Wage compression within the firm*

Marco Leonardi
University of Milan and IZA

Michele Pellizzari
University of Geneva, CEPR and IZA

Domenico Tabasso
University of Geneva and IZA

May, 2016

Abstract

We revisit the role of labor market institutions by looking at their effect within the firm. We study a peculiar wage indexation mechanism - the *Scala Mobile* (SM) - that heavily compressed the distribution of Italian wages during the 1970s and 1980s. The SM imposed large real wage increases at the bottom of the distribution and real cuts for high-wage workers. We document that this mechanism triggered a strong redistribution within the firm. Skilled workers received lower total wage adjustments when employed at firms with many unskilled workers and they tended to move towards more skill-intensive firms. We rationalize these findings with a simplified model of intra-firm bargaining with on-the-job search.

*We would like to thank David Card, Giacomo De Giorgi, Andrea Ichino, Thomas Lemieux, Marco Manacorda, Enrico Moretti and Giulio Zanella for useful comments and discussions. We are also very grateful to Giuseppe Tattara and Marco Valentini for providing the data and for their insightful comments. Pietro Ichino helped us reconstructing the functioning of the Scala Mobile. We received useful suggestions from seminar participants at the Bank of Italy, Copenhagen Business School, Collegio Carlo Alberto, University of Essex, University of Geneva, the Tinbergen Institute, University of Zurich, the 2015 fRDB Workshop of Fellows and Affiliates and the 2015 Policy Evaluation in Health Care and Labour Markets (Catholic University Milan). All errors remain our sole responsibility. Financial support from the Swiss National Science Foundation is gratefully acknowledged (grant n. 100018 152770).
Corresponding author: Michele Pellizzari, Institute of Economics and Econometrics, Geneva School of Economics and Management, University of Geneva, 40 Bd du Pont d'Arve, CH-1211, Geneva 4, Switzerland. Email: michele.pellizzari@unige.ch

1 Introduction

The analysis of labor market institutions and their role in shaping the distribution of earnings is the focus of one of the most copious branches of the economics literature (David Card, W. Craig Riddell and Thomas Lemieux, 2004; John Di Nardo and David S. Lee, 2004; John Di Nardo, Nicole Fortin and Thomas Lemieux, 1996; David S. Lee, 1999; Marco Manacorda, 2004). Institutions such as minimum wages or unions affect earnings both within and across firms; however virtually all studies in this area analyze their effects only on the overall distribution of wages.

In this paper we revisit the role of labor market institutions by focusing on their impact on the distribution of wages both within and across firms. In doing so we also provide the first empirical application of an interesting class of models of intra-firm bargaining (Pierre Cahuc, Fabien Postel-Vinay and Jean-Marc Robin, 2006; Pierre Cahuc, Francois Marque and Etienne Wasmer, 2008; Lars A. Stole and Jeffrey Zwiebel, 1996).

We study a peculiar wage indexation system that was implemented in Italy from the late 1970s to the early 1990s. This system - known as the *Scala Mobile* (henceforth SM) - mandated that the wages of all dependent employees in the country had to be increased each quarter by (at least) the same nominal amount in absolute terms.[1] The resulting SM adjustments were identical for all workers in nominal absolute value but implied large real wage increases for workers at the bottom of the distribution and real wage cuts for workers at the top.[2] As such, the system compressed the distribution of earnings from the bottom similarly to a rising statutory minimum wage (Manacorda, 2004).

Over the period of strongest implementation of the SM (1977-1982), the mere automatic application of the system - thus disregarding endogenous equilibrium responses - implied a yearly increase of about 9% of the real wages for workers in the bottom decile of the overall wage distribution and a decline of about 16% for workers in the top decile. Clearly, the SM only mandated minimum wage adjustments for each individual worker and did not forbid employers and employees to negotiate additional pay rises. Hence, the SM system inter-

[1] Such nominal amount was computed as the product of the (quarterly) point change in the price index and a fixed parameter.

[2] Obviously, the SM only defined minimum mandatory adjustments and employers and employees could negotiate additional wage rises.

played with the various levels of national, sectoral, firm and individual bargaining. Eventually, when we look at total wage changes, workers at the bottom of the distribution still enjoyed a very substantial real wage increase while workers at the top of the distribution barely kept their purchasing power.

When looking beyond this overall impact, we find that the effect of the SM was highly heterogeneous across firms: those with many low-paid workers were forced to grant each year large real wage increases to many of their employees, whereas firms with few low-paid workers barely had to worry about the indexation system. At the firm level we find a strong negative correlation between the overall burden of the SM and the average total wage change.[3] In other words, the system worked across the whole wage distribution but it also triggered a substantial process of redistribution within firms. Because the SM was more binding for firms with many workers at the bottom of the wage distribution, skilled workers employed in firms with many low-wage workers saw their salaries grow less rapidly than similar workers employed in firms with fewer unskilled workers. As a consequence, workers at the top of the wage distribution were induced to move out of firms with heavy SM burdens to join employers with low SM burdens, who could offer them larger wage increases beyond the compulsory SM adjustments. We also document that the SM forced the least skill-intensive firms out of the market. Firms that remained active were induced to substantially compress their internal wage structure, both by increasing wages below the firm-specific median and by decreasing those above the median.

To rationalize these findings, we develop a simplified version of a search model with intra-firm bargaining and on-the-job search, building on the work of Stole and Zwiebel (1996) and Cahuc, Postel-Vinay and Robin (2006). The model features heterogeneous workers (skilled and unskilled) who are complementary in production and heterogeneous employers producing with different combinations of skills. While the wages of unskilled workers are assumed to change exogenously (e.g. according to an automatic wage indexation scheme, like the SM), skilled workers negotiate their salaries over the rents induced by search and technological frictions. With a given probability, skilled workers meet new potential employers and engage in a three-player negotiation involving the incumbent and the poaching firm (Cahuc, Postel-Vinay and Robin, 2006;

[3]For our main results we measure the burden of the SM at the firm with the share of employees who were given positive real wage increases by the system and in section 6 we experiment with alternative indicators.

Ariel Rubinstein, 1982). This process generates labor turnover and wage dispersion across and within firms. The implications of the theory are fully in line with our empirical evidence. An exogenous rise of the wage of the unskilled workers reduces the wage of the skilled ones and this effect is stronger in firms employing many unskilled workers. Job turnover is characterized by movements of skilled workers away from the least skill-intensive towards the most skill-intensive firms. Rising the unskilled wage also forces the least skill-intensive employers to exit the market.

Our paper contributes to various branches of the literature. The role of the SM in the evolution of wage inequality in Italy has already been studied in Manacorda (2004). However, due to the lack of longitudinal data, that paper only analyzes the effect on overall dispersion and does not look at differences across the distribution nor at the within-firm dynamics. Our data cover the universe of all firms and workers in one region of the country and we can then extend the analysis of Manacorda (2004) to look at within-firm negotiations, workers turnover and firm exit.

Most of the literature on labor market institutions, such as minimum wages and unions, focuses on estimating their effects on low-wage earners under the assumptions that high-wage earners would be unaffected.[4] A few papers have looked at the spillover effects of the minimum wage on workers who are paid above the minimum (Edward M. Gramlich, 1976; Jean Baldwin Grossman, 1983; Lee, 1999). However, the analysis has been limited to the close neighborhood of the minimum wage (with the notable exception of David Neumark, Mark Schweitzer and William Wascher (2004)). Our paper provides evidence that, through intra-firm wage bargaining and the resulting turnover of workers, such spillover effects could span throughout the entire distribution.[5]

We show evidence that intra-firm bargaining is a key mechanism through which the SM affected wages in the upper part of the distribution. This is consistent with the theories presented in Stole and Zwiebel (1996), Cahuc, Marque and Wasmer (2008) and Cahuc, Postel-Vinay and Robin (2006). Due to the scarcity of datasets covering the entire workforce of sampled firms, our paper

[4]In fact, the causal effects of the minimum wage on the lower part of the distribution has often been identified empirically by assuming the absence of a causal effect on the upper part (Di Nardo, Fortin and Lemieux, 1996; Lee, 1999).

[5]To the best of our knowledge, John Di Nardo, Kevin F Hallock and Jörn-Steffen Pischke (2000) is the only paper investigating the effect of unions on non-unionized high-wage workers.

is, to the best of our knowledge, the first providing empirical support to these models.[6] Our work thus also contribute to a series of recent studies - like Luigi Guiso, Luigi Pistaferri and Fabiano Schivardi (2005) and Luigi Guiso, Luigi Pistaferri and Fabiano Schivardi (2013) - investigating wage dynamics within the firm.

Finally, our results also speak to the vast literature on inequality aversion. Most of the studies in this area make use of laboratory experiments or case studies and document pervasive inequality aversion affecting work morale and job performance (Gary Charness and Peter Kuhn, 2007; Dirk Engelmann and Martin Strobel, 2004; Ernst Fehr and Klaus M. Schmidt, 1999; Alexandre Mas, 2006). Despite some important recent contributions (e.g. David Card, Alexandre Mas, Enrico Moretti and Emmanuel Saez (2012); Andrew E. Clark and Claudia Senik (2010); Andrew E. Clark, David Masclet and Marie Claire Villeval (2010)), empirical evidence on the general labor market is still limited, perhaps due to the difficulty in finding exogenous sources of variation in inequality within relevant reference groups.[7] In this paper the SM does provide exogenous variation in the distribution of pay within firms and our results on job turnover seem to go counter to the idea that skilled workers are generally averse to inequality. When investigating the correlates of worker turnover, we find that high-wage workers were unaffected by the SM-induced change of their position in the within-firm distribution of pay. Apparently, the possibility to obtain higher wage growth in more skill-intensive firms was their primary motive to move. On the other hand, low-wage workers were substantially less inclined to leave their employers if the SM put them closer to the within-firm median pay. These results are consistent with those in Card et al. (2012) despite being obtained on very different data, time periods and institutional settings.

The paper is organized as follows. In Section 2 we describe the data and in Section 3 we present a brief history of the SM and its functioning. In Section 4 we present our results on the effects of the SM on the distribution of wages whereas Section 5 looks at workers turnover. Section 6 provides some robustness results. Section 7 develops the theoretical framework for interpreting the empirical findings. Section 8 concludes.

[6] Another bargaining model that might be consistent with our findings is Matthew Rabin (2006), as the SM provides a natural reference point for the negotiation of further wage increases.

[7] See for example the early contribution of Grossman (1983).

2 The INPS Social Security Archives for the region of Veneto

The dataset used for this study is derived from the archives of the Italian Social Security Administration (INPS). It contains information on all individuals who have worked as dependent employees for at least one day at any private firm located in the region of Veneto between 1975 and 1995.[8] Once this condition is met, the entire working history of the employee is reconstructed, importing information also from employment spells outside the region.[9]

The unit of observation is the individual employment relationship and the archive includes information about start and end dates, the total compensation paid in each year, the number of working weeks in the year, the type of contract (part-time vs. full time, temporary vs. permanent), the industrial sector of activity, the geographical location of the establishment, gender, age and citizenship of the worker. Both workers and establishments are individually (but anonymously) identifiable and can be followed over time. For firms we observe the date of founding (censored at 1974) and, if they ceased their activities within the period of observation, the date of closure.

Two important limitations of this dataset are worth mentioning. First, there is no information on workers' education. Second, once a worker disappears from the dataset we cannot say whether she was unemployed, inactive or employed in a sector that is not covered by the data, namely the public sector and self-employment. We do observe, however, if she returns to private dependent employment. In section 6 we try to assess the importance of this second data limitation. Specifically, we investigate the relation between the SM mechanism and the likelihood of exiting the dataset, i.e. the likelihood of leaving a private sector employment.

The original data cover a long period of time (from 1975 to 2004) but we

[8] Veneto is one of the largest regions of Italy with around 5 million residents. It is located in the north-east of the country and it borders with Austria on the north and Croatia (and the Adriatic sea) on the east. It used to be one of the poorest regions of the country, with very high emigration rates (mostly to Northern Europe and South America). Starting in the 1960s, it experienced very sustained economic growth and it is now one of the richest areas of Italy, comparable to the north-west (Milan, Turin, Genoa), which has traditionally been the wealthiest part of the country.

[9] The same data have already been used in David Card, Francesco Devicienti and Agata Maida (2014); Federico Cingano and Alfonso Rosolia (2012); Marco Leonardi and Giovanni Pica (2013).

only focus on the years 1976-1992, which are the years of implementation of the SM system (see Section 3).

Our main analysis restricts the sample to the period between 1976 - the year before the SM was first introduced - and 1982 - the year before the first major revision of the system. We explain this choice in the next Section where we describe the functioning of the *Scala mobile* mechanism and its evolution over time. Before selecting the main sample for analysis: (1) we drop apprentices and managers who were not subject to the SM system and we trim wages at the top and bottom 2%; (2) we build a measure of firm size and various measures of within-firm wage dispersion using all remaining observations. Since the main analysis looks at individual wage changes between 1976 and 1982 (see Section 4) we select the sample in the following way: (1) we drop older workers who retire at some point between 1977 and 1982 and those experiencing a period of non-employment; (2) we keep only workers who held at least one full-time job (in Veneto) in each year between 1976 and 1982. For those holding more than one job per year we only consider the longest spell and we annualize earnings for job spells lasting less than the full calendar year.

The descriptive statistics of this sample which includes 423,614 workers who were employed in 67,733 different firms in 1976 is in Table 1. When we use firm-level data to look at the effects of SM on within-firm wage dispersion (Section 4) or when we look at the probability of firm exiting the sample in 1982 (Section 5) we collapse the benchmark sample at the firm level (67,733 observations). When we look at the probability of workers exiting the sample in 1982 (Section 5), we use the larger sample of all those workers who are present in 1976 but may or may not be present in the sample in 1982 (736,318 observations).

[INSERT TABLE 1]

Table 1 compares the original universe of observations in Veneto in the year 1976 (column 1) with the benchmark sample of our analysis (column 2); the top panel shows the descriptive statistics of the workers sample, the bottom panel of the firm-level sample. Our sample of workers is better paid (we keep only the continously employed) and there are more blue collars than in the universe of workers in Veneto (we use only the years between 1976 and 1982). Eventually our sample is less than 40% of the total number of workers in Veneto.

Despite this selection, our sample reflects some of the most salient features of the Italian labor market of the 1970s. Employees were young (average age is around 32 years), mostly male (only 27% were women) and blue collars (only 13% of workers in the sample were white collars). The average gross annual wage in 1976 was the equivalent of 16,875 Euros at 2014 prices. This includes the worker's base salary and additional monetary payments for extra-hours, pay-for-performance, sickness and maternity benefits. In kind benefits are excluded. Average wages are higher for males than for females (around 17,700 Euros for males and slightly less than 15,000 for women) and for white collars than blue collars (almost 20,000 Euros against 16,500 Euros). Around 65% of these workers never changed employer during the interval of time under analysis.

The bottom panel of Table 1 presents descriptive statistics for the firm sample. Firm size is larger than in the original population. This difference is due to our focus on workers who are continuously employed throughout the period of observation who are more likely to be employed in larger establishments. Average firm size is around 9 (full-time equivalent) employees but the distribution is very skewed, with a few very large firms and a large number of small and very small ones. The average number of employees is above 21 workers and the median is 5. Only about 10% of firms in our selected sample have more that 15 employees, an important threshold in the Italian system as it determined the applicability of more stringent employment protection regulations.[10]

Figure 1 compares the evolution of overall wage inequality (measured by the standard deviation of log wages) in Veneto and in the entire Italy.[11] The vertical bars indicate crucial times in the history of the SM system, which was first introduced in 1977, then reformed to limit its equalizing effects in 1983 and 1986 and finally abandoned in 1992 (see Section 3).

[INSERT FIGURE 1]

Overall, the evolution of wage inequality in Veneto resembles closely what is observed for the rest of the country. Figure 1 shows that inequality in Italy declined substantially from the late 1970s and until the mid-1980s. Then, it rose rapidly until the late 1990s and flattened out, and possibly reversed, in

[10]For example, according to the Law 300/1970 ("Statuto dei Lavoratori") firms above the threshold were subject to substantially stricter legislation with respect to unfair redundancies.

[11]The data for the entire country are derived from the historical archives of the Bank of Italy Survey of Household Incomes and Wealth (SHIW).

the first half of the 2000s.[12] As formally documented in Manacorda (2004), this pattern suggests that the SM played an important role in artificially compressing the distribution of wages and that its gradual abolition led to larger and larger dispersion.

3 The *Scala Mobile* and collective bargaining in Italy

Wage indexation mechanisms started to be adopted in Italy already after WWII, with large differences across sectors, geographical areas, qualifications and even gender. There was, in fact, no national legislation on the issue and the entire matter was delegated to bilateral negotiations between unions and employers. Only in 1977 a national law imposed the same indexation system to all dependent employees, the so-called *Scala Mobile* (SM).[13] The only exceptions were managers, who always maintained their pre-1977 scheme, and employees in the public sector, for whom the common system was introduced a little later, in July 1978.

The SM mandated that each quarter the wages of all dependent employees in the country increased by the same nominal absolute amount computed as a the product of the point change in the price index and a fixed parameter, named the *contingenza* point. Since the absolute SM adjustment was identical for all workers, it obviously implied a much larger percentage change for workers earning low wages than for those earning high wages. Hence, the system had a powerful equalizing effect, especially given the exceptionally high inflation rates experienced by the country during this period (21.2% in 1980). In fact, one of the main problems with the SM was that it was itself generating inflation, as firms transferred part of the mandated wage rises into higher prices.

The system was reformed a first time in 1983. The base period of the price index was updated and a new *contingenza* point was set, substantially reducing the generosity of the system (Christopher L. Erikson and Andrea Ichino, 1995).

[12] This can be compared with a more continuous rise in wage inequality over the same period experienced in the US and the UK. In the US, in particular, while the ratio between the wages in the 50th percentile and those the in the 10th percentile ratio stabilized in the 1990s, the 90/50 ratio shows an uninterrupted growth even in the most recent data (David H. Autor, Lawrence F. Katz and Melissa S. Kearney, 2006).

[13] The Italian term *Scala Mobile* means escalator and is evocative of the automatic wage adjustments implied by the indexation mechanism.

In the following years the SM became the target of fierce opposition, especially from skilled workers who perceived its strong equalizing effect as unfair.[14] Eventually the indexation mechanism was further modified in 1986. First, the SM adjustments started to be paid out every 6 rather than 3 months (in April and October). Second and most importantly, the fixed *contingenza* point was abandoned and wage adjustments were made almost entirely proportional to inflation. Specifically, the new SM system set percentage wage rises equal to inflation up to a (sector- and occupation-specific) contractual minimum and equal to one-fourth of inflation for the part exceeding the minimum. Eventually the entire system of wage bargaining was reformed in 1992 and the SM was abandoned: the last automatic wage increase was paid in October 1991.

In summary the equalizing power of the SM was strongest between 1977 and 1982, much milder between 1983 and 1985, and it essentially disappeared after 1986. Excluding this last period (post-1986), Figure 2 presents a simple exercise that helps quantifying the potential effect of the SM on the distribution of wages before and after the reform of 1983.[15]

[INSERT FIGURE 2]

The left panel of the figure shows the actual distribution of annual wages in 1976 and simulates the distribution that would have resulted two years later from the automatic application of the SM (at constant prices). The hypothetical distribution in 1978 is constructed by adding the SM payments to each individual wage in 1976 year by year and deflating all values at 1976 prices. Both distributions are rescaled to have mean zero so that they only differ by their degree of dispersion. The right panel of the figure illustrates the same exercise for the period 1983-1985, after the 1983 reform of the system which substantially reduced the equalizing power of the SM. This is evident from the figure: the application of the SM reduces the standard deviation of wages by 24 percentage points in two years between 1976 and 1978, while the post-reform system reduces it only by 17 percentage points over the same time span of two years.

[14] Frustration among white collars culminated in the famous "march of the forty thousand", one of the few examples of mass strikes by white collars.

[15] Performing the same calculations for the period after 1986 is more complicated because it requires knowledge of the entire set of contractual minimum wages, which are not available in our data and are very difficult to reconstruct. Card, Devicienti and Maida (2014) were able to reconstruct the minima but only for the period after 1995 and only for some industries.

Table 2 provides the exact details of the functioning of the indexation mechanism during its entire existence, from January 1977 to October 1991. In the first period (1977-1985) SM adjustments were paid at quarterly frequency, in January, April, July and October. For each quarter between April 1977 (the first adjustment) and October 1982 (the last adjustment before the 1983 reform), the table reports the level and the point change of the price index, the *contingenza* point and the actual mandated SM adjustment. This is computed as the product of column [2] and column [3] in the table, namely as the product of the (rounded) point change in the price index and the *contingenza* point. For example, in April 1977 the price index was 149 and it had increased by 6 points (rounded) since the previous quarter. Then, all private dependent employees in the country had their wages risen by $6 \times 2,389 = 14,334$ Liras. The same procedure was replicated at each quarter until January 1983 when payments became biannual and both the price index and the *contingenza* point were revised. Finally, for the third period (1986-1991) the table reports the percentage change in the price index and, as an example, the contractual base wage of the manufacturing sector. SM adjustments were then divided into two parts; a part that increased the base wage proportionally to inflation (this is reported in the last column of Table 2, Panel C) and a part that increased the difference between the actual and the base wage by one fourth of inflation (this additional adjustment is not reported in the table as it depended on the actual individual wage).

[INSERT TABLE 2]

It is perhaps useful at this point to make a specific example to further clarify the role of the SM for workers at different points of the distribution of wages. Consider April 1977. The 6-point increase of the price index between January and April 1977 amounts to a percentage change of approximately 4%.[16] The SM adjustment of 14,334 Liras corresponds to a percentage increase of 4% (i.e. exactly in line with inflation) for a monthly wage of around 360,000 Liras (approximately 1,380 Euros at 2014 prices). Therefore the SM adjustment implied a real wage increase for anyone earning less than this amount and a real wage cut for anyone earning more. For example for a skilled person earning a monthly salary of 560,000 Liras in 1977 (around the 90th percentile of the distribution) the 14,339 Liras corresponded to a real wage cut of about 1.3% in a quarter. On

[16]Notice that this is a quarterly increase. Yearly inflation was 18.1% in 1977.

the other end, for someone earning 235,000 Liras per month (around the 10th percentile of the distribution) the SM adjustment entailed a real rise of about 2% in a quarter.

To produce the main results of our analysis we focus on the initial period of application of the SM, namely the years between 1976 and 1982, when the equalizing power of the system was strongest. We use data for the following periods, 1982-1985 and 1985-1992, for robustness and comparison.

4 Wage changes under the Scala Mobile

The SM was a system that directly affected the way wages were updated over time. Hence, it is natural to start our empirical investigation with an analysis of its effects on the distribution of wage changes. As already mentioned, we focus on the period 1976-1982 for our main results and use later phases of the SM for comparison.

A proper understanding of the effects of the SM on the distribution of wages requires taking into account not only the mandatory adjustments imposed by the system but also the additional wage changes that could be negotiated between employers and employees at the various levels of the bargaining process. In fact, the SM system only imposed minimum wage changes and it did not forbid further pay rises: wages were negotiated through the collective bargaining process and eventually salaries were regularly increased by more than the SM, more so at the bottom than at the top of the distribution.

Collective bargaining in Italy was (and still is) organized in several levels. First, national contracts were negotiated at the sectoral level by unions and employers representatives of the sectors. These contracts were legally binding for all firms and workers within the sector regardless of their affiliation with the trade unions or the employers' federation (the so-called *erga omnes* clause). The exact amount of these increments could be different for different categories of workers within a sector, for example white and blue collars. Additional salary components could be added either unilaterally by the employer or via a firm-level contract. These components could potentially vary across firms within the same sector, across groups of workers in the same firm and even at the individual level. National contracts normally defined the parameters within which these additional components could be set but the general principle was that any

variation beyond the national contract could only improve working conditions. Hence, all additional salary components could only be positive (or zero).[17]

All these different levels of bargaining took place at irregular intervals over the period 1977-1982, with national wage agreements being signed at different times (normally every 3 years) for different sectors and with negotiations at the firm level occurring erratically and often separately for different categories of workers. To avoid complications due to the potential endogeneity and heterogeneity of the timing of these various bargaining steps, we focus on wage changes over the entire period. More specifically, we consider the wages in 1976, the last year before the introduction of the SM, and we compare them with those in 1982, the last year before the first important reform of the indexation mechanism.[18] This approach also has the important advantage that workers can be ranked according to their position in the initial distribution of wages in 1976, a distribution which is realized prior to the introduction of the SM and can therefore be considered exogenous to it.

Of course, cumulative wage changes can only be computed for workers who are observed both in 1976 and in 1982 and they also incorporate the potential effect of job-to-job transitions. Given the structure of our dataset, the interpretation of the attrition rate can be problematic because we cannot say whether workers who disappear from the archive move into unemployment, inactivity, self-employment or employment in the public sector (see section 2). In section 6 we assess the effects of the SM mechanism on the likelihood of exiting private sector employment.

To understand the functioning of the SM, it is useful to start from the simple nominal wage change between 1976 and 1982 and to rewrite it as the sum of the SM adjustment and a residual change capturing the combined outcome of the various levels of bargaining:

$$\Delta W_{ij} = s\Delta P + \Delta W_{ij}^{N} \tag{1}$$

where ΔW_{ij} is the simple difference between the nominal annual gross wages in 1982 and 1976 for worker i employed in firm j (in 1976), s is the nominal

[17] The collective bargaining system in Italy has remained virtually unchanged until the early 1990s. See Erikson and Ichino (1995) and Guiso, Pistaferri and Schivardi (2005) for more details.

[18] Manacorda (2004) follows the same approach but considers the period 1977-1985.

contingenza point, ΔP is the point difference in the price index and ΔW_{ij}^N is the residual negotiated change.[19] Equation 1 clearly shows that the SM adjustment was the same for all workers and that any heterogeneity in the overall wage change could only come from the negotiated part.

From equation 1 it is easy to compute *nominal percentage* wage changes by dividing both sides by the wage in 1976, $\left(W_{i(76)}\right)$:

$$\frac{\Delta W_{ij}}{W_{i(76)}} = \frac{s\Delta P}{W_{i(76)}} + \frac{\Delta W_{ij}^N}{W_{i(76)}} \tag{2}$$

For notational simplicity we will label $\Delta w_{ij} = \frac{\Delta W_{ij}}{W_{i(76)}}$ the total percentage wage change, $\Delta w_i^s = \frac{s\Delta P}{W_{i(76)}}$ the percentage SM adjustment and $\Delta w_{ij}^n = \frac{\Delta W_{ij}^N}{W_{i(76)}}$ the percentage negotiated change. Equation 2 shows that, while the nominal absolute SM adjustment was identical for all workers, it implied different percentage changes depending on the level of the initial wage. When compared to inflation (which totaled 157% between 1976 and 1982) the SM granted positive and often substantial real wage increases at the bottom of the distribution and real wage cuts at the top.

[INSERT FIGURE 3 HERE]

This is clearly evident in Figure 3 which plots the averages of Δw_{ij} and Δw_{ij}^s for each percentile of the distribution of $W_{i(76)}$. The horizontal line indicates the rate of inflation between 1976 and 1982 (+157%). The red dotted line represents the percentage wage changes induced by the sole application of the SM (Δw_{ij}^s). It shows that the system granted real wage increases up to the 14th percentile while for all wages above that level the SM alone implied real wage cuts. Among the lowest percentiles of the distribution the SM adjustments were very substantial, of the order of 400% in nominal terms and 400-157=243% in real terms. Symmetrically, the SM mandated substantial real wage cuts at the top: the cumulative nominal percent increase in the top decile was 20% over the entire period compared to a cumulative inflation rate of 157%. Eventually, during the period 1976-1982, real wages increased overall by about 70% on average

[19] The computation of the SM change over the entire period is slightly more complicated than the simple product $s\Delta P$ as one needs to consider that the adjustments were computed quarterly. However, the nominal SM adjustment remains the same for all workers regardless of whether it is computed quarterly, annually or over several years as we do in this section.

but by around 200% in the bottom decile and by only 18% in the top decile (and virtually zero at the very top of the distribution).

We now rewrite equation 2 and specify the negotiated wage change Δw_{ij}^n as a function of both individual and firm-level variables, which should capture all the relevant dimensions of the wage bargaining:

$$\begin{aligned}\Delta w_{ij} &= \Delta w_i^s + \left[\alpha \Delta w_i^s + \beta \pi_{W_{i(76)}} + \gamma X_{ij} + \varepsilon_{ij}\right] \\ &= (1+\alpha)\Delta w_i^s + \beta \pi_{W_{i(76)}} + \gamma X_{ij} + \varepsilon_{ij} \end{aligned} \tag{3}$$

The vector X_{ij} includes a constant term, which captures common components of the national level of bargaining; dummies for occupation (white and blue collars), which capture further wage adjustments set at the national level by groups of workers; individual characteristics (a gender dummy and a quadratic function of age), which capture additional individual-specific increments; firm fixed-effects which capture firm-level bargaining. In order to control for local labour market conditions we also include in X_{ij} a full set of dummies for the province of residence of the worker and the share of firms located in the worker's municipality of residence which closed down between January and December 1976.[20] ε_{ij} is an error term capturing all other factors that affected the bargaining of wages and that are unobservable in our data.

We also allow the negotiated wage change to respond to the changes commanded by the SM because it is reasonable to assume that firms reacted to SM wage changes by taking them into account when bargaining on the negotiated segment of the wage.[21] Finally, we also allow the negotiated wage changes to vary along the distribution of initial wages, as suggested by the descriptive evidence in Figure 3. We thus introduce the percentile of the distribution of $W_{i(76)}$, which we indicate with $\pi_{W_{i(76)}}$, among the explanatory variables of equation 3.[22]

Notice that the identification of the coefficient $(1+\alpha)$ in equation 3 is problematic because $\Delta w_i^s = \frac{s\Delta P}{W_{i(76)}}$ is the ratio of a constant and the wage in 1976, hence it only varies along the distribution of the individuals' wages in 1976.

[20] There are 7 provinces in Veneto, ranging from 200 to 900 thousands inhabitants (in 2015), and 567 municipalities.

[21] If wage negotiations were used to offset the SM one should expect the estimated α to be negative: $\alpha = -1$ (and therefore $1+\alpha = 0$) would imply complete offsetting while $\alpha = 0$ (which implies $1+\alpha = 1$) would indicate no offsetting.

[22] We use the percentile rather than $W_{i(76)}$ itself to avoid the division bias induced by the fact that $W_{i(76)}$ also appears at the denominator of the dependent variable.

Once conditioning on $\pi_{W_{i(76)}}$ there is very little variation left for the identification of α. This standard problem of collinearity implies that we can only meaningfully identify either α or β.[23] As our focus is on the distributional implications of the SM, we will simply drop Δw_i^s and estimate the resulting equation by groups of firms depending on how heavily they were affected by the SM system:

$$\Delta w_{ij} = \beta^{SM_j} \pi_{W_{i(76)}} + \gamma^{SM_j} X_{ij} + \varepsilon_{ij} \tag{4}$$

We group firms on the basis of a variable -SM_j- which measures the burden imposed by the SM system on firm j. SM_j is the share of firm's j employees with positive SM real wage adjustments, i.e. the number of full-time equivalent employees with Δw_i^s larger than the inflation rate (cumulative over the period 1976-1982) over firm size (in full-time equivalent employment). In constructing this measure we consider all the workers who were employed at the firm in 1976 and we compute their cumulative SM wage adjustments under the assumption that they would remain continuously employed throughout the period. In other words SM_j is defined exclusively on the basis of the composition of employment at the firm in 1976 and on the statutory rules of the SM and, therefore, is exogenous to the process of wage bargaining that took place between 1976 and 1982.

In Section 6 we experiment with alternative measures of SM_j and we show that our results are robust to different measures. Notice that it is only thanks to the exceptional richness of our data, which include information on all the workers of any sampled firm, that we can construct this variable and investigate how the SM affected the bargaining of wages within the firm.[24]

[INSERT TABLE 3 HERE]

Before showing the results of the estimation of equation 4, Table 3 presents some basic descriptive statistics on SM_j in our sample of firms. A mean value of $SM_j = 0.409$ indicates that about 40% of the employees of the average firm were receiving real pay raises from the SM. But the distribution of the SM burden across firms is highly skewed: 22.5% of all firms had a value of $SM_j = 0$ i.e.

[23] The identification of α is the key problem faced by Manacorda (2004), who solves it by conditioning on the worker's percentile in the gender-specific rather than the overall distribution of initial wages. Using the same approach we can replicate his results very closely. Results are available upon request.

[24] Notice also that the direct effect of SM_j on Δw_{ij} cannot be identified because equation 4 includes firm fixed-effects which are collinear to SM_j.

in these firms no employee was expected positive real SM adjustments (in other words all employees were paid above the 14th percentile of the wage distribution). SM_j clearly correlates positively with the share of employees in bottom quintile of the wage distribution and negatively with the share of those in the top quintile. Interestingly, the correlation is not very strong with the share of white-collars workers in the firm.

We classify firms into 3 groups: those with zero SM burden (whose workers should not be affected by the SM mechanism), those with SM_j below average and those with SM_j above average (the average being 0.409).[25]

The results of the estimation of equation 4 are presented in Table 4. For simplicity we report only the estimates of the β coefficients and, in order to investigate potential non-linearities, in Panel B we replace $\pi_{W_{i(76)}}$ in equation 4 with quintile dummies (omitting the 3rd quintile as a reference category). Each column in each panel is a separate regression.

Our basic specification (column 1, Panel A) shows that workers in higher percentiles of the wage distribution in 1976 were indeed receiving lower wage increases overall between 1982 and 1976, thus compressing the distribution. In the overall sample moving up one percentile in the wage distribution is associated with a lower Δw_{ij} of about 2 percentage points over an average total cumulative change of 226% over the period.

Interestingly, this gradient is substantially more negative in firms with larger SM burdens, about 2.5 percentage points (column 4) compared to 1.7 for firms with either $SM_j = 0$ or below the average (columns 2 and 3).[26]

In Panel B we investigate non-linearities along the distribution of initial wages and replace $\pi_{W_{i(76)}}$ in equation 4 with quintile dummies (omitting the 3rd quintile as a reference category). Results show that workers in the first two quintiles enjoyed wage changes higher than the median while the last two quintile got substantially lower raises. This pattern is exacerbated in firms with high SM burden.[27]

[25] Estimating Equation 4 separately on the three groups of firms is equivalent to estimating a model fully interacted with indicators dummies for the three groups.

[26] The coefficients in columns 2 and 3 are statistically different from the one in column 4 at the 99% confidence level. We also estimate a version of the regression in column 1 of Panel A including an interaction term with SM_j and we obtain a coefficient of -0.016 for $\pi_{W_{i(76)}}$ and -0.012 on the interaction, both statistically significant at the 99% level (results available upon request).

[27] In firms with $SM_j = 0$ there are no workers in the bottom quintile by definition.

[INSERT TABLE 4 HERE]

Figure 4 presents an alternative way to look at these effects. In the figure, we plot the average residual wage change (once the average wage change of the firm has been netted out with firm fixed effects) of workers employed in firms with different burdens.[28] Firms with zero burden do not employ workers earning below the 14th percentile of the distribution and basically pay the same wage increase to all workers: the average real wage change is constant at zero across all workers. Firms with a low burden pay high wage increases to workers in the first quintile of the distribution (in 1976) and keep the pace of inflation for the other quintiles (with an average real wage change of zero), i.e. these firms compress wages at the bottom of the distribution but wage changes are proportional above the 1st quintile. Firms with a high burden pay wage increases only slightly higher than zero to workers in the first quintile and impose real wage losses to the other quintiles, with losses increasing with the percentile of the worker distribution in 1976 i.e. these firms compress wages throughout the distribution.

[INSERT FIGURE 4 HERE]

4.1 Within-firm wage compression

The results of the previous section bear obvious implications for the distribution of wages within the firm. Exploiting our data we can improve on Manacorda (2004) - who showed that the SM contributed to compressing the overall distribution of wages in Italy- investigating wage compression across and inside the firm. More specifically, the results of Table 4 and Figure 4 suggest that the distribution of wages within the firm became more compressed and that this effect was stronger in firms with a higher SM burden.

Since in our data we observe all the workers of any given firm in Veneto, we can look at the wage distribution within firms. We focus on all the firms that were active in the region in 1976 and for each of them we compute the standard deviation of log wages in the initial and the end year of analysis (i.e. 1976 and

[28] To construct Figure 4 we first estimate a regression similar to equation 4 but omitting $\pi_{W_{i(76)}}$. We then take the residuals of such regression and we compute their average by percentile of the initial distribution of wages and by our three groups of SM_j.

1982).[29] We then compute the difference of these two measures of dispersion and we regress it on SM_j and a set of firm specific controls including size and size squared (measured in full-time equivalent employees), a dummy for firms established before 1974 and the share of white collars, all measured in 1976.[30]

The results are reported in the first column of Table 5 for the overall sample of firms and in the fourth column for the sample of firms with at least 15 employees. In Panel B we investigate non-linearities and we replace SM_j with the three group dummies (and we exclude the constant). Results show that in firms characterized by higher SM burdens the distribution of wages became more compressed over time. The magnitude of this effect is of the order of about 0.03 points (over a negative average change of 4 points) for each percentage point increase in the SM burden. This effect is understandably larger in larger firms where there was obviously more room to redistribute resources across co-workers (column 4).

[INSERT TABLE 5 HERE]

Panel B of Table 5 further indicates that no compression was actually taking place in firms with no SM burden ($SM_j = 0$) and in those firms wages were actually getting more dispersed. On the other hand, firms with positive SM burdens were compressing their distributions and the more so when the burden was high. The same pattern is observed in large firms.

The other columns of Table 5 (columns 2, 3, 5 and 6) report results from similar regressions where we replace the dependent variable with changes in measures of within-firm dispersion at the bottom and at the top of the distribution. More specifically, for each firm we compute the 25th, the 50th and the 75th percentile of the distribution of wages within the firm in both the initial (1976) and the end year (1982). Then, we take the ratio of the 25th to the 50th percentiles as a measure of dispersion in the bottom part of the distribution and the ratio of the 75th and the 50th percentiles as a measure of dispersion in the upper part of the distribution. Finally, we compute the changes in these two indicators between 1976 and 1982 and we use these changes as dependent variables.

[29] The number of observations in Table 5 is different from the number of firms in which we observe the workers of our restricted sample used for the regressions in Table 4, namely the 67,733 firms indicated in Table 1. This is because here we focus only on those firms that are active both in 1976 and in 1982.

[30] The date of establishment of the firm is very noisily measured before 1974.

Results show that the overall compression of wages within the firm that we highlighted in columns 1 and 4 is the result of a pervasive process affecting the entire distribution, namely both the 25th and the 75th percentiles got significantly closer to the median. Consistent with our previous findings these effects are stronger in larger firms and in those with high SM burdens.

These results clearly suggest that the SM, a labour market institution that was essentially irrelevant for workers above the 15th percentile, actually contributed to compressing the distribution of wages also in the upper part of the distribution. Given that it is hard to imagine a direct effect of the SM for high wage earners, for whom the system was merely imposing minimum pay rises largely below inflation, these effects could only take place via some sort of spillovers. The significance and magnitude of the estimates in Table 5 further suggests that such spillovers were largely taking place within the firm.

Given the above results, it is reasonable to expect that the SM could have also affected workers turnover, especially among skilled workers paid at the top of the distribution in 1976 and working in firms with high SM burdens. This, in turn, could have important effects on the likelihood of firm survival. In the next section we investigate the effect of the SM on worker turnover and firm exit more in details.

5 Workers turnover and firm exit under the Scala Mobile

In this section we estimate a model similar to equation 4 where we simply replace the dependent variable with a dummy indicator for whether the worker ever changed employer over the period of analysis.

[INSERT TABLE 6 HERE]

Results are reported in Table 6 in the same format used for the previous table on wage changes (Table 4). For readability all coefficients have been multiplied by 100. As expected the baseline effect reported in the first row of panel A shows that higher paid individuals in 1976 are less likely to have left their initial firms by 1982. However this relation is less steep in firms with a high SM burden, about 1.2 percentage points (column 4) over an average of 42% against 1.5-1.6

in firms with burden below the mean. In other words, higher paid individuals are more likely to change employer if they were initially employed in high-burden firms than in low-burden firms.

This effect is clearer in Panel B where we replace $\pi_{W_{i(76)}}$ with a set of quintiles dummies. The estimated effects are always positive and significant in the two lower quintiles indicating that low-paid workers tend to leave the initial firm more than the median worker. Higher paid individuals are less likely to leave except in the last column: in high-burden firms high paid workers are more likely to leave than in low-burden firms.

Combined with our previous findings on wage changes, this evidence seems consistent with the idea that employers with a large share of unskilled workers in 1976 were forced by the SM to pay large real wage increases to their unskilled workers. Adjustment costs and frictions made it difficult to adjust by dismissing unskilled workers or by changing production technologies. Hence these firms were forced to lower the pay rises for their skilled employees and many of them decided to leave, mostly towards more skill-intensive employers, as we document in Figure 5.

[INSERT FIGURE 5 HERE]

Figure 5 investigates the characteristics of the destination firms towards which job changers move. To construct this figure we consider only the job movers and for each of them we compute the difference in the share of workers in bottom quintile of the wage distribution in their firms in 1982 and in 1976.[31] We apply a simple partitioned regression procedure. First, we regress such difference on all our usual covariates, namely a quadratic function of age, a gender dummy, a dummy for blue-collar workers and fixed effects for the 1976 firms, and we take the residuals. Then we also regress the wage in 1976 on the same set of controls and take the residuals. Finally, for each percentile of the residuals of the wage regression we plot on the graph the average residual of the first regression. The clear negative correlation shown in Figure 5 indicates that the better paid workers were moving away from firms with many low-paid employees towards firms with a lower SM burden.

[INSERT TABLE 7 HERE]

[31] We cannot look at the difference in SM_j because this variable can only be computed for 1976.

With high-paid workers leaving and ever increasing SM burdens, low skill-intensive firms were more likely to go out of business. Table 7 uses firm-level data to look at the pattern of firm exit by considering all the establishments that were active in Veneto in 1976 and constructing an indicator for whether they had disappeared by 1982. We use such indicator as the dependent variable and we estimate a simple linear probability model conditioning on our usual set of firm controls. Results indicate that the likelihood of exiting the market increases with the burden of the SM: a percentage point increase in SM_j leads to a 0.068 p.p. increase in the exit probability (over an average of around 34%). The effect is stronger in larger firms, where, given an average exit probability of 20%, the exit probability increases by 10 p.p. for each one percentage point increase in SM.

In Panel B of Table 7 we replace the SM burden with the usual three group dummies (and we exclude the constant). We find some non-linearites among the smaller firms but for the larger ones there is a clear trend towards higher exit rates when SM_j is larger.

To sum up, our empirical results can be summarized in the following way. As the SM system mandated higher nominal wage adjustments (i) total wage changes were lowered, especially for high-paid workers, (ii) who were particularly penalized when employed in firms that were heavily affected by the SM and (iii) tended to leave such firms to move towards more skill-intensive ones; (iv) firms with high SM burdens were more prone to exit the market.

5.1 Inequality aversion and turnover

At this point a natural question is whether one's position in the distribution of wages among co-workers played a role in the decision to move out of the firm, as suggested by a number of studies.[32]. Our previous results indicate that highly paid workers were penalized in terms of wage growth when employed in firms with high SM burden and this could have been an incentive to search for a new job in a more skill-intensive firm.

We can also test an additional explanation, based on the compression of the within-firm distribution of pay (see Table 5) rather than on the different SM burden across firms. The turnover of highly paid workers can in fact be due

[32]Card et al. (2012); Charness and Kuhn (2007); Clark and Senik (2010); Clark, Masclet and Villeval (2010); Engelmann and Strobel (2004); Fehr and Schmidt (1999); Mas (2006)

to "equality aversion": as the SM mechanism pushed the wages of high skilled workers towards those of their less skilled colleagues, some high skilled workers may have preferred to leave the firm. Therefore, according to this additional explanation (which is not necessarily alternative to that investigated in the previous section), high skilled workers preferred moving to another firm with a higher share of skilled workers rather than accepting a reduction in the within-firm wage differentials.

In order to investigate this possibility, we augment our benchmark specification with a set of terms capturing the exogenous variation induced by the SM system on one's relative position in the real pay scale within the firm.[33] More specifically, we consider the wages observed in 1976 and we construct the fictitious counterfactual real wages that would have been observed in 1982 as a result of the mere automatic application of the SM. In other words, we add the SM payments to each individual wage in 1976 year by year until 1982 and we deflate the resulting values at 1976 prices.[34] Let $W^s_{i(82)}$ be such a 1982 counterfactual wage for worker i employed in firm j in 1976. For each worker we then compute the ratio between her wage and the median wage at the firm for both the actual 1976 and the counterfactual 1982 distributions and we take the difference between these two relative wages. Notice that the median firm wage for the counterfactual distribution in 1982 is simply the median counterfactual wage of the co-workers at the 1976 firm. In other words, in this exercise we never use the information about the firm in which the workers are observed in 1982. Instead, we assume that each worker could predict her position in the wage scale within her firm in 1982 based on the workforce composition of her firm in 1976 and the automatic SM wage adjustment.

Let Δw^r_{ij} be the absolute percentage difference between the individual real wage and the firm median across the two years:

$$\Delta w^r_{ij} = \frac{W_{i(76)}}{\widetilde{W}_{j(76)}} - \frac{W^s_{i(82)}}{\widetilde{W}^s_{j(82)}} \tag{5}$$

where $\widetilde{W}_{j(76)}$ and $\widetilde{W}_{j(82)}$ are the within-firm median of $W_{i(76)}$ and $W^s_{i(82)}$, respec-

[33] In this case we look at real wages because the SM, by increasing all wages by the same lump sum payment, does not affect the nominal distribution.

[34] We performed the same exercise to construct Figure 2 in Section 3, although in that case we only looked at the changes over two years, for ease of comparison across different periods.

tively. Δw_{ij}^r measures how much the SM was expected to move one's individual wage with respect to the median. Table 8 provides some descriptive statistics to help understand the potential effect of the SM system on the within distribution of wages. In 1976 workers who were placed below their firm median were earning on average 91.6% of the median whereas those above the firm median were earning on average 19.4% more (column 1). In the counterfactual 1982 distribution both groups got closer to the median and were 4.3% below and 9.2% above respectively (column 2). Hence, the SM system could potentially bring all workers substantially closer to their firms' medians, on average by 4.2 percentage points from below and 10.2 percentage points from above (column 3). Beyond this average effect, some were much more heavily affected by the SM, especially among the highly paid who could see their real wages reduced towards the firm median by over 150 percentage points.

To control for these effects within our econometric framework, we construct dummies for the distribution of Δw_{ij}^r and we include them in our linear probability model for job changing. Specifically, we define a dummy for workers whose wages could have been moved by the SM closer to their firm median by 2 to 5 percentage points, 5 to 10 percentage points and more than 10 percentage points:

$$\begin{aligned} I_{2-5} &= 1\left[0.02 \leq \left|\Delta w_{ij}^r\right| < 0.05\right] \\ I_{5-10} &= 1\left[0.05 \leq \left|\Delta w_{ij}^r\right| < 0.1\right] \\ I_{10+} &= 1\left[\left|\Delta w_{ij}^r\right| > 0.1\right] \end{aligned}$$

In doing so, we keep those workers who could have observed small changes (± 0.02) as a reference group. In addition, we also control for the relative wage in 1976 ($\frac{W_{i(76)}}{\widetilde{W}_{j(76)}}$) and we interact all these new explanatory variables with a dummy indicating whether the worker was above or below the firm median in 1976.

Eventually, we estimate the following specification:

$$\begin{aligned} mover_{ij} &= \tau_1^a I_{2-5} + \tau_2^a I_{5-10} + \tau_3^a I_{10+} + \tau_1^b I_{2-5} + \tau_2^b I_{5-10} + \tau_3^b I_{10+} \\ &\quad + \phi_0\left[w_{ij}^r > 1\right] + \phi_1^a w_{ij}^r + \phi_1^b w_{ij}^r + \theta_0 \pi_{W_{i(76)}} + \theta_1 X_{ij} + u_{ij} \end{aligned} \tag{6}$$

where: $mover_{ij}$ is a dummy equal to one if worker i employed in firm j in

1976 changes employer by 1982; and the term $w_{ij}^r = \frac{W_{i(76)}}{\widetilde{W}_{j(76)}}$ is the relative wage position of woker i in firm j in 1976. The coefficients marked with superscript a (above) indicate interactions with a dummy for $\left[w_{ij}^r > 1\right]$ and those marked with b (below) interactions with $\left[w_{ij}^r < 1\right]$. Therefore we are including interaction terms for all the dummies described above and the relative wage position in 1976.[35]

Our coefficients of main interest in equation 6 are the τs. They indicate whether workers who were expecting their wages to become more compressed towards their firms medians by the SM system were more likely to leave. These effects are estimated holding constant the worker's initial relative position both in the overall distribution of wages, as we control for $\pi_{W_{i(76)}}$, and within the firm, as we control very flexibly for w_{ij}^r. In other words, we are comparing workers who in 1976 were earning the same salaries and were in the same position in the within-firm distribution but who could see their real wages compressed to the firm median by different degrees due to the different distributions of pay at their firms and the effects of the SM mechanism on such distributions. The results are reported in Table 9 for all workers (column 1) and for workers employed in firms with more than 15 employees (column 2). As before, all coefficients are multiplied by 100 to improve their readability.

[INSERT TABLE 9 HERE]

We find that exogenous (i.e. driven only by the SM mechanism) expected changes in relative wages within the firm do not affect quitting behaviour for workers above the firm median. There is only a small effect for those who expected changes in the order of 2 to 5 percentage points. On the other hand, workers who are initially paid below the median do show a lower propensity to leave the firm when they expect their wages to approach the median and the effects are strongly statistically significant. The size of these effects increases (in absolute terms) monotonically with the size of the expected change. Given an overall probability of moving around 34%, workers who expected a 2 to 5 percentage point movement toward their median are 1.3 percentage point less likely to leave their firm with respect to workers who expected a shift towards the median of a smaller size (less than 2 p.p.). For those who expected a change

[35] This specification resembles that in Card et al. (2012).

above 10 percentage points, we estimate a 5 p.p. decrease in the likelihood of moving to a different firm, once again keeping those with a very small expected change as the reference category. All these results are confirmed also we focus on firms with more the 15 employees. Finally it is interesting to observe that the estimated effect of the wage percentile ($\pi_{W_{76}}$) is absolutely in line with that presented in Table 6, although the specification proposed in eq. 6 is much richer than that we estimated in the previous section.

These findings speak to the literature of inequality aversion, where there seems to be a consensus around the idea that workers are averse to inequality in their reference group. Such a consensus is based mostly on evidence from laboratory experiments and our findings suggest that in real labour markets workers might in fact behave very differently. The highly paid do not seem to be so concerned about their relative position within the firm but they do care about their absolute wages, as the results in Table 6 and Figure 5 clearly indicate. It is only the workers at the bottom of the firm distribution who seem to show aversion to inequality, as they are less likely to quit when they expect their wages to approach the median. These results are consistent with those in (Card et al., 2012), who also find effects of relative wages within the firm on job satisfaction and the propensity to look for another employer but only below the firm median.

6 Robustness Analysis

In this section we do three things: first we show that our results are robust to the use of different measures of the SM burden at the firm level; second, we look at how wages evolved in the same firms that we used for our main analysis in later periods, when the SM faded away; third, we investigate whether workers' attrition in our data is related to the SM system. For brevity, we will present robustness results only for a limited set of outcomes - only wages and wage dispersion within firms - and specifications - only the linear effects of $\pi_{i(76)}$ - but we have thoroughly tested all our findings and additional results are available upon request.

6.1 Alternative measure of SM burden

In the previous sections we have measured the SM burden of the firm with the share of 1976 employees expecting to receive real wage increases from the SM system. We now replicate our main findings with an alternative measure - which we label SM_{2j} - that takes into account the entire distribution of the SM real wage adjustments due by the firm. To construct this alternative indicator we consider all the workers employed at the firm in 1976 and we compute the sum of all the real SM adjustments that were due by the employer in 1977.[36] We then express this sum as a fraction of the total wage bill in 1976:

$$SM_{2j} = \frac{\sum_{i \in j} \left[\frac{W_{i(76)} + s\Delta P_{76-77}}{P_{77}/P_{76}} - W_{i(76)} \right]}{\sum_{i \in j} W_{i(76)}} \tag{7}$$

where j is the firm where worker i was employed in 1976 and $\frac{W_{i(76)} + s\Delta P_{76-77}}{P_{77}/P_{76}}$ is the wage (at 1976 prices) that i would have received in 1977 by the mechanical application of the SM wage adjustment. The numerator of equation 7 is the sum at the firm level of all the absolute real SM adjustments due by the firm in 1977 to its 1976 employees. Because it is in real terms, the numerator will be positive for firms with many low-paid workers who had positive real wage increases and negative for those with lots of high-skilled workers; the denominator is the firm's total wage bill in 1976.

[INSERT TABLE 10 HERE]

Table 10 reports the descriptive statistics of this alternative measure of the SM burden. SM_{2j} is positive for firms with many low-paid workers, as the firms payed large shares of their wage bill in SM adjustments and most of their workers got real wage increases. Conversely, SM_{2j} is negative for firms with many high-wage employees, as the SM required them to pay negative real wage adjustments. The average value of SM_{2j} is around zero. According to the value of SM_{2j} firms are divided in three groups of similar size. The burden imposed by the system varies widely across firms: as we have already observed for our benchmark measure, SM_{2j} correlates strongly with the firm's employment composition. Firms in the top third of the distribution of the burden employ ap-

[36] In equation 7 we consider only the SM adjustments due in 1977 to avoid making unnecessary assumptions about agents' expectations about future price levels.

proximately 11% of white collars and over 75% of workers with wages in the bottom quintile. Conversely, firms with burden in the bottom third employ 20% of white collars and 20% of workers in the top quintile of the wage distribution.

Table 11 presents in Panel B the results of the estimation of equation 4 with this alternative measure of the burden imposed by the SM. For convenience, Panel A reports the estimated coefficient obtained with the benchmark measure of the burden and it is taken directly from Table 4.[37] Notice that now firms are grouped into the three categories of low, medium and high burden in different ways depending on the indicator of burden that is used.

[INSERT TABLE 11 HERE]

The results obtained with this new measure (Panel B) of the burden are remarkably similar to those reported in Panel A: a one percentile movement up the wage distribution is associated with a decrease in the wage change of about 1.8 percentage points, and such a negative effect is significantly stronger for workers employed in high burden firms.

[INSERT TABLE 12 HERE]

Panel B of Table 12 further replicates the estimates of the effect of the SM burden on within-firm wage compression using SM_{2j} instead of the simple SM_j (as in Table 5).[38] Once again, the results are in line with those presented in Table 5 (reported in Panel A of Table 12 for convenience). When we employ SM_{2j} as a measure of the SM burden, we confirm the finding that the SM compressed the distribution of wages within the firm, both from the bottom and, even strongly, from the top.

6.2 The effects of SM after 1982

Our analysis shows that the burden imposed by the SM system on the firm correlates with a number of important individual and firm outcomes, such as wage growth, wage dispersion, turnover and firm exit. We are confident that the effects we find can be attributed to the SM system. First of all, we construct SM_j

[37] We have also replicated the results of Panel B of Table 4 with our alternative measure of the SM burden and our main findings are confirmed. Detailed results are available upon request.

[38] For brevity we do not report robustness checks for other outcomes, namely turnover and firm exit. The results are entirely consistent with those presented in section 5 and are available from the authors upon request.

(but also SM_{2j}) using only pre-determined variables (i.e. the wages in 1976) and institutional information (i.e. the rules of the SM). Second, our models condition on a rich set of control variables, including firm fixed effects, allowing us to rule out many alternative explanations.

Nevertheless, the SM burden of the firm (SM_j or SM_{2j}) inevitably correlates with the baseline composition of firm employment in 1976. This is clearly evident from Table 3 and Table 10 and one might wonder whether the effects that we find should be attributed more to the particular mix of workers employed at the firm in 1976 rather than to the burden of the SM. Given that SM_j or SM_{2j} correlate with firm employment with rather different degrees, it is already quite reassuring that we find virtually identical results when using one or the other indicators. However, in Panels B and C of Tables 11 and 12 we perform additional robustness checks looking at the post 1982 period.

We take the exact same firms that we use for our main estimates (Tables 4, 5, 6) and we investigate whether the wages paid to their workers correlate with their initial 1976 SM burden also in the periods 1983-1985, when the SM system was first weakened, and 1986-1992, when its compressing power was almost completely eliminated (see Section 3). If our measure of the SM burden simply proxies for employment composition, this exercise should produce results similar to our baseline estimates, if instead SM_j truly picks up the effect of the SM system, we should observe no correlation with outcomes measured in later periods when the SM was much weaker.[39] We do not go beyond 1992 for two reasons: (i) first, when the SM was finally abolished in 1992 many other changes in the system of industrial relations were introduced and (ii), as we move away from 1976, more and more firms disappear from our data and the comparison with our main findings become more and more difficult.[40]

The results of this validation exercise are reported in Panels C and D of Table 11 and Table 12 for the wage changes and the within-firm dispersion, respectively. For the first outcome (wage changes) we still find that better paid workers enjoy lower wage increases, both in 1983-1985 and in 1986-1992. However, there does not seem to be any significant difference across firms with different SM burdens as of 1976. When we look at changes in the within-firm distribution

[39]Of course, the effects of employment composition could also themselves change over time but it would still be worrisome to find that the SM burden measured in 1976 correlates significantly with later outcomes.

[40]We already loose 22.4% of firms between 1976 and 1983 and another 23.8% by 1986.

of wages in Table 12 we don't find any significant variation across firms with different SM burdens.

[INSERT FIGURE 6 HERE]

The absence of significant differences across firms with different SM burdens after 1983 is also evident in Figure 6, where the two panels replicate the same analysis of Figure 4 for the periods 1983-1985 and 1986-1992 but still grouping firms on the basis of their SM burden in 1976. The figures show that wage compression was still taking place because workers in lower percentiles received higher pay raises, but there does not seem to be much difference between firms with low, medium or high SM burden. This is in stark contrast to the period 1976-1982 (Figure 4) when firms with zero SM burden paid real wage increases approximately equal to zero to all their workers irrespective of their position in the initial distribution.

6.3 Workers' attrition

As we already mentioned, in our data we cannot tell why a worker disappears from our data, which essentially only cover private dependent employment. Hence, attrition can be due to transitions into unemployment or inactivity as well as into self-employment or the public sector. Despite the difficulty in interpreting this outcome, we are interested in understanding whether attrition was associated with the SM system. In fact, it is plausible to think that workers at the bottom of the distribution who became more and more expensive to their employers because of the high real wage increases imposed by the SM were more likely to be dismissed. Given the very strict employment protection that was enforced in Italy at the time, we do not expect the SM system to have a strong effect on dismissals. Nevertheless, Table 13 shows the result of a regression similar to the previous ones in this section where we consider all the workers that we observed in our data in 1976 and where the dependent variable is a dummy that takes value one if the worker disappeared by 1982.[41]

[INSERT TABLE 13 HERE]

[41] As for Table 6, all the coefficients are multiplied by 100 to increase their readability.

The results show that high-wage workers are less likely to exit the data and that this effect is present only in firms with positive SM burdens. The estimated effects are relatively small: workers in the bottom decile of the distribution were about 10 percentage points more likely to disappear from the data than those in the top decile (over an average attrition of 42%). Due to the data limitations discussed above, we cannot conclude from these results that the SM system led to the dismissal of low wage workers but they do suggest that some of the adjustment might have taken place on the employment margin.

7 A model of within-firm bargaining and on-the-job search

In this section we present a simplified matching model that helps rationalizing the empirical evidence documented in the previous sections. Consider an economy with two types of workers - the skilled (H) and the unskilled (L) - and heterogeneous firms producing using different combinations of workers.

For tractability we assume the following production function:

$$y_\rho = (x_H + \rho x_L)\, min\,(H, L/\rho) \qquad \text{with } \rho \geq 1 \tag{8}$$

where x_H and x_L are the productivities (or the contributions to output) of skilled and unskilled workers respectively and ρ is the parameter of firm heterogeneity.[42] Equation 8 defines a class of Leontief production functions that can be easily interpreted as team work. For example, a firm with $\rho = 1$ produces using teams composed by one skilled and one unskilled worker; therefore, if it employs one unskilled and two skilled workers, only one team is productive and one of the unskilled workers is not contributing to output. A firm with $\rho = 2$ produces with teams of one skilled worker and two unskilled. Hence, the parameter ρ can be interpreted as the inverse of skill intensity. One skilled worker is always needed to operate the team but there are many types of firms, producing with few or many unskilled workers per team. We assume that ρ is distributed according to a generic cdf $P(\cdot)$ over the support $[1, +\infty]$.[43]

[42] For simplicity, we normalize x_L to equal 1.

[43] Notice that ρ does not necessarily define firm size, as each firm can operate multiple teams. We maintain the assumption that all the teams of the same firm must adopt the same technology.

The production process in equation 8 captures the essence of skill complementarities while at the same time maintaining individual productivities independent of one another (conditional on production taking place) and avoiding the complications due to the differences between marginal and infra-marginal workers which are unnecessary for our purposes (Cahuc, Marque and Wasmer, 2008; Stole and Zwiebel, 1996).

For simplicity we assume a finite horizon and the following timing of the model. At time zero all workers are exogenously allocated to jobs and there is no unemployment (nor inactivity). This is admittedly a very restrictive assumption but it is coherent with our empirical analysis which focuses on individuals who are employed in 1976. Given such an allocation, wages are negotiated and paid out and production takes place. The resulting distribution should be seen as the theoretical counterpart of the initial distribution of wages in 1976. At time 1 workers have the opportunity to meet a new potential employer but frictions impose that such opportunity arises only with some probability λ smaller than 1. Other frictions prevent firms from changing their production technologies. Nest, wages are renegotiated and job-to-job moves take place. Finally, wages are paid out and production takes place.

We assume that the initial wages of the unskilled workers are set exogenously at a fixed level $\overline{w}$ for all firms. We assume that such pay level changes over time only in relation to changes in the minimum wage or new rounds of unions negotiations or, as it is relevant for our application, according to a statutory indexation system like the SM. With no variation in wages across firms, there is no reason for unskilled workers to change employer and we will assume that they never do.[44]

The wages of skilled workers are negotiated according to a strategic bargaining process similar to that in Cahuc, Postel-Vinay and Robin (2006). Let us first consider workers who do not have the opportunity to change employer, namely all the workers at time 0 and a fraction λ at time 1. Their wages are set by maximizing the weighted product of the partners' surpluses:

$$w_0(\rho) = \max_w (w-u)^\gamma \left(y_\rho - \rho\overline{w} - w\right)^{1-\gamma} \tag{9}$$

[44]Unskilled workers may have an incentive to move from less- to more skill-intensive firms if they anticipate that the first have a higher probability of exiting the market but we abstract from this effect.

where $w_0(\rho)$ is the wage paid to a H-worker at a ρ-firm, γ is the bargaining power of the worker and u is the value of unemployment. The surplus of the firm is derived under the assumption that if the negotiation fails and the skilled worker is not hired the entire team is dismissed at no cost and that the value of vacant jobs is zero.[45] For simplicity we normalize the value of unemployment to zero ($u = 0$) and we derive the following solution to the maximization problem in equation 9:

$$w_0(\rho) = \gamma[x_H - \rho(\overline{w} - 1)] \tag{10}$$

Equation 10 clearly shows the nature of the spillover effect between the wages of the unskilled and the skilled workers. As the exogenous salary of the unskilled increases, for example because of a mandatory SM adjustment, employers extract more rents from the wages of their skilled employees through individual or firm-level negotiations. The derivative of $w_0(\rho)$ with respect to $\overline{w}$ is $-\gamma\rho$ indicating that this effect is stronger in firms employing many unskilled workers (relative to the skilled). This is consistent with our results in Section 4.

If $\overline{w}$ is larger than 1, which corresponds to the productivity of the unskilled (x_L), then $w_0(\rho)$ is decreasing in ρ. In other words, if the employer is forced to pay the unskilled above their productivity, then H-workers are better paid in more skill-intensive firms (i.e. with lower ρ). Under this assumption, H-workers will never want to move to less skill-intensive employers (i.e with higher ρ), however, they would like to move to more skill-intensive firms (i.e. with lower ρ) if they have the opportunity to do so.

When a skilled worker meets a new potential employer at time 1 (with probability λ), the type of the poaching firm, denoted with ρ', is randomly drawn from the distribution $P(\cdot)$. The new job opportunity triggers a three-player bargaining between the worker, the incumbent and the poaching employer. The mechanism is identical to the one described in Cahuc, Postel-Vinay and Robin (2006), although it is implemented in our much simplified framework.[46] All parties have perfect information about their types, wage offers are observable and verifiable and there are no renegotiation costs. The sequence of the bargaining process is the following: once the worker makes contact with a new

[45] An alternative way to state the same assumption is that unskilled workers are only hired conditional on successful bargaining with the skilled worker. When paying the exogenous wage rate $\overline{w}$, unskilled workers can be hired (and dismissed) frictionlessly.

[46] The non-renegotiation wage of equation 10 plays in our setting the same role as the wage negotiated by the unemployed workers in Cahuc, Postel-Vinay and Robin (2006).

potential firm, the incumbent and the poaching employer simultaneously make a wage offer, then the worker chooses the best offer and, finally, she goes back to the employer whose offer was refused and renegotiates using the new wage proposal as an outside option.

The outcome of this game depends on the types of the employers. If the poaching firm is more skill-intensive than the incumbent (i.e. $\rho' < \rho$), then the latter is drawn to offer the entire surplus to the worker, namely $[x_h - \rho(\overline{w} - 1)]$, in an attempt to retain her.[47] Then, the worker negotiates a new wage with the poaching employer using this as an outside option. Eventually, the worker will move to the new more skill-intensive firm with the following wage:

$$w(\rho, \rho') = [x_h - \rho(\overline{w} - 1)] + \gamma(\rho - \rho')(\overline{w} - 1) \quad \text{with } \rho' < \rho \tag{11}$$

where we indicate with $w(\rho, \rho')$ the wage paid by a firm of type ρ' to a skilled worker who had the alternative option of working for a ρ-firm. Such wage is equal to the full surplus of the alternative match plus a fraction γ of the difference between the surpluses of the two potential matches.

Of course, it might also happen that the new potential employer is less skill-intensive that the incumbent, i.e. $\rho \leq \rho'$. In this case the worker might still have an interest in triggering the renegotiation game because it may allow her to command a higher wage from the incumbent employer. Now it is the poaching firm which is drawn to offer the entire surplus to the worker, who then uses it as an outside option in the negotiation with the current employer to obtain the following wage:

$$w(\rho', \rho) = \left[x_h - \rho'(\overline{w} - 1)\right] + \gamma(\rho' - \rho)(\overline{w} - 1) \quad \text{with } \rho \leq \rho' \tag{12}$$

Obviously, the worker will engage in the negotiation game only if $w(\rho', \rho)$ is higher than $w_0(\rho)$ and this is guaranteed when $\rho' < \frac{X_H}{\overline{w}-1}$. This is exactly the same condition required for the total surplus of the match without renegotiation to be positive (see equation 9). In other words, production technologies with ρ larger than $\frac{X_H}{\overline{w}-1}$ are not profitable in equilibrium.[48]

[47] We assume that when the worker is indifferent between the new and the incumbent employer she remains in the current job.

[48] For simplicity we have set the value of unemployment to zero. As a consequence workers always engage in the renegotiation process because their outside option will always increase regardless of the type of the poaching firm.

To sum up, this simple model is able to rationalize all our empirical findings as follows.

- As the wage of unskilled workers increases, the wages of the skilled decrease and such spillover effect is stronger in less skill-intensive firms (i.e. firms with higher ρ). This is consistent with our main findings in Section 4.

- Skilled workers move from less to more skill-intensive firms with probability $\lambda P(\rho)$. Hence, they are more likely to move when they are employed at less skill-intensive firms. This is consistent with our findings in Section 5.

- As the wage of unskilled workers increases the less skill-intensive firms exit the market, as shown in Table 7. In fact, we have shown that only firms with $\rho \leq \frac{X_H}{\overline{w}-1}$ are associated with non-negative surpluses. As $\overline{w}$ increases, this threshold decreases and firms with unprofitable technologies leave the market.

- The spillover effect is stronger for the job stayers. To see this, consider two skilled workers - A and B - who are both employed at the same incumbent firm of type ρ. At some point, they both find an alternative employer. However, worker A is lucky and meets a more skill-intensive firm of type $\rho' < \rho$ whereas worker B finds a less skill-intensive firm of type $\rho'' > \rho$. Then, worker A leaves the original employer and joins the new firm at the wage $w(\rho, \rho')$ while worker B remains in her current job but renegotiates the wage to $w(\rho'', \rho)$. Then, it is easy to show that the derivative with respect to $\overline{w}$ of $w(\rho'', \rho)$, the wage of the job stayer, is more negative than the same derivative of $w(\rho, \rho')$, the wage of the job mover.[49] In our empirical analysis we do not investigate in details the differences in wage changes between job movers and job stayers because of the complicated selection mechanism but when we simply add a dummy for movers in the regressions of Table 4 we find that movers enjoyed larger wage gains, particularly when coming from firms with high SM burdens.[50] Despite

[49] Note that $\frac{\partial w(\rho,\rho')}{\partial \overline{w}} = -(1-\gamma)\rho - \gamma\rho' < 0$ and $\frac{\partial w(\rho'',\rho)}{\partial \overline{w}} = -(1-\gamma)\rho'' - \gamma\rho < 0$. Given that $\rho' < \rho < \rho''$, it follows that $\frac{\partial w(\rho'',\rho)}{\partial \overline{w}} < \frac{\partial w(\rho,\rho')}{\partial \overline{w}}$.

[50] The correct identification of the effects of the SM burden on movers and stayers separately would require an exclusion restriction for the selection into the two groups.

its descriptive nature, this result is consistent with the implications of the model.

8 Conclusions

In this paper we study a unique wage indexation mechanism that was adopted in Italy in the late 1970s and early 1980s, the *Scala Mobile* (SM). Because of the way it was designed, granting absolute wage increases of the same amount to all workers, the SM induced large real pay rises to workers at the bottom of the distribution and merely real wage cuts towards the top. Nevertheless, we document that the system generated important spillover effects on high-wage workers who experienced lower wage growth as their low-wage colleagues were given higher mandatory SM adjustments. This effect was stronger for skilled workers employed at establishments with larger shares of unskilled workers, suggesting that the spillover effect was generated by intra-firm bargaining.

We rationalize these results with a theoretical model where the wages of unskilled workers are set exogenously whereas those of the skilled are negotiated. Given the complementarity of skill types in the production process, an increase in the exogenous wage rate of the unskilled induces firms to extract more rents from the jobs of their skilled colleagues. This mechanism is consistent with our empirical evidence and suggests that an important channel through which labor market institutions affect the overall distribution of wages operates within the boundaries of the firm.

This is an important result because the large literature on labor market institutions and inequality has focused almost exclusively on the lower end of the distribution. Revisiting the role of these institutions in the light of their impact within the firm might contribute to explaining the evolution of inequality also among high-wage earners.

We also show that part of the adjustment to the SM took place through job turnover. As predicted by our model, high mandatory wage rises to the unskilled induced skilled workers to move towards the most skill-intensive firms and away from the least skill-intensive ones, which were eventually more likely to exit the market.

The SM was abolished in the early 1990s in the aftermath of a profound wave of frustration among skilled white-collars, who felt damaged by the in-

creased levels of wage compression induced by the indexation system. This is perfectly in line with our results and intriguingly at odds with much of the literature on inequality aversion (Truman F. Bewley, 1999; Fehr and Schmidt, 1999). Contrary to the predictions of many studies in this area, our findings indicate that under certain circumstances individuals can be averse to too much intra-firm wage equality. At the moment we cannot say whether skilled workers left the least skill-intensive firms because they could get higher wages elsewhere or because their wages were getting too close to those of the unskilled. However, we believe that this is a very promising avenue for future research that can be fruitfully pursued exploiting the same SM mechanism of this paper.

References

Autor, David H., Lawrence F. Katz, and Melissa S. Kearney. 2006. "The Polarization of the U.S. Labor Market." *The American Economic Review*, 96(2): 189–194.

Bewley, Truman F. 1999. *Why wages don't fall during a recession.* Harvard University Press.

Cahuc, Pierre, Fabien Postel-Vinay, and Jean-Marc Robin. 2006. "Wage Bargaining with On-the-Job Search: Theory and Evidence." *Econometrica*, 74(2): pp. 323–364.

Cahuc, Pierre, Francois Marque, and Etienne Wasmer. 2008. "A Theory of Wages and Labor Demand with Intra-Firm Bargaining and Matching Frictions." *International Economic Review*, 49(3): pp. 943–972.

Card, David, Alexandre Mas, Enrico Moretti, and Emmanuel Saez. 2012. "Inequality at Work: The Effect of Peer Salaries on Job Satisfaction." *American Economic Review*, 102(6): 2981–3003.

Card, David, Francesco Devicienti, and Agata Maida. 2014. "Rent-sharing, Holdup, and Wages: Evidence from Matched Panel Data." *Review of Economic Studies*, 81(1): 84–111.

Card, David, W. Craig Riddell, and Thomas Lemieux. 2004. "Unions and Wage Inequality." *Journal of Labor Research*, 24(4): 519–562.

Charness, Gary, and Peter Kuhn. 2007. "Does Pay Inequality Affect Worker Effort? Experimental Evidence." *Journal of Labor Economics*, 25: 693–723.

Cingano, Federico, and Alfonso Rosolia. 2012. "People I Know: Job Search and Social Networks." *Journal of Labor Economics*, 30(2): 291 – 332.

Clark, Andrew E., and Claudia Senik. 2010. "Who Compares to Whom? The Anatomy of Income Comparisons in Europe." *Economic Journal*, 120(544): 573–594.

Clark, Andrew E., David Masclet, and Marie Claire Villeval. 2010. "Effort and Comparison Income: Experimental and Survey Evidence." *Industrial and Labor Relations Review*, 63(3): 407–426.

Di Nardo, John, and David S. Lee. 2004. "Economic Impacts of New Unionization On Private Sector Employers: 1984-2001." *The Quarterly Journal of Economics*, 119(4): 1383–1441.

Di Nardo, John, Kevin F Hallock, and Jörn-Steffen Pischke. 2000. "Unions And The Labour Market For Managers." C.E.P.R. Discussion Papers CEPR Discussion Papers 2418.

Di Nardo, John, Nicole Fortin, and Thomas Lemieux. 1996. "Labor market institutions and the distribution of wages, 1973-1992: A semiparametric approach." *Econometrica*, 64(5): 1001–1044.

Engelmann, Dirk, and Martin Strobel. 2004. "Inequality Aversion, Efficiency, and Maximin Preferences in Simple Distribution Experiments." *American Economic Review*, 94(4): 857–869.

Erikson, Christopher L., and Andrea Ichino. 1995. "Wage differentials in Italy: Market forces, institutions, and inflation." In *Differences and changes in the wage structure*. , ed. University of Chicago Press. Richard B. Freeman and Lawrence F. Katz.

Fehr, Ernst, and Klaus M. Schmidt. 1999. "A Theory Of Fairness, Competition, And Cooperation." *The Quarterly Journal of Economics*, 114(3): 817–868.

Gramlich, Edward M. 1976. "Impact of Minimum Wages on Other Wages, Employment, and Family Incomes." *Brookings Papers on Economic Activity*, 7(2): 409–462.

Grossman, Jean Baldwin. 1983. "The Impact of the Minimum Wage on Other Wages." *The Journal of Human Resources*, 18(3): 359–378.

Guiso, Luigi, Luigi Pistaferri, and Fabiano Schivardi. 2005. "Insurance within the Firm." *Journal of Political Economy*, 113(5): 1054–1087.

Guiso, Luigi, Luigi Pistaferri, and Fabiano Schivardi. 2013. "Credit within the Firm." *Review of Economic Studies*, 80(1): 211–247.

Lee, David S. 1999. "Wage Inequality in the United States during the 1980s: Rising Dispersion or Falling Minimum Wage?" *The Quarterly Journal of Economics*, 114(3): 977–1023.

Leonardi, Marco, and Giovanni Pica. 2013. "Who Pays for it? The Heterogeneous Wage Effects of Employment Protection Legislation." *Economic Journal*, 123(12): 1236–1278.

Manacorda, Marco. 2004. "Can the Scala Mobile explain the fall and rise of earnings inequality in Italy? A semiparametric analysis, 1977-1993." *Journal of Labor Economics*, 22(3): 585–613.

Mas, Alexandre. 2006. "Pay, Reference Points, and Police Performance." *The Quarterly Journal of Economics*, 121(3): 783–821.

Neumark, David, Mark Schweitzer, and William Wascher. 2004. "Minimum Wage Effects throughout the Wage Distribution." *Journal of Human Resources*, 39(2): 425–450.

Rabin, Matthew. 2006. "A Model of Reference-Dependent Preferences." *The Quarterly Journal of Economics*, 121(4): 1133–1165.

Rubinstein, Ariel. 1982. "Perfect Equilibrium in a Bargaining Model." *Econometrica*, 50(1): 97–109.

Stole, Lars A., and Jeffrey Zwiebel. 1996. "Intra-Firm Bargaining under Non-Binding Contracts." *The Review of Economic Studies*, 63(3): pp. 375–410.

9 Figures and Tables

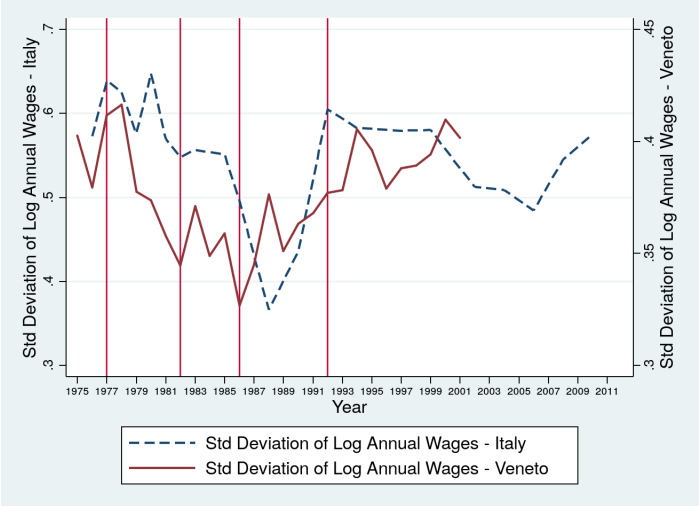

Figure 1: Wage inequality 1975-2011 - Italy and Veneto

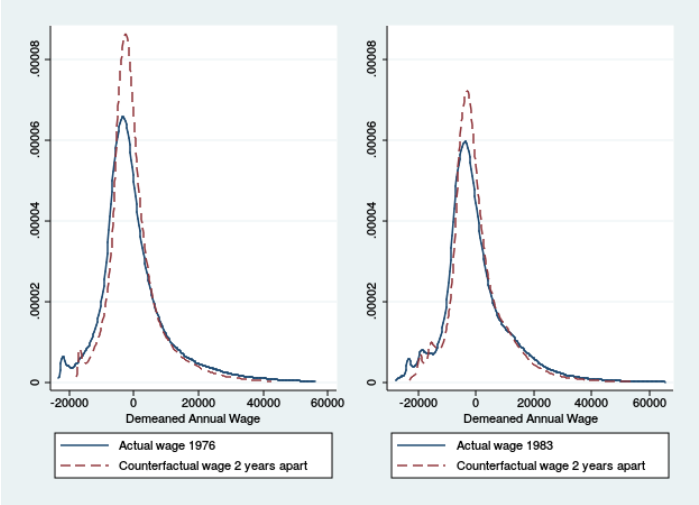

Figure 2: Actual and counterfactual wage distributions

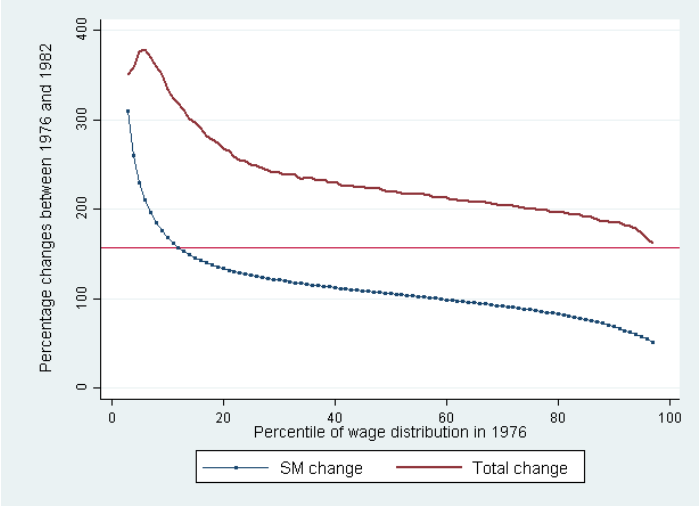

Figure 3: Wage changes in the period 1976-1982

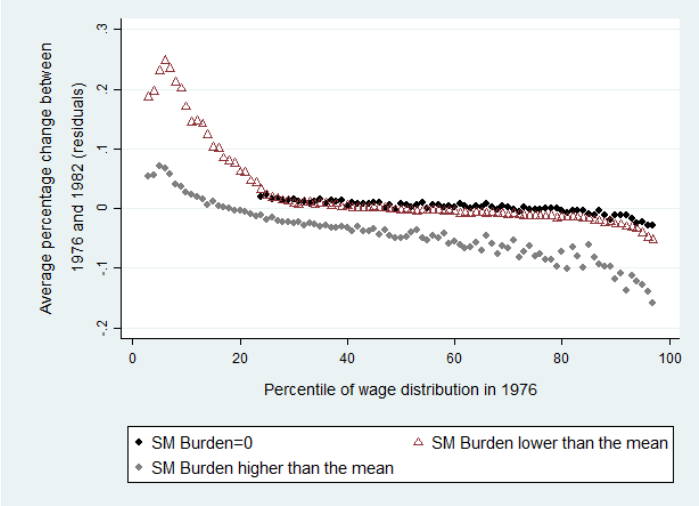

Figure 4: Annualized wage changes by SM burden (1976-1982)

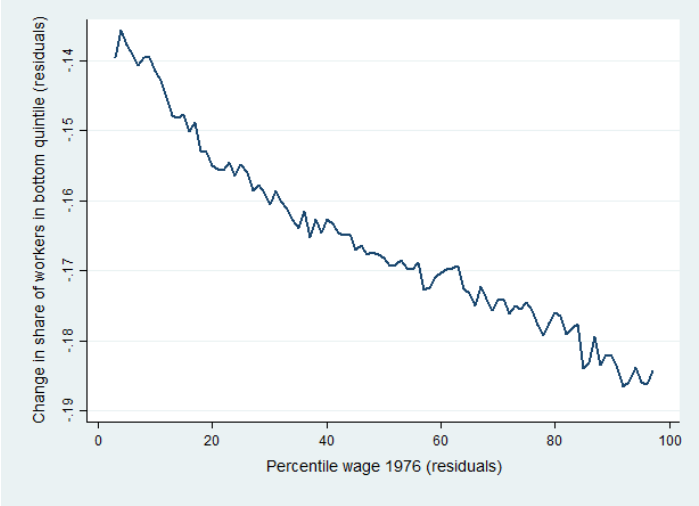

Figure 5: Changes in firm characteristics for the job movers (1976-1982)

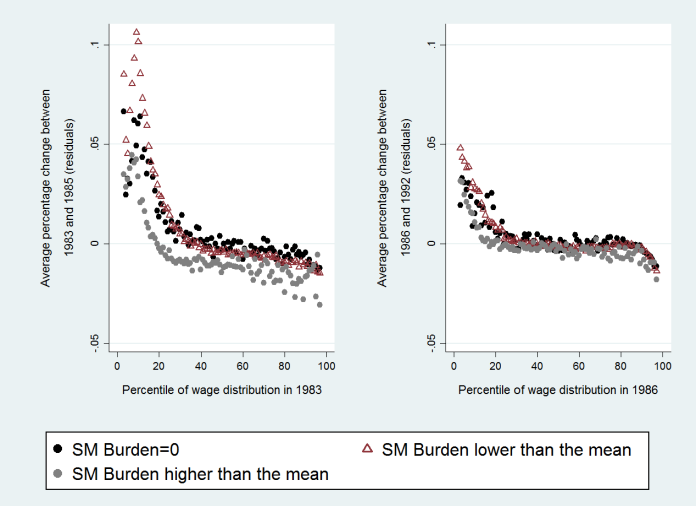

Figure 6: Annualized wage changes by SM burden (1983-1985 and 1986-1992)

Table 1: Descriptive statistics

	Universe of observations	Restricted sample[a]
	Mean (Std. Dev.)	Mean (Std. Dev.)
Worker-level descriptive statistics		
Female	0.318	0.271
Age	32.573	32.366
	(12.668)	(10.405)
White collar	0.198	0.132
Job mover[b]	0.418	0.347
Wage in 1976[c]	13,214	16,875
	(45,846)	(4,752)
Number of workers	1,103,231	423,614
Firm-level descriptive statistics		
Number of full-time employees	5.795	9.368
	(50.317)	(61.208)
More than 15 employees	0.053	0.096
	(0.224)	(0.295)
Share of white collars	0.169	0.144
	(0.375)	(0.287)
Number of firms	147,719	67,733

[a] These descriptive statistics refer to the most selected sample used in the empirical analysis, namely workers who are continuously employed between 1976 and 1982 and their employers.

[b] Job movers are workers who changed employer(s) throughout the period 1977-1982.

[c] Wages are reported in Euros at 2014 prices.
All values calculated in the year 1976.
Source: INPS Social Security Archives, 1976-1982.

Table 2: The functioning of the *Scala Mobile*

Year	Month	$P_t^\star$	ΔP_t	*contingenza* point	SM adjustment
		[1]	[2]	[3]	[2]×[3]
Panel A: First period (1977-1982)					
1977	1	143	9	2,389	0
1977	4	149	6	2,389	14,334
1977	7	154	5	2,389	11,945
1977	10	158	4	2,389	9,556
1978	1	162	4	2,389	9,556
1978	4	167	5	2,389	11,945
1978	7	173	6	2,389	14,334
1978	10	178	5	2,389	11,945
1979	1	184	6	2,389	14,334
1979	4	192	8	2,389	19,112
1979	7	198	6	2,389	14,334
1979	10	206	8	2,389	19,112
1980	1	214	8	2,389	19,112
1980	4	226	12	2,389	28,668
1980	7	234	8	2,389	19,112
1980	10	244	10	2,389	23,890
1981	1	255	11	2,389	26,279
1981	4	269	14	2,389	33,446
1981	7	279	10	2,389	23,890
1981	10	288	9	2,389	21,501
1982	1	297	9	2,389	21,501
1982	4	309	12	2,389	28,668
1982	7	322	13	2,389	31,057
1982	10	335	13	2,389	31,057
Panel B: Second period (1983-1985)					
1983	1	104	4	6,800	27,200
1983	4	107	3	6,800	20,400
1983	7	110	3	6,800	20,400
1983	10	112	2	6,800	13,600
1984•	1	117	2	6,800	13,600
1984•	4	120	2	6,800	13,600
1984	7	123	3	6,800	20,400
1984	10	124	1	6,800	6,800

Continued on next page

Continued from previous page

Year	Month	$P_t^{\star}$	ΔP_t	*contingenza* point	SM adjustment
		[1]	[2]	[3]	[2]×[3]
1985	1	127	3	6,800	20,400
1985	4	131	4	6,800	27,200
1985	7	133	2	6,800	13,600
1985	10	135	2	6,800	13,600

Panel C: Third period (1986-1991)

year	month	$P_t^{\star}$	$\%\Delta P_t$	Base $w^{\pm}$	Fixed full increase
		[1]	[2]	[3]	[2]×[3]
1986	4	138	2.72	580,000	15,776
1986	10	142	2.90	595,776	17,271
1987	4	145	2.61	613,047	16,015
1987	10	149	2.59	629,062	16,275
1988	4	153	2.64	645,337	17,011
1988	10	157	2.63	662,348	17,444
1989	4	162	3.43	679,792	23,287
1989	10	167	3.00	703,080	21,123
1990	4	173	3.68	724,203	26,664
1990	10	179	3.35	750,866	25,149
1991	4	187	4.34	776,015	33,676
1991	10	194	3.51	809,691	28,438

$\star$ The SM used a special price index purposely constructed by Italian National Statistical Institute (*indice dei prezzi al consumo per le famiglie di operai e impiegati*).

• Occasional caps to wage increases were adopted.

$\pm$ For the manufacturing sector.

All amounts are in current Italian Liras.

Table 3: SM_j and firm's employment

	% firms	Mean	s.d.	Share of white collars[a]	Share of workers in bottom quintile[a]	Share of workers in top quintile[a]
SM_j		0.409	0.392			
$SM_j = 0$	0.225	0.000	0.000	0.177	0.000	0.140
$0 < SM_j \leq \overline{SM}$	0.350	0.176	0.114	0.140	0.084	0.104
$SM_j > \overline{SM}$	0.420	0.826	0.209	0.115	0.648	0.011

[a] In the firm's total employment in 1976.
All statistics are computed over the sample of 49,566 firms which employed the 423,614 workers observed in both 1976 and 1982.
SM_j is the firm share of workers expecting to receive real pay raises from the SM (see Section 4 for details). $\overline{SM}$ is the mean SM_j in the sample.

Table 4: Wage changes under the SM (1976-1982)

	Full sample	$SM_j = 0$	$0 < SM_j \leq \overline{SM}$	$SM_j > \overline{SM}$
		Panel A		
$\pi_{W_{i(76)}}$	-0.018***	-0.017***	-0.017***	-0.025***
	(0.000)	(0.000)	(0.000)	(0.000)
		Panel B		
1^{st} quintile[a]	0.967***	-	1.019***	0.903***
	(0.004)		(0.005)	(0.014)
2^{nd} quintile[a]	0.264***	0.237***	0.249***	0.317***
	(0.003)	(0.012)	(0.003)	(0.014)
4^{th} quintile[a]	-0.204***	-0.234***	-0.199***	-0.278***
	(0.003)	(0.010)	(0.003)	(0.020)
5^{th} quintile[a]	-0.466***	-0.556***	-0.455***	-0.581***
	(0.003)	(0.012)	(0.003)	(0.027)
Observations	423,614	32,594	323,275	66,745

[a] Quintile of the distribution of wages in 1976.
The dependent variable is the percentage difference of gross annual wages between 1976 and 1982.
SM_j is the firm share of workers receiving real pay raises from the SM (see Section 4 for details).
$\pi_{W_{i(76)}}$ is the percentile of the distribution of wages in 1976.
All specifications include a constant, age, age squared, a gender dummy, a dummy for blue-collar workers, province dummies and the share of firms that closed down during 1976. Results are estimated with firm fixed effects.
Each column in each panel is a separate regression.
Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Wages within firm (1976-1982)

	All Firms			Firms with $>$ 15 employees		
	ΔStd.Dev	$\Delta\pi_{25/50}$	$\Delta\pi_{75/50}$	ΔStd.Dev	$\Delta\pi_{25/50}$	$\Delta\pi_{75/50}$
	(1)	(2)	(3)	(4)	(5)	(6)
			Panel A			
SM_j	-0.031***	0.017***	-0.047***	-0.068***	0.053***	-0.088***
	(0.003)	(0.003)	(0.004)	(0.007)	(0.006)	(0.008)
			Panel B			
$SM_j = 0$	0.055***	-0.042***	-0.086***	-0.014	0.167***	-0.175***
	(0.014)	(0.012)	(0.016)	(0.036)	(0.031)	(0.041)
$0 < SM_j < \overline{SM}$	-0.068***	0.029***	-0.113***	-0.080***	0.188***	-0.180***
	(0.014)	(0.012)	(0.016)	(0.036)	(0.031)	(0.040)
$SM_j \geq \overline{SM}$	-0.074***	0.045***	-0.159***	-0.109***	0.227***	-0.218***
	(0.013)	(0.011)	(0.016)	(0.035)	(0.030)	(0.039)
Observations	33,134	33,134	33,134	5,572	5,572	5,572

The dependent variables are the changes in three measures of the dispersion of wages within firms: (i) the std. deviation of log wages (columns 1 and 4); (ii) the ratio of the 25th and 50th percentile (columns 2 and 5); (iii) the ratio between the 50th and 75th percentile (columns 3 and 6).
SM_j is the firm share of workers expecting to receive real pay raises from the SM (see Section 4 for details).
All specifications include the following firm controls: size, size squared, a dummy for firms established before 1974 and the share of white collar workers.
Each column in each panel is a separate regression.
Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6: Probability of changing employer

	Full sample	$SM_j = 0$	$0 < SM_j \leq \overline{SM}$	$SM_j > \overline{SM}$
		Panel A		
$\pi_{W_{i(76)}}$	-0.151***	-0.146***	-0.156***	-0.117***
	(0.004)	(0.020)	(0.004)	(0.012)
		Panel B		
1^{st} quintile[a]	8.229***	-	9.599***	5.846***
	(0.253)		(0.298)	(0.707)
2^{nd} quintile[a]	2.821***	2.619***	2.875***	1.703**
	(0.188)	(0.888)	(0.202)	(0.695)
4^{th} quintile[a]	-2.741***	-2.563***	-2.789***	0.016
	(0.173)	(0.743)	(0.180)	(1.015)
5^{th} quintile[a]	-3.453***	-4.285***	-3.377***	-0.289
	(0.212)	(0.918)	(0.220)	(1.370)
Observations	423,614	33,594	323,275	66,745

[a] Quintile of the distribution of wages in 1976.
The dependent variable is a dummy equal to one for workers who changed employer at least once between 1976 and 1982.
SM_j is the firm share of workers expecting to receive real pay raises from the SM (see Section 4 for details).
$\pi_{W_{i(76)}}$ is the percentile of the distribution of wages in 1976.
All specifications include a constant, age, age squared, a gender dummy, a dummy for blue-collar workers, province dummies and the share of firms that closed down during 1976. Results are estimated with firm fixed effects.
Each column in each panel is a separate regression.
All coefficients have been multiplied by 100 for readability. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 7: Probability of firm exit

Dependent var.= prob. of firm exit[a]	All Firm	Firms with more than 15 employees
	Panel A	
SM_j	0.068***	0.100***
	(0.005)	(0.025)
	Panel B	
$SM_j = 0$	0.552***	0.256**
	(0.020)	(0.126)
$0 < SM_j < \overline{SM}$	0.461***	0.295**
	(0.021)	(0.124)
$SM_j \geq \overline{SM}$	0.542***	0.345***
	(0.019)	(0.121)
Observations	67,733	6,515

[a] The dependent variable is a dummy equal to one for firms which ceased operating at some point between 1976 and 1982. The sample includes all firms that were operating in Veneto in 1976.
SM_j is the firm share of workers expecting to receive real pay raises from the SM (see Section 4 for details).
All specifications include the following firm controls: average workers' age (and squared), proportion of female workers, size, size squared, a dummy for firms established before 1974, three sector dummies and the share of white collar workers. The results are estimated with OLS.
Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 8: Expected SM effect on relative wages within the firm

	$\frac{W_{i(76)}}{\widetilde{W}_{j(76)}}$	$\frac{W^s_{i(82)}}{\widetilde{W}^s_{j(82)}}$	$\Delta w^r_{ij} = \frac{W_{i(76)}}{\widetilde{W}_{j(76)}} - \frac{W^s_{i(82)}}{\widetilde{W}^s_{j(82)}}$		
	mean	mean	mean	min	max
$W_{i(76)} < \widetilde{W}_{j(76)}$	0.916	0.957	0.042	0.000	0.358
$W_{i(76)} > \widetilde{W}_{j(76)}$	1.194	1.092	-0.102	-1.592	0.000

Table 9: Probability of changing employer with inequality aversion

	Workers of all firms	Workers of firms with more than 15 employees
Above the firm median (τ^a):[a]		
I_{2-5}	-0.441*	-0.289
	(0.003)	(0.003)
I_{5-10}	-0.031	0.243
	(0.003)	(0.003)
I_{10+}	0.161	0.606
	(0.004)	(0.004)
Below the firm median (τ^b):[a]		
I_{2-5}	-1.348***	-1.153***
	(0.002)	(0.002)
I_{5-10}	-3.082***	-2.675***
	(0.003)	(0.004)
I_{10+}	-4.838***	-4.813***
	(0.006)	(0.007)
$\left[w_{ij}^r > 1\right]$	-0.176	0.132
	(0.002)	(0.003)
$w_{ij}^r \times \left[w_{ij}^r > 1\right]$	4.855***	4.179***
	(0.008)	(0.008)
$w_{ij}^r \times \left[w_{ij}^r < 1\right]$	-1.600	0.982
	(0.020)	(0.022)
$\pi_{W_{i(76)}}{}^b$	-0.123***	-0.117***
	(0.000)	(0.000)
Observations	423,408	305,840

[a] See Section 5.1 for details.

[b] Percentile of the distribution of wages in 1976.

The dependent variable is a dummy equal to one for workers who changed employer at least once at some point between 1976 and 1982.

w_{ij}^r is the ratio between the individual wage (in 1976) and the firm median (in 1976).

All specifications include a constant, age, age squared, a gender dummy, a dummy for blue-collar workers, province dummies and the share of firms that closed down during 1976. Results are estimated with firm fixed effects.

Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 10: SM_{2j} and firm's employment

	Mean	s.d.	Share of white collars[a]	Share of workers in bottom quintile[a]	Share of workers in top quintile[a]
SM_{2j}	0.001	0.045			
Bottom third of SM_{2j}	-0.038	0.015	0.199	0.034	0.203
Middle third of SM_{2j}	-0.008	0.008	0.102	0.126	0.013
Top third of SM_{2j}	0.048	0.044	0.114	0.747	0.003

[a] In the firm's total employment in 1976.
All statistics are computed over the sample of 49,566 firms which employed the 423,614 workers observed in 1976 and 1982.

Table 11: Wage changes under the SM - Robustness

	Full sample	SM burden:[a]		
		low	medium	high
	Panel A: Benchmark Analysis, 1976–1982			
$\pi_{W_{i(76)}}$	-0.018***	-0.017***	-0.017***	-0.025***
	(0.000)	(0.000)	(0.000)	(0.000)
Observations	423,614	32,594	323,275	66,745
	Panel B: Alternative Measure of SM Burden, 1976–1982[d]			
$\pi_{W_{i(76)}}$	-0.018***	-0.018***	-0.016***	-0.021***
	(0.000)	(0.000)	(0.000)	(0.000)
Observations	423,614	32,594	323,275	66,745
	Panel C: Results for the Period 1983–1985			
$\pi_{W_{i(83)}}$	-0.003***	-0.003***	-0.003***	-0.003***
	(0.000)	(0.000)	(0.000)	(0.000)
Observations	426,099	35,633	319,235	71,231
	Panel D: Results for the Period 1986–1992			
$\pi_{W_{i(86)}}$	-0.005***	-0.005***	-0.004***	-0.006***
	(0.000)	(0.000)	(0.000)	(0.000)
Observations	297,894	26,924	220,601	50,369

[a] In Panel B the 3 groups are defined as the bottom third, middle third and top third of the (firm) distribution of SM_{2j}. In all other panels the 3 groups are defined as $SM_j = 0$ (low), $0 < SM_j \leq \overline{SM}$ (middle) and $SM_j > \overline{SM}$ (high).
The dependent variable is the percentage difference of gross annual wages between 1982 and 1976 (Panels A and B); between 1985 and 1983 (Panel C); and between 1992 and 1986 (Panel D).

[a] $\pi_{W_{i(k)}}$ is the percentile of the distribution of wages in year k.
In Panels A, C and D SM_j is the firm share of 1976 employees expecting to receive real pay raises from the SM (see Section 4 for details). In Panel B SM_{2j} is sum of all real SM adjustments due by the firm in 1977 over the firm's wage bill in 1976 (see Section 6 for details).
All specifications include a constant, age, age squared, a gender dummy, a dummy for blue-collar workers, province dummies and the share of firms that closed down during 1976. Results are estimated with firm fixed effects. (see Section 6 for details)
Each column in each panel is a separate regression.
Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 12: Wages within the firm - Robustness

	All Firms			Firms with $>$ 15 employees		
	ΔStd.Dev.	$\Delta\pi_{25/50}$	$\Delta\pi_{75/50}$	ΔStd.Dev.	$\Delta\pi_{25/50}$	$\Delta\pi_{75/50}$
	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Benchmark Analysis, 1976–1982					
SM_j	-0.031***	0.017***	-0.047***	-0.068***	0.053***	-0.088***
	(0.003)	(0.003)	(0.004)	(0.007)	(0.006)	(0.008)
Observations	33,134	33,134	33,134	5,572	5,572	5,572
	Panel B: Alternative Measure of SM Burden, 1976–1982					
$SMBurden_j$	-0.124***	0.018	-0.246***	-0.085**	-0.008	-0.164***
	(0.020)	(0.017)	(0.023)	(0.035)	(0.030)	(0.039)
Observations	33,134	33,134	33,134	5,572	5,572	5,572
	Panel C: Results for the Period 1983–1985					
SM_j	0.003	-0.003	0.004	0.003	-0.008	-0.006
	(0.003)	(0.003)	(0.003)	(0.006)	(0.005)	(0.006)
Observations	25,679	25,679	25,679	5,627	5,627	5,627
	Panel D: Results for the Period 1986–1992					
SM_j	0.001	-0.001	0.009**	-0.012*	0.003	-0.003
	(0.004)	(0.003)	(0.004)	(0.007)	(0.006)	(0.008)
Observations	17,796	17,796	17,796	4,769	4,769	4,769

The dependent variables are the changes in three measures of the dispersion of wages within firms: (i) the std. deviation of log wages (columns 1 and 4); (ii) the ratio of the 25th and 50th percentile (columns 2 and 5); (iii) the ratio between the 50th and 75th percentile (columns 3 and 6). In Panels A and B the changes are taken over the period 1976-1982, in Panel C over 1983-1985 and in Panel D over 1986-1992.
In Panels A, C and D SM_j is the firm share of 1976 employees receiving real pay raises from the SM (see Section 4 for details). In Panel B SM_{2j} is sum of all real SM adjustments due by the firm in 1977 over the firm's wage bill in 1976 (see Section 6 for details).
All specifications include the following firm controls: average workers' age (and squared), proportion of female workers, size, size squared, a dummy for firms established before 1974, three sector dummies and the share of white collar workers. The results are estimated with OLS. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 13: Workers' attrition

	Full sample	$SM_j = 0$	$0 < SM_j \leq$ Av.SM	$SM_j >$ Av.SM
$\pi w_{i(76)}$ [a]	-0.212***	-0.002	-0.224***	-0.147***
	(0.003)	(0.017)	(0.003)	(0.010)
Observations	736,318	55,640	544,971	135,707

[a] Percentile of the distribution of wages in 1976.
The dependent variable is a dummy equal to one for workers who changed employment status at least once at some point between 1976 and 1982.
SM_j is the firm share of workers expecting to receive real pay raises from the SM (see Section 4 for details).
All specifications include a constant, age, age squared, a gender dummy, a dummy for blue-collar workers and firm controls: size, size squared, a dummy for firms established before 1974, the share of white collar workers and dummies for the province in which the firm is located. The results are estimated with firms fixed effects.
Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$