The dynamic of a regional labour market. Job and worker flows.

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Abstract.

The research exploits the social security database for private employee in manufacturing to analyse employment and worker flows for all establishments, through two business cycles, 1984-1990, 1993-1997, for a highly industrialized territory in North- East Italy.
Labour market presents a high rate of gross turnover since the mid seventies, which conveys the idea of large flexibility.
Job and worker flows display a marked cyclical pattern pointing to a flexible behaviour during the cycle.
The high rate of worker turnover in the nineties is not the result of the introduction of labour market reforms in the earlier nineties, but rather the result of an excess of labour demand over supply, which has lengthened the endogenous turnover component – measured through the vacancy chain model - and has thus increased worker turnover. The endogenous component, or churning, is now much higher than ten or fifteen years ago.
This underlines the basic trend towards a more tight labour market, where the high and growing number of contract disclosures reflects the difficulty of the entrepreneurs to tie the more skilled workers to the firm. Firms and sectors subject to high pressure are identified through the direct computation of the vacancy chain model.

JEL classification: J21; J31; J42; J63.
Keywords: Employment; Job Flows; Worker Flows; Cyclicality.

The dynamic of a regional labour market. Job and worker flows.[1]

1. Introduction.

Veneto labour market has been characterised since almost a decade by almost full employment and by a positive rate of job creation in manufacturing, before a negative national rate. It is a dynamic manucentric territory, with a large population of small firms; the average establishment size is 16 employees.

Our study develops from longitudinal data on establishment and worker flows from 1982 to 1997.[2] Our database is built on the social security archive (Inps) of employee and self-employed that worked in the two Italian provinces of Treviso and Vicenza. The long period of time covered by the data base allows us to discuss the role of quits, hires and turnover in relation to two expansionary cycles: 1984 -1990 and 1993 - 1996.[3] Inps data include register-based information on all establishments and employee that have been hired by those establishments for at least one day during the period of observation, independent of the workers place of residence. Both establishments and persons are assigned a unique identification number and can be followed over time.

All flows calculated in the course of this research are based on comparing workers and establishment matches in consecutive weeks.

The stock of manufacture workers in the two Veneto provinces has varied between 260.000 employee at the mid seventies and 300.000 employee in the early nineties years, with a yearly positive average rate of variation of 0,1%. The aggregate rate of growth is the result of a marked increase of white collars and women in the employee population (Occari, Tattara and Volpe, 1997).

A labour market apparently still, characterised by small aggregate increments, does not prevent that every year, on average, one worker every four begins working with a new firm and one worker every four discloses his previous contract and move to a new job.

The main finding of the studies based at the individual level that have been developed in the last decade reveals that gross job flows and worker flows are surprisingly large in all phases of the cycle and that worker inflows and outflows are contemporaneously observed within the same productive unit.[4] The fact that gross

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[1] We thank Bruno Anastasia, Maurizio Gambuzza and the participants to the Monteriggioni workshop for their comments. This research is part of the Miur project 1999-2001. N. 9913193479.

[2] Revelli (1995) and Rapiti (1998). On the Inps data base used in the present paper, see Tattara and Volpe (2001, 18-22)

[3] Our paper builds on previous results presented by Occari and Pitingaro (1998) that are now extended through time and qualified through the vacancy chain model.

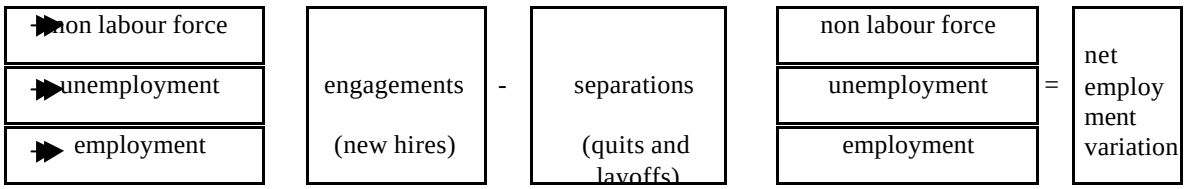
[4] Boeri (1996). The unit of analysis is the unit which pays social security for its employees. In the case of firms with several establishments, the firm can 'centralize' social security payments within a single unit; separate establishments, that meet some specified requirement, are allowed to pay directly social security contributions for their employee. Due to such an ambiguity we use the word 'establishment' and avoid the word firm, as the subject of social security contributions.

The problems inherent to the evaluation of the effect of the fiscal bonus accorded, in 1981, to the firms declaring for the first time their irregular employee to the social security, and the consequent, large,

flows are much larger than net flows implies a great deal of heterogeneity of the firms, jobs and workers. Veneto is no exception.
A large dynamic of gross flows conflicts with the view of an Italian labour market strictly regulated and conditioned by the trade unions and with the idea that these forces have been effective in preventing labour mobility. Gross worker flows provide nonetheless an ambiguous measure of labour market flexibility as they embed a large endogenous component of mobility, the intra-employment flow, much voluntary in nature, that is typical of a tight labour market and points towards different policy instruments.
The next sections discuss the following elements. Section 2 asses the flow magnitudes. There are substantial job and worker flows during all phases of the business cycle. Section 3 describes the cyclicity of the flows. Creations are pro-cyclical and destructions counter cyclical but pro-cyclical creations dominate so that job reallocation remains pro-cyclical, contrary to the stylised argument. The same happens with hires and separations with a definite cyclical net balance. Section 4 computes the endogenous component of worker flows. Intra-employment has significantly increased in time and shows a cyclical pattern. Section 5 concludes.

2. Net employment growth, job flows and worker flows.

An individual worker can move for a variety of reasons and in various ways. From one occupation to another, from one employer to another, from one industry to another, from one area to another. He can leave employment to become unemployed or shift between employments and out of the labour force. In addition population can change through demography, migration, changes in birth and death rates.
Labour mobility is usually measured by labour turnover.
Engagements measure new hires. Separations measure disclosed contracts, i.e. quits and layoffs. Both measures are defined in continuous time. Net employment change, in a definite time interval, is the difference between engagements and separations.



Labour turnover is computed excluding from the computation job ‘creations’ due to changes in ‘ownership’. A ‘cleaned’ social security archive has been used, where flow measures attributable to changes in ownership have been cancelled. This has lead to a reduction of around 5% of total engagements and separations. [5]

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break in the series, advice us to skip the earlier years, 1975-1981, and limit our research to the period 1982-1997.

[5] 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 cancelled. The complex matching procedure is explained in Occari and Pitingaro (1997)

Turnover is defined as the sum of engagements (e) and separations (s) for each worker (i) in the economy in a definite time interval. The gross rate of worker turnover is the ratio between turnover and employment (E). Employment is a stock measure, defined at the end of an interval of time (during the month of December). Figure 1 displays GWT and the employee stock. The change in stock has been, overall, very limited over the whole period of time, but has shown precise cyclical variations: + 30.000 employees in the late eighties, 1984-1989, and + 10.000 from 1993 to 1997. (Figure 1)

$$GWT_t = (e_{it} + s_{it})/E_t \quad (1)$$

The high level of worker turnover is due to a number of institutional factors, but particularly to the small establishment average size. GWT differs from Total Turnover, TT, because every worker can engage and separate several times in the time period, usually one year. (e) are total engagements and (s) total separations in the time interval.

$$TT_t = (e_t + s_t)/E_t \quad (2)$$

An important dynamic aspect of economic development 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 (Leonard, 1987; Davis and Haltivanger, 1990; Boeri,1996; Anastasia, Gambuzza and Rasera, 2000).

Job turnover refers to gross changes of positions and not to changes in the employment contracts. It is measured by the sum of job creations and destructions in a sector or in the whole system in a definite period of time.
A job created means the addition of an extra employee to the stock of workers in an establishment; a job destroied means a unit reduction in employment in a specific establishment. Changes in jobs are influenced by economic growth, business cycle, structural change and competition between industries.

Job turnover differs from worker turnover, which is defined by the sum of all engagements and separations per worker, independently of the employment variation. A positive worker turnover can take place even without any job turnover. Let us assume jobs and employment totally fixed. Work turnover is nonetheless positive because of the natural worker mobility due to retirements and new entrances. The same when job destruction in one firm is paralleled by job creation in another firm: aggregate jobs do not vary so that job turnover is zero, while worker turnover is positive.

FIG. 1. GWT (LEFT SCALE) AND EMPLOYEE STOCK (RIGHT SCALE) IN MANUFACTURING I TREVISO AND VICENZA

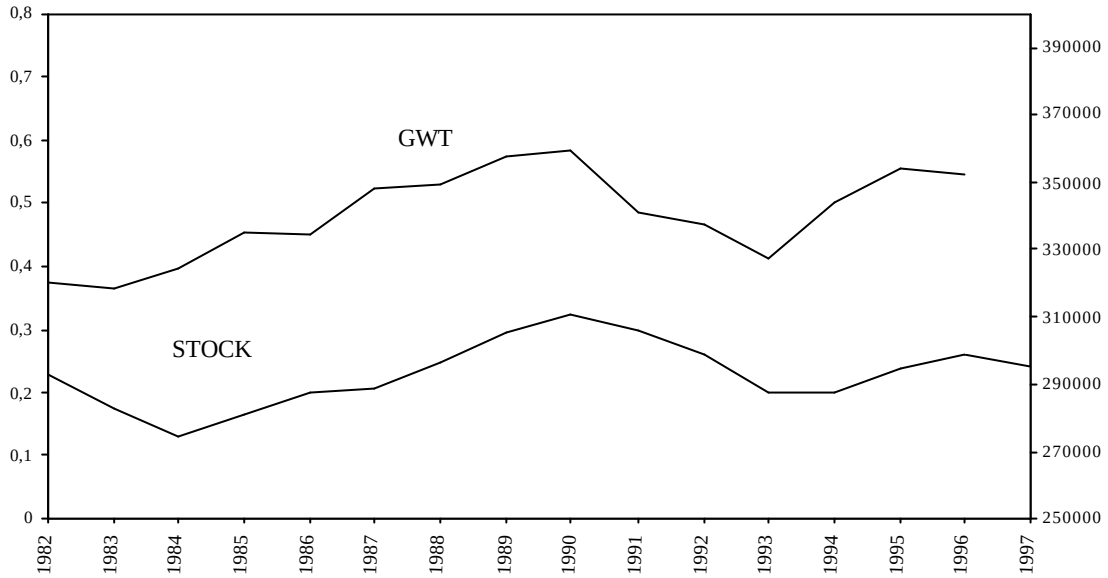
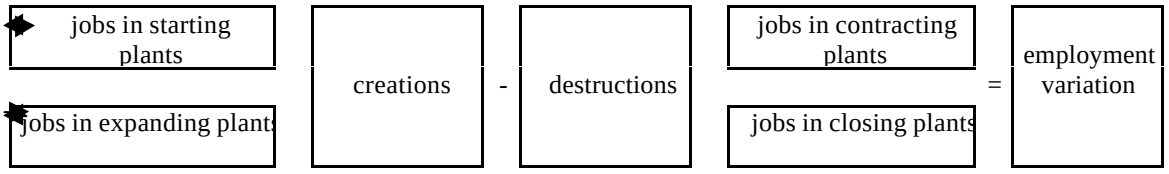


FIG 2. GROSS WORKER TURNOVER (LEFT SCALE) AND GROSS JOB TURNOVER (RIGH SCALE).



Job turnover is computed from our data base by aggregation, at the three digit sector level, of individual records and computing job creation (c_n) and job destruction (d_n) by establishment in the time unit.
The rate of job turnover or gross job turnover is the ratio of turnover to employment (Figure 2).

$$GJT_t = (c_{nt} + d_{nt})/E_t \qquad (3)$$

Job flow refers to an initial and to a final date and its magnitude is time sensitive. For example in case of seasonal work (summer), jobs created counted at half year are much larger than jobs created counted in December, when seasonal (summer) workers are already separated. As we share the idea that job turnover should measure restructuring and some permanent feature of the labour market (Shettkat, 1992), we relate creations and destructions at yearly intervals.
Job turnover is affected by the aggregation level and a more detailed classification results in a higher job turnover. It depends as well on the establishments size, as a bigger size internalises many changes between jobs that are not captured by the measure adopted.
As usual job flows are always higher than net changes and even sectors that are losing jobs manifest substantial job mobility.

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

$$e_t - s_t = e_{it} - s_{it} = c_{nt} - d_{nt} = \Delta E_t \qquad (4)$$

$$TT_t = GWT_t = GJT_t = \Delta E_t \qquad (5)$$

Only Total Turnover is defined non ambiguously in relation to the time period. Both Gross Job Turnover and Gross Worker Turnover vary in relation to the time interval. GWT increases as the time span extends, because both engagements and separations add up as time goes on, while 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 is the time period, the larger are temporary

transitions. GWT and GJT approach as the time interval is shortened, to match perfectly only when time is continuous (Schettkat, 1996, 19)[6].

GWT computed in our territory looks very high in comparison with the same index computed in other countries (Belgium, US and other. Leonard 1987; Schettkat, 1996a; Bingley et al. 1999). As we have already noticed, in our territory a new job has been created and destroied every year out of a stock of four employee (Figure 2). On average more than half of the employee stock, in a given year, is made by new entrants in the labour market and by workers who will move to another establishment within the year.

Difference between engagements and separations or between creations and destroied is a measure of the net stock growth. The increase in employment is negligible, but this is the result of the creation of new jobs and the parallel process of job destruction.

Engagements can be divided into three components:

1. engagements due to a net variation in employment, ΔE.
2. engagements due to an inflow (outflow) of labour that is not affected by a change in the employment level. They represent a reallocation of workers between industries and firms, at a given level of employment.
3. a residual engagement flow, which represents the substitution (or compensatory) component or excess turnover or churning flow (Schettkat, 1992). The expression excess or churning means that such mobility is not paralleled by changes in employment or in the productive structure of the economy or in the birth or death of firms.

The ratio between GWT and GJT is an index of churning or substitution component inside the process of reallocation of labour in the time unit, or an index of the worker reshuffling per unit of jobs created and destroied. Following a suggestion by Schettkat (1996):[7]

$$s_t = \Delta E_t + 0.5\,(c_{nt} + d_{nt} - |\,c_{nt} - d_{nt}\,|) + ch_t \qquad (6)$$

The first term at the right side measures the employment variation, the second the reallocation of worker flows related to job flows.
As usual the churning rate is

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[6] According to our calculations, taking into account the year 1996, the sum of job creations and job destructions counted every quarter, at the 3 digit level, amounted 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 destroied during the year 1996.

[7] $s_t = \Delta E_t + 0.5\,(c_{nt} + d_{nt} - |\,c_{nt} - d_{nt}\,|) + ch_t$.
Assume $c_{nt} - d_{nt}$ positive. $ch_t = s_t - \Delta E_t - d_{nt}$
Assume $c_{nt} - d_{nt}$ negative. $ch_t = s_t - \Delta E_t - c_{nt}$
For an analysys of the substitution component in Veneto, based on Ministero del Lavoro data, Anastasia, Gambuzza and Rasera (2000).

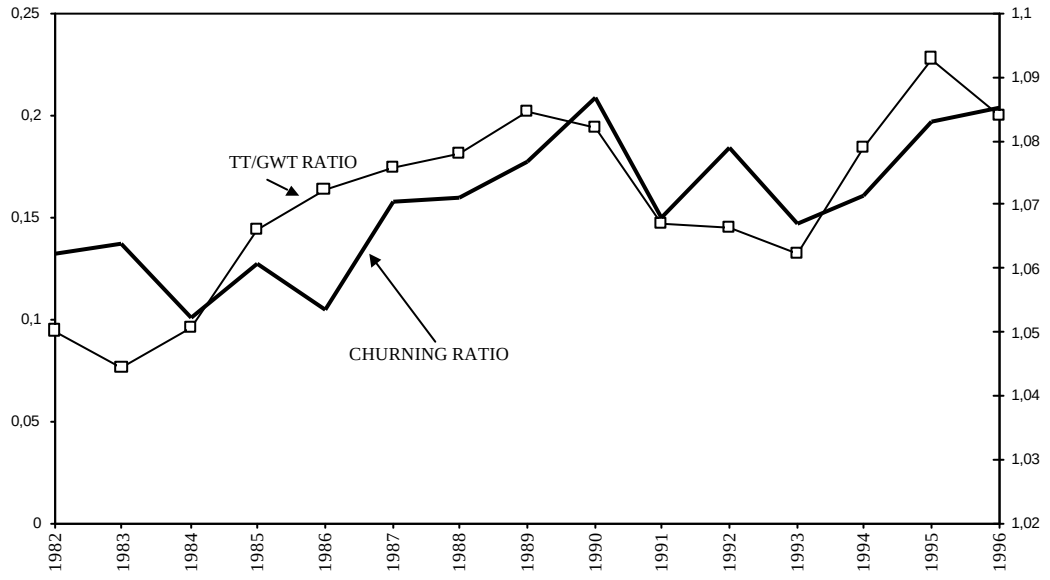
$$CH_t = ch_t / \Delta E_t \qquad (7)$$

Figure 2 shows that there are large job and worker flows at all stages of the business cycle. During the period 1982-1997 on average 44% of engagements were due to job creation and the same percentage of separations were due to job destruction. This large scale reallocation of labour represents the attempt by workers and establishments to end and form employee-employers matches.

The difference between GJT and GWT leaves room to a large substitution component or churning. Churning is computed from (7) and increases through time, moving from a value of 1.3 in 1983 to 2.0 in 1997.

Churning embeds a lot of short term variations. Churning systematic widening, as time goes on, requires a more structural explanation: downsizing, structural changes among productive sectors, the tightening of the labour market with extension of education and reduction of the working age are all elements susceptible to increase GWT for a given level of GJT. [8]

FIG. 3. CHURNING RATE (LEFT SCALE) AND TT/GWT RATIO (RIGHT SCALE)



A similar measure of jobs volatility is obtained by comparing TT and GWT.

[8] Most pronounced for public employee, where reduction in labour force partecipation is more evident, and reflected indirectly in the private manufacturing sector.

TT_t/GWT_t is a mobility index based on the individual worker. It defines the number of times a worker, which experiments a mobility episode, engages or separates in the time unit. It tells us how mobile is a mobile worker.

The ratio TT_t/GWT_t (figure 3) shows that the increased mobility through time is, partially, the result of mobility of workers, who are already mobile in the time unit.
It points to a segmented labour market, a labour market where the overall increased mobility is the probable result of a stable component and of an unstable component, the latter becoming progressively more unstable as time goes on.

Part of the churning cyclical volatility is the result of a definitional problem. Both because churning depends from the unit of time and because, given the time interval, it depends on a scale problem. In other words the number of engagements and separations approximately doubles of the number of creations and destructions. So, for a given yearly rate of variation of creations and destructions and of engagements and separations, churning increases. To have a constant churning, creations and destructions should vary at a rate approximately double than the rate of engagements and separations.

A comparison of three different periods of the same length, characterised by a similar increase in net employment, summarises some points of the previous reasoning:

Table 1.GJT and GWT.

period	variation in employment stock (%)	job creation	job destruction	GJT= $(c_n+d_n)/E$	engage-ments	separations (*)	GWT= $(e_i+s_i)/E$	churning
1987-1988	12003 (3.4%)	80620	-68617	0.26	168154	156151	0.56	0.15
1989-1990	8132 (4.7%)	80949	-72817	0.25	192834	183602	0.62	0.18
1994-1995	11518 (4.0%)	65592	-54074	0.21	170968	159450	0.57	0.18

(*)To balance: cfr. appendix.

The employment stock variation, that measures around 12.000 employee in both periods 1987-88 and 1994-95, is paralleled in the latter period by a reduced job creation and job destruction. In the last biennium (1994-95), with a similar employment variation, less jobs are created and destroyed than in 1987-88. (-15.000 creations +13.000 destructions). GJT decreases, while GWT stays approximately the same, and churning grows.
In 1989-90 instead both engagements and separations increase so that the increase in churning is accompanied by GWT increase.
Churning, in relation to job created, has definitely increased as time went on: more worker have churned on a fixed number of jobs.

A large part of turnover is idiosyncratic and independent from the aggregate employment growth. It mirrors in a limited part the job reallocation inside establishments, sectors and places and open the interpretation to a tight labour market, characterised by high worker mobility.

3. Turnover cyclical variations.

Worker turnover is definitively cyclical (GWT, figure 1). Cyclical behaviour is emphasised by TT (figure 3) which shows as in the cycle upswing (downswing) the total number of engagements/separations increases (decreases).

Job turnover (GJT) is much more stable in time than GWT. It smoothes the cycle with a limited increase till 1987, a relative maximum of modest height at the top of the cycle, in 1990, a decline from 1991 to 1994 followed by a modest recovery. Standard deviation computed on TT, GWT and GJT from 1982 to 1997, is respectively 0,072, 0,083 and 0,018. Churning, which represents the substitution component in turnover, embeds a large part of the cyclical variability (figure 2).

On the cyclical pattern of GWT, labour market literature looks not very definite. Pro and cons can be shortly remembered.

- Turnover is neutral if high engagements dominate in the upswings and high separations in downswings.
- Turnover is anti-cyclical. In a 'non constrained' labour market, restructuring during recessions (with high separations-layoffs) is profitable, as their opportunity cost is low (Caballero 1991, 1992), so turnover is high in downswings. In upswing, instead, firms wait before creating new jobs, engagements are delayed, separations are low. The counter-cyclical turnover is the result of anti-cyclical separations and neutral engagements.[9]
- Turnover is cyclical because:
- in a 'constrained' labour market it is difficult to fire workers during recessions, while engagements rise in upswing.
- it is a function of the age of the establishments. A larger turnover is expected for younger establishments (less than 8-10 years of age), which are still searching for the appropriate work-force composition. As a consequence in upswing, as new entrances increase, the quota represented by young firms increases, and this might lead to an increase in the turnover indexes. [10]
- in a supply dominated labour market, upswings are possibly characterised by increase in engagements and separations, as workers find easier to shift to a different job and to improve their own position. Matching between labour demand and supply is made easier in upswing and more difficult in downswing and this induces a cyclical turnover pattern due basically to voluntary movements among workers.
- in a tight labour market, the endogenous turnover component becomes more relevant and this is typically cyclical. Voluntary disclosures are higher in upswing, when pressure of demand is stronger, and lower in downswing. This effect is emphasised through a multiplier effect – the vacancy chain model.

[9] Such a behaviour for GJT has been proved for the US, where small establishments are almost absent (Boeri, 1996).

[10] Contini and Revelli argue this motive to explain GJT cyclicicality (1997, 250)

Figure 4 provides information on the pro-cyclical behaviour of engagements and separations. Pro-cyclical engagements dominate the less marked pro-cyclical separations over the cycle and this leads to a cyclical GWT. Pro-cyclical separations are the result of highly pro-cyclical quits (pro-cyclical intra-employment flows as we will soon show) and more moderate counter-cyclical layoffs.[11]
Job creation is pro-cyclical, job destruction is counter-cyclical and job reallocation moderately cyclical, as the cyclical variations in job creation is not cancelled by the contrary variation in job destruction.

Turnover cyclical behaviour due to entrance of new, younger, firms in upswing, is not verified by our data. We provide two different empirical tests. First, the cyclical effect due to establishments' demography. A high GWT could in principle be the entire result of the birth and death of establishments, i.e. could be due to the fact that in upswing new establishments are created (new engagements) and in the downswing many establishments disappear (separations). In theory this is compatible with a perfect rigid labour force, zero engagements and zero separations, in continuing establishments. This point might be relevant in the two provinces examined, that are characterized by many small firms, high birth and death rates, and by a continuous downsizing process through time.[12] Turnover has been computed limited to continuing establishments and the result confirms its high level and its cyclical pattern (figure 4). Second, the cyclical effect deriving by the increasing number of young establishments in upswing and their reduced number in downswing. The underlying assumption, that turnover values estimated in relation to establishments' age presents significant breaks, is not proved. GWT appears rather constant as establishments grow older, a result that is stable through the years and leads to no evidence of a negative relation between GWT and establishments age (it should be tested for GJT also).

[11] Let us represent layoffs by people that were employed and are at present unemployed for more than 5 years. Their distribution is meaningfully counter-cyclical.
[12] In the considered time interval, the average size of establishments in our two provinces has declined from 21 to 16 employee.

FIG. 4. JOB FLOWS AND WORKER FLOWS.

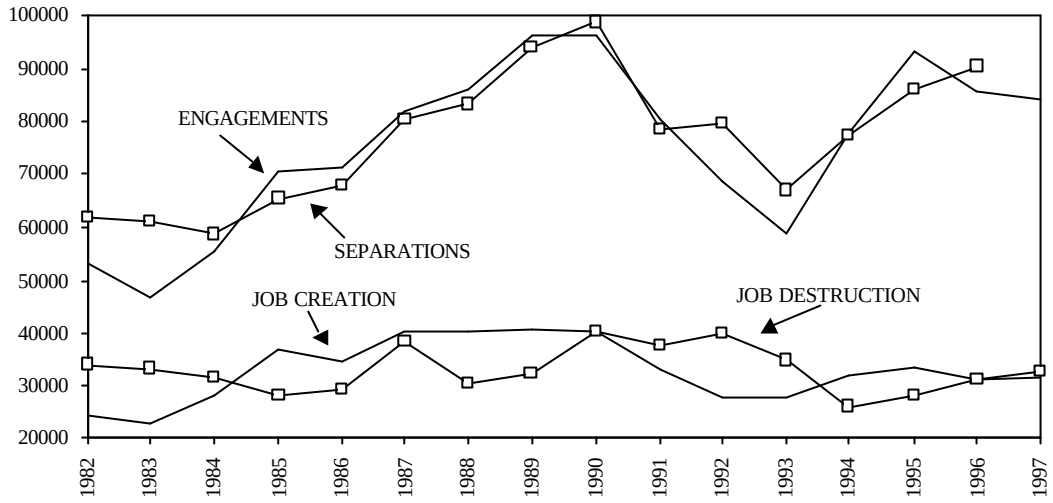


FIG. 5. GWT AND GWT FOR CONTINUING ESTABLISHMENTS (LEFT SCAL
RATIO BETWEEN THE TWO (RIGHT SCALE)

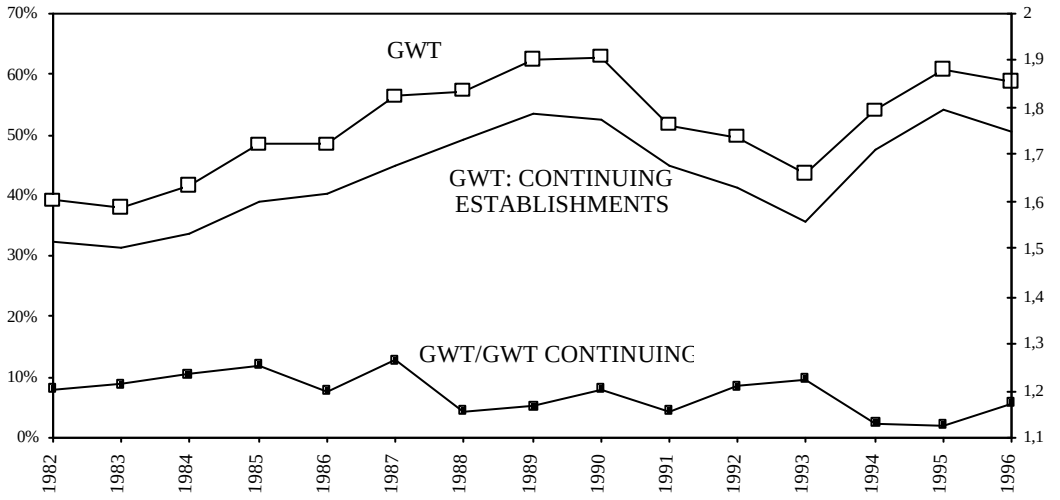
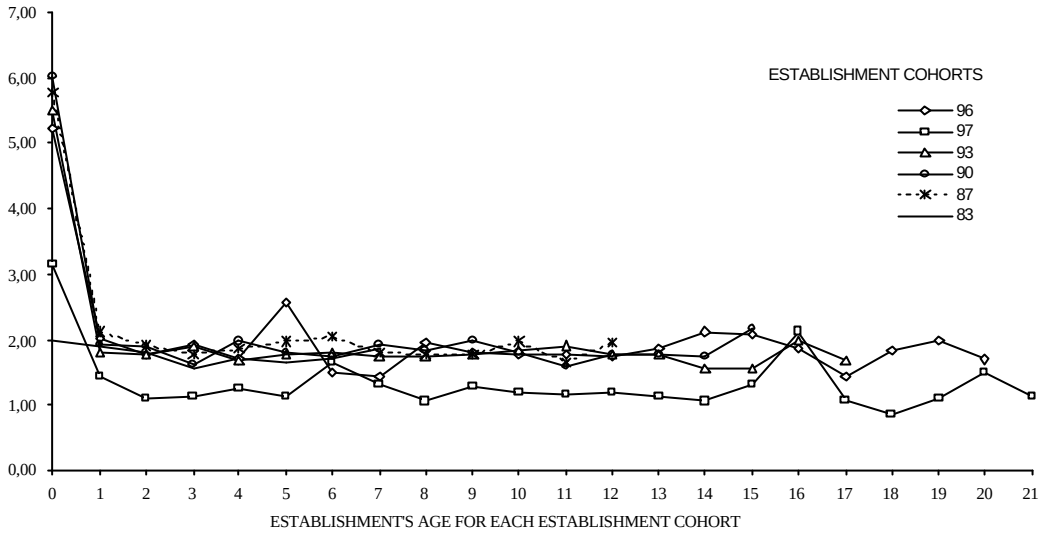


FIG. 6. GROSS WORKER TURNOVER PER ESTABLISHMNT COHORT IN RELATION TO THE ESTABLISHMENT AGE



4. The vacancy chain model.

In a tight labour market worker turnover appears to be markedly cyclical, mainly because the cyclical behaviour of its endogenous component. Net employment change in the economy explains only an insignificant part of engagements and separations. The larger share is function of job creation and destruction (around 50%) and of workers turnover not affecting the aggregate level of employment.

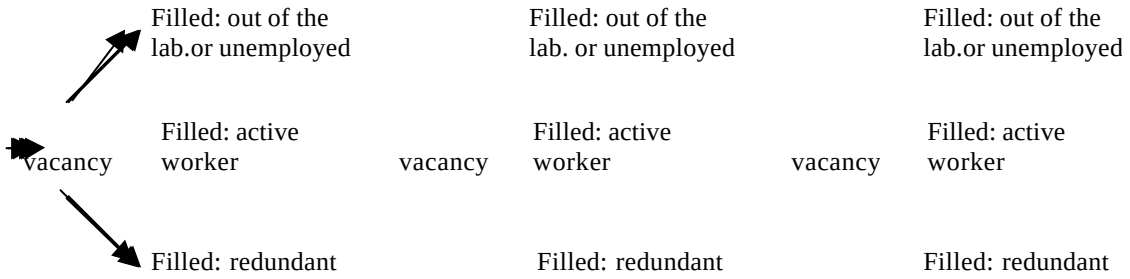
The extent of labour turnover in an economy depends, among other things, on voluntary mobility: any time an employed moves to a different job, this may result in *rehiring* by the firm which loses his worker and this process can create a whole chain of hiring and rehiring. In other words an additional vacant position can create many more vacancies, leading to the development of a vacancy chain.

A simple linkage between engagements, separations and labour mobility is provided by the vacancy chain model (Contini e Revelli, 1988, Ackerloff, 1988, Schettkat, 1992). The model is constructed at the firm level. Once a vacancy opens up within a firm it may be filled by 1. hiring a worker from the rank of the employed. i.e. hiring from another firm. 2. hiring a worker from the pool of the non-employed, i.e. from the unemployed or from out of the labour force.
Hiring from the employed can materialize in: 1.1. hiring a worker from another firm where that worker is filling an active position and leaves beside him a vacant position. 1.2. hiring a worker from another firm where that worker is redundant and is not replaced.

The probability of hiring from the employed is likely to create a sequence of new vacancies. The expected length of such sequence depends on the flow probability of

hiring from each of the three sets of workers: the out of the labour force, the redundant, the active job worker. Hiring a worker which is out of the labour force or a redundant worker sets no chain or brings an end to the existing chain. Only hiring an active worker sets a positive chain and allows the chain to proceed to a successive step.

In the following chart the mechanism of the vacancy chain is represented by the horizontal arrows. Diagonal arrows point to the leakages from the chain.



The probability for hiring from the employed and from the unemployed depends on the tightness of the labour market. In a tight market, hiring of other's firms employee is more likely because the set of non-employment is small by definition.
A tight market is defined as a market with few new entrants and few unemployed. The probability to encounter a redundant position is function of the firm's reaction to a disclosure and of the availability of workers with the required skills in the labour market. Entrepreneurs behaviour depends, among other things, from structural changes on the production side: decline of plants producing old products, innovative products produced in new established plants, establishment size and all factors that make some establishment grow at the cost of others. Least but not last are the professional qualities of the disclosed worker and of the workers who moves, that make necessary a rapid substitution or can lead the entrepreneur to consider the vacant position as a redundant position.

Turnover caused by intra-employment flows is related to job to job mobility. It is likely to involve voluntary mobility and this underlines its endogenous nature: it has already been referred to as substitution or churning.

The indirect computation of the vacancy chain is obtained beginning from the aggregate data of engagements and separations and of creations and destructions. For a long time horizon, at the beginning of t, the sum of the vacancies created V_t is:

$$V_t = v_t /(1 - p_t(e_t))$$

Where $p_t(e_t)$ is the probability of hiring from the employed. v_t is the one time increase in vacancies (jobs, hirings).

The direct computation of the vacancy chain, which is of interest here, is obtained by reconstructing the single rings of the chain in the labour market. It allows to discover interesting phenomena connected to the dynamic of the process, his speed, the kind of establishments involved and their number.

The vacancy chain computation procedure is based on the following assumptions:

- Definition of the chain domain or of the labour market boundaries. Our object is to discuss the characters of manufacturing employment in a densely industrialised area, so the geographical boundaries are the two provinces of Treviso and Vicenza and the branch boundaries are manufacturing (Ateco.1981. 3 and 4). Of course the more tight are the boundaries the shorter is the chain, as leakages get more numerous.
- Vacant position: a position which is filled within three months. A vacant position is created when an existing contract is disclosed or when the entrepreneur wants to hire an additional worker and draws up a new contract.
- Out of the labour force worker: a worker having no previous entrance in the social security archives or unemployed (i.e. without work as employee for > 4 months). An unemployed worker is a worker which has entered the Inps archive in the past, but has not been hired during four months or more, after the disclosure of the preceding contract. A new entrant is a worker which entered, for the first time, the Inps archive in 1975-1997.
- Active worker: a worker who leaves a vacant position which is filled within three months by an active worker.
- Beginning of the chain: a vacant position which is filled by a worker which is non-active, i.e. unemployed or new entrant.
- Ring of the chain: the filling of a vacancy by an active worker.
- Redundant position: a vacant position filled by a worker who, after the disclosure of his contract, is not replaced within three months by the firm he left.
- Time: the vacancy runs from three months before to six months after the year of reference . Almost all the chains exhaust within this time period.

The replacement process has been computed under various binding conditions, which can be derived by the social security database: blue collars substituted by blue collars, separations matched by engagements only if the salary of the engaged worker ranges within ± 30% from the salary of the separated worker etc…. The computed bound chain is a bit smaller than in the unbound chain. The two procedures have been tested for a couple of years and the difference did not exceed 5%, so eventually we have made no further restriction than the time of the matching (less or equal to four months).

The computation process is summarized taking directly into account the year 1989.

96.397	total new contracts within the year of workers, of whatever place of origin, in manufacturing (3 and 4) in establishments in Treviso and Vicenza.[13]
44.878	quick hires (≤ 4 months) of workers in manufacturing (3 and 4) in establishments in Treviso and Vicenza . Previous employment: whatever.
51.559	slow hires and new entrants in manufacturing (3 and 4) in establishments in Treviso and Vicenza. New entrants: 17.505
35.494	quick hires (≤ 4 months) of workers in manufacturing (3 and 4) in establishments in Treviso and Vicenza . Previous employment: manufacturing (3 and 4) in Treviso and Vicenza.
24.781	hires tracked through the vacancy chain computation (68% of the total quick hires, i.e. of 35.494). [We will be able to rise substantially this percentage in the near future through repeated computer iterations].
18.597	endogenous components: active workers. 11.792 vacancies at the beginning of the chains or chain seeds. 6.805 the remaining multiplied component of the chains.
6.184	redundant workers

In our territory engagements intra employment represent around 55% of total employment mobility for a given stock, with fluctuations that make such a measure vary between 43% and 65% towards the end of the period. Schettkat, on his study of the German labour market, refers to values of 50% a meaning of a tight labour market (Schettkat, 1996b). While our data show that the retirement rate[14] has not varied during the period, except for a visible increase in 1994, first entrances have undergone a substantial loss, declining from 24% of the employment stock of the late seventies to 18% of the mid eighties to a low of 16% in 1993. The entrance rate has subsequently partially recovered because of the positive contribution of non-EEC workers, which has brought back the first entrances to 18%.

The vacancy chain multiplier, is defined as the ratio between the number of the chain rings (associations of active workers) and the chain seeds.

The vacancy chain multiplier in manufacturing and from manufacturing, varied between 1.2 and 1.6. (Table 2). It shows a distinct cyclical pattern, which closely mirrors the pattern of the stock of employment. Intra-employment hiring stayed relatively high in 1984, meaning that firms preferred to hire from the employed although unemployed were available. But it did show an increase in the peak years, 1989 and 1996, meaning a tight labour market and much recourse to intra-employment (Figure 8).

Churning varies with age. Young people (< 25 years old) have a intra-employment hiring rate 2-4 time bigger than more mature workers (30-40 years old). Labour poaching was limited to young workers in the eighties, but it seems to have extended

[13] Establishments that declare their employee contributions to the Inps.
[14] Computed as separations of workers more than 50 years old.

to more mature workers in the nineties, after having taken due remark for the aging of the employee stock through time (Table 3).[15]

The gender distribution of intra-employment in manufacturing shows that the more recent upswing is characterized by an increase in frequencies for males. An analysis of gender in relation to sectors explains the gender behaviour through a decline in employment in textile and shoes. The analysis of intra-employment in relation to sectors shows that sectors having poached an increasing number of workers in the first nineties are food and plastic, which are relatively new, flourishing, industrial districts. Mechanics and metals, which are the sectors which were characterized traditionally the most high number of poaching, have stayed relatively constant (Table 3).

The probability that hiring from the employed is becoming more and more voluntary as time goes on can be related to the hiring speed. A quick replacement of a separating worker shows that the firm is willing to replace immediately the worker whose contract was disclosed, looking for a new worker. From the worker side, the quick finding of a new position is an index of the voluntary nature of the separation (a quit, not a layoff).
Quick filling shows a continuous upward trend, which is not broken by the 1993 depression, and point to a structural change in the matching process leading towards a more efficient market, given the high rate of churning. The pattern is markedly cyclical.

The percentage of very quick fillings from the workers side follows the cycle, suggesting layoffs in upswings (large quota of fillings < 1 month) and quits in downswings (low fillings < 1 month). From the employers side quick fillings increase since 1989, to show that structural conditions in the labour market are now more tight than in the eighties.[16]

[15] The absolute number of intra-employment hiring is much less for young people at the end than at the beginning of the period, but the age composition of the stock has changed as well. We measure this ratio between intra-employment hires and a stock measure, both computed according to the respective workers age.

[16] The underlining idea is the following. Assume all workers quit and find immediately a new job in different firms, while these firms have been looking for engagements since many months. The intra-employment filling time is shorter from the worker's perspective than from the firm's perspective.

FIG. 7. QUICK INTRA-EMPLOYMENT ENGAGEMENTS (0-3 MONTHS) IN MANUFACTURING OVER TOTAL SEPARATIONS (EMPLOYEE < 50 YEARS OLD)

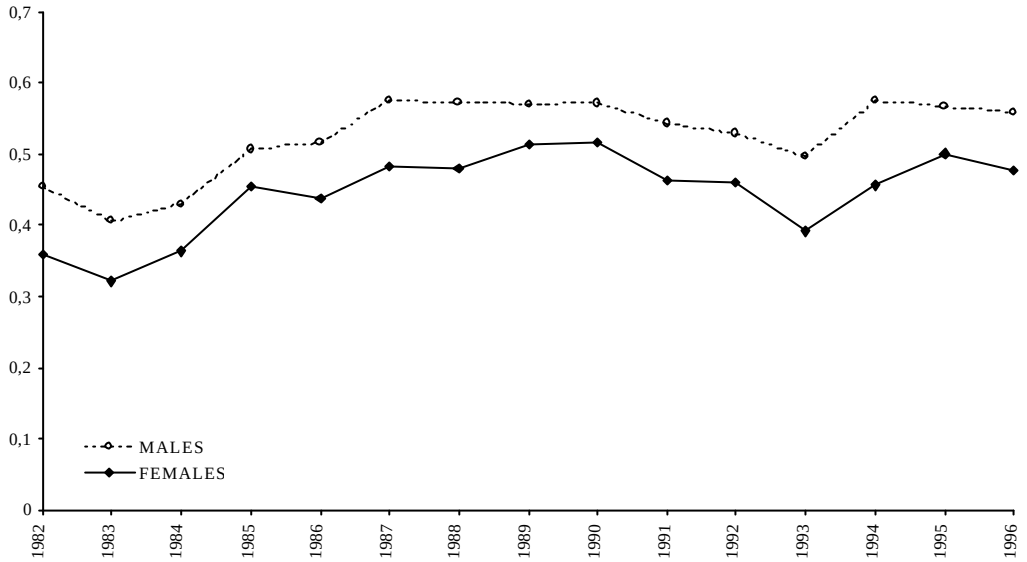


FIG.8. LENGHT OF THE VACANCY CHAIN AND EMPLOYMENT STOCK (RIGHT AXIS

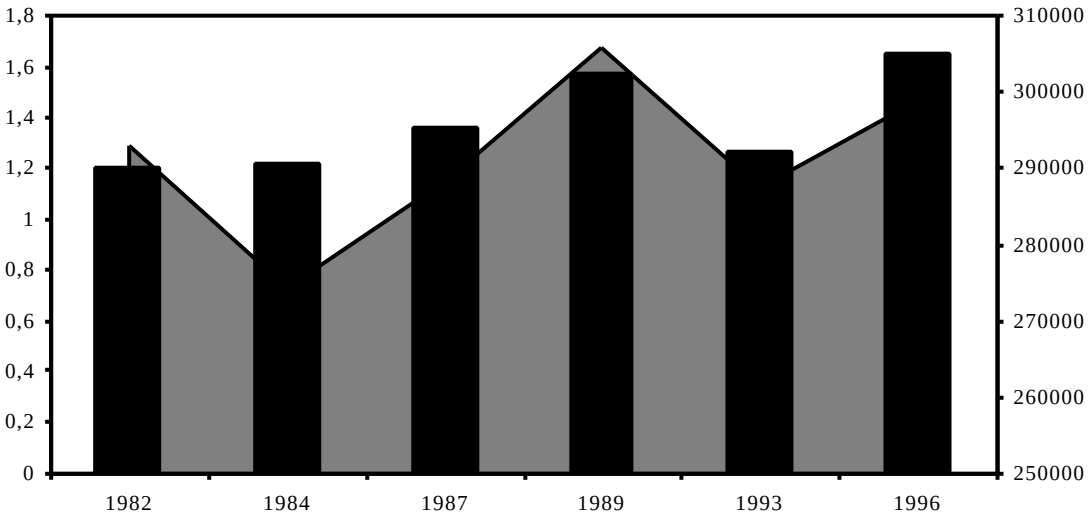


Table 2. The vacancy chain numbers.

year	multiplied component	redundants	chain seeds
1982	8020	9336	6630
1984	6893	12532	5682
1987	14338	11386	10564
1989	18597	11050	11792
1993	8970	12724	7090
1996	14652	8018	8936

Table 3. The multiplied component or intra-employment.

	gender		age		time < 1 month	
	M/stock	F/stock	< 25/stock	30-50/stock	employers	employee
1982	2,3	2,9	4,4	1,6	70,73	77,8
1984	2,6	3,1	4,7	1,9	68,66	79,0
1987	4	4,1	7,1	2,6	68,83	78,7
1989	4,7	4,7	8	3,1	68,76	81,9
1993	3,2	3,1	5,3	2,5	73,16	76,3
1996	4	3,3	6,8	2,8	76,25	82,4

	Sectors (Ateco 1981)							
	metal (31)	mech (32)	food (41)	textile (43)	leather (44)	garnm-shoes (45)	furniture (46)	plastic (48)
1982	4194	1454	491	2680	1553	7355	3216	602
1984	4336	1314	424	2389	1866	7955	3448	804
1987	7877	1789	555	4468	2765	9281	3953	1374
1989	8913	2184	720	3916	2828	9627	5533	1701
1993	6942	1278	595	3117	1692	6360	3786	965
1996	4194	1454	1521	2602	1821	4777	4053	1607

5. Policy implications.

Our territory is characterized by a high worker and job turnover. A substantial amount of reallocation of jobs and workers during all phases of the business cycle is a distinguished feature of our research

The increase in the overall hiring rate can be explained by an increase in job-to-job mobility through a longer hiring chain. This however is partly an indicator of increased labour market mobility, but mainly the result of favourable macroeconomic conditions that are reflected on the micro level activity. Better demand conditions, a reduction in unemployment and the parallel tightening of the labour market due to a reduction of new entrances and a couple of years with high retirement rates, positively influenced the level of intra-employment mobility and determined longer vacancy chains.

If the increase in intra-employment hiring is caused by a longer hiring chain (length of the chain, n. of chain seeds) - recruitment is increasingly made from employment and this causes a chain of hiring efforts - one would expect a negative relation between intra employment hiring and excess supply of labour. There is empirical evidence that a process of mismatch in our territory has been very limited (possibly

limited to people > 50 years old), therefore a decrease in the unemployment rate (excess of labour supply) is directly linked to job-to-job mobility.
The importance of the intra-employment component in explaining workers turnover points to a set of political measures trying to tie the more mature workers to the firm. One example is a recent collective contract (in the furniture sector) tying the individual workers salary to a reduction in the worker turnover at the district level. On the other side employers try to promote immigration of non eec-workers so to increase the exogenous component of employment.

Appendix . The computation of the stock, based on Social Security (Inps) data.

Sr (n): worker stock at the end of the month n.
Si (n): stock Inps. Workers that have worked during month n;
Ass_n : associations in year n,
Ass_n : separations in year n,
We have assumed that:

$$Sr(D_n) - Sr(D_{n-1}) = Ass_n - Sep_n = \Delta E_n \quad (1)$$

D_n is for December of year n.
(1) is not true with Inps data, i.e. taking Si (n) and not Sr (n). In general $Si \geq Sr$ because our estimate based on Inps data assumes new associations as part of the workers stock, while new separations are not counted. In other words a worker that during December separates and is engaged in a different firm is counted twice in the stock measure.
We have tested that the difference between $Si(D_n) - Si(D_{n-1})$ and $Ass_n - Sep_n$ (the last term defines the net variation in employment) can be empirically relevant. We now prove that

$$Si(D_n) - Si(D_{n-1}) - Sep(D_n) + Sep(D_{n-1}) = Ass_n - Sep_n = \Delta E_n \quad (2)$$

We know that the stock in any month is equal to the Inps stock less separations in the same month.

$$Si(t_n) - Sep(t_n) = Sr(t_n) \quad (3)$$

At the same time we can think to the inps stock as to the stock of the previous month to which associations have been added.

$$Sr(t-1_n) + Ass(t_n) = Si(t_n) \quad (4)$$

Substituting (4) in (3) we get rid of any inps measure.

$$Sr(t-1_n) + Ass(t_n) - Sep(t_n) = Sr(t_n) \quad (5)$$

Let us compute $Si(D_n) - Si(D_{n-1})$ by substituting (4) and repeatedly (5) (for twelve months):

$$Si(D_n) - Si(D_{n-1}) = [Sr(D-1_n) + Ass(D_n)] - [Sr(D-1_{n-1}) + Ass(D_{n-1})] =$$
$$= \left[(Sr(D-1_{n-1}) + Ass(D_{n-1}) - Sep(D_{n-1})) + \sum_{i=GEn}^{dic} Ass(i_n) - \sum_{i=GEn}^{dic} Sep(i_n) - \right] - [Sr(D-1_{n-1}) + Ass(D_{n-}$$
$$= -Sep(D_{n-1}) + \sum_{i=Gen}^{Dic} Ass(i_n) - \sum_{i=Gen}^{Nov} Sep(i_n) \qquad (6)$$

We take the difference between $Si(D_n) - Si(D_{n-1})$ and $Ass_n - Sep_n$,i.e. the difference between (6) and the sums over the twelve months:

$$[Si(D_n) - Si(D_{n-1})] - [Ass_n - Sep_n] =$$
$$= \left[-Sep(D_{n-1}) + \sum_{i=Gen}^{Dic} Ass(i_n) - \sum_{i=Gen}^{Nov} Sep(i_n) \right] - \left[\sum_{i=Gen}^{Dic} Ass(i_n) - \sum_{i=Gen}^{Dic} Sep(i_n) \right] =$$
$$= -Sep(D_{n-1}) + Sep(D_n) \qquad (7)$$

If we are concerned with Inps data we need to compute (2) instead of (1). The basic idea is that stocks computed from Inps data do not take into account the separations, that are counted in the following month. Any time we make the difference between two stocks, we need to take out from the two stock the separations that have not been included.

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