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The cyclical behaviour of
job and worker flows

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Abstract

This research exploits a large employer-level panel dataset in order to analyse employment and worker flows. Excess reallocation, the difference between worker and job flows at the firm level, is substantial and has a definite cyclical pattern. Both accessions and separations are cyclical in contrast to the conventional wisdom that assumes separation to be countercyclical. Separations increase in upswing, following the accession increase, and decline in recession. Unemployment during recession is not, to a large extent, due to an increase in the rate at which workers separate from their employers, as traditionally assumed among macroeconomists, but to the decline in job creations.

Keywords: Job Flows, Worker Flows, Reallocation, Cyclical behaviour

JEL Codes: E24, E32, J21, J44

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The cyclical behaviour of job and worker flows¹.

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 excess reallocation flows or churning flows: these are mainly job-to-job flows. The high level of such flows in Canada, Denmark, Estonia, France, Italy, Netherlands and in the United States, has been recently discussed (for a summary: Davis and Haltiwanger, 1999; Haltiwanger and Vodopivec, 2002).

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.

Both accessions and separations are cyclical in contrast to the conventional wisdom that assumes separation to be countercyclical. As a result excess reallocation is cyclical. Separations increase in upswing, following the accession increase, and decline in recession. Unemployment during recession is not, to a large extent, due to an increase in the rate at which workers separate from their employers but to the decline in job creations. In a similar vein a labour market that becomes more and more tight as time goes by, is characterised by an increasing turnover (both accessions and separations) and an increasing excess reallocation. The excess reallocation increase is largely independent from the labour market reforms that have attempted to make more flexible the Italian labour market in the nineties.

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 provides some empirical evidence of these flows. The following

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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.

sections 4 and 5 extend the study of the general relationship between total turnover and gross job turnover taking explicit account of the cycle and controlling for firms and workers heterogeneity, section 6 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 lavoratori², a alleged strong element of rigidity in the Italian labour

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 behavior on the grounds of union membership or activity and so on. As far as 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 require 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.

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.

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 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 uninterrupted³.

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

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

Worker total turnover (TT) is defined as the total number of accessions (a) to a job or separations (s) from a job in the economy in a definite time interval⁶. The turnover ratio is defined as the ratio between turnover and the number of individuals exposed to the turnover risk (N), i.e. 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

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.

denominator is a measure of employment: past employment, current employment or an average of the two (Davis and Haltiwanger, 1999).

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

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.

Gross job turnover (GJT) 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 , $j=1, \dots, F$. The rate of job turnover or gross job turnover is the ratio between the sum of creations and destructions, in absolute value, computed at the plant level, and the number of individuals exposed to the turnover risk (N).

$$GJT = \frac{1}{N} \sum_{j=1}^F (c_j + d_j) \quad (2)$$

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:

$$a - s = \sum_{j=1}^F (c_j - d_j) = \Delta E \quad (3)$$

$$T^*T \geq GJT \geq \Delta E \quad (4)$$

The difference between accessions and separations is equal to the difference between creations and destructions and measures the net growth of the employment stock. 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: job turnover 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. Worker and job turnover 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.

Worker flows have two components: those that are an immediate consequence of job creation and destruction and those that are in excess of these flows⁸. 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 excess reallocation 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: a job to job transition. The employer keeps the same employment level but reshapes his firm's

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.

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.

skill mix through parallel hiring and firing (Burgess et al., 2000, p.79). Excess reallocation is defined as the difference between worker and job turnover flows⁹.

$$CH = TT - GJT \quad (5)$$

1. Empirical evidence.

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 value¹⁰). 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 variation in accessions more than in separations (table 1).

Figure 1. Accessions, separations and excess reallocation

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 Akerlof et 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.

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. 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. 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 mechanics¹¹. 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 excess reallocation.

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 Albæk and Sørensen (1998).

Table 1. Worker and job flows in Veneto manufacturing.

	a/N	s/N	TT	c/N	d/N	GJT	CH	CH/TT	employees	unemployment rate	n. firms
1982	0,15	0,17	0,32	0,06	0,08	0,13	0,18	0,57	193505	0,067	10882
1983	0,14	0,17	0,31	0,05	0,09	0,14	0,17	0,54	185989	0,078	10741
1984	0,16	0,17	0,33	0,07	0,07	0,14	0,19	0,57	184164	0,090	11292
1985	0,21	0,17	0,38	0,09	0,06	0,15	0,23	0,61	191032	0,084	12319
1986	0,21	0,18	0,38	0,09	0,06	0,15	0,24	0,62	196304	0,077	12922
1987	0,22	0,20	0,42	0,09	0,06	0,15	0,27	0,64	203491	0,074	13601
1988	0,24	0,21	0,45	0,09	0,06	0,15	0,31	0,68	210478	0,068	14268
1989	0,26	0,22	0,48	0,09	0,05	0,14	0,34	0,70	219433	0,058	14759
1990	0,24	0,23	0,47	0,07	0,06	0,14	0,33	0,71	224729	0,047	14910
1991	0,21	0,21	0,41	0,06	0,07	0,13	0,28	0,68	224483	0,046	14433
1992	0,18	0,21	0,39	0,06	0,08	0,14	0,25	0,65	219097	0,055	14118
1993	0,16	0,18	0,34	0,06	0,08	0,14	0,21	0,60	213251	0,054	13213
1994	0,23	0,21	0,44	0,08	0,06	0,14	0,30	0,69	220548	0,062	13707
1995	0,27	0,23	0,50	0,09	0,05	0,13	0,37	0,74	229695	0,056	14186
1996	0,23	0,23	0,46	0,07	0,06	0,13	0,34	0,73	233481	0,054	14122
mean	0,21	0,20	0,41	0,07	0,07	0,14	0,27	0,65	209979	0,065	13298
st.dev	0,04	0,02	0,06	0,01	0,01	0,01	0,06	0,06			

Unemployment figures are from *Veneto Lavoro*, various issues

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 worker turnover is the sum of a job reallocation rate of 14% and an excess reallocation rate of 27%. Excess reallocation 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 excess reallocation rate indicates a large amount of worker mobility over and above that occasioned by job reallocation. Data show that excess reallocation declines with the size of the employer (both worker and job reallocation decline) but is not related to the age of the firms, apart from the huge flows during the first couple of years of activity. On the whole excess reallocation flows are important throughout the age and size distribution of firms, but bigger firms have a higher excess reallocation over

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).

turnover as in Burgess Lane and Stevens (2000). Our figures are almost double the rates reported by Burgess Lane and Stevens, for a comparable firm size and age, once the flow rates are rendered homogeneous (referring our numerators to the stock value). In our population almost 65% of all firms faced a worker turnover rate that was made by 50% or more by excess reallocation and half of the firms faced a turnover made by 75% by excess reallocation (on the importance of job to job transitions, Nagypal, 2004; 2005a; 2005b; Shimer, 2005a; 2005b). This means that half of the firms of the entire population were affected by excess reallocation flows of very high magnitude. The percentage of firms affected by high excess reallocation flows has increased through time as the labour market has become more tight and has followed closely the unemployment cycle with opposite sign. Firms with high reallocation flows ($>50\%$) have moved from 50% at the beginning of the period to 63% at the 1990 peak, have dropped to 53% in the low 1993 to remount to 64% in 1996¹³.

¹³ The percentage refers to firms having a positive TT.

Table.2. Job and worker reallocation in manufacturing per firm's dimension and age.

	TT		GJT		CH		CH/TT	
	1982	1996	1982	1996	1982	1996	1982	1996
Dimension								
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
Age								
1 $\leq$ years < 3	0,46	0,59	0,20	0,19	0,27	0,40	0,57	0,68
3 $\leq$ years < 8	0,41	0,38	0,15	0,11	0,26	0,27	0,63	0,71
8 $\leq$ 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 firm's age 3-7 is 3-6 for 1982.

4. Excess reallocation flows.

Figure 2 provides a graphical presentation of the TT-GJT relation, following Burgess Lane and Stevens (2000, p.491). The upper part of the plane represents the SLL with positive excess reallocation ($TT \geq GJT$). Assume, as a starting point, a firm with growth rate equal zero but a positive excess reallocation level (A), basically due to job to job transitions independent of employment net variations. 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 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).

Figure 2. Relationship between T^*T and the firm's GJT.

Growth rate absolute value is represented by GJT. Figures 3 and 4 represent, in the $T^*T \times GJT$ plane, the empirical relation between total flow and job flow rates in 1982 and 1996 for continuing employers. Various considerations follow. First, a lot of firms 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 jobs and the firms' policy aiming at reducing labour costs via short term/seasonal contracts as well. 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 adjustment to more quiet periods. Third, excess reallocation flows are, on the whole, much higher in 1996 than in 1982: the dark core of the plot is larger in figure 2 than in figure 3, a clear sign of a tighter labour market in more recent years and of firm's recourse to shorter labour contracts.

The inferior linear boundary of the 'TTxGJT' plot reflects $TT \geq GJT$. The superior linear boundary is due to $TT + GJT \leq 2$; $TT + GJT = ((a + s) + (a - s))/N = 2a/N$, as $\max(a) = N \Rightarrow TT + GJT \leq 2$. These two conditions shape a triangular SLI.

Figure 3. Total turnover and Gross job flows at the establishment level. 1982.

Figure 4. Total turnover and Gross job flows at the establishment level. 1996.

5. Empirical specification, identification strategy and results.

In this section we use a simple econometric model to evaluate the excess reallocation flows via the relation between total turnover and gross job turnover. Repeating the estimation for all the years of our study allows us to discuss the question of the cyclical behaviour of excess reallocation. The econometric specification adopted to answer this question is a simple model in which the probability of having a certain turnover rate depends on gross job turnover and on a set of demographic and other explanatory variables. Excess reallocation is indirectly estimated through the relation between worker and job turnover¹⁴.

The estimated equation is:

$$TT_{i,t} = b_0 + b_1 GJT_{i,t} + \mathbf{b}X_{i,t} + \varepsilon_{i,t} \quad t = 1982, \dots, 1996 \quad (6)$$

where X_i is a vector of explanatory variables controlling for observable heterogeneity: dimension, firm age, artisan/non-artisan firm, sector, worker's gender, age, qualification (blue/white collar, time-limit, seasonal contracts and so on, as fully detailed in the Appendix), a set of territorial and yearly dummies is included as well.

The parameter of interest is b_0 ¹⁵. It provides an assessment of the relation between total turnover and job turnover, i.e. excess reallocation: the bigger is the

¹⁴ Excess reallocation (CH) is not directly estimated because CH is likely to be affected by “measurement error”. In fact GJT does not identify individual jobs at the firm 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. CH is correlated with GJT, but job flows are understated and reallocation flows overstated (Burgess, 2001), i.e. $TT_j = (\overline{CH}_j + \alpha_j) + (\overline{GJT}_j - \alpha_j)$ where α_j is a correcting factor introduced in order 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 and, as a result, the relation between CH and GJT is underestimated as the covariance between the two is distorted due to

$$\begin{aligned} \text{Cov}(\overline{CH}_j, \overline{GJT}_j) &= \text{Cov}[(\overline{CH}_j + \alpha_j), (\overline{GJT}_j - \alpha_j)] = \\ &= \text{Cov}(\overline{CH}_j, \overline{GJT}_j) - s_a^2 + \text{Cov}(\overline{GJT}_j, \alpha_j) - \text{Cov}(\overline{CH}_j, \alpha_j) \end{aligned}$$

¹⁵ b_1 expresses the relation of total turnover to firms with different rates of growth, and is not of immediate interest here. A positive, declining, relation is expected as said before as firms move to a bigger (smaller) dimensions.

coefficient the bigger is excess reallocation. As from our preliminary descriptive work and from available theoretical models of labour flows cyclical (Nagypal, 2004; 2005a; 2005b; Shimer, 2005a; 2005b), we expect the value of b_0 to be positive and cyclical.

Let us discuss the behaviour of b_0 in relation to the TT-GJT plane of previous figure 2 (right hand side).

In figure 2, b_0 represents the position of point A along the TT line. $b_0 = 0$, $b_1 = 1$ and means zero excess reallocation for all GJT (the lower boundary). $b_0 = 2$, $b_1 = -1$ means that worker turnover flow is explained entirely by excess reallocation (the upper boundary). $0 < b_0 < 1$ means positive excess reallocation values.

For every time period equation 5 has been estimated (regression with robust standard errors, Appendix) and the corresponding values of b_0 provide, given the appropriate controls, an estimate of the yearly excess reallocation (figure 5).¹⁶

When the economy is experiencing rapid growth, from 1984 to 1990 and in 1995-96 job seekers are mainly employed workers and excess reallocation reflects the growing job to job transitions. For a given level of job flow, worker flow is definitely higher in expansion than in depression. When demand is low (1982-83, 1991-93), employees are keen in keeping their job, whatsoever they may be, and excess reallocation is reduced; as soon as employment increases at the aggregate level, more and more total flows represent replaced quits, and excess reallocation flows explain the larger part of total turnover.

The variations through time of the estimated values of b_0 point to an amplification mechanism that goes from gross job turnover to total turnover. Excess reallocation in our territory, given appropriate controls, responds rapidly and amplifies economic shocks, represented by the employment variations.

Excess reallocation flows explain the interaction between on the job search and job variations. This interaction generates a strong internal propagation mechanism and the employed search increases the variability of unemployment (amplification mechanism). The historical data of figure 5 point to the fact that on the job search and job to job transitions vary positively with aggregate productivity shocks (which, in the standard model, is equal to market tightness) when comparing

¹⁶ For space reason only GJT coefficient estimates are reproduced; other results are in the appendix.

different equilibria for different aggregate productivity levels. They also show that the amplification mechanism embedded in our model shows up clearly when considering the response of the unemployment and the excess reallocation flows to changes in aggregate productivity, a rather important character of actual labour markets, neglected by what has become the standard theory of equilibrium unemployment, i.e., the Mortensen-Pissarides model (Mortensen and Pissarides, 1994; Pissarides, 2000). Moreover our estimates show that excess reallocation varies negatively and the unemployment rate varies positively with job destruction shocks. Shimer (2005) argues that a destruction shock induces a positive correlation between excess reallocation and unemployment in the standard model, in stark contrast with the data. In our model, on the other hand, a higher destruction rate discourages excess turnover, because it shifts the composition of searchers towards the unemployed or people with lower expectations. These empirical results corroborate important theoretical intuitions at the basis of the theoretical models of cyclicity of hires, separation and job to job transitions recently advanced by Nagypal (2004; 2005a; 2005b) and Shimer (2005a; 2005b).

6. Conclusions.

Almost all the firms almost all the time are simultaneously hiring and experiencing separations. 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 represent job to job transitions. Additionally many accessions 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.

Using an informative employer-level panel we have studied the prevalence and cyclicity of excess reallocation, representing mainly job to job transitions. We have found that excess reallocation flows are vast and more than half of our firm's population face a labour turnover that is made by more than 50% by excess reallocation flows, i.e. workers move to a new employer conditional of not leaving the labour force. This means that studies looking only at flows between the states of employment, unemployment and out of the labour force largely underestimate the extent of mobility in the labour market.

With regard to cyclicity we challenge the traditional view among macroeconomists studying aggregate labour markets that high unemployment during recessions are due, to a large extent, to an increase in separation rates and that separations are countercyclical. Labour market cyclicity has its origin in the amplification mechanism explained by excess reallocation. Using estimation of the relation between total turnover and gross job turnover we explore the extent to which excess reallocation entails an amplification mechanism that helps in explaining the volatility of labour flows during the business cycle.

These results substantiate the need for a micro level analysis of employment adjustment and at the same time suggest that aggregate analysis of the labour market evolution through time offers important elements to understand the dynamic of labour flows.

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Appendix

In equation (6) X_i is a vector of explanatory variables, controlling for observable heterogeneity:

size: firm size;

age: firm age;

young: ratio between employee <30 years old and total stock.

blue collar: ratio between blue collar and total stock;

gender: ratio between males and total stock;

temporary: ratio between training on the job (cfl) employees and apprentices to total employee;

season: ratio between seasonal workers and total stock;

dummies: artisan firms, sector (Ateco 3 digit), territory (local labour system: SLL).

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.

Variables	1983	1990
GJT	0.1092221 (0.0601741)	-0.0773138 (0.0467086)
GJT square	0.4672064 (0.0605303)	0.6374797 (0.0505554)
size	-0.000469 (0.0000912)	-0.0001631 (0.0000782)
size square	0.000000252 (0.0000000684)	-0.0000000694 (0.0000000808)
age	0.0125153 (0.0069155)	0.0094451 (0.0026212)
age square	-0.0023815 (0.0006733)	-0.0009022 (0.0001451)
season	1.53386 (0.0591345)	1.65686 (0.0410046)
gender	-0.0447542 (0.0115446)	-0.0703747 (0.0106907)
young	-0.118635 (0.0126967)	-0.1986939 (0.0121538)
temporary	0.1224221 (0.0145948)	0.1280901 (0.0133365)
blue collar	-0.5159035 (0.0223035)	-0.4122132 (0.0161637)
artisan	0.0714505 (0.0075155)	0.0817135 (0.0062661)
dummy if GJT=0	-0.1108671 (0.0096683)	-0.1545955 (0.0076687)
sector 1	0.0238638 (0.0104753)	0.0550309 (0.0088669)
sector 2	-0.0232483 (0.0129367)	0.0032415 (0.0121843)
sector 3	0.0460966	0.0771035

	(0.0098283)	(0.0077128)
sector 5	-0.0193389 (0.014022)	0.0078595 (0.0109002)
sector 6	0.0297275 (0.013179)	0.0590705 (0.0119945)
sector 7	-0.0104207 (0.0127798)	-0.0052675 (0.0107801)
sector 8	-0.01218 (0.0179452)	-0.0005177 (0.0137825)
SLL 1	0.0645013 (0.0431659)	-0.0177614 (0.0299654)
SLL 2	0.0238966 (0.0128774)	0.0306253 (0.0118957)
SLL 3	0.0674182 (0.0600888)	-0.0268925 (0.0294916)
SLL 4	0.0127318 (0.0124755)	-0.0012259 (0.010329)
SLL 5	0.025134 (0.0174848)	0.0182949 (0.0143555)
SLL 6	-0.0174936 (0.0173086)	0.0056162 (0.0194171)
SLL 7	0.0061748 (0.0144369)	-0.0096699 (0.0126126)
SLL 8	0.0103995 (0.013131)	0.0112394 (0.0127119)
SLL 9	0.0134701 (0.0169649)	0.0008884 (0.014853)
SLL 11	0.012715 (0.0172332)	-0.0081628 (0.0128781)
SLL 12	0.0458948 (0.0163038)	0.0056324 (0.0118621)
SLL 13	0.0177098 (0.0129484)	0.0031188 (0.011882)
SLL 14	0.0103134 (0.0166277)	-0.001021 (0.0132889)
SLL 15	0.0101434 (0.0145234)	0.0214466 (0.0146719)
SLL 16	0.0176667 (0.0117379)	0.0230354 (0.0100486)
SLL 17	0.0268691 (0.0183315)	0.0081831 (0.0166036)
Constant	0.7255904 (0.0274125)	0.722718 (0.0189536)