Wage Mobility and Dynamics in Italy
1993-1998

by

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1. Macroeconomic Conditions and long term trend in Employment

(i)   During the first half of the 1980s, overall employment in Italy was stagnant, with the sole exception of the Central regions (Figure 1.1). In the North-West, large manufacturing industries, undergoing profound restructuring processes, expelled labour that was only partially reabsorbed by self-employment and the service sector.

Between 1985 and 1990, the expansionary fiscal policy produced a positive effect on employment almost everywhere (except for the South) and in particular for women. During the 1980s, the female labour force increased by 1,570,000 from 33.4% to 37.3% of the total.

Figure 1.1 Geographical distribution of total employment – Years 1977-1999.

Annual means; index numbers base 1977=100

Employment in Italy by macroregion (base 1977: 100)
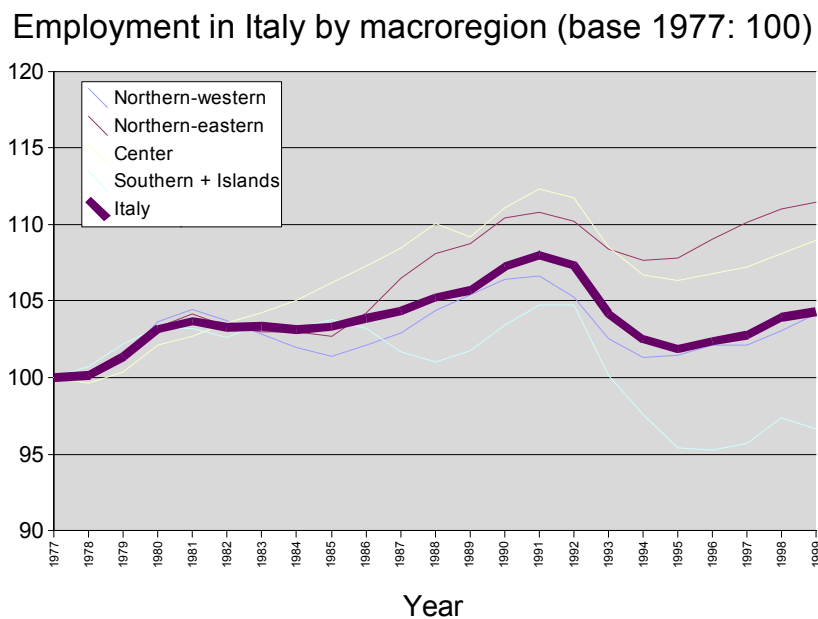
Source: Istat and CNR-FGB-Istat-2.

(ii)   Development in the service sector occurred, following the physiological patterns of industrialised countries: the increase in employment recorded between 1985 and 1996 -- about 84,000 jobs, representing a share of dependent employment that rose from 41% to 49% -- was to a large extent met by the massive entrance into the workplace of young people and women, and to a very small extent by the movement of workers from the declining sectors.

(iii)   In the early 90's Italy's economy went into a downturn, with the recession reaching its peak in 1993 (Table 1.1). The macro-economic picture began to improve after devaluation of the lira (end 1993), but the effects on the labour market were not seen quickly. Between 1991 and 1995 there was a decrease of 1,200,000 in the total number in employment. The 1991 level was re-attained only in the year 2000 (Figure 1.1). Women maintained an important share during the revival, reaching 36.8% of total employment in 2000 (40% of dependent employment)[2].

Table 1.1 **Macroeconomic Conditions**

	Unemployment rate		GDP (in 1995 liras)	Change in GDP (in 1995 liras)		
	before LFS revision 1992	after LFS revision 1992		1 year	2 year	5 year
1970			940737			
1971			958932	1.93%		
1972			989179	3.15%	5.15%	
1973			1053959	6.55%	9.91%	
1974			1109575	5.28%	12.17%	
1975			1086832	-2.05%	3.12%	15.53%
1976			1157786	6.53%	4.34%	20.74%
1977	7.00%		1185098	2.36%	9.04%	19.81%
1978	7.10%		1228364	3.65%	6.10%	16.55%
1979	7.50%		1296309	5.53%	9.38%	16.83%
1980	7.50%		1341394	3.48%	9.20%	23.42%
1981	8.30%		1351868	0.78%	4.29%	16.76%
1982	9.00%		1360399	0.63%	1.42%	14.79%
1983	10.00%		1377220	1.24%	1.88%	12.12%
1984	10.60%		1415209	2.76%	4.03%	9.17%
1985	11.00%		1457306	2.97%	5.82%	8.64%
1986	11.40%		1494116	2.53%	5.58%	10.52%
1987	12.30%		1538714	2.98%	5.59%	13.11%
1988	12.30%		1599473	3.95%	7.05%	16.14%
1989	12.30%		1645403	2.87%	6.93%	16.27%
1990	11.20%		1677885	1.97%	4.90%	15.14%
1991	10.80%		1701210	1.39%	3.39%	13.86%
1992	11.40%		1714149	0.76%	2.16%	11.40%
1993	13.60%	10.10%	1699000	-0.88%	-0.13%	6.22%
1994	15.00%	11.10%	1736505	2.21%	1.30%	5.54%
1995	15.70%	11.60%	1787278	2.92%	5.20%	6.52%
1996	15.70%	11.60%	1806815	1.09%	4.05%	6.21%
1997		11.70%	1843426	2.03%	3.14%	7.54%
1998		11.80%	1876807	1.81%	3.87%	10.47%
1999		11.80%	1907064	1.61%	3.45%	9.82%
2000			1962649	2.91%	4.57%	9.81%

(iv)   Meanwhile the institutional framework and that of industrial relations changed radically. The standard (open end) contracts lost importance in favour of "atypical" contracts, which, in 2001 already represented the most widespread channel for entry into the labour market (Figure 1.2). The Ministry of Labour estimates that in

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[2] Source Istat, *Annual Report 2000*.

2000 approximately 60% of those entering dependent employment did so via a fixed-term contract[3], many of which were in the form of "parasubordinato/quasi-subordinate" work.

Figure 1.2 **Contributions of standard contracts and atypical (fixed-term and/or part-time) contracts to the variation in dependent employment - Years 1994-2000 (percentage values)**
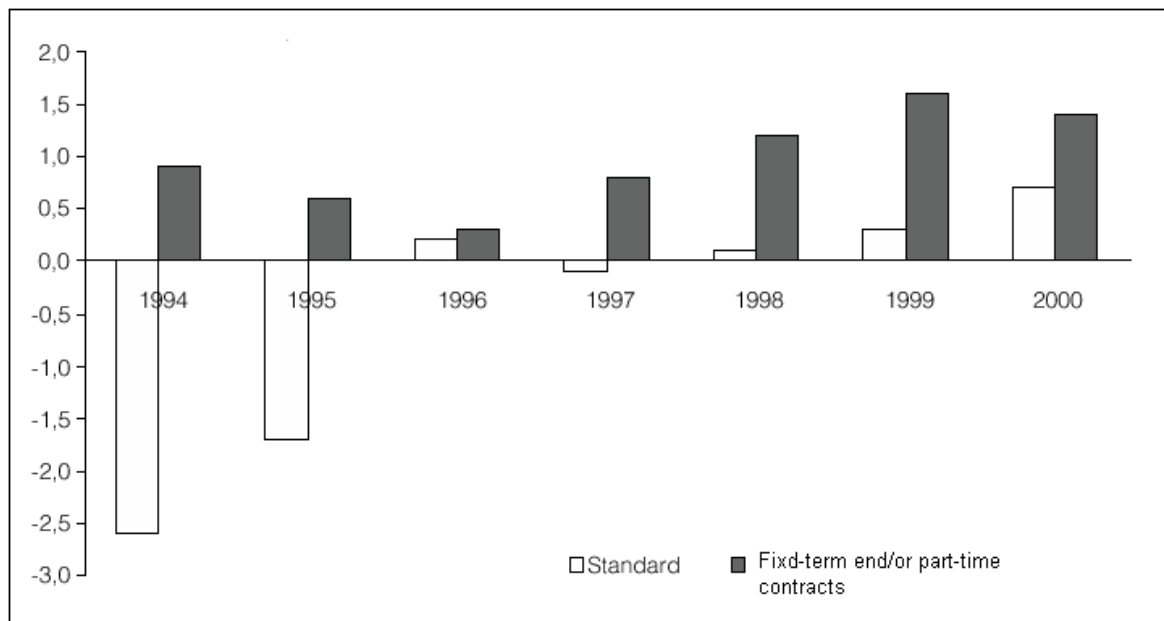
Source: Istat, *Annual report 2000*

(v)   The age structure of dependent employment is dangerously shifting: the presence of young people (15-24 years) dropped from 21% in the mid 1980s to below 12.5% in 1999 (source Inps); the weight of the central age-groups (25-44 years) increased and the modal age-group moved sharply upwards, whereas the weight of the older age-groups remained constant. The peak of the baby-boomers from the 1960s entered the labour market at the beginning of the 1980s: since then the shrink in younger cohorts has reached impressive proportions (the cohort of 15-year-olds numbered 972,000 in 1980, and only about 600,000 in 2000). During those years there was a marked increase in secondary and higher education and, at the same time, participation rates in the age-group 15-24 years dropped from 40% and above in the 1980s to 37.4% in 1997.

An important contributing cause to the ageing of dependent employment lies in the drastic fall of hires of young labour that began in 1991: this anticipates by two years the recession of late 1993, and is in part attributable to the changes in regulations that, in 1991, reduced the advantages of training-work contracts, in particular in the North[4]. The ratio employment/population in the younger age-groups shows a slight drop in 1996 (reaching minimum

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[3] Estimated from data from employment agencies, see Ministry of Labour, "Report on monitoring labour policies" (*Rapporto di monitoraggio delle politiche del lavoro) 2001*.

values of 24.7% in the 15-24 age-group and 63.1% in the 25-34 age-group) after which it slowly increases: this indicates that young people continue to enter the labour market, but are no longer employed as dependent employees (with standard contracts, training-work contracts or as apprentices), but increasingly find work with different types of atypical contracts that do not come into the category of dependent employment with "regular" social-security coverage: this type of "quasi-subordinate" work constitutes an important variant, but is certainly not the only one.

(vi) The ageing process affects companies in different ways: as is known, young workers are heavily concentrated in the small firm sector, while mature labour force is concentrated in the large firms. There is a physiological explanation at the root of the worker age - firm size distribution: annual entry-exit rates for small firms are over 10%, and therefore the average life of these firms is much shorter than that of large firms. For any person entering a small firm there is a high probability that he/she will be forced out of the job after a few years. This risk may be acceptable to a young person, much less so to a mature one, who may have strong incentives to hold to his/her post as long as possible, especially if employed in a large firm.

Our data indicate that persons entering the labour market for the first time are more likely to start in a small company and move on to a larger firm after having gained some experience. In a sense, small firms seem to play the role of training ground for the young workforce.

The upwards shift in the distribution of employment by age and firm size is very marked: during a space of only seven years, from 1988 to 1995, the mode of the distribution among smaller firms shifts markedly from the 20-24 age-group to the 25-29 age-group: among larger firms, from the 40-44 age-group to the 45-49 age-group (Figure 1.3).

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[4] See chapter 2 on the Institutional Aspects

Figure 1.3 Workforce age distribution by firm size 1988-1995
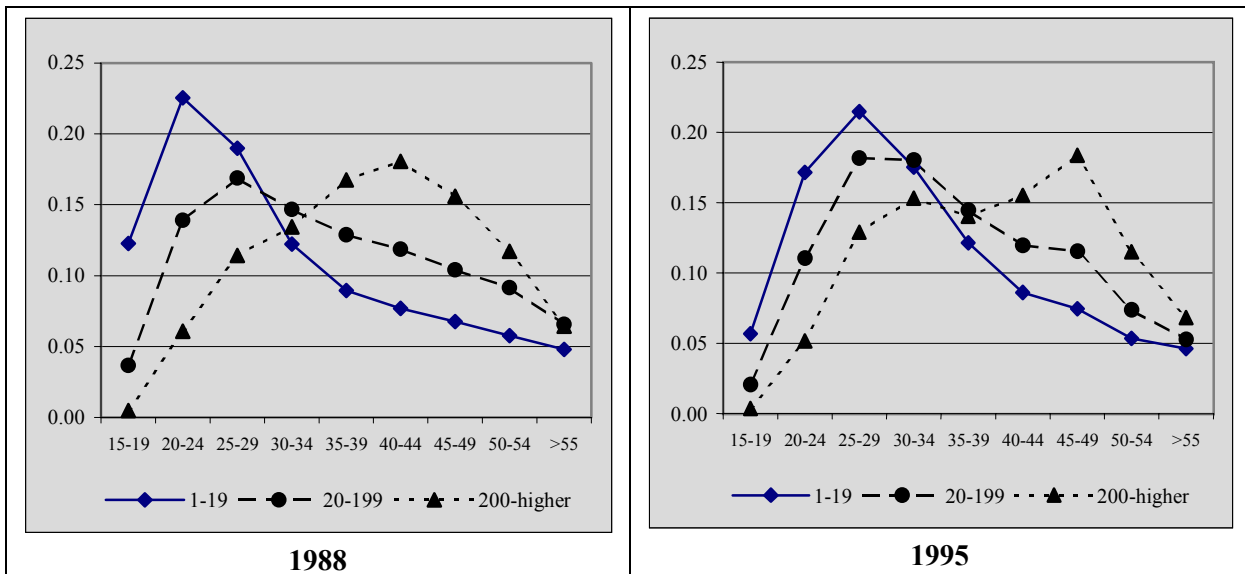
Source: Our elaborations on WHIP data

(vii)   The overall distribution of dependent employment by firm size has somewhat changed over the last 15 years: employment at of firms with less than 20 workers has held steady at around 40% of total employment; the share of the larger firms (> 1000 workers) has dropped by almost four percentage points, and that of small-medium firms (20-100 workers) has increased in proportion.   Large differences emerge, however, if we look separately at the manufacturing sector. Here   the shift is huge. (Figure 1.3)   Here the share of firms > 1000 declined from 23% in the early 80s to 16% in 1998: large manufacturers went through a profound restructuring process that caused the loss of about 380,000 jobs only in small part reabsorbed by small and medium firms. During the 1984-1998   period,   overall   dependent employment increased by about 900,000 workers, while manufacturing alone lost about 250,000 workers.

Figure 1.4 Employment trend by firm size in the manufacturing sector
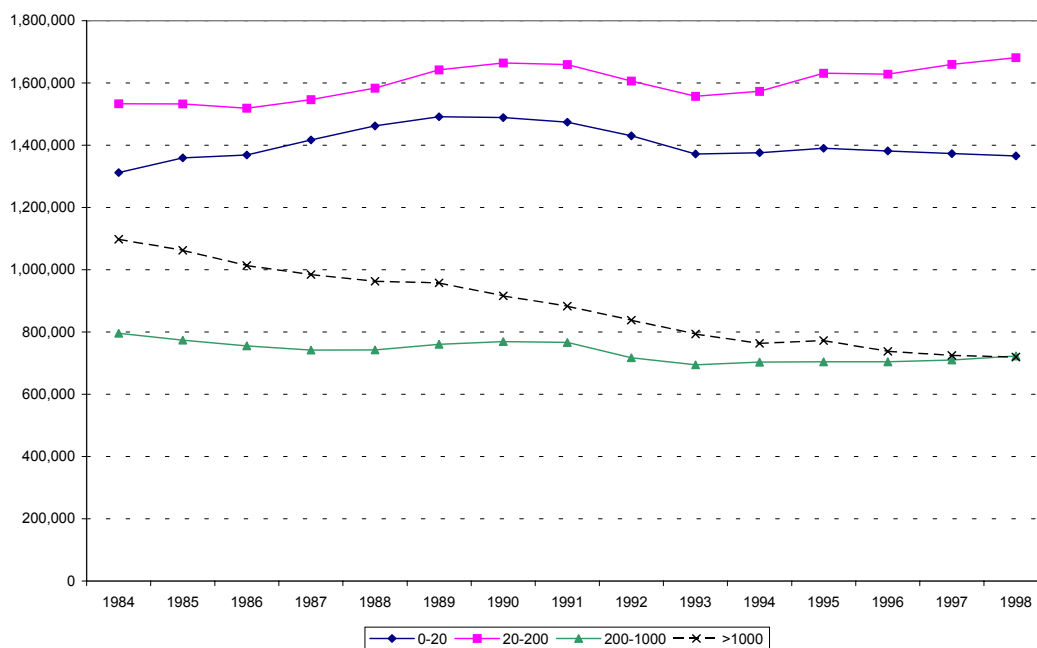
Source: INPS

2. Institutional Aspects of the Italian Labour Market

2.1 *The institutional context*

A   Since the 1980s several reforms have changed the rules of the Italian labour market, enhancing the mobility of labour (already all but negligible) and, to some extent, net job creation. The focus of the debate on the labour market shifted moved from employment protection to business back-up measures: those that were once tools of labour policies (i.e., labour cost regulation and flexibility) became objectives to pursue, assuming their positive effect on employment. One result of twenty years of reforms has been that of improving possible matches between workers and firms. The standard open-ended contract continues to be the main form of hiring but it is no longer the only one.

B   1984 was a fundamental year of reforms for the Italian labour market:

1) restrictions on hirings were markedly reduced;

2) part-time work was introduced;

3) work-training contracts (CFL = contratti di formazione-lavoro) were completely rehauled and extended (vis-à-vis the already existing fixed-term contract, introduced in 1962). The CFL is a multi-purpose tool, aimed at

young people 15 to 29. [5] Hires via CFL contracts enabled firms to benefit from a hefty 50% rebate on social security contributions (s.s.c.). In addition it was a fixed-term contract, with a predetermined duration of no less than 18 months, and no longer than 24. At the lapse of the contract the firm has the right, but no obligation, to upgrade the CFL contract into an open-ended one, taking advantage of favourable tax treatment for one additional year.

C   The *cassa integrazione* scheme (earnings integration scheme) supported large firms in crisis, basically replacing a very weak unemployment benefit scheme. In Southern Italy payroll and profit tax exemptions, as well as heavy financial assistance were the chief instruments to encourage firm entry and performance. Entrepreneurs of Northern Italy were also offered incentives to invest in the least industrialized South, ranging from payroll tax reductions, tax relief on reinvested profits, loans at heavily subsidized rates.

D   Another important year of reform was 1991. "Mobility lists" and "entry" work contracts were introduced, subsidized early retirement was granted to workers near retirement age, restrictions on firings were reduced for small and medium firms. "Mobility lists" enabled large firms to proceed with collective layoffs: workers were temporarily placed on a "mobility list" to encourage their re-entrance into work. At the same time, new forms of fixed-term contracts were made available to employers willing to hire people belonging to such lists or in *cassa integrazione*. The mechanism common to the new forms of contract is dual: to ensure a reduction in labour costs, and to regain flexibility compared to the typical contract. The reform touched also the CFL contract: the field of application was extended, eligibility was increased to age 32, payroll tax rebates were almost halved.

E   The introduction of a formal "justification clause" that small firms must provide to the unions for any layoff they intend to pursue (the so called "tutela obbligatoria"). No sanction is levied against violation of this loose clause.   The previous regime, sanctioned by the Statuto dei Lavoratori (1976), waived restrictions to the dismissal of workers for firms with less than 16 employees, while it introduced the "just clause" for dismissal from larger firms (the so-called "tutela reale"), and appropriate sanctions in case of violation.

F   In 1993, at the peak of recession, the unions, Confindustria (the Italian Manufacturers' Association) and the government pledged themselves to act in concert to improve the condition of the labour market. Initially the debate concerned the definition of pay levels, with the introduction of decentralised bargaining aimed at reducing the inflationary pressure caused by the presence of the so-called "escalator clause" linking wages to inflation.

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[5]   The other classical tool to hire on a fixed-term basis, the so-called apprenticeship, introduced in 1959, has a narrower target, young people less than 19 years old, provides for a minimum of five years' duration and is directed at getting a professional degree certificate.

The new watchword of subsequent policies was "increasing flexibility on all fronts". As a matter of fact, most of the action took place in the labour market, while little was achieved in term of product market flexibility.

G   Starting from 1994, the system of tax relief for Southern Italy was placed under review. The system exempted employers from paying social-security and welfare contributions for newly hired workers, and had been in place for for ten years. The European Union determined that the incentives in Southern Italy were in violation of internal market competitiveness, and they were progressively reduced. At present, a per-head contributions system is in force (fixed sum for each newly hired person) for firms in Southern Italy.

The 1997 reforms extended the range of possible work contracts, by introducing temporary (leased) work. Private temporary agencies employ the worker and redirect him/her toward firms seeking temporary staff. The working relationship is between worker and temporary agency, but the work is done for the firm that "rents" the worker.

Finally, with the last reform in 2003 the number of possible work contracts have been extended to 21 different typologies including job sharing, work on project, staff leasing.

2.2   *Wage Setting Practices in Italy*

Italy's wage setting process has been and still is dominated by industry-wide national union wage contracts. These are formally binding only for firms belonging to the employers' associations who have signed them, but, both the courts (in case of worker-firm disputes) and the law (which subordinates some firms' benefits to the use of those contracts) tend to extend their actual coverage.

Firm level bargaining is quite widespread in the large firm sector, which is smaller in Italy than in most EU member states   (firms with more than 200 employees account for only 30% of total employment).   These contracts top up national wages and, particularly in the periods of stronger unions' power (since the mid '60s to the beginning of the '80s), "anticipated" the issues subsequently generalised through industry wide contracts. Wage rises negotiated at the firm level through union bargaining are quite egalitarian.

The wage policies of autonomous firms follow different rules. Both these and individual worker-firm bargaining had been quite compressed during the period of stronger union power. However, since the mid '80s these components have gained more role. Presently, these components represent between 5 and 10% of average earnings, another 10% being dictated by firm level contracts.

As far as nominal adjustment to price inflation is concerned, important changes have taken place during the '90s. Up to 1992 nominal wages were indexed to prices through an automatic mechanism known as *scala mobile* ("escalator clause") whose rules were uniform across sectors.

The scala mobile came under attack for its inflationary bias during the Eighties. The high degree of safeguard provided for was a source of real wage resistance against terms of trade shocks (particularly the oil prices' hikes experienced in 1974 and 1979) and indirect taxes rises. The quarterly timing speeded up the inflationary spiral.

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The egalitarian bias was affecting wage differentials and restricting the role for autonomous firms' and unions' decisions as the scala mobile automatisms were responsible for most of the wage dynamics.

In 1986 the mechanism was partially reformed. Its timing became half-yearly. Both the average safeguard granted for and the egalitarian bias were reduced: a 100% safeguard was granted to a minimum uniform wage threshold, with a 25% safeguard granted to the difference between the nationally contracted for wage (differentiated across industries and broad job categories) and that common minimum threshold. On average the safeguard against price rises declined to around 60%.

In 1992 the scala mobile was finally dismantled. The formal agreements signed up in July 1992 and July 1993 shaped a new bargaining system, in which national contracts, to be agreed upon every two years (against the 3 years of the previous set up), are supposed to be guided by the price inflation expected (and targeted by the Government) for the future, while firms' level bargaining is supposed to be geared by profit sharing considerations. Past inflation triggers automatic wage rises only in case no agreement is reached, and the safeguard granted is at most 50%. The difference between actual and targeted inflation is not automatically recovered, and is to be taken into account at the start of a new bargaining round. .

3. Data Used

In order to produce the tables presented, WHIP (Workers Histories Italian Panel developed at LABORatorio R. Revelli) data set has been used. The original source of information are administrative data from the Italian Institute for Social Security (INPS): social security contributions are collected from firms and individual workers, to be delivered as retirement benefits and other wage supplements.

All the employees in the private sector (roughly 10 million), self employed in artisan and trade activities (1.9 and 1.6 million respectively), in minor occupations (e.g. house-keepers), freelance professionals, and employees and self employed workers in agriculture pay compulsory contributions to INPS. Obligations are defined by a rather complex set of rules, so is the population coverage.

WHIP data set is a random sample of workers recorded in every INPS archives, but for the purpose of this paper, only dependent workers were selected. The section on dependent employment in WHIP comes from two archives, the workers and the firm ones which are connected through the social security code of the firm.

3.1 Dependent workers archive

Employers are required, once a year, to fill a form for each person on payroll during the year, summarising relevant information for the computation of retirement benefits; for each *employee, calendar year and employer* the following data are available:

-       employee identification (social security number, date of birth, sex, place of birth);

- employer identification, linking the worker to the relevant firm;
- place of work (province);
- list of months for which wages or salaries were paid;
- number of salaried weeks and days;
- date of closure of the relationship with the current employer;
- yearly salary or wage subject to social security contributions;
- yearly wage supplements due and paid by the employer;
- occupation (apprentice, manual worker, non-manual worker, manager);
- type of labor relationship (full time, part time, defines or undefined duration);
- code of contractual agreement and position in the contractual ladder.
- wage supplements paid by the employer on behalf of INPS (starting from 1989).

The archive is organized by individual worker and year (roughly 12.5 million records per year). A worker may appear with more than one record in a given year, whenever (s)he had worked for two or more employers during the year.

3.2   Firm archive

The second archive contains roughly 1.2 million firms, information is updated each month, reporting active firms with at least one employee. Firms actually pay compulsory social security contributions on a monthly basis. Data available in the archive are:
- firm's identifiers: social security code;
- economic activity,
- dates of registration and termination (if applicable);

and, *for each reference month:*
- number of employees to whom some salary or wage was paid by the employer;
- before tax wage (or salary) bill paid by the employer;
- social security contributions paid by the employer;
- total number of days for which some wage (or salary) was paid by the employer;
- wage supplements paid by the employer on behalf on the Social Security Institute; rebates on contributions (for young and female workers, firms located in "underdeveloped" areas, etc.).

The archive is organised by insurance records: a firm may keep more than one insurance record; records belonging to a firm are always linked together by social security codes. An insurance record may refer to a firm, an establishment (either plant or facility) or to an (arbitrarily) defined fraction of the firm. The basic entity

referred to in this application is the *firm* (but see remarks about data on Venetian provinces); it may result from aggregation of "insurance" records.

The social security code of each firm ensures month by month linkage between workers and firms, whose history and attributes can be attached to the worker. Records of individual workers can be linked by means of the individual social security code to generate longitudinal series.

3.3   The Work Histories Italian Panel (WHIP)

WHIP data set is a random sample of workers recorded in every INPS archives, but for the purpose of this paper, only dependent workers of private firms were selected. A sample of employees is available over a period of twelve years – from 1985 up to 1998 (soon 2001). The Social Security forms of employees born on 10 March, June, September and December of any year were selected; in this way a sequence of random samples of the population of employees is formed, with a sampling rate of 1:90. Approximately 100,000 individuals are included for each year from Italian private firms, whereas workers in agriculture and central state administration are excluded. Individual longitudinal data has been generated by means of the identifiers available for each worker. Firms' longitudinal records have also been accessed and linked to every sampled worker, rendering available employer data and thus obtaining a matched employer-employee database. The data therefore includes not only individuals' wage and career histories, but also extra informations about each worker and the firms where s/he currently works and has held previuos jobs.

3.4   Treatment of legal transformations, mergers and acquisitions

The use of administrative data on firms poses the important problem of the treatment of legal transformations. Administrative archives treat events such as ownership transfers or rental**,** bequests, donations, legal transformations as enrolments and cancellations even if these events do not produce an interruption in the life of a firm. These events generate "spurious" movements of firms, jobs and workers. Firms may close or open, change ownership title, without this necessarily implying the end or the beginning of activity. But such events may yield fictitious job "destruction" or "creation". From the workers' viewpoint, job changes will be observed that may have not actually occurred.

The WHIP data base detects and corrects legal transformations firstly through the aggregation of "insurance" records to built the longitudinal files. As previously illustrated the basic entity referred to in the WHIP dataset is the firm which result from aggregation of all "insurance" records belonging to that firm. In this way all legal transformation happened within the firm and involving establishment or plants have no effect on the reconstruction of the worker career of the employees.
Moreover the possibility offered by the archive to observe both individual employees and the firms for which they work enables to deduce the existence of other underlying legal transformations from the contemporaneous flow of

workers between two firms. The key is to discriminate between "normal" movements, deriving from workers' decisions to change jobs, and "spurious" movements. It is intuitively unlikely that "many" workers of a company independently and simultaneously decide to move together to another firm, whereas this event will take place if all or part of the activities of the first firm are transferred to the second firm. In order to identify spurious components a threshold for the intensity of such movements has been established. In the WHIP archive the whole population of employed persons is not available as it is a 1:90 sample; however the observation of two workers who move within one month from the same firm (call it A) to a same firm (call it B) would statistically means that on average firm A has handed over about 200 workers to firm B. Thus, if we observe in the same month at least two workers move form firm A to firm B we call it a spurious movement. Once we detect spurious movements in this way, we proceed in keeping connected the job spells of every workers who has made the same movement some months before or after.

3.5 *Selection criteria and definition of variables*

Individuals referred to in this application represent a subset of the available data, and the following (inclusive) criteria are employed in the selection process:

- individuals reported to have a job spell active during the month of May of the year of interest; in this way we select a cross-section of workers for each referred years
- blue and white collars working full-time only;

Wage in WHIP is defined as the total amount of the earnings paid to the worker: basic wage, cost-of-living allowance, residual fees, overtime plus back pay, bonuses, supplements holiday pay, sick pay[6]. Wages reported in the tables are defined as average daily retributions, referring to a single job spell/year. This is computed as the total annual wage earned in the firm divided by the number of paid working days declared by the employer. Nominal daily wages are deflated by the CPI index and are expressed in 1990 Italian Liras[7].

3.6 *Cells vs. firms*

As already pointed out WHIP dataset is a 1:90 random sample of workers and <u>does not cover all the workers of a firm</u>. At the firm level, we only know the mean wage paid to blue and white collars but not the s.d. If the firm is sufficiently large, we have enough workers (1 every 90) to estimate the s.d. of wages, but if the firm is small (and as saud in Italy the majority of firms are small) we cannot estimate it (if the firm has less than 100 employees, we have on average just one worker in our sample). For 99% of firms recorded in our database, we have less than 10 workers belonging to the same firm; for 83% of them we have just one worker. For this reason, in order to

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[6] At a fiscal level it represents the basis on which payroll taxes can be determined
[7] 1 Euro = 1936.27 Italian Liras

compute the statistics in chapter 5 and 6 <u>we have built cells</u>, on the basis of geography, firm size, sector of economic activity, on the following dimensions:

➢ Geography: 4 macro areas : North-West, North-Est, Centre and South

➢ Firm size: 6 classes: 1-9 workers, 10-19 workers, 20-49 workers, 50-199 workers, 200-999 workers, 1000 and more workers

➢ Sector of acrivity: 8 branches: Mining and chemical industries, Metal manufacturing industries, Other manufacturing industries, Building, Commerce, shops and hotels, Transport and communications, Banking and insurance, Other private services

As discussed in the appendix, we are going to decrease radically the cell size.

Furthermore, we weight the statistics computed at the cell level with the number of firms belonging to the cell in the population (as published by Osservatorio INPS, official aggregate statistics on the population observed by INPS). This allows to weight small firms correctly (see the appendix for details).

We have 192 cells. These are some statistics on the cells for 1990.

	Table2	Table3
N. of cells	192	192
Average n. of firms per cell	289	252
s.d of n. of firms	373	308
Min n. of firms per cell	2	1
Max n. of firms per cell	2190	1783
Average n. of workers per cell	460	402
s.d of n. of workers	439	385
Min n. of workers per cell	50	43
Max n. of workers per cell	2731	2657

Moreover we present the same statistics computed on large firms only, i.e. on firms for wich we observe at least three workers (about 300 employees or more). So tables referred to "all firms" are computed on cells, while tables referred to "large firms" are computed on firms.

4. Trends in the Italian wage levels and distribution

4.1 Time trends[8]

In Table A we report the temporal sequences of the mean, standard deviation, median, P10 and P90 percentiles. Ratios of these percentile points are also displayed, as they help gauging how wages changed in different parts of the distribution.

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[8] From Borgarello A., Devicenti F. "Trends in the Italian Earnings Distribution 1985-1996" LABORatorio R. Revelli Working Paper No. 2 / 2001

The time path of real earnings reported in column 2 is consistent with the growth the Italian economy experienced until 1992 and its slowdown thereafter: mean wages are at their peak in 1992; only in 1996 did they return to the 1990 level.

Over the twelve-year observation period average earnings grew by about 11% with remarkable differences between the tails and the centre of the distribution: the earnings of the richest 10% have grown by a sizeable 20%, compared with a more modest 15% of the poorest 10% of the population. Median workers, instead, did worse, with a rather low 4% growth over between 1985 and 1996.

Table 4.1 Wage Distribution Indicators

	Mean	Std	p10	p50	p90	p90/p10	p90/p50	p50/p10
1985	2674	988	1635	2519	3790	2.32	1.50	1.54
1986	2759	1046	1710	2574	3948	2.31	1.53	1.50
1987	2831	1134	1749	2612	4124	2.36	1.58	1.49
1988	2852	1174	1759	2607	4212	2.39	1.62	1.48
1989	2918	1222	1871	2621	4328	2.31	1.65	1.40
1990	2962	1265	1880	2645	4441	2.36	1.68	1.41
1991	3065	1341	1918	2742	4579	2.39	1.67	1.43
1992	3078	1359	1930	2733	4633	2.40	1.70	1.42
1993	3075	1337	1948	2735	4596	2.36	1.68	1.40
1994	3054	1329	1934	2710	4578	2.37	1.69	1.40
1995	2988	1312	1884	2633	4550	2.41	1.73	1.40
1996	2977	1314	1888	2612	4544	2.41	1.74	1.38
%change1985-96	11.3	33	15.4	3.7	19.9	3.9	15.6	-10.4

Note: values in the first part of the table are expressed in thousands of Italian lire.
Source: our elaborations on WHIP data.

These trends are illustrated in Figure 4.1 which plots mean earnings, p50, p10 and p90 over time. Both the poorest and the richest tenth exhibit a growing path in the first part of the period, although after 1992 they become flatter and downward sloping. The richest tenth had a steeper growth than the bottom tenth, which in turn grew slightly faster than the median. In 1985, P90 was 2.3 times P10; by 1996, the ratio had increaased to 2.4. Even more increased the distance between the richest tenth and the median: the ratio P90 / P50 was 1.5 in 1985 and 1.7 in 1996. On the other hand, the poorest tenth gained ground with respect to the median, with a P50 / P10 ratio dropping from 1.54 to 1.38 from 1985 to 1996. Overall, the evidence points to a reduction in inequalities in the poorest half of the distribution between 1985 and 1996, and an increase in the richest half.

Figure 4.1 Mean, 10th Percentile, Median and 90th Percentile in the Wages Distribution
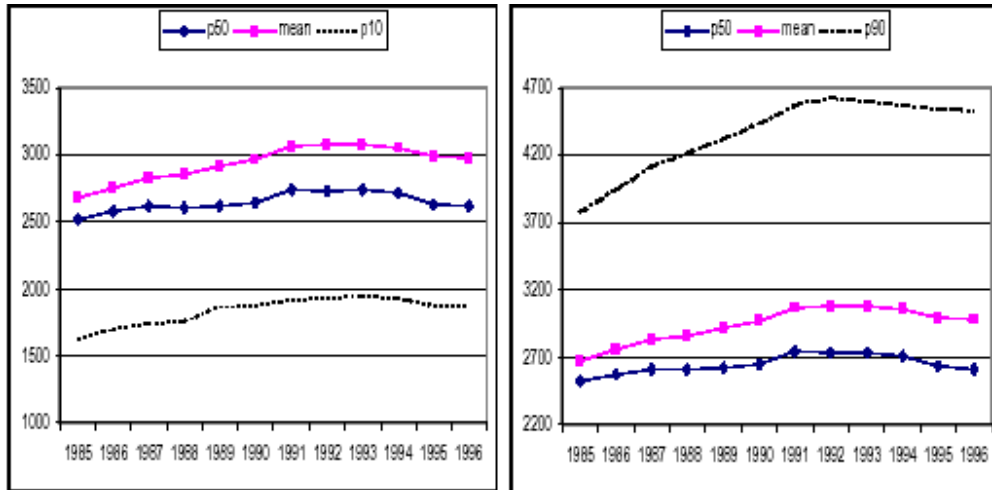
Source: WHIP data

Figure 4.2 depicts the density functions of real (in 1996 price) monthly earnings of dependent workers in the private sector, in three years 1985, 1991, 1996.

As usually observed, such densities are right-hand skewed and unimodal. The vast majority of earners have monthly wages between 1033 and 2065 EU, and the mode is at about 1240 EU. Some wage clumping can be observed – particularly so in 1985 – in the left tail. In subsequent years, this "bump" of wage concentration gets flatter but does not disappear completely.

Figure 4.2 Frequency Density Functions: 1985, 1991 and 1996.
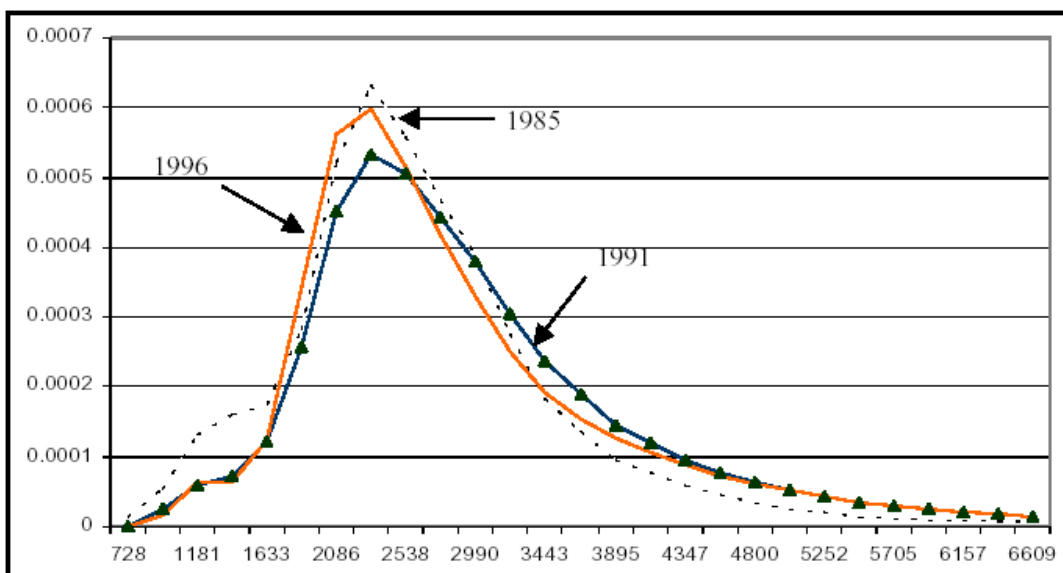
Note: the horizontal axis measures real monthly wages in Italian Liras at 1996 prices. The density function are calculated with the Kernel estimation method. The wage frequency density function (vertical axis) shows the concentration of people at each wage level. Wages greater than 6.7 million of Italian liras are not shown (but have been used to compute the kernel density) so as to improve the picture's readability.
Source: WHIP data 1985, 1991, 1996.

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The earnings structure for dependent employment is strongly seniority-based. Career advancements for those who remain for long periods with the same company come about in a semi-automatic fashion, leaving little room for merit-related incentives. These automatic mechanisms, in part attenuated starting from 1993 with the abolition of the *scala mobile*[9], are still very strong among some groups workers.

This is very clear among the blue collars whose earnings are strongly predetermined by union agreements and firm-based pay polices. As a consequence we observe modest career profiles of blue-collar workers, while among the white collars there is much more earnings variability, with inequality growing fastest too, during the 1980s and 1990s.

The classic wage-age profile is found also in the Italian data, with real wages as well as wage variability increasing as workers grow older. Moreover mean wages of the youngest age group fell between the mid Eighties and the late Nineties, while for more senior employees the pattern is reversed, indicating rising returns to seniority and experience.

4.2   Wages by firm size

The Figure 4.3 shows the distribution, by average monthly wage classes of firms and dependent employees in 2001.

Figure 4.3 Firms and dependent workers distribution by wage classes –2001 (Wages in Euro)

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[9] See paragraph on the wage setting process

Figura 4.13 – Distribuzione delle imprese e dei dipendenti per classe di retribuzio-
ne – Anno 2001 *(valori percentuali; classi di retribuzione in euro)*

Fonte: Istat, Rilevazione su occupazione, retribuzioni e oneri sociali (Oros)
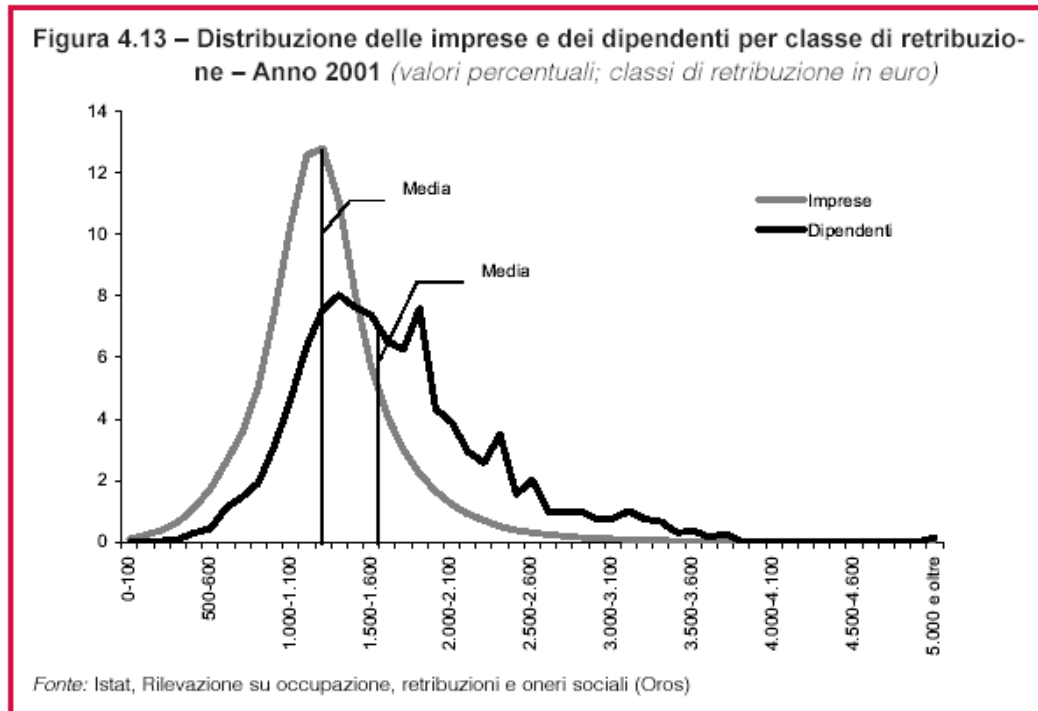
Source: ISTAT

Both distributions are right skewed but with some differences in the dispersion: employees distribution is much more flat and with a bigger right tail. This different form is attributable first of all at the relationship between firm dimension and wages paid by the firms. 83.5% of Italian firms, who employed 50% of employees, pay less than 1600 euros: they are all small firms (average firm size 4.7 employees). On the right tail, instead, a smaller number of firms of medium-large dimension employs a larger number of workers and pays higher wages. Peaks in the distribution are due to the presence of very large firm. The relationship between wages and wage dimension is clear in Figure 4.4

Figure 4.4 Average firm size by wage classes – 2001 (wages in Euro)

Figura 4.14 – Dimensione media delle imprese per classe di retribuzione – Anno 2001 *(numero di dipendenti per impresa; classi di retribuzione in euro)*

Fonte: Istat, Rilevazione su occupazione, retribuzioni e oneri sociali (Oros)
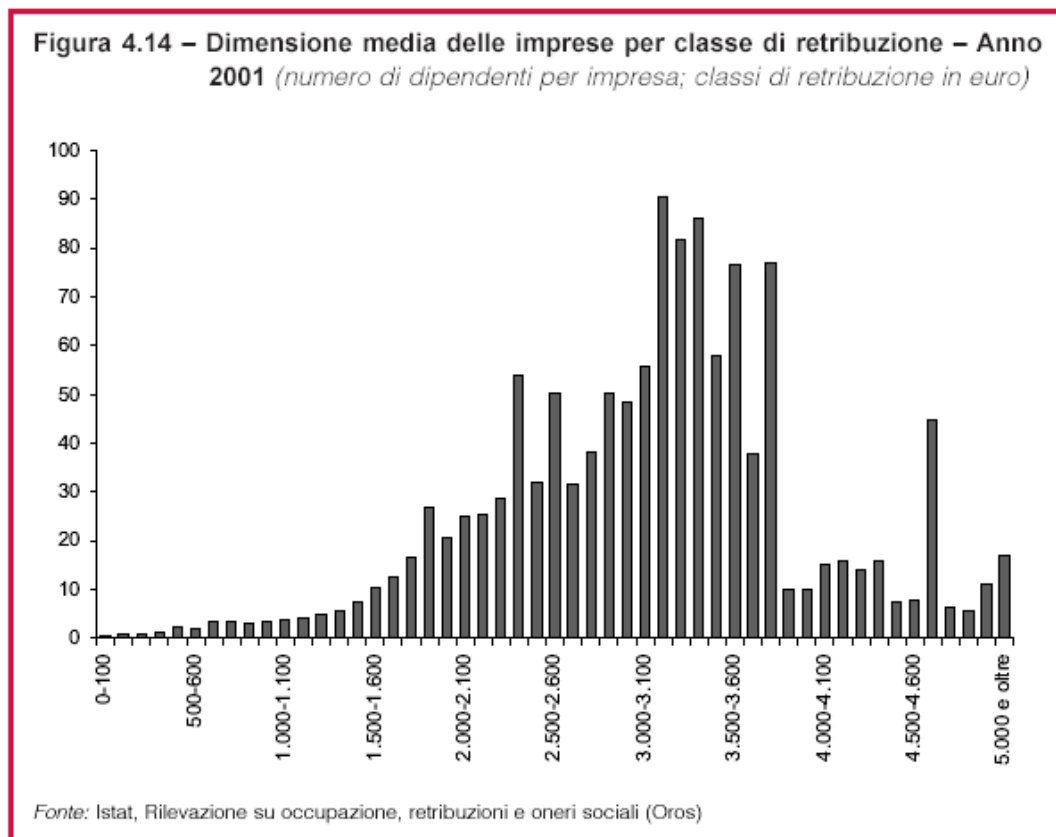
Source: ISTAT

In the low wage classes of the distribution there are small and very small firms, while in the medium-high wage classes we have medium and large firms. In the last part of the distribution the average firm size start declining. Besides medium and large firms of the financial and monetary intermediation there are also small and medium firm with high productivity that are able to pay high wages. These are firms of financial trading, software houses, informatics, technical and engineering consultancies.

4.3 Wage decomposition

Table 4.2 contains the results of a the wage decomposition into a within-group component (an average of the subgroup inequalities, weighted by the subgroup share), plus a between-group component (the amount of inequality that would remain if there was no inequality within any sub-group)[10].

Table 4.2 **Inequality decompositions by population subgroups, 1985 and 1996**

Sub-group Partition	Inequality index		Sub-group Employment Share (%)	
	1985	1996	1985	1996

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[10] The inequality index decomposed is the mean logarithmic deviation

All persons	61	74	100	100
Male	58	77	70	67
female	51	58	30	33
within-group	56	71		
between-group	5	4		
blue collars	39	38	66	61
White collars	68	70	26	32
managers	50	33	0.4	2
apprenticeship	44	32	7	5
Within-group	47	48		
between-group	14	26		
North	58	75	62	63
Centre	63	82	18	18
South	68	66	20	19
within-group	61	74		
between-group	0.2	0.2		
age 15-24	46	38	26	17
age 25-34	43	46	28	35
age 35-49	59	75	32	35
age 50-64	61	90	14	13
within-group	51	60		
between-group	10	14		
Manufacturing	57	72	57	52
Constructions	43	46	13	10
Services	77	84	30	38
within-group	61	74		
between-group	0	1		

Source: Borgarello et al. 2001 on WHIP data

For all the population partitions used, inequality is mainly explained by its within-group component. The between-group component is negligible. The two exceptions are occupation and age groups. In the age group partition the between component is able to account for about one fifth aggregate inequality, while for the occupation partition the between-group component explains up to one third of observed inequality. This is consistent with a collective wage setting process that relies on seniority (here proxied by age) and occupation. As Borgarello al. (2001) discuss in details, the increase in inequality cannot be explained by a change in the sample composition with respect to observable worker attribute; nor is it due to changes in the distribution of unobservables, as it has been documented to be the case for the US. In Italy it is instead the effect of changing prices of the observable characteristics that plays a major role in accounting for the observed inequality increase. If earnings have become more dispersed, that seems to be because more senior, more experienced and,

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ultimately, more skilled workers have been able to attract a greater and greater reward in the new labor market environment.

5. Structure of wages between and within firm

Table 5.1, i.e. the standard "Table 2", includes two kinds of statistics, those referred to "observation = a person" and those referred to "observation = a firm".

As detailed in chapter 3, we select blue and white collars working full time in *May of year t*. We then compute their wage as the real[11] average daily wage in thousand lire. In fact, the WHIP archive records the total wage paid by the firm in each year (or part of the year if an accession or a separation occurs in the year) and the number of working days supplied by each individuals. Notice that for movers in year t this is not the average wage earned in the year t in different firms, but the average wage *earned in the firm employing them in May t*.

The first set of statistics (referred to "observation = a person") confirms several stylized facts well known in the literature.

1. Average individual wage is increasing with workers' age and firm size, and the whole distribution shifts to the right accordingly.

2. Also the standard deviation of individual wages is increasing with workers'age and firm size, reflecting the higher heterogeneity of jobs within larger firms as well as the wider range of career paths experienced by older workers.

3. Over the business cycle all statistics on individual real wages show a hump in 1993, while 1990 and 1998 figures are almost equal. Recalling from chapter 1 (macroeconomic framework) the overall employment and GDP profiles, we notice that GDP growth started to slow down in 1991, reaching its trough in 1993; employment increased till 1991, then decreased for three years and started to recover only in 1995, showing the well known lag between production changes and employment changes. Individual wages were still slightly increasing in 1993, showing much more rigidity with respect to the business cycle. However, after the collective agreements signed in July 1992 and July 1993 (discussed in chapter 2, institutional aspects) that reshaped the system of collective bargaining, real wages stopped growing altogether.

The second set of statistics (referred to "observation = a firm") introduces some new hints.

1. As individual wages, firm wages are increasing with firm size; they show the same hump over the business cycle, but only among large firms. Notice that average firm wage is lower than average individual wage. This because small firms pay (on average) lower wages and weigh more in these statistics. This is true in general, but it is particularly evident in Italy. For example, firms employing less than 20 employees represent more than 90% of firms and employ about 40% of workers. Also among

large firms average firm wage is lower than average individual wage, due to the same reason, i.e. we observe a larger number of medium-size firm*s* (e.g. 250-500 employees) than very large firms (e.g. 2500-10000 employees), and the average wage is still increasing with firm size.

2. The variability of wages between firms (s.d. of average firm wages) is lower than total variability of individual wages (s.d. of individual wages); while variability of wages within firms (average of s.d. of firm wages) is larger than the variability between firms. Roughly speaking, between-firms variability represents about two thirds ot total variability, although this is not an exact decomposition. Among large firms between-firms variability is larger, being about the same size as the within-firm variability.

3. Table 5.2, computed *at the firm level* with the Vicenza and Treviso data (see appendix for details) shows that the within-firm variability is increasing with firm size. This is expected, as job heterogeneity increases with firm size. Also between-firms variability is increasing with firm size, but only above the 200 employee – threshold.

Some comments are in order. First, as discussed in the Appendix, statistics on cells may underestimate between-firms variability and overestimate within-firm variability, as a consequence of attributing to "within cell" the variability "between firms belonging to the same cell". So, referring to 1998, 8.59 may be a lower bound and 21.82 may be an upper bound of between-firms and within-firm variability. On the contrary, 24.90 and 20.17 are unbiased estimates of between-firms and within-firm variability among large firms, as they are computed on firms, and not on cells. However, as said above, these figures are higher than the overall average, being referred to large firms only. Therefore, the true value of the overall between-firms variability lays in the interval (8.59, 24.90) and the true value of the overall within-firm variability is below 20.17. In the near future we plan to decrease the cell size in order to be able to obtain an unbiased estimate of the overall within-firm and between-firms variability, as we discuss in details in the Appendix.

In any case, what we learn from this exercise is that between-firms variability is sizeable. It is sizeable, for example, with respect to variability between individual characteristics. Characteristics like gender, geographical area, industry account for a negligible part of the total variance of wages[12], while occupation and age account for less than one third of the total variance of wages (we discussed the point in chapter 4). In "Table 2", among large firms, between-firms variability is even *larger* than within-firm variability (24.90 versus 20.17, in 1998). The results presented in chapter 4 on the decomposition by individual characteristics are not directly comparable with "Table 2", as the one discussed here is not an exact decomposition. However, this is an indication toward the importance of firm wage policies in shaping the wage distribution, importance that seems to overtake the importance of individual observable characteristics.

Figure 5.1 adds to this point. It shows p10, p50 and p90 of the wage distribution *within firms* of which we observe at least 10 workers, ordered by firm average wage. *It indeed appears that "the tide rises all boats" as all*

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[11] The base year is 1990 and we deflate wages using the CPI index.
[12] Notice that cells are defined as geographical area by industry by <u>firm size</u>.

percentiles increase with average firm wage. Firm wage policy shows its relevance in all these statistics.

Finally, notice the high correlation between firm average wage and within-firm s.d. (.73 in 1998). This emerges both from the quoted figure in "Table 2" (Table 5.1) and from figure 5.1, showing that also the p10-p90 gap becomes bigger as average wage increases. Firm size drives the result: small firms pay lower wages and wage dispersion within the firm is lower with respect to larger firms, as Table 5.2 and Table 5.3 confirm.

Notice that the correlation increases over time. Again, firm size drives the result. The number of employees decreased markedly from 1990 to 1998, mainly in large firms. In describing the macroeconomic framework we showed details on this point: large firms loosing weight in absolute as well as relative terms, mainly in manufacturing. This shows up in the correlation coefficient that increases over time when computed on all firms (and obviously not when computed among large firms only), because, as Table 5.3 shows, correlation is higher among small firms, whose weight has become larger over time.

Table 5.1 "Table 2": Structure of wages between and within firm

	ALL FIRMS			LARGE FIRMS		
Year	1990	1993	1998	1990	1993	1998
Average Wage, observation = a person	86.46	89.07	87.53	102.12	105.66	102.88
(s.d.)	31.26	32.16	30.78	34.17	35.64	34.24
(90%-ile)	127.30	130.96	128.76	149.12	154.24	148.84
(10%-ile)	57.34	58.95	58.69	67.14	69.20	66.73
[N – workers]	88351	84647	77136	31063	28579	24506
Average of firm average wage, observ = a firm	74.33	76.81	77.42	94.67	98.04	96.53
(s.d.)	9.29	9.21	8.59	24.43	25.46	24.90
(90%-ile)	86.68	87.92	88.59	128.53	133.20	131.13
(10%-ile)	63.90	66.62	67.37	67.04	69.33	68.46
[N – firms] (cells)	192	191	192	4072	3857	3688
Average N of workers per cell (unweighted)	460	443	402	8	7	7
Average std of N of workers per cell	439	400	363	25	24	18
Average of s.d. of wage, observ = a firm	21.46	21.83	21.82	20.73	21.29	20.17
(s.d.)	5.21	5.43	5.61	15.57	16.15	14.90
(90%-ile)	27.99	28.60	28.95	42.81	43.28	40.17
(10%-ile)	15.33	15.82	14.86	4.64	4.61	4.53
[N – firms]	192	191	192	4072	3857	3688
Average Coefficient of variation of wages, observ = a firm)	0.29	0.28	0.28	0.21	0.20	0.20
(s.d.)	0.0005	0.0005	0.0005	0.0013	0.0013	0.0013
(90%-ile)	0.36	0.34	0.34	0.39	0.38	0.36
(10%-ile)	0.23	0.22	0.22	0.06	0.06	0.06
[N – firms]	192	191	192	4072	3857	3688
Correlation(average wage, s.d. of wage), observ = a firm	0.60	0.65	0.73	0.59	0.61	0.57
Average Wage for workers between 25 and 30, observation = a person	78.44	79.87	78.07	90.63	92.37	89.08
(s.d.)	23.29	22.65	21.79	25.33	25.15	24.98
(90%-ile)	107.72	107.85	105.53	122.85	122.47	121.69
(10%-ile)	56.60	57.91	57.31	64.11	66.11	63.40
[N – workers]	19399	19743	17383	5142	5099	4360
Average Wage for workers between 45 and 50, observation = a person	97.01	100.56	99.41	108.12	112.46	112.70
(s.d.)	34.94	36.52	34.70	35.61	37.22	34.84
(90%-ile)	146.13	152.34	147.48	158.90	164.92	158.81
(10%-ile)	62.00	63.84	63.29	71.34	73.99	74.98
[N – workers]	10570	11303	10373	5154	5330	4487

Table 5.2 **Veneto, variability of firm wage, by firm size, 1990**

size_class	within	between	mean w_f
3-9	9.05	11.96	68.74
10-19	11.69	12.41	70.83
20-49	15.31	12.02	75.74
50-99	18.05	12.81	78.68
100-199	19.71	10.96	80.36
200-499	19.26	14.77	82.52
500 +	21.14	16.22	89.94
All	10.67	12.48	70.40

Note: industry dimension neglected

Table 5.3 **Veneto, correlation between wage and standard deviation of wages, 1990**

Size class	correlation
3-5	0.622
6-9	0.648
10-19	0.677
20-49	0.683
50-199	0.636
200-999	0.356
1000 +	0.317

Figure 5.1 : Tide raising all boats

mean vs p10-p50-p90 - Italy - FIRMS above 1000 workers (at least 10 sampled)

mean vs p10-p50-p90 - Veneto - FIRMS above 10 workers
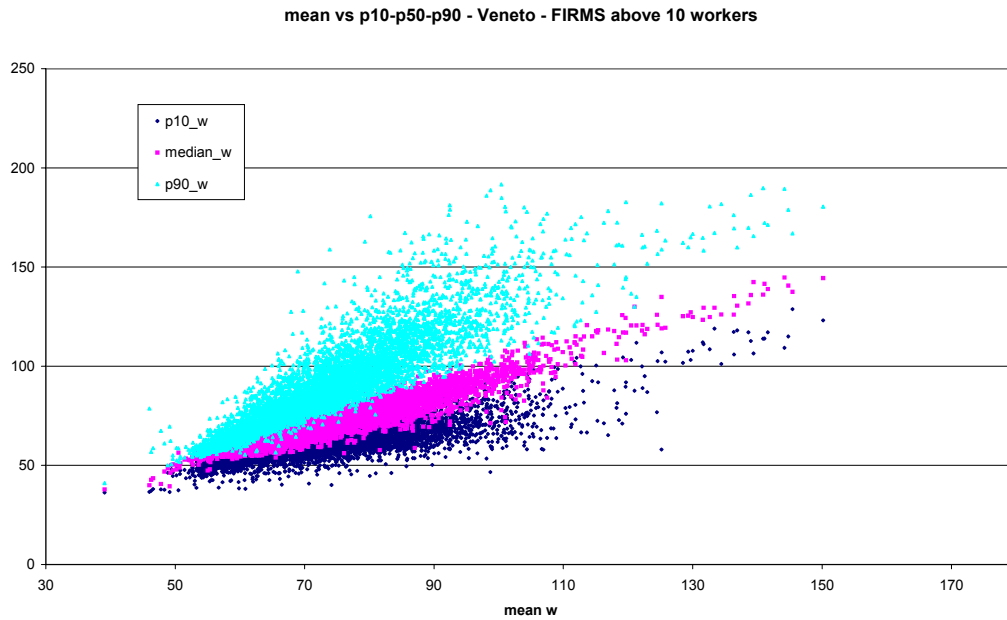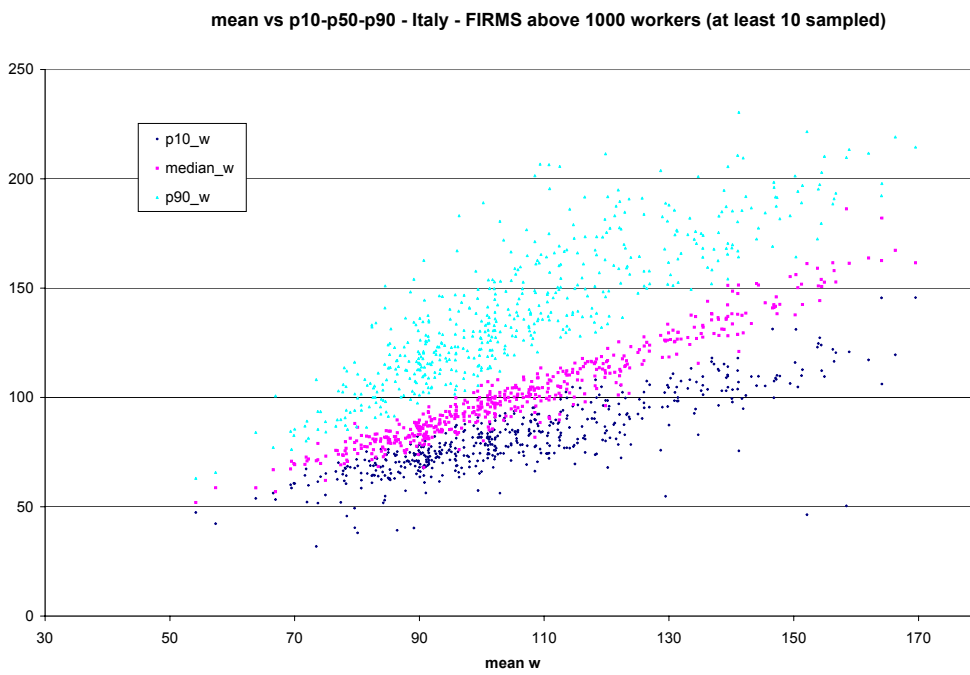
6. Wage Dynamics

We present two different approaches to this topic. First, the standard "Table 3" on wage dynamics. Second, a wage growth decomposition with an analysis of the variance components referred to movers and stayers in a closed panel 1986-1991.

6.1 Wage Dynamics

"Table 3" (Table 6.1 and Table 6.2), as "Table 2" (Table 5.1), includes two kinds of statistics, those referred to "observation = a person" and those referred to "observation = a firm".

As detailed in chapter 3, we select blue and white collars working full time both in *May of year t and in May of year t-1*. We compute their wages W_t and W_{t-1} as real average daily wages in thousand lire exactly as for "Table 2". Again, for movers in year j (j=t, t-1) this is not the average wage earned in the year j in different firms, but the average wage *earned in the firm employing them in May j*. The definition of wage changes is:

$$absolute\ change = W_t - W_{t-1}$$
$$relative\ change = \ln W_t - \ln W_{t-1}$$

In the set of statistics referred to "observation = a person" wage changes are computed with stayers as well as movers. In the set of statistics referred to "observation = a firm" wage changes are computed with stayers only (cell-stayers for "all firms", firm-stayers for "large firms"), so that *firm wage* change is estimated.

The first set of statistics (referred to "observation = a person") confirms some stylized facts, well known in the literature.

1. Average changes in individual wages follow the business cycle, showing a U-shaped pattern: 3.4% in 1990, 0.7% in 1993 and 2.6% in 1998; large firms employees experience the same average wage rises. The distribution of individual wage changes follows the same pattern, as well as its standard deviation; this pattern is the same for all as well as large firms, and for every tenure interval.

2. Average changes in individual wages are higher for movers[13] than stayers, higher for low tenure than for high tenure workers. This pattern is consistent with an increasing and convex wage profile over seniority. The same pattern can be observed among large firms, with even higher wage increases for movers, i.e. for those who join a large firm.

3. In 1993 the sharp downturn penalized movers (0.3% average gain) but also long tenure workers (same negligible average gain), while short tenure workers were slightly less penalized (1.5% average gain), as expected for workers at the beginning of their career within the firm.

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[13] In all years but 1993, when many of them were displaced.

4. The distribution of wage changes is the widest among movers, the s.d. decreases among low tenure workers and it is minimum among long tenure workers. Different past career paths generate heterogeneity of wage changes at the beginning of the career within a firm; while, once become insiders, workers follow a much more predetermined wage path, described mostly by seniority and occupation.

5. Finally, large negative changes can be observed among movers and also stayers, in all as well as large firms. In the 1993 downturn, the 10th decile of the distribution points to a loss of about 10% in real wages.

The second set of statistics (referred to "observation = a firm") introduces some new hints.

1. The average change in firm wages is very close to average change in individual wages. This is consistent with the fact that individuals employed in "all firms" and in "large firms" enjoy the same average wage growth (notice the difference with respect to wage levels discussed in the previous chapter).

2. The between-firms s.d. of wage changes is lower than the s.d. of individual wage changes (about one tenth among all firms, about half among large firms). The within-firm s.d. of wage changes is almost as high as s.d. of individual wage changes.

Most of the discussion on wage levels applies here as well. Again, statistics on cells may underestimate the between-firms variability and overestimate the within-firm variability. So, referring to 1998, .018 may be a lower bound and .108 may be an upper bound of between-firms and within-firm variability. On the contrary, .064 and .071 are unbiased estimates of between-firms and within-firm variability among large firms, being computed on firms, not cells[14]. The true value of the overall between-firms variability lays in the interval (.018, .064) and the true value of the overall within-firm variability is below .071. Also in this case we plan to decrease the cell size in order to be able to obtain an unbiased estimate of the overall within-firm and between-firms variability, as we discuss in details in the Appendix.

As in "Table 2", among large firms, between-firms variability is even *larger* than within-firm variability (.066 versus .061, in 1998).

Again, what we learn from this exercise is that variability between firms is sizable. Firm wage policy matters in shaping not only the wage levels distribution but also the wage changes one.

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[14] Computing between-firms and within-firm variability by size class is high on the agenda; this to understand whether variability of wage changes is increasing with firm size, as it is when computed on wage levels.

Table 6.1 "Table 3: wage dynamics "- Differences in levels

	all firms			large firms		
	1989-1990	1992-1993	1997-1998	1989-1990	1992-1993	1997-1998
Average change in wage, observation = a person	3.213	0.470	2.335	4.007	0.034	2.299
(s.d.)	11.534	9.955	9.921	12.043	10.389	10.509
(90%-ile)	15.343	10.558	12.699	17.116	10.847	13.628
(10%-ile)	-7.251	-9.444	-7.042	-7.222	-10.588	-7.799
[N – workers]	77276	77166	68417	28460	26896	22232
Average of firm average change in wage, observ = a firm	2.670	0.876	2.456	3.183	0.235	2.147
(s.d.)	1.195	1.367	1.336	7.073	6.114	5.959
(90%-ile)	4.174	2.205	4.236	11.450	7.078	8.816
(10%-ile)	1.457	-1.275	0.668	-4.337	-6.339	-4.158
[N – firms] (cells)	192	192	192	3517	3471	3233
Average N of workers per cell (unweighted)	339	345	302	8	7	6
Average std of N of workers per cell	343	326	282	26	25	18
Average of s.d. of change in wage, observ = a firm	9.690	8.515	8.342	7.845	7.257	6.835
(s.d.)	1.411	1.452	1.359	6.224	5.411	5.138
(90%-ile)	12.163	10.532	10.080	15.692	14.176	13.944
(10%-ile)	8.047	6.786	7.164	1.764	1.626	1.541
[N – firms]	192	192	192	3517	3471	3233
Average Coefficient of variation of change in wages, observ = a firm)*	4.284	5.9742	5.872	0.630	0.086	0.625
(s.d.)	0.047	0.199	0.104	0.023	0.031	0.026
(90%-ile)	5.905	21.548	13.035	3.119	3.527	3.336
(10%-ile)	2.642	-8.956	1.872	-2.316	-3.347	-2.566
[N – firms]	192	187	186	3117	3081	2862
Avg change in wage for people who change firms, observ = a person	3.677	0.595	2.805	6.374	2.635	5.801
(s.d.)	17.734	15.636	16.012	18.298	16.447	16.829
90%-ile	26.343	20.361	23.688	30.789	24.593	28.249
10%-ile	-17.040	-18.987	-17.133	-15.088	-18.308	-15.167
[N – workers]	8989	6876	6407	1806	1187	1309
Avg change in wage for people with tenure < 3 years, observ = a person	3.750	1.186	2.942	5.347	2.129	4.373
(s.d.)	13.477	11.774	11.815	14.296	12.630	12.714
90%-ile	18.566	14.165	16.524	21.963	17.017	19.967
10%-ile	-9.715	-11.604	-9.694	-9.014	-11.264	-8.700
[N – workers]	25504	22375	20071	5506	4383	4128
Avg change in wage for people with tenure >= 3 years, observ = a person	2.949	0.177	2.083	3.685	-0.374	1.826
(s.d.)	10.436	9.092	9.007	11.414	9.842	9.877
90%-ile	13.812	9.087	11.031	15.949	9.568	12.186
10%-ile	-6.181	-8.749	-6.227	-6.921	-10.488	-7.673
[N – workers]	51772	54791	48346	22954	22513	18104

Table 6.2 "Table 3: Wage dynamics" – Differences in logs

	all firms			large firms		
	1989-1990	1992-1993	1997-1998	1989-1990	1992-1993	1997-1998
Average change in wage, observation = a person	0.034	0.007	0.026	0.035	0.001	0.022
(s.d.)	0.136	0.112	0.116	0.125	0.103	0.108
(90%-ile)	0.168	0.121	0.142	0.156	0.104	0.132
(10%-ile)	-0.088	-0.101	-0.080	-0.077	-0.097	-0.076
[N – workers]	77282	77165	68417	28600	27103	22336
Average of firm average change in wage, obs. = a firm	0.035	0.013	0.032	0.029	0.001	0.022
(s.d.)	0.014	0.018	0.018	0.074	0.063	0.064
(90%-ile)	0.050	0.031	0.053	0.110	0.071	0.091
(10%-ile)	0.019	-0.016	0.005	-0.052	-0.068	-0.045
[N – firms] (cells)	192	192	192	3520	3470	3223
Average N of workers per cell (unweighted)	339	345	302	8	7	7
Average std of N of workers per cell	343	326	282	26	25	18
Average of s.d. of change in wage, observ = a firm	0.131	0.107	0.108	0.083	0.074	0.071
(s.d.)	0.020	0.017	0.017	0.065	0.055	0.056
(90%-ile)	0.161	0.130	0.136	0.166	0.145	0.142
(10%-ile)	0.106	0.090	0.091	0.020	0.018	0.018
[N – firms]	192	192	192	3520	3470	3223
Average Coefficient of variation of change in wages, observ = a firm)*	4.473	5.278	5.819	0.647	0.114	0.542
(s.d.)	0.061	0.147	0.138	0.023	0.030	0.026
(90%-ile)	5.717	13.033	19.557	3.128	3.671	3.262
(10%-ile)	2.504	-8.155	1.922	-2.261	-3.888	-2.771
[N – firms]	191	187	190	3120	3083	2859
Avg change in wage for people who change firms, observ = a person	0.041	0.003	0.030	0.072	0.022	0.063
(s.d.)	0.227	0.188	0.201	0.228	0.185	0.196
90%-ile	0.326	0.240	0.285	0.366	0.260	0.316
10%-ile	-0.222	-0.238	-0.223	-0.187	-0.207	-0.183
[N – workers]	8970	6810	6292	1832	1180	1279
Avg change in wage for people with tenure < 3 years, observ = a person	0.045	0.015	0.035	0.058	0.020	0.048
(s.d.)	0.171	0.141	0.149	0.169	0.139	0.147
90%-ile	0.227	0.171	0.200	0.240	0.173	0.218
10%-ile	-0.132	-0.142	-0.127	-0.108	-0.126	-0.102
[N – workers]	25457	22259	19957	5542	4385	4088
Avg change in wage for people with tenure >= 3 years, observ = a person	0.028	0.003	0.023	0.030	-0.003	0.017
(s.d.)	0.115	0.098	0.099	0.111	0.095	0.097
90%-ile	0.140	0.099	0.120	0.138	0.089	0.112
10%-ile	-0.071	-0.088	-0.067	-0.071	-0.093	-0.073
[N – workers]	51825	54906	48460	23058	22718	18248

6.2 Wage growth decomposition for movers and stayers

We present here a decomposition of wage growth along a 5-year observation period, that provides information on the impact of firm vs. individual characteristics on wage growth variability over a longer time span than the year-to-year of Table 3. Observations come from a closed panel of over 30,000 workers and their whereabouts in the labor market between 1986 and 1991. We consider their initial and final position and firm affiliation, and measure individual wage growth over the period .

Let w(i;jk) be the wage change (1986-91) for the i-th individual who has moved from firm-type j in 1986 to firm-type k in 1991. If he/she is a stayer, then j=k. Firm-types refer here to size class and industry.

The following decomposition is of interest:

$$W(i; jk) = \left(\frac{w_{91}(i;k)}{w_{86}(i;j)} \right) + \left(\frac{\overline{w}_{91}(k)}{\overline{w}_{86}(j)} \right) - \left(\frac{\overline{w}_{91}(k)}{\overline{w}_{86}(j)} \right) - 1$$

where $\dfrac{\overline{w}_{91}(k)}{\overline{w}_{86}(j)} = \hat{w}(jk)$ is the mean wage growth 1986-91 observed across firm-type j (origin) in 1986 and firm-type k (destination) in 1991. The decomposition then reads as follows:

$$W(i; jk) = \left[\left(\frac{\overline{w}_{91}(k)}{\overline{w}_{86}(j)} \right) - 1 \right] + \left[\left(\frac{w_{91}(i;k)}{w_{86}(i;j)} \right) - \left(\frac{\overline{w}_{91}(k)}{\overline{w}_{86}(j)} \right) \right] = \hat{w}(jk) + w'(i; jk)$$

where $\hat{w}(jk)$ has been above defined and $w'(jk)$ can be seen as the wage premium (or loss) accruing to the i-th individual in moving from firm-type j to firm-type k, i.e. the extra-pay that individuals with certain characteristics are able to gain (or lose) over the mean wage change $\hat{w}(jk)$.

That is to say: "total" individual wage growth = mean wage growth across firms of origin and destination (firm effect) + wage individual premium. Or, the total wage growth associated to a move from firm-type j to firm-type k is given by the sum of two elements: the mean pay differential between the firm of origin in 1986 and that of destination in 1991 (firm effect), which does not depend on the workers' individual characteristics, and the individual premium that reflects various characteristics of the match, i.e. determined by the interaction of both workers' and firm's attributes.

The variance of wage growth is as follows:

var [w(i;jk)] = var [w'(i;jk)] + var [w^(jk)] + 2 cov [w'(i;jk), w^(jk)]

    i.e.

var (total) = var (premium) + var (premium) + 2 cov (firm, premium)

The variance of the total wage increase (*var [w(i;jk)]*) is the same variance of individual wage change discussed in Table 3, measured over a 5 year time span. The variance of the firm effect (*var [w^(jk)]*) is close to the "between variance" discussed in Table 3 when computed for stayers.

Table 6.3 displays the variance components calculated for all workers and for stayers only, separately for white (white_c) and blue-collars (blue_c) and for various cuts of the sample:

- by activity branch (manufacturing manuf, services serv) and firm size (large = > 500; medium = 20-500; small = < 20);
- by activity branch and status (mover; stayer);
- by activity branch and firm employment history 1986-91 (expanding = > 10%; constant = between -10% and + 10%); declining and closeouts = < - 10%).

Here, differently from Table 3, definitions reflect individual employment positions as of 1986.

The following observations are in order (and in accord with expectations):

1. covariance (premium, firm) is always negative, i.e. if *firm* is high, *premium* is low (and viceversa)
2. *var (mover) > var (stayer) in all cases, consistently with findings in table 3*
3. *var (total) is about as large as var (premium); both much larger than var (firm)*
4. var (total) and var (premium) are bigger for small firms and decreasing with size. It reflects the wage differential due to firms size: individuals starting in small firms and moving elsewhere will face more w-growth variability than others)
5. var (white) > var (blue) this is expected given the larger variance of earnings of the former (both cross-sectional and longitudinal), and their higher possibilities of climbing the hierarchical ladder, and of the predictably modest career profiles of blue-collar workers.

6. var (decline) > var (constant) = var (expanding) for similar reasons as in # 4

Table 6.3 Variance decomposition

industry	occupation	Sample cut	N. obs.	Var(w tot)	Var(premium)	Var(firm eff)	Covariance	Corr (var_pr,var_f)
M	B	dim_large	4418	0.06411	0.06441	0.01268	-0.00649	-0.2271
M	B	dim_med	6818	0.08127	0.08258	0.01898	-0.01015	-0.25626
M	B	dim_small	4024	0.10883	0.10127	0.02178	-0.00711	-0.15136
M	W	dim_large	2281	0.09837	0.10743	0.06333	-0.03619	-0.43877
M	W	dim_med	2142	0.14314	0.1668	0.10999	-0.06683	-0.49336
M	W	dim_small	496	0.18179	0.17594	0.08686	-0.04051	-0.32767
S	B	dim_large	1130	0.05412	0.05836	0.00704	-0.00564	-0.27829
S	B	dim_med	1522	0.1042	0.11259	0.029	-0.0187	-0.32716
S	B	dim_small	2445	0.11759	0.11856	0.02549	-0.01323	-0.2406
S	W	dim_large	2140	0.088	0.10062	0.02974	-0.02118	-0.38713
S	W	dim_med	1465	0.11805	0.13978	0.07013	-0.04593	-0.46389
S	W	dim_small	1210	0.16158	0.16244	0.0736	-0.03723	-0.34052
M	B	mover	5193	0.11767	0.11976	0.03031	-0.0162	-0.26891
M	B	stayer	10106	0.06708	0.07346	0.02495	-0.01567	-0.36593
M	W	mover	1733	0.17057	0.19256	0.1309	-0.07644	-0.4815
M	W	stayer	3194	0.09972	0.11464	0.06621	-0.04057	-0.46565
S	B	mover	1655	0.1532	0.16178	0.03889	-0.02373	-0.29923
S	B	stayer	3461	0.07475	0.11218	0.05032	-0.04388	-0.58398
S	W	mover	1060	0.21507	0.23687	0.11828	-0.07004	-0.41843
S	W	stayer	3765	0.08545	0.12291	0.06918	-0.05332	-0.57823
M	B	cost	2668	0.07298	0.0791	0.02482	-0.01547	-0.34919
M	B	decline	7004	0.09779	0.10311	0.02777	-0.01655	-0.30919
M	B	exp	5627	0.0723	0.07699	0.02575	-0.01522	-0.34186
M	W	cost	842	0.11335	0.12568	0.06832	-0.04033	-0.43517
M	W	decline	2100	0.14392	0.16301	0.09785	-0.05847	-0.46297
M	W	exp	1985	0.11261	0.13033	0.08766	-0.05269	-0.49297
S	B	cost	966	0.08003	0.1101	0.04732	-0.03869	-0.53606
S	B	decline	2174	0.12573	0.14141	0.04179	-0.02874	-0.37382
S	B	exp	1976	0.0824	0.12376	0.05046	-0.04591	-0.58092
S	W	cost	1108	0.09022	0.13837	0.07402	-0.06108	-0.60355
S	W	decline	1310	0.16668	0.19596	0.10859	-0.06893	-0.47256
S	W	exp	2407	0.09979	0.13273	0.06313	-0.04803	-0.52474

7. Mobility

Due to the characteristics of our data, we are not able to compute entry and exit rate at the firm level, counting the number of workers who leave/join the firm in a given year. Nor could we do it at the cell level, given that most of the mobility occurs within cells[15].

Therefore we present in this chapter several statistics on worker mobility and on the relationship between worker mobility and wage dynamics. This answers many of the questions proposed by "Table 4" in an indirect way, e.g. exit and entry rates of high wage and low wage workers, correlation between average firm wage and worker turnover.

The question on who enters into and who exits from firms, as well as the high level/low level jobs distinction, is a more open one. This is more relevant in large than in small firms, where heterogeneity of internal positions is very limited. Furthermore, in small firms, openings and closures generate large part of worker turnover; in which case everybody enters or exits. As to larger firms, we know that

- Most of the new entrants, in very recent years (after 1998), are hired via atypical, work-and-training contracts, temporary, fixed-term contracts or leased work. All such contracts are on a low wage level.
- However, in the Eighties and Nineties, which are relevant for this investigation, the great majority of hires were open-ended standard contracts; even at the peak of the CFL (work-training contracts) utilization, the take-up rate of CFL workers seldom reached 30% of total hires of young labour force.
- Collective wage setting process is mostly based on seniority (more so in 1990 than in 1998), so most of the newly hired workers (all the young ones) enter at the bottom of the wage ladder and climb it later in their career.
- Early retirement decisions (no matter if voluntary or forced by the firm) often involve high wage workers. Likewise, collective layoffs, following the cost-cutting processes, have often hit the most "expensive" (and least productive) workers, i.e. those with few skills but a lot of seniority[16].

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[15] The following is what we cannot do now (the idea popped up July 29), but intend to do by the end of September 2004: our database contains monthly data on employment at firm level and also average wages for each of such firms. We shall compute monthly differences in employment levels and use them as proxy of entries and exits. Thus, ranking firms by firm wage levels, we shall provide proxy statistics on entry and exit rates by quintile/decile of firm wages. What we expect is a negative relation between firm wages and entry/exit rates.
We show, in fact, that both worker mobility and wages are highly correlated with firm size. This is a stylised fact that emerges from statistics on several countries and it is particularly true in Italy where small firms are so common. Small firms pay lower wages and are characterized by a very high worker turnover, viceversa for large firms.
If we were to rank mobility rates by levels of firm wages we would simply stress the relationship between mobility and firm size.

[16] More hints on this point in par. 7.2

For the time being, we present interesting results (and relevant for the purpose of Table 4) which come from a previous analysis on a closed panel of workers 1986-91, in paragraph 7.2[17]

BOX: Our answers to the questions proposed by Table 4

Employees (s.d.)	Macroeconomic framework (Figure 1.1and Figure 1.4)
Number of occupations (s.d.)	coarse coding only in our data
Number of levels (s.d.)	coarse coding only in our data
Employment growth (s.d.)	Macroeconomic framework (Figure 1.1and Figure 1.4)
Exit rate, *observ = person*	Separation rates This chapter (Table 7.1)
Exit rate (s.d.)	Due to the characteristics of our data, we are not able to compute entry and exit rate at a firm level, computing the number of workers who leave/join the firm in a given year. Nor we could do at a cell level, given that most of the mobility occurs within cells. Using data from the firm archive, which records monthly data on employment at firm level, we could compute monthly differences in employment and use them as proxy of entries and exits. In this way, ranking firms by firm wage levels, we can provide proxy statistics on entry and exit rates by quintile/decile of firm wages. What we aspect is a negative relation between firm wages and entry/exit rates. Therefore we present in this chapter several statistics on worker mobility and on the relationship between worker mobility and wage dynamics. This answers many of the questions proposed by "Table 4" in an indirect way
Exit rate, top quartile of firm wages (s.d.)	There is a strong relationship between firm size, firm wages, and turnover rates: large firm pays higher wages and have lower turnover rates. If we would rank mobility rates by levels of firm wages we will simply stress the relationship between mobility and firm size. Instead we presents some statistics on the relation between mobility and individual wage levels and growth (Paragraph 7.2)
Exit rate, bottom quartile of firm wages (s.d.)	
Exit rate, top decile of firm wages (s.d.)	
Exit rate, bottom decile of firm wages (s.d.)	
Entry rate (s.d.)	See notes on Entry rates
Entry rate, top quartile of firm wages (s.d.)	See notes on Entry rates by firm wage distribution
Entry rate, bottom quartile of firm wages (s.d.)	
Entry rate, top decile of firm wages (s.d.)	
Entry rate, bottom decile of firm wages (s.d.)	
% of employees who switch jobs* internally (s.d.)	Not observable in our data

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[17] To get more insights on the relationship between entry/exit rates and job level we will perform in September 2004 a new test <u>among large firms only</u>[17], looking at wages of those who enter and exit and compare them with the average firm wage.

% of new jobs* filled internally (s.d.)	Not observable in our data
% of workers who have been at firm 5+ years (s.d.)	This chapter (Table 7.2). Moreover, due to the increase in flexibility in the labour market, following the various labour market reforms, this percentage is decreasing over time.
Correlation (exit rate, average wage)	Again firm size drives the results: large firms pay higher wages and have lower exit rates
Correlation(exit rate, average wage change)	
Correlation(exit rate, s.d. of wage)	
Panel B - High Level Jobs* Panel C - Low Level Jobs*	To get more hints on the relationship between entry/exit rates and job level we will perform in the very near future a test by looking, among large firms only, at wages of those who enters and exits comparing it with the average firm wage. For now some very interesting results come from an analyses made on a closed panel and presented in paragraph 7.2

7.1 Workers mobility in Italy

7.1.1   Worker turnover

Worker turnover rates (per year) are observed between 32% in a country like Japan – historically characterised by careers that take place predominately within one firm – to values between 75% and 96% for Great Britain and the United States, which are distinguished by a high degree of flexibility in the labour market. Italy with turnover rates of about 60% is characterised by a mobility higher than that of other European countries, with the exception of the United Kingdom.

Table 7.1 Yearly worker flows, three sub-periods.

		Separation rate	Engagement rate	Gross worker turnover	Business cycle
Italy	86-90	29.86	32.53	62.39	expansion
	91-93	28.77	28.01	56.78	recession
	94-96	29.68	29.01	58.69	up-turn

Percentage values, our calculations based on WHIP data.

As regards the behaviour of turnover through time, we highlight two facts. To begin with, the GWT appears to move pro-cyclically, highest during the expansionary phase 1986-1990; lowest with the recession that culminated in 1993; and then turning upwards again in the new expansion that accompanied the devaluation of the Lira 1994-1996. Engagement rate is more sensitive to the cycle than separation rate: the latter, considering all areas, stand within one percentage point of variation. Secondly, the engagement rate decreases during the decade. Both these points are partly related to the better performance of employment in the first period.

There is a negative correlation between the magnitude of worker flows and age: during expansions, the separation rate of young workers (less than 24) is about 56-59%; it is down to about 18% for mature adults (35-44 years

old), and increases from there on, as retirement age becomes closer. Engagement rates follow the same pattern: 75% for the youngest bracket, about 30% for the next youngest, and hovering around 13-15% for the more mature age groups, which is all but negligible.

Blue-collar workers are much more mobile than white-collar workers, which in turn are more mobile than managers (but the probability of a direct job-to-job change conditional to a move, is much higher for managers, than for any of the other categories). Moreover the difference in mobility of blue-collar workers with respect to white-collar workers has widened noticeably during the years.

Finally, mobility is strongly negatively correlated with firm size. Throughout the whole observation period, the average separation rate among small firms (less than 10 employees) hovers between 46-52%; among large firms (more than 1000 employees) about 10-11%. The same differential holds for the engagement rate. This is a remarkable difference, only in part explained by composition effects attributable to the prevalence of older workers near retirement in large firms, or by the higher birth-death rates of small firms.

Internal mobility is limited in small firms where few occupational slots are available; it is much wider in the large firms, where a successful career may initiate at low levels and, step by step, move up the hierarchy. Additional constraints to mobility, as those related to the presence of unions, are obviously higher in the large-firm sector.

During the years, however, this difference has been somewhat reduced: the engagement and separation rates diminishes in small firms (<20 employees), while, at the same time, worker mobility increases in firms with more than 200 employees.

Considering the combined effects of worker age and firm size, it is brought to light how the latter strongly influences mobility, partially attenuating the differences due to age.

Figure 7.1 Gross worker turnover by worker age and firm size. 1985-1996.
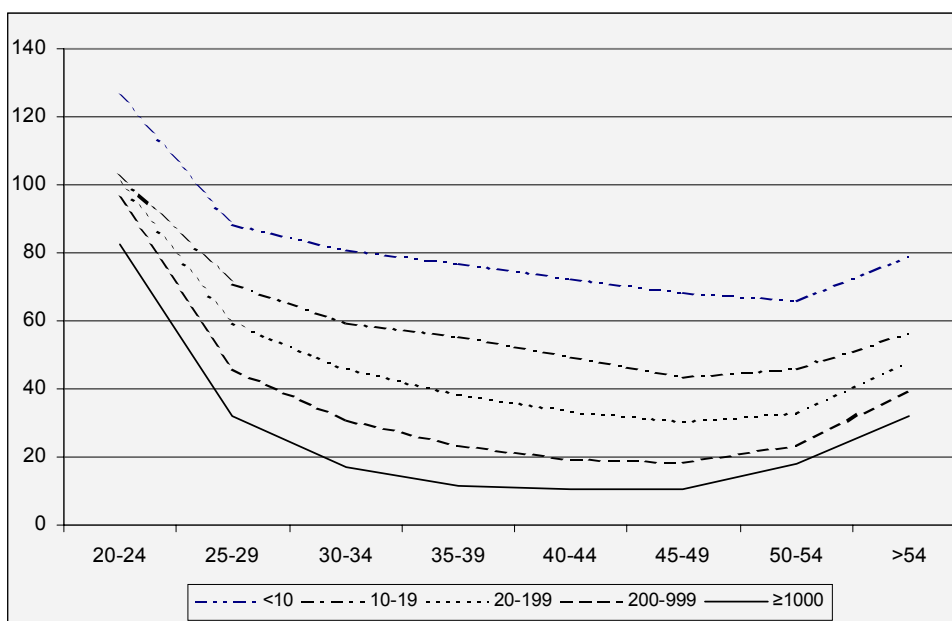
Source: our calculations based on WHIP data.

In small firms, the "U" shaped curve that describes mobility as a function of age is not only set notably higher, but it also has a flatter shape (Figure 7.1). This makes for the decidedly higher mobility of intermediate age workers employed by small firms. For firms under 10 employees, turnover for dependent workers in the age group 36-45 is observed at over 70%; and it is around 50% for firms of between 10 and 20 employees. At the extreme opposite, we find firms having over 1000 employees with turnover for 36-45 year olds just over 10%.

7.1.2 The duration of employment spells

Approximately 6% of the employed have a job spell that lasts less than 12 months (2.7% are less than 6 months), while 67% have a job spell longer than 5 years.

From a geographic perspective, the area with the highest level of individuals with short contracts is the South. Almost 9% of workers were found to be employed for a period of less than one year, and 19% had spells that ended within two years. In the North West and Centre, instead, lower percentages are seen, respectively 12% and 13%. These last two areas also showed a larger number of workers with spells of over five years.

Table 7.2 Distribution of dependent workers in February 1991 by duration of job spell

Duration (in months)	<6	11-Jun	23-Dec	24-35	36-47	48-59	> 5 years
Percentages	2.68	3.66	8.09	7.13	6.09	5.49	66.85
Cumulative percentages	2.68	6.34	14.43	21.56	27.65	33.15	100
North West	2.19	3.13	6.99	6.34	5.91	5.09	70.35
North East	2.88	3.58	8.73	7.59	6.19	5.74	65.29
Centre	2.27	3.39	7.4	6.62	5.68	5.71	68.93
South/Islands	3.76	4.98	10.04	8.53	6.73	5.74	60.22

Source: our calculations based on WHIP data.

There is a "hard core" of high mobility workers - among whom the seasonal count little more than half - about 6% of all employees. Excluding the hard core, the average rate of separations drops by one fourth, from 33% to about 25%.

7.2   Worker mobility and wage dynamics

Here we focus on the relation between labour mobility, wage levels and wage growth on the basis of our closed panel 1986-91 drawn from the same WHIP dataset (containing over 30,000 individual workers: 20415 stayers and 9752 movers[18].

Table 7.3 and Figure 7.2 illustrate differences of wage levels of 1986 and 1991 (in current liras) and wage growth 1986-91 between movers and stayers, by occupational status (blue and white-collars). More details on the distributions below the average values reported in Table 7.3 can be found in Table 9.1 in the appendix.

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[18] An updated version (til 1996, possibly 1998) will be available very soon after the summer.

Table 7.3 Wage levels and growth of movers and stayers 1986-1991

	Blue collars						White collars					
	1986 level		1991 level		Wage growth 1986-1991		1986 level		1991 level		Wage growth 1986-1991	
	Mean	S.d.	Mean	S.d.	Mean	S.d.	Mean	S.d.	Mean	S.d.	Mean	S.d.
All	1658	(393.9)	2528	(678.6)	0.54	(0.3)	2254	(721.6)	3884	(1436.9)	0.73	(0.3)
1Stayers	1702	(404.4)	2591	(698.8)	0.53	(0.3)	2305	(719.6)	3921	(1420.4)	0.70	(0.3)
2Movers	1570	(356.4)	2404	(618.2)	0.56	(0.4)	2127	(711.0)	3790	(1473.5)	0.80	(0.4)
Wage in 1986 < 25 percentile												
3Stayers			1970	(416.1)	0.62	(0.3)			2571	(526.2)	0.72	(0.3)
4Movers			2121	(441.7)	0.73	(0.4)			2725	(723.6)	0.87	(0.5)
Wage in 1986 > 75 percentile												
5Stayers			3264	(677.2)	0.50	(0.2)			5502	(1470.9)	0.71	(0.3)
6Movers			3015	(792.0)	0.41	(0.3)			5610	(1541.0)	0.76	(0.4)

Basic observations are as follows:

1   stayers always do better than movers (both blue and white collars) as far as wage levels, both before (1986) and after the job change (1991);

2   the average wage growth 1986-91 of movers is higher than that of the stayers'. The distribution of wage growth of movers dominates the stayers' from the median through the right tail. While wage growth of stayers is higher than that of movers in left tail of distribution (P10 and P25 – see Table 9.1 in the appendix);

3   individuals who start as low-wage movers (wage 1986 < 25-percentile) end up worse than average movers, i.e. remain in low wage-levels in 1991 both among blue and white collars (row 4 and 2 of Table 7.3). Wage levels of the average movers dominate wage level of low-wage movers throughout the wage distribution;

4   individuals who start as high-wage movers (wage 1986 > 75-percentile) end up better than average movers, and continue to be high-wage earners also in 1991 (Row 6 and 2). This relationship holds throughout the distribution, with differentials increasing for blue collars, and decreasing for white collars. See details in Table 9.1 in the appendix);

5   panels I and II of fig. 7.2 show the 1991- wage (level) percentiles of 1986-low earners (< P25): panel I displays the B-collars and panel II the W-collars. Among the former (B-collars) the movers' wage distribution strongly dominates the stayers'. Among the latter (W-collars) the pattern is similar, but only beyond the median (P50);

6   panels III and IV of fig. 7.2 show the 1991- wage (level) percentiles of 1986-high earners (> P75). Panel III displays the B-collars. Here the pattern is reversed: among the former (B-collars) the stayers' wage distribution strongly dominates the movers'. This is the effect of job displacement of the relatively older manual workforce, following the restructuring and cost-cutting processes of large companies. Those who get laid off (most of them being "expensive" workers) suffer substantial wage cuts once (and if) rehired elsewhere[19].

7   among the high-earning W-collars, instead (panel IV), we find very slight differences between movers and stayers in the tails of the distribution. Only near the median, do movers do better than the stayers.
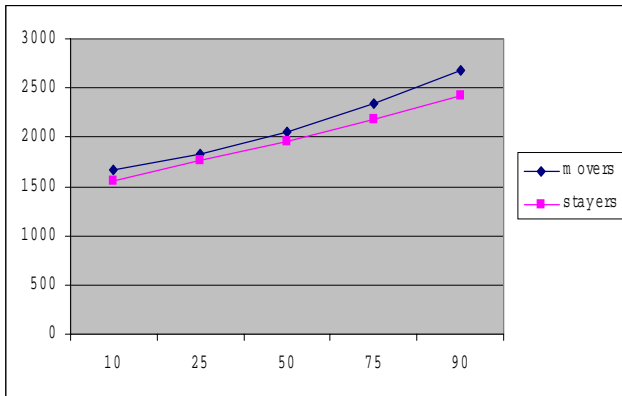
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[19] This evidence is reported in B. Contini and C. Villosio, "Worker Mobility, job displacement, redeployment and wage dynamics in Italy", LABORatorio R. Revelli, W.P. # (2004).
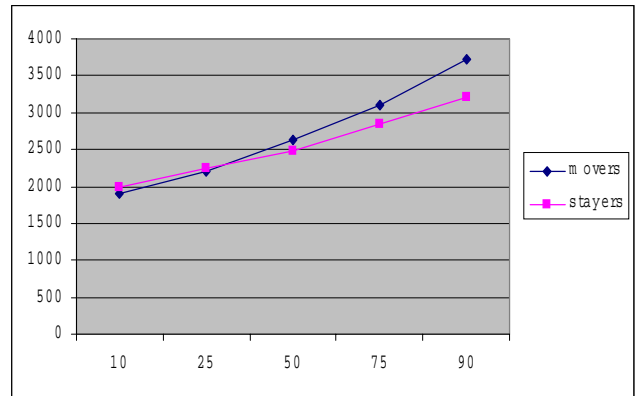
Figure 7.2 Wage 1991 Percentiles

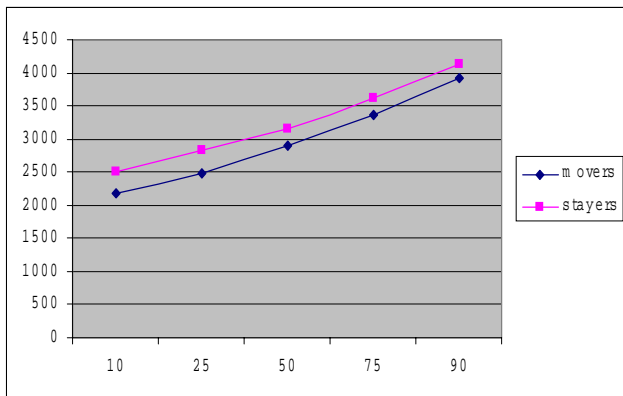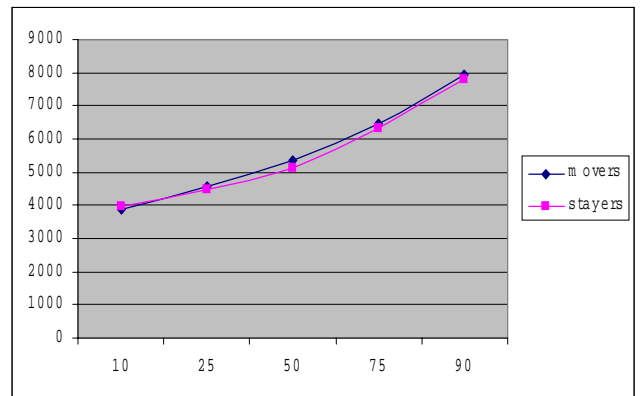PANEL I

Low Earners 1986 (<P25)

B-collars

PANEL II

W-collars

High Earners 1986 (>P75)

B-collars

PANEL III

W-collars

PANEL IV

8. Methodological Appendix

8.1   Treviso and Vicenza data

We check the validity of our statistics computed at the cell level using a different dataset, referred to only two provinces (Treviso and Vicenza). The two provinces are located in the North-East part of Italy, both belonging to the regional administration of Veneto.

The <u>whole universe</u> of employees working there is available[20]. Using this dataset we mimic the sampling procedure that generated WHIP and compute again the statistics required in Table 2 and 3. We then compare these statistics with those computed by firm instead of by cell.

Before going into details of the comparison, a foreword is needed. The comparison is quite clean, although two differences between WHIP and this data may be relevant.

First, in this dataset very small firms weight even more than in the whole country, and as we have already seen firm size matters in several of the statistics we compute. Furthermore, this prevents us to compute meaningful statistics for Table 4, as we observe very few large firms in these two provinces.

Second, here the issue concerning multiple administrative records belonging to the same firm as well as the issue of legal transformations of firms has been tackled in a different fashion with respect to the Whip panel data. The (relatively) limited amount of firms appearing in the dataset has rendered viable a reliable reconstruction of many firms. However, this operation has been brought forward mostly by hand, resorting to informal interviews and common sense, especially on larger and well-known enterprises. This seems to adversely impact the accuracy with which firms size is recorded, and to upward bias worker mobility measures.

8.2   The experiment

We compute several sets of statistics: first we mimic the WHIP cells presented in text, comparing weighted and unweighted statistics. Second, we increase the cell disaggregation to compare within and between variance behaviour. Finally, we compute all statistics at the firm level and compare cells and firms.

CELLS: In order to make a profitable use of this dataset, every care has been taken in order to make it consistently comparable to the Whip data. First of all, the data from Veneto has been sampled precisely like the Whip data, mimicking the "four-birthdates per year" selection process. As a consequence, a 1:90 sample has been drawn, resulting in a subset of the Whip data concerning the two provinces of Vicenza e Treviso. Then the same sample selection of workers included in the cells has been applied.

FIRMS: All firms employing <u>at least three workers</u> have been included.

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[20] The original criterion for inclusion in the more comprehensive, yet territorially limited panel mentioned is: individuals having spent at least one employment spell, between years 1975-1997 in the named provinces. All their career (in and outside the two provinces) is then observed for the period 1975-1997.

8.3   *What do we learn from the experiment?*

We learn how to weight cells to obtain unbiased estimates of the means. We learn about the sign and size of the bias on estimated between and within variability. We learn that increasing cell disaggragation we almost close the gap. We will produce table 2 and 3 on Italy following this hint in the very near future.

In more details.

1. When observation=a person then nothing changes, as it should be. Notice only that "FIRMS" includes only firms employing at least three workers, and hence they are on average a bit larger than those included in the cells; this shows up in higher average wages (table 2) and in higher average absolute wage change (table 3)

2. "UNWEIGHTED CELLS" gives too little weight to small firms; weighting allows to compute correctly average firm wage (table 2) and average wage change at the firm level (table 3). The weight is the number of firms belonging to the cell *in the population* (source: Osservatorio INPS)

3. Both in table 2 and 3, between firms variability in "WEIGHTED CELLS I" is underestimated with respect to "FIRMS", while within firms variability is overestimated (overall variability is correctly estimated).

    a. In general, observing cells instead of firms attributes to "within cell variability" the variability "between the firms that belong to the same cell". This problem should become smaller the smaller the cells.

    a. In Table 2, comparing "WEIGHTED CELLS I" "WEIGHTED CELLS II" "WEIGHTED CELLS III" we notice that as cells become smaller the gap between variability estimated at the cell level and at the firm level closes more and more. For example between variability moves from 6.99 to 7.79 to 9.34, where at the firm level is 12.48.

    b. As the average number of workers per cell *using the WHIP data* is now about 400, we plan to further decrease all cells' size till the gain in terms of increase of between variability and decrease in within variability is negligible. We leave this improvement to the near future.

4. correlation between w_f and sd w within is high, increasing with weighting and equal to the correlation computed at the firm level in "WEIGHTED CELLS III".

Table 2: Structure of wages between and within firm, year 1990

	UNWEIGHTED CELLS	WEIGHTED CELLS(I)	WEIGHTED CELLS (II)	WEIGHTED CELLS (III)	FIRMS
Average Wage, observation = a person	75.63	75.63	75.39	75.39	76.30
(s.d.)	**21.51**	**21.51**	**21.44**	**21.44**	**22.10**
(90%-ile)	102.37	102.36	101.79	101.79	103.13
(10%-ile)	56.45	56.45	56.25	56.25	56.49
[N – workers]	3125	3125	3154	3154	271446
Average of firm average wage, observ = a firm	81.04	69.99	69.74	69.78	70.40
(s.d.)	**13.99**	**6.99**	**7.79**	**9.34**	**12.48**
(90%-ile)	101.12	78.56	80.65	81.21	86.64
(10%-ile)	65.53	63.00	62.39	58.38	57.08
[N – firms] (cells)	**45**	**44**	**100**	**186**	**17322**
Average N of workers per cell (unweighted)	69	71	32	17	16
Average std of N of workers per cell	81	82	40	21	56
Average of s.d. of wage, observ = a firm	**20.67**	**16.44**	**15.36**	**14.46**	**10.67**
(s.d.)	9.33	5.75	6.83	7.80	8.88
(90%-ile)	35.15	22.43	23.01	23.67	22.70
(10%-ile)	11.99	11.99	8.06	6.25	2.35
[N – firms]	45	44	96	169	17322
Average Coefficient of variation of wages, observ = a firm)	0.25	0.23	0.22	0.20	0.14
(s.d.)	0.0010	0.0007	0.0008	0.0009	0.0010
(90%-ile)	0.04	0.29	0.30	0.31	0.28
(10%-ile)	0.15	0.17	0.13	0.09	0.04
[N – firms]	45	44	96	169	17322
Correlation(average wage, s.d. of wage), observ = a firm	**0.48**	**0.60**	**0.64**	**0.67**	**0.67**
Average Wage for workers between 25 and 30, observation = a person	71.99	71.99	71.96	71.96	73.17
(s.d.)	17.90	17.90	17.91	17.91	18.60
(90%-ile)	92.41	92.41	92.42	92.42	95.64
(10%-ile)	55.73	55.73	55.67	55.67	56.12
[N – workers]	851	851	852	852	67287
Average Wage for workers between 45 and 50, observation = a person	80.68	80.68	79.90	79.90	83.14
(s.d.)	22.28	22.28	22.50	22.50	24.59
(90%-ile)	105.44	105.44	105.00	105.00	114.25
(10%-ile)	61.17	61.17	59.53	59.53	60.17
[N – workers]	294	294	303	303	27701

Table 3: Wage dynamics, year 1989-90, levels

LEVELS	UNWEIGHTED CELLS	WEIGHTED CELLS (I)	FIRMS
Average change in wage, observation = a person	2.0749	2.0749	2.3081
(s.d.)	8.4668	8.4668	8.6814
(90%-ile)	11.4265	11.4265	11.7370
(10%-ile)	-6.2812	-6.2812	-5.9553
[N – workers]	2717	2717	231796
Average of firm average change in wage, observ = a firm (weights observations differently from previous row)	3.4268	1.9396	2.4681
(s.d.)	3.1722	1.8541	4.5883
(90%-ile)	7.9833	3.5367	7.7980
(10%-ile)	-0.0538	-0.4944	-2.0506
[N – firms] (cells)	43	43	14233
Average N of workers per cell (unweighted)	52.2558	52.4186	14.1477
Average std of N of workers per cell	60.9356	60.8293	55.2035
Average of s.d. of change in wage, observ = a firm	7.4144	6.9731	5.2491
(s.d.)	2.2684	1.1958	3.7703
(90%-ile)	10.5859	8.3087	10.2306
(10%-ile)	4.9942	5.6611	1.2482
[N – firms]	43	43	14233
Average Coefficient of variation of change in wages, observ = a firm)*	1.4204	1.4197	0.8429
(s.d.)	0.0651	0.0651	0.0248
(90%-ile)	6.3568	6.3568	3.5275
(10%-ile)	0.1874	0.1874	-2.2867
[N – firms]	42	42	12580
Avg change in wage for people who change firms, observ = a person	1.266	1.266	2.2107
(s.d.)	12.1560	12.1560	12.9009
90%-ile	15.2646	15.2646	17.9501
10%-ile	-12.7260	-12.7260	-13.2232
[N – workers]	381	381	30432
Avg change in wage for people with tenure < 3 years, observ = a person	2.0472	2.0472	2.4214
(s.d.)	10.0134	10.0134	10.1787
90%-ile	13.1734	13.1734	13.8708
10%-ile	-8.8291	-8.8291	-8.3870
[N – workers]	947	947	78569
Avg change in wage for people with tenure >= 3 years, observ = a person	2.0897	2.0897	2.2500
(s.d.)	7.5128	7.5128	7.8024
90%-ile	10.3602	10.3602	10.5613
10%-ile	-5.1658	-5.1658	-4.7738
[N – workers]	1770	1770	153227

Table 3: Wage dynamics, year 1989-90, logs

	UNWEIGHTED CELLS	WEIGHTED CELLS (I)	FIRMS
Average change in wage, observation = a person	0.0242	0.0242	0.0266
(s.d.)	0.1070	0.1070	0.1100
(90%-ile)	0.1460	0.1460	0.1466
(10%-ile)	-0.0853	-0.0853	-0.0826
[N – workers]	2717	2717	231799
Average of firm average change in wage, observ = a firm	0.0371	0.0255	0.0325
(s.d.)	0.0314	0.0240	0.0607
(90%-ile)	0.0706	0.0450	0.1035
(10%-ile)	0.0081	0.0141	-0.0299
[N – firms] (cells)	43	43	14215
Average N of workers per cell (unweighted)	52.2093	52.3721	14.1512
Average std of N of workers per cell	60.8486	60.7422	55.4040
Average of s.d. of change in wage, observ = a firm	0.0901	0.0943	0.0714
(s.d.)	0.0250	0.0128	0.0486
(90%-ile)	0.1134	0.1078	0.1329
(10%-ile)	0.0568	0.0798	0.0188
[N – firms]	43	43	14215
Average Coefficient of variation of change in wages, observ = a firm)*	2.8158	2.8153	0.8368
(s.d.)	0.0371	0.0371	0.0246
(90%-ile)	6.9129	6.9129	3.4964
(10%-ile)	0.8161	0.8161	-2.3074
[N – firms]	43	43	12566
Avg change in wage for people who change firms, observ = a person	0.0073	0.0073	0.0211
(s.d.)	0.1573	0.1573	0.1722
90%-ile	0.2062	0.2062	0.2320
10%-ile	-0.1952	-0.1952	-0.1953
[N – workers]	381	381	30640
Avg change in wage for people with tenure < 3 years, observ = a person	0.0214	0.0214	0.0277
(s.d.)	0.1300	0.1300	0.1351
90%-ile	0.1705	0.1705	0.1834
10%-ile	-0.1302	-0.1302	-0.1245
[N – workers]	946	946	78747
Avg change in wage for people with tenure >= 3 years, observ = a person	0.0258	0.0258	0.0260
(s.d.)	0.0923	0.0923	0.0945
90%-ile	0.1305	0.1305	0.1264
10%-ile	-0.0657	-0.0657	-0.0617
[N – workers]	1771	1771	153052

Table 3: Wage dynamics, year 1989-90, logs

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Table 9.1 Wage levels and growth of movers and stayers

		n obs	mean	std	max	median	min	pct10	pct25	pct75	pct90	desc
1	B	20415	1657,85	393,92	8900,67	1602,49	313,00	1246,07	1401,58	1863,33	2150,73	wage 1986, all B
	W	9752	2254,06	721,62	7640,20	2142,51	538,99	1461,50	1759,17	2597,13	3152,82	wage 1986, all W
2	B	13567	1702,29	404,36	5126,42	1645,72	313,00	1275,50	1436,98	1919,25	2212,00	wage 1986, stayers only B
	W	6959	2305,11	719,60	7640,20	2194,33	538,99	1515,75	1826,27	2641,92	3201,17	wage 1986, stayers only W
3	B	6848	1569,79	356,40	8900,67	1519,80	508,63	1208,50	1344,90	1753,83	1999,42	wage 1986, movers only B
	W	2793	2126,86	710,99	6076,00	1994,41	717,25	1364,58	1611,13	2470,33	3065,42	wage 1986, movers only W
4	B	20415	2528,42	678,61	8388,75	2410,39	668,75	1813,88	2073,37	2868,88	3389,83	wage 1991, all B
	W	9752	3883,63	1436,93	14898,60	3597,88	910,71	2365,00	2903,79	4512,25	5780,78	wage 1991, all W
5	B	13567	2591,42	698,76	7476,00	2468,17	676,00	1845,73	2123,91	2956,74	3497,27	wage 1991, stayers only B
	W	6959	3921,24	1420,36	14898,60	3643,58	1272,32	2433,58	2962,17	4497,25	5801,01	wage 1991, stayers only W
6	B	6848	2403,59	618,18	8388,75	2303,69	668,75	1766,42	1993,08	2682,46	3156,42	wage 1991, movers only B
	W	2793	3789,94	1473,49	11491,00	3474,67	910,71	2209,17	2739,78	4550,51	5724,83	wage 1991, movers only W
7	B	20415	0,54	0,30	2,30	0,51	−0,14	0,22	0,37	0,67	0,88	wage change 1986-1991, all B
	W	9752	0,73	0,35	2,30	0,66	−0,14	0,39	0,52	0,87	1,18	wage change 1986-1991, all W
8	B	13567	0,53	0,26	2,30	0,51	−0,14	0,24	0,38	0,65	0,82	wage change 1986-1991, stayers only B
	W	6959	0,70	0,30	2,30	0,65	−0,08	0,40	0,52	0,82	1,07	wage change 1986-1991, stayers only W
9	B	6848	0,56	0,36	2,29	0,51	−0,14	0,17	0,33	0,72	1,00	wage change 1986-1991, movers only B
	W	2793	0,80	0,43	2,30	0,72	−0,14	0,33	0,51	1,03	1,39	wage change 1986-1991, movers only W
10	B	2252	2120,67	441,74	4443,92	2060,45	668,75	1662,33	1827,13	2348,13	2678,59	wage 1991, movers only < P25 (ww86, all) B
	W	969	2724,57	723,65	5598,84	2622,84	910,71	1903,00	2203,83	3102,08	3714,58	wage 1991, movers only < P25 (ww86, all) W
11	B	2252	0,73	0,39	2,29	0,66	−0,14	0,32	0,47	0,92	1,25	wage change 1991-1996, movers only < P25 (ww86, all) B
	W	969	0,87	0,47	2,30	0,78	−0,14	0,34	0,52	1,13	1,58	wage change 1991-1996, movers only < P25 (ww86, all) W
12	B	2851	1970,00	416,15	4326,25	1962,58	676,00	1556,58	1759,31	2180,48	2428,00	wage 1991, stayers only < P25 (ww86, all) B
	W	1469	2570,67	526,17	5417,42	2489,50	1272,32	1982,17	2236,25	2841,83	3200,00	wage 1991, stayers only < P25 (ww86, all) W
13	B	2851	0,62	0,31	2,30	0,55	−0,11	0,34	0,43	0,74	0,96	wage change 1991-1996, stayers only < P25 (ww86, all) B
	W	1469	0,72	0,32	2,29	0,64	0,02	0,43	0,51	0,83	1,15	wage change 1991-1996, stayers only < P25 (ww86, all) W
14	B	1133	3015,48	791,97	8388,75	2908,42	1608,25	2170,59	2490,83	3352,23	3929,50	wage 1991, movers only > P75 (ww86, all) B
	W	583	5609,62	1540,96	11491,00	5360,00	2392,67	3864,67	4546,75	6468,00	7957,38	wage 1991, movers only > P75 (ww86, all) W
15	B	1133	0,41	0,31	2,09	0,40	−0,14	0,02	0,20	0,58	0,78	wage change 1991-1996, movers only > P75 (ww86, all) B
	W	583	0,76	0,41	2,26	0,70	−0,14	0,28	0,49	0,98	1,30	wage change 1991-1996, movers only > P75 (ww86, all) W
16	B	3972	3264,25	677,23	7476,00	3166,13	1622,35	2509,37	2829,58	3618,71	4119,14	wage 1991, stayers only > P75 (ww86, all) B
	W	1855	5502,14	1470,93	14898,60	5111,75	2639,99	3983,00	4461,88	6333,23	7804,67	wage 1991, stayers only > P75 (ww86, all) W

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17	B	3972	0,50	0,25	2,19	0,49	−0,14	0,20	0,34	0,63	0,78	wage change 1991-1996, stayers only > P75 (ww86, all) B
	W	1855	0,71	0,33	2,30	0,67	−0,08	0,35	0,50	0,86	1,14	wage change 1991-1996, stayers only > P75 (ww86, all) W