EARNINGS EFFECTS OF EMPLOYMENT PROMOTING REFORMS: ANALYSIS OF THE 1997 LABOUR MARKET REFORM IN SPAIN

María Cervini Plá [-]
Universitat Autònoma de Barcelona

Xavier Ramos [-]
Universitat Autònoma de Barcelona & IZA

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ABSTRACT : Temporary employment accounts in Spain for about one third of total salaried employment since the mid-Eighties, which triples European figures. In the Nineties, two labour market reforms were implemented in an attempt to reduce the very high incidence of temporary employment, achieving some positive effects on employment. However, we still have a very limited knowledge of the likely effects on earnings levels and dynamics. Since the reform applied only to certain age groups, in this paper we use a natural experiment research design to assess the impact of the 1997 reform on the statics and dynamics of earnings. Using data on the Spanish component of the ECHP, we find positive effects on earnings levels of young men signing new contracts from unemployment and suspect positive effects on earnings stability. The latter is the result of an increase of the permanent earnings component and a decrease of the transitory component.

Keywords: Temporary and permanent employment, labour market reforms, natural experiment research, earnings level and dynamics, Spain.

JEL classification: C23, D31, J31, J38

[-] Departament d'Economia Aplicada. Universitat Autònoma de Barcelona. Edificio B, 08193 Bellaterra (Barcelona), Spain. Phone:+34 93 5814575. Fax: +34 93 5812292. E-mail: maria.cervini@uab.es

[-] Departament d'Economia Aplicada. Universitat Autònoma de Barcelona. Edificio B, 08193 Bellaterra (Barcelona), Spain. Phone:+34 93 5812868. Fax: +34 93 5812292.E-mail: xavi.ramos@uab.es

1. Introduction

The Spanish labour market has experienced four reforms during the last twenty years (in 1984, 1994, 1997 and 2001). Up to the early 1980s, the intervention in the labour market was especially important. While the wages were kept very low, the permanence in the labour market was guaranteed by difficulties in laying-off workers and very rigid conditions to hire employees. Permanent work contracts represented more than 90% of all jobs. The main objective of the 1984 reform was to ease the access to employment, making hiring temporary workers easier for employers. Although the reform achieved certain employment dynamism, it also generated a dual labour market (insider-outsider) and segmentation problems. Temporary employment increased from around 10% in the mid-Eighties to more than 30% in the early Nineties. This figure doubles the European average. As the proportion of temporary jobs surged, the recent reforms in the 1990s and 2001 have aimed at achieving a more "balanced" situation between both types of contracts both by restricting the use of fixed-term contracts and by reducing mandatory firing costs under new permanent contracts.[1]

The employment effects of these reforms have captured most of the attention in the literature, and recent research shows that they were rather successful in terms of fostering the 'right' employment transitions from temporary to permanent contracts — and especially the later one of 1997.[2] As a consequence, the share of temporary employment declined from 35.4% in 1995 to 32% in 2001.

Such smooth decline is likely to have a bearing on both earnings levels as well as earnings instability, possibly reducing earnings mobility during the period analysed. Hence, the obvious question that arises is whether there is any relationship between more secure forms of work (with higher EPL and higher firing costs) and higher or lower average earnings and volatility. The question seems especially interesting in the light of the discussion on the trade-off between income inequality and unemployment. It is commonly assumed that the US and the UK have low unemployment at the expense of high and widening income inequalities, while continental Europe has been able to maintain fair levels of income inequality, but is paying the price in terms of high unemployment levels (Bertola, Blau, Kahn, 2001).

Given the existing limited knowledge of the likely effects of the 1997 Spanish labour market reform on earnings levels and dynamics, this paper, investigates the

[1] Segura (2001) and Dolado et al. (2002) analyse the impact of these reforms in more detail.
[2] See Dolado et al. (2002), Kugler, Jimeno and Hernanz (2002), Güell-Rottlan and Petrongolo (2000).

consequences of this reform on the static and dynamic of Spanish male earnings. Since the reform applied only to certain age groups, we use a natural experiment research design to assess the impact of the 1997 reform on earnings levels.[3] Then, we provide a longitudinal perspective on changes in earnings inequality, decomposing individual earnings into its permanent and transitory components by fitting error component models to the covariance structure of individual earnings.[4] For both purposes we use the eight waves of the Spanish component of the European Community Household Panel (ECHP).

Overall our evidence suggests that the reform had rather limited impact on earnings. Actually, only young men entering employment from unemployment experience a positive effect on earnings because of the reform. We also suspect positive effects on earnings stability. The latter is the result of an increase of the permanent earnings component and a decrease of the transitory component. Our results suggest that the labour market reform, which granted more stability to temporary employment contracts and possibly fostered the subsequent decline in temporary employment, may have helped explain the observed reduction in earnings instability, which in turn explains most of the declining earnings inequality trend.

We also find that relative earnings persistence increases over the life-cycle, which implies lower mobility for older cohorts. A closer look by cohorts reveals that transitory differences account for most of the earnings dispersion only for the youngest one, which is consistent with the disproportionate incidence that temporary employment has on younger workers. As the age group that suffers temporary employment the most, the observed large fall in overall earnings dispersion —the largest of all cohorts—, due mainly to the fall in the transitory component, may perfectly be a reflection of the positive effects of the reforms.

[3] Kugler, Jimeno and Hernanz (2002) set up a natural experiment research design to assess the impact of the 1997 reform on permanent employment.

[4] In the last twenty-five years a growing body of literature has modelled the intertemporal earnings covariance structure using panel data, and has separately identified the permanent and the transitory component of individual earnings to assess the relevance of each component. Some recent contributions are Dickens (2000), Kalwij and Alessie (2003) and Ramos (2003) for Britain; Gottschalk and Moffitt (1994, 1995, 2002), Baker (1997) and Haider (2001) for the United States; Baker and Solon (2003) for Canada; Biewen (2001) for Germany and Cappellari (2004) for Italy. Prior to these studies, and with the exception of Abowd and Card (1989), the literature on the covariance structure of earnings jumps back to the late 1970s and early 1980s: Hause (1977, 1980); Lillard and Willis (1978); Lillard and Weiss (1979); MaCurdy (1982).

The rest of the paper is structured as follows. The next section describes the institutional framework and the Spanish labour market reforms. Section 3 explains the natural experiment research design used to evaluate the impact of the 1997 reform on the earnings level. This section also contains a discussion of the error components models used to decompose the covariance structure into a permanent and transitory component and to assess the impact of the reform on earnings mobility. Section 4 describes the data and our methodological decisions. Section 5 presents the main empirical results. Finally, section 6, summarises the main findings and suggests the future research agenda.

2. The Spanish Labour Market Reform

From an institutional point of view, the Spanish labour market has experienced four reforms during the last twenty years (in 1984, 1994, 1997 and 2001). Up to the early 1980s, permanent work contracts —open-ended contracts subject to mandatory severance payments— accounted for more than 90% of all contracts, with the remaining temporary contracts applying mainly to seasonal jobs, e.g. in agriculture or tourism. In 1984, with an unemployment rate of 20.1%, the Spanish government tried to implement a significant change in the Employment Protection Legislation (EPL) by liberalising temporary contracts in two main respects: first, their use was extended to all types of jobs; and second, they entailed much lower dismissal costs than regular permanent contracts. Although the reform achieved certain employment dynamism, it also generated a dual labour market (insider-outsider) and segmentation problems between unstable low-paying jobs and stable high-paying jobs. Temporary employment increased from around 10% in the mid-Eighties to more than 30% in the early Nineties. This figure doubles the European average.[5] Between 1985 and 1994, over 95% of all new hires were employed through temporary contracts and the conversion rate from temporary to permanent contracts after 1984 was only around 10%.[6]

[5] A clear sign that employers took full advantage of the newly available flexibility device is that a large fraction of temporary workers have been hired under fixed-term contracts while other types of temporary contracts (probationary, seasonal, etc.), which are more representative in other European labour markets, have remained relatively unimportant.

[6] See Güell-Rottlan and Petrongolo (2000).

Temporary employment becomes a new and increasing concern, and in the 1990s, the reforms aim at reducing the incidence of temporary employment by partly undoing the liberalisation introduced in 1984. The new regulations introduced with the 1994 reform restrict the usage of fixed-term temporary contracts to seasonal jobs[7] and try to reduce dismissal costs for permanent contracts by relaxing the conditions for 'fair' dismissals of workers under permanent contracts. In particular, the definition of fair dismissal was widened by including additional "economic reasons" for dismissals. In practice, however, not much changed: employers continued to hire workers under temporary contracts for all type of jobs —and not just for seasonal jobs—, and judges did not change their criteria or behaviour when appraising dismissals, despite the new regulations.[8]

The very limited success of the 1994 reform led to a new reform in 1997, which was eventually extended in 2001. As with the 1994 reform, the main objective of the 1997 and 2001 reforms was to reduce the use of temporary contracts. In 1997, the employers organisation (CEOE) and the two major unions (UGT and CC.OO) reached an agreement to reform the system of work contracts and the structure of collective bargaining. As shown in Table 1, the 1997 reform reduced dismissal costs for unfair dismissals by about 25% and lowered payroll taxes between 40% and 90% for newly signed permanent contracts and for conversions of temporary into permanent contracts after the second quarter of 1997 for certain groups.[9] In principle, the 1997 reform envisaged the new contract to be in effect for a period of four years. In 2001, however, when the new permanent contracts were supposed to expire, fearing that their elimination would exert a negative effect on job creation, the government allowed them to remain in effect and extended their use to hire other groups of workers. That is, the 1990s and 2001 reforms could be considered counter-reforms as they purposed to reduce the temporality in the labour market generated by the 1984 reform.

We analyse the income effects of the 1997 reform for two reasons. First, the design of the reform invites to set up a natural experiment research design to identify

[7] In the case of workers over 45 years of age, temporary contracts could be continued to be used for all types of jobs and not only for seasonal jobs until 1995. After 1995, however, the use of temporary contracts for the over 45 age group, as for the rest of the workers, was limited to seasonal jobs.

[8] In particular, dismissals under "economic reasons" continued to be granted mainly when there was agreement between employers and workers and labour courts continued to rule most dismissals as unfair.

[9] These groups are: unemployed workers under 30 years of age, over 45 years of age, workers over 45 years holding a temporary contract, the long-term unemployed, women under-represented in their occupations, and disabled workers.

the effects of the reform. More precisely, the new regulations affected dismissal costs and payroll taxes differently for given population groups: younger and older workers, the long-term unemployed, women under-represented in their occupations and disabled workers. Our estimation strategy follows Kugler et al. (2002), and exploits the temporal and cross-section variation to evaluate the impact of the reduction in payroll taxes and dismissal costs on earnings levels and dynamics.

3. Measuring the consequences of the 1997 Reform on earnings

This section presents the methodology we use to measure the impact of the 1997 labour market reform on the level of earnings (section 3.1) and on the stability of earnings (section 3.2).

3.1 Effects on earnings level: Identification strategy

In contrast with the majority of Continental reforms, Spain's 1997 Reform marks a sharp change for some groups (i.e., young workers, older workers, the long-term unemployed, women under-represented in their occupations, and disabled workers), while leaving other groups unaffected. Following Kugler, Jimeno and Hernanz (2002), we exploit this fact to set up a natural experiment research design and assess the impact of the 1997 reform on earnings levels. That is, we compare treated groups (workers under 30 and over 45 years of age) with the control group (middle-aged workers) before and after the 1997 reform.

As shown in Table 1, we concentrate on two different contrasts by age group. First, we asses the impact of reducing dismissal costs and payroll tax for the young (less than 30 years) and the older (over 45) unemployed —here the control group is the middle-aged unemployed. Second, we analyse the earnings effect of the larger reduction in payroll tax for the older workers holding a temporary contract —thus the control group is the younger workers also holding a temporary contract. Hence, the latter can be thought of a reform 'at the margin', while the former is definitely a substantial change in provisions.

Note that we concentrate on contrasts by age group since other treated groups – the long-term unemployed and women under-represented in certain occupations- may be self-selected.

The following regression is used to implement the estimation strategy:

(1) $Y_{it} = \alpha_0 + \alpha_1 post_{it} + \alpha_2^{'} group_i + \alpha_{31} t + \alpha_{32}^{'} group_i * t + \beta^{'} group_i * post_{it} + X^{'}\gamma + \theta_i + \varepsilon_{it}$

where Y_{it} represents the earnings of individual *i* at time *t*; $post_{it}$ is a dummy variable that is equal to 1 if individual *i* is observed in 1998 and/or afterwards and is equal to 0 otherwise. The variable $group_i$ is a vector of dummies for treated groups. The variable *t* is a time-trend, so α_{31} captures the evolution of earnings over time, the impact of macro shocks affecting earnings in both treated and control groups, while α_{32} allows for different age-group specific slopes. The most important coefficients in this regression are the β's, which represent the treatment effects; that is, capture the effects on earnings of the reform in the years after the reform. Finally, the covariates affecting individual *i* at time *t* are represented by *X* and include variables like occupation, education, marital status, experience.[10]

Table 1. Principal Changes in Dismissal Costs and Payroll Tax due to the Labour Market Reform of 1997 which permit identification.

		Dismissal cost under existing permanent contracts (pre-reform)	Dismissal cost under new permanent contracts (post-reform)	Payroll tax reductions for newly hired workers under permanent contracts after 1997
Unemployed Workers				
Treated groups	Young (< 30 years)	45 days' wages per year of seniority with a maximum of 42 months' wages	33 days' wages per year of seniority with a maximum of 24 months' wages	40% of employer contribution for 24 months
	Older (> 45 years)	45 days' wages per year of seniority with a maximum of 42 months' wages	33 days' wages per year of seniority with a maximum of 24 months' wages	60% of employer contribution for 24 months, 50% thereafter
Control group	Middle-aged (30-45 years)	45 days' wages per year of seniority with a maximum of 42 months' wages	45 days' wages per year of seniority with a maximum of 42 months' wages	None
Workers under Temporary contract				
Treated group	Older (> 45 years)	45 days' wages per year of seniority with a maximum of 42 months' wages	33 days' wages per year of seniority with a maximum of 24 months' wages	60% of employer contribution for 24 months, 50% thereafter
Control group	Young and Middle-aged (≤45 years)	45 days' wages per year of seniority with a maximum of 42 months' wages	33 days' wages per year of seniority with a maximum of 24 months' wages	50% of employer contribution for 24 months

[10] Estimated coefficients of interest are robust to several specifications, i.e. we estimate regressions for the two treated groups separately and jointly using OLS (assuming that $\theta_i = 0$) and fixed effects.

3.2 Effects on earnings mobility

The purpose of this section is to present some parsimonious error component models that will characterize the dynamic structure of individual earnings and let us assess the impact of the reform on earnings stability.

Let us begin with the simplest model of all, which, despite its simplicity, provides a very intuitive insight into the matter of concern. However, since this first model overlooks several important features of the earnings dynamics, then we will discuss a more general model.

Let Y_{ict} denote the log earnings in year *t* of the *i*th sample member born in cohort *c*. Then we can express Y_{ict} as an earnings function:

(1) $Y_{ict} = X_{ict}\beta + y_{ict}$

Thus y_{ict} is the residual from this earnings regression, and X represents a set of human capital and job-related covariates.[11] The most rudimentary error component model is the canonical permanent-transitory model with a white-noise transitory component.

(2) $y_{ict} = \alpha_{ic} + v_{ict}$

In this case, y_{ict} is expressed as the sum of a time-invariant earnings component α_{ic} with population variance σ_α^2, and a time-varying transitory component v_{ict} with variance σ_v^2. The transitory component is assumed to be serially uncorrelated, and α_{ic} and v_{ict} are orthogonal to each other. The covariance of earnings is determined by:

(3) $Cov(y_{it}, y_{is}) = \begin{cases} \sigma_\alpha^2 + \sigma_v^2 & t = s \\ \sigma_\alpha^2 & t \neq s \end{cases}$

The variance in current relative earnings y_{ict} is $\sigma_\alpha^2 + \sigma_v^2$ which exceeds σ_α^2, the variance in the permanent component of earnings, by σ_v^2, the variance of transitory earnings. The variance of the permanent component, σ_α^2, (which fully determines the covariance) represents the persistent dispersion of earnings, and the individual component α_{ic} is seen as representing the effects of (unmeasured) characteristics such as ability and work-related tastes which are assumed to persist throughout the sample period.

[11] The set could include: race, education, labour force experience, job histories, geographical data, local labour market conditions, union membership, and interactions of certain variables with time, etc.

However, this rudimentary model possesses several weaknesses that renders it inappropriate for our purposes. First, several empirical studies have found evidence of persistent heterogeneity across individuals, not only in their levels of earnings, but in their growth rates.[12] Second, some earnings shocks have permanent effects, and some of the more recent literature on earnings dynamics has modelled such earnings variation with a random-walk component.[13] Third, most studies have found that the transitory component is serially correlated.[14]

The following specification extends the simple model in (2) and encompasses all the relevant aspects of earnings dynamics considered above:

(4) $y_{ict} = p_t g_c \left[\alpha_{ic} + \eta_i a_{ict} + u_{ict}\right] + \lambda_t s_c v_{ict}$ where:

(5) $u_{ict} = u_{i(c-1)(t-1)} + r_{ict} \qquad r_{ict} \sim (\bar{r}_i, \sigma_r^2)\ , \quad E(u_{i(c-1)(t-1)}, r_{ict}) = 0$

(6) $\sum_{j=0}^{p} \rho_j v_{ict-j} = \sum_{j=0}^{q} \theta_j \varepsilon_{ict-j} \qquad \varepsilon_{ict} \sim (0, \sigma_\varepsilon^2)$

The variance of individual earnings could change with age or labour market experience. Therefore, apart from allowing for permanent individual differences in the level of (log) earnings, one may also allow for different growth rates in earnings across individuals. In equation (4), a_{ict} is the age of individual i at time t and η_i is the random growth term with mean 0 and variance σ_η^2. The intercept α_i represents earnings capacity at the beginning of the working life, determined by schooling or other time-invariant ability shifters. The growth parameter, η_i, captures idiosyncratic earnings capacity related to age. For example, in a human capital framework it may result from differential learning ability on-the-job.[15] A negative covariance between α_i and η_i implies that the two sources of heterogeneity offset each other, as could be the case in the presence of investments in (generic) on-the-job training (see Hause

[12] See Hause (1980), Baker (1997), Dickens (2000), Moffitt and Gottschalk (2002), Ramos (2003), Baker and Solon (2003), Kalwij and Alessie (2003), Cappellari (2004).
[13] See Dickens (2000), Moffitt and Gottschalk (1995, 2002), Ramos (2003), Baker and Solon (2003), Kalwij and Alessie (2003), Cappellari (2004).
[14] In particular, Dickens (2000) models the transitory component as an ARMA(1,1) and he also proves an ARMA(1,2), Moffitt and Gottschalk (1995, 2002) use an ARMA(1,1) transitory error component, Baker and Solon (2003) incorporate serial correlation of the transitory component via a first-order autoregressive process (AR(1)), Ramos (2003) also allows the transitory component to follow a first-order autoregressive process (AR(1)), Cappellari (2004) adopts an AR(1) specification, and Biewen (2001) analysing this kind of models for income uses an ARMA(1,1) specification.
[15] Other theoretical frameworks, such as signalling, matching or contract theory also predict earnings heterogeneity at the start of the life cycle and during the career.

1980). Alternatively, a positive $\sigma_{\alpha\eta}$ implies rising permanent inequality over the life-cycle. Such a case is consistent with schooling-matching models, where more educated workers have higher initial earnings and where in addition these grow faster as the quality of the match is revealed to employers.

The returns to human capital may have changed over time as a result of permanent shocks. A simple way to incorporate such non-stationary pattern of earnings is with p_t and λ_t. Where p_t and λ_t are the respective year-specific factor loadings on the permanent and transitory components of relative earnings.[16] An increase in p_t causes a wider spread of the earnings distribution but does not affect the ranking of individuals. Without any change in the variance of the transitory component, an increase in p_t decreases wage mobility.

Since earnings shocks could have permanent effects, equation (5) specifies a random-walk component in earnings growth where r_{ict} is a "white noise" innovation with variance σ_r^2. The random-walk innovation r_{ict}, unlike the transitory innovation ε_{ict} in equation (6), accommodates any permanent reordering of workers in the earnings distribution.

Cohort shifters g_c and s_c allow for earnings and its components to vary according to the different life-cycle stage in which they are observed and differentiate life cycle dynamics from secular changes in earnings inequality.

Finally, equation (6) incorporates serial correlation of the transitory component, v_{ict} is assumed to follow an ARMA (p,q) process and ε_{ict} is assumed to be white noise, i.e. serially independently distributed error term with mean 0 and variance σ_ε^2. The autoregressive parameters are denoted by ρ_j with $\rho_0 = 1$ and the moving average parameters are denoted by θ_j with $\theta_0 = 1$. The parameter ρ_j captures the smooth decline of covariances as the lag length increases. [17]

[16] The transitory weight λ_t has been also applied only to the white noise of the transitory component.

[17] As Lillard and Willis (1978) express, this serial correlation term may be interpreted in a couple of ways. First, it reflects the effect of random shocks which persist longer than one year but which deteriorate in effect over time. Second, it reflects the operation of individual, unobservable variables which are serially correlated over time.

4. Data and methodological decisions

In this study we employ the eight waves of the Spanish component of the ECHP, covering the period 1993-2000.[18]

As most previous studies, we analyse only males. This allows mitigating issues of endogenous female labour market participation, which may be exacerbated when analyzing earnings dynamics. In particular, the sample is restricted to full-time male employees who reported positive earnings in at least one of the eight waves. Therefore, individuals are allowed to enter the panel at any wave and to re-enter the panel if they do exit. Such a sample selection produces an unbalanced panel since not all persons are present for all eight waves. Movements into and out of the earnings sample may be due to unemployment, retirement, mobility to or from self-employment and attrition.[19] However, the use of the unbalanced panel helps to mitigate the potential overestimation of earnings persistence that would arise from balanced samples in which only individuals with positive earnings in each wave contribute to estimation.

To separate life-cycle from time effects, we partition the sample into three age cohorts. The youngest cohort contains males born after 1968. That is, aged less than 30 in 1997, the year of the reform. The middle cohort contains those born between 1953 and 1967. The oldest cohort comprises those individuals born before 1952, so aged 45 years or more in 1997 when the reform takes place.

Furthermore, we select male workers aged between 21 and 60, so the chosen age range selects out the extremes of the earnings life cycle, where volatility arising just after labour market entry or before retirement may be confounded with volatility due to structural labour market changes. The final sample consists of 5,268 individuals and a total of 20,605 individual-year observations.

[18] The ECHP is a specially conducted survey and belongs to the ever more complete set of harmonised statistical operations for European Union (EU) countries. ECHP uses fixed panel techniques for 8 annual cycles. The population scope is the private households who live in main family dwellings and the set of people who are members of the household. In the case of Spain, the geographic scope is national with the exception of Ceuta and Melilla. The sample size is 70.000 household in the whole EU and some 8000 in Spain. The collection method is personal and phone interviews. Although the ECHP questionnaires cover the period 1994-2001, our sample period is 1993-2000 because the earnings questions refer to the year prior to the interview.

[19] A specific problem with panel data is attrition; members of the original sample are lost at successive interviews, causing the panel to decline in size and, quite possibly, to became unrepresentative. The incompleteness of the empirical panel data may be caused by a variety of reasons. For example, after few waves, people may refuse cooperation; households may not be located again or have split up.

The earnings measure is the log of the gross annual earnings or salary, deflated by the consumer price index. Our strategy is to work with log-earnings residuals from equation (1).

Table 2. Descriptive Statistics by Age Group, Pre- and Post-Reform

Variable	Age <30		Age 30-45		Age >45	
	Pre	Post	Pre	Post	Pre	Post
Log earnings	9.129	9.232	9.687	9.675	9.816	9.86
Age	25.64	25.51	36.78	36.42	51.27	51.17
% Married	30.00	25.00	80.09	76.14	91.53	88.79
% No Education	2.18	0.89	2.58	1.72	12.07	8.75
% Primary Education	14.63	8.00	22.17	13.24	41.97	37.02
% Secondary and Technical Education	75.28	77.06	55.92	66.00	27.86	34.75
% University Education	7.92	14.06	19.32	19.03	18.10	19.48
% with Permanent Contract	41.89	51.28	73.54	74.69	81.93	83.81
% with Transitory Contract	58.11	48.67	26.46	25.28	18.07	16.19
% with Temporary to Permanent Transition	6.19	10.33	3.38	4.59	1.69	4.74
N	3070	1800	6153	3315	4027	2069

5. Estimated Effects of the 1997 Reform

5.1 Effects on earnings levels

Table 3 reports fixed effects estimates of the earnings effect of the reform on men who have been unemployed at least once. The results in column (1) show a large and statistically significant increase in average earnings for young relative to middle-aged unemployed workers after the 1997 reform, but insignificant effects for older unemployed men.[20] More precisely, young unemployed workers experienced an 8% earnings increase during the reform period relative to their middle-aged counterpart. Thus, our first important finding is that the reform had an overall positive effect on average earnings for the young unemployed but not for the older ones.

The estimates in column (2) suggest that such positive effect on young unemployed may be due to the impact the reform had on men who signed new (post-

[20] Reported standard errors are Huber-White.

reform) permanent contracts (at *t*) transiting from unemployment (at *t*-1). Notice that such effect is absent for the older group. As expected, it is also nil for those transiting from unemployment to temporary employment, as the reform did not target such transitions. Such differential incidence on the age groups parallels the employment effects (increase in the transition probabilities from unemployment to permanent employment) found by Kugler, Jimeno and Hernanz (2002) and Mendez (2005).[21]

As pointed out above, the main goal of the reform was to lower the incidence of temporary employment. Thus, the reform promoted temporary to permanent employment transitions for all age groups by lowering dismissal costs and reducing payroll taxes. The somewhat larger reduction in payroll taxes for men aged over 45 years permits identification. How did the earnings of this group change as a consequence of the reform, relative to men under temporary contracts and younger than 46 years? The statistically insignificant estimates of the interaction term in Table 4 suggest that the reform appears to have no effect on older workers under temporary contracts, i.e. the larger payroll tax reductions did not bear any effect on the earnings of our treated group. So, not only the reform did not induce transitions into permanent employment from temporary contracts, as Mendez (2005) finds out, but our results suggest that it also had no effect on the earnings level of those making such transitions.

Table 3. Effects of the Reform on Earnings Levels for Unemployed

	Ever Unemployed	Unemployed to Permanent	Unemployed Temporary
	(1)	(2)	(3)
Age < 30	-0.251**	-0.222**	-0.244**

[21] Arguably our estimates subsume composition and price effects. That is, our estimated effect may be due to mere employment effects— for instance, if the reform succeeds in the promotion of permanent employment amongst the treated groups with no impact on the returns to that employment—, or to wage changes in one of the employment states for the treated group, with no change in employment composition.

Age > 45	0.008	0.055	0.104
(Age < 30)*Reform	0.088**	0.117*	-0.001
(Age > 45)*Reform	-0.051	0.028	0.056
N	14050	4523	5546

* denotes statistically significant at 10%; and ** at 5%. Coefficients from fixed effect panel regressions. Control group is unemployed aged 30-45 years.

Table 4. Effects of the Reform on Earnings Levels for Temporary Workers

	Ever Temporary (1)	Temporary to Permanent (2)	Temporary to Temporary (3)
Age > 45	-0.078	-0.299**	-0.059
(Age > 45)*Reform	-0.052	0.009	-0.040
N	9085	5032	5349

* denotes statistically significant at 10%; and ** at 5%. Coefficients from fixed effect panel regressions. Control group is temporary workers aged less than 46 years.

So far we have assessed the effects of the reform by means of comparison between treated and untreated groups. Comparisons between individuals of the same age group but on different employment transitions provide valuable complementary information on the effects of the reform. Table 5 shows that unemployed men who manage to get a permanent contract during the reform years do not see any earnings increase relative to those from the same age group but making different transitions, unless they are aged over 45 years. This result is especially relevant because unemployment to permanent transitions for this age group do not yield on average any earnings premium over the entire sample period. However, for the young and middle-aged groups our estimates suggest the opposite. As expected, unemployment to permanent transitions yield on average and over the sample period a (noticeable 10%) earnings increase, but such increase does not differ in the pre- and the post-reform years.

The last column in Table 6 provides information on the differential earnings effects of the reform on older workers switching from temporary to permanent contracts as compared to equally older workers under a temporary contract at *t*-1 but not on such transition. As the estimated coefficient of the interaction between the reform and the temporary to permanent transition dummy shows, conditional on

holding a temporary contract at *t*-1, those who jump to a permanent contract during the reform years obtain a substantial 16% earnings increase, relative to those not transiting to permanent employment. The first column shows that workers younger than 46 years transiting from temporary to permanent contracts after the reform experience no earnings increase, despite the 19% increase observed on average for men transiting from temporary to permanent employment within this age group.

Table 5. Effects of the Reform on Earnings Levels for Unemployed Workers Within Age Groups

	Age < 30	30<=Age<=45	Age > 45
Unemployment to Permanent Transition	0.105**	0.092**	0.002
Unemployment to Permanent Transition*Reform	0.027	-0.017	0.150**
N	4365	6170	3515

* denotes statistically significant at 5%

Table 6. Effects of the Reform on Earnings Levels for Workers under Transitory Contract at *t*-1 and Selected Within Age Groups

	Age <= 45	Age > 45
Temporary to Permanent Transition	0.190**	0.147**
Temporary to Permanent Transition*Reform	0.018	0.160**
N	7702	1383

* denotes statistically significant at 5%

5.2 Effects on earnings dynamics

This subsection presents the results of fitting the general error component models outlined in section 3.2 to the elements of the covariance matrix for all three cohorts pooled together (i.e. the 108 auto-covariances) and analyses the changes in the permanent and transitory components over the sample period.

The parameters of the error component models are estimated using minimum distance techniques. The parameters chosen are those that minimize the (weighted) sum of the squared distance between the covariance structure implied by the error

component model and the actual covariances.[22] Goodness of fit is assessed, and nested models are tested using the sum of squared residuals (henceforth SSR) weighted by the inverse of an estimate of the variance of residuals. Under the null of correct specification, the SSR statistic is distributed as a chi square with $(\Sigma_c(t(t+1)/2)-p)$ degrees of freedom, where Σ_c is the number of cohorts (in our case 3), t is the number of waves and p is the number of parameters.

We have followed a general to specific modelling strategy where, in the case of nested models, the restrictions imposed by more parsimonious models are tested. Here we only present the model which shows a better fit. Table 7 presents parameter estimates of one of our preferred models:

(7) $y_{ict} = p_t g_c \left[\alpha_{ic} + \eta_i a_{ict}\right] + s_c v_{ict}$ where $(\alpha_i, \eta_i) \sim \left[(0,0);\left(\sigma_\alpha^2, \alpha_\eta^2, \sigma_{\alpha\eta}\right)\right]$

(8) $v_{ict} = \rho_1 v_{ict-1} + \lambda_t \varepsilon_{ict}$ $\varepsilon_{ict} \sim (0, \sigma_\varepsilon^2)$ $v_{ic0} \sim (0, \sigma_0^2)$

The model is similar to the model represented by equations (4), (5) and (6) in Section 3.2, without a random walk in the permanent component and with the time shifter of the transitory component applying only to the white noise error term. The permanent component is specified as a random growth in age and the transitory component follows an AR(1) process with cohort-based heteroscedastic initial variances, and time- and cohort- specific loading factors on both components.

The estimated coefficients for the long-term earnings component indicate that both time-invariant and age-related heterogeneity matter for the formation of long-term earnings differentials. The estimates of σ_α^2 and σ_η^2 in the first two rows of the left panel in Table 7, capture the individual heterogeneity in the intercept and slope of the age-earnings profile. Our estimate of σ_η^2 implies that a worker with an earnings growth rate one standard deviation above the mean accumulates a 23,8% earnings advantage in ten years.[23]

The negative estimate of $\sigma_{\mu\eta}$ indicates a trade-off between initial earnings and subsequent earnings growth; that is, consistent with the on-the-job-training hypothesis, individual age-earnings profiles seem to cross at relatively early stages of the working

[22] For a detailed description of the statistical methodology employed to estimate the models see Abowd and Card (1989), Dickens (2000), Cappellari (2004). Following Altonji and Segal (1996), we use the identity matrix as a weighting matrix.

[23] The estimate of σ_η^2 is 0,0005 so, $\sqrt{0,0005} = 0,02155 \rightarrow 1,02155^{10} = 23,76\%$.

career. This is also the evidence found in several previous studies.[24] In contrast to our results, Cappellari (2004) finds a positive covariance, which is consistent with more educated workers also having higher propensity to acquiring skills on the job, with a resulting divergence of earnings profile over the life cycle.

The estimates of the time-specific loading factors on the permanent component, p_t, are typically close to 1. First, time shifters, decrease with respect to 1993, then increase until 1997, decrease in 1998 and then recover up to the end of the period.[25]

The estimated cohort-specific loading factors, $g_{cohort...}$, indicate that the persistent component increases over the life-cycle, especially for the middle age cohort and then decrease for the oldest cohort.

The right panel in Table 7 reports the estimated parameters for the transitory component.

The estimated serial correlation parameter $(\rho = 0,74)$ implies that the effect of random shocks dies out in the mid-term, becoming negligible after ten years: only 4,8 percent of a shock to the transitory component is still present after ten years.[26] Not surprisingly, the time-specific loading factors on the transitory innovation display a much higher variation than the corresponding loading factors for the persistent component. However, they decrease monotonically as from 1996. Thus, these parameters help accommodate the movements observed in actual variances.

[24] Lillard and Wiess (1979), Hause (1980), Baker (1997) and Ramos (2003).

[25] For identification, p_t for 1993 (wave 1), λ_t for 1993 and g_{cohort} and s_{cohort} for the youngest cohorts are all set to 1.

[26] $0,7374^{10} = 0,0475$

Table 7: Estimates of earnings dynamic models (RG + AR(1))
(log-earnings residuals from eq. (1))

Permanent component			Transitory component		
	Coefficient	t-ratio		Coefficient	t-ratio
σ_{α}^{2}	0,6535	3,92	σ_{ε}^{2}	0,1012	4,14
σ_{η}^{2}	0,0005	3,54	σ_{0}^{2}	0,5083	4,91
$\sigma_{\alpha\eta}$	-0,0171	-3,68	ρ	0,7374	4,36
p_{94}	0,8808	11,24			
p_{95}	0,9441	14,94	λ_{95}	0,7257	6,98
p_{96}	0,9461	12,64	λ_{96}	0,9066	7,13
p_{97}	0,9779	18,26	λ_{97}	0,7708	7,55
p_{98}	0,8523	15,09	λ_{98}	0,7161	7,58
p_{99}	0,8770	15,35	λ_{99}	0,6328	7,44
p_{00}	1,0047	14,22	λ_{00}	0,5868	7,80
$g_{(53-67)}$	2,2482	5,59	$s_{(53-67)}$	0,5732	17,10
$g_{(<1952)}$	1,0858	6,51	$s_{(<1952)}$	0,5028	16,33
SSR~ χ_{2} (d.f.)					

Finally, the estimated cohort-specific loading factors on the transitory component, $s_{cohort...}$, are smaller than 1 and they decrease very rapidly as older cohorts are considered, indicating that earnings volatility tends to be larger for younger cohorts.

The parameter estimates can be used to predict the permanent and transitory components, thereby providing insights into the extent to which changes in the distribution of life-time earnings and transitory fluctuations contribute to the evolution of cross-sectional differentials. Figure 2 presents the actual and predicted variances of log-earnings by cohort. Permanent and transitory components are predicted setting transitory and permanent weights, respectively, to their 1993 values. It is worth noting that this model is able to reproduce very closely the evolution of the observed variance for each cohort over the sample period.

Earnings inequality —as measured by the actual variance— declines over the sample period for the younger cohort and has a u-shaped form for the middle and older cohort. This trend is mostly accounted for by the evolution of the transitory component. Such reduction in earnings instability is likely to be related to the countervailing labour

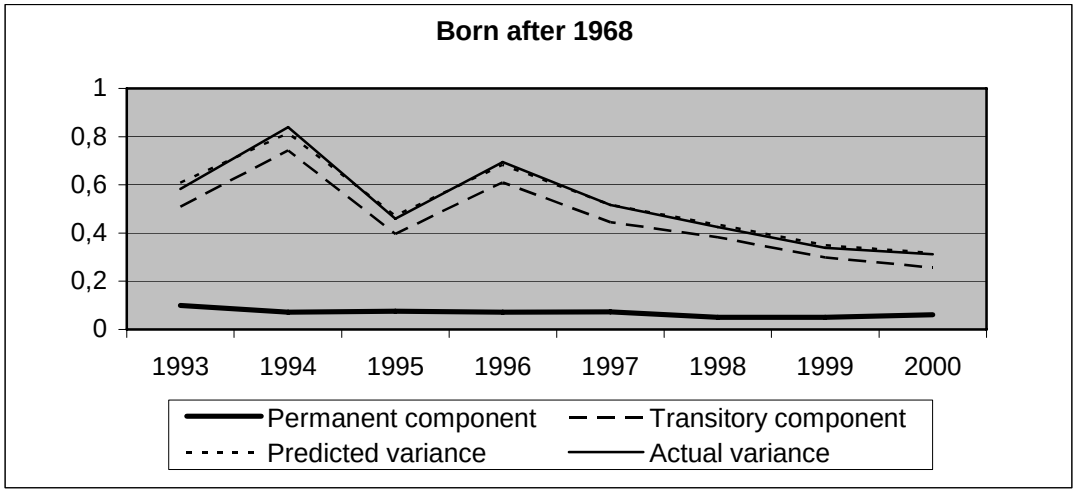
market reforms of 1994 and 1997, which granted more stability to temporary employment contracts, and to the subsequent decline in temporary employment.

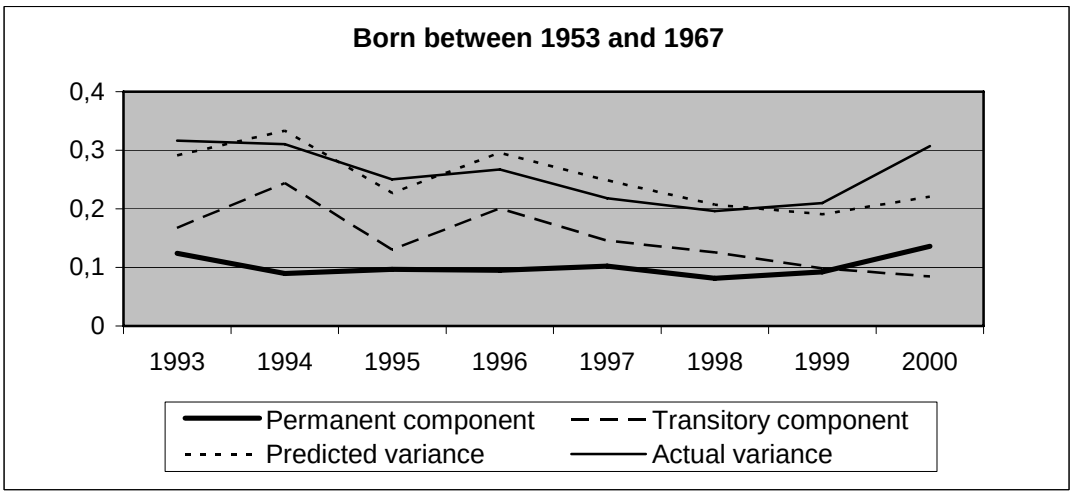
A closer look by cohorts reveals that transitory differences account for most of the earnings dispersion only for the youngest one, which is consistent with the disproportionate incidence that temporary employment has on younger workers. As the age group that suffers temporary employment the most, the observed large fall in overall earnings dispersion —the largest of all cohorts—, due mainly to the fall in the transitory component, may perfectly be a reflection of the positive effects of the reforms.

Long-term inequality appears to be at higher levels for older cohorts relative to younger ones, which is consistent with the evidence of life cycle earnings divergence provided earlier. In addition, the incidence of long-term variance on overall inequality tends to be larger the older the cohort considered, reflecting lower volatility.

Our results are similar to those in Baker and Solon (2003), who exploring the case of Canada, find that the persistent component has played at least a somewhat larger role in this country. For Italy, Cappellari (2004) finds that inequality trends have been driven by the long-term earnings component. The reported Spanish earnings mobility patterns across cohorts are also in line with previous studies, where transitory differences appear to fall over the life cycle, being especially high for younger age groups. Finally, the reported middle degree of persistence of the transitory shocks is not at odds with previous estimates.

Figure 2: Actual and predicted variances with permanent and transitory predicted components, by cohort. (RG + AR(1))


Born after 1968
1
0,8
0,6
0,4
0,2
0
1993
1994
1995
1996
1997
1998
1999
2000
Permanent component
Transitory component
Predicted variance
Actual variance


Born between 1953 and 1967
0,4
0,3
0,2
0,1
0
1993
1994
1995
1996
1997
1998
1999
2000
Permanent component
Transitory component
Predicted variance
Actual variance

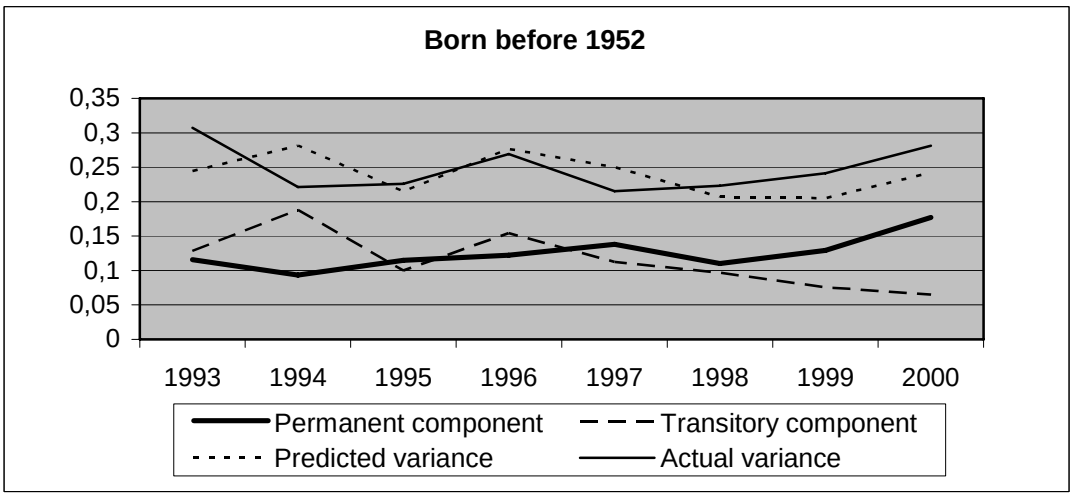
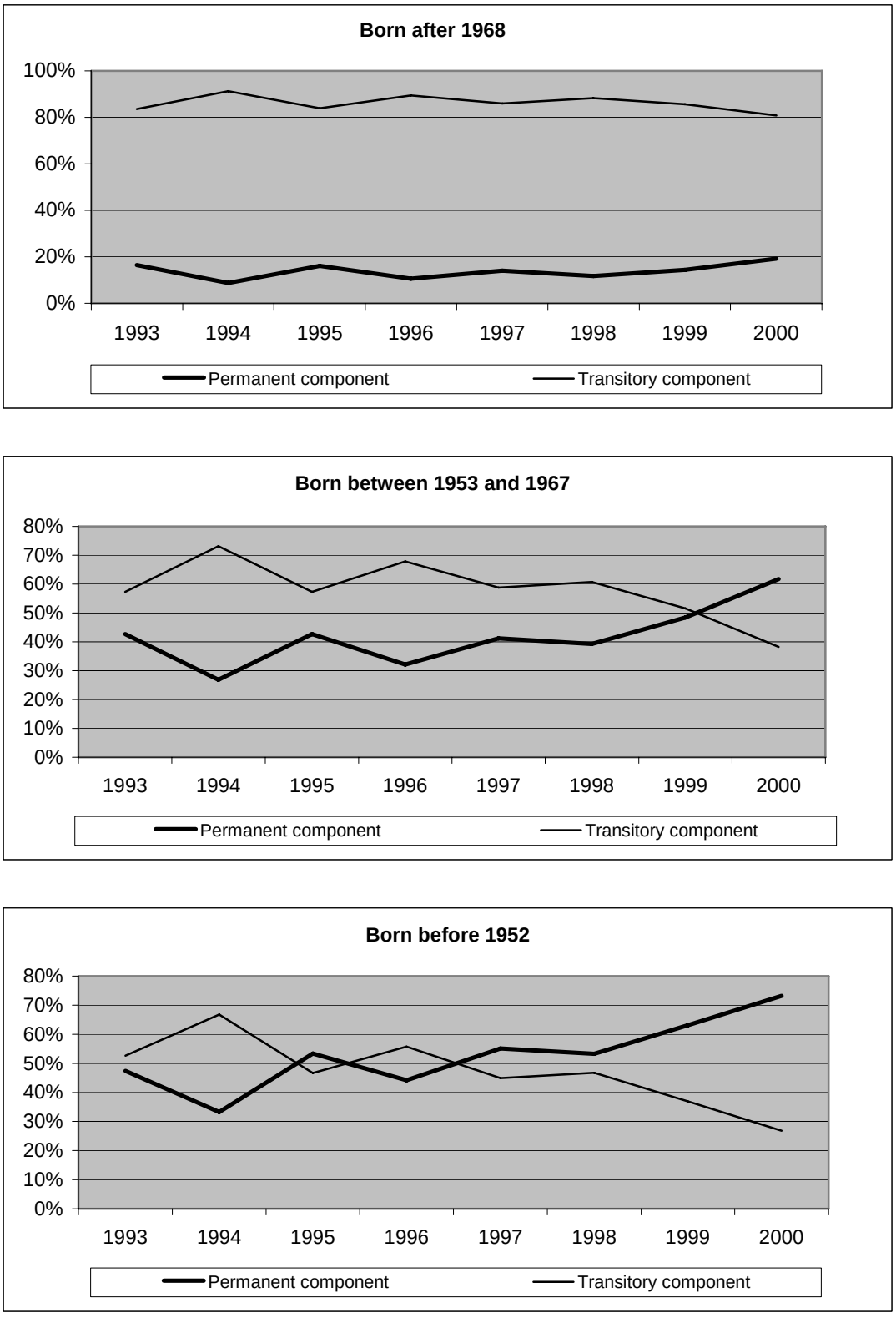

Born before 1952
0,35
0,3
0,25
0,2
0,15
0,1
0,05
0
1993
1994
1995
1996
1997
1998
1999
2000
Permanent component
Transitory component
Predicted variance
Actual variance

Figure 3: Predicted permanent and transitory components by cohort as % of predicted overall variance. (RG + AR(1))



6. Final remarks

In this study we have analysed the consequences of the 1997 labour market reform on the static and dynamic of Spanish male earnings. Since the reform applied only to certain age groups, we use a natural experiment research design to assess the impact of the 1997 reform on earnings levels. We also provide a longitudinal perspective on changes in earnings inequality, decomposing individual earnings into its permanent and transitory components by fitting error component models to the covariance structure of individual earnings.

We find rather limited effects of the reform on earnings levels —affecting only the earnings of young workers who enter employment from unemployment— and also suspect them positive on earnings stability. The latter is the result of an increase of the permanent earnings component and a decrease of the transitory component. Our results suggest that the labour market reform, which granted more stability to temporary employment contracts and possibly fostered the subsequent decline in temporary employment, may have helped explain the observed reduction in earnings instability, which in turn explains most of the declining earnings inequality trend.

The serial correlation parameter estimate ($\rho = 0,74$) implies that the effect of random shocks dies out in a middle term, becoming negligible after ten years: only 4,8 percent of a shock to the transitory component is still present after ten years. Hence, the increase in transitory wage inequality has some persistent inequality consequences from an individual's lifecycle perspective.

Relative earnings persistence increases over the life-cycle, which implies lower mobility for the older cohorts. That is, the degree of mobility appears to fall over the life cycle, being especially high for younger age groups. This evidence is also found in the previous literature on earnings dynamics.

A closer look by cohorts reveals that transitory differences account for most of the earnings dispersion only for the youngest one, which is consistent with the disproportionate incidence that temporary employment has on younger workers. As the age group that suffers temporary employment the most, the observed large fall in overall earnings dispersion —the largest of all cohorts—, due mainly to the fall in the transitory component, may perfectly be a reflection of the positive effects of the reforms.

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