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Employment Protection Job–Tenure and Short Term Mobility Wage Gains

A New Explanation for the Italian Case

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The three papers that are being edited in succession in this discussion paper series –respectively by Sulis, Patriarca and Naticchioni-Panigo- are the results of the development of one of the main topics investigated within the program of the research partnership DSE-ISFOL in the years 2003-2004, *i.e.* the interpretation and the quantitative analysis of labour mobility and earnings dynamics in Italy. Each paper is an autonomous development of the research interest of the authors, who remain responsible for results and comments. Nevertheless, these papers have found a common source of inspiration from interaction, seminar activity and discussion among the members of the research group.

I tre lavori che vengono pubblicati in successione in questa collana – rispettivamente di Sulis, Patriarca e Naticchioni-Panigo- sviluppano una delle tematiche centrali della convenzione di ricerca DSE-ISFOL per gli anni 2003-2004, *i.e.* modelli interpretativi e analisi quantitativa della mobilità occupazionale e salariale. Questi lavori rappresentano sviluppi autonomi degli interessi di ricerca dei singoli autori, che rimangono pertanto responsabili di risultati e commenti, pur traendo tuttavia inspirazione dall'attività seminariale, dall'interazione e dal confronto all'interno del gruppo di ricerca.

Employment Protection, Job-Tenure and Short Term Mobility Wage Gains: A New Explanation for the Italian Case

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Abstract

This paper investigates theoretical and empirical links between job-tenure and short-term mobility wage gains. Standard theoretical approaches examining this subject predict a negative correlation between these variables. Furthermore, this result has been confirmed in different applied researches for US. However, European labour market institutions appear to be quite different from US ones, especially for employment protection and turnover costs. Taking this feature into account we develop a theoretical model, evaluated through analytical and simulation procedures, where optimal switching conditions determine a positive correlation between job-tenure and short-term mobility wage gains. Our main proposition is confirmed for the Italian case using an administrative panel database (INPS) and different econometric specifications.

JEL codes: J31, J38, J63, J65 and C23
Keywords: Job-tenure, Employment Protection, Mobility Wage Gains, Risk Aversion, Panel Data Estimation.

1 Introduction

Job mobility effects on wage growth are analyzed through different approaches allowing for between and/or within-job wage dynamics.

In Search Theory models wage growth is entirely explained by discrete jumps (short-term mobility wage gains). On the other hand, job-matching and human capital approaches allow for different within-job wage dynamics while short-term mobility wage gains (MWG) will be rather negatives.

All these theories predict a negative correlation between short-term MWG and previous job-tenure, even if they are based on alternative analytical frameworks (see section 2). This theoretical relationship appears to be confirmed by recent empirical evidence.

However, both theoretical and applied research have been developed to explain the US labor market dynamics[1], where employment protection is the lowest among OECD countries[2]. Results cannot be generalized for European countries where employment protection legislation and labor market institutions play a more important role entailing a relevant trade-off between mobility wage gains and job-uncertainty. Indeed, these institutional differences, in particular the fact that firing costs are nearly proportional to job tenure, seem to be useful to explain differences between US and Italy concerning job-tenure effects on retention rates (a proxy for the probability to remain in the same job).

For this reason, we develop a complementary analytical framework allowing for a positive correlation between job-tenure and short-term MWG ("risk effect"). We will use a model where turnover costs are proportional to job tenure while job uncertainty decreases with these costs. A key feature of this model is the asymmetric uncertainty between job positions due to differences in job-tenure. Indeed, as turnover costs increase with job-tenure, current job uncertainty will be always lower than that of outside options (where job-tenure is zero when a job change takes place). When this difference increase short-term MWG must also increase to fulfil the optimal switching rule (while long-term MWG becomes progressively less important to switching decisions). We prove this proposition in two different ways, using both analytical and simulation approaches.

In order to test the accuracy of our theoretical proposition we use an administrative database of the Italian Social Security System (INPS). We will

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[1] Almost all studies analysing job-tenure effects on MWG have used US panel data. See Carroll and Powell (2002), Gottschalk (2001) or Buchinsky *et al.* (2002). See the following sections.

[2] See for instance the OECD (1999) ranking concerning Employment Protection Legislation.

carry out a panel estimation with more than 330.000 observations for 61,991 male workers from 1992 to 1998. Since we are interested in dealing with both individual effects and endogeneity bias (due to the potential feedback between individual effects and job-tenure) we have decided to carry out several different specifications for an extended log-wage equation (OLS, fixed effects, first differences, IV fixed effects, IV first differences and General 2SLS).

The structure of the paper is the following. In section 2 we summarize both standard economic approaches and empirical evidence concerning MWG. In section 3 we develop our theoretical model showing that under some specific assumptions it is possible to obtain a positive correlation between short-term MWG and previous job-tenure. In section 4 we present the empirical application to the Italian case while concluding remarks are reported in section 5.

2 Theoretical and empirical survey

Search Theory[3] central hypothesis assumes that wage gains, which are derived from job mobility, are the result of discrete jumps in the wage level when the worker moves between two different positions (assuming that after this jump the wage level is constant up to the next job-change).

These models assume that worker productivity is constant along his/her working experience. Nevertheless, his/her wage can vary among different firms. Each of them can get different productivity levels from the same worker. Using this framework, Burdett (1978) examines the dynamics of the voluntary job mobility. In his model, workers search 'on-the-job' considering a stable distribution of potential wages, with imperfect (and costly) information regarding higher wage offers.

Imperfect information and turnover costs determine a positive effect from voluntary mobility on wage growth. Furthermore, assuming the stability of the (between-jobs) wage distribution function it is possible to derive an additional corollary: MWG increase at a decreasing rate with job switching intensity. Indeed, when workers "move" voluntarily, they go up inside the wage distribution function $F(w)$. Therefore, if $F(w)$ is continuous and strictly increasing in w, the "marginal probability" of getting a better wage offer (as well as the size of expected MWG) decreases with the number of voluntary job changes.

Therefore, Search Theory predicts a concave positive relationship between wages and job mobility thoroughly explained by MWG. This result involves a negative correlation between previous job tenure and short term MWG.

Returns from voluntary job mobility are not always characterized by discrete changes in the wage distribution. They could also be determined by the expected wage evolution in the new job.

Jovanovic (1979) develops a job-matching model, which assumes as given the new job value while current job value evolves stochastically according to the

[3] Search Theory seminal paper is Phelps *et al.* (1973). For a recent survey see Mortensen and Pissarides (1999).

information concerning the actual worker productivity.

The starting wage depends on the expected worker productivity. In competitive markets, when new information is revealed the wage level evolves according to productivity dynamics. A job change takes place when the value of the outside option is higher than the current job expected value.

However, a general pattern for wage dynamics and its relationship with job mobility is not strictly described. In order to do so it is necessary to assume that worker productivity information is accumulated at decreasing rates and it is not transferable across firms (Mortensen, 1988). In this framework it is possible to claim that: a) job mobility can incorporate a short-term earnings drop if it is compensated by a higher wage growth in the new job; dynamic characteristics of information process entail a concave wage evolution (even without job mobility).

Human Capital approach represents an alternative theoretical framework to analyze MWG (Becker, 1962). More specifically, on-the-job training models[4] highlight the fact that the relative value of current employment (along with productivity and wages) increase with job tenure because of specific human capital (SHC) accumulation. However, SHC accumulation rate decreases with job-tenure (a standard hypothesis in Human Capital models *a la* Becker) and then wage growth will decline alongside the worker experience within a particular job.

If SHC is not transferable across firms, SHC accumulation (and wage growth) will accelerate after each job change, while short-term MWG are not unambiguously determined.

When between firms worker productivity is identical (for a given job-tenure) or differences are not significant, short-term MWG will be strongly negative (but afterward compensated by a higher wage growth) because of the loss of (non transferable) SHC. If the new job wage dynamics replicates that observed in the previous job, new initial wages must be forcefully higher than those observed in the previous work (but not necessarily greater than the last wage observed before the job-change). Nevertheless, short-term MWG can be positive if the SHC non-transferability hypothesis is removed. This is the case for a within-sector job change where the optimal switching rule could be satisfied by initial gains in the wage level.

Therefore, job-matching and human capital approaches allow for both short-term and long-term changes in wage dynamics. As a general result, wage growth will increases after every job change while short-term MWG will be rather negatives (except for cases implying between-firm transmissible information and general human capital accumulation).

To sum up, all standard theoretical approaches predict a negative relationship between previous job tenure and "short-term" MWG. In Search Theory models short tenures are correlated with high MWG at the beginning of labor market experience. On contrary, long tenures and weak MWG would be typical

[4]For detailed information about on-the-job training and job-mobility relationship see Mincer (1988) and Krueger and Rouse (1998).

for experienced workers (because of decreasing probability of getting a better wage offer)[5]. Moreover, on-the-job training models define a positive correlation between SHC and job-tenure, which entails a negative relationship between this variable and short-term MWG. Job-tenure increases the mobility wage loss because current SHC will not be appreciated in the new job. Finally, similar results apply for job-matching models.

As far as empirical evidence is concerned, it is worth noting that applied studies on MWG has widely increased since the seminal contribution of Bartel and Borjas (1978). As a general result we highlight that short term MWG are always around 10-20%, and they seems to be slightly correlated with individual and firm characteristics[6].

Unfortunately, most of these papers do not consider the relationship between previous job-tenure and short term MWG. However, there are three recent studies (for US panel data) where the composite wage effect of voluntary job-change and previous job-tenure is explicitly analyzed.

Covering the period going from 1979 to 1994, and using parametric and non-parametric estimations, Carroll and Powell (2002) find out that voluntary job-change entails a short-term MWG of 8,7% when previous job-tenure is lower than 2 years. After that, short-term MWG decrease systematically, becoming non-significant when previous job tenure is higher than 6 years. Moreover, OLS estimates indicate that short-term MWG decrease 1,5% for each additional year in previous job tenure.

Gottschalk (2001) uses the 1986-1993 panel of the Survey of Income and Program Participation (SIPP) to perform OLS estimates of between job wage growth equations. As in Carrol and Powell (2002), voluntary MWG are negatively correlated with previous job-tenure: each additional month in previous position involve a wage loss of 0,3% (e.g. 3,6% per year).

In another paper, Buchinsky *et al.* (2002) apply a Bayesian approach (and Markov Chain Monte Carlo methods) to estimate simultaneously a participation equation, a wage equation and an interfirm mobility equation using the US Panel Study of Income Dynamics (PSID, 1975-1992). Even if main coefficients appear to be slightly different across population sub-groups (classified by education level), there is a common feature related to the fact that short-term MWG is generally decreasing in previous job-tenure.

In all these papers US empirical evidence supports standard theoretical hypotheses showing a negative relationship between voluntary short term MWG and previous job tenure.

[5] Nevertheless, it is also possible to find a positive correlation between job tenure and short term MWG in Search Theory models. Conditional on wages, the longer the tenure, the higher the expected short term MWG (because job tenure is assumed to be positively correlated with on-the-job search activities). But this is true just for a given wage rate. When we allow wages to change, previous results (with a negative correlation between job-tenure and short-term MWG) still apply.

[6] See for instance Altonji and Shakokto (1987), Topel (1991), Topel and Ward (1992).

3 The Model: Previous Job Tenure and Short-term MWG

Standard theoretical approaches have disregarded the case for a positive correlation between previous job-tenure and short-term MWG[7].

However, some empirical evidence does not support standard hypotheses. As we will see in the following sections, short-term MWG (estimated using Italian administrative data) appears to be positively correlated with previous job-tenure.

In order to solve this puzzle we present a simplified analytical framework, which entails a positive correlation between those two variables.

Let V_B and V_A be the new job (B) and the current job (A) actual values, defined as:

$$V_B = b + \sum_{t^*+1}^{T} \left[\frac{b + \frac{d}{e^{1/(t-t^*)}}}{(1+r)^{(t-t^*)}} \right] \tag{1}$$

$$V_A = a + \sum_{t^*+1}^{T} \left[\frac{a + \frac{c}{e^{1/(t-t^*)}}}{(1+r)^{(t-t^*)}} \right] \tag{2}$$

where b is the initial wage in B, t^* identifies the job-switching time, $\frac{d}{e^{1/(t-t^*)}}$ is the expected (non-linear) wage growth in B after t^*, T is the expected termination date, a is the wage in A at t^*, $\frac{c}{e^{1/(t-t^*)}}$ is the expected wage growth in A after t^*, t^A identifies the beginning of job A, while r is the time discount rate. For simplicity we make the following assumptions $a > 0$, $b > 0$, $c > 0$ and $d > 0$.

Using previous definitions, optimal switching rule entails that

$$b + Vg_B > a + Vg_A \tag{3}$$

where $Vg_B = \sum_{t^*+1}^{T} \left[\frac{b + \frac{d}{e^{1/(t-t^*)}}}{(1+r)^{(t-t^*)}} \right]$ is the actual value for future wages in the new job, while $Vg_A = \sum_{t^*+1}^{T} \left[\frac{a + \frac{c}{e^{1/(t-t^*)}}}{(1+r)^{(t-t^*)}} \right]$ is the actual value for future wages in the current position. Therefore, equation (3) can be rewritten as

$$b - a > Vg_A - Vg_B = \Phi(t^* - t^A, c - d, T) \tag{4}$$

where $b - a$ is the short term MWG, with $\Phi'_1 > 0$, $\Phi'_2 > 0$, and $\Phi'_3 > 0$ if $c > d$.

Therefore, we can derive our main proposition:

[7] Except for some particular situations, as those described in section 2 (such as transmissible information and non-idiosyncratic accumulation of SHC), and the case of optimal search decisions conditional on a given wage rate.

Proposition 1 *When wage flows are stochastic (because of job-uncertainty) and firing costs are increasing in job-tenure, voluntary short-term MWG are increasing in both previous job-tenure and worker risk aversion.*

Proof. Let Fc be the firing cost function depending on job-tenure $(t-t^i)$, a suitable assumption for European countries, with

$$Fc^i = \tau(t-t^i), \text{ where } \tau \in R^+ \text{ and } i = [*, A] \tag{5}$$

In turn we assume firing probabilities to be inversely correlated with firing costs,

$$\begin{aligned} FP^i &= \varphi\left(Fc^i\right), \quad \text{with} \quad \varphi' < 0 & (6)\\ &= \lambda\left(t-t^i\right), \quad \text{with} \quad \lambda' < 0 & (7) \end{aligned}$$

entailing that LIFO rules (last-in-first-out) will be applied in order to adjust employment levels (all other thinks equal).

In this framework (and assuming a simple two-parameters exponential form for $\lambda(.)$[8]) it is possible to achieve a general expression for risk-adjusted firing probabilities ($RAFP$, the worker appraisal about firing probabilities when risk-aversion is taken into account)[9]:

$$\begin{aligned} RAFP_t^i &= \Omega(FP^i) \\ &= \begin{cases} 0, & \forall t = t^* \\ \frac{\alpha\chi}{1+e^{\beta[\tau(t-t^i)]}}, & \forall t > t^* \end{cases} \end{aligned} \tag{8}$$

where $\chi \in [0,2]$ is a risk aversion coefficient[10], α represents the FP^i intercept while $\beta > 0$ is the convexity parameter[11].

[8] This assumption is derived from empirical evidence concerning Italian retention rates for different levels of job-tenure (see figure 3).

[9] For simplicity, we assume that job loss is permanent and unemployment benefits are zero. As already noted by Adam and Canziani (1998) and Bertola and Ichino (1995), Italian "dual" labor market displays the lowest unemployment outflow rate and the highest unemployment duration in the OECD. Therefore, job loss could be seen as a permanent shock in spite of the marginal probability of finding another job (e.g. using microdata for 1995 and 1996, Iannelli and Soro-Bonmatí, 2001; state that one-year Italian transition probabilities from unemployment to employment were always below 0.35). In order to take explicitely into account the impact of these unemployment outflows rates we could have decided to use a general discounted rate (different in the old and new job) at the place of the firing probabilities. We claim that results of the model would not be qualitatively different. Moreover, Italian and UK benefit replacement rates were the lowest in the OECD between 1989 and 1994. Nevertheless, note that the higher the unemployment benefit the weaker the "risk effect" we present in this paper.

[10] Where $\chi = 1$ stands for risk neutrality, $\chi = 2$ for extreme risk aversion while $\chi = 0$ identifies extreme risk lovers. In this framework, different values of χ, might lead to firing probabilities higher than one. To avoid this problems it would be possible to determine the upper limit for χ being equal to $2/\alpha$. However, this would make the reading of the paper more complicated without changing the main results. Anyway, we assume that firing probabilities are always bounded in $[0,1]$.

[11] At $t = t^*$, $RAFP_t^i$ is zero by assumption. This just entails that movers cannot be fired up to receive their first wage in the new job and stayers cannot be fired up to take their final wage in job A.

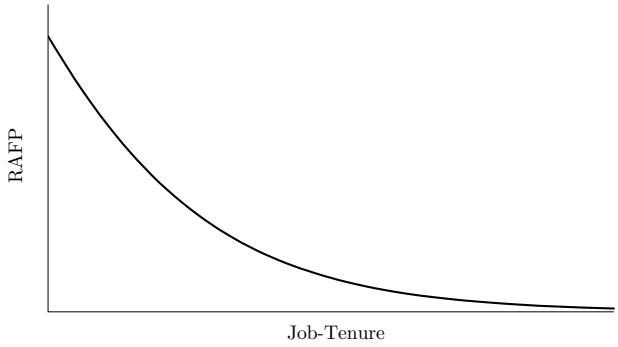

Figure 1: RAFP response to Job-tenure evolution.

In this framework job-tenure reduces firing probabilities but non-linearly. At the beginning of any job an increase in job-tenure strongly affects hazard rates. However, as long as job-tenure grows up, and firing costs are higher enough to isolate workers from "unemployment risk", a further increase in job-tenure becomes less and less relevant to modify firing probabilities (see figure 1). First order condition entails that:

$$\frac{\partial RAFP_t^i}{\partial t} = \frac{-\alpha\chi}{\left(1+e^{\beta[\tau(t-t^i)]}\right)^2}\beta\tau e^{\beta\left[\tau\left(t-t^i\right)\right]} < 0. \tag{9}$$

Furthermore, according to previous hypotheses we claim that $RAFP_t^i$ are linearly increasing in risk aversion, entailing that[12]:

$$\frac{\partial RAFP_t^i}{\partial \chi} = \frac{\alpha}{1+e^{\beta\left[\tau\left(t-t^i\right)\right]}} > 0. \tag{10}$$

Using previous statements, we can prove our main proposition by means of two different cases involving both analytic and asymptotic-like (simulation) explanations.

Case 1 *Modelling job uncertainty as cumulative probabilities*

Let us define expected actual values as:

$$E(V_B) = b\Pi_{t^*} + \sum_{t=t^*+1}^{T} \frac{\left[b+\frac{d}{e^{1/(t-t^*)}}\right]\Pi_t^B}{(1+r)^{(t-t^*)}} \tag{11}$$

[12] Additional features of $RAFP_t^i$ involve that $\underset{(t-t^i)\to\infty}{Lim} RAFP_t^i = 0$, $\underset{(t-t^i)\to 0}{Lim} RAFP_t^i = \frac{\alpha\chi}{2}$, $\underset{\chi\to 2,(t-t^i)\to 0}{Lim} RAFP_t^i = \alpha$ and $\underset{\chi\to 0}{Lim} RAFP_t^i = 0$.

$$E(V_A) = a\Pi_{t^*} + \sum_{t=t^*+1}^{T} \frac{\left[a + \frac{c}{e^{1/(t-t^*)}}\right] \Pi_t^A}{(1+r)^{(t-t^*)}} \tag{12}$$

where

$$\begin{aligned} \Pi_t^B &= (1 - RAFP_t^*)\left(1 - RAFP_{t-1}^*\right)... \\ &\quad ...\left(1 - RAFP_{t^*+1}^*\right) \geq 0 \end{aligned} \tag{13}$$

is the (cumulative) probability to remain in the new job up to time t,

$$\begin{aligned} \Pi_t^A &= \left(1 - RAFP_t^A\right)\left(1 - RAFP_{t-1}^A\right)... \\ &\quad ...\left(1 - RAFP_{t^*+1}^A\right) > \Pi_t^* \geq 0 \end{aligned} \tag{14}$$

represents the (cumulative) probability to remain in the current job up to time t, and

$$\begin{aligned} \Pi_{t^*} &= \Pi_{t^*}^A = \Pi_{t^*}^B = 1 - RAFP_{t^*}^i \\ &= 1 \end{aligned} \tag{15}$$

is the probability to rest in job i from t^* to t^*, equal to one because of equation 8.

Then, assuming "risk neutrality" by simplicity ($\chi = 1$),

$$\Pi_t^B = (1 - \frac{\alpha}{1+e^{\beta\tau}})(1 - \frac{\alpha}{1+e^{2\beta\tau}})...(1 - \frac{\alpha}{1+e^{t\beta\tau}}) \tag{16}$$

and

$$\Pi_t^B < \Pi_t^A = (1-\frac{\alpha}{1+e^{\beta\tau(t^*+1-t^A)}})(1-\frac{\alpha}{1+e^{\beta\tau(t^*+2-t^A)}})...(1-\frac{\alpha}{1+e^{\beta\tau(t^*+t-t^A)}}). \tag{17}$$

From previous equations, the higher the tenure in job A, the higher the new-job "relative uncertainty" and the higher the short-term MWG required to fulfill optimal switching condition, assuming that d is exogenously given.

However, the exogeneity assumption concerning future employment wage growth does not seem to be a suitable hypothesis.

Indeed, it is always possible (at least theoretically) to find a wage offer fulfilling optimal switching conditions without any short-term MWG. Even a negative short-term MWG could be completely offset when the long-term MWG is higher enough to induce worker mobility.

Therefore, allowing long-term MWG to be endogenously determined entails that further assumptions must be made in order to achieve a more general result concerning the relationship between previous job-tenure and short-term MWG.

Case 2 *Model calibration using experimental data and bootstrapping replications*

When both short term and long term MWG are affected by current employment job-tenure, the proof of our proposition becomes more complicated (depending on many specific assumptions concerning wage-offer distribution). A straightforward solution involves asymptotic-like procedures based on experimental data and bootstrapping replications.

Using previous model specification, we build an artificial database[13] including information about current and future employment wage flows, previous job-tenure, risk-aversion and wage flow composition for more than 5000 "virtual workers". With this information we calibrate equations (11) and (12) in order to analyze switching decisions as well as related short term and long term MWG[14]. Finally, we perform 2000 bootstrapping replications (with a random re-sampling window of 1000 observations) obtaining a matrix with MWG mean values we use to analyze the relationship between risk aversion, previous job-tenure, and both short-term and long-term mobility wage gains.

	Previous Job-Tenure				
Risk Aversion	2	4	6	8	10
Short-Term MWG: (1)					
1.2	100.0	129.8	130.4	131.1	131.6
1.4	100.4	150.6	152.5	153.5	154.3
1.6	101.2	184.2	187.4	189.0	191.0
1.8	103.8	232.3	238.6	245.9	247.1
Long-Term MWG: (2)					
1.2	100.0	113.8	114.2	114.5	114.6
1.4	100.3	122.4	123.3	123.8	124.8
1.6	100.8	136.6	137.3	137.8	138.2
1.8	101.4	155.0	157.1	161.7	162.2
Relative Short Term MWG: (1) / (2)					
1.2	100.0	114.0	114.2	114.5	114.8
1.4	100.1	123.0	123.7	124.0	123.7
1.6	100.4	134.9	136.4	137.2	138.2
1.8	102.4	149.9	151.9	152.0	152.4

Table 1: Short term, long term and relative short-term MWG responses to Previous Job-tenure and Worker Risk-Aversion. Bootstrapping results from experimental data (Benchmark case equal to 100: Risk-Aversion = 1.2 and Previous Job-Tenure = 2).

[13] Derived from 20 different combinations between job-tenure and worker risk-aversion. Information included in these databases were generated assuming that: 1) a and b follow a similiar uniform distribution $\sim U(150, 800)$ and 2) $c = a(1 + e_1)$ and $d = b(1 + e_2)$, where the random variables e_1 and e_2 follow the same uniform distribution $\sim U(0.5, 0.085)$.

[14] We define here short-term MWG as $(b - a)/a$ while long-term MWG will be proxied by $(d - b)/b$.

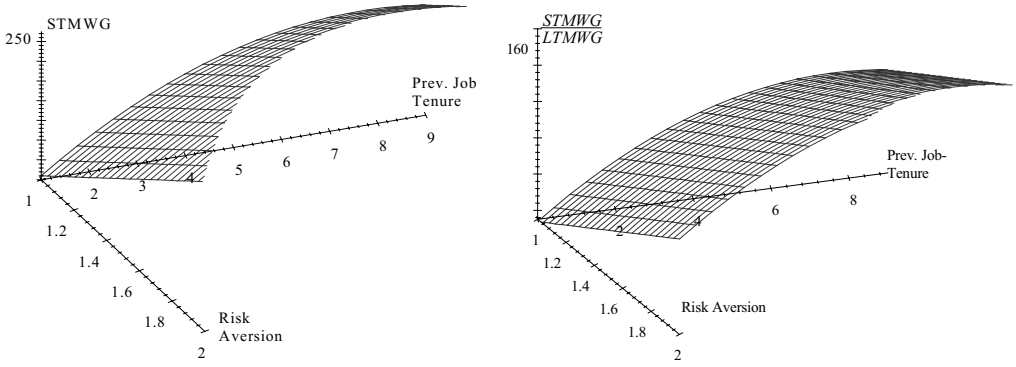

Figure 2: Short-term and Relative Short-term MWG response surface functions.

As we can see from table 1 and figure 2, short-term and relative short-term MWG (the ratio between short-term MWG and long-term MWG) are monotonically increasing in both previous job-tenure and worker risk-aversion even allowing for endogeneity in long-term MWG. In other words, model calibration and bootstrapping replications allow us to induce the proof of our main proposition even when there are upward endogenous changes in the stochastic parameter d[15]. Moreover, we find that previous job-tenure increases not only required wage flows from alternative jobs but also its time-composition. The higher the previous job-tenure, the higher the weight of short-term MWG (entailing that long-term MWG becomes progressively less important to determine switching decisions). ■

With this model we have developed a simplified analytical framework in order to evaluate how risk effect may drive job switching decisions.

Furthermore, it is interesting to underline how our findings could be used to analyze macroeconomic determinants of job-turnover and wage dynamics.

When risk-aversion drives job-switching decisions, expected short term MWG (and then voluntary job-turnover[16]) will be extremely sensitive to different structural features relaying on production and distribution processes. Amongst them, output volatility, GDP growth and income inequality appear to be the main forces explaining aggregate and idiosyncratic differences about risk appraisal.

Indeed, the higher the size of macroeconomic fluctuations the lower the retention rate for any job-tenure (but particularly for the lowest ones). In other words, job-uncertainty asymmetries (between current and alternative jobs) increase with output volatility entailing a lower (voluntary) job-mobility rate at

[15] "Upward endogenous changes" means that the alternative wage offers finally accepted by movers concern not only short term but also long term endogenous MWG.

[16] Because demanded short-term MWG are inversely correlated with job-switching probabilities (assuming that alternative wage offers follow an exogenous time-invariant distribution).

both aggregate and individual levels (and mainly for experienced and risk averse workers).

In turn, if utility functions are concave in wealth then income polarization and/or income inequality lead to a higher aggregate risk-aversion coefficient. This result will increase "perceived" job-uncertainty asymmetries enlarging short-term MWG and reducing job-mobility (especially for experienced and poor workers –because poverty increase risk aversion when utility function is concave in wealth).

Moreover, both job-uncertainty asymmetries and risk aversion coefficients will be negatively correlated with economic growth because of higher retention rates and lower risk-aversion coefficients prevailing in growing economies.

Therefore, output volatility, income inequality and macroeconomic stagnation could reinforce each other to amplify the "risk-effect" we present in this paper. These macroeconomic features increase short-term MWG, reducing voluntary job-mobility, particularly for older insiders and poor workers. As a by-product of this result it appears reasonable to think that poor people living in volatile, unequal and stagnated economies will be less likely to voluntary move between jobs. In this way they lose many outside alternatives to move-up within the wage distribution remaining in a sort of "poverty trap".

In the following sections we will use an Italian administrative database and different econometric specification in order to test our main theoretical proposition as well as related corollaries involving wealth asymmetries in the relationship between job-tenure and short term MWG.

4 An application to the Italian case

According to OECD (1999), job tenure is one of the main important variables affecting turnover costs and employment protection legislation, leading to very different patterns for European and US labor markets.

	Severance Payment after			Notice Period After		
Country	9 months	4 years	20 years	9 months	4 years	20 years
Italy	0.7	3.5	18.0	0.3	1.1	2.2
US	0.0	0.0	0.0	0.0	0.0	0.0

Table 2: Examples of differences in turnover costs according to changes in job tenure (OECD, 1999 -in months)

It is easy to claim that job-tenure represents for the workers an important way to acquire stability and bargaining power for Italian workers (table2). In the US this phenomenon is almost negligible.

Besides, turnover costs differences (between Italy and US) are at the origin of our theoretical motivations. There is also a significant difference regarding the relationship between hazard rates (one minus retention rate -the probability to remain in the same job[17]) and job-tenure, in turn related to the above

[17] See Diebold *et al.* (1997).

Figure 3: Hazard rates by job-tenure. A comparison between US and Italy. (Source: Panel-INPS and Diebold *et al.*, 1997)

mentioned turnover cost discrepancy. In figure 3 we show that Italian retention rates are monotonically decreasing in job-tenure while the US ones present a "U shaped" relationship. As job-tenure increases, US relative hazard rates (the ratio between US and Italian hazard rates) becomes larger, especially for "experienced workers" for whom the higher Italian turnover costs appear to be particularly protective.

It is important to highlight that re-employment opportunities are also quite different between these countries, given that Italian unemployment outflow rate is just a fourth of the US one (e.g. 9.5% and 37.4% respectively, in 1993).

Differences in both hazard rate-job tenure relationship and unemployment outflow could explain why "risk effect" hypotheses appear to be particularly relevant for the case of Italian labor market.

From this remarks two typical features of "segmented labor markets" clearly emerge: a) workers with higher job-tenure are protected against displacement and b) in the case of layoff it will be more difficult for them to find a new job.

4.1 Data description and descriptive statistics

In order to test our main theoretical hypothesis we use the administrative database of the Italian Social security system by INPS (the Italian social security institute). We work on a employer-employee panel version of this database for the period 1985-1998, elaborated by ISFOL. The sample units are salaried full-time workers[18] in the private sectors but agriculture. The proportion of our sample on the Italian employees population is approximately of 1/90. Using this database it is possible to properly manage with mobility issues, because for each worker we have monthly information about mobility.

[18] Apprenticeships and part time workers are excluded from our database.

The whole database contains more than 2.000.000 observations for about 300.000 different workers. In order to have a treatable database and to use panel estimates we have selected all the workers who are in the database at least three years in the period 1992-1998. Moreover, as usual in this kind of analysis we have considered only male workers. At the end we use an unbalanced database of more than 330.000 observations for 61.991 male workers.

In order to test our theoretical hypothesis we have generated some additional variables.

- Job tenure. For each observation we are interested in two kinds of job tenure. On the one hand, if a worker does not change job in the current year we compute the standard job tenure adding the job tenure at time $t-1$ to the one in time t (*Job Tenure*). On the other hand, if a worker moves we are interested in both the job tenure before the job change (*Prev. Job Tenure*) and the job tenure after the job change (again *Job Tenure*). Moreover, for each worker in 1985 we have a truncated information about job tenure, in the sense that all labor contracts in 1985 that had began before 1985 do not contain the information concerning the beginning of the job match, hence they all formally begun in January 1985. This means that job tenure spells are often left truncated. In order to manage with this problem we have decide to carry out our estimations in the period 1992-1998. We use the period 85-91 to derive the job tenure at 1992 for all matches starting after January 1985. However, for those workers with tenure starting before 1985 -and that are in the same workplace in 1992- we still have truncated spells (about 15% of our sample). For this reason we do not consider these workers, meaning that the length of job tenure cannot be longer than 14 years.

- Voluntary job change. In order to evaluate our theoretical hypotheses we have to identify all job changes that workers undertake in a voluntary way. Unfortunately, we do not have this information in our database. Nevertheless, we approximate this variable in two different ways, which are the most widespread in the literature. The first one is to assume that each job change that takes place without any unemployment spell is voluntary (*i.e.* in our database it means that less than 30 days occur between the two labor contracts -the same hypothesis is assumed by Abowd, Kramarz, and Margolis, 1999). The second one is to consider as voluntary only the job changes characterized by an increase in the short term MWG[19].

Using these two definitions of voluntary job change[20], we can also compute the variable "*Vol.* Prev. Job Ten.*", which represents the job tenure before

[19] Of course, even in this second case we have imposed a constraint for the unemployment spells that cannot be higher than two months. This is to avoid that a job change characterized by both an increase in wage and, for instance, two years of unemployment spell were treated as voluntary.

[20] Voluntary job change cases are higher in the first case than in the second one (26.375 and 19.690 respectively), and 17.553 job changes are identified as voluntary in both cases.

a voluntary job change. It will be our main variable of interest, since we are interested in computing the return of previous job tenure on wage gains after a voluntary job change.

It is important to note that 48.4% of the workers remain always in the same job, 31% move once and 13.3% twice[21].

Secondly, it is also interesting to analyze differences in real yearly wage growth. Using the two definitions of voluntary job change, it is possible to observe from table 3 that movers ('with change') show a higher wage growth, in average, than the stayers ('no change', 3.6% and 2.5% respectively). Moreover, in order to test the robustness of the first definition of voluntary job change we show that wage growth for workers who change workplace voluntarily is, in average, higher than the involuntary ones (5.5% *vs* 1.6%)[22], meaning that this is a suitable proxy for a voluntary job change.

Type of Voluntary job change	No change	With change	Involuntary	Voluntary
	Mean	Mean	Mean	Mean
- Absence of Un.Spell	2.5%	3.6%	1.6%	5.5%
- Increase in STMWG	2.5%	3.6%	-3.7%	15.3%

Table 3: Real Yearly wage growth for movers and stayers by voluntary job change definitions in the period 1993-98

4.2 Econometric Methodology

To test our main hypothesis concerning job-tenure effects on short term MWG we use a standard wage equation for panel data, *i.e.* regressing the logarithm of the wage on the covariates in level. It is important to note that using this specification allow us to evaluate the impact of a change in one of the covariates on the wage growth. In case of a job change at time t the wage growth ($\Delta \log w$) actually represents the 'relative' short term mobility wage gain ($(b-a)/a$) defined in the theoretical section of the paper[23].

The wage equation is the following:

$$\log w_{i,t} = \sum_{k=1}^{K} b_k x_{k,i,t} + u_i + \omega_{i,t} \ , \ \ n = 1, ..., N \ ; \text{ and } t = 1, ..., T \qquad (18)$$

where $\log w_{i,t}$ is the dependent variable, $x_{k,i,t}$ are K explanatory variables, u_i is the individual effect for each worker, and $\omega_{i,t} \backsim IID(0, \sigma_\omega^2)$ are random disturbances.

[21] We are not interested in how many times this worker has changed job in period t.

[22] Moreover, we have successfully tested that averages in wage growth of the different groups are statistically differents.

[23] Note that we cannot observe, by construction of the database, the last wage in the previous job and the first wage in the new job. We approximate these wages using the last year average wage in the last year in the previous job $(t-1)$ and the first year average wage in the new job (in t).

In our model, $\log w_{it}$ is the log of annual labor earnings divided by the number of worked days, whereas the vector of K covariates is composed by the following variables: $\text{Age}_{i,t}$, $\text{Age}^2_{i,t}$, Job $\text{Tenure}_{i,t}$, Job $\text{Tenure}^2_{i,t}$,$\text{Volont}_{i,t}$*Prev. Job $\text{Tenure}_{i,t-1}$, $(\text{Volont}_{i,t} * \text{Prev.Job Tenure}_{i,t-1})^2$, log $\text{Firmsize}_{i,t}$, qualification, regional, sector and yearly dummies. We carry out panel data estimation in order to take into account the impact and the bias that individual effects determine on the other coefficients (using fixed effect and first differences)[24].

Unfortunately, standard identification problems arise. There is a quite important and well known literature (for example Altonji and Shakotko, 1987; Topel, 1991) concerning endogeneity problems in the wage equation due to the correlation between tenure and individual effects. The basic idea is that there is a positive correlation between job-tenure and the individual fixed effects because high productivity workers -receiving higher wages- are less likely to experience layoffs and quits, ending up with longer job-tenure. In this framework tenure coefficients would be biased. In order to manage with this problem we implement a standard identification strategy using instrumental variables for tenure. The choice of the instruments is not of course an easy task. We have followed the Altonji and Shakotko (1987) methodology, using as additional instruments the deviations of the tenure variables around their means on a given match (index j represents the firm). More specifically:

$$\tilde{T}_{i,j,t} = T_{i,j,t} - \bar{T}_{i,j,\cdot} \text{ and } (\tilde{T}^2_{i,j,t}) = T^2_{i,j,t} - (\bar{T}_{i,j,\cdot})^2$$

These instruments are by construction uncorrelated with the individual effects. Moreover, we have a similar endogeneity problem for our variable of interest, previous job tenure, which is a composite variable derived from the multiplication between a dummy variable identifying voluntary job changes and the job-tenure in previous work position. Therefore, we use the same kind of instruments we have used for tenure, *i.e.* deviation from the means of previous job tenure (PJT) at the match level. As before, they are uncorrelated by construction with the individual effect.

4.3 Estimation results

As first and most direct approximation of the impact of previous job tenure we use yearly dummies, from 1 to 13 years, derived from a fixed effect estimation for the two voluntary job change definitions and controlling for all variables already mentioned. From figure 4 it is possible to claim that using this specification previous job tenure impact on short term MWG (STMWG) is positive and basically increasing.

Unfortunately, in order to manage with endogeneity problems it is almost impossible to implement instrumental variable estimates for 13 dummy variables. Hence, we have to use a polynomial specification. According to the

[24] Implementing the Hausman test (1978) we have checked that individual effects and regressors are not uncorrelated implying that random effect estimation are biased. Moreover, we have tested that the variance of individual effects is significantly different from zero (Breusch-Pagan, 1980)). Therefore, individual effects must be included in the estimation process.

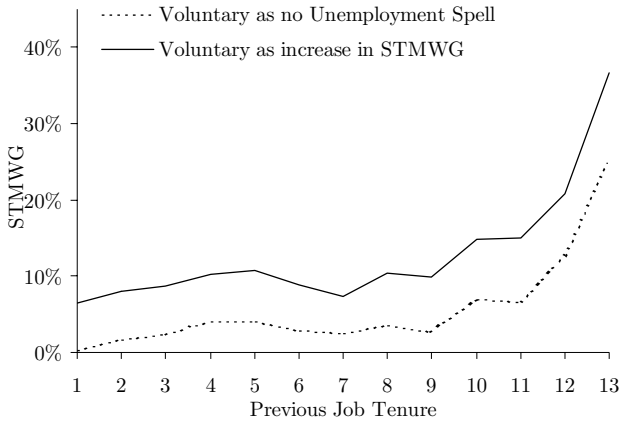

Figure 4: Previous job tenure impact using yearly dummies for the two voluntary job change definitions.

previous section we carry out our estimations using eight different econometric specifications: OLS, fixed effects, first differences, IV using first differences, IV using fixed effects and G2SLS.

Moreover, in order to test the robustness of results we have implemented all these estimations for the two definitions of voluntary job change. We have only reported the coefficients concerning our variables of interest[25].

It is worth noting that coefficients regarding job tenure and previous job tenure are almost always significant. Of course, as in Altonji and Shakotko (1987), job tenure OLS coefficients are higher than the ones in the other estimations, especially when a voluntary job change is identified by the absence of unemployment spells. This is due to endogeneity bias. These main results are strongly consistent with the hypotheses of this paper and do not depend on the definition of voluntary job change[26].

[25] Note that we have carried out other model specifications including additional variables like the voluntary and involuntary dummies and the unemployment spells. Results did not change in a significant way. Moreover, the voluntary coefficient when significant would represent the intercept in the following graphs. Since it was rarely significant and the impact on the other coefficient was negligible we decided not to put them in the final model specification.

[26] In order to properly estimate the tenure coefficients we have carried out our regression using all workers, both stayers and movers. Nevertheless, we have also tried to consider only the movers. Previous job tenure coefficients do not change in a significant way, while tenure coefficients are more rarely significant.

	OLS	FD	FE	IV FD	IV FE	G2SLS
	Voluntary job change as increase in STMWG					
jobtenu	0.015 *	0.019 *	0.011 *	0.019 *	0.011 *	0.011 *
jobtenuˆ2	-0.001 *	-0.001 *	-0.001 *	-0.001 *	0.000 *	0.000 **
prev JT	0.041 *	0.042 *	0.033 *	0.050 *	0.041 *	0.041 *
prev JTˆ2	-0.003 *	-0.003 *	-0.002 *	-0.005 *	-0.004 *	-0.004 *
R^2	0.51	0.05	0.15	0.16	0.16	0.47
R^2 Within			0.40	0.13	0.41	0.39
	Voluntary job change as absence of Unemployment Spell					
jobtenu	0.013 *	0.005 *	0.006 *	-0.001 *	0.005 *	0.006 *
jobtenuˆ2	0.000 *	0.000 *	0.000 *	NS	0.000 *	0.000 **
prev JT	0.021 *	0.009 *	0.006 *	0.007 *	0.005 *	0.006 *
prev JTˆ2	-0.001 *	-0.001 *	NS	-0.001 *	0.000 *	0.000 *
R^2	0.50	0.02	0.15	0.14	0.15	0.46
R^2 Within			0.40	0.16	0.40	0.38

*Coeff. sig. at 1%, **Coeff. sig. at 5%, '-'-not present in the equation, NS not significative

Table 4. OLS, fixed effects, IV FE and G2SLS for the period 1992-1998 for the two voluntary job change definitions, both for quadratic and cubic specifications.

The higher the job tenure before a job change, the higher the switching risk (as already explained in our theoretical model) and the higher the potential loss of SHC (or idiosyncratic information about worker-firm matching productivity). The first effect, captured by previous job tenure coefficients, entails a positive correlation between previous job tenure and short term MWG to compensate increasing job uncertainty and represents the core of our paper. The second one, the loss in SHC captured by job tenure coefficients, concerns the traditional assumption of human capital theory involving a negative impact of job tenure on short term MWG. Hence the overall result will depend on the relative size of each effect.

In figure 5 we show graphically our results for the two definitions of voluntary job change. Considering the case where a voluntary job change is defined by an increase in STMWG, it is possible to claim that the different effects are characterized by similar trends across the different econometric specifications. Further, for all the identification strategies our variable of interest displays a positive trend (the 'risk effect'). For instance, looking at the 2GSLS estimates it is possible to argue that in the Italian case the risk effect is non linear involving that up to about 7 years of previous job tenure the overall effect is positive. After that SHC effect dominates the risk one and the overall marginal impact of job tenure on short-term MWG becomes negative[27]. Using the other type

[27] Overall effect is computed using the following coefficients: a(Volont*Prev.JobTen.)+b (Volont*Prev.JobTen.)^2)-(c Job Tenure + d Job Tenure^2). The first argument is the risk effect and the second one is the SHC-"matching" effect.

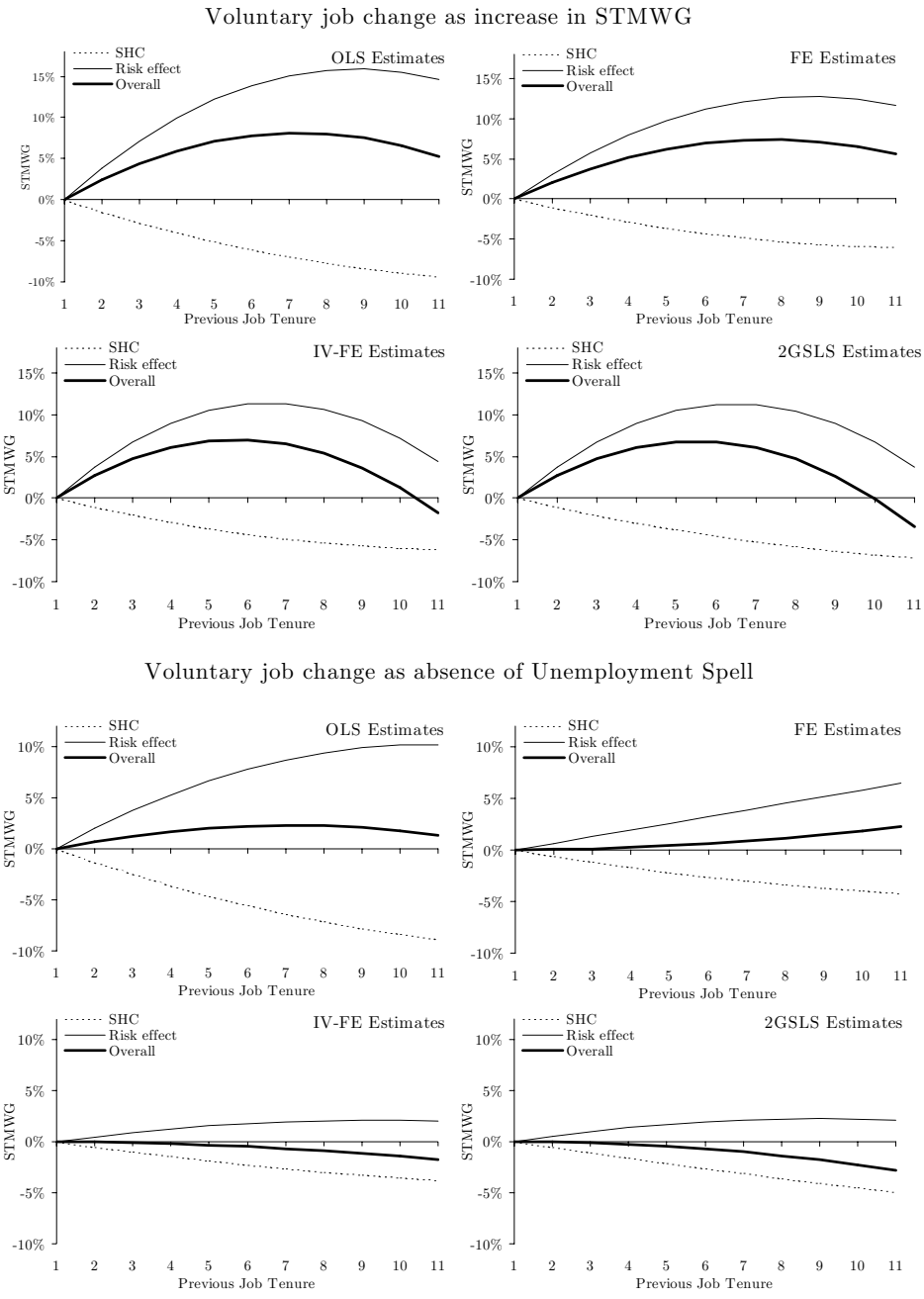

Figure 5: Previous Job Tenure and STMWG in the different estimations and for the two types of voluntary job change

of voluntary job change results display a less uniform trend, even if also in this case the risk effect is always positive.

Up to now we have tested the impact of previous job tenure on STMWG. However, our theoretical model also analyses the importance of risk aversion. More specifically, our theoretical proposition claims that STMWG are increasing in both previous job tenure and risk aversion. Unfortunately, it is not possible to identify in our database a risk aversion proxy for each worker. Nevertheless, it is well known that when utility functions are concave poor workers display a higher risk aversion than rich ones[28].

We use this suitable hypothesis to carried out estimates for the poorer and richer workers, the former proxied by the first quintile of the wage distribution and the latter by the last quintile. We have used G2SLS and FE-IV estimates for the two types of voluntary job change definitions. Results confirm our hypothesis for any estimate and any voluntary type definition (table 5 and figure 6): risk aversion plays an important role involving that previous job tenure impact on STMWG is more important for poor workers than rich ones. Further, this implies that the incidence of voluntary job changes for poor workers is much lower than for rich ones (37% and 77% respectively of total job changes) because poor workers demand more when moving voluntarily.

		Type of volontary job change			
		Absence of Un.Spell		Increase in STMWG	
		IV FE	G2SLS	IV FE	G2SLS
Poor (first 2 deciles)	Prev IT	0.0035 *	0.0034 *	0.0508 *	0.0497 *
	PrevJT2	-	-	-0.0047 *	-0.0046 *
Rich (Last 2 deciles)	Prev IT	0.0054 *	0.0036 **	0.0318 *	0.0331 *
	PrevJT2	-0.0005 *	-0.0004 **	-0.0031 *	-0.0032 *

Table 5. Risk aversion impact on STMWG through previous job tenure
*Coeff. sig. at 1%, **Coeff. sig. at 5%

Results derived in this section are not consistent with those found for the US labor market (*i.e.*- Buchinsky *et al.*, 2002, Gottschalk, 2001). Indeed, positive correlation between previous job-tenure and short-term MWG has never been documented for that country and cannot be explained by standard theoretical frameworks. Nevertheless, our theoretical model can be used to explain this puzzle. Italian labor market is characterized by a strict level of employment protection legislation (EPL). More specifically, firing costs are both higher than those in the US and increasing in job tenure. This means that in Italy the labour market is more segmented between insiders and outsiders. For these reasons it is not surprising that the risk effect dominates for Italian workers while SHC effect is more significant in the US. In fact, when firing costs are proportional to job-tenure the higher the job-tenure the lower the uncertainty on actual job wage

[28] Usually this assumption concerns concave utility functions in wealth. In this case we do not have information on wealth and then we use the wage level as a proxy of that variable.

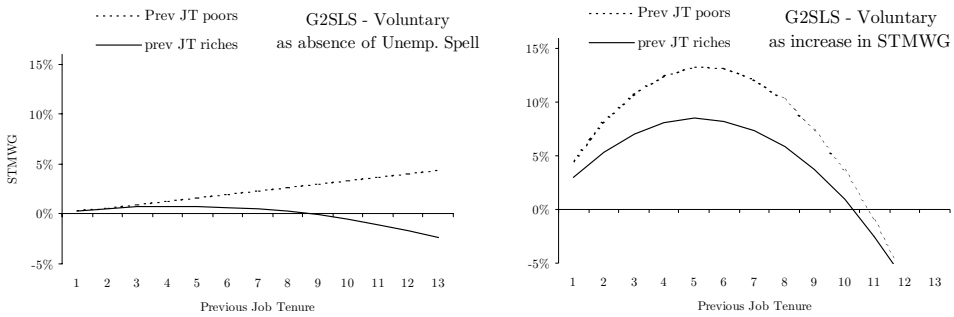

Figure 6: Risk aversion (poor and rich workers) and previous job tenure impact on STMWG, for the two types of voluntary job change.

flows and the higher the job-switching risk (because movers will loose their job 'insurance' linked to firing costs). Because of lower firing costs, job uncertainty (firing probability) for US workers is not strongly correlated with job tenure and then risk effect is negligible. Moreover, in the US even for displaced workers it is easier to look for a job because unemployment outflow rates are higher. On the contrary, job uncertainty for Italian workers decreases with job-tenure because of binding firing costs, and the probability to find a job once displaced is lower in Italy than in the US. For these workers, job-switching risks (in terms of increasing probability of being fired) will be higher and increasing in job-tenure. This means that they will demand higher short-term MWG in order to compensate the increasing uncertainty[29].

This effect is more important for poor workers, because of risk aversion. As a by-product of our theoretical framework we find out that risk effect asymmetries by income level might entail a poverty trap where low wage workers show a lower incidence of voluntary job change (as shown in table 6 voluntary job change represent one of the sources of wage growth). This is confirmed by the fact that in our database first wage quintile workers display a 16% lower rate of voluntary job change than top wage quintile workers, for a given job tenure of 5-6 years..

5 Conclusions

Standard theoretical approaches (search theory, job-matching and human capital models) predict a negative relationship between job-tenure and short term mobility wage gains (MWG). This results appears to be confirmed by recent

[29] In the econometric estimations we do not take into account the trade off between STMWG and LTMWG. In the simulation of the theoretical section we have pointed out that in presence of strict employment protection legislation workers who decide to change job will ask for higher returns in the short run and relatively lower in the long run, since LTMWG will be less appreciated because of the higher uncertainty in the new job.

empirical applications for the US labor market (see Buchinsky *et al.*, 2002 and Gottschalk, 2001).

However, European labor market institutions entail a quite different pattern derived from a higher trade-off between job uncertainty and mobility wage gains.

Assuming that between-jobs risk asymmetries are mainly determined by differences in job tenure and worker risk aversion, we present a new theoretical model entailing for an alternative positive correlation between previous job-tenure and short term MWG, .

With this analytical framework we find out that when wage flows are stochastic (because of job-uncertainty) and firing costs are increasing in job-tenure, both absolute and relative short term MWG -the ratio between short term and long term MWG- are also increasing in job tenure and risk aversion ("risk effect"). This result is achieved by means of analytical and simulation procedures involving different assumptions about current and alternative wage offer distributions.

An interesting by-product of this model implies that the "risk effect" is more important for poor worker, because poverty increase risk aversion when utility functions are concave in wealth.

In order to test our main hypothesis, we use an unbalanced sub-sample of INPS (Italian Social Security Institute) panel database to estimate a log-wage extended model, using more than 330,000 observations for 61,991 male Italian workers.

We have carried out different econometric specifications (OLS, individual fixed effects, first differences, IV individual fixed effects, IV first differences and General 2SLS random effects) in order to control for individual observable and non-observable effects, firm attributes and endogeneity bias (using the Altonji and Shakotko methodology). Disregarding the econometric specification, estimation results support our theoretical proposition. The "risk effect" is positive and generally greater than the specific human capital loss, involving a positive overall impact of previous tenure on short term MWG.

Moreover, confirming the risk aversion hypothesis concerning wealth asymmetries, we find out that the "risk effect" is stronger for poor workers than riches ones.

These results are not consistent with previous research on the same subject focusing on US databases. However it is not surprising because firing costs in the Italian labor market are both higher than in the US one and increasing in job tenure (entailing a positive relationship between job-tenure and retention rates). Therefore, the higher the job tenure the higher the rise in job uncertainty for movers and, in turn, the higher the short-term MWG that satisfies optimal switching conditions. This effect is not relevant for US workers because job tenure does not affect firing cost and then it is negligible for job uncertainty.

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