DISCUSSION PAPER SERIES

IZA DP No. 946

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December 2003

Forschungsinstitut
zur Zukunft der Arbeit
Institute for the Study
of Labor

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Discussion Paper No. 946
December 2003

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ABSTRACT

Earnings Instability of Job Stayers and Job Changers*

I use the PSID to decompose the rise in wage inequality into a permanent and a transitory component. I consider separately job stayers and job changers. I find that earnings instability (the variance of the transitory component of earnings) increased much more among job changers than among job stayers. I interpret the evidence in a search and matching model with on-the-job search. The increasing variance of the transitory component of earnings is modeled as a mean-preserving spread of the distribution of productivity shocks. The mean-preserving spread induces on-the-job search on a wider range of productivity values. As a result of increased on-the-job search, the variance of the transitory part of earnings increases among job changers. The direction of the change in the transitory variance across job stayers is ambiguous and depends on their composition between non-seekers and on-the-job seekers who did not find a new job.

JEL Classification: J21, J31

Keywords: earnings instability, on-the-job search

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* I thank Steve Nickell, Steve Pischke, Richard Dickens, David Jaeger and Ann Huff-Stevens.

1 Introduction

Many studies have written about the rising wage inequality in the US and the UK. Since the work of Gottschalk and Moffitt (1994) many other papers have focussed on another aspect of the widening wage distribution: the growth of earnings instability or the increasing variance of the transitory component of earnings. Gottschalk and Moffitt (1994) have documented the large growth of earnings instability in the US since the end of the '70s and have claimed that the increase in the variance of the transitory component of earnings has been an important contributor to the recent rise in overall earnings inequality.

This paper documents the different pattern of earnings instability among job stayers and job changers (voluntary and involuntary) and provides an explanation of the differences in the framework of a standard search and matching model with on-the-job search. In the empirical part of this paper, I decompose the rise in wage inequality into a permanent and a transitory part. I first use the full PSID sample and confirm the common result in the literature about the rise in earnings instability. I then consider separately a balanced sample of job stayers and a balanced sample of job changers. I find that job stayers are hardly affected by any significant rise in earnings instability. The rise in the transitory variance of earnings is mostly due to job changers. To check the robustness of the results, I provide some comparisons using different definitions of job stayer and job changer and different models of transitory/permanent decomposition.

The empirical part of this paper is related to the many studies that, after Gottschalk and Moffitt (1994), have focussed on evaluating the relative contribution of the permanent and transitory part of earnings to the increase in the total variance of earnings. The literature has followed two complementary approaches. Gottschalk and Moffitt (1995 and 2002), Haider (2001), Baker and Solon (2003) and Dickens (2000) have modeled the persistent and transitory components of earnings in different countries. Buchinsky and Hunt (1999) and Gittleman and Joyce (1996) have looked at year-to-year mobility rates across quantiles of the earnings distribution. The results of the literature on the US indicate an equal increase in the variance of the permanent and transitory components (Gottschalk and Moffitt 1994; Katz and Autor 1999; Haider 2001). Consistent with that, mobility rates are stable or slightly declining over time.[1] After the initial attempt by Gottschalk

[1] Buchinsky and Hunt find declining mobility rates but they use the NLSY and therefore only one cohort of young workers. The results are not entirely comparable with those obtained on the PSID (Gottschalk and Moffitt 1994) or the March-March matched CPS

and Moffitt (1994), nobody else has looked at the differences between job stayers and job changers. One notable exception is Huff-Stevens (2001). She focusses on the effect of involuntary displacement on earnings instability. She estimates variance component models separately on displaced and non-displaced workers and finds evidence that displacement substantially raises earnings instability for several years after job loss. Furthermore she finds that both the increased incidence and the increased cost of displacement contributed to the rise in earnings instability over the '80s. Unlike Huff-Stevens (2001), I focus on both voluntary and involuntary changes and I claim that one of the reasons why earnings instability rises more among job changers rather than job stayers is the increasing extent of on-the-job search.

1.1 Motivation

While the pattern of increased earnings instability is now well established, little is known about the causes of this increased instability. Differences in earnings instability across stayers and changers may inform on the sources of the increase in the transitory component of earnings. The distinction between changers and stayers is important because they have different earnings dynamics. Different events are associated with the permanent and transitory component of earnings. Promotions within the job typically lead to permanent gains. Displacement has a permanent and a transitory component. After the initial wage loss, displaced workers gradually catch up over time until they reach a permanently lower wage level (Jacobson, LaLonde and Sullivan 1993). Temporary layoffs, overtime and performance pay typically lead to transitory variations. If the increased wage volatility affects only job changers, this means that the sources of volatility are to be found in between-job changes. If job stayers do not experience an increased wage volatility, this may suggest that the increase in inequality among job stayers is of a permanent nature and stayers are insulated from the increasing variance of transitory wage shocks.

A recent paper looks at transitory shocks to the wages of job stayers from the point of view of the provision of insurance within the firm. Using an Italian employer-employee matched dataset, Guiso, Pistaferri and Schivardi (2002) find that job stayers are well insulated from transitory shocks to the firm profits. They allow workers' wages to respond to both permanent and transitory shocks to the firm and find that firms provide full insurance to

files (Gittleman and Joyce 1996).

transitory shocks and partial insurance to permanent shocks. Their results are obviously valid only for stayers. My results on PSID data seem to be consistent with theirs.

The distinction between different patterns of instability for changers and stayers is also relevant in the context of different theories of wage inequality and unemployment. The increase in earnings instability in the labor market is at the basis of Ljungqvist and Sargent's (1998) theory of the different evolution of unemployment in the US and EU. That theory has clear implications about earnings instability of job stayers and job changers that have not been verified with the empirical evidence. Ljungqvist and Sargent (1998) model earnings instability in the labor market (which they call turbulence) as the probability of skill depreciation for workers who separate from an employment relationship. In their view, an increase in turbulence is equivalent to an increase in the average skill depreciation after job loss. They claim that the increase in European unemployment is a consequence of the interaction of more turbulence and generous unemployment benefits. The rise in turbulence increases the fraction of unemployed workers entitled to high unemployment benefits, this raises the reservation wage and causes unemployment. The results in Ljungqvist and Sargent (1998) depend on the assumption that the increase in earnings instability is only limited to involuntary layoffs. Den Haan, Haefke and Ramey (2002) show that the same mechanism of Ljungqvist and Sargent, applied to a matching model, does not work if voluntary quits are subject to the same probability of skill loss.

In the wage inequality literature, the causes of the increase in earnings instability are not yet well understood. The evidence on the rising variance of the temporary component of earnings is at odds with models of within-group wage inequality that rely exclusively on ex-ante differences in unobserved permanent ability. If within-group wage inequality were due only to the rising returns to unobserved ability, this would be reflected only in the rise of the permanent variance of individual earnings with no effect on the transitory variance. Violante (2002) builds a model of residual wage inequality with the purpose of reconciling the theory with the evidence that increasing residual wage inequality reflects increased earnings instability. Unlike previous models of residual wage inequality, his model is not based on ex-ante differences in ability. In his model the increase in residual wage inequality (and earnings instability) is due to an acceleration in technical change that reduces workers' capacity to transfer skills from old to new machines. In his model the increase in earnings instability is common across job stayers and job changers. The evidence presented in this paper regard-

ing earnings instability of job stayers and job changers sheds further light on the possible sources of the increase in instability.

1.2 Overview of the Theory

In the theoretical part of this paper I illustrate the mechanism that may insulate job stayers from the increase in earnings instability. I use a search and matching model with on-the-job search by Pissarides (2000). Although the original model was intended to study unemployment, I use it to describe differences in transitory wage inequality across stayers and changers in the face of an increase in the overall variance of transitory shocks. The model has two appealing properties: the first is that individuals are ex-ante identical and wages are affected only by transitory shocks and not by permanent differences across individuals, the second is that wages of job stayers and job changers are different. These two characteristics make the model appropriate to study the distribution of the transitory component of wages separately across stayers and changers when the overall distribution of the transitory shocks is subject to a mean-preserving spread. This model has nothing to say about the variance of the permanent component of earnings.

In the model, identical individuals are matched to jobs with different transitory productivities. In every instant each job is hit at the Poisson rate λ by a transitory productivity shock $x \rightsquigarrow G(x)$. This shock is transitory since it arrives at the Poisson rate λ and every x' is independent from the previous x. Wages are affected by the transitory shock because they are renegotiated after the realization of the shock. In a search and matching model with on-the-job search, both the unemployed and part of the employed search for new jobs. Wages of on-the-job seekers and non-seekers are different since there is perfect information and on-the-job seekers must compensate the firm in anticipation of the likely event of job change. On-the-job seekers are job changers with a probability given by the matching function. All non-seekers and those seekers who do not find a new match are job stayers.

A mean-preserving spread of the distribution $G(x)$ formalizes an increase in the variance of the transitory component of wages, i.e. the increase in overall earnings instability. The mean-preserving spread has the effect of increasing the range of productivities over which workers seek on the job, and reducing the range of productivities over which workers decide not to seek and stay in the same job. As a result, the variance of wages across job changers is increased after the mean-preserving spread. However, the effect on the variance across job stayers is ambiguous. The ambiguity for job stayers comes from the fact that although the total proportion of em-

ployed job stayers is reduced, their composition between non-seekers and seekers who did not find a job may change. While non-seekers have a lower wage variance after the mean-preserving spread, job seekers have a higher variance.

The model illustrates the evidence shown in the empirical part of the paper that indicates that the increase in earnings instability affects changers rather than stayers. This model is based on the increase in the number of job seekers following a mean-preserving spread of the distribution of transitory productivity shocks. This is of course only one of the possible explanations of the difference between stayers and changers in terms of wage instability, the other being internal labor markets that protect the wages of "insiders" from transitory shocks.

The rest of the paper proceeds as follows. In section 2 I describe the data and the sample of job stayers and job changers. Section 3 illustrates the statistical model and the estimation technique. In section 4 I discuss the results. Section 5 presents a simple model to interpret the evidence and section 6 provides the conclusion.

2 Wage Data of Job Stayers and Job Changers

The objective of the empirical exercise is to quantify the relative importance of permanent and transitory shocks to earnings of job stayers and job changers. In particular the aim is to verify whether the increase in earnings instability affects stayers and changers in the same fashion. To do so I proceed in three steps. First, I split the full sample of individuals into job stayers and job changers. Second, I fit a statistical model of the permanent and transitory component of earnings to the full sample of individuals, disregarding the difference between job stayers and job changers. Third, I fit the same model separately on a sample of job stayers and on a sample of job changers. I compare the results obtained on job stayers and on job changers to the results obtained on the full sample.

2.1 Sample Selection

The data source is the PSID, a longitudinal survey which follows a sample of US households. Approximately 5,000 households were interviewed in the initial year of the survey, including a core sample of about 3,000 households and a supplementary low-income (SEO) sample of around 2,000 households. At the interview date each year, the head of household is asked about annual labor earnings and hours worked in the previous year. I use data from 1970

to 1992. The earnings information therefore applies to years 1969 to 1991. I restrict the sample to male heads of household between the age of 20 and 59 who are not students or self employed at the time of the survey. To control for outliers, I exclude those who worked less than 520 hours and those who worked more than 5096 hours. I also exclude those whose earnings are top coded and those whose nominal wage is less than half the national minimum wage. The SEO sample is excluded. This selection process gives a final sample of 37,699 individual/year observations. In the course of this paper, I use log real hourly wages. The hourly wage is defined as the ratio of annual labor earnings to hours of work deflated by the CPI. The real wage is expressed in terms of 1991 dollars.

2.2 Definition of Stayers and Changers

Identifying a job separation in the PSID is a difficult task since the survey does not contain employers' codes. Typically, in addition to the question on the "current employment status", two questions are used: one asking the number of "months with the current employer", the other asking the "reason for separation from previous employer". I identify a separation on the basis of the information on tenure with the current employer. In the section where I check the robustness of my results, I also use a definition of job change on the basis of the "reason for separation" question.

The question regarding tenure in the PSID underwent numerous changes in the course of twenty years.[2] From 1970 to 1975 the question regarding tenure with the current employer is expressed in years brackets. In 1976-77 and between 1981 and 1992 tenure with the current employer is expressed in months. In 1978 the question was asked only to those under age 45. In 1979 and 1980 the information regarding tenure is missing. Furthermore, in 1984 there was a change in the tenure question. Until 1983 workers were asked how long they had been working for the present employer. After 1983 the question asked the total time they had been working for the current employer, implying that workers with more than one spell of employment with the same employer would respond differently before and after 1983. According to Gottschalk and Moffitt (1999), this change in the question does not affect their results on job separations.

A job changer is everybody with less than one year of tenure before 1976. The change in the measurement of tenure in 1976 requires a change in the definition of job changers. After 1976 a job changer is defined if "months

[2] See the Appendix in Polsky (1999) for the exact wording of the question over time.

with current employer" at the time of the interview is less than twelve. All individuals who are unemployed in the current year are classified as job changers. All other individuals in the sample are job stayers.

It must be made clear that identifying the effects of job change on earnings in the PSID is complicated by the fact that earnings are measured on an annual basis. The change in earnings for job changers cannot be exactly measured since the earnings during the year of the job change are a mixture of the earnings from the old and the new job. Although this issue is obviously very important in a cross-sectional study of the effects of job change on earnings, it should be less relevant in a time series study that compares the effects over time.

2.3 The Samples of Job Stayers and Job Changers

To identify the effect of shocks on job stayers I build two balanced samples of stayers at the beginning and at the end of the period. I divide the PSID in two periods: 1970-1980 and 1981-1992. Job stayers are defined over the periods 1970-1977 and 1981-1992 since there is no information on tenure from 1978 to 1980. A stayer is anybody who satisfies the definition of stayer for all years in the period 1970-1977 or 1981-1992. There are 412 stayers in the years 1970-1977 and 359 stayers in the years 1981-1992.

The choice of a balanced sample is due to the fact that the identification of the permanent and transitory component of income requires the use of longitudinal data. To identify the effects of a permanent or a transitory wage shock on job stayers we must consider stayers throughout 1970-1977 and throughout 1981-1992. The choice of two separate balanced samples is due to sample size considerations and to the fact that the information on job tenure is interrupted between 1978 and 1980.

The same reasoning applies to job changers. I construct two balanced samples of job changers between 1970-1977 and between 1981-1992. A changer in each of the two balanced samples is anybody who has positive hourly wages in each year and has been classified as a job changer at least once during that period. There are 269 job changers in the period 1970-1977 and 321 job changers in the period 1981-1992.

2.4 Descriptive Statistics

Table 1 shows the descriptive statistics for the full sample of individuals, the changers in each year t, the stayers in each year t and the two balanced samples of stayers and changers in 1970-1977 and 1981-1992. The infor-

Year	Full Sample		Changers		Stayers		Balanced Sample Changers		Balanced Sample Stayers	
	Var. log(w)	N	Var. log(w)	N	Var. log(w)	N	Var. log(w)	N	Var. log(w)	N
1970	0.197	1257	0.226	182	0.187	1075	0.187	269	0.134	412
1971	0.221	1310	0.257	222	0.205	1088	0.154	269	0.137	412
1972	0.217	1371	0.222	228	0.202	1143	0.158	269	0.143	412
1973	0.213	1434	0.225	261	0.194	1173	0.174	269	0.142	412
1974	0.212	1500	0.226	283	0.192	1217	0.166	269	0.142	412
1975	0.201	1555	0.223	359	0.177	1196	0.180	269	0.130	412
1976	0.204	1566	0.243	275	0.181	1291	0.169	269	0.138	412
1977	0.219	1601	0.220	299	0.202	1302	0.188	269	0.149	412
1978	0.196	1643	.	.	.	.	.	.	.	.
1979	0.209	1689	.	.	.	.	.	.	.	.
1980	0.223	1737	.	.	.	.	.	.	.	.
1981	0.230	1745	0.270	336	0.198	1409	0.177	321	0.144	359
1982	0.240	1734	0.275	352	0.207	1382	0.199	321	0.136	359
1983	0.256	1716	0.342	344	0.209	1372	0.197	321	0.152	359
1984	0.269	1728	0.273	354	0.236	1374	0.202	321	0.150	359
1985	0.260	1714	0.321	285	0.228	1429	0.194	321	0.143	359
1986	0.274	1754	0.331	308	0.234	1446	0.206	321	0.144	359
1987	0.289	1752	0.367	314	0.248	1438	0.213	321	0.161	359
1988	0.280	1767	0.329	352	0.241	1415	0.215	321	0.165	359
1989	0.291	1773	0.303	328	0.260	1445	0.238	321	0.162	359
1990	0.276	1776	0.266	345	0.248	1431	0.236	321	0.165	359
1991	0.291	1793	0.331	304	0.257	1489	0.234	321	0.161	359
1992	0.293	1784	0.346	315	0.260	1469	0.236	321	0.155	359

Notes: The total number of individual/year observations is 37699. Wages are hourly wages computed as annual earnings divided by annual hours. Wages are expressed in 1991 dollars.

Table 1: PSID Sample Descriptive Statistics

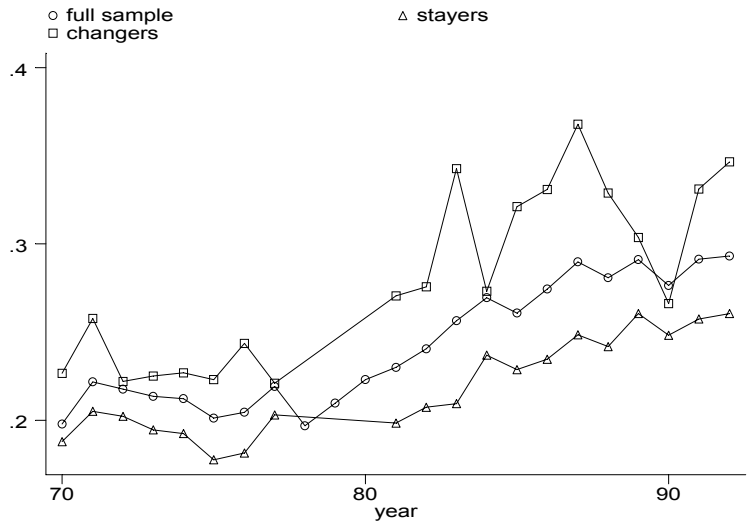

Figure 1: Variance of log hourly wages. Job stayers and job changers.

mation regarding tenure is missing in 1978, 1979 and 1980, therefore job changers and job stayers are not defined in those years. The proportion of job changers (unemployed and those with less than 12 month of tenure) is rather stable around 18% of the sample during the course of the panel. The cross-sectional log wage variance of the full sample increases by around 10 points between 1970 and 1992. The increase is concentrated in the 1980s and the log variance reaches its peak in 1992, the last year of the sample. These numbers and the timing of the increase are broadly consistent with the results reported in Katz and Autor (1999) on the CPS.

The different pattern of the log variance of wages of job stayers and job changers are shown in figure 1. In figure 1, I plot the variance of log real hourly wages for the whole sample, the stayers and the changers. The log wage variance across stayers goes from 0.18 in 1970 to 0.26 in 1992. The log wage variance across changers goes from 0.22 in 1970 to 0.34 in 1992. The timing of the increase is common across stayers and changers, the extent of the increase is different: job stayers see an increase in the log variance of wages of around 8 points from 1970 to 1992, job changers an increase of 12 points.

Changers and stayers also differ across observable characteristics such as age and education (not reported in table 1). Stayers are on average older

and more educated than changers. The mean age across stayers is 37.7 years and the percentage of stayers with some college is 24.4%. The mean age across changers is 32.8 years, the percentage of changers with some college is 19.9%. These differences probably reflect the fact that the definition of changers also includes the unemployed.

Finally, the last four columns of table 1 show the descriptive statistics of the two balanced panels of job changers and of job stayers. In the following two paragraphs, I compare the wage statistics of the balanced samples of job stayers (changers) to the sample of all job stayers (changers). I claim that the balanced samples of stayers (changers) are sufficiently similar to the full samples of job stayers (changers).

The two balanced panels of stayers are a restricted sample of individuals who have tenure of more than 12 months in all years from 1970 to 1977 and from 1981 to 1992. There are 412 stayers in the years 1970-1977 and 359 stayers in the years 1981-1992. The log wage variance across the 412 stayers of the balanced panel goes from 0.134 in 1970 to 0.149 in 1977. The log wage variance in the sample of all stayers in t goes form 0.187 in 1970 to 0.202 in 1977. The log variance of wages in the balanced sample of stayers is unsurprisingly lower than in the sample of all stayers, the extent of the increase is similar. The same comparison can be made between the 359 job stayers of the balanced panel 1981-1992 and the full sample of stayers in the same period. The log wage variance across the full sample of stayers goes form 0.198 in 1981 to 0.260 in 1992. The log wage variance across the 359 stayers of the balanced panel 1981-1992 goes from 0.144 in 1981 to 0.155 in 1992. The lowest and the highest wage variance in the balanced sample of stayers is 0.136 in 1982 and 0.165 in 1990. The variance of log wages across the 359 stayers in the balanced sample is lower than in the full sample. Although the extent of the increase in the log variance of wages is also lower than in the full sample of stayers, it is still a sizeable 3 log points (or about 21%) from the value of 0.136 in 1982 to 0.165 in 1990.

The two balanced samples of job changers include those individuals who have been classified as job changers at least once in the period 1970-1977 or 1981-1992. There are 269 job changers in the years 1970-1977 and 321 job changers in the years 1981-1992. The log wage variance across the 269 job changers in the balanced sample goes from 0.187 in 1970 to 0.188 in 1977. The log wage variance across the full sample of changers goes form 0.226 in 1970 to 0.220 in 1977. Like in the case of job stayers, the wage variance in the balanced sample is lower than in the full sample of changers. However, the pattern of the log wage variance is similarly stable during the period 1970-1977 in both samples. In the period 1981-1992, the log wage variance

across the 321 job changers of the balanced sample increases from 0.177 in 1981 to 0.236 in 1992 or 33%. Similarly the log wage variance in the full sample of changers increases by 28%, from 0.270 in 1970 to 0.346 in 1992.

I will base my conclusions on earnings instability of stayers on the results obtained on the 412 stayers in the balanced panel 1970-1977 and on the 359 stayers in the balanced panel 1981-1992. The same reasoning applies to job changers. The results on earnings instability of job changers are based on the balanced samples of 269 job changers in 1970-1977 and of 312 job changers in 1981-1992. The balanced panels of stayers (changers) are two very selected samples of individuals. However I argue that they still maintain a sufficient similarity with the broader sample of stayers (changers) and that this selection is necessary to assess the effect of permanent and transitory shocks to wages of job stayers and job changers.

3 Statistical Model

I start by running the following first-stage regression:

$$w_{it} = \alpha_t + X_{it}\beta_t + y_{it} \tag{1}$$

w_{it} denotes the log hourly wage for individual i at time t. α_t is a set of year dummies to control for fluctuations in aggregate wages. X_{it} contains a quadratic in experience. The parameter vector β_t is allowed to change by year since the returns to experience have increased during the sample period. y_{it} is the residual from which I identify the permanent and transitory component.

I estimate one of the most popular models of permanent/transitory variance decomposition. This model has been estimated by Gottschalk and Moffitt (1995 and 2002) on PSID data and by Dickens (2000) on UK data. The model allows for an individual effect μ_{it} and for a transitory shock v_{it}. The two components are orthogonal to each other and are allowed to vary by time with the respective loading factors ϕ_t and π_t:

$$y_{it} = \phi_t \mu_{it} + \pi_t v_{it} \tag{2}$$

μ_{it} is a Random Walk $\mu_{it} = \mu_{it-1} + \eta_{it}$ with initial variance σ_μ^2 and $\eta_{it} \rightsquigarrow iid(0, \sigma_\eta^2)$.[3] The individual effect is modelled as a Random Walk to

[3] μ_{it} could be made vary by age to reflect life-cycle effects in the wage variance. For simplicity purposes I prefer this specification.

allow for non-stationarity of wages. The individual effect will also capture individual permanent characteristics such as "ability" and education. The time-varying loading factor ϕ_t will reflect the changing market returns to education and unobserved skills. v_{it} is an AR(1) process: $v_{it} = \rho v_{it-1} + \epsilon_{it}$ where $\epsilon_{it} \rightsquigarrow iid(0, \sigma_\epsilon^2)$ is white noise. The AR(1) process is the most appropriate model of the autocovariance structure of wages which shows a large drop at the first lag and then a decline at a geometric rate.[4] v_{it} will also incorporate measurement error in wages, but this fact should not be of immediate concern unless the importance of measurement error were changing over time.

The entries of the theoretical covariance matrix are:

$$\begin{aligned} var(y_{it}) &= \phi_t^2(\sigma_\mu^2 + t\sigma_\eta^2) + \pi_t^2 \frac{\sigma_\epsilon^2}{1-\rho^2} \\ cov(y_{it}, y_{it-s}) &= \phi_t \phi_{t-s}[\sigma_\mu^2 + (t-s)\sigma_\eta^2] + \pi_t \pi_{t-s} \rho^s \frac{\sigma_\epsilon^2}{1-\rho^2} \end{aligned}$$

Since I am mostly interested in the long run changes in earnings instability, I smooth the time dummies ϕ_t, π_t to third order polynomials in time:

$$\phi_t = 1 + \sum_{j=1}^{3} \phi_j (t-1)^j \qquad \text{and} \qquad \pi_t = 1 + \sum_{j=1}^{3} \pi_j (t-1)^j$$

I estimate this model both on the full unbalanced panel of individuals and separately on the two balanced panels of job stayers and job changers.

3.1 Estimation

I fit the sample covariance structure of log (residual) hourly wages to the covariance structure implied by model 2 using a minimum distance estimator. The basic unit of data for each individual is the vector of estimated mean-zero residuals from regression 1:

$$y_i = \begin{pmatrix} \widehat{y}_{i1} \\ . \\ \widehat{y}_{iT} \end{pmatrix} \tag{3}$$

[4] The sample covariance structure of wages in the PSID has been studied by many in the literature. The covariance structure of wages in this sample is similar to the one obtained by Gottshalk and Moffitt (1995) and Haider (2001) and is available upon request.

where T is the total length of the panel. For the full sample panel of individuals $T = 23$. The full sample of individuals constitutes an unbalanced panel therefore some entries of the vector 3 are missing for some individuals in some years.

The empirical covariance matrix of log residual wages is given by: $C = \frac{\sum_{i=1}^{n} \widehat{y}_i \widehat{y}_i^{'}}{I}$ where n is the number of individuals. Since the panel is unbalanced, not all individuals contribute to each entry of C. To keep this into account, I define for each individual i a vector d_i of dimension $(T \times 1)$ of indicator variables. Each indicator variable is equal 1 if $\widehat{y}_{it}$ is non missing and 0 otherwise. $I = \sum_{i=1}^{n} d_i d_i^{'}$ is the denominator of C.

In the paper I estimate a model of C. Let m be the vector of the distinct elements of C which contains $T(T+1)/2$ elements. To estimate the model in equation 2 I minimize:

$$\min_{b} [m - f(b)]' A [m - f(b)]$$

where A is the identity matrix and $f(b)$ is the theoretical covariance matrix implied by model 2. Under some general conditions the estimator $\widehat{b}$ has asymptotic distribution $\sqrt{N}(\widehat{b} - b) \sim N(0, \Omega)$. The variance matrix $\Omega = (G'G)^{-1} G'VG(G'G)^{-1}$ can be estimated with the empirical counterpart of the gradient matrix $G = \frac{\delta f(b)}{\delta b}$ and of $V = [m - f(b)][m - f(b)]'$.

I estimate the model 2 on the full sample and then separately on the two balanced panels of stayers and changers. Stayers and changers are defined in the periods 1970-1977 and 1981-1992. Therefore T=8 for the period between 1970 and 1977 and T=12 for the period between 1981 and 1992. The two panels of stayers and changers are balanced therefore in this case the covariance matrix is simply $C = \frac{\sum_{i=1}^{n} \widehat{y}_i \widehat{y}_i^{'}}{n}$.

4 Results

All the tables and the figures regarding the estimation results are reported in the Appendix. Table 2 shows the results of estimating model 2 on the full unbalanced sample of individuals from 1970 to 1992. Figure 2 shows the log variance of the residuals of the first-stage equation 1 and the fit of the model. The results of the variance decomposition are plotted in figure 3. The largest component is the permanent component but the relative contribution of the two components changes over time. The permanent component seems to decline in the 1970s in correspondence with the declining education premium. Consistent with the previous literature on the PSID, the rise in

the permanent component accounts for most of the rising wage inequality in the 1980s. The transitory component increases first in the 1970s and again in the 1990s. The results on the transitory component of earnings are also in line with most of the literature on PSID data. Haider (2001) uses PSID data from 1967-1991 and finds an increasing transitory component in the 1970s and flat transitory component in the 1980s. Gottschalk and Moffitt (2002) use PSID data from 1970-1995 and find that the transitory component rises in the late 1980s. Heathcote et al. (2003) use PSID data from 1967-1995 and find a rising transitory component in the 1970s and in the 1990s, a flat transitory component in the 1980s.

In table 3, I show the results of model 2 estimated on the two balanced panels of stayers. In figure 4 I group together the pictures of the model fit and of the variance decomposition for both sample of stayers. On the top part of figure 4 I put the two pictures of the log variance of the residual wages for stayers. On the bottom part of the same figure I put the variance decomposition results. The log variance of residual wages across stayers is lower than in the full sample, as was clear already from the raw statistics of table 1, yet it increases over time. The two bottom pictures of figure 4 show the crucial empirical finding of the paper. The variance decomposition results for the stayers show that most of the total variance is accounted for by the permanent component and that the transitory component contributes virtually nothing to the increase in wage inequality across this group.

Table 4 in the Appendix shows the results of model 2 estimated on the two balanced panels of changers. The two bottom panels of figure 5 show the variance decomposition results for changers. The vertical axis are scaled in the same way in figure 5 and 4 to facilitate the comparison between stayers and changers. The results show that both the variance of the permanent and of the transitory part of earnings increased across job changers. The difference in the results of figure 5 and 4 show that the increasing earnings instability found in the full sample (figure 3) is mostly due to job changers.

4.1 Robustness Check: Stayers

In table 5 in the Appendix, I verify the robustness of the results on earnings instability of job stayers along three dimensions. I compare two different definitions of stayers, two different models of earnings instability and four different wage measures. I now proceed to explain the terminology used in table 5.

"Stayer Definition 1" in table 5 is the definition used in this paper based on the "months with current employer" question and described above.

"Stayer Definition 2" is the definition of job stayer based on the "reason for separation from previous employer" question. According to this definition, anybody who is currently employed and did not give any reason for separation from the previous employer is recorded as a job stayer. "Stayer Definition 2" does not require a valid value of tenure with the current employer. The question "reason for separation from previous employer" is available every year of the sample therefore the two balanced samples of stayers cover the years 1970-1980 and 1981-1992. When defined according to definition 2, the balanced samples of stayers contain 342 individuals in the period 1970-1980 and 586 individuals in the period 1981-1992.

"Unit Root Model" in table 5 corresponds to the model 2 explained above. "Stationary Model" in table 5 substitutes the random walk term in model 2 with a time-invariant individual fixed effect. "Stationary Model" indicates a model of the following form:

$$y_{it} = \phi_t \mu_i + \pi_t v_{it} + \tau_t \eta_{it} \tag{4}$$

μ_i is an individual time-invariant effect with variance σ_μ^2 and with time-varying loading factor ϕ_t. Like in model 2, the individual fixed effect will capture individual permanent characteristics such as "ability" and education, but it will not allow for non-mean-reverting shocks. The time-varying loading factor ϕ_t will reflect the changing market return to education and unobserved skills. Like in model 2, v_{it} is an AR(1) process: $v_{it} = \rho v_{it-1} + \epsilon_{it}$ where $\epsilon_{it} \rightsquigarrow iid(0, \sigma_\epsilon^2)$ is white noise. $\eta_{it} \rightsquigarrow iid(0, \sigma_\eta^2)$ is a purely transitory term with the associated loading factor τ_t. In this model measurement error in wages will be captured by η_{it}.

The robustness check considers different wage measures and different samples. "Hourly Wage Residuals" in table 5 corresponds to the benchmark measure used in tables 2 and 3. Log hourly wages are purged of year and experience effects with the first-stage regression 1. "Hourly Wage Residuals (2)" considers the residuals of a regression of wages on a quadratic in experience, year dummies and 1 digit industry*year dummies. This purges the transitory variance from fluctuations in industry-specific wages. In this case, the first-stage regression 1 becomes: $w_{ijt} = X_{it}\beta + \alpha_t + \psi_{jt} + y_{it}$ where the subscript j indicates the industry, α_t indicates year dummies and ψ_{jt} indicates a set of interactions 1 digit industry*year. "Hourly Wage Residuals (3)" includes the low-income SEO sample. Finally "Annual Earnings Residuals" are included with the intent of avoiding the problem of measurement error in hours. "Hourly Wage Residuals (3)" and "Annual Earnings Residuals" are both residuals from the first-stage equation 1.

Table 5 reports the transitory variance calculated on the two balanced panels of stayers for every combination "model-stayer definition-wage measure". For simplicity only the transitory variance is reported. The reported values correspond to a simple average of the estimated transitory variance during the period. For example the values for the benchmark combination "Unit Root Model-Stayer Definition 1-Hourly Wage Residuals" correspond to the average of the transitory variance plotted in the two bottom charts of figure 4. For "Unit Root Model" the reported values are the average of $\pi_t^2 \frac{\sigma_\epsilon^2}{1-\rho^2}$ over the period of interest, for "Stationary Model" the reported values are the average of $\tau_t^2 \sigma_\eta^2$.

Eight out of sixteen of the possible cases in table 5 report a decreasing or a stable value in the average transitory variance for stayers between the periods 1970-77 and 1980-92. The remaining eight cases in table 5 report an increase in the average transitory variance for stayers. Four out of the eight cases of rising transitory variance indicate a very mild increase of less or equal to 0.002 points. Four out of the eight cases of rising transitory variance are concentrated in the "Stationary Model-Stayer Definition 2" bottom right corner of table 5. The "Stationary Model" tends to estimate a higher transitory variance rather than the "Unit Root Model" and a bigger increase over time. The stayers defined according to definition 2 tend to have a larger estimated increase in the transitory variance. Finally when the transitory variance for stayers is calculated using annual earnings rather than hourly wages, it appears to increase in four cases out of four. Apart from the case of annual earnings where the evidence seem to indicate an increase in earnings instability for stayers too, I view the results in table 5 as evidence of stable or very mild increase in earnings instability for stayers.

4.2 Robustness Check: Changers

In table 6 in the Appendix, I verify the robustness of the results on earnings instability of job changers. I use the same method as for job stayers.

"Changer Definition 1" is the definition based on the "months with current employer" question and described above. "Changer Definition 2" is the definition based on the "reason for separation from previous employer" question. According to definition 2, anybody who is currently unemployed or has given any reason for separation form the previous employer is considered as a job changer. As in the case of stayers, "Unit Root Model" refers to equation 2 in the text, "Stationary Model" refers to equation 4. The wage measures used are the same as for job stayers.

The results in table 6 indicate an increase of the transitory variance of

wages for job changers in all cases except for three.

5 The Model

I interpret the evidence shown in the previous section in a search and matching model with on-the-job search by Pissarides (2000). I argue that Pissarides' model can be fruitfully used to understand the different effects of an increase in the transitory variance of earnings on job stayers and job changers. This model provides different wage equations for stayers and changers and implies that wages are affected by transitory shocks. These characteristics make it a useful model to look at the different effects that an increase in the overall variance of transitory shocks may have on wages of job stayers and job changers.

The novelty introduced in this paper is the application of Pissarides' model to the study of earnings instability. I will look at the effects of a mean-preserving spread of the distribution of transitory shocks on the cross-sectional variance of wages of job stayers and job changers. The recent literature provides some models of the increase in earnings instability. Violante (2002) explains the increase in earnings instability on the basis of an acceleration of technical change and reduced transferability of skills. Aghion, Howitt and Violante (2002) underline the role of the interaction of faster technological change and "random" adaptability to the new technologies. In this paper, I assume the increase in the overall variance of the transitory part of wages and focus on the differences across stayers and changers.

In the empirical part of this paper, I underlined the differences in earnings instability across job stayers and job changers. I claim that the increase in the cross-sectional variance of wages for changers is due to increases in both the variance of the permanent and the transitory part. For job stayers, most of the increase is explained by the increase in the variance of the permanent part of individual wages and very little by the increase in the variance of the transitory part. The following model considers ex-ante identical individuals and therefore disregards differences in permanent characteristics while focussing on wage differences due to transitory shocks. The model provides a rationale for the different evolution of the transitory variance of wages across job stayers and job changers.

I shall now briefly explain the main lines of Pissarides' on-the-job search model. The model is in continuous time. Workers are ex-ante identical with productivity p. Job seekers and jobs are matched via a matching function.

Jobs have productivity px where p is the constant productivity and x is the idiosyncratic one. Jobs are created at maximum productivity px with $x = 1$. The match is hit by an idiosyncratic productivity shock $x \rightsquigarrow G(x)$ with $x \in [0, 1]$ at Poisson rate λ. This shock is transitory: the shock x' is independent of the previous x. At every point in time jobs are therefore distinguished by their transitory productivity x.

In a matching model with on-the-job search, both unemployed and part of the employed search for jobs. Since there is perfect information, when the worker is searching on the job, the firm is aware of it and the Nash bargaining that determines the wage takes that into account. This implies that wages for on-the-job seekers and non-seekers are different. Wages are affected by the transitory shock x because, after realization of the shock x, the wage is renegotiated and the surplus is split by Nash bargaining. The rate at which unemployed and employed job seekers move into new jobs is derived from a matching function $m = m(v, u + e)$ where u is the unemployed, e the employed job seekers, and 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.

The optimal policy can be characterized by two reservation rules. There is a reservation productivity R such that jobs $x < R$ are destroyed. There is a second reservation productivity S such that workers in jobs $R < x < S$ seek a new job. Workers in jobs $S < x < 1$ do not search. The expected returns of the employed worker when he searches on the job (s) and when he does not (ns)are respectively:

$$rW^s(x) = w^s(x) - \sigma + \lambda \int_R^1 \max(W^{ns}(s), W^s(s))dG(s) + \lambda G(R)U - \\ - \lambda W^s(x) + \theta q(\theta)[W^{ns}(1) - W^s(x)]$$

$$rW^{ns}(x) = w^{ns}(x) + \lambda \int_R^1 \max(W^{ns}(s), W^s(s))dG(s) + \lambda G(R)U - \lambda W^{ns}(x)$$

Job seekers and non-seekers have different wages $w^s(x)$ and $w^{ns}(x)$. When $x < R$ jobs are destroyed and workers get the value of unemployment U. The difference between $W^s(x)$ and $W^{ns}(x)$ is the cost of search σ and the capital gain the job seeker enjoys when he changes job: $\theta q(\theta)[W^{ns}(1) - W^s(x)]$ where $\theta q(\theta)$ is the rate at which job seekers find a new match, and $W^{ns}(1)$ is the

value of the new job as jobs are always created at maximum productivity $x = 1$. The flow value of unemployment is:

$$rU = z + \theta q(\theta)[W^{ns}(1) - U]$$

where z is the unemployment benefit.

The value of a filled job is also different if the worker is searching or not:

$$rJ^s(x) = px - w^s(x) + \lambda \int_R^1 \max(J^{ns}(s), J^s(s))dG(s) - [\lambda + \theta q(\theta)]J^s(x) \tag{5}$$

$$rJ^{ns}(x) = px - w^{ns}(x) + \lambda \int_R^1 \max(J^{ns}(s), J^s(s))dG(s) - \lambda J^{ns}(x) \tag{6}$$

When the worker is searching, $J^s(x)$ contains an additional probability that the job is destroyed given by the probability that the job seeker finds a new match: $\theta q(\theta)$. The flow value of a vacancy is:

$$rV = -pc + q(\theta)[J^{ns}(1) - V]$$

and the zero-profit or free entry condition is $V = 0$.

Wages are set by Nash rule to share the surplus of a match. Therefore for job seekers and non-seekers $i = s, ns$:

$$W^i(x) - U = \frac{\beta}{1-\beta} J^i(x)$$

Knowing the value for workers and firms of vacant and filled jobs, substituting in the Nash rule, we find the wage equation for seekers and non-seekers:

$$w^s(x) = (1-\beta)(z+\sigma) + \beta px \tag{7}$$

and

$$w^{ns}(x) = (1-\beta)z + \beta p(x + c\theta) \tag{8}$$

When the worker quits to take another job, the return of the firm drops from $J(x)$ to zero. The return from the new job to the worker is $W^{ns}(1)$ since new jobs are created at the maximum productivity $x = 1$. The Nash

rule implies that the worker has to compensate the firm for this asymmetry in the returns. Therefore the wage for non-seekers is always higher than for job seekers, at given productivity x, $w^{ns}(x) > w^{s}(x)$. This can be proven rewriting $w^{ns}(x) - w^{s}(x) = (1-\beta)(\frac{\beta}{1-\beta}pc\theta - \sigma)$ and noticing that $\frac{\beta}{1-\beta}pc\theta$ is in equilibrium the expected return from search.

The evolution of the number of employed job seekers e is:

$$\frac{de}{dt} = \lambda(1-u)[G(S) - G(R)] - \lambda e - \theta q(\theta) e \tag{9}$$

where the first term on the RHS is the sum of new entry and re-entry in the range $[R, S]$, following the arrival of a productivity shock. The job-to-job number of quits is given by $\theta q(\theta) e$. The evolution of unemployment is given by:

$$\frac{du}{dt} = \lambda(1-u)G(R) - \theta q(\theta) u \tag{10}$$

I now look at the effect of increasing the variance of transitory shocks on the wages of job changers and stayers. The increase in the transitory component of wages is modelled as a mean-preserving spread of $G(x)$. I take a parametric change in the productivity distribution and solve the model with $x(h) = x + h(x - \overline{x})$. I consider the effect of a marginal dh at $h = 0$.

An equilibrium in this model is a value of S, R, market tightness θ, a wage $w(x)$ and unemployment u. To find the reservation rule S, write the value to a worker of a job x, when he is searching on the job and when he is not, $W^{s}(x)$ and $W^{ns}(x)$. S is such that $W^{ns}(S) = W^{s}(S)$. The job creation condition is given by $J^{ns}(1)$ and the zero profit condition $V = 0$. The job reservation productivity is R such that $J^{s}(R) = 0$, this determines the job destruction condition. The equation that determines S, the job creation condition, and the job destruction condition take respectively the following form:

$$\frac{(1+h)(S-R)}{r+\lambda+\theta q(\theta)} = \frac{\beta}{1-\beta}\frac{c}{q(\theta)} - \frac{\sigma}{p\theta q(\theta)} \tag{11}$$

$$\frac{(1+h)(1-R)(1-\beta)}{r+\lambda} = \frac{c}{q(\theta)} + \frac{p\beta c\theta - (1-\beta)\sigma}{p(r+\lambda)} \tag{12}$$

$$(1+h)R - h\overline{x} + \Lambda(R,\theta,\sigma,h) = \frac{z+\sigma}{p} \tag{13}$$

where $\Lambda(R,\theta,\sigma,h) = \lambda \int_R^1 \max(J^{ns}(s), J^s(s))dG(s)$ is the option value of the job with $\frac{d\Lambda}{d\theta} < 0$, $\frac{d\Lambda}{dR} < 0$ and $\frac{d\Lambda}{dh} > 0$. Equation 11 is obtained combining combining 5 and 6 with 7 and 8 and substituting $x = x + h(x - \overline{x})$. Equation 12 is obtained from 6 calculated in $x = 1$ and $V = 0$ and equation 11. Equation 13 is obtained from $J^s(R) = 0$.

The job creation condition 12 is negatively sloped in the space R, θ. The last term on the RHS of equation 12 is the gain from search going to the firm. The expected productivity gain from job creation (LHS of equation 12) minus the gain from search must be equal to the average creation cost. The mean-preserving spread h shifts the job creation curve out. The intuition is that the mean-preserving spread makes productivities above the mean better and productivities below the mean worse. Workers and firms do not consider productivities below R, therefore the benefits from productivities above the mean outweight the costs from productivities below the mean.

The job destruction curve 13 implies that the reservation productivity net of the option value of the job is equal to total workers' costs. The job destruction curve 13 is upward sloping in the space R, θ. A higher θ reduces the option value of the job because higher θ implies higher job destruction since a searching worker is more likely to find a job and quit. A higher θ also increases the expected returns from search and therefore more search is undertaken and a job is more likely to be destroyed. This also reduces the option value of a job. The total differential of equation 13 can be written:

$$(1 + \frac{d\Lambda}{dR})\frac{dR}{dh} = \overline{x} - R - \frac{d\Lambda}{dh} - \frac{d\Lambda}{d\theta}\frac{d\theta}{dh} \tag{14}$$

The mean-preserving spread has three effects on R: it increases R directly if $\overline{x} > R$, it increases R through market tightness θ, it decreases R by increasing the option value of a job. The reason $\frac{d\Lambda}{dh} > 0$ is the same as before, the truncation of the productivity distribution at R. Substituting the total differential of equation 12 into 14, we obtain that $\frac{d\theta}{dh} > 0$ and $\frac{dR}{dh} > 0$.

The total differential of equation 11 with respect to h at $h = 0$ gives:

$$\frac{dS}{dh} - \frac{dR}{dh} = -(S - R) + [\frac{\beta}{1-\beta}c(1 + \eta\frac{r+\lambda}{\theta q\,(\theta)}) + \frac{(1-\eta)(r+\lambda)\sigma}{p\theta^2 q(\theta)}]\frac{d\theta}{dh}$$

Knowing that $\frac{d\theta}{dh} > 0$ and $\frac{dR}{dh} > 0$ and assuming $S - R$ small, the result of a mean-preserving spread is $\frac{dS}{dh} - \frac{dR}{dh} > 0$ and $\frac{dS}{dh} > 0$. This means that the range of productivities over which workers search on the job is larger and the range of productivities over which they do not search is smaller. A mean-preserving spread makes the gap between S and R larger because it increases θ and therefore increases the expected rewards from search. The intuition is again that the mean-preserving spread makes productivities above the mean better and productivities below the mean worse, but workers and firms do not consider productivities below R.

The effects of the mean-preserving spread ($\frac{d\theta}{dh} > 0$ and $\frac{dR}{dh} > 0$) on the level of unemployment $u = \frac{\lambda G(R)}{\lambda G(R)+\theta q(\theta)}$ are ambiguous. At given unemployment both the job destruction rate, $\lambda G(R)$, and the job creation rate, $\theta q(\theta)\frac{u}{1-u}$, are higher. The effect on u in steady state depends on the parameters.

We now look at the implications for the variance of wages of changers and stayers. On-the-job seekers (s) are changers with probability $\theta q(\theta)$. Job stayers are all the non-seekers (ns) plus those seekers (s) who did not change job. From equation 9, the number of employed job seekers in steady state is given by:

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

Note that e is the steady state number of job seekers already net of the changers. The changers go from a job with productivity in $[R, S]$ to a job with productivity $x = 1$ because all vacancies enjoy maximum productivity. We look at wages of stayers and changers before the change. The proportion of employed job changers in steady state is therefore given by $\frac{e\theta q(\theta)}{1-u}$. The proportion of employed job stayers is given by: $1 - \frac{e\theta q(\theta)}{1-u} = (1 - \frac{e\theta q(\theta)}{1-u} - \frac{e}{1-u}) + \frac{e}{1-u}$. This is the sum of non-seekers net of the changers plus the seekers who did not find a job.

The effect of the mean-preserving spread ($\frac{d\theta}{dh} > 0$ and $\frac{dS}{dh} - \frac{dR}{dh} > 0$) on the number of job seekers, e, on the number of quits, $e\theta q(\theta)$, and on the fraction of employed job seekers $\frac{e}{1-u}$ is ambiguous. The ambiguity of the effect on $\frac{e}{1-u}$ comes from the fact that job seekers search on a wider range $[R, S]$, but more workers find a match and leave the job seekers' pool to become non-seekers. The effect on the job-to-job quit rate $\frac{e\theta q(\theta)}{(1-u)}$ is positive.

The wages of employed seekers and non-seekers are given by:

$$w^s(x) = (1 - \beta)(z + \sigma) + \beta px \qquad \text{for } x \in (R, S)$$

$$w^{ns}(x) = (1-\beta)z + \beta p(x + c\theta) \qquad \text{for } x \in (S, 1)$$

Taking now the variance of the wages for stayers and changers:

$$var(w^{changers}(x)) = \left(\frac{e\theta q(\theta)}{1-u}\right)^2 \beta^2 p^2 var(x \mid R < x < S) \tag{15}$$

$$\begin{aligned} var(w^{stayers}(x)) \quad &= \quad \left(1 - \frac{e\theta q(\theta)}{1-u} - \frac{e}{1-u}\right)^2 \beta^2 p^2 var(x \mid x > S) + \\ + \left(\frac{e}{1-u}\right)^2 &\beta^2 p^2 var(x \quad | \quad R < x < S) \end{aligned} \tag{16}$$

The conditional variance of a random variable increases as the support over which the variance is taken becomes larger. It is therefore clear that the variance of wages across job changers increases after the mean-preserving spread, as both the job-to-job quit rate, $\frac{e\theta q(\theta)}{1-u}$, and the conditional variance, $var(x \mid R < x < S)$, increase. The results for job stayers are ambiguous since the effect of the mean-preserving spread on both the proportion of employed non-seekers, $1 - \frac{e\theta q(\theta)}{1-u} - \frac{e}{1-u}$, and the proportion of employed seekers who did not find a job, $\frac{e}{1-u}$, is in principle ambiguous. The conditional variance $var(x \mid x > S)$ decreases. The ambiguity for job stayers comes from the fact that although the total proportion of employed job stayers is reduced, their composition between non-seekers and seekers who did not find a job may change. While non-seekers have a lower wage variance after the mean-preserving spread, seekers have a higher variance.

5.1 The Link between the Theory and the Evidence

A few comments are in order on the relationship between the theory and the empirical evidence. First of all, this theory has nothing to say about the permanent component of wages since individuals are identical and wages differ only because of the different realizations of the transitory shock x. Equations 16 and 15 in the model indicate the cross-sectional variance of wages across stayers and changers. They are the theoretical counterpart of the transitory variance of wages shown in the bottom lines of the two lower charts of figure 4 for job stayers and of figure 5 for job changers.

Secondly, the assumption of the model is that the productivity shock x is drawn form the general distribution $G(x)$ at the Poisson rate $\lambda < \infty$, i.e.

there are periods without shocks. Wages need a certain degree of persistence, in fact, if wages were continuously reset, nobody would search. However, the shock x in the model is really transitory because eventually everybody draws a shock x from the same distribution $G(x)$, and every shock x' is independent from the previous shock x. Equations 16 and 15 indicate the cross-sectional variance of *i.i.d.* wages. In the empirical part, the benchmark equation 2 models the transitory part of wages as an AR(1) process. In equation 4, I model the transitory part of wages as an *i.i.d.* process. Therefore it can be argued that the correspondence between the cross-sectional variance of the transitory part of wages in the theory and in the empirical part is not perfect. However, I am interested in the comparative statics of the transitory variance of wages with respect to a mean-preserving spread whatever the process that drives the transitory shock.

Finally, the correspondence between the definition of changers (stayers) used in the empirical part and the one implied by the theory is also not perfect. In the empirical part, I define as job changers those who have less than 12 months of tenure with the current employer or are unemployed and I take their wage in the same year. However, wages in the PSID refer to the previous year and are likely to be a mix of the old and new job's wages. In the theory part, I exclude the unemployed from the definition of changers and I consider the cross-sectional wage variance of changers before the change because after the change all wages are identical with $x = 1$. Furthermore, equations 16 and 15 in the theory part indicate the cross-sectional variance across all stayers and changers. In the empirical part, figure 4 and 5 show the transitory wage variance across a balanced sample of stayers and changers. However, I argued in the empirical section that the balanced sample of stayers (changers) has similar characteristics to the sample of all stayers (changers).

6 Conclusions

In this paper, I use the PSID to decompose the rise in wage inequality into permanent and transitory shocks. I show that the increase in the variance of transitory shocks, also known as earnings instability, is mostly restricted to job changers. Job stayers hardly suffer any increase in earnings instability over time. I verify the robustness of the results using two different models of earnings dynamics, two different definitions of job stayers and four different wage measures.

A simple search and matching model with on-the-job search provides

an interpretation of the evidence. An increase in the variance of transitory shocks to earnings increases the range of productivities over which workers search on the job. The wage variance across job changers increases as worker search over a wider range of productivities. The direction of the change in the wage variance across job stayers is ambiguous and depends on their composition between non-seekers and seekers who did not find a job.

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7 Appendix: Tables and Figures

Permanent Component			Transitory Component		
	Estimate	S.E.		Estimate	S.E.
ϕ_1	-0.077	(0.001)	π_1	0.038	(0.001)
ϕ_2	0.006	(0.000)	π_2	-0.003	(0.000)
ϕ_3	-0.000	(0.000)	π_3	0.000	(0.000)
σ_μ	0.143	(0.000)	ρ	0.279	(0.000)
σ_η	0.012	(0.000)	σ_ε	0.042	(0.000)

Notes: Parameter estimates and standard errors for the benchmark model on the full sample.

Table 2: Parameter Estimates

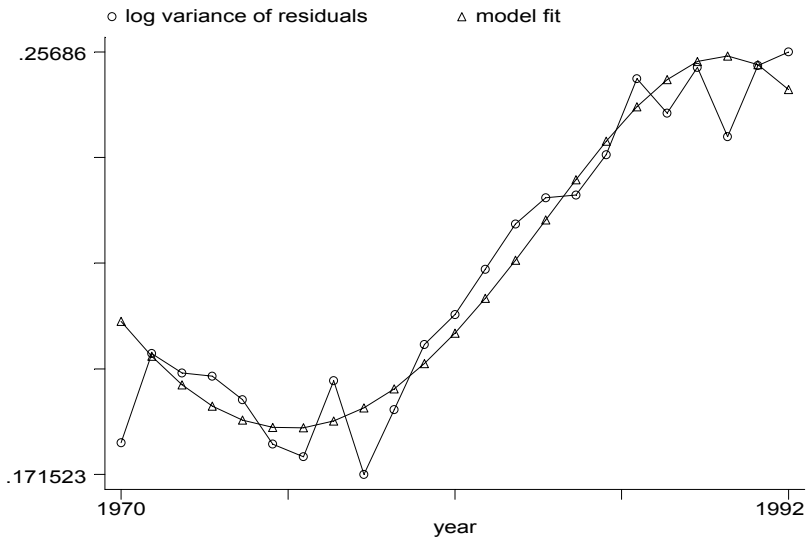

Figure 2: Model Fit

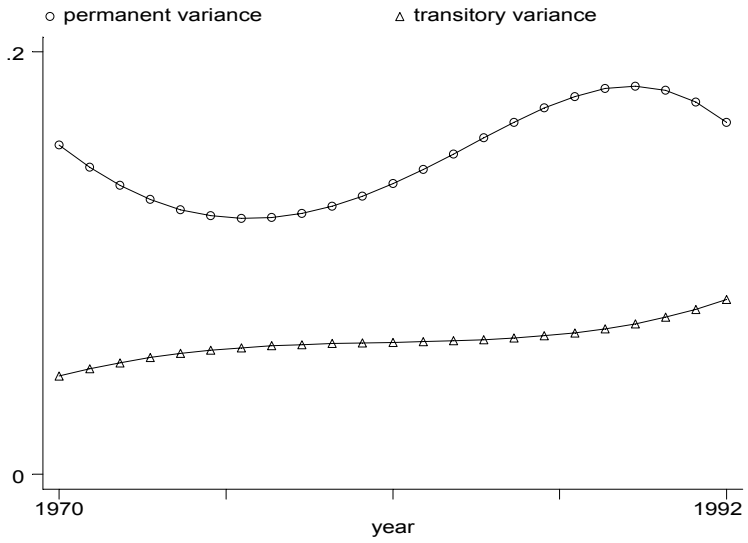

Figure 3: Variance Decomposition.

Permanent Component			Transitory Component		
		Stayers 1970-1977			
	Estimate	S.E.		Estimate	S.E.
ϕ_1	0.011	(0.000)	π_1	0.278	(0.057)
ϕ_2	-0.014	(0.000)	π_2	0.184	(0.003)
ϕ_3	0.001	(0.000)	π_3	-0.041	(0.001)
σ_μ	0.113	(0.001)	ρ	0.069	(0.000)
σ_η	0.020	(0.000)	σ_ε	0.003	(0.000)
		Stayers 1981-1992			
	Estimate	S.E.		Estimate	S.E.
ϕ_1	-0.021	(0.000)	π_1	-0.078	(0.005)
ϕ_2	0.001	(0.000)	π_2	-0.184	(0.012)
ϕ_3	-0.000	(0.000)	π_3	0.018	(0.001)
σ_μ	0124	(0.000)	ρ	0.501	(0.025)
σ_η	0.009	(0.000)	σ_ε	0.002	(0.000)

Notes: Parameter estimates and standard errors for the benchmark model on the two balanced panels of stayers.

Table 3: Parameter Estimates: Stayers

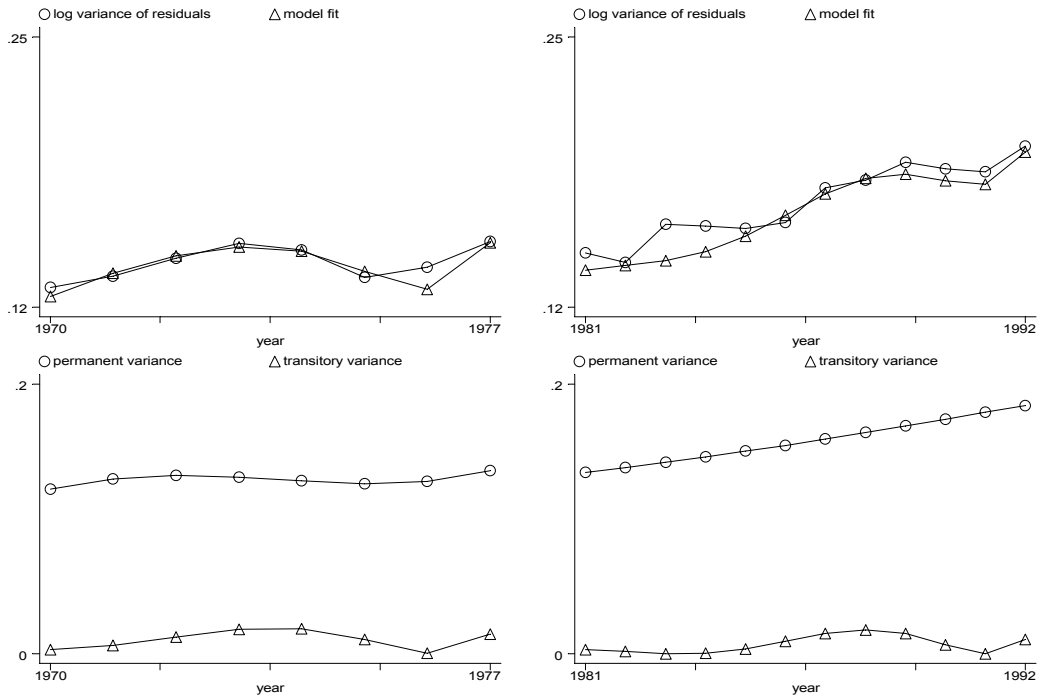

Figure 4: Model fit and Variance decomposition: Stayers.

Permanent Component			Transitory Component		
		Changers 1970-1977			
	Estimate	S.E.		Estimate	S.E.
ϕ_1	-0.202	(0.002)	π_1	1.240	(0.151)
ϕ_2	0.042	(0.000)	π_2	-0.348	(0.041)
ϕ_3	-0.003	(0.000)	π_3	0.029	(0.003)
σ_μ	0.106	(0.000)	ρ	0.037	(0.003)
σ_η	0.036	(0.000)	σ_ε	0.005	(0.000)
		Changers 1981-1992			
	Estimate	S.E.		Estimate	S.E.
ϕ_1	-0.100	(0.002)	π_1	1.034	(0.241)
ϕ_2	0.011	(0.000)	π_2	-0.202	(0.044)
ϕ_3	-0.000	(0.000)	π_3	0.010	(0.002)
σ_μ	0117	(0.000)	ρ	-0.092	(0.007)
σ_η	0.036	(0.000)	σ_ε	0.004	(0.001)

Notes: Parameter estimates and standard errors for the benchmark model on the two balanced panels of changers.

Table 4: Parameter Estimates: Changers

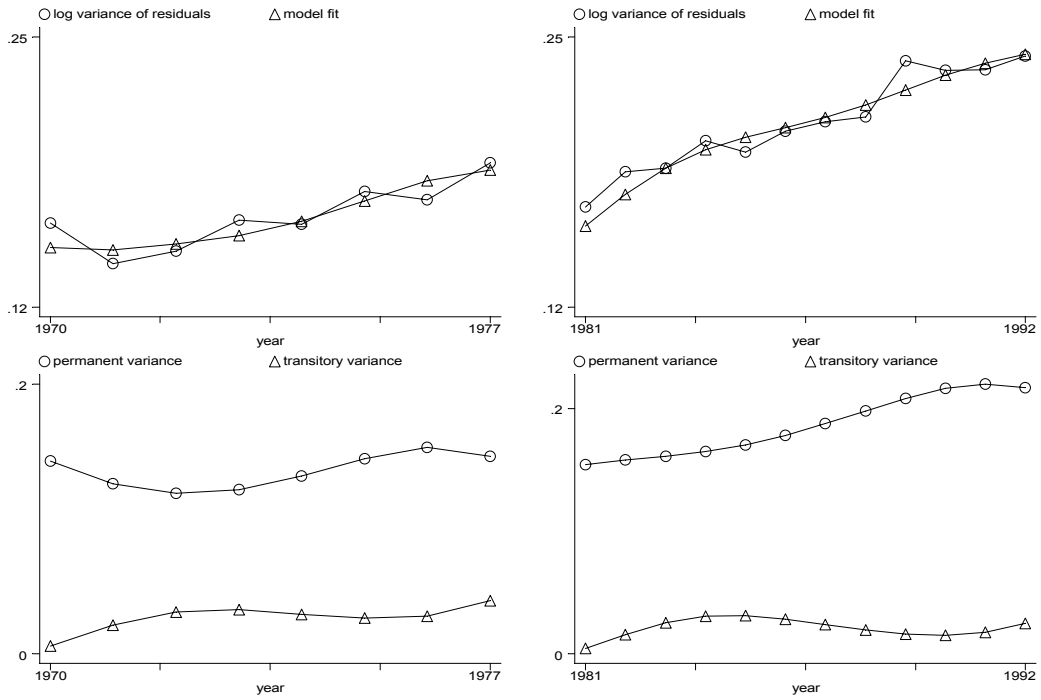

Figure 5: Model fit and Variance decomposition: Changers

	Stayer Definition 1		Stayer Definition 2	
	Transitory Variance		Transitory Variance	
Unit Root Model	1970-1977	1981-1992	1970-1980	1981-1992
Hourly Wage Residuals	0.010	0.007	0.009	0.007
	(0.000)	(0.000)	(0.000)	(0.000)
Hourly Wage Residuals (2)	0.012	0.010	0.013	0.010
	(0.000)	(0.000)	(0.000)	(0.001)
Hourly Wage Residuals (3)	0.012	0.009	0.018	0.008
	(0.000)	(0.000)	(0.000)	(0.000)
Annual Earnings Residuals	0.006	0.008	0.006	0.014
	(0.000)	(0.000)	(0.000)	(0.000)
	Transitory Variance		Transitory Variance	
Stationary Model	1970-1977	1981-1992	1970-1980	1981-1992
Hourly Wage Residuals	0.014	0.014	0.013	0.016
	(0.000)	(0.000)	(0.000)	(0.000)
Hourly Wage Residuals (2)	0.014	0.015	0.015	0.019
	(0.000)	(0.000)	(0.000)	(0.001)
Hourly Wage Residuals (3)	0.018	0.017	0.017	0.019
	(0.000)	(0.000)	(0.002)	(0.001)
Annual Earnings Residuals	0.008	0.010	0.005	0.013
	(0.000)	(0.001)	(0.000)	(0.000)

Notes: "Stayer Definition 1" uses the question "Months with current employer". "Stayer Definition 2" uses the question "Reason for separation from previous employer". "Unit Root Model" is equation 2 in the text. "Stationary Model" is equation 4 in the text. "Hourly Wage Residuals (2)" considers the residuals from an augmented first stage regression $w_{ijt} = X_{it}\beta + \alpha_t + \psi_{jt} + y_{it}$ where ψ_{jt} indicates a set of interactions 1 digit industry-year. "Hourly Wage Residuals (3)" includes the low-income SEO sample.

Table 5: Robustness Analysis: Stayers

	Changer Definition 1		Changer Definition 2	
	Transitory Variance		Transitory Variance	
Unit Root Model	1970-1977	1981-1992	1970-1980	1981-1992
Hourly Wage Residuals	0.020	0.021	0.028	0.043
	(0.001)	(0.001)	(0.001)	(0.002)
Hourly Wage Residuals (2)	0.056	0.052	0.033	0.058
	(0.002)	(0.002)	(0.002)	(0.004)
Hourly Wage Residuals (3)	0.038	0.073	0.024	0.049
	(0.001)	(0.003)	(0.001)	(0.002)
Annual Earnings Residuals	0.023	0.036	0.024	0.070
	(0.001)	(0.002)	(0.003)	(0.004)
	Transitory Variance		Transitory Variance	
Stationary Model	1970-1977	1981-1992	1970-1980	1981-1992
Hourly Wage Residuals	0.025	0.030	0.027	0.050
	(0.001)	(0.001)	(0.001)	(0.002)
Hourly Wage Residuals (2)	0.022	0.025	0.031	0.039
	(0.001)	(0.002)	(0.001)	(0.001)
Hourly Wage Residuals (3)	0.036	0.036	0.036	0.057
	(0.002)	(0.003)	(0.002)	(0.004)
Annual Earnings Residuals	0.027	0.039	0.028	0.052
	(0.001)	(0.002)	(0.001)	(0.004)

Notes: "Changer Definition 1" uses the question "Months with current employer". "Changer Definition 2" uses the question "Reason for separation from previous employer". "Unit Root Model" is equation 2 in the text. "Stationary Model" is equation 4 in the text. "Hourly Wage Residuals (2)" considers the residuals from an augmented first stage regression $w_{ijt} = X_{it}\beta + \alpha_t + \psi_{jt} + y_{it}$ where ψ_{jt} indicates a set of interactions 1 digit industry-year. "Hourly Wage Residuals (3)" includes the low-income SEO sample.

Table 6: Robustness Analysis: Changers

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