Job Mobility and Earnings Instability

Marco Leonardi*
University of Milan and IZA

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Abstract

There is still no consensus on the causes of the increase of earnings instability in the US in the '70s and '80s. It is difficult to attribute the increase to job mobility because there is no evidence of a contemporaneous decline in job stability and job security. Using both a simple descriptive method and covariance structure models, this paper shows that job mobility accounts for a substantial part of the increase in earnings instability. The empirical evidence is consistent with the predictions of a search and matching model where an increase in the variance of productivity shocks increases on-the-job search and earnings instability among job changers while leaving job turnover and earnings instability of job stayers approximatively constant.

Keywords: Earnings instability, On-the-job search.
JEL Classification: J21, J31.

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1 Introduction

The evolution of earnings instability –i.e. the variance of the transitory component of individual earnings– in the U.S. is well researched since the work of Gottschalk and Moffitt (1994). Although most scholars agree that earnings instability for men raised in the '70s and in the early '80s and flattened out in the '90s, little is known about the causes of its increase.[1]

Workers' mobility is a possible explanation of earnings instability either because individuals search for better matches with different firms (Topel and Ward, 1992) or because of the scarring effects of unemployment (Huff-Stevens, 2001). In the vast literature on earnings dynamics the link between workers mobility and earnings instability has received scant attention probably because identifying a clear decline in job security and job stability has proved elusive. A considerable amount of research has studied the frequency of job changes and most studies found very little if any increase over time at least until the late 1990s.[2] However, even if the frequency of job changes has not increased much over time, earnings instability in consequence of job change may have increased if job changers experience higher wage losses or gains upon job change.

In a different strand of literature, recent papers by Kambourov and Manovskii (2008) and Moscarini and Thompson (2007) show a substantial increase over time in workers' mobility across industry and occupation at different levels of aggregation especially in the '70s and '80s (see Figure 2 and 3 in Kambourov and Manovskii, 2008).[3] On the other side of the market, firms also have become more unequal: between-plant measures of wage and productivity dispersion

[1] Gottschalk and Moffitt (2009) and Meghir and Pistaferri (2011) offer recent and complete oveviews of the literature. Among the papers which used PSID data in levels rather than year-to-year changes and found an increase in instability: Moffitt and Gottschalk (2002, 2012), Jensen and Shore (2010), Haider (2001), Hyslop (2001). A recent reanalysis of the PSID by Shin and Solon (2011) partially disagrees on the timing of the rise of instability: it trended upwards during the 1970s, but did not show a clear trend after that until climbing again after 1998. However the difference is explained by their looking at year-to-year earnings changes (i.e. earnings volatility) rather than earnings levels (see Section 4).

[2] See for example the articles by Jaeger and Huff-Stevens, Gottschalk and Moffitt, Neumark et al. in the special issue of the Journal of Labor Economics 17(4), October 1999. More recently, using various data sources, Huff-Stevens (2005) concluded that the prevalence of long-term employment relationships for men was stable between 1969 and 2002. Farber (2008) finds an increase the proportion of workers in jobs with less than one year of tenure. However he agrees that this increase is recent and the measure is stable until the early nineties. Hallock (2009) finds a recent decline in worker-firm attachment. Celik et al. (2012) find that the fraction of workers who do not change jobs (defined as having the same employer over two years) is relatively constant.

[3] Industry and occupational mobility are likely to be correlated with job change and Kambourov and Manovskii (2008) report a correlation of 0.8 between two-digit occupation switch and employer change and a correlation of 0.86 between two-digit industry switch and employer change. However, this literature is not necessarily in contrast with the literature on job stability in that one can experience occupation changes with the same employer.

have increased over time in the U.S. (Dunne et al., 2004; Leonardi, 2007) and there is more firm volatility measured as the variance of growth rates of sales, employment and wages (Comin and Philippon, 2006).[4] Finally Comin et al. (2009) document a positive relationship between firm-level volatility and the volatility and dispersion of wages at the occupation level. This evidence is suggestive that higher earnings instability in the '70s and '80s may be associated not much with a higher turnover but with a higher probability of occupational change (i.e. conditional on the same turnover rate, job changers change more often occupation upon job change) and eventually a higher variance of earnings changes.[5]

To establish the link between instability and mobility, I first assess the contribution of job changers to the evolution of the overall transitory variance of earnings, secondly I provide a model to interpret the descriptive evidence. In the empirical part of the paper I use PSID data on male heads of household and divide the sample into job stayers and job changers using the variable "time spent with the current employer". I document the different evolution of instability between job stayers and job changers using two methods: the descriptive measures of earninigs instability due to the early work by Gottschalk and Moffitt (1994) and the more formal permanent-transitory variance decomposition method common in the literature on earnings dynamics. With both methods I find a higher increase over time in the transitory variance of earnings among job changers rather than job stayers. (In the course of the paper I will refer to the "transitory variance" meaning the variance of the transitory component of earnings, likewise the "permanent variance" indicates the variance of the permanent component.)

The empirical part is related to few papers in the literature on earnings instability. Gottschalk and Moffitt (1994) made an early attempt to distinguish the contribution of low-tenured workers to the trend of earnings instability. Huff-Stevens (2001) looked at the effect of job change on earnings instability focussing on involuntary displacement. More recently Celik et al. (2012) use CPS, SIPP and employer-employee matched data and find a decrease in earnings instabil-

[4]Haltiwanger in the discussion of Comin and Philippon (2006) notes that this phenomenon is more evident among listed (and therefore larger) firms. In any case listed firms account for around 50% of total U.S. employment.

[5]Kambourov and Manovskii (2009) show that the heterogeneity of workers' occupational experience can account for part of the cross sectional variance of wages in the same age-education group. Poletaev and Robinson (2008) show that wage losses of displaced workers are larger the larger the distance of the "portfolio" of skills of their occupations before and after job loss. Violante (2002) develops a model in which technological change makes it more difficult for workers to transfer their skills to more recent vintages of capital. As a result, workers experience larger wage losses upon separation which results in an increase in the variance of transitory earnings.

ity among job changers due to declining unemployment associated with job change. I find an increase in earnings instability of job changers but differently from Celik et al. (2012) I use PSID data in levels while they use CPS and administrative data in year-to-year changes. In a related paper Cappellari and Leonardi (2013) use Italian employer-employee matched data and model the effect of tenure directly within error-component models of earnings dynamics. Hospido (2012) decomposes the variance of earnings in the PSID in individual and job-specific effects but she does not look at the contribution of job changers to the evolution over time of earnings instability.

Since the empirical findings in this paper are based on a descriptive permanent-transitory statistical decomposition, in the second part of the paper I offer an interpretation of the results. I show that the evidence of the '70s and '80s in the U.S. characterized by rising earnings instability and constant job turnover can be explained within a simple matching model allowing for on-the-job search. The model predicts that a mean-preserving spread of the distribution of productivity shocks (which may be thought to model the increasing uncertainty of demand) induces more employed workers to search for better jobs and thus increases the variance of wage changes upon job change. Job turnover does not necessarily increase much because not all search turns successfully into a new job match. The implication is a larger increase in earnings instability for job changers than for job stayers.

A complementary literature investigates the link between workers' mobility and instability estimating structural models at the cost of imposing some behavioral and distributional assumptions (Flinn, 2002; Jolivet, Postel-Vinay and Robin, 2006; Bowlus and Robin, 2004; Flabbi and Leonardi, 2010). Flabbi and Leonardi (2010) show that an increase in mobility (the job offer arrival rate in a model with on the job search) increases the cross-sectional variance of earnings in the U.S. thus suggesting - although with other methods - that there is a role for job mobility in explaining instability.

The rest of the paper proceeds as follows. Section 2 describes the data. Section 3 introduces the results obtained with the window-average models. Section 4 presents the statistical model and the results. Section 5 presents a search and matching model adapted to the study of earnings instability of job stayers and job changers and Section 6 provides the conclusion.

2 The Data

I use data on 9,772 individuals for the period 1976-2007 of the PSID, from 1997 the data are biannual. It is an unbalanced panel with 78,590 observations of male heads aged 25 to 60. Details on the step-by-step sample selection are reported in the Data Appendix. The structure of the panel is described in the Appendix: Table A.1 shows the structure of the unbalanced panel i.e. the distribution of individuals by the number of years that they are observed in the sample and Table A.2 shows the number of individuals in each year. The full sample is divided in job stayers and job changers.

2.1 Definition of Stayers and Changers

Since the PSID does not collect information on employers, the identification of job changes in this data set is problematic.[6] The variable of primary interest reports the "time the worker has been with his current employer". The tenure question switched from being coded in intervals prior to 1976 to being measured in months: for this reason I use data from 1976 onwards. The question asks about employer tenure (except for the years 1978-1981 when it asks only about position tenure): therefore in this paper job changers are those who move jobs between firms i.e. they are actually employer changers.[7]

Let us first define a change of job and then define for how long it affects earnings instability. A change of job is identified when a worker records tenure less than 12 months. Table 1 shows the distribution of job changes across the 9,772 individuals of the sample: around 50% of them never changed employer while in the sample, the rest has one or more changes during the period i.e. they recorded tenure less than 12 months once or more than once (up to 14 times).

The study of individual earnings instability requires panel observations over time and cannot be simply measured on the year of the change of job i.e. only on workers with tenure less than 12 months. I allow the job change to affect instability for 4 years after the change and therefore I define job changers those individuals with less than 4 years of tenure (48 months) and job stayers those with 4 or more years of tenure. Tenure is a time-varying characteristic

[6] Many of the difficulties related to measuring job tenure in the PSID were discussed in the paper by Jaeger and Stevens (1999) and other papers in the same journal issue.

[7] See Devereux and Hart (2006) for a study of wage cyclicality of within-firms job changers using English data.

TABLE 1. Number of job changes per individual

Number of changes	Full sample	1976	1990	2007
0	4,866	1,070	950	1,557
1	2,458	513	660	781
2	1,139	246	473	349
3	623	165	341	187
4	311	82	200	110
5	160	53	108	49
6	103	31	76	33
7	46	17	31	13
8	35	15	30	13
9	12	8	8	2
10	10	4	9	1
11	5	2	5	0
12	1	1	1	0
13	2	0	2	0
14	1	1	1	1
Total	9,772	2,208	2,895	3,096

of individuals therefore the same individual is a changer for 4 years after job change and a stayer if he stays 4 or longer than 4 years with the same employer: Job changers are 5,470 and job stayers are 4,302 in the sample.[8] Of course the threshold that divides job changers and job stayers is arbitrary: Four years is the minimum number of years that gives a reasonable sample and a long enough post-change period to be able to measure the effects of job change on instability.[9] As a robustness check I define a second sample of job changers as those with less than 10 years of tenure i.e. I allow the effects of job change on earnings instability for a much longer time.

I neglect the information on the type of job change because the question is asked only to those who changed within the year. Therefore individuals may have changed voluntarily or involuntarily and may have gone through an unemployment spell as long as they have a valid record on annual labor earnings in all years.[10]

[8]Notice that job stayers are less than the 4,866 individuals which never recorded a job change in Table 1 because with this definition anybody who records tenure less than 4 years is a job changer even if he never recorded tenure less than 12 months, in other words I consider job changers also those who first appeared in the sample with tenure longer than 12 months but shorter than 48 months.

[9]Cappellari and Leonardi (2013) on Italian data find that the effect of tenure on instability goes to zero after the fourth year of tenure.

[10]The type of change is defined by the answer to the question: "What happened to the job you had before - did the company go out of business, were you laid off, promoted, or what?". The four reasons identified in the survey are (1) quit, (2) permanently laid-off or fired, (3) business or plant closed, (4) other reason (mainly seasonal or temporary job ended).

One possible concern is that the change in earnings upon job change cannot be exactly measured since the PSID records annual earnings and earnings during the year of the job change are a mixture of the earnings from the old and the new job. However this issue is not crucial for our purposes because we are not studying the variance of earnings changes at the moment of the job change but we look at the effects of job change on the variance of earnings over time.

There is also an issue of possible mismeasurement of tenure and consequent misallocation of individuals among job changers and job stayers. For this reason and to use earnings data both before and after job change to measure instability (in the benchmark definition of job changers I use only earnings data after job change to measure instability of job changers), I also define a third group of job changers as those individuals who record a job change (tenure less than 12 months) in any year during the sample. Job stayers are those who never recorded a single employer change during the sample period (4,866 individuals or around 50% of the sample, see Table 1).[11]

2.2 Descriptive Statistics

Selected demographic and socio-economic characteristics are reported in Table 2 for the full sample and separately for job stayers and job changers: as expected job changers are younger and have lower labor earnings on average, job stayers and job changers are similar in terms of education level and race.

The dependent variable is annual real labor income (in year 2000 dollars). Following large part of the literature I estimate first-stage residuals:

$$\log w_{it} = X_{it}\beta + u_{it} \tag{1}$$

where the covariates are age, age squared, year and race dummies. Three different regressions are run, one for each education group (college, high school, less than high school) to allow

[11]Table A.3 in Appendix shows the average tenure in months the proportion of job changers in the sample according to the three definitions. In the first period of the PSID, between 1978 and 1981 the question on tenure asked about position tenure rather than explicitly about employer tenure. This results in a higher percentage of job changers between 1978 and 1981, however if instability is higher immediately after job change this should go in the direction of finding higher instability for job changers in the early years of the PSID rather than in the late years, as I actually find.

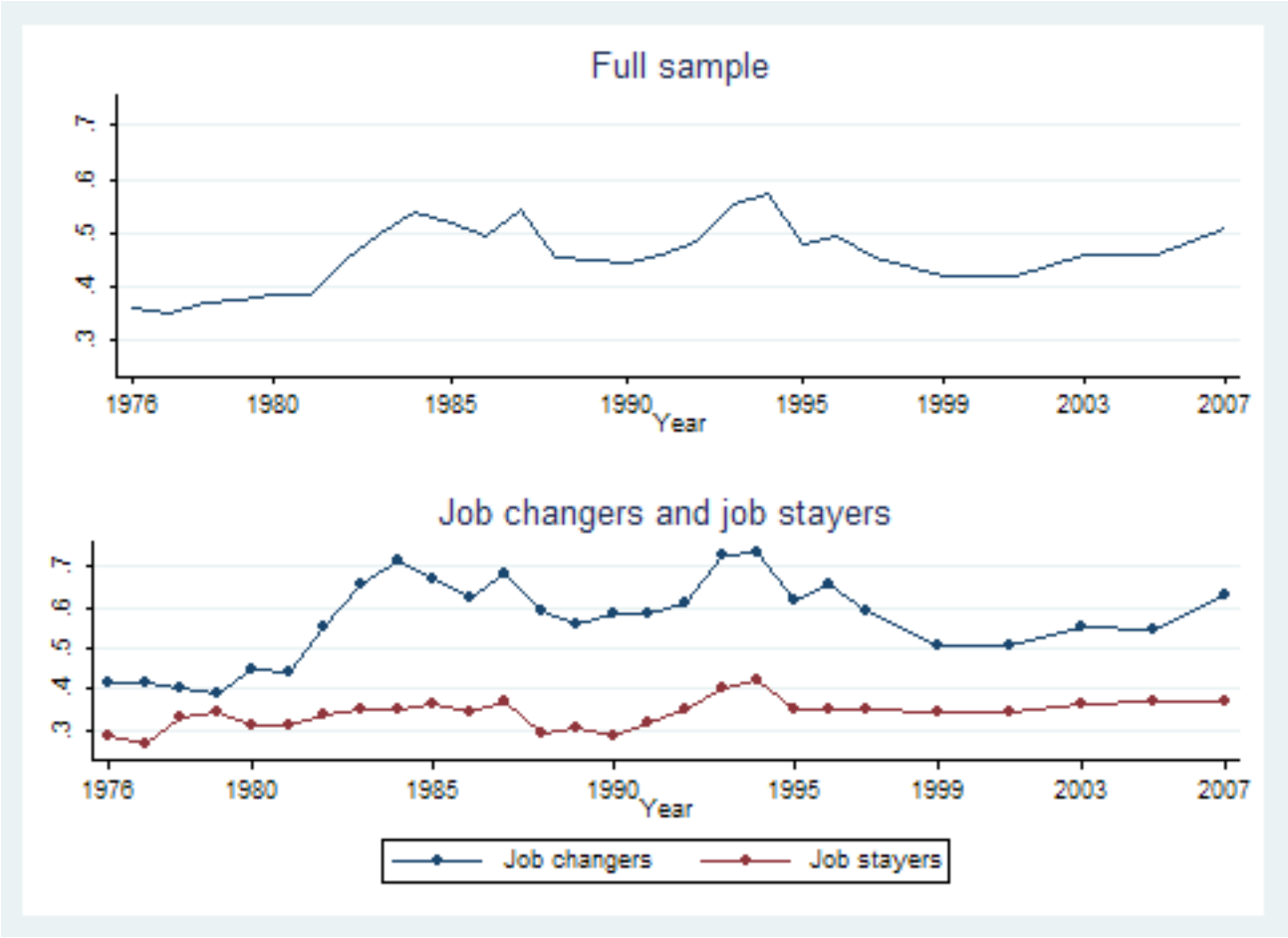

FIGURE 1. The variance of log residual earnings for the full sample and separately for job stayers and job changers. Job changers have less than 4 years of tenure, job stayers have 4 or more years of tenure.

for time-varying education premia. Figure 1 plots the cross sectional variance of log residual earnings over time for the full sample (top panel) and for job stayers and job changers (bottom panel). The evolution of the log variance of earnings shows that job changers experienced a much higher increase over time during the '80s while the group of job stayers have a stable variance over time.

3 Window-averaging method

To characterize the difference across job changers and job stayers I consider the window-averaging method first applied in Gottschalk and Moffitt (1994) which computes individual-specific measures of earnings instability and then averages them over time. A simple permanent-transitory decomposition can be written as the sum of two orthogonal components: $u_{it} = m_i + v_{it}$ where the first term indicates permanent earnings and the second indicates transitory earnings

TABLE 2. PSID descriptive statistics

	Full sample	Job stayers	Job changers
Age	32.38	35.62	29.84
	(9.17)	(10.26)	(7.26)
Tenure in months	62.93	121.3	17
	(76.2)	(83.13)	(12.2)
HS dropout	0.21	0.22	0.20
HS graduate	0.60	0.61	0.59
College graduate	0.19	0.17	0.20
Married	0.65	0.68	0.61
White	0.61	0.62	0.61
Number of children	1.05	1.23	0.91
	(1.27)	(1.37)	(1.17)
Family size	3.01	3.33	2.76
	(1.59)	(1.70)	(1.45)
Head labor income	30,678	36,955	25,740
	(20,276)	(21,983)	(17,295)
Family total income	45,456	53,540	39,099
	(30,899)	(33,459)	(27,083)
North east	0.13	0.14	0.13
North central	0.21	0.22	0.20
South	0.50	0.49	0.50
N. individuals	9,772	4,302	5,470
N. observations	78,590	49,461	29,129

Notes: Standard deviation of continuous variables in parentheses. Head labor income and family total income are in year 2000 dollars. Job changers have less than 4 years of tenure, job stayers have 4 or more years of tenure.

which vary over time. To compute the variances of the permanent and transitory components and their trend over time I take data within a window $[t-q, t+q]$. The mean of each individual's residuals constitute his permanent component of earnings and the variance of each individual's deviations from his own mean constitutes his transitory component of earnings. The mean of these variances is the transitory variance. The exact formula of the transitory variance is the following: $\sigma_v^2 = \frac{1}{N}\sum_{i=1}^{N}\frac{1}{T_i-1}\sum_{t=1}^{T_i}(u_{it}-u_i)^2$ where N is the number of individuals i each of whom is observed T_i periods; u_i is the average of the individual's residuals over T_i. Repeating this calculation moving the fixed-lenght window by one year t in the data, provides a trend in the estimated transitory variance. The variance of the permanent component is computed as: $\sigma_m^2 = \frac{1}{N-1}\sum_{i=1}^{N}(u_i-u)^2 - \frac{\sigma_v^2}{T}$ where u is the mean of u_{it} over all individuals and time periods and T is the mean of T_i over i.

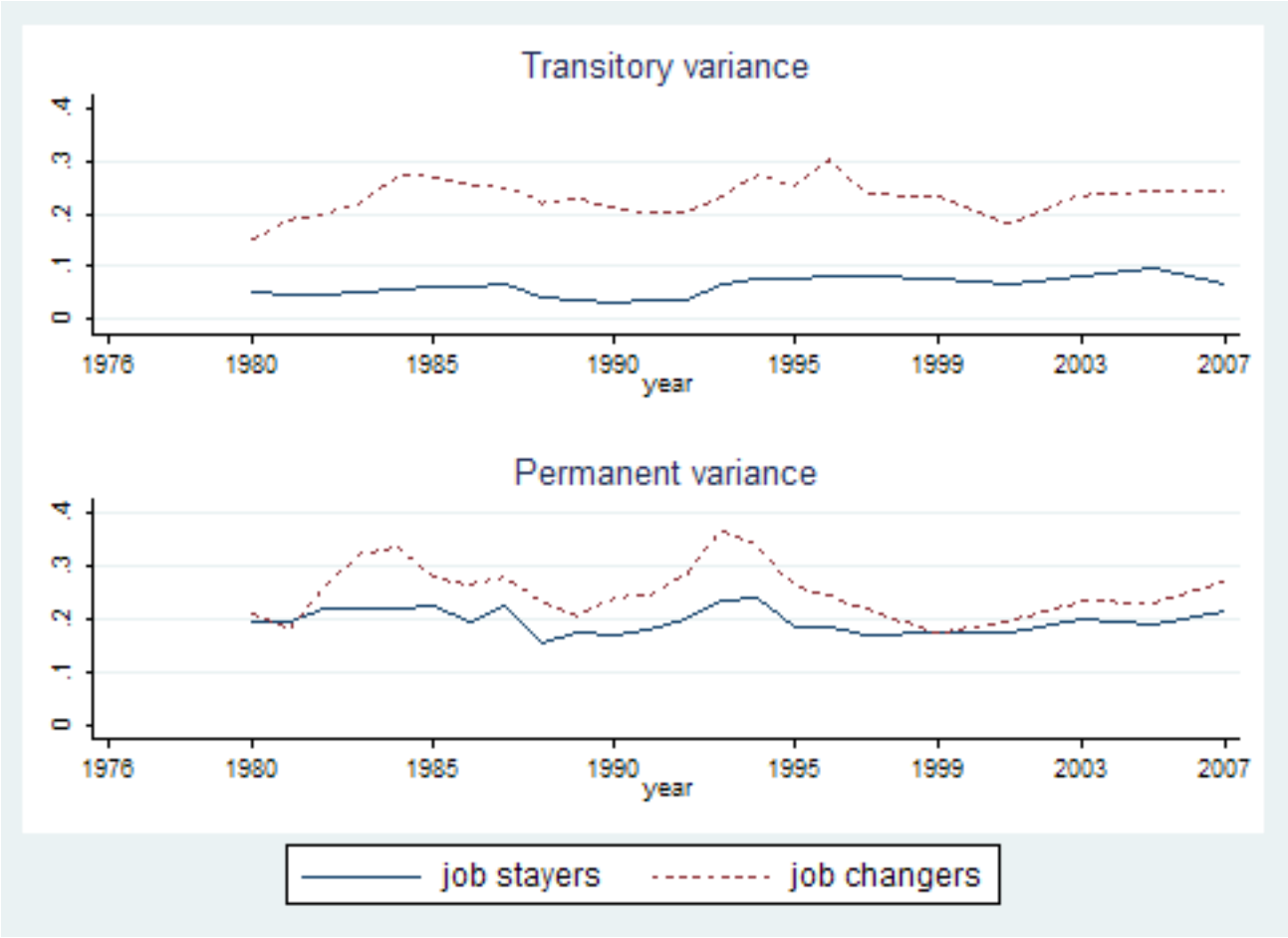

FIGURE 2. Predicted variance components. Window-averaging method.

Figure 2 shows the results of this exercise using a five-year window i.e. $q = 2$; I find results to be robust when using $q = 4$. The figure shows a rising transitory variance for the sample of job changers with tenure < 4 years and a flat profile for stayers with tenure $>= 4$ years. The figure also shows the permanent variance for changers and stayers, with no clear trend for either group. This simple decomposition method suggests that the different evolution of job changers and job stayers in the variances of Figure 1 is due to differences in the variance of the transitory part rather than the permanent part of earnings across the two groups.

One possible concern with the results is that earnings instability attributed to job change is due to the effect of industry and occupational-specific wage fluctuations. Failing to control for fluctuations in industry- and occupation-specific labor income when individuals change jobs across occupations and industry may lead to confound individual-specific earnings instability due to job change with occupation- and industry-specific average labor income changes.[12] To

[12]Kambourov and Manovskii (2008) document the increase in industry and occupation mobility in the PSID 1968-1997. Measuring industry (occupation) mobility as the fraction of currently employed males who report a current industry (occupation) different from the one in the previous year, they report an increase in occupational

purge the estimated transitory variance from fluctuations in occupation- and industry-specific labor income, I include year-specific industry and occupation dummies in the first-stage regression: $\log w_{ijt} = X_{it}\beta + \psi_{jt} + u_{it}$ where the subscript j indicates the industry and ψ_{jt} indicates a set of interactions 2 digit industry*year and 2 digit occupation*year. The individual controls X_{it} are unchanged with respect to equation 1. When I compute the transitory variance using this newly estimated residual, the results (not shown, but available upon request) are substantially unchanged wrt. Figure 2.

Finally Figure 3 shows the evolution of the transitory variance estimated on the benchmark sample of job changers with tenure <4 years, on the sample of job changers with tenure <10 years and on the sample of ever changers. The trend of instability of these last two groups is flatter. This is somewhat expected if one thinks that the transitory variance in these two groups is computed across individuals who may have changed job long before the year in which the variance is computed or may have not changed job yet (in the case of "ever changers").

The Gottschalk and Moffitt (1994) approach is very simple and intuitive and generates individual-specific measures of instability which, instead, are not available when using more formal models. However the residuals used in the computation are not the right ones if the permanent and transitory components are serially-correlated. To allow for serial correlation, I turn next to a more complicated model.

4 Error-Component Model and Results

Past literature suggests that in PSID data permanent income is a martingale and transitory income serially uncorrelated or a first order Moving Average process (see for example Meghir and Pistaferri, 2004 and Blundell et al., 2008). The residuals u_{it} in equation 1 are then modelled as the sum of two uncorrelated parts:

$$u_{it} = r_{it} + v_{it} \tag{2}$$

The permanent component follows a martingale, hence $r_{it} = r_{it-1} + \xi_{it}$ where $\xi_{it} \sim (0, \sigma^2_{\xi t})$ denotes the permanent income shock, independently and identically distributed across i and t.

mobility at the two digit level from 12% in the early seventies to 17% in the mid nineties and an increase in industry mobility at the two digit level from 8% to 13%.

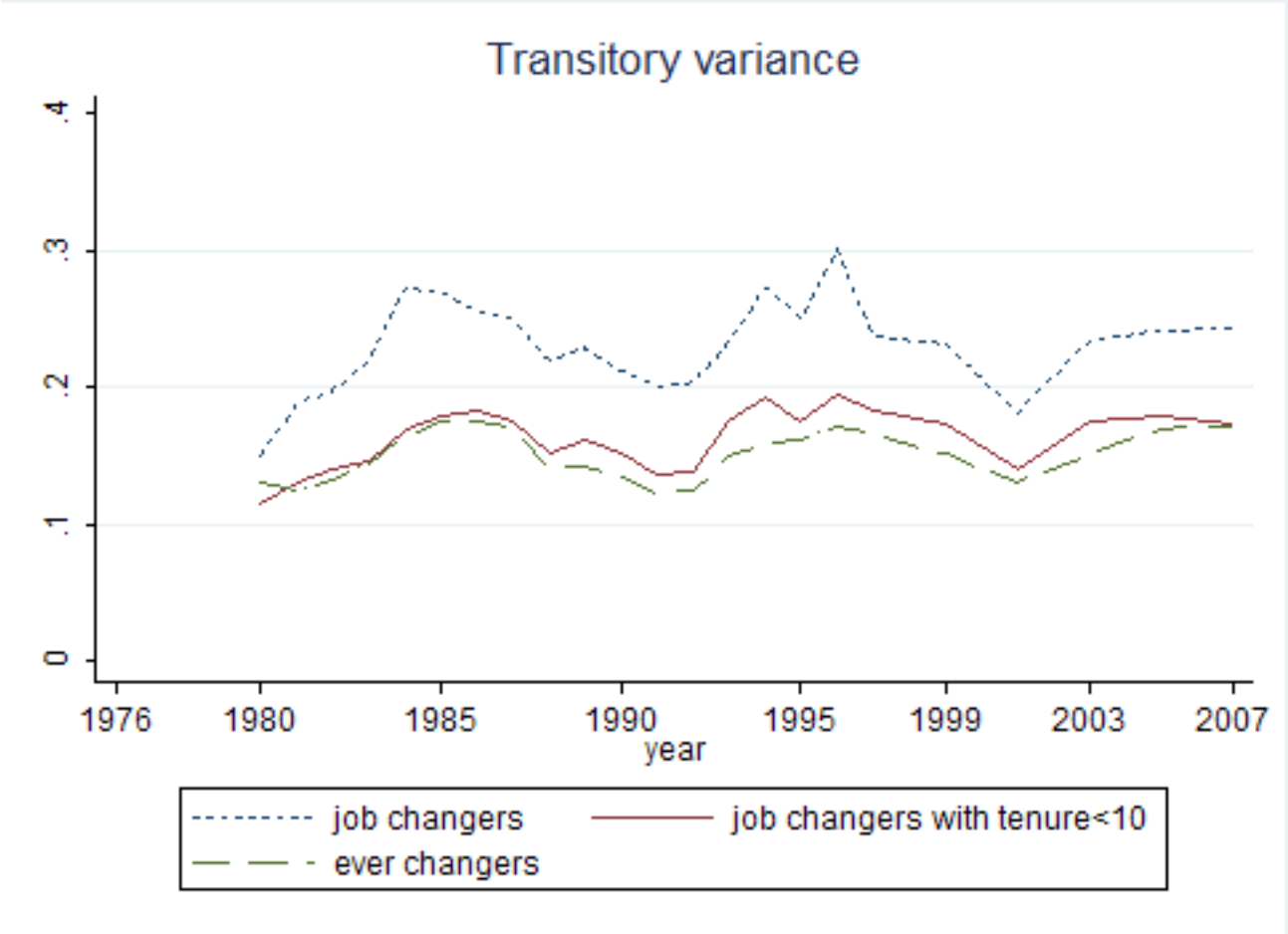

FIGURE 3. Predicted transitory variance component. Three definitions of job changers. Window-averaging method.

The transitory v_{it} is given by an ARMA(1,1) process $v_{it} = \rho v_{it-1} + \theta\varepsilon_{it-1} + \varepsilon_{it}$ with transitory shocks $\varepsilon_{it} \sim (0, \sigma^2_{\varepsilon t})$ uncorrelated with permanent shocks $E(\xi_{it}, \varepsilon_{it}) = 0$.[13]

Iterating the permanent component back to the initial period, the (residual) labor income is equal to:

$$u_{it} = r_{i0} + \sum_{z=1}^{t} \xi_{iz} + \rho v_{it-1} + \theta\varepsilon_{it-1} + \varepsilon_{it} \tag{3}$$

residual labor income income in period t is the sum of the initial level of permanent income at the start of the sample $r_{i0} \sim (0, \sigma^2_{r0})$ representing an unobservable endowment or initial condition, past and contemporaneous permanent income shocks and transitory shocks. The introduction of the AR term introduces a problem of left-censoring or initial conditions because the parameters of the transitory variance cannot be identified prior to 1976, yet their evolution prior to that year affects variances and covariances after 1976. I estimate the initial conditions assuming $v_{i0} \sim_i (0, \sigma^2_{v0})$.

The variance-covariance matrix is given by:

$$\begin{aligned}
\text{cov}(\text{u}_{it,} u_{it-s}) = \sigma^2_{r0} + \sum_{j=1}^{t-s} \sigma^2_{\xi j} + \rho^2\sigma^2_{vt-1} + \theta^2\sigma^2_{\varepsilon t-1} + \sigma^2_{\varepsilon t} \qquad & \text{if } s = 0 \\
= \sigma^2_{r0} + \sum_{j=1}^{t-s} \sigma^2_{\xi j} + \rho\sigma^2_{vt-1} + \theta\sigma^2_{\varepsilon t-1} \qquad & \text{if } s = 1 \\
= \sigma^2_{r0} + \sum_{j=1}^{t-s} \sigma^2_{\xi j} + \rho^s\sigma^2_{vt-s} + \rho^{s-1}\theta\sigma^2_{\varepsilon t-s} \qquad & \text{if } s > 1
\end{aligned} \tag{4}$$

The PSID sample is biannual between $T-5$ =1999 and T =2007 therefore the terms of the matrix corresponding to the alternate years must be adapted. The diagonal covariance matrix term (T-5, T-5) is written as $cov(u_{iT-5}, u_{iT-5}) = \sigma^2_{r0} + \sum_{j=1}^{T-6} \sigma^2_{\xi j} + 2\sigma^2_{\xi T-5} + \rho^2\sigma^2_{vt-1} + \sigma^2_{\varepsilon T-5}$ and similarly up to T-1=2005. The last two variances $\sigma^2_{\xi T}$ and $\sigma^2_{\varepsilon T}$ for year 2007 are not identified.

[13] In general the transitory part is modelled as an ARMA model. The orders of the AR and MA components are established empirically: I estimate the autocovariances of the first-differences of the residuals of $\log w = X\beta + u$. The estimated autocovariances (Table not shown) are initially negative at one lag but fall close to zero after the first lag. Between lags 2 and 3 they drop again sharply and after lag 3, they are no longer significant. This is suggestive of a low order MA process, of order 1 or 2 in levels.

The off-diagonal term with $s = 1$ (T-5, T-4) is $cov(u_{iT-5}, u_{iT-4}) = \sigma^2_{r0} + \sum_{j=1}^{T-4} \sigma^2_{\xi j} + \rho\sigma^2_{vt-1}$ and similarly up to (T-2, T-1). The estimation is performed using a diagonally weighted minimum distance procedure.

Some papers in the literature estimate this model in differences, I estimate the model in levels because the last five PSID years (1997, 1999, 2001, 2003, 2005 and 2007) are alternate years and one cannot take one-year differences. While many papers include age or cohort variation in the variances (Moffitt and Gottshalk, 2012, do but also show that they are not important in their Figure 3 and page 13), I neglect age effects because of the small sample size when I divide the sample in job stayers and job changers. (Meghir and Pistaferri, 2004, estimate this model in differences and they also neglect age effects in the variances because they divide the sample by education group.)

4.1 Results

Table 3 reports the parameter coefficients and standard errors estimated on the full sample of workers and separately on job changers and job stayers.

In the column of the full sample results, the MA parameter θ =-0.86 while ρ =0.75 indicates the persistance of transitory shocks: 31% of a transitory innovation contributes to transitory earnings after 4 years (0.75^4). Transitory shocks are more persistent among stayers than changers. The coefficients of the full sample can be compared to previous results. Dickens (2000) estimates an ARMA process for the transitory component of income on UK data with a MA coefficient of -0.57 and an AR coefficient of 0.96, Moffitt and Gottschalk (2012) estimate a MA coefficient of -0.57 and an AR coefficient of 0.84. These papers are the natural comparison, because they decompose the covariance structure of income levels, whereas other papers in the literature estimate the process for first differences in income.

The table shows that the variance of log initial permanent (residual) income is $\sigma^2_{r0} = 0.10$. This means that, even controlling for the flexible first-stage equation, the initial condition of permanent income has a variance of 11%. The variance of the initial condition of transitory income shocks σ^2_{v0} is even higher at 20%. Both the variance of initial permanent income and the variance of initial transitory income shocks are higher among job changers than job stayers indicating their higher heterogeneity and higher instability on average.

TABLE 3. Estimates of error component model: random walk + ARMA(1,1)

	Full sample		Job stayers		Job changers	
	coefficient	s.e.	coefficient	s.e.	coefficient	s.e.
θ	-0.8649	0.2035	-0.7923	0.1709	-0.6757	0.2008
σ^2_{r0}	0.1086	0.0191	0.1143	0.0285	0.1591	0.0772
σ^2_{v0}	0.2036	0.0308	0.1005	0.0315	0.1698	0.1608
ρ	0.7512	0.0134	0.8459	0.0270	0.6220	0.0339
			permanent income shocks			
1977	-0.0075	0.0160	-0.0066	0.0226	-0.0092	0.0630
1978	0.0017	0.0068	-0.0157	0.0113	-0.0315	0.0284
1979	-0.0032	0.0053	0.0114	0.0091	-0.0013	0.0159
1980	-0.0023	0.0056	-0.0065	0.0096	0.0047	0.0154
1981	0.0031	0.0053	0.0074	0.0075	0.0319	0.0165
1982	0.0178	0.0050	0.0112	0.0059	0.0212	0.0190
1983	0.0002	0.0058	0.0019	0.0064	-0.0017	0.0221
1984	-0.0098	0.0061	-0.0110	0.0063	0.0086	0.0212
1985	0.0128	0.0075	-0.0011	0.0070	0.0046	0.0253
1986	-0.0031	0.0062	0.0038	0.0060	-0.0126	0.0232
1987	0.0069	0.0061	0.0075	0.0059	0.0169	0.0230
1988	-0.0161	0.0067	-0.0206	0.0070	-0.0081	0.0234
1989	0.0160	0.0060	0.0241	0.0075	0.0079	0.0208
1990	0.0029	0.0059	-0.0073	0.0068	0.0173	0.0224
1991	0.0000	0.0061	0.0025	0.0061	-0.0184	0.02235
1992	-0.0029	0.0061	-0.0000	0.0067	-0.0314	0.01815
1993	-0.0067	0.0075	-0.0062	0.0078	-0.0014	0.0222
1994	-0.0114	0.0105	-0.0186	0.0138	0.0408	0.0339
1995	-0.0158	0.0118	-0.0150	0.01559	-0.0045	0.0358
1996	0.0046	0.0111	0.0058	0.0148	-0.0367	0.0283
1997	-0.0341	0.0136	-0.0265	0.0155	-0.0488	0.0321
1999	0.0142	0.0156	0.0037	0.0176	0.0088	0.0302
2001	0.0133	0.0155	-0.0061	0.0176	0.0603	0.0316
2003	0.0005	0.0135	-0.0098	0.0161	-0.0094	0.0306
2005	0.0104	0.0103	-0.0025	0.0103	0.0211	0.0196

TABLE 4. Continued: transitory variances estimates

	Full sample		Job stayers		Job changers	
			transitory income shocks			
1977	0.0540	0.0143	0.0461	0.0172	0.1380	0.0537
1978	0.0547	0.0139	0.0350	0.0168	0.0400	0.0366
1979	0.0570	0.0144	0.0350	0.0137	0.1191	0.0396
1980	0.0544	0.0134	0.0144	0.0084	0.0994	0.0311
1981	0.0571	0.0133	0.0241	0.0087	0.1142	0.0317
1982	0.0693	0.0142	0.0261	0.0086	0.1798	0.0431
1983	0.0939	0.0235	0.0383	0.0106	0.2225	0.0544
1984	0.0720	0.0197	0.0430	0.0139	0.2091	0.0644
1985	0.0514	0.0136	0.0162	0.0089	0.1459	0.0496
1986	0.0545	0.0128	0.0151	0.0071	0.1437	0.0412
1987	0.0604	0.0184	0.0377	0.0148	0.1565	0.0497
1988	0.0286	0.0083	-0.0131	0.0084	0.0998	0.0384
1989	0.0438	0.0105	0.0306	0.0094	0.1061	0.0331
1990	0.0515	0.0128	0.0140	0.0071	0.1478	0.0395
1991	0.0510	0.0116	0.0269	0.0080	0.1431	0.0409
1992	0.0728	0.0153	0.0272	0.0090	0.2011	0.0479
1993	0.0975	0.0257	0.0637	0.0182	0.2391	0.0705
1994	0.0751	0.0251	0.0423	0.0222	0.1572	0.0601
1995	0.0347	0.0115	0.0017	0.0145	0.1143	0.0408
1996	0.0916	0.0256	0.0532	0.0176	0.2387	0.0655
1997	0.0452	0.0189	0.0296	0.0194	0.1027	0.0522
1999	0.0443	0.0160	0.0336	0.0166	0.0910	0.0403
2001	0.0581	0.0147	0.0369	0.0126	0.0836	0.0305
2003	0.0739	0.0191	0.0645	0.0172	0.1577	0.0457
2005	0.0959	0.0206	0.0628	0.0156	0.1621	0.0416
			model statistics			
X2	566.48		505.6344		397.4206	
SSD	0.0898		0.0721		0.6687	
DF	297		297		297	

Notes: I impose equality of the variances of both permanent and transitory shocks in the first and in the last two years of the sample period. This is to avoid instability when few moments are used for identification.

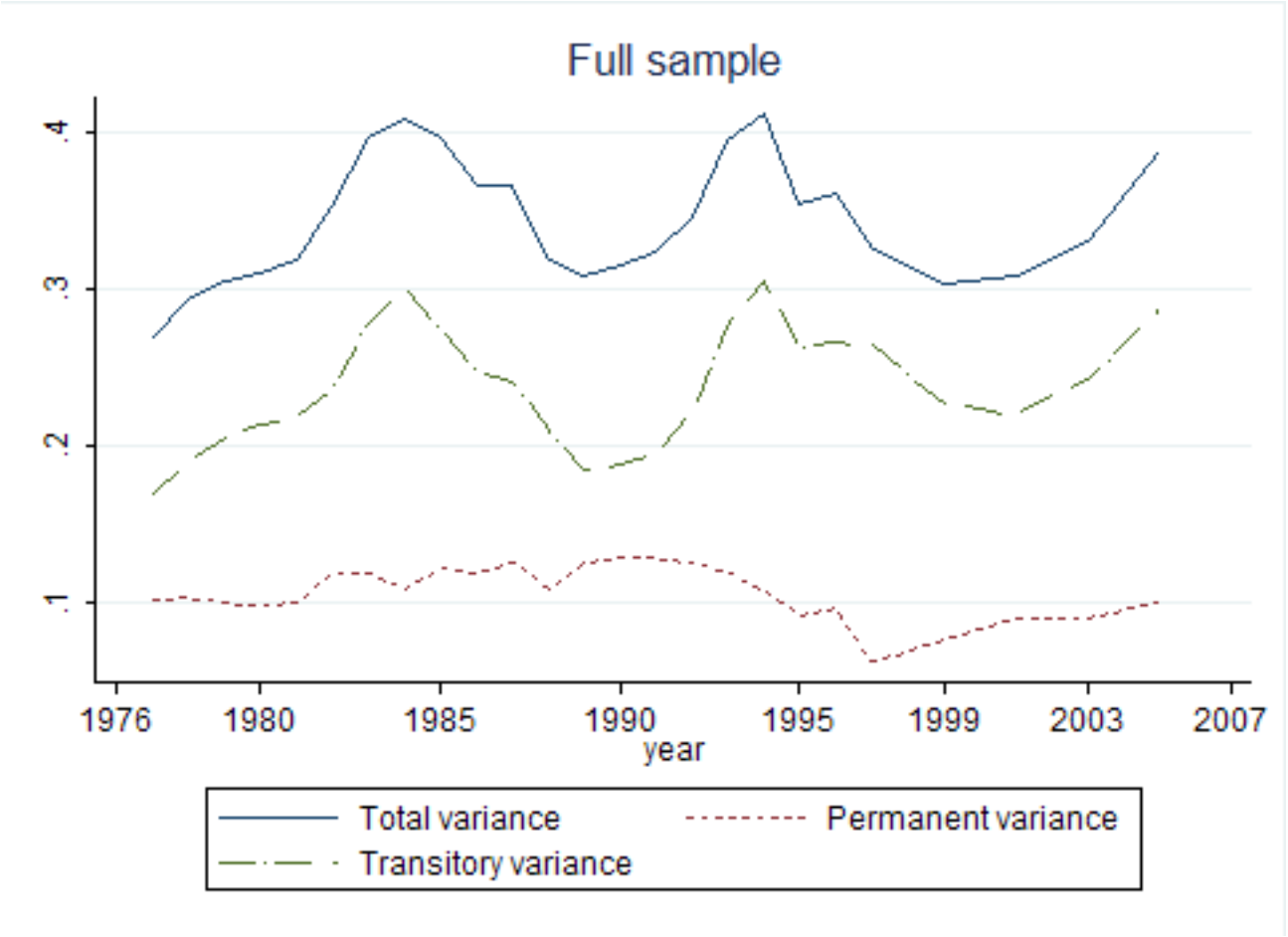

FIGURE 4. Predicted total variance and variance components. RW + ARMA model.

Finally, while the variance of permanent shocks is very small and often insignificantly different form zero (as expected given that a permanent income shock lasts for a a lifetime), the dispersion of transitory income shocks ($\sigma^2_{\varepsilon t}$) is substantial in all years. In Figure 4, I use the estimated parameters to predict the variance of the full sample and its components according to the variance-covariance matrix 4. The predicted total variance of earnings replicates quite closely the patterns of the variance displayed in the top panel of Figure 1, indicating that the fitting performance of the model is rather good. The temporal evolution of the estimated ARMA(1,1) process shows a rising transitory variance during the '80s and stabilizing in the '90s, similar to the pattern found in Moffitt and Gottschalk (2012).[14]

In Figure 5, I use the estimated parameters to predict the permanent and the transitory

[14]The results partially differ because I use a different sample selection (only individuals with valid tenure information and from year 1976 instead of 1968) and because I let the variance of (the permanent and) the transitory component to vary over time, while Moffitt and Gottschalk (2012) allow the overall process to shift over time and consider cohort effects. Table A.2 shows that more than 50% of individuals are in the sample for 5 or less periods. Selecting only those with 6 or more years - which makes the sample similar to Meghir and Pistaferri (2004) and Hospido (2012) - would give similar results.

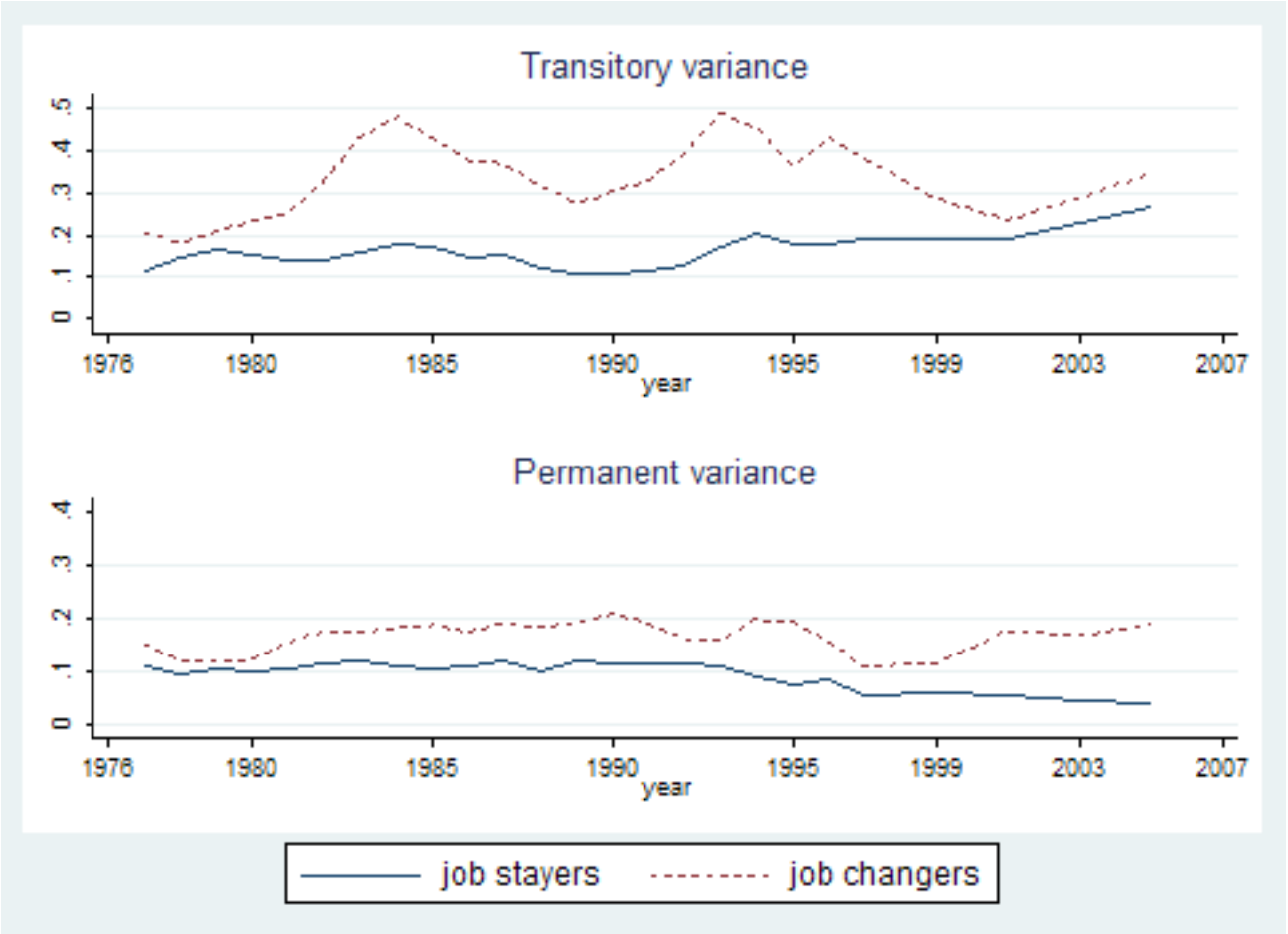

FIGURE 5. Predicted variance components. RW + ARMA model.

component of the variance for job changers and job stayers. The results confirm those obtained with the simpler method in Figure 2: Job changers have much higher transitory variance than job stayers on average and they also show a different (increasing) trend over time. The permanent variance of job stayers estimated with this method appears to be declining over time.

The comparison of Figures 4 and 5 suggests that the increase in earnings instability estimated during the 80s in the full sample is driven by job changers: the timing of the increase is the consistent in the two series. In other words this evidence is suggestive that job turnover may contribute to explaining the rise of earnings instability.

The main term of comparison for these results is the recent paper of Celik et al. (2012) in which they estimate a flat profile of earnings instability for job-to-job changers in the '90s and a declining instability due to lower unemployment. The explanation of the difference in results lies in the fact that that models estimated in differences reach partially different results than models in levels because they tend to underestimate the transitory part of the variance (Moffitt and Gottschalk, 2012). For example papers which estimate models in differences such as Dynarski and Gruber (1997), Cameron and Tracy (1998), Dahl et al. (2011), Shin and Solon (2011), Ziliak et al. (2012) find no increase in male earnings instability over the course of the 1980s.

One possible concern is that measurement error may affect the estimates of the transitory variance and the differences between job stayers and job changers. Measurement error is omitted from the model on the presumption that is unlikely to have changed over time and thus affected the estimates of trends.[15] Given the structure of PSID data it is likely that there is greater measurement error in wages among job changers than job stayers because wages are harder to measure among job changers. In fact, yearly earnings of a job changer who changed job during a survey period will be the sum of what he earned in his first job plus what he earned in his second job. Probably most people will be able to recall what they would have earned in either job had they worked there for the entire year, but not what they actually did earn while they were actually employed at that employer. This is a good argument to consider higher

[15]Pischke (1995) finds that the covariance structure of earnings is similar using the PSID validation study and the actual reported PSID earnings. Gottschalk and Huynh (2010) claim that measurement error has little effect on mobility estimates because different types of errors cancel each other out i.e. respondents with high incomes tend to understate their incomes and respondents with low income tend to overstate theirs.

measurement error in the earnings of job changers, however this difference does not explain why the time trend in measurement error for the job changers should be greater than for job stayers.

4.2 Concluding remarks on the empirical evidence

When coming to an explanation of the causes of the difference across changers and stayers the descriptive permanent-transitory decomposition does not help.

Potentially the difference in instability across job chagers and job stayers could be due to the effect of unemployment. In fact there is evidence of a positive correlation between earnings instability and the unemployment rate (Moffitt and Gottschalk, 2012). However, unemployment rose in the 1980s but then went back to the original low levels the late 1990s and early 2000s while the transitory variance of the low-tenured males has risen continuously. Also Huff Stevens (2001) finds that not all increases in the variance of job changers can be explained by unemployment spells. Thus, the explanation for the difference in instability across job changers and job stayers is likely to go beyond the business cycle.

There are many other potential explanations: Job stayers and job changers have different earnings dynamics and different events are associated with their permanent and transitory component of earnings. A job change implies both a permanent wage change (and the jump to a different firm-specific tenure profile) and a transitory wage change (short tenure and on-the-job search may imply more unstable earnings). For job stayers, promotions within the job typically lead to permanent gains while overtime and performance pay typically lead to transitory variations. Furthermore, job stayers may be mostly insured from transitory wage shocks by their firms (Guiso, Pistaferri and Schivardi, 2005)

The next section will provide a simple model of on-the-job search that gives predictions in line with the empirical results. The model gives an interpretation of the different evolution of instability across job changers and job stayers highlighting the role of voluntary job change (rather than unvoluntary job change linked to unemployment) and the role of the variance of wage changes upon job change rather than the increase in turnover (because most evidence points to a limited increase of job turnover at least until recently as discussed in the Introduction).

5 The Model

I adapt a simple search and matching model with on-the-job search (Pissarides, 2000) to obtain original results on the wage variance of job changers and job stayers. The results are obtained through a mean-preserving spread of the productivity shock distribution which may be thought to reflect the increasing uncertainty of demand.[16] In this model ex-ante identical workers are matched randomly to firms whose distribution of productivities becomes more dispersed over time. We will look at job changers and job stayers wages as predicted by the model before and after the mean preserving spread of firm productivities. (As customary in the literature, the model predicts wages rather than total labor earnings which I analyzed in the empirical evidence.) [17]

The hypotheses of the model are the following:

(i) Workers are ex-ante identical with permanent productivity p normalized to 1, i.e. the model abstracts from individual permanent characteristics and focuses on the transitory part of earnings.

(ii) Job seekers (employed and unemployed) and jobs are matched via a matching function $m = m(v, u + e)$ where u indicates the unemployed job seekers and e the employed job seekers, v the number of vacancies. Jobs arrive to each searching worker, employed and unemployed, at the rate $\theta q(\theta)$, where $q(\theta) = m(1, \frac{u+e}{v})$ and $\theta = \frac{v}{u+e}$ is the ratio of vacancies to job seekers;[18]

(iii) The match has idiosyncratic productivity x. Every new match is created at maximum productivity px with $x = 1$. After creation the match is hit by an idiosyncratic productivity shock $x \rightsquigarrow G(x)$ with $x \in [0, 1]$ at Poisson rate λ. The shock is transitory: every x' is independent of the previous x.

The model can be characterized by two reservation rules. There is a reservation productivity

[16] For example Comin and Philippon (2006) attribute higher firm volatility to higher competition in the goods market. They find that firm volatility increases after deregulation and that the increase in firm-level volatility is correlated with high research and development (R&D) activity as well as more access to debt and equity markets.

[17] The comparative statics exercise with the general equilibrium solution of the model is based on the assumption of stationarity of the model. This implies that we are looking at two different points in time and we find them generating different parameters. In the context of the data, this means judging if the beginning and the end of the period under consideration are sufficiently far apart to credibly belong to two different steady states. Using data from 1976 to 2007 we assume that observations at the begining and at the end of the period belong to two different steady states even if we do not know exactly when the mean-preserving spread took place and which is the period before and after the change.

[18] By the usual properties of the matching function $q'(\theta) < 0$ and the elasticity of $q(\theta)$ is in absolute value $0 \leq \eta(\theta) \leq 1$.

R such that jobs $x < R$ are destroyed and workers end in unemployment. There is a second reservation productivity S such that workers in jobs $R \leq x \leq S$ seek a new job in the hope of finding a better match x. Workers in jobs $S < x \leq 1$ do not search because they are satisfied with their high-productivity match. Changes in the number of employed job seekers come from productivity shocks in and out the range $[R, S]$. The evolution of the number of employed job seekers e is given by:

$$\frac{de}{dt} = \lambda(1-u)[G(S) - G(R)] - \lambda e - \theta q(\theta) e. \tag{5}$$

Every period λ job seekers receive a shock and leave the stock of job seekers, those who newly enter (or re-enter) the job seekers' pool are only those who receive a shock in the range $[R, S]$. The number of job changers is given by $\theta q(\theta) e$: they leave the stock of job seekers because they find new jobs. From equation 5, the fraction of employed job seekers in steady state is given by:

$$\frac{e}{(1-u)} = \frac{\lambda[G(S) - G(R)]}{\lambda + \theta q(\theta)}. \tag{6}$$

A mean preserving spread of the productivity distribution $G(x)$ has two effects: more people search (i.e. $\frac{dS}{dh} - \frac{dR}{dh} > 0$) but there are also more vacancies ($\frac{d\theta}{dh} > 0$) therefore more seekers find new jobs and leave the stock of job seekers.[19] As a result the effect on the fraction of job seekers in equation 6 is ambiguous because the mean-preserving spread increases both the numerator and the denominator. The effect on the job-to-job turnover rate= $\frac{\theta q(\theta) e}{1-u}$ is positive but limited by this general equilibrium effect.[20] I will use this result to explain why we observe in the data an increasing instability but a stable job turnover rate.

The intuition is that the mean-preserving spread makes productivities above the mean better and productivities below the mean worse. Since workers and firms do not consider productivities below the job destruction threshold R (because jobs below R are destroyed anyway), the benefits from productivities above the mean outweigh the costs from productivities below the mean. Therefore firms create more vacancies because their expected gain from job creation increases more than the costs (θ is higher) and workers search more because the expected rewards from

[19] The mean-preserving spread of $G(x)$ is modelled as a parametric change in the productivity distribution: $x(h) = x + h(x - \overline{x})$ considering the effect of a marginal dh at $h = 0$. (see Pissarides, 2000).

[20] The effect of the mean-preserving spread on the steady state level of unemployment $u = \frac{\lambda G(R)}{\lambda G(R) + \theta q(\theta)}$ is also ambiguous and depends on the parameters.

search are higher (the range $[R, S]$ is wider). Wages $w(x)$ in this economy depend from the transitory shock x because are renegotiated after each shock x.[21] Wages of on-the-job seekers (s) and non-seekers (ns) are different and they are given by:

$$\begin{aligned} w^s(x) &= (1-\beta)(z+\sigma)+\beta x \qquad \text{for } x \in [R, S] \\ w^{ns}(x) &= (1-\beta)z+\beta(x+c\theta) \qquad \text{for } x \in (S, 1] \end{aligned}$$

where β, z, σ and c are respectively the bargaining power of workers, the unemployment benefit, the search cost for on-the-job seekers and the flow cost of a vacancy. As usual in the Nash bargaining framework, firms and workers share the surplus of a job (hence the term βx in both $w^s(x)$ and $w^{ns}(x)$). Seekers sustain search cost σ for which they are partially compensated (hence the term σ in $w^s(x)$). Since there is an assumption of perfect information, non-seekers (ns) must be paid more than seekers (s) because seekers have to compensate the firm for the likely possibility of the quit (hence the term $c\theta$ in $w^{ns}(x)$).

We are finally in the position to analyse what happens to wages of job changers and job stayers after the mean-reserving spread in productivity shocks. Job changers are those among the job seekers in the range $[R, S]$ who have found a new match. Job changers have density $g(x)$ over $[R, S]$ therefore:

$$var\{w_{changers}(x)\} = \beta^2 var\{x \mid R < x < S\}. \tag{7}$$

The variance of wages across job changers unambiguously increases after the mean-preserving spread, because the range of productivities in $[R, S]$ increases. Remind that all job changers go from a job with productivity in $[R, S]$ to a new job with productivity $x = 1$ because all vacancies enjoy maximum productivity by assumption. The only meaningful wage variance of job changers is therefore the variance of wages before the job change or alternatively the variance of the wage change $var(w_{new} - w_{old})$ given that $w_{new} = w^{ns}(1)$ for everybody. Job stayers are those job seekers (s) in $[R, S]$ who did not find a job plus all non-seekers (ns) in the range $(S, 1]$. Job stayers have density $f_s(x) = (1-\theta q(\theta))\frac{g(x)}{I}$ over $[R, S]$ and $f_{ns}(x) = \frac{g(x)}{I}$ over

[21] Wages in the model depend only on the realizations of the i.i.d shocks x. However, the shock x arrives at the Poisson rate $\lambda < \infty$, i.e. there are periods without shocks. Similarly to the empirical specification, transitory shocks to wages need a certain degree of persistence, in fact, if wages were continuously reset, nobody would search.

$(S,1)$ where $I = \int_R^S (1-\theta q(\theta))g(x)dx + \int_S^1 g(x)dx = 1 - G(S)\theta q(\theta) - (1-\theta q(\theta))G(R)$. Hence:

$$var\{w_{stayers}(x)\} = \left(\int_R^S w^s(x)^2 f_s(x)dx + \int_S^1 w^{ns}(x)^2 f_{ns}(x)dx\right) - \left(\int_R^S w^s(x) f_s(x)dx + \int_S^1 w^{ns}(x) f_{ns}(x)dx\right)^2. \quad (8)$$

The change in the variance of job stayers wages has an ambiguous sign since the mean-preserving spread increases the range $[R,S]$ but at the same time reduces the range $(S,1]$.

In conclusion the model predicts the increasing variance of wages of job changers through the increase in the extent of on-the-job search (the range $[R,S]$) which governs both the number of seekers and the their variance of wages. This feature of the model allows to generate higher wage instability not necessarily because of a higher job turnover but because of a higher search activity on-the-job coupled with an increase in the variance of wage changes upon job change. A simple calibration in the Appendix shows that this model can generate a large increase in the wage variance of job changers with a very low increase in job turnover thus reconciling the two pieces of evidence which characterize the U.S. labor market in the '70s and '80s.

6 Conclusions

In this paper I use a simple descriptive method and covariance structure models to show that increases in the transitory variance are concentrated among job changers while job stayers have a much flatter profile of transitory shocks over time.

I provide an interpretation of the role of job changes in driving the evolution of earnings instability using a standard search and matching model with on-the-job search. A mean-preserving spread to the distribution of productivity shocks increases on-the-job search and the wage variance across job changers who experience larger wage changes upon job change. Consistently with the evidence, the model predicts a larger increase over time in earnings instability for job changers than for job stayers combined with a "limited" increase in job turnover.

There are several avenues of further research. First, establishing a tighter relationship between the timing of the increase in the overall variance and the explanation based on job turnover. This requires better data on job change at the cost of reducing the temporal range

of analysis. Second, experimenting different strategies to model the effect of job change on earnings including both individual and job-specific effects in the spirit of Hospido (2012) or Cappellari and Leonardi (2013). Finally, the relationship between job change and the transitory variance may lie in the trade off between accepting jobs at higher average wages in exchange with higher instability. This would point to an inverse relationship between the permanent and the transitory variance which cannot be studied within covariance models that assume hortogonality between the two.

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A Data Appendix and Additional Tables

The 1970–2007 PSID core individual file (after dropping the Latino sample) contains information on 58,663 individuals. Dropping those who are never heads of their household between 1976 and 2007, the sample is reduced to 20,979 individuals. Keeping only those who are continuously heads of their household and are aged 25 to 60 over this period leaves us with a sample of 17,053 individuals. I then drop female heads and remain with a sample of 11,751 male heads. I also drop those with missing education records and trim those with outlying earnings records, eliminating the first and last percentile in each year*education group (college, high school and less than high school). The sample then includes 10,340 individuals. I finaly drop those with missing tenure information, the final sample includes 9.772 individuals.

Table A.1. PSID distribution of observations by number of years

Number of years	Full sample	Job stayers	Job changers
1	1,382	532	850
2	1,127	463	664
3	908	391	517
4	703	307	396
5	631	276	355
6	521	229	292
7	422	192	230
8	394	186	208
9	384	179	205
10	388	202	186
11	274	142	132
12	274	130	144
13	252	123	129
14	265	119	146
15	235	115	120
16	205	78	127
17	195	82	113
18	150	70	80
19	172	72	100
20	156	66	90
21	158	83	75
22	128	61	67
23	112	46	66
24	106	45	61
25	92	43	49
26	81	42	39
27	57	28	29
Total	9,772	4,302	5,470

Notes: Job changers have less than 4 years of tenure, job stayers have 4 or more years of tenure.

TABLE A.2. PSID distribution of observations by year

Year	Full sample	Job stayers	Job changers
1976	2,208	1,412	796
1977	2,254	1,419	835
1978	2,713	1,431	1,282
1979	2,871	1,510	1,361
1980	2,977	1,548	1,429
1981	2,965	1,861	1,104
1982	2,981	1,875	1,106
1983	2,952	1,921	1,031
1984	3,055	1,948	1,107
1985	3,175	2,013	1,162
1986	3,204	2,012	1,192
1987	3,289	2,013	1,276
1988	2,831	1,781	1,050
1989	2,884	1,795	1,089
1990	2,895	1,821	1,074
1991	2,891	1,846	1,045
1992	2,882	1,907	975
1993	2,933	2,010	923
1994	3,196	2,157	1,039
1995	3,203	2,141	1,062
1996	3,184	2,092	1,092
1997	2,574	1,719	855
1999	2,718	1,777	941
2001	2,764	1,774	990
2003	2,907	1,842	1,065
2005	2,988	1,921	1,067
2007	3,096	1,915	1,181
Total	78,590	49,461	29,129

Notes: Job changers have less than 4 years of tenure, job stayers have 4 or more years of tenure.

TABLE A.3. PSID ditribution of tenure

Year	Average tenure in months	Percentage of job changers with tenure<4	Percentage of job changers with tenure<10	Percentage of ever changers
1976	103.435	0.360	0.668	0.515
1977	104.196	0.370	0.665	0.553
1978	79.063	0.472	0.756	0.568
1979	79.638	0.474	0.754	0.589
1980	81.664	0.480	0.742	0.609
1981	101.507	0.372	0.666	0.617
1982	100.596	0.371	0.667	0.622
1983	102.542	0.349	0.650	0.629
1984	101.410	0.362	0.658	0.643
1985	101.6	0.365	0.654	0.656
1986	101.424	0.372	0.655	0.661
1987	99.304	0.387	0.667	0.660
1988	101.380	0.370	0.635	0.668
1989	99.774	0.377	0.641	0.674
1990	100.659	0.370	0.632	0.671
1991	101.742	0.361	0.625	0.675
1992	106.186	0.338	0.621	0.668
1993	108.912	0.314	0.615	0.651
1994	110.037	0.325	0.612	0.628
1995	109.547	0.331	0.616	0.625
1996	110.003	0.342	0.616	0.620
1997	111.404	0.332	0.613	0.610
1999	109.645	0.346	0.614	0.599
2001	110.544	0.358	0.608	0.585
2003	110.262	0.366	0.624	0.551
2005	108.619	0.357	0.643	0.532
2007	105.169	0.381	0.660	0.497

Notes: Three definitions of job changers: with less than 4 years of tenure, with less than 10 years of tenure or ever changer i.e. those who recorded a job change (less than 12 months tenure) in any year of the sample.

B Calibration exercise

I will summarize my findings by means of a simulation. The model is quite stylized and the numbers have to be taken *cum grano salis*. The aim of the calibration exercise is to illustrate the results of a mean-preserving spread for plausible parameter values. Assuming a uniform distribution of shocks, a matching function of the form $q(\theta) = A\theta^{-a}$ and the following values for the parameters: $\lambda = 0.2; r = 0.06; \beta = 0.5; c = 1.19; \sigma = 0.41; a = 0.4; A = 1; z = 0.02; h = 0$ (The parameters used for λ, r, β, a are commonly used in the literature. c, σ and z are chosen only with the purpose of obtaining plausible values of R, S and u), we obtain: $R = 0.38; S = 0.60; u = 0.10; \theta = 0.47; var^{0.5}(w_{changers}) = 0.052; var^{0.5}(w_{stayers}) = 0.100$.

A mean-preserving spread of $h = 0.1$ changes the results to: $R = 0.39; S = 0.63; u = 0.10; \theta = 0.50; var^{0.5}(w_{changers}) = 0.058; var^{0.5}(w_{stayers}) = 0.107$.

Thus the mean-preserving spread in this simple example implies an increase in on-the-job search ($S - R$ goes from 0.22 to 0.24), a very low increase in the job turnover rate $\frac{\theta q(\theta) e}{1-u}$ from 0.033 to 0.036, a 11% increase in the standard deviation of wages for job changers and a lower increase of 7% in the standard deviation of wages for stayers.