***
Const	3.445***	3.678***	3.509***
Area, Time and Sector dummies	yes	yes	yes
N. Observations	186,717	186,717	186,717
N. Individuals	47,403	47,403	47,403

Notes: ***,** and * denote significance at 1%, 5% and 10% respectevely. Instruments are the linear projections of other provinces average sales per employee on the endogeneous variables.

As we can see, when taking into account the endogeneity of the relationship between profits and wages, results significantly change. In fact the elasticities of rents with respect to wages are now much higher and the highest increases concern the lower tail of the wage distribution. In particular, rents have a decreasing impact along the wage distribution with elasticities running from 5.4% at the 10th percentile, to 4.4% at the median and falling to a 3.4% at the highest percentile. In terms of the Lester range this is equal to 0.18 at the bottom percentile and to 0.11 at the highest percentile, which means that a workers who passes from an unprofitable firms (two standard deviations below the mean of profits) to a profitable one (two standard deviations above the mean of profits), gets an increase in wage of 18% at the bottom of the wage distribution and of 11% at the top. These estimates are quite consistent with those of Card, Devicienti and Maida (2010) who find an average Lester range for Veneto in Italy of around 10%.

This means that the second level of bargaining in Italy (at the firm level) is such to favour unskilled workers. This finding is consistent with the idea that unions in Italy are relevant not only at the national level, but also at the firm level. Moreover, this result is also in line with Bagger, Fontaine, Postel Vinay, Robin (2011) who, using a structural matching model, have shown that workers bargaining power decrease with the education level.

4.3 Characterization of the results

In this section we carry out some descriptive statistics that helps us to further characterize our results. In particular we analyze firm performance by quartiles of the firm profits distribution. We have a look at the average growth rate of profits in order to see whether in Italy it is high profits or low profits firms that on average have enjoyed the highest growth rates in profits. This picture is interesting because if we find out that low profits firms (where the majority of low skilled workers are sorted into) are those who have also enjoyed the highest profits growth rates, it means that not only low paid workers are those with higher elasticities with respect to rents, but also that -in cumulative terms- the overall amount of rent shared goes to this kind of workers. On the other hand, if high profits firms are those that have enjoyed the highest growth rate of profits it means that, even if low paid workers are those who gain more from rent sharing, since they are relatively less present in these kinds of firms, the overall cumulative rents they can extract from firms is limited (since they are concentrated in firms with low profits growth rates).

We therefore proceed by computing the annual growth of profits using the dataset collapsed by firm in order not to count twice or more firms that have more than a worker present in our database and then to average out these values for each the firms. Since for some firms we do not have any information about its annual growth rate, we lose a certain number of observations in these descriptive statistics (16,360) which however represents 8.7% of our sample.[18] Nonetheless, the picture gives interesting results that are worthy to be reported. In fact, table 7 shows that that the firms who have experienced between 1996-2003 a higher degree of annual profits growth rates in percentage terms are low profits firms, which have had an average annual profit growth rate of around 8% compared with just to 4.28% for high profit firms. In terms of

[18] Moreover, these averages have been computed by not taking into account a very few number of observations (1,959 in the entire simple) for which the growth rate of quasi-rents from one to another was extremely high and that could bring some distortion in the descriptive statistics.

the median differences are smoother. So these descriptive statistics, joint with previous results, point out a picture where low skilled workers, who are relatively more concentrated in low profits firms and that experience a relatively higher elasticity of wages with respect to rents, are also employed in those firms that in Italy have experienced the highest growth rates of profits.

Table 7: Mean and Median of Average Profits Growth by Profits Quartiles.

Profit Distribution (quartiles)	Average Annual Growth Rate of Profits		
	Mean	Median	N. Obs
1	8.61%	3.90%	40,126
2	6.36%	3.77%	43,022
3	4.99%	2.84%	43,616
4	4.28%	3.01%	43,593

Source: Panel ISFOL on INPS-AIDA data. Average profits growth computed from firm data.

Conclusions

In this work we analyze the degree of rent sharing along the wage distribution. Our findings show that rent sharing impact is not uniform across workers located at different points of the wage distribution. In particular, taking into account first national level of bargaining, sorting and endogeneity, we find out a decreasing pattern of rent sharing along the wage distribution, with elasticities of wages with respect to quasi rents passing from 4.8% at the 10th percentile to 2.8% at the 90th percentile of the workers' wage distribution. One of the possible explanation might be related to the role for firm unions in protecting the lowest paid workers' categories. Moreover, to further characterize our findings, we look at the average growth rate of profits of the firms distinguished by profits levels, in order to check whether the relatively higher return to rent-sharing for low skilled workers is offset by the fact that they work in firms experiencing relatively low growth rates of profits. This appears to be not the case, since our findings show that low profits firms, in which most of the low paid workers are sorted, are those that have experienced on average higher rate of profits growth.

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Appendix

Table A1: Characteristics of the match between AIDA-INPS (1996-2003)

Table A1: Characteristics of the Match between AIDA-INPS (1996-2003)			
	Universe of Job-Year Observations	Matched Job-Year Observations	Panel Estimation Sample
Number of Workers	205,933	123,462	47,403
Real weekly wage	415.19	443.51	413.92
Age	36	37	37
Females	0.37	0.33	0.30
White collars and Manager	0.38	0.39	0.37
Number of Firms	204,937	67,624	34,063
Firm size (INPS)	2446	3068	296
Firm size (AIDA)		2828	301
Real profit per employee (1000s euro)		31.34	9.28
Quasi Rent per employee (1000s euro)		144.47	21.69
Real sales per employee (1000s euro)		318.51	241.57
Number of Records	1,204,049	564,373	186,717

The Universe of Job-Year Observations refers to the original INPS database, with workers aged between 15 and 64, employed in standard labour contracts (blue collars, white collars and managers) and working in the industry and service sectors. The Matched Job-Year Observations referes to the fraction of the INPS database which has been merged with the AIDA database (with no any outlier cleaning). The Panel Estimation Sample has been constructed by using the longest available contract for each worker each year and restricting the sample to those workers aged between 25-49. Data have been further cleaned by dropping outliers (observations for which the difference in absolute value between the firm size reported in AIDA and the firm size reported in INPS was higher than 200, extreme observations below (above) the 1st (99th) percentile of wages and profits per employee variables, observations for which the growth rate of the wage from year to year was higher than 100% or less than -50% and where the growth rate of profits per employee was higher than 300% or less than -300% and, finally, observations above the 99th percentile of the distribution of the difference between wages and minimum wages in order to drop out other possible outliers of the analysis) and considering the 60 major national contracts.

Table A2: Cross-Section, Fixed Effects, IV Fixed Effects Regression of Wages on Rents on the Average Wages.

	(1)	(2)	(3)	(4)
Ln Quasi Rent	0.059***	0.039***	0.014***	0.041***
Ln Minimum Wage		1.675***	0.998***	0.989***
Age	0.027***	0.009***	0.005***	0.005***
Age Squared	-0.000***	-0.000***	-0.000***	-0.000***
Tenure 2-9	0.059***	0.018***	0.012***	0.012***
Tenure >10	0.084***	0.032***	0.006***	0.007***
White Collar and Manager	0.216***	0.030***	0.030***	0.030***
ln Firm Size	0.018***	0.015***	0.014***	0.014***
Const	4.951***	-4.021***	0.414***	0.501***
Area, Time and Sector dummies	yes	yes	yes	yes
N. Observations	186,717	186,717	186,717	186,717
N. Individuals	47,403	47,403	47,403	47,403
R squared	0.39	0.62	0.26	0.24
F-test Instrument First Stage				207.94

Notes: ***,** and * denote significance at 1%, 5% and 10% respectevely. The instrument is the weighted avearge of other provinces real sales per employee.