Job flows, worker flows and mismatching in Veneto manufacturing. 1982-1996.

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Abstract.

This research exploits a large employer-level panel dataset in order to analyse employment and worker flows for all establishments in a highly industrialized region in the North- East of Italy, the Veneto. Our results have relevance for models of job creation, job destruction and labour excess reallocation.
The relation between separations from and accessions to existing jobs and between worker flows and job flows is scrutinized. Excess reallocation, the difference between worker flows and job flows at the plant level, is substantial. Mortality for new job matches is quite high and many new accessions are mismatched and lead to separations. Worker flows are very high for young workers to reduce drastically for workers after 35 years of age.
The time series behaviour of worker flows and job excess reallocation from 1982 to 1996 is examined; worker level heterogeneity and employer level heterogeneity are discussed in determining the cyclical pattern of such flows and their rapid increment in more recent years. On this the paper makes progress in respect to the previous literature where turnover and excess reallocation are examined mainly in a static framework.

JEL classification: R23; J21; J44;
Keywords: Regional Labour Markets; Job Flows; Worker Flows; Reallocation; Matched employer-employee panel data.

Job flows, worker flows and mismatching in Veneto manufacturing. 1982-1996[1].

1 Introduction.

This paper analyses worker flows and job flows at the level of the employer. Worker flows are distinct from job flows: many contracting employers hire workers and many expanding employers fire workers and many workers leave expanding employers. Worker flows in excess of job flows are referred to as churning flows or to excess reallocation flows. The high level of such flows in Canada, Denmark, France, Italy, Netherlands and in the United States, has been recently discussed (for a summary: Davis and Haltiwanger, 1999).

The diversity of worker flows and job flows underlines the complexity of the search and reallocation process going on in the labour market and the task of the supporting institutions.

The following questions are addressed: what are the magnitudes and the cyclical pattern of worker flows, job flows and excess reallocation? Do firms achieve expansion by rising accessions or reducing separations? What part do both worker heterogeneity and employer heterogeneity play in determining the magnitude of such flows? The dynamic relationship between worker flows and churning flows, taking into account such heterogeneity, is evidence of mismatching. What are its main determinants?

The study is based on the Veneto worker histories (VWH) longitudinal panel built at the university of Venice. Our data reveal a number of complex relations between accessions and separations. Accessions and separations are a general occurrence in Veneto labour market as most employees move, at some point. Accessions and separations depend on the employer lifecycle dynamics (firm's size, age and industry) but they are strongly affected by the career profile of the worker. High worker flows are concentrated at a young age, and the labour market legislation has recently become much more flexible in this respect; mature workers are only slightly affected.

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The VWH data-base used in the paper has been build with the help of a Miur financing and is available on request. All figures and tables in the paper are derived from the VWH data-base.

We investigate whether there is a time-series variation in churning. A burst of net hiring increases the number of mismatching in the labour market and is accompanied by higher churning. During a downward swing net hirings decrease, the number of separations increases and churning has an unclear relation with worker flows. The length of the time period analysed allows a clear identification of the role played by the structural changes underwent by the labour market through time in modelling the churning flows; a labour market that becomes more and more tight is characterised by an increasing turnover and an increasing churning. In such a situation the unemployment risk is reduced and the reallocation process is mainly lead by the workers.

The paper has the following structure. Section 2 describes the data and defines the various measures of mobility: worker flows, job flows and excess reallocation flows. Section 3 analyses the general relationship between such flow magnitudes and the role of employers' and workers' characteristics affecting worker flows and job flows. Section 4 provides econometric evidence on time series and cyclical behaviour of worker flows and section 5 concludes.

2 Data and definitions.

Data. Recent works on job and worker flows exploit matched employer-worker data to examine whether worker engagements and separations are related to job creations and destructions at the employer level. Studies cover various countries and sectors and span from the late seventies to mid nineties. Some studies rely on a quarterly frequency and some on annual frequency (Leonard, 1993; Burgess, 2000; 2001; Bingley, 2000; Abowd, 1999; Picot, 2001).

The ideal dataset for analysing the divergence between worker and job flows is provided by the universe of employers matched by the universe of workers, because job flows are defined on the employer behaviour over time. We are able to exploit a long panel of such data. The longitudinal panel VWH used in this research is constructed from the administrative records of the Italian Social Security System (Inps). It refers to the entire population of employees and workers in two provinces, Treviso and Vicenza, of an Italian region, Veneto. The database covers each single plant and each single individual employed in the private sector (no state and local government, with few

exceptions) except for those who are self-employed, farm workers and people receiving no salary.

Veneto provides a useful laboratory because of the large presence of small firms, indeed the average establishment size is 13 employees and half of the employee stock is not subject to protection against dismissal as stated by art. 18 of the Statuto dei lavoratori[2], a alleged strong element of rigidity in the Italian labour market. For a decade Veneto has been also a full employment region with a positive rate of job creation in manufacturing, compared to a negative national rate and positive migration flows. It is a dynamic manufacturing territory endowed with considerable elements of flexibility.

The central role played by manufacture (garments, mechanical goods, goldsmiths, leather, textile, furniture and plastics) induces to concentrate the present work on manufacturing employment. The stock of manufacturing workers in the two Veneto provinces of Treviso and Vicenza has varied between 194.000 employees in the early eighties and 233.000 employees in 1996, with a yearly positive average rate of variation of 1.4%. The average rate of growth in employment is the result of a marked increase in white collars and women (Occari, Tattara and Volpe, 1997; 2001, p.18-22).

The VWH longitudinal panel has records on establishment and worker flows from 1982 to 1997, a rather long period of time, compared with other studies of the same kind; employers are classified in the three-digit ATECO 1981 standard classification (Revelli, 1994; Rapiti, 1998). The period of time covered by the database allows us to discuss the role of quits and layoffs, hires and turnover in relation to two expansionary cycles: 1984-1990 and 1993-1997 (Occari and Pitingaro, 1998).

VWH data include register-based information on all establishments and employees that have been hired by those establishments for at least one day during the period of

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[2] Statuto dei lavoratori is the name given to Law No. 300 of May 20, 1970, containing "rules on the protection of the freedom and dignity of workers and of trade union freedom and union activity in the workplace, and rules on the public employment service". The law was intended to promote the presence of trade unions at company level.

The Statuto differs from parallel European legislation in that it emphasizes protection of the rights of the individual. These provisions forbid, for instance, the use of private police in the workplace, personal searches, the abuse of disciplinary power, discriminatory behaviour on the grounds of union membership or activity and so on. In the Part relating to trade union activity, the Statute grants a series of prerogatives to plant-level union structures appointed within the framework of trade union organizations that are signatories to collective agreements. Part III and Article 18 of the Statute apply to work/production units in the industrial and commercial sector with more than 15 employees and requires the employer to reinstate employees who have been dismissed without justifiable reason. The law No. 108 of May 10, 1990 has partially changed the termination of the employment relationship.

observation, independent of the workers place of residence and taking into account the occupational spells out of Treviso and Vicenza as well. The unit of observation is the employer-day; such information is used to build a monthly history of the working life of each employee. Employers are identified by their identification number, which changes if ownership, in a strict sense, changes. This has been amended and any time more than 50% of all employees are taken over by the new legal employer, the employment spell is said to be continuing. Similarly, if there are short breaks in the employment spell, as long as the worker continues at the old employer, his spell is considered uninterrupted[3].

Data include all individual employment spells with an employer, of whatever duration, and this probably results in a lot of very short spells. Although short spells characterize the average job, they are concentrated on young workers, while long spells characterize the mature workers' current experience.

All employment size are considered, because our territory is characterized by a multitude of very small units (establishments with ≤ 5 employees account for almost 12% of the total manufacturing employment).[4] These are two reasons but certainly not the only reasons that explain comparatively high mobility flows.

Definitions. Engagements measure new hires. Separations measure terminated contracts, i.e. quits and layoffs. Both measures are defined in continuous time. A job is a position filled by a worker. It refers, generally, to an establishment.[5]

Turnover is defined as the total number of accessions to a job or separations from a job in the economy in a definite time interval[6]. The turnover ratio is defined as the ratio between turnover and the number of individuals exposed to the turnover risk (N), i.e.

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[3] A 'cleaned' social security archive has been used. The engagements/separations and the creations/destructions that are due to a change in the unit that pays the social security contribution not matched by a corresponding change of the working population assessed at the establishment level are defined as 'spurious' and have been deleted. This has lead to a reduction of 9% of total engagements and separations in manufacturing. The complex matching procedure is explained in Occari and Pitingaro (1997). This procedure is common practice among people working with social security data. For a similar procedure, see Bingley and Westergård-Nielsen (2002).

[4] The absolute importance of small establishments makes the comparison with other countries doubtful; for example in our territory the percentage of employment in establishments with ≥ 100 employee is 27% while in Denmark is more than 40% and is still larger in the United States. On the uncertain meaning of the mobility measures for small establishments, see Tattara and Valentini (2003).

[5] Social security contributions can be paid by the firm or, in case of a firms with more than one permanent establishment, by the establishment. The firm has nonetheless the possibility to centralize social security payments.

[6] Every worker can access and separate several times in the year; Gross Worker Turnover is the ratio between the number of workers that have 1 or more accessions and/or separations in the interval and the employee flow. GWT is not referred to directly in this paper.

the number of individuals, that at any moment in the time period, have shown as employees: worker flows (the numerator) are meaningfully compared to the whole set of workers that are potential candidates for originating such flows (Anastasia, Gambuzza and Rasera, 2000).

N is computed as the stock at the beginning of the period + accessions in the period of employees still employed at the end of the period + temporary accessions in the period (neither part of the initial stock nor of the final). Our index diverges from the indexes commonly used in turnover studies, whose denominator is a measure of employment: past employment, current employment or an average of the two (Davis and Haltiwanger, 1999).

$$TT = \frac{1}{N}(a + s) \qquad (1)$$

a = accessions in the interval
s = separations in the interval
N = employee flow in the interval

An important dynamic aspect of economic growth is due to the growth and decline of firms and establishments. In every industrial sector firms create jobs and firms destruct jobs. Creation and destruction frequently coexist in subunits (Boeri, 1996; Davis and Haltiwanger, 1996; Leonard and von Audenrode 1999). Job turnover refers to gross changes of positions and not to changes in employment contracts. It is measured by the sum of job creations and destructions at the establishment level, in a sector or in the whole system, in a definite time interval. A job created means the addition of an extra employee to the stock of workers; a job destroyed means a unit reduction in employment, both measured at the establishment level. Their sum, in absolute terms, is the magnitude of the job flow. Changes in jobs are influenced by economic growth, business cycle, structural change and competition between industries.

Job turnover is computed by adding up job creations (c_j) and job destructions (d_j), in absolute value, at the establishment level in the time unit. Establishments are labelled by j, j=1,…,F.

The rate of job turnover or gross job turnover is the ratio between the sum of cancellations and destructions, in absolute value, computed at the plant level, and the number of individuals exposed to the turnover risk (N).

$$GJT = \frac{1}{N}\sum_{j=1}^{F}(c_j + d_j) \quad (3)$$

c_j = job creation in the interval in establishment j
d_j = job destruction in the interval in establishment j
N = employee flow in the interval

A positive worker turnover can take place even without any job turnover. Assume jobs and employment totally fixed, work turnover is nonetheless positive because of the natural worker mobility due to retirements and new entrances.

The relation between worker, job turnover and the net employment variation is as follows:

$$a - s = \sum_{j=1}^{F}(c_j - d_j) = \Delta E \quad (4)$$

$$TT \geq GJT \geq \Delta E \quad (5)$$

The difference between accessions and separations or between creations and destructions is a measure of the net stock growth. Although in many contemporary economic systems the increase in employment is negligible, this is the result of the creation of many new jobs and of the parallel process of destruction.

Only Total turnover is defined non-ambiguously in relation to the adopted time periodization: GJT decreases as the time period extends because transitions of temporary nature (those which compensate in the time interval) are not taken into account and the longer the period, the more numerous are the temporary transitions. TT and GJT match perfectly only when time is represented as a continuous process (Schettkat, 1996, p.19)[7]. All turnover measures depend on the size of the establishments, as a bigger size internalizes many changes between jobs that are not captured by the measure adopted.

[7] According to our calculations, taking into account the year 1996, the sum of job creations and destructions counted every quarter, at the 3 digit level, amounts to 122.000, while job creations and destructions counted yearly are just half of that: 62.000 jobs. 30.000 jobs are temporary jobs, i.e. jobs which are created and destroyed during the year 1996.

Worker flows have two components: those that are an immediate consequence of job creation and destruction and those that are in excess of these flows[8]. The second component is computed as a residue and is referred to excess reallocation flow.

Excess reallocation is variously defined. The general definition is that of replaced quits or of contemporaneous hirings and firings: in both cases churning expresses the re-evaluation of a job match, initiated either by the employee or by the employer. The word reallocation means that the employer or the employee revise their past decisions or reallocate, while remaining in the same state. The worker moves to a different employer but remains employed. The employer keeps the same employment level but reshapes his firm's skill mix through parallel hiring and firing (Burgess et al., 2000, p.79). Excess reallocation is defined as the difference between TT and GJT[9].

$$CH = TT - GJT \qquad (6)$$

3 Empirical description of job flows, worker flows and churning.

3.1 Establishment heterogeneity.

Total accessions and separations are very large: on average accessions constitute 21% and separations 20% of the number of subjects exposed to the mobility risk (24% and 23% of the employee stock value[10]). A mean worker flow (hires plus separations) rate of 41% (34% in firms>5 employee) indicates a vast amount of worker reallocation. Approximately one in 2.5 job matches either forms or breaks up each year.

The standard deviation of accessions through time almost doubles the standard deviation of separations: firms face the cycle through variations in accessions more than in separations (table 1).

The rate of job creation is 7.4%, and 6.6% is the rate of job destruction (average 1982-96). Job inflows and outflows leave a positive balance that measures net employment growth in the economy. About one-fourth of the jobs created in a year are in new firms.

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[8] Basically reallocation flows are in excess of flows due to firms' demography (creation and destruction) although a more coherent definition would take into direct account also workers' demography, as human beings birth and die as well. Flows due to human replacement are instead included in reallocation flows, according to the standard definition, on the ground that they are "replaced quits" as well.

[9] The last equation is able to capture the reallocation of workers over the same job, but not the reallocation of job over the same workers. In order to capture both kind of churning we need to use a more structured definition such as vacancy chain model, see Akerlofet al., 1988; Contini et al., 1997.

[10] Value in brackets refer to the stock value- and not to the exposed – in order to make international comparisons possible.

A large proportion (one-third) of the jobs that are destroyed are in a firm that dies. Job creation constitutes 36% of total accessions, on average. There are considerable differences over time in the ratio of accessions that are due to job creations. In the boom years (1981-1989) 39% of accessions were due to job creations, while only 31% of accessions were due to job creations in 1990-1992, the declining side of the cycle. Job destruction makes up 34% of separations, on average; in the slack years 40% of separations are due to disappearance of jobs against 30% in the boom years.

The variability of job creations is equal to the variability of job destructions (the same standard deviation: 1,3% and 1,2%). Job reallocation rate, on average 14% (16% of the employee stock value) looks rather low in comparison with values reported by other studies, taken into account that our dataset covers all size establishments and that Veneto manufacturing has considerably reshuffled its sectors, moving positively from apparel to mechanics[11].

How large is the fraction of all reallocations due to job reallocation? An analysis of the distribution of worker and job flows reveals a large amount of churning.

Table 1 Accessions, separations, job creation and job destruction in Veneto manufacturing.

	a/N	s/N	TT	c/N	d/N	GJT	CH	CH/TT	employees	establishments
1982	0,15	0,17	0,32	0,06	0,08	0,13	0,18	0,57	193505	10882
1983	0,14	0,17	0,31	0,05	0,09	0,14	0,17	0,54	185989	10741
1984	0,16	0,17	0,33	0,07	0,07	0,14	0,19	0,57	184164	11292
1985	0,21	0,17	0,38	0,09	0,06	0,15	0,23	0,61	191032	12319
1986	0,21	0,18	0,38	0,09	0,06	0,15	0,24	0,62	196304	12922
1987	0,22	0,20	0,42	0,09	0,06	0,15	0,27	0,64	203491	13601
1988	0,24	0,21	0,45	0,09	0,06	0,15	0,31	0,68	210478	14268
1989	0,26	0,22	0,48	0,09	0,05	0,14	0,34	0,70	219433	14759
1990	0,24	0,23	0,47	0,07	0,06	0,14	0,33	0,71	224729	14910
1991	0,21	0,21	0,41	0,06	0,07	0,13	0,28	0,68	224483	14433
1992	0,18	0,21	0,39	0,06	0,08	0,14	0,25	0,65	219097	14118
1993	0,16	0,18	0,34	0,06	0,08	0,14	0,21	0,60	213251	13213
1994	0,23	0,21	0,44	0,08	0,06	0,14	0,30	0,69	220548	13707
1995	0,27	0,23	0,50	0,09	0,05	0,13	0,37	0,74	229695	14186
1996	0,23	0,23	0,46	0,07	0,06	0,13	0,34	0,73	233481	14122
mean	0,21	0,20	0,41	0,07	0,07	0,14	0,27	0,65	209979	13298
st.dev	0,04	0,02	0,06	0,01	0,01	0,01	0,06	0,06		

[11] Lower values have been computed by Leonard and van Audenrode (1993) for Belgium and by Gerlach and Wagner (1993) for Lower Saxony, but the dataset covers only large establishments. Average job reallocation was 23% (all size establishments) in Denmark by Albœk and Sørensen (1998).

The average value of 35% (32% in firms>5 employee, over the stock value) of worker flows accounted for by job flows can be compared with the estimate of 35%-56% by Davis and Haltiwanger (1992), 24% by Anderson and Mayer (1994) and by 38% by Burgess, Lane and Stevens (2000)[12].

Total turnover is the sum of a job reallocation rate of 14% and a churning rate of 27%. Churning flows account for 65% of all worker flows, peaking 74% in boom years and in recent years, with a low of 60% in the slack year 1993 and in the early eighties. The very high churning rate indicates a large amount of worker mobility over and above that occasioned by job reallocation. Data show that churning declines with the size of the employer (both turnover and job reallocation decline) but is not related to the age of the establishments, apart from the huge flows during the first couple of years of activity. On the whole churning flows are important throughout the age and size distribution of the establishments, but larger establishments have a higher churning over turnover as in Burgess Lane and Stevens (2000). Our figures are almost double the rates reported by Burgess Lane and Stevens, for a comparable plant size and age, once the flow rates are rendered homogeneous (referring our numerators to the stock value). The frequency distribution of the ratio (CH/TT) is shown in figure 1. Clearly for most employers for most of the time, job reallocation flows are a minor factor in worker flows. Figure 1 shows that, by the end of the time interval, almost 65% of all establishments faced a turnover rate that was made by 50% or more by churning while half of the establishments faced a turnover rate that was made by 75% or more by churning. This means that half of the establishments were affected by churning of very high magnitude. The percentage of establishments affected by high churning (>50%) has increased through time, moving from 50% at the beginning of the interval to 65% in 1996 (of firms with a positive TT).

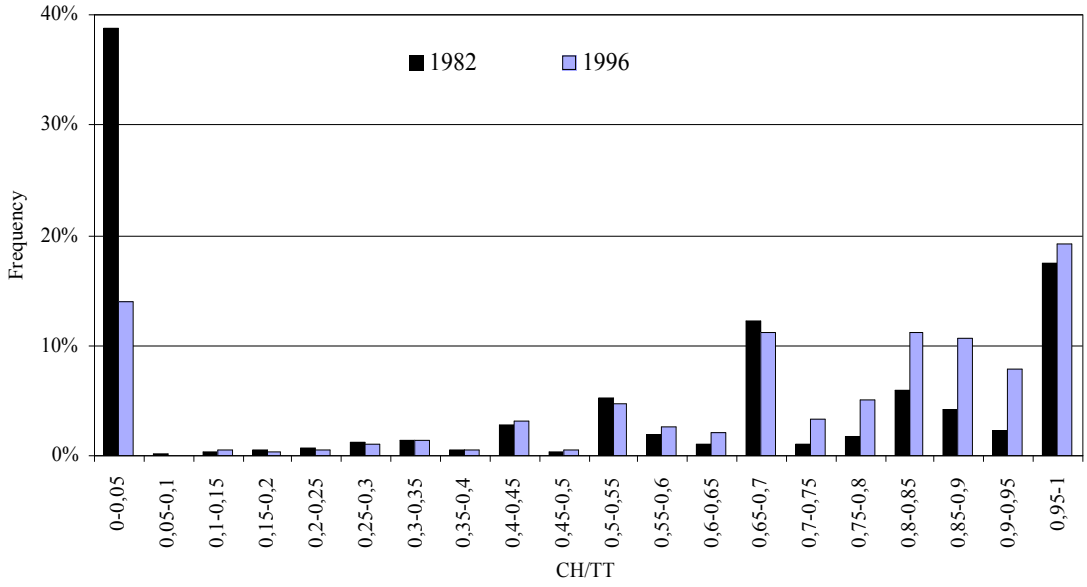
[12] Such comparisons look exciting but hide serious pitfalls. Sample coverage and business units are often differently defined. Ownership and organizational changes vary across different datasets and are differently dealt with. The roles played by institutions are different, so different are the wage policy and job security provisions in different countries and these reflect immediately in the magnitude of flow measures. See Davis and Haltiwanger (1999, p.1753).

Table.2. Job and worker reallocation in manufacturing per establishment's size and establishment's age.

	TT		GJT		CH		CH/TT	
	1982	1996	1982	1996	1982	1996	1982	1996
Size classess								
Employment ≤5	0,63	0,63	0,32	0,26	0,31	0,37	0,50	0,59
5<Employment≤15	0,47	0,52	0,19	0,15	0,28	0,37	0,60	0,71
15<Employment≤49	0,31	0,47	0,12	0,11	0,19	0,36	0,61	0,77
49<Employment≤99	0,22	0,38	0,08	0,08	0,15	0,30	0,66	0,78
99<Employment≤199	0,21	0,33	0,09	0,06	0,12	0,27	0,57	0,81
Employment>199	0,14	0,27	0,06	0,06	0,07	0,21	0,55	0,78
Plant's age								
1≤ years <3	0,46	0,59	0,20	0,19	0,27	0,40	0,57	0,68
3≤ years <8	0,41	0,38	0,15	0,11	0,26	0,27	0,63	0,71
8≤ years ≤21		0,40		0,11		0,29		0,73
years>21		0,45		0,10		0,35		0,77

The number of employee is the denominator in the turnover formula, i.e. employees exposed to turnover risk. The plant's age 3-7 is 3-6 for 1982.

Figure 1. Churning flows as a proprortion of total flow
All establishments.



The high level of excess reallocation is directly associated to the extent that accessions and separations are associated with large changes in employment, at the plant level.

High accessions in declining plants are, by necessity, associated with very high excess reallocation flows, as high separations in expanding plants.

Figures 2 and 3 show the cross sectional distributions of accessions and separations by establishment growth rate for continuing plants, in order to get rid of the effect of new and closing plants. Opening of new plants accounts for 13,5% of accessions in manufacturing; the major part of accessions takes place in moderately growing and declining plants: 73% of all accessions are in plant with growth rate between -0.1% and 0.2%; 23% of all accessions take part in establishments with decreasing or constant employment.

Declining plants hiring a substantial amount of workers highlights the heterogeneity of the plant work force and the importance of a continuous flow of worker excess reallocation.

A very large share, 48%, of all separations takes part in expanding plants. Separations in expanding plants were 37% in 1982 to rise to 55% at the end of the period: further evidence of worker heterogeneity and of an increase in such heterogeneity in the most recent years (higher churning).

The large amount of separations in expanding plants means that hires need to be much greater than job creations in order to achieve the desired expansion and supports different evidence. First, accessions and separations are strongly correlated within the same year, for continuing establishments[13]. Mortality rate for new job matches is quite high: on average 37% of new accessions are closed in 6 months or less, so we interpret this as mismatched new accessions leading to separations. Particularly expanding establishments, that need to hire more people, are subject to wrong hirings and this reflects in excess reallocation as the mistakes are rectified, by workers or by entrepreneurs. Second, the labour market becomes more mobile as time goes by. 37% of separations pertain to growing establishments in 1982, to reach 54% in 1990, had a low of 42% in the slack year 1993 and a peak of 62% in 1995. This, of course, mirrors the cyclical behaviour of the excess reallocation ratio in table 1. Expanding establishments hire young workers and these are more mobile than mature workers; half of the young employees are hired through training programs or apprenticeship. Third, many hires fill short period jobs: 40% of total hires end in 6 months: half of these are the result of an

[13] To get rid of the effect of new plants and closing plants; in Veneto, in most years, the balance is positive.

explicit firm's policy to exploit seasonal work or work of limited duration, while the other half is probably dominated by workers, leaving to obtain better job matches and lead to replacement[14].

[14] Firing for cause and retirement are included in these numbers, but the amount of fires is likely to be of small magnitude, specially in expanding plants, and the large number of separations underlines the large extent of voluntary quits. Only this point is taken by Albœk and Sørensen (1998), but there are no reasons not to consider the first two arguments,

Figure 2. Percentage of accessions by establishment growth rates.

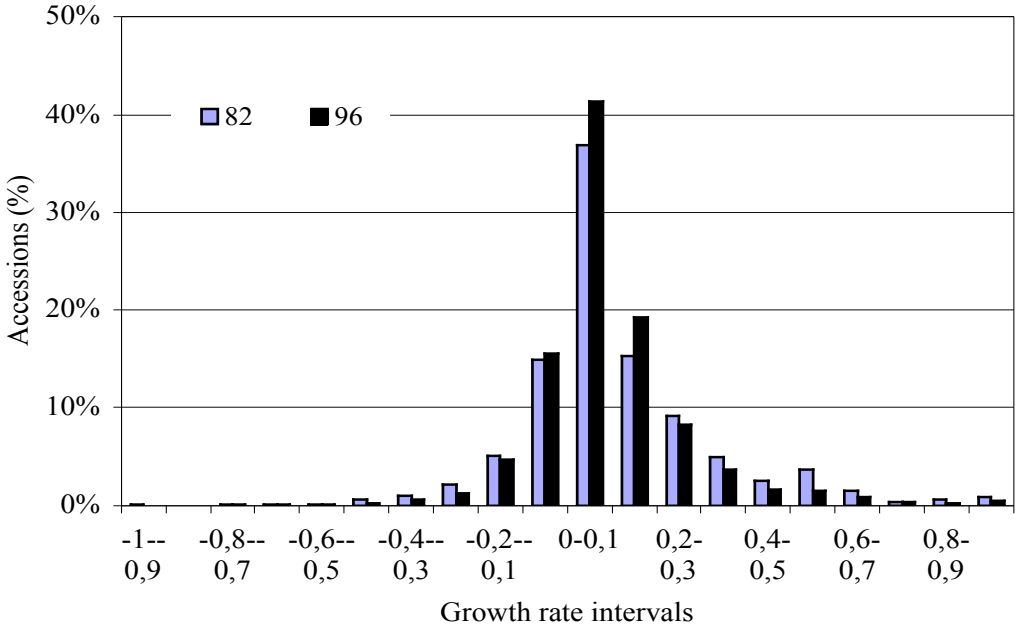
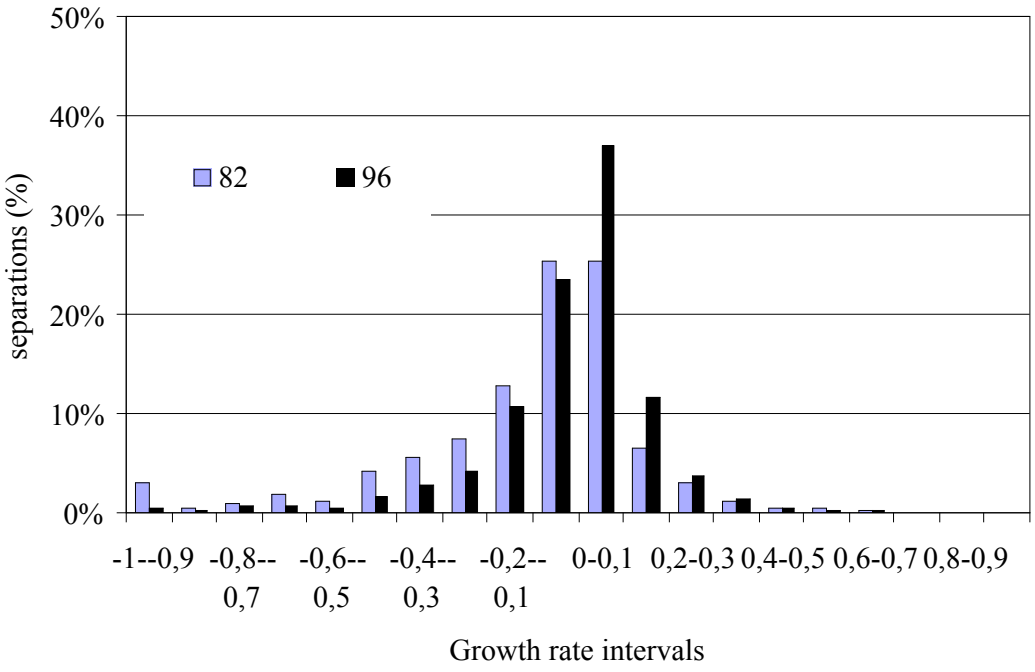


Figure 3. Percentage of separations by establishment growth rate.



3.2 Workers heterogeneity.

The high level of excess reallocation does not imply that all workers change job frequently. Workers heterogeneity shows evidently in differences in mobility.

High worker flow rates can be reconciled with the findings of a large quota of lifetime jobs that characterise the Italian labour market according to international comparisons. We address the issue of whether reallocation is confined to a fringe of high turnover positions by taking all workers employed in a period T and asking how many workers were employed with the same employee both in $(t - i)$ and in $(t + T - i)$, $i = 1 \ldots T$. Table 5 presents the results[15]. There is a stable core of positions and workers. 73% of workers are employed with the same employer during at least 7 years, despite the huge worker flow rate recorded above. This quota is superior to the similar quota computed by Burgess, Lane and Stevens (2000) and by the quota reported by Anderson and Mayer (1994) and underlines the basic idea, common to many comparative studies, that the Italian labour market is the market of *posto fisso*.

The contemporary presence of high flows means that the labour market is segmented. What kind of worker heterogeneity explains such a huge difference in worker flows? Mobility is higher for males and lower for females, higher for blue collars and lower for white collars, higher (double) for immigrants and lower for native workers (Bragato, 2003) but on the whole such differences are not very marked (immigrants in the nineties are still a lomited amount on the stock value).

We pursue the idea of an important heterogeneity among workers taking age into account. Mobility is very high for young workers: total turnover measures 64% for workers less than 25 years old and 27% for workers between 26 and 49 years. More and more young people arrange some years of job shopping before entering a period of stable employment and employers frequently resort to seasonal workers. The increment of mobility that has taken place through time is particularly evident for young people, under 25-30 years of age (Table 3). The standard deviation declines rapidly at the central ages; mature workers appear much more homogeneous, in respect to mobility, than young workers, while the various pension reforms have varied through time the retirement age (Table 4).

[15] The detailed procedure is in Tattara and Valentini (2005).

Table 3. Total turnover according to personal characteristics of the employee.

	Sex		Qualification	
	Males	Females	Blue collars	White collars
1982	0,32	0,31	0,32	0,26
1983	0,31	0,30	0,31	0,27
1984	0,33	0,33	0,34	0,28
1985	0,38	0,38	0,39	0,31
1986	0,39	0,38	0,39	0,32
1987	0,42	0,40	0,42	0,34
1988	0,47	0,43	0,47	0,35
1989	0,49	0,45	0,49	0,36
1990	0,48	0,44	0,48	0,36
1991	0,43	0,39	0,43	0,32
1992	0,40	0,37	0,40	0,31
1993	0,36	0,33	0,36	0,26
1994	0,46	0,40	0,46	0,31
1995	0,52	0,46	0,53	0,33
1996	0,49	0,42	0,49	0,33
mean	0,42	0,39	0,42	0,31
st.dev.	0,07	0,05	0,07	0,03

Table 4. Total turnover according to the employee age.

	Years of age									
	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	61-65
1982	0,59	0,34	0,23	0,19	0,16	0,15	0,15	0,20	0,32	0,49
1983	0,60	0,32	0,23	0,18	0,16	0,15	0,15	0,23	0,36	0,58
1984	0,67	0,35	0,24	0,21	0,17	0,16	0,17	0,22	0,35	0,50
1985	0,78	0,42	0,28	0,22	0,19	0,17	0,17	0,23	0,35	0,47
1986	0,77	0,44	0,30	0,23	0,19	0,17	0,18	0,23	0,34	0,47
1987	0,81	0,48	0,33	0,26	0,22	0,19	0,18	0,25	0,32	0,43
1988	0,86	0,56	0,37	0,29	0,24	0,21	0,18	0,25	0,33	0,44
1989	0,87	0,58	0,42	0,34	0,28	0,23	0,20	0,24	0,33	0,47
1990	0,85	0,55	0,43	0,37	0,29	0,23	0,19	0,24	0,35	0,49
1991	0,80	0,50	0,38	0,33	0,26	0,21	0,17	0,24	0,31	0,45
1992	0,83	0,46	0,35	0,29	0,25	0,20	0,19	0,27	0,35	0,46
1993	0,81	0,40	0,30	0,25	0,21	0,18	0,17	0,28	0,37	0,42
1994	1,00	0,53	0,38	0,33	0,27	0,21	0,21	0,40	0,48	0,45
1995	1,10	0,62	0,46	0,39	0,34	0,27	0,22	0,28	0,36	0,47
1996	1,04	0,58	0,44	0,37	0,31	0,25	0,20	0,37	0,46	0,52
mean	0,82	0,47	0,34	0,28	0,24	0,20	0,18	0,26	0,36	0,47
st.dev.	0,15	0,10	0,08	0,07	0,06	0,04	0,02	0,05	0,05	0,04

Table. 5. Duration of job matches.

% of jobs that have a tenure of				
	0-1 years	2-5 years	6-7 years	> 7 years
1982	6.57	21.83	7.55	64.05
1983	6.26	20.45	7.88	65.41
1984	7.00	19.85	8.19	64.96
1985	8.69	20.74	8.18	62.40
1986	9.07	22.66	7.67	60.60
1987	10.34	24.10	7.06	58.49
1988	11.30	24.82	7.01	56.87
1989	11.99	25.01	7.33	55.67
1990	11.85	24.85	7.71	55.59
mean	9.23	22.70	7.62	60.45
st.dev.	0.021378	0.0195	0.004059	0.037244

4. Worker flows determinants.

Worker flows are the result of the firm personnel policy and the workers voluntary movements variably interlocked through time. An estimate of the excess reallocation is indirectly computed estimating the relation between TT and GJT, including territorial and yearly dummies and all observable characteristics of the establishments and of the workers[16].

Figure 5 provides a graphical presentation of the TT-GJT relation. Assume as a starting point a firm with an unknown excess reallocation level (A), reflecting worker and firm heterogeneity. In order to grow (job creation) firm A can pursue two strategies 1) increase accessions and have an higher turnover, i.e. move to (B); 2) decrease

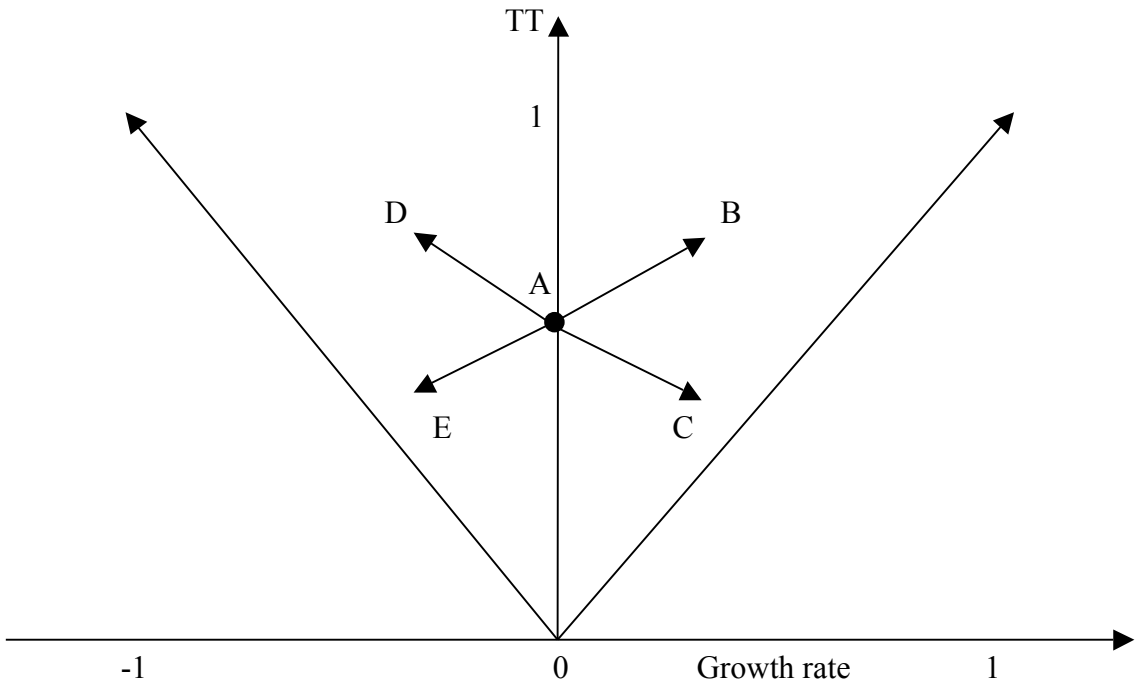
[16] Reallocation is likely to be overstated because of a "measurement error". In fact GJT does not identify individual jobs at the plant level; plant level employment changes, particularly in large firms may not show up in newly created and newly destroyed jobs as observed in Davis and Haltiwanger (1996, p.91) and in Burgess, Lane and Stevens (2000, p.428), and the recourse to seasonal work, of a permanent character, does not show up in employment changes computed at yearly intervals (Anastasia, Gambuzza and Rasera, 2000). The uncertain meaning of GJT is reflected in "measurement error" in CH, as CH = TT - GJT, hence the regression of CH on GJT is likely to show up a negative coefficient induced by measurement error. Let us assume $TT_j = CH_j + GJT_j$ i.e. excess reallocation or churning flows as accessions + separations in excess of creations and destructions in a year. We want to examine the CH decisions by establishments. Following Burgess (2001) CH is correlated with GJT, but as reported, job flows are understated and reallocation flows overstated $TT_j = (\overline{CH}_j + \alpha_j) + (\overline{GJT}_j - \alpha_j)$ where the two measures are corrected by α_j to get the true, non observable, reallocation value. The correction coefficient affects CH and GJT in the same measure, as the error is symmetric by definition. The relation between CH and GJT is underestimated as the covariance between the two is distorted due to

$$\mathrm{Cov}(CH_j, GJT_j) = \mathrm{Cov}[(\overline{CH}_j + \alpha_j), (\overline{GJT}_j - \alpha_j)] =$$

$$\mathrm{Cov}(\overline{CH}_j, \overline{GJT}_j) - s_a^2 + \mathrm{Cov}(\overline{GJT}_j, \alpha_j) - \mathrm{Cov}(\overline{CH}_j, \alpha_j)$$

separations and have a lower turnover, move to (C). In order to decline (job destruction) the conceivable strategies are 1) increase separations and have a higher turnover, move to (D); 2) decrease accessions and have a lower turnover, move to (E).
Higher accessions (north east of A) provide the *direct* answer to a positive change in employment, while a negative change in employment is *directly* accomplished by higher separations (south west of A).

Figure 5. Relationship between TT and the firm's rate of growth.



Growth rate absolute value is represented by GJT. Figures 6 and 7 represent, in the TTxGJT plane, the relation between total flow and job flow rates in 1982 and 1996 for continuing employers. The figure is comparable to fig.4 in Burgess Lane and Stevens (2000, p.491). First, a lot of establishments with modest growth rates have a widely dispersed pattern of worker flows and, as a consequence, various excess reallocation levels (the central part of the plot): this dispersion reflects the heterogeneity between workers and firms. Second, high job flows (high growth rates, both positive and negative) tend to exhaust total flows, leaving a modest excess reallocation: rapidly growing firms provide a stimulating environment to the workers, and entrepreneurs prefer to delay the possible mismatch adjustment to more quiet periods. Third, the TT-

GJT pattern is non symmetrical in relation to the firm growth rates. The empirical analysis shows that growing firms move from A to B in terms of figure 5, with both higher hirings and separations, and declining firms move from A to E with increased separations and few hirings. Fourth, excess reallocation flows are, on the whole, much higher in 1996 than in 1982, as we have already noticed: the dark core of the plot is larger in figure 7 than in figure 6.

The inferior linear boundary of the TTxGJT plot reflects $TT \geq GJT$ as in (5). The superior linear boundary is the consequence of $TT + GJT \leq 2$: $TT + GJT = ((a + s) + (a - s))/N = 2a/N$, as $\max(a) = N \Rightarrow TT + GJT \leq 2$. These two conditions shape a triangular area.

Figure 6. Total turnover and Gross job flows at the establishment level. 1982.

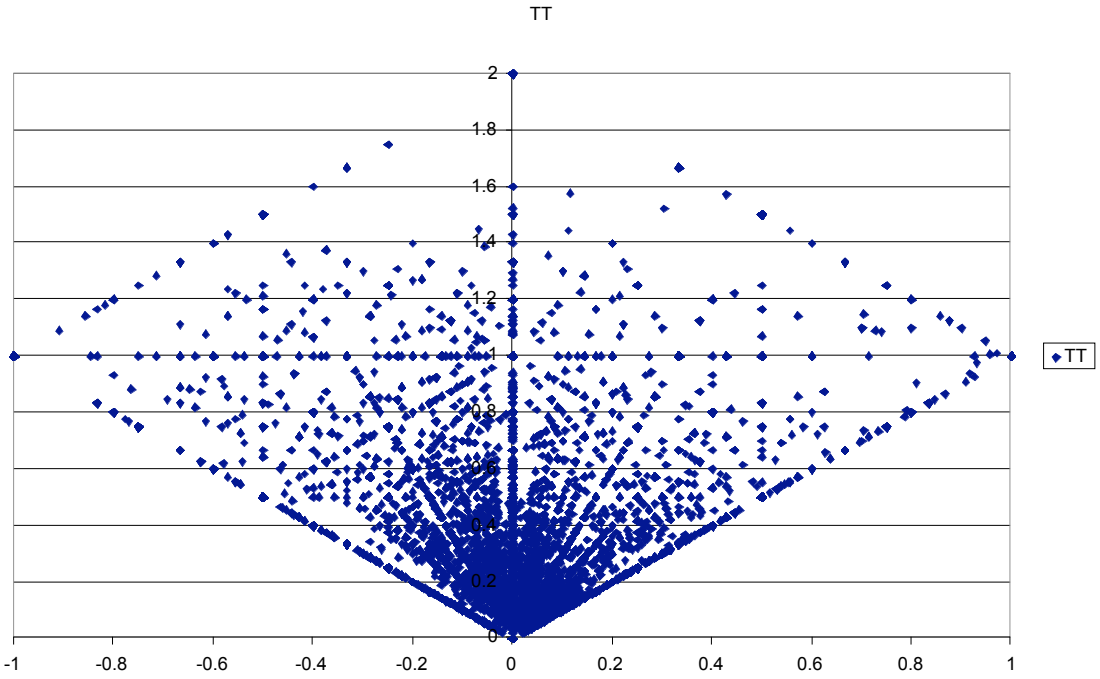
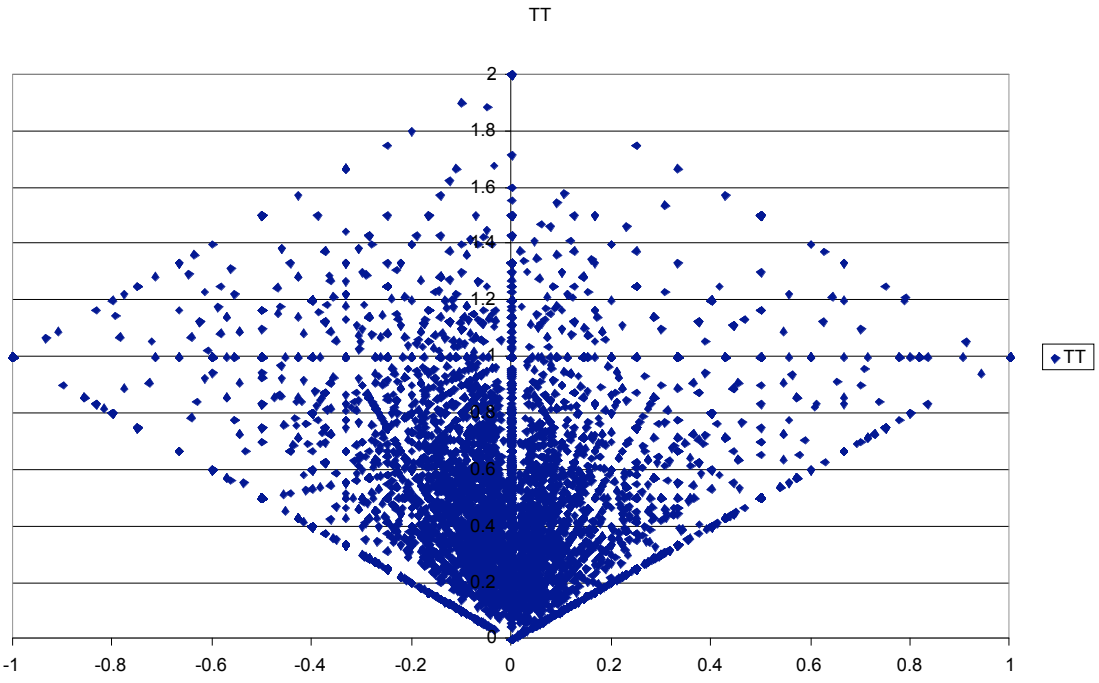


Figure 7. Total turnover and Gross job flows at the establishment level. 1996.



In order to answer the dynamic relation between TT and GJT, the following equation has been estimated:

$$TT_i = \text{constant} + b_0 GJT_i + b_1 GJT_i^2 + \mathbf{b}X_i + \_i \qquad t = 1982, \ldots, 1996 \qquad (7)$$

where X_i is a vector of explanatory variables controlling for observable heterogeneity: plant size, plant age, territory, worker gender, age, qualification, labour contract and so on, as fully detailed in the Appendix.

Different models for growing and declining firms over the population of continuing establishments from the year 1982 to year 1996 are estimated[17]. Figure 8 and 9 chart the main determinants of the TT-GJT relation after controlling for firms and employees basic heterogeneity and point to a clear pattern for churning flows as a measure of bad matching (and unobserved heterogeneity). Several patterns of mismatching are observed in relation to the rate of growth of the individual firm, to the economic cycle and to labour market structural evolution.

Growing and declining firms. For a stated rate of variation in employment, positive net hirings (growing firms) are associated to larger worker flows than negative net hirings (declining firms); the relation is stable and clear through time. Growing firms hire and

[17] For space reason only GJT coefficient estimates are reproduced; other results are in the appendix.

separate, as several hirings turn out in bad matching and need replacement, while declining firms separate workers and do not replace retirements. Entrepreneurs of growing firms hire more than what is needed to face the employment increase as many hires end up quickly in a separation. Some marginal reshuffling in order to revise possible mismatching occurs in declining firms as well, but does not alter the picture and turnover and churning are relatively low.

The relation between turnover and job variation is positive as higher growing firms have relatively less churning: rapid growing firms basically hire workers. To work in a dynamic stimulating environment increases the worker 'threshold separation value' and workers tend to stay and at the same time entrepreneurs are not willing to loose their employees, especially when demand is growing. The relation assumes a flat shape as growth rate increases: firms registering a high growth rate are more concerned with having the required number of people than with the match quality. There is not much time left for performing an accurate personnel selection and manage a replacement process, that is probably delayed to the near future.

The cycle and the evolution of the labour market structural characteristics are also influential and can be identified since they both have changed through time in the period at hand. Boom and decline in the economy. When the economy is experiencing rapid growth, as in the mid eighties and in the mid nineties job seekers are mainly employed workers and excess reallocation reflects the employment to employment process. For a given level of GJT, TT is definitely higher in boom than in slack years. The observation of TT and GJT in figure 8 and 9 provides support to this interpretation comparing slack years as 1983, 1992 with boom years as 1985, 1990 and 1995. When demand is low, employees are keen in keeping their job, whatsoever they may be; as soon as employment increases at the aggregate level, more and more total flows represent replaced quits, and excess turnover or churning explains the larger part of total turnover.

Labour market structural evolution. The TT-GJT relation estimate referred to the mid nineties points to a higher TT value for a given GJT than in the mid eighties; two expansionary periods, but the second one has developed in a more tight setting. Labour market structure deeply influences the dynamic of the process. Workers move in a tight labour market shifting easily from job to job without fear of unemployment and the threshold value of a viable 'job idea' declines. Thus more 'new ideas' are turned into

jobs in a tight labour market, increasing vacancies still further, as firms re-advertise immediately, in order to fill the vacant slots: in boom no employer is willing to loose his workers and reduce his activity level. With full employment, it is the worker that plays the game: in a tight labour market the relation TT-GJT in the TTxGJT plane are higher and more flat, as the major part of total turnover is made by churning (i.e. the comparison between 1992 – trough - and 1990 and 1995 – peaks). A tighter market means an increasing number of quits, mainly voluntary in nature resulting from the excess labour demand, and greater workers ability to swap easily towards more preferred jobs. Firms are forced to face an increased number of replacements in order to get a desired personnel structure; they are more the passive than the active players of the game.

Firms willing to decrease employment in the context of a tight labour market do not hire and increase separations in bad years. In this situation a tight labour market results in a larger TT for a given GJT: the threshold value of a viable 'new job prospect' is almost nil and the worker moves easily to a different job, i.e. the high value of the 1990 and 1995 relation in figure 9. In a loose market, as in 1983, 1985 and 1992, firms basically reduce hirings.

Figure 8. TT and GJT estimated relationship in growing firms

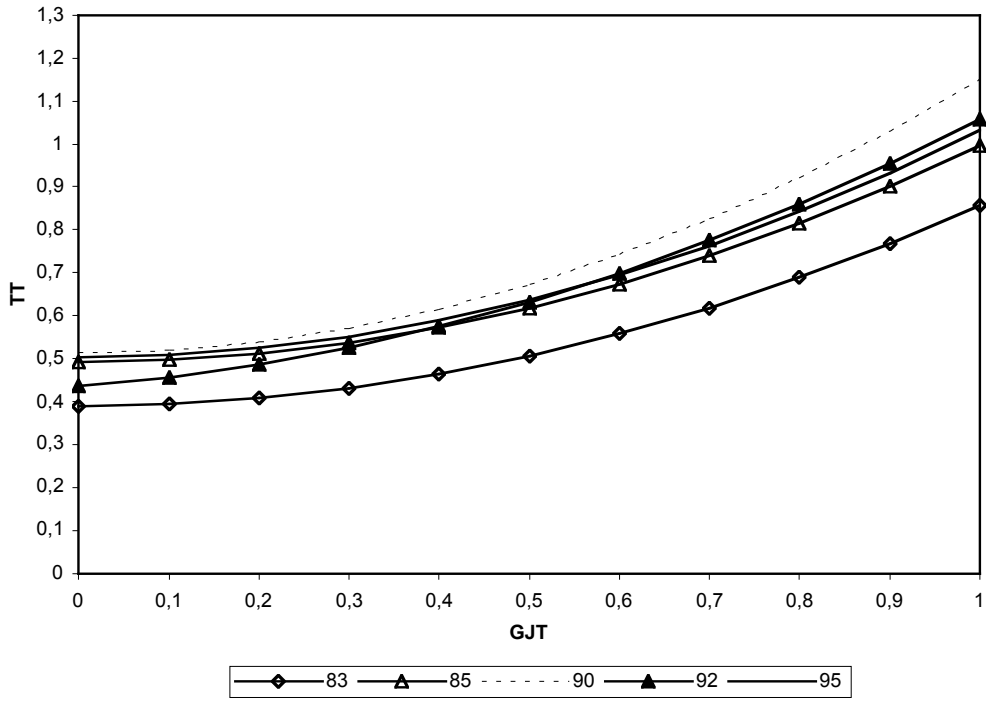
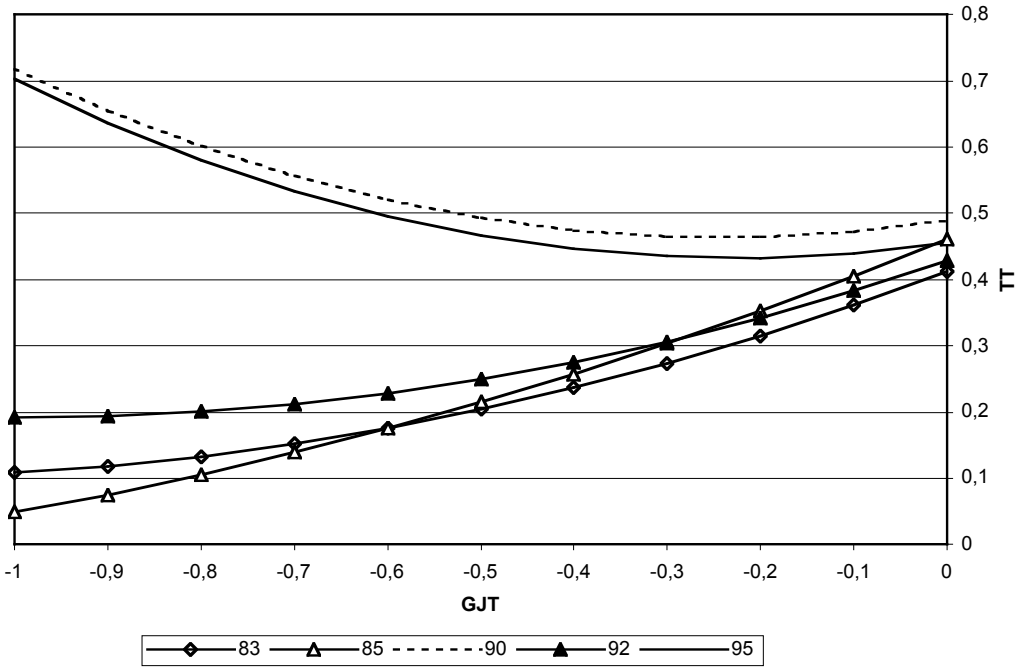


Figure 9. TT and GJT estimated relationship in declining firms



5. Conclusions.

Almost all the firms almost all the time are simultaneously hiring and experiencing separations. We have shown that on average firms expand by raising their hiring and this move is often paralleled by an expansion in separations, as a substantial part of new hirings end in a short period of time, either because they fill temporary jobs either because recently made matching are often revalued by both sides, workers and firms. Conversely, firms reduce the workforce by increasing separations and slightly reducing hirings. There are substantial differences and asymmetries in firm's behaviour according to their growth dynamics, the economic cycle and the structural evolution of the labour market. Using the employer-level panel VWH we have been able to separate employer heterogeneity from match heterogeneity and, exploiting the time properties of the series, we have shown the permanence of match heterogeneity over and above employer and worker heterogeneity and have pointed to some meaningful explanatory variables. This result throw new light on the idiosyncratic behaviour of firms as a cause of reallocation, which has most recently been noted by both Davis and Haltiwanger (1999) and Abowd et al. (1999) and at the same time enriches the Burgess, Lane and Stevens (2000, 2001) findings, as it takes advantage of a much longer period of observation.

The presence of bad matching explains why firms in general want some minimum level of worker turnover despite the costs associated with it, even when employment is increasing quite rapidly. For some firms a low pay/high turnover strategy may simply be the cheapest strategy, but in general the explanation lies in the necessary revision of bad matching both by firms and workers. These results substantiate the need for a micro level analysis of employment adjustment and at the same time suggests that aggregate analysis of the labour market evolution through time offers important elements to understand the phenomenon.

The dynamic relation between worker flows and churning flows, taken into account workers and firms observed heterogeneity, is still complex. A tight labour market, given a stated job creation, has a higher churning than a market with high unemployment, both for declining and growing firms. But the dynamics at the employer level tells us that growing and declining firms have a asymmetric behaviour and that the most rapidly growing firms experiment a limited total turnover, as they concentrate on hiring, and delay personnel reshuffling to the subsequent day. Declining firms in a tight market are abandoned by workers that leave the sinking ship in excess of the declined required by the job losses and, as a consequence, hire and have a high turnover rate.

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Appendix

In equation (7) X_i is a vector of explanatory variables, controlling for observable heterogeneity: plant size, plant age, area dummies, sector dummies, craftsman-other firms dummies, ratio between employees <30 years old and total stock, ratio between blue collar and total employee stock, ratio between males and total stock, ratio between CFL (training and work contract) and apprenticeships to total employees, ratio between seasonal workers and total employee stock.

Normalized variables are preferred to "level" variables in order to avoid the dimensional effect: TT depends on the firm structure, rather than on the absolute value of its characteristics.

Different models for growing and declining firms on population of continuing establishments from 1982 to 1996 have been estimated. The starting and closing years are excluded. Coefficients of 1993 and 1990 are in table 1A; other estimates are available on request.

Table 1A : Estimation results

	1983		1990	
Variables	Growing firms	Declining firms	Growing firms	Declining firms
GJT	0.1092221 (0.0601741)	0.5304398 (0.0468396)	-0.0773138 (0.0467086)	0.2143078 (0.0468509)
GJT square	0.4672064 (0.0605303)	0.2270958 (0.0438492)	0.6374797 (0.0505554)	0.4423396 (0.0454012)
dimension	-0.000469 (0.0000912)	-0.000241 (0.0000304)	-0.0001631 (0.0000782)	-0.0002373 (0.0000451)
dimension square	0.000000252 (0.0000000684)	0.0000000477 (0.0000000075)	-0.0000000694 (0.0000000808)	0.0000000459 (0.0000000119)
firms'age	0.0125153 (0.0069155)	0.0229267 (0.0076526)	0.0094451 (0.0026212)	0.0109869 (0.003231)
firms'age square	-0.0023815 (0.0006733)	-0.003419 (0.0007238)	-0.0009022 (0.0001451)	-0.0010223 (0.0001742)
fraction of seasonal workers	1.53386 (0.0591345)	1.63565 (0.0679278)	1.65686 (0.0410046)	1.677671 (0.0436503)
fraction of man workers	-0.0447542 (0.0115446)	-0.0461665 (0.0107291)	-0.0703747 (0.0106907)	-0.0638585 (0.0109983)
fraction of young workers	-0.118635 (0.0126967)	-0.1017252 (0.0116489)	-0.1986939 (0.0121538)	-0.1877847 (0.0123698)
fraction of fixed term workers	0.1224221 (0.0145948)	0.1169251 (0.0138293)	0.1280901 (0.0133365)	0.1206366 (0.0133772)
fraction of blue collar workers	-0.5159035	-0.503549	-0.4122132	-0.4261355

	(0.0223035)	(0.0214039)	(0.0161637)	(0.0172013)
artisan firms	0.0714505	0.0818812	0.0817135	0.101431
	(0.0075155)	(0.0071697)	(0.0062661)	(0.0072263)
Dummy if GJT=0	-0.1108671	-0.0622451	-0.1545955	-0.1391
	(0.0096683)	(0.0084965)	(0.0076687)	(0.0085442)
Sector dummies:				
sector 1	0.0238638	0.0214737	0.0550309	0.0586835
	(0.0104753)	(0.0096749)	(0.0088669)	(0.0097268)
sector 2	-0.0232483	-0.011402	0.0032415	-0.0035858
	(0.0129367)	(0.013126)	(0.0121843)	(0.0127338)
sector 3	0.0460966	0.0450087	0.0771035	0.0867559
	(0.0098283)	(0.0094329)	(0.0077128)	(0.0090529)
sector 5	-0.0193389	-0.0252835	0.0078595	0.0091579
	(0.014022)	(0.0127853)	(0.0109002)	(0.0120697)
sector 6	0.0297275	0.0360475	0.0590705	0.0427987
	(0.013179)	(0.0128853)	(0.0119945)	(0.0133453)
sector 7	-0.0104207	-0.0045938	-0.0052675	0.0003879
	(0.0127798)	(0.0128587)	(0.0107801)	(0.0122192)
sector 8	-0.01218	-0.0161091	-0.0005177	0.0128363
	(0.0179452)	(0.0176705)	(0.0137825)	(0.0165501)
Territorial Dummy:				
area 1	0.0645013	0.0484763	-0.0177614	0.0026241
	(0.0431659)	(0.0380562)	(0.0299654)	(0.0443056)
area 2	0.0238966	0.005176	0.0306253	0.0188248
	(0.0128774)	(0.0123392)	(0.0118957)	(0.0132913)
area 3	0.0674182	0.0917234	-0.0268925	-0.0117659
	(0.0600888)	(0.0619138)	(0.0294916)	(0.0306278)
area 4	0.0127318	0.0167067	-0.0012259	-0.0058041
	(0.0124755)	(0.0118843)	(0.010329)	(0.0114741)
area 5	0.025134	0.0181384	0.0182949	0.0166454
	(0.0174848)	(0.0154632)	(0.0143555)	(0.0166351)
area 6	-0.0174936	-0.0111453	0.0056162	-0.0283707
	(0.0173086)	(0.0190958)	(0.0194171)	(0.0194712)
area 7	0.0061748	0.0061276	-0.0096699	-0.007252
	(0.0144369)	(0.0144165)	(0.0126126)	(0.0141939)
area 8	0.0103995	0.0047481	0.0112394	0.0162892
	(0.013131)	(0.0125773)	(0.0127119)	(0.0141358)
area 9	0.0134701	0.0050636	0.0008884	0.0105103
	(0.0169649)	(0.0158507)	(0.014853)	(0.0158618)
area 11	0.012715	0.0262623	-0.0081628	-0.0017317
	(0.0172332)	(0.0168977)	(0.0128781)	(0.0159225)
area 12	0.0458948	0.0369068	0.0056324	-0.0161377
	(0.0163038)	(0.0147451)	(0.0118621)	(0.012902)
area 13	0.0177098	0.0124022	0.0031188	0.0091244
	(0.0129484)	(0.0124343)	(0.011882)	(0.0132909)
area 14	0.0103134	-0.0000634	-0.001021	-0.0105177
	(0.0166277)	(0.0151553)	(0.0132889)	(0.0151531)
area 15	0.0101434	0.0189936	0.0214466	0.0086982
	(0.0145234)	(0.0142835)	(0.0146719)	(0.0165414)
area 16	0.0176667	0.0106355	0.0230354	0.0179059

	(0.0117379)	(0.0110031)	(0.0100486)	(0.0110785)
area 17	0.0268691	0.026388	0.0081831	-0.0044446
	(0.0183315)	(0.0168327)	(0.0166036)	(0.0183061)
Constant	0.7255904	0.6319379	0.722718	0.6951804
	(0.0274125)	(0.0268206)	(0.0189536)	(0.0215205)

Note: Robust standard error in parenthesis.