

**Shaping earnings instability:
labour market policy and
institutional factors**

Denisa Maria SOLOGON^{1, 2, 3}

Cathal O'DONOGHUE^{2, 4, 5}

CEPS/INSTEAD, Luxembourg¹

IZA, Germany²,

Maastricht University, The Netherlands³

Teagasc Rural Economy Research Centre, Ireland⁴

ULB, Belgium⁵

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Shaping earnings instability: labour market policy and institutional factors*

Denisa Maria Sologon

CEPS/INSTEAD, Luxembourg;

IZA, Germany;

Maastricht University, The Netherlands

denisa.sologon@ceps.lu

Cathal O'Donoghue

TEAGASC, Ireland;

IZA, ULB

cathal.odonoghue@teagasc.ie

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Abstract

The concerns regarding the economic insecurity stemming from earnings instability and volatility have been gaining momentum in the contemporary political discourse. If earnings instability/volatility is a proxy for risk, for risk-averse individuals, increasing earnings instability/volatility bears substantial welfare costs. Using the European Community Household Panel and the OECD labour market indicators, we explore the cross-national differences in earnings instability and earnings volatility across 14 European countries in the 1990s and the relationship between earnings instability/volatility, labour market institutions and macroeconomic shocks by means of non-linear least squares. Earnings instability is measured by the variance of transitory earnings, and earnings volatility by the standard deviation of the two-year changes in log earnings. Evaluated for the average country, we find that the employment protection legislation, the degree of corporatism and the deregulation in the product market are associated with a lower earnings instability and a lower earnings volatility. The institutions are found to shape the distributional effects of macroeconomic shocks on earnings instability and earnings volatility. The institutions which counteract the adverse effects of macroeconomic shocks on both earnings instability and earnings volatility, are a high corporatism, deregulated product markets and generous unemployment benefits. The institutions which counteract the adverse effects of macroeconomic shocks only on earnings volatility are the employment protection legislation and low tax-wedges on labour.

Keywords: economic insecurity, earnings instability, labour market institutions; labour market policies and institutions

JEL classification codes: C23, D31, J31, J60, J50, J08

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1 Introduction

The concept of economic insecurity has been gaining an increasing attention over the past decades both in a national and a cross-national context, fueled by the raising concerns regarding the impact of globalization on the security of well-paid jobs and of welfare safety nets in the world's advanced economies (Hacker, 2006, Mughan, 2007, Milberg and Winkler, 2009). According to the International Labour Organisation (ILO), economic security represents "basic social security, defined by access to basic needs infrastructure pertaining to health, education, dwelling, information, and social protection, as well as *work-related security*"¹. Central to the "work-related security" is "income security" which "denotes adequate actual, perceived and expected income, either earned or in the form of social security and other benefits"². Income security is a main determinant of household welfare and there are a number of factors that influence it: policy changes, employment shocks, capital market shocks, changes in the structure of labour market earnings. Since labour market earnings are the main source of household income, a large part of economic/income (in)security is determined by labour market earnings (in)security. The focus of this paper is on this driver of economic/income (in)security, namely on labour market earnings (in)security and its complex relationship with labour market policies and institutions. It is not about one-off shocks, but about systematic changes in the earnings structure in terms of increased earnings instability and year-to-year fluctuations and risk, and how these relate to labour market institutions. We explore this question using data for 14 European countries between 1994 and 2001.

The welfare implications of increasing earnings instability are not straightforward. Since existing evidence shows that consumption is well insulated from transitory shocks (Attanasio and Davis, 1996), increasing earnings instability is unlikely to reduce welfare through consumption. If we consider earnings instability as a proxy for risk and that individuals are averse to earnings variability and future income risk, then increasing earnings instability may carry substantial welfare costs (Blundell and Preston, 1998, Creedy and Wilhelm, 2002, Gottschalk and Spolaore, 2002). These findings have fuelled the increasing concerns about the economic security of American families in the contemporary political discourse (Nichols and Zimmerman, 2008).

Two measures of earnings instability are explored in this study, estimated using the European Community Household Panel. The first measure is derived from the transitory component of earnings which captures the volatility in the labour market, random events influencing earnings

¹ILO (n.d.)

²ILO (n.d.)

in a particular period, expected to average out over time, unlike the permanent component which reflects persistent individual characteristics such as ability, education, training (Friedman and Kuznets, 1954). Under the independence assumption, overall inequality at any point in time is composed of permanent inequality and transitory inequality. A growing persistent inequality indicates a growing inequality in lifetime or long-term resources. A growing transitory inequality indicates that individuals are facing an increase in the year-to-year earning fluctuations (instability) (Baker and Solon, 2003). Our first measure of earnings instability is the variance in the transitory component of earnings or transitory earnings inequality. One must differentiate between the concept of earnings instability and earnings mobility, which is defined as the degree to which individual's rank changes within the wage distribution and which is determined by the ratio between the two components of inequality (Kalwij and Alessie, 2003): a large contribution of permanent inequality indicates that individual earnings are highly correlated over time and individuals experience low rates of earnings mobility.

The number of studies interested in exploring the trends in the two components of earnings inequality have been growing over the past decades: MaCurdy (1982), Abowd and Card (1989), Moffitt and Gottschalk (1995, 1998, 2002, 2008), Baker (1997), and Baker and Solon (2003) in the US and Canada; Dickens (2000*b*), Ramos (2003), Kalwij and Alessie (2003), Cappellari (2004), Gustavsson (2004), and Sologon and O'Donoghue (2010)³ in Europe. These studies document the trends in transitory and permanent inequality, without explaining the potential driving factors behind them. Sologon and O'Donoghue (2011*b,a*) take the first steps and explore the role of labour market policies and institutions in understanding the cross-national differences in persistent earnings inequality and earnings mobility, expressed as the ratio between permanent and transitory inequality, across Europe. For the variance in the transitory component of earnings, a similar study does not exist. We attempt to fill part of this gap in the literature.

The second measure of earnings instability we explore here was implemented first by Shin and Solon (2011). This measure, which is based on the dispersion in the age-adjusted year-to-year earnings changes, captures a complementary aspect of earnings instability. Whereas the transitory variance captures only the transitory earnings shocks, the dispersion in the year-to-year changes in earnings captures both transitory and permanent shocks in earnings, as discussed in Shin and Solon (2011). As this measure captures also shocks in the returns to human capital and other persistent characteristics, we consider it a measure of earnings volatility, following the financial literature and Shin and Solon (2011).

³This paper is also available in Sologon (2010).

Using the OECD data on labour market policies and institutions for 14 EU countries and these two measures of earnings instability and volatility estimated using the ECHP between 1994 and 2001, we apply a non-linear least squares method to explore the complex relationship between earnings instability/volatility, and labour market policies and institutions. We consider the institutional factors linked with the wage-setting mechanism, as they are expected to affect the degree of earnings instability/volatility: the strictness of employment protection legislation (EPL), the degree of support in the labour market as public expenditure for active labour market programmes (ALMPs) (as % of GDP) and the average unemployment benefit replacement rate (UBRR), the degree of unionization and corporatism, and the product market regulation (PMR). Additionally, we explore which institutions manage to shape the effects of macroeconomic shocks on economic insecurity and implicitly on earnings instability/volatility. Using a different approach and around 30 years of data prior to the recent crisis for 40 OECD and BRIICS countries, in a recent OECD study, Ahrend et al. (2011) explore the role of these institutions in shaping the distributive impact of macroeconomic shocks on inequality and poverty, and find that these institutions do matter. Our study reaches similar conclusions to the OECD study.

In Europe, this question has become increasingly relevant in the context of the economic reality of the 1990s: the implementation of the single market (1992) and the preparation of the single currency (Maastricht criteria adopted in 1993) increased the pressure on the European labour markets to change. Since the early 1990s, influenced by the 1994 OECD Job Strategy, Europe has been moving towards more flexible labour markets (OECD, 2004). The pace of change was different across Europe (Palier, 2010) supporting the expectation of increased country heterogeneity with respect to the labour market structure and the distribution of labour market income across Europe. We investigate whether the heterogeneity in the main labour market policy and institutional factors can help us understand the cross-national differences in earnings instability/volatility across Europe. Is increased labour market flexibility likely to be associated with an increasing earnings instability/volatility?

2 Theoretical links between earnings instability and labour market policies and institutions

Katz and Autor (1999) underlines that the rise of earnings instability/volatility is "a bit of a puzzle for hypotheses only emphasizing rising skills prices associated with increased growth in the demand for skills relative to the supply of skills". However, some explanations can be formulated. The increase in earnings instability/volatility may be attributed to an increased earnings exposure to macroeconomic shocks, a rise in the temporary workforce which increases earnings exposure

to shocks, an increased labour market volatility, an increased competitiveness, globalization, an increased international capital mobility (Rodrik, 1997, Katz and Autor, 1999). A period of skill-biased technological change with the spread of new technologies can, on the one hand, increase the demand for skills, and on the other hand increase earnings instability/volatility, as firms face uncertainty with respect to the abilities of their workers (Katz and Autor, 1999).

The labour market institutional framework is expected to be a filtering mechanism aimed to minimize the adverse effects of macroeconomic shocks on earnings instability/volatility. The weakening of the labour market institutions (e.g. unions, government wage regulation) in filtering the impact of macroeconomic shocks on earnings is expected to be among the factors increasing earnings instability/volatility (Rodrik, 1997; Katz and Autor, 1999).

Across age groups, as postulated by Freeman's (1975) "active labour market hypothesis", similarly with overall income, supply and demand factors together with the other macroeconomic shocks are expected to have the largest effect on the youngest generations of workers, as they have a weaker attachment to the labour market and a lower labour protection compared with senior workers.

The labour market policies and institutions expected to affect earnings instability and earnings volatility are the ones linked with the wage-setting mechanism. These include inter alia: (i) Employment protection legislation (EPL); (ii) Trade unions and the structure of collective bargaining; (iii) Product market regulation (PMR); (iv) The public spending on active labour market policies (ALMPs); (v) The average unemployment benefit replacement rate (UBRR); (vi) The tax wedge (the sum of the personal income tax and all social security contributions as a percentage of total labour cost). Based on the standard wage-setting/price-setting (WS/PS) model (Layard et al., 1991), any factor that affects the slope of the wage-setting curve (the degree of unionization and of corporatism, the PMR, the unemployment benefits) and the slope of the price-setting curve (the EPL, the PMR, the tax wedge) may be expected to interact with policies and institutions that affect the level of the wage-setting (the unemployment benefits) and the level of the price-setting curve (the PMR) (Bassanini and Duval, 2006*a,b*). All possible interactions across policies and institutions can affect earnings instability/volatility, and which policies complement/substitute each other should be established empirically.

To sum up, earnings instability and earnings volatility may result from changes in labour market policies and institutions and the sensitivity of wages to shocks in market conditions. Their magnitude depends on the ability of labour market policy and institutions to minimize the adverse effects of macroeconomic shocks.

3 Methodology

3.1 Measuring earnings instability and earnings volatility

This study explores two measures of earnings instability, which capture complementary aspects. The first measure of earnings instability emerges from the branch of literature which uses complex parametric models of earnings dynamics to decompose overall inequality into transitory inequality and permanent inequality (Baker, 1997, Dickens, 2000*b*, Moffitt and Gottschalk, 2002, 1995, Haider, 2001, Baker and Solon, 2003, Ramos, 2003, Kalwij and Alessie, 2003, Cappellari, 2004, Sologon and O'Donoghue, 2011*b*). Our first measure of earnings instability is the variance in the transitory component of individual earnings, which captures the variability in earnings due to transitory shocks. This measure is estimated using the European Community Household Panel (ECHP). Using equally weighted minimum distance methods, we estimate the covariance structure of earnings by four birth cohorts for each country and decompose earnings inequality into a permanent and a transitory component. A complete discussion of the estimation method and results is available in Sologon and O'Donoghue (2010) and Sologon (2010).

The general specification of the transitory component of earnings is an ARMA(1,1) process with time and cohort specific shifters:

$$\gamma_c \lambda_t v_{it} = \gamma_c \lambda_t [\rho v_{i,t-1} + \epsilon_{it} + \theta \epsilon_{i,t-1}], \epsilon_{it} \sim iid(0, \sigma_\epsilon^2), v_{i0} \sim iid(0, \sigma_{c,0}^2) \quad (1)$$

The time and cohort shifters allow the structure of transitory earnings to vary over time and across cohorts.⁴ ϵ_{it} is assumed to be white noise, the variance $\sigma_{c,0}^2$ measures the volatility of shocks in the first period for each cohort and σ_ϵ^2 the volatility of shocks in subsequent years. ρ is the autoregressive parameter measuring the persistence of shocks.⁵ Earnings instability measured as the transitory variance in year t is estimated as the $Var(\gamma_c \lambda_t v_{it})$. The aggregation to obtain the overall inequality from the within-cohort inequalities for each country follows the Shorrocks sub-group inequality decomposition (Shorrocks, 1984, Chakravarty, 2001):

$$I = \sum_{c=1}^4 n_c PV_c + \sum_{c=1}^4 n_c TV_c \quad (2)$$

where n_c , PV_c , TV_c are the population share, the permanent variance, the transitory variance of cohort c . Our first measure of earnings instability is the overall within-cohort transitory inequality: $EI = TV = \sum_{c=1}^4 n_c TV_c$

⁴Four cohorts are considered (1940-1950, 1951-1960, 1961-1970 and 1971-1981).

⁵The MA parameter θ , which accommodates sharp drops in the lag-1 autocovariance compared with the other autocovariances, was found to differ significantly from 0 only in Italy, Greece and Spain.

The second measure is based on the dispersion in the age-adjusted year-to-year earnings changes, implemented first by Shin and Solo(2011). This measure captures both permanent and transitory shocks in the measure of earnings instability and provides complementary information to the first measure. As this measure captures also shocks in the returns to human capital and other persistent characteristics, we refer to it as a measure of earnings volatility (Shin and Solon, 2011). Following Shin and Solon (2011), the measure of earnings changes is based on overlapping two-year differences for 1994-1996, 1995-1997,..., 1999-2001. We regress these changes in log earnings ($y_{it} - y_{i,t-2}$) on a polynomial in age and age squared, separately for each year. The measure of earnings volatility (EV) is the standard deviation of the age-adjusted residuals.

$$y_{it} - y_{i,t-2} = f(\text{age}, \text{age}^2) + r_{it}, EV = SD(r_{it}) \quad (3)$$

3.2 Estimation of the link between earnings instability and labour market policies and institutions

The relationship between earnings instability/volatility and labour market policies and institutions is estimated using non-linear least squares, for all countries pooled together. The unit of analysis is the country observed between 1994 and 2001. Exceptions are Luxembourg and Austria observed between 1995 and 2001, and Finland between 1996 and 2001. Less observations are available for the earnings volatility measure: each country has a measure between 1996 and 2001, except Luxembourg and Austria covered between 1997 and 2001, and Finland between 1998 and 2001.

Two steps are envisaged. First, we test whether policies interact with the overall institutional framework in shaping earnings instability. Second, we test whether institutions interact with the macroeconomic shocks in shaping earnings instability/volatility. Macroeconomic shocks are treated initially as unobservable but common to all countries - as time effects -, and lastly as observable and country-specific.

These regressions suffer from two problems which prevent the establishment of causality: first, the endogeneity between institutions and overall inequality is expected to affect also the relationship between institutions and the two measures of earnings instability, and second, the unobserved country-heterogeneity. These are long-standing and unsettled problems in the debate regarding the impact of labour market institutions, technological change, globalization, immigration on earnings inequality, expected to affect earnings instability/volatility. The absence of good instruments prevents the establishment of causality. The estimated parameters should be interpreted as complex controlled associations between earnings instability/volatility and the institutional framework, and not causal relationships.

3.2.1 Systemic Interactions

The interactions between institutions are specified in a multiplicative form between the deviations of the respective institutions from their sample mean, as is usually done in macroeconomic equations. This specification enables the interpretation of the marginal effect of each institution when the others are kept constant at the sample mean. Undertaking a systematic analysis of policy interactions is not straightforward, as a model with seven policies/institutions implies including 21 cross-interactions, thereby inducing a substantial loss of degrees of freedom. To avoid this, we adopt an alternative strategy, similarly with Bassanini and Duval (2006a) for unemployment, Sologon and O'Donoghue (2011a) for earnings mobility, and Sologon and O'Donoghue (2011b) for persistent inequality. We estimate systemic interactions, meaning interactions between each policy/institution and the overall institutional setting, defined as the sum of the direct effects of the policies/institutions. The model specification is displayed in equation (4):

$$EI_{it} = \sum_{k=1}^K v_k X_{kit} + \sum_{k=1}^K \varphi_k (X_{kit} - \bar{X}) \left(\sum_{k=1}^K v_k (X_{kit} - \bar{X}_k) \right) + u_{it} \quad (4)$$

i , t and k are the country, the period and the institution index. EI_{it} is the measure of earnings instability of country i in year t . The parameters v_k and φ_k are estimated simultaneously using non-linear least squares. v_k is the direct effect of institution X_k on EI_t for a country with an average mix of policies and institutions. φ_k is the interaction effect between the institution/policy X_k and the overall institutional framework, expressed as the sum of the direct effects of policies/institutions (expressed in a deviation form in the interaction).

We evaluate the partial derivatives of (4) with respect to each policy/institution to indicate which of them has the potential to reduce earnings instability. The partial derivative of EI with respect to each policy/institution for a country with an average mix of policies is v_k . The partial derivative of EI with respect to policy/institution X_k for a country with an institutional mix which differs from the average is:

$$\frac{\partial EI}{\partial X_k} = v_k + 2\varphi_k v_k (X_k - \bar{X}_k) + \sum_{j \neq k}^J (\varphi_k v_j + \varphi_j v_k) (X_j - \bar{X}_j) \quad (5)$$

Setting all institutions, except X_k and X_j , equal to their averages we get:

$$\frac{\partial EI}{\partial X_k} = v_k + 2\varphi_k v_k (X_k - \bar{X}_k) + (\varphi_k v_j + \varphi_j v_k) (X_j - \bar{X}_j) \quad (6)$$

Evaluated at the average $\bar{X}_k$, expression (6) becomes:

$$\frac{\partial EI}{\partial X_k} = v_k + (\varphi_k v_j + \varphi_j v_k) (X_j - \bar{X}_j) \quad (7)$$

The sign of the partial derivative depends on the direct and the interaction effects of the interacting institution and its deviation from the average.

Next, in order to explore the possible cross-interactions between institutions, we compute the cross-derivatives of EI in (4) with respect to two policies/institutions X_j and X_k , when all the other policies/institutions are set equal to the average:

$$\frac{\partial^2 EI}{\partial X_k \partial X_j} = \varphi_k v_j + \varphi_j v_k \quad (8)$$

3.2.2 Interactions between institutions and shocks

Similar with Blanchard and Wolfers(1999) for unemployment, Sologon and O'Donoghue (2011a) for earnings mobility and Sologon and O'Donoghue (2011b) for persistent inequality, we explore the role of labour market policy and institutional factors in shaping the impact of macroeconomic shocks on earnings instability/volatility in two steps.

Common unobservable shocks and interactions with institutions

First we treat the macro shocks as unobservable but common to all countries. The macro shocks are incorporated as time effects, as shown:

$$EI_{it} = \tau_t \left(1 + \sum_{k=1}^K \gamma_k (X_{kit} - \bar{X}_k) \right) + u_{it} \quad (9)$$

τ_t is the time effect for period t . γ_k is the interaction effect between the institution/policy X_k and the overall unobserved shock captured by τ_t . This specification allows the effect of the common macro shocks on earnings instability to depend on the country-specific mix of labour market policies/institutions. This specification represents more a description of the data, rather than tightly specified theoretical interactions, but it captures the basic hypothesis that given the same shocks, countries with weaker institutions experience higher earnings instability/volatility.

Country specific observable shocks and interactions with institutions

Second, we replace the unobservable common shocks by a set of country-specific observable shocks:

$$EI_{it} = \sum_{s=1}^S \zeta_s Z_{sit} \left(1 + \sum_{k=1}^K \gamma_k (X_{kit} - \bar{X}_k) \right) + u_{it} \quad (10)$$

$\sum_{s=1}^S \zeta_s Z_{sit}$ is a set of observed macroeconomic shocks, which are interacted with labour market policies and institutions. ζ_s are the direct effects of shocks and γ_k the interaction effects between the institution/policy X_k and the aggregated macroeconomic shocks.

4 Data

The earnings instability measures are estimated using the ECHP⁶ over the period 1994-2001. Luxembourg and Austria are observed between 1995 and 2001 and Finland between 1996 and 2001. Following the tradition of previous studies, we consider only men to avoid the selection bias attached to female earnings. The earnings measure is the real log hourly wage adjusted for CPI of workers aged 20 to 57, born between 1940 and 1981. Hourly earnings lower than 50 Euros and higher than 1 Euro are disregarded. The working sample for each country is an unbalanced panel, weighted using the "base weights" of the last wave observed for each individual, as recommended by Eurostat.

Several studies explore the extent of attrition in ECHP and its impact on a typical empirical analysis. Behr et al. (2005) report that the extent and the determinants of panel attrition in ECHP vary between countries and across waves within one country, but these differences do not bias the analysis of income mobility via transition matrices, of individual rank stability measures, of standard cross-sectional measures of inequality such as the Gini-index or the ranking of national results. Ayala et al. (2011) confirm that attrition does not seem to significantly affect the aggregated mobility indicators. In Sologon and O'Donoghue (2011a), we explore the correlations between several mobility indicators using the ECHP: the Shorrocks index, the Fields index (Fields, 2009), the Dickens index (Dickens, 2000a), the Immobility Ratio based on the transition matrix approach and the Immobility Ratio defined as the ratio between persistent and transitory inequality (Kalwij and Alessie, 2003). On aggregate, conclusions in relation to mobility are reasonably robust to the measure used, with a rank correlation of mobility measures over 0.8. Since overall inequality and earnings mobility are closely linked to the permanent and transitory components of earnings inequality and with the year-to-year earnings changes, we expect the same limited impact of attrition on the two earnings instability measures used in this study.

Table 1 shows the evolution of mean hourly earnings and the variance of log hourly earnings for the sample with positive earnings, the inflows and outflows in the sample of positive earnings over time for each country. Mean hourly earnings increase in all countries, except in Austria where they record a slight decrease. Overall inequality, measured by the variance of ln hourly earnings increases in Finland, the Netherlands, Luxembourg, Greece, Italy, and Portugal, and decreases in the rest. In 2001, Portugal has the highest inequality and Denmark the lowest.

⁶The European Community Household Panel provided by Eurostat via the Department of Applied Economics at the Université Libre de Bruxelles.

Additional summary statistics are available in Sologon (2010).

The link between the two measures of earnings instability and labour market policies and institutions is investigated using the Bassanini and Duval (2006a, 2006b) (OECD) dataset⁷. The institutional variables are: employment protection legislation (EPL), trade union density, the degree of corporatism, the tax wedge, product market regulation (PMR), the average unemployment benefit replacement rate (UBRR) and the spending on active labour market programmes (ALMPs). The macroeconomic shock variables are: labour demand shock, terms of trade shock, total factor productivity shock, and the real interest shock. These variables are observed for most countries between 1994 and 2001. Their description is included in Table 2.⁸ The summary statistics of the institutional and shock variables are in Table 3. Luxembourg and Greece have some missing institutional and shock variables and they are dropped from the final estimations. Portugal, Denmark and Ireland record some missing values for the labour demand shock.

5 Patterns in earnings instability and volatility and policy and institutional factors across Europe

The trends in transitory inequality, illustrated in Figure 1, show a substantial convergence in earnings instability across Europe. Based on their converging trends in 2001, we identify two country clusters. The cluster which converges to a lower level of earnings instability is formed by the Scandinavian countries, Austria, Belgium, Germany, Ireland and Italy. Strong increases in earnings instability are observed in Portugal and the Netherlands, and strong drops in Ireland, Austria and Luxembourg.

The trends in earnings volatility as measured by the standard deviation in the year-to-year earnings changes, which captures both transitory and permanent shocks, is illustrated in Figure 2. The country-cluster identified as having a higher earnings instability in 2001, also has a higher earnings volatility. Exceptions are the Netherlands and Ireland. The Netherlands records a strong increase in earnings instability reaching the third highest level in 2001 based on Figure 1, but maintains one of the lowest levels of earnings volatility throughout the period based on Figure 2. Ireland converges in earnings instability with the lower cluster based on Figure 1, but maintains one of the highest levels of earnings volatility based on Figure 2. Most countries record a decrease or stagnation in earnings volatility across Europe, except Finland. The largest drops are recorded in France, Austria, Greece and Ireland.

The evolution of the European labour market policies and institutions over time is shown in

⁷The data was provided by email from the authors.

⁸For a detailed description, please refer to Bassanini and Duval (2006a,b).

Figure 3. In most countries, except Austria, France, Ireland and Greece with constant regulatory level, and the UK with increasing regulation, labour markets are more deregulated (EPL decreased) in 2001 compared with early 1990s. Consistent across countries, a deregulation wave is identified in the product market (decreasing PMR). Union density decreases in all countries, except Belgium. Active labour market policies (ALMPs) develop in all countries (the most in the Netherlands, Denmark and Ireland), except Germany where the opposite holds. The tax wedge decreases over time across the EU: the Anglo-Saxon countries record the largest decline, followed by the Nordic and the Mediterranean countries. Exceptions are Austria, Belgium, Denmark and France where the opposite is observed. The unemployment benefits replacement rates (UBRR) increase in all countries, except in Denmark, Finland and the UK. These reforms are accompanied by a stable degree of corporatism across the EU.

In 2001, Figure 4, which plots pairs of labour market indicators, reveals a substantial institutional heterogeneity across the 14 EU countries. This heterogeneity has the potential to explain the differences in earnings instability and volatility across Europe. The labour market indicators in Figure 4 are re-scaled by setting the UK, a typical Anglo-Saxon model with the lowest regulation, the lowest labour market support, a low corporatism, among the lowest union densities and tax wedges, as the base. The labour market support is summarized in one indicator computed as the arithmetic average of the ALMPs and the unemployment benefit RR, similar with Milberg and Winkler (2009).

The Anglo-Saxon countries (UK and Ireland) have the lowest regulation in the labour market, the lowest tax wedge and a medium union density. They differ substantially from one another in the level of labour market support, in corporatism and PMR, with the UK having the lowest values in Europe. The Northern countries (the Scandinavian countries and the Netherlands), Austria⁹ and Belgium, which adopted the "Flexicurity" model with relatively low levels of regulation in the labour market coupled with relatively high levels of unemployment benefits and ALMPs, also have a high corporatism, among the highest union densities (except the Netherlands) and tax wedges, and among the lowest PMR. Denmark and Netherlands, the pioneers of "Flexicurity" stand out with the highest levels of labour market support. The Continental countries (Germany, France and Luxembourg¹⁰) have a relatively stricter EPL and a substantially lower unionisation than the Nordic/Flexicurity countries. The degree of labour market support is lower than in Denmark and the Netherlands. In Germany, the other institutions are similar to

⁹The success of the "Flexicurity" model in Austria is discussed in Auer (2002) and European Commission (2006)

¹⁰Luxembourg has the highest union density among the Continental countries. The other institutional variables are missing.

the ones in the Nordic/Flexicurity countries. In France, PMR is higher and corporatism is lower than in Germany and the Nordic/Flexicurity countries. The Mediterranean countries (Portugal, Spain, Greece¹¹ and Italy) have among the strictest regulation in the labour and product market, among the lowest levels of labour market support, among the lowest union densities, an intermediate corporatism and medium-high tax wedges. Italy differs with a lower EPL and a high corporatism.

The institutional factors are expected to interact with the macroeconomic shocks in shaping earnings instability and volatility. Figure 5 illustrates the evolution of selected macroeconomic shocks. Given that changes in labour demand factors, technology, terms of trade, real interest do not differ significantly across Europe, they cannot by themselves explain the changes in earnings instability. These trends are not surprising, as these countries operate in the same world markets, with similar technology, industry and occupation mixes. Ireland stands out with respect to its evolution in the total factors productivity shock: a sharp increase is recorded until 1997, followed by stabilization towards 2001; similarly, the real interest shock drops towards 1998 and stabilizes afterwards. These trends are most likely related to the Celtic Tiger. As these countries face similar macro shocks, the differences in institutions may explain the differences in earnings instability/volatility across countries.

6 Estimation results

We proceed with the estimation results. We report first the estimates for earnings instability measured by the variance in transitory earnings, and then the estimates for earnings volatility measured by the standard deviation in year-to-year changes in earnings.

6.1 Estimation results - Earnings Instability

6.1.1 Direct effects and systemic interactions

Table 4 reveals the estimates of the first model (equation 4). Most direct and systemic interactions are significant. The model has a high explanatory power, suggesting that the complex institutional framework plays an active role in shaping earnings instability in Europe. In our discussion, unless stated otherwise, we consider the results for a country with an average mix of policies/institutions and a low corporatism. In this particular institutional mix, we find that countries with a stricter labour market regulation (EPL) have on average a lower earnings instability. A similar association is found for the generosity of the unemployment benefit replacement

¹¹Greece has a higher EPL and union density than Portugal. The other indicators are missing.

rate (UBRR)(albeit insignificant). In the same institutional mix, the institutions which are positively associated with earnings instability are the degree of unionization, the tax wedge, the product market regulation (PMR) and the spending on ALMPs. In order to grasp the magnitude of these effects, we simulate the changes in policies/institutions evaluated at their sample averages, which implemented separately, imply a reduction in transitory inequality by 1% relative to the average country (Table 5). The most efficient reforms associated with a decrease of 1% in transitory inequality are decreasing the tax wedge (1%) or increasing labour market regulation (1.66%); the least efficient are decreasing the spending on ALMPs (3.85%) and decreasing the union density (4.75%). All systemic interactions are highly significant and reinforce the direct institutional effects. The transition from a decentralized economy to a corporatist economy is associated with a decrease in earnings instability of 37%¹² relative to the average country.

Evaluating the first derivative (evaluated at the min, mean, and max values of the respective institution) and the second derivative in Table 6, only union density displays a monotonic relationship: its effect is positive and stronger the higher the union density. For the other institutions, the partial derivative reverses its sign when evaluated at the min/max value of the respective institution. For example, an increase in EPL evaluated at the highest sample value has an increasing effect on earnings instability, opposite to the effects observed at lower values of EPL. Thus too much labour market regulation exacerbates earnings instability. A similar U-shape relationship with earnings instability is found for: the tax wedge, the PMR, the ALMPs and the UBRR.

To explore the extent to which the effect of each policy/institution varies depending on the mix of policies in place we evaluate the partial derivatives for institutional mixes that differ from the average country with a low corporatism. Table 6 shows the partial derivative of EI with respect to each institution at its average value, evaluated at different moments of the other institutions. Figures 7, 8 and 9 complement Table 6 by illustrating the partial derivative for each institution at its minimum and maximum value, evaluated at different moments of the other institutions. The effect of each policy/institution, both in sign and magnitude, depends to a large extent on the mix of policies in place, both in signs and magnitudes. For example, for an average country, the effect of each policy/institution has opposite signs in corporatist versus decentralized economies (Table 6); the effect UBRR maintains its sign but decreases its magnitude in corporatist economies. For an average EPL, the effect of EPL has opposite signs

¹²37% = $(0.017 - 2.285 * 0.017) / \bar{EI}$, where $\bar{EI} = .0573$ is the transitory variance for a country with an average mix of policies and a low corporatism

when evaluated at min/max values of the other institutions (Table 6). This holds for most institutions, with a some exceptions. For example, the higher the union density, the stronger the negative effect of EPL in countries with an average EPL, the stronger the positive effect of PMR in countries with an average PMR, and the stronger the positive effect of ALMPs in countries with an average spending on ALMPs (Table 6).

Next we turn to Figures 7-9. In Figure 7 (EPL) we find that for low values of EPL, the effect of EPL is negative irrespective of the policy mix. The magnitude of the effect, however, varies substantially across different policy mixes, and the strongest negative effect is found when the spending on ALMPs is high. The same holds for a low unemployment benefit replacement rate (Figure 9 (UBRR)). Figure 7 (Union Density) shows that when union density is high, the effect of union density is positive for most institutional mixes. The same holds for PMR (Figure 8), for the tax wedge (Figure 8) and for ALMPs (Figure 9). The effects of the remaining institutions, evaluated both at low and high levels, differ substantially across different institutional mixes, both in magnitudes and signs (Figures 7- 9). In Table 6, the cross-derivatives of EI with respect to pairs of policies/institutions, when all the other policies/institutions are set equal to the average, summarize the extend to which the effect of each institution varies for different levels of the other institutions. A positive cross-derivative indicates that the effect of one institution, if positive, becomes stronger the higher the level of the second institution; if negative, it is counteracted the higher the level of the second institution. A negative cross-derivative indicates that the effect of one institution, if negative, becomes stronger the higher the level of the second institution; if positive, it is counteracted the higher the level of the second institution.

This model specification performs well in explaining between-country differences in earnings instability, as displayed in Figure 6 (Model 1, column 1). Our next question is how well does it explain the evolution of earnings instability over time across the 14 EU countries? The correlation between the change in the predicted outcome and the actual outcome is significant, positive and strong, indicating that the model does a good job at explaining the evolution over time (Figure 6 - Model 1, column 2).

6.1.2 Macroeconomic shocks and interactions

As labour market policies/institutions interact with macroeconomic shocks, we look for explanations of the cross-national differences in earnings instability across Europe based on the interaction between shocks and institutions. This section explores the role of labour market policy and institutional factors in shaping the impact of macroeconomic shocks on earnings instability.

Common unobservable shocks and interactions

First, we treat shocks as unobservables but common to all countries. Our basic hypothesis is that, given the same shocks, countries with weaker institutions experience higher earnings instability. This model has a high explanatory power, slightly lower compared with the initial model. The estimation results are displayed in Table 7. The estimated time effects indicate that for a country with an average mix of policies (and low corporatism), earnings instability increased by 18,65% (absolute increase of 0,0118) between 1994 and 2001. The significant interaction effects indicate that a high corporatism diminishes the adverse effects of shocks on earnings instability, whereas product market regulation and ALMPs augment them.

To get a sense of the magnitudes, column(2) gives the range of each institutional variable (in deviation from the sample mean). We take an adverse shock that would raise earnings instability by 1% for a country with an average mix of policies, and evaluate this effect (column(3)) when we consider, in turn min/max values of each institution. We find that the range of the effects of institutions on the impact of a given shock on earnings instability varies across institutions: the same shock will have the strongest negative impact on earnings instability in the country with a high corporatism, followed by the most deregulated product market, and the least developed ALMPs (*ceteris paribus* at the average). This ranks descendently the efficiency of each factor in reducing the adverse effects of shocks. Factors that augment the adverse effects of shocks are in a descendant order: the most developed ALMPs, the most regulated product market and low corporatism. This model performs well in explaining the cross-country heterogeneity in the evolution of earnings instability over the sample period, as illustrated by Figure 6 (Model 2, column 2), and the strong positive and highly significant correlation between the actual and the predicted change in earnings instability (0,89).

Country specific observable shocks and interactions

Next, the unobservable common shocks are replaced by a set of country-specific observable shocks. We consider four sources of shocks: the labour demand shift, the rate of total factor productivity growth, the terms of trade and the real rate of interest. Due to some missing data on shocks for some countries, the panel is slightly unbalanced.¹³

Replacing the unobservable shocks by a set of country-specific observable shocks (Table 8) leads to a slightly lower explanatory power compared with the previous models, suggesting that

¹³The data on shocks is missing for Portugal (all years for the labour demand shock and TFP shock), for Denmark (2000 and 2001 for the labour demand shock), for Ireland (1999-2001 for the labour demand shock), restraining the estimation sample to 80 observations.

the heterogeneity in the magnitude of shocks explains part of the cross-country heterogeneity in the earnings instability. Whereas three out of four shocks are significant, only two institutions appear to significantly affect the impact of these shocks on earnings instability. Also in this specification, a high corporatism is an effective tool in reducing the adverse effects of these shocks on earnings instability and the generosity of the unemployment benefit acts as a filter against the adverse effects of these shocks. A positive labour demand shift and an increase in the real interest rate are associated with an increase in earnings instability. The opposite holds for the terms of trade shocks.

This specification, however, performs poorly in explaining the cross-country heterogeneity in the evolution of earnings instability over time, as indicated by Figure 6 (Model 3, column 2) and the insignificant correlation between the actual and the predicted change.¹⁴

6.2 Estimation results - Earnings Volatility

Next, we estimate the links between earnings volatility, measured as the standard deviation in the two-year earnings changes, and labour market institutions and macroeconomic shocks.

6.2.1 Overall effects of institutions

Given the smaller number of observations available for earnings volatility, estimating the partial and the cross-derivatives from the systemic institutional interactions is not feasible. Instead of the specification with systemic interactions, we estimate an ordinary least squares regression, where the institutions are expressed in deviation from the sample mean. This allows the interpretation of each parameter estimate as the overall effect for a country with an average mix of institution.

The estimates are displayed in Table 9. For a country with an average mix of institutions, increasing the EPL and the degree of corporatism are negatively associated with earnings volatility; the opposite is obtained for PMR. These associations hold also for earnings instability. In order to grasp the magnitude of these effects, we simulate the changes in policies/institutions evaluated at their sample averages, which implemented separately, imply a reduction in earnings volatility by 1% relative to the average country (Table 10). The magnitudes differ substantially among institutions. An increase of 7,87% in EPL from the average or a decrease of 4,14% in PMR from the average, *ceteris paribus*, are associated with a decrease of 1% in earnings volatility. The transition from a low to a high corporatism for a country with an average mix of institutions is equivalent with a decrease of 16.85% in earnings volatility.

¹⁴For the predictions in Figure 6, the missing shocks are replaced by the previous value observed in each country.

6.2.2 Macroeconomic shocks and interactions

Next we estimate the models which explore the interactions between labour market institutions and macroeconomic shocks in shaping earnings volatility, following the specifications in equations (9) and (10).

Common unobservable shocks and interactions

First, we treat shocks as unobservables but common to all countries, following the basic hypothesis that, given the same shocks, countries with weaker institutions experience higher earnings volatility. The estimation results are displayed in Table 11. Taking into account the interactions with the unobserved common shocks increases considerably the explanatory power of the model, from an adjusted R^2 of .61 in the first model to .99. Column [1] displays the estimated parameters and column [3] displays the relative change in volatility implied by an adverse shock which would raise volatility by 1% for the average country, when evaluated at the minimum and maximum value of each institution.

The estimated time effects indicate that for a country with an average mix of policies (and low corporatism), earnings volatility decreased by 9,45% (absolute decrease of 0,025) between 1994 and 2001. Thus for the average country, earnings volatility in terms of permanent and transitory shocks has decreased over time.

For a country with an average mix of policies, a high corporatism emerges as an effective tool in counteracting the adverse effects of macroeconomic shocks on earnings volatility: an adverse macroeconomic shock which would raise earnings volatility by 1% for the average country with a low corporatism, would decrease earnings volatility by 15% under a high corporatism (column [3]). The regulation in the labour market emerges as a filtering mechanism against adverse macroeconomic shocks: an adverse shock which would raise earnings volatility by 1% for the average country, would raise it by 9.68% under a minimum EPL, but would decrease it by 5.83% under a maximum EPL (column [3]). The opposite is found for the regulation in the product market, which appears to exacerbate the adverse effects of shocks: an adverse shock which would raise earnings volatility by 1% for the average country, would increase it by 11.35% under a maximum PMR (column [3]).

This model specification performs well in explaining between-country differences in earnings volatility, as displayed in Figure 10 (Model 2, column 1). The model does well in predicting the direction of change in volatility between the first and the last wave, but less well in predicting

the magnitude of the changes Figure 10 (Model 2, column 2).¹⁵

Country specific observable shocks and interactions

Next, the unobservable common shocks are replaced by a set of country specific observable shocks: the labour demand shift, the rate of total factor productivity growth, the terms of trade and the real rate of interest. Due to some missing data on shocks for some countries, the panel is slightly unbalanced.¹⁶ Table 12 shows the estimates.

The explanatory power of this specification is high (.984), sign that the country-heterogeneity in these macroeconomic shocks explains part of the country-heterogeneity in earnings volatility as measured by the standard deviation in the two-year changes in log earnings. Three shocks are significantly associated with earnings volatility: the labour demand and the real interest rate shocks are positively associated, whereas the terms of trade shock is negatively associated. The same associations are observed for earnings instability, sign that these macroeconomic shocks are a source of transitory and permanent earnings shocks.

Controlling for these observed macroeconomic shocks, the labour market regulation and the generosity of the unemployment benefit act as filtering mechanisms against the adverse macroeconomic shocks, whereas the opposite is found for the tax wedge and the product market regulation.

This model specification performs less well in predicting the changes in earnings volatility over time than the previous model, where the direction of change was predicted correctly for all countries (Figure 10).

6.3 Discussion of results

We end with a discussion of the results, taking each policy driver in turn. Transitory variance is referred as earnings instability and the standard deviation in the two-year changes in log earnings as earnings volatility.

Employment protection legislation (EPL)

For a country with an average mix of policies/institutions and a low corporatism, we bring evidence of a U-shape relationship between earnings instability and EPL. At low and average levels of EPL, a stricter labour market regulation is associated with a decrease in earnings instability. At high levels of regulation, the association turns positive, suggesting that extreme levels

¹⁵For the predictions in Figure 10, the missing shocks are replaced by the previous value observed.

¹⁶The data on shocks is missing for Portugal (all years for the labour demand shock and TFP shock), for Denmark (2000 and 2001 for the labour demand shock), for Ireland (1999-2001 for the labour demand shock), restraining the estimation sample to 80 observations.

of EPL make the "cost" of EPL on earnings instability dominant. The literature points to the existence of both "costs" and "benefits" associated with a strict employment protection regulation. Cazes and Nesporova (2003) argue against a strict EPL because of its key role in generating labour market rigidity: EPL increases the cost of hiring and of layoffs, and consequently lowers labour turnover (Blanchard, 1999). A lower turnover is expected to affect mainly workers with temporary contracts, as they have a weaker protection in the labour market. Thus, the potential "cost" of a strict EPL is widening differentials between workers with regular jobs covered by the EPL and workers with irregular jobs, unemployed job-seekers. A strict EPL "benefits" covered workers by lowering turnover and offering a better protection in the labour market, thus reducing earnings instability.

The relationship between EPL and earnings instability depends on the mix of policies in place, suggesting that certain policy mixes augment the "costs" of EPL, whereas other mixes augment its "benefits". For example, increasing EPL from the average increases earnings instability in the presence of a high corporatism/low tax wedge/deregulated product markets/low ALMPs/high UBR. These policy mixes augment the "cost" of EPL. Whereas the "benefit" of increasing EPL from low values dominates across all mixes, increasing EPL from high values decreases earnings instability only when coupled either with a high union density or a highly regulated product market or developed ALMPs or a high tax wedge.

Using the Shin and Solon (2011) measure of earnings volatility, we find that, for an average country with a low corporatism, the EPL is negatively associated also with earnings volatility, suggesting that the EPL has the potential to reduce the impact of both permanent and transitory shocks on earnings. Additionally, we bring evidence that the EPL acts as a filtering mechanism against adverse macroeconomic shocks on earnings volatility.

Labour market support as spending for active labour market programs (ALMPs)

For a country with an average mix of policies and a low corporatism, more developed ALMPs are associated with a higher earnings instability. The ALMPs are found to exacerbate the adverse effects of macro shocks on earnings instability. These findings are consistent with our expectations. ALMPs, which typically consist of job placement services and labour market programmes such as job-search, vocational training or hiring subsidies can improve the efficiency of job-matching, enhance the work experience and skills of the unemployed, facilitating their reintegration into the labour market (Bassanini and Duval, 2006*a,b*, Sologon and O'Donoghue, 2011*b*). These reintegrated workers, however, are the least protected in the labour market and thus are expected to be the most affected by macroeconomic shocks. In the face of macroeconomic shocks, their presence in the labour market may amplify earnings instability.

For low levels of spending on ALMPs, increasing ALMPs is negatively associated with earnings instability. This effect, however, turns positive for countries with an average ALMPs, becoming stronger the higher the level of spending on ALMPs. This signals that complementary protection mechanisms should be put in place to protect the vulnerable groups re-integrated into the labour market by these policies. We identify a set of policy/institutional mixes which have the potential to reduce this increase in earnings instability or even reverse the sign. We find that the increase in earnings instability associated with increasing ALMPs when they are already high is considerably lower when accompanied by highly regulated labour markets, by a high corporatism, by low non-wage labour costs, and by high unemployment benefit replacement rates. Under the same conditions, increasing ALMPs from an average level is actually associated with a decrease in earnings instability. Similarly, each of these conditions reinforce the negative effect of increasing ALMPs when they are low. This indicates that these institutional circumstances assure a smoother reintegration of workers into the labour market. Generous unemployment benefits favour a better job-matching, thus more stable employment profile for the reintegrated workers; low tax wedges (non-wage labour costs) favour less costly and faster reintegration into the labour market; and highly regulated labour markets and corporatist economies may provide a better labour market protection for the reintegrated workers.

For earnings volatility, we did not find any significant associations with ALMPs.

Labour market support as average unemployment benefit replacement rate (UBRR)

For an average country with either low or average UBRRs, more generous unemployment benefits are associated with a lower earnings instability. Generous unemployment benefits are found to limit the adverse effect of macroeconomic shocks on both earnings instability and earnings volatility, meaning on both transitory and permanent shocks. These findings have two potential explanations. First, this negative effect may be spurious, if we consider the "cost" of generous unemployment benefits for unemployment: they are expected to weaken the job-search intensity, decrease the employability and human capital for the unemployed, and consequently exclude them from the labour market. As this group is more prone to earnings instability, their exclusion from the labour market hides part of the earnings instability. This explanation is supported by Blanchard and Wolfers (1999) who finds that generous unemployment benefits lead to a larger effect of adverse shocks on unemployment. Second, generous unemployment benefits, have also associated "benefits". Their "benefit" is that longer and more generous unemployment benefits represent incentives not to accept low-paid jobs, thereby improving job-matching. A better job-matching increases the likelihood of more stable employment and earnings profiles (Bassanini and Duval, 2006b, 2006a), which in turn imply a lower earnings instability/volatility.

The unemployment spells have an averse effect on the employability and the human capital accumulation of the unemployed, expected to increase their earnings vulnerability once they re-enter the labour market, unless protection mechanisms and developed ALMPs are in place to counteract this increase in earnings instability. We find that the decrease in earnings instability associated with an increase in the UBRR is the largest when the ALMPs are very developed. Thus developed ALMPs have the potential to counteract the adverse effect of increasing the generosity of the UBRR for earnings instability, similar with unemployment (Bassanini and Duval, 2006*a,b*). Evaluated at low levels, the generosity of the UBRR is negatively associated with earnings instability for most policy mixes. Evaluated at very high values, the effect of UBRR on earnings instability varies substantially depending on the institutional mix.

Trade unions

For an average institutional mix and a low corporatism, the higher the degree of unionisation, the higher the earnings instability. This is a surprising result, given that the stated purpose of unions is to reduce earnings disparities (OECD, 2004). But we find that the effect of unionisation depends on corporatism: in corporatist economies, a higher unionisation is negatively associated with earnings instability, opposite to what we find in decentralized economies. This is consistent with the evidence that unions in decentralized economies push towards claiming a larger share of the surplus, effect mitigated in corporatist economies which benefit from a higher coordination (Teulings and Hartog, 2008). Our findings suggest that there are both "costs" and "benefits" associated with a higher unionisations, and which one outweigh the other depends on the institutional mix.

The "benefits" of unionisation stem indirectly from its impact on training and minimum wage. By forcing employers to provide training to their employees, they increase the employees' human capital and adaptability to new technologies (Aghion and Williamson, 2001), thus reducing earnings instability for covered workers. However, even if unions decrease the within-group earnings instability, they may still increase the overall earnings instability by increasing the between-group transitory differentials, between unionised and non-unionised workers.

Evaluated at the average, the "cost" of unionization for earnings instability is mitigated also by a highly regulated labour market / a low tax wedge / a deregulated product market / low ALMPs / high unemployment benefits. Evaluated at its minimum, the "cost" is mitigated by a highly regulated labour market / a low tax wedge / a deregulated product market / low levels of spending on ALMPs / high UBRRs. Evaluated at its maximum, the "cost" is mitigated only for the average country with a minimum tax wedge.

For earnings volatility, we did not find any significant associations with unionisation.

Corporatism

We find that countries with an average institutional mix and a corporatist economy have a lower earnings instability and a lower earnings volatility than countries with an average institutional mix and a decentralized economy. We also find strong negative significant interaction effects between corporatism and macroeconomic shocks for both measures of earnings instability and volatility, suggesting that corporatist systems are effective in reducing the adverse effects of macroeconomic shocks on both transitory and permanent earnings shocks. Our findings run counter to the traditional view that corporatism generates labour market rigidity, but it is consistent with the recent research on the impact of corporatism on wage structures. Teulings and Hartog (2008) argue that corporatist systems can be very flexible, even more so than decentralized ones, because they allow the contracts to be renegotiated to ensure a smooth adjustment to aggregate shocks. As corporatist systems deal with the adjustment to aggregate shocks, they can prevent the exacerbation of earnings instability and volatility in the presence of adverse shocks.

From the cross-institutional interactions, the corporatist systems emerge as desired complements for counteracting the increase in earnings instability associated with the development of ALMPs, with the generosity of the unemployment benefits, with unionization, with the regulation in the product market and with the tax wedge. This suggest that a high degree of coordination has the potential of keeping earnings instability low.

Product market regulation (PMR)

The "benefit" of more regulated sectors is that they display more compressed and more stable earnings structures and are therefore expected to have a lower earnings instability than non-regulated sectors. Whereas the "benefit" emerges within the regulated sectors, the "cost" emerges when taking a larger perspective by including also non-regulated sectors: the potential "cost" of a stricter product market regulation is widening transitory differentials between workers in non-regulated sectors and those in regulated sectors. Deregulation in the product market is expected to increase competition, lower market rents and wages, thereby increasing earnings instability in the previously regulated sectors (Fortin and Lemieux, 1997).

We find that some policy mixes augment the "costs" of a strict regulation in the product market, whereas other mixes augment the "benefits". For a country with an average mix and a low corporatism, a stricter regulation in the product market is associated with a higher earnings instability. Regulated product markets also appear to exacerbate the adverse effects of macro shocks on earnings instability. For corporatist systems, however, a stricter PMR is associated

with a lower earnings instability. The "cost" of increasing PMR from the average is also mitigated in the presence of a highly regulated labour market / a low tax wedge / a high UBR. The "cost" of increasing PMR from high values is mitigated only for an average country with a minimum tax wedge. In deregulated product markets, the effect of a stricter regulation varies substantially depending on the institutional mix.

Using the Shin and Solon (2011) measure of earnings volatility, we find that, for an average country with a low corporatism, the PMR is positively associated also with earnings volatility and exacerbates the adverse macroeconomic shocks on earnings volatility.

7 Concluding remarks

The concerns regarding the economic insecurity stemming from earnings instability and earnings volatility have been gaining momentum in the contemporary political discourse given the recent trends in earnings inequality which reflect an increasing earnings insecurity, both in the US and Europe. If we consider earnings instability and earnings volatility as proxies for risk and that individuals are averse to earnings variability, then increasing earnings instability/volatility bears substantial welfare costs. Whereas most studies focused on identifying earnings instability/volatility, little is known regarding the potential driving factors. Our paper takes the first step towards understanding the complex relationship between earnings instability/volatility, labour market policies and institutions and macroeconomic shocks. We explore this relationship in a European context. The European institutions have been long regarded as a source of labour market rigidity, but the economic reality of the 1990s pressured Europe to move towards more flexible labour markets. A series of labour market reforms have implemented across Europe, increasing the country-heterogeneity in labour market policies and institutions (Palier, 2010). This heterogeneity has the potential to help us understand the cross-national differences in earnings instability and earnings volatility across Europe.

Earnings instability is measured as the variance in the transitory component of earnings. Earnings volatility is measured as the dispersion in the age-adjusted year-to-year earnings changes. Whereas the transitory variance captures only the transitory earnings shocks, the dispersion in the year-to-year changes in earnings captures both transitory and permanent shocks. Using the OECD labour market indicators, in this study we explore by means of non-linear least squares the relationship between earnings instability/volatility, and labour market institutions and macroeconomic shocks across 14 EU countries between 1994 and 2001. Most findings in this paper are consistent with Ahrend et al. (2011), which explore the role of institutions in shaping the distributive impact of macroeconomic shocks using a different data and a different methodological

approach.

Evaluated for the average country, we find that the employment protection legislation, the degree of corporatism and the deregulation in the product market are associated with a lower earnings instability and a lower earnings volatility.

The institutions are found to shape the distributional effects of macroeconomic shocks on earnings instability and earnings volatility. The institutions which are found to counteract the adverse effects of macroeconomic shocks on both earnings instability and earnings volatility, which offer protection/adaptability to both permanent and transitory shocks, are a high corporatism, deregulated and competitive product markets and generous unemployment benefits. The institutions which are found to counteract the adverse effects of macroeconomic shocks only on earnings volatility are employment protection legislation and low tax-wedges on labour.

We bring evidence of a complex system of interactions within the institutional framework affecting earnings instability, where the effects of most institutions/policies depend to a large extent on the institutional mix. These cross-interactions reveal that there are “costs” and “benefits” associated with many institutions, and the prevalence of one or the other depends on the policy mix in place. One institution which affects significantly the relationship between earnings instability and the other policies/institutions is the degree of corporatism. For example, in the case of union density, for a country with an average mix of policies and a corporatist economy, union density is negatively associated with earnings instability, whereas in a decentralized economy the opposite is found. This suggests that corporatist systems enhance the “benefits” of unionisation. Our findings bring supporting evidence that corporatist systems can be very flexible, even more so than decentralized ones, in line with Teulings and Hartog (2008)’s current findings regarding the impact of corporatism on wage structures. As corporatist systems deal with the adjustment to aggregate shocks, they limit the increase in earnings instability and volatility in the presence of adverse shocks.

For a country with an average mix of policies/institutions and a low corporatism, we find a U-shape relationship between earnings instability and the strictness of labour market regulation, sign that very strict levels of EPL come at a cost. A similar result is found for the generosity of the unemployment benefit replacement rate: evaluated at low levels, the generosity of the UBRR is negatively associated with earnings instability for most policy mixes, but at very high values, the effect of UBRR on earnings instability varies substantially depending on the institutional mix. Particular care is required when designing the EPL and the unemployment benefit schemes.

We find that the earnings instability associated with developed ALMPs is augmented in pe-

riods of adverse macroeconomic shocks. These policies are a crucial instrument for reintegrating the vulnerable groups into the labour market. To counteract the increase in earnings instability, these policies need to be accompanied by appropriate protection mechanisms. We identify a few institutional mixes, as deviations from the average country, which have the potential to achieve this goal when they accompany the development of ALMPs: regulated labour markets, a high corporatism, low non-wage labour costs and high unemployment benefit replacement rates. We also find that the decrease in earnings instability associated with an increase in the UBRR is the largest when the ALMPs are very developed, sign that developed ALMPs have the potential to counteract the adverse effect of increasing the generosity of the unemployment benefit for earnings instability, similar with unemployment (Bassanini and Duval, 2006*a,b*).

Denmark and the Netherlands have among the most flexible labour markets in Europe, but their earnings instability and volatility outcomes differ considerably. Denmark has among the lowest levels of earnings instability in Europe throughout the sample period, whereas the Netherlands records a significant increase reaching in 2001 a level which is 2.6 times higher than in 1994, among the highest in Europe. They differ also in their earnings volatility: in 2001 Denmark is the least volatile, whereas the Netherlands is ranked the 6th. The difference between the two countries may be explained by the differences between their "Flexicurity" models. The Dutch "Flexicurity" model determined an impressive growth in employment in the 1990s, but this growth was entirely in part-time jobs which account for 70% of all low-wage workers (Salverda, 2008). The collective agreements in the Netherlands provided an insufficient protection for this vulnerable group (see Salverda (2008)), which may explain the staggering increase in earnings instability in the Netherlands. The lesson to be drawn is that "Flexicurity" comes at a cost and the institutional framework in place needs to be adapted to re-integrate the vulnerable groups into the labour market, to offer adequate protection, and to favour their investment in human capital for future stable careers.

Table 1: Summary Statistics

		1994	1995	1996	1997	1998	1999	2000	2001
UK	Mean	8,16	8,11	8,22	8,34	8,68	9,01	9,21	9,68
	Var(Ln Earnings)	0,189	0,188	0,177	0,174	0,174	0,167	0,172	0,171
	(%t-1 Waget >0)		64,59	66,31	67,06	67,04	67,36	68,33	68,58
	N	1859	1882	1967	2059	2076	2066	2065	2021
Ireland	Mean	9,3	9,54	9,76	10,02	10,43	10,84	11,69	12,44
	Var(Ln Earnings)	0,249	0,237	0,226	0,213	0,206	0,179	0,167	0,164
	(%t-1 Waget >0)		49,99	50,04	52,41	53,13	54,1	51,63	54,65
	N	1762	1561	1393	1348	1238	1081	891	764
Denmark	Mean	10,89	11,40	11,58	11,61	11,86	11,85	12,02	12,08
	Var(Ln Earnings)	0,091	0,077	0,084	0,08	0,07	0,08	0,079	0,069
	(%t-1 Waget >0)		68,74	66,59	69,43	66,23	67,41	69,6	71,6
	N	1360	1339	1284	1224	1125	1051	1015	997
Finland	Mean			7,89	8,01	8,41	8,45	8,66	8,86
	Mean ln(wage)			2,07	2,08	2,13	2,13	2,16	2,18
	Var(Ln Earnings)			0,1	0,11	0,095	0,107	0,095	0,11
	(%t-1 Waget >0)				55,95	57,2	59,29	53,83	64,16
	N			1613	1628	1606	1557	1293	1297
Netherlands	Mean	9,69	9,56	9,59	9,7	10,02	9,88	10,04	9,91
	Var(Ln Earnings)	0,119	0,126	0,14	0,125	0,114	0,106	0,114	0,152
	(%t-1 Waget >0)		69,07	71,37	68,68	67,52	67,24	68,56	69,59
	N	2209	2390	2444	2416	2351	2379	2412	2371
Belgium	Mean	8,48	8,82	8,71	8,75	8,81	8,83	8,92	9,1
	Var(Ln Earnings)	0,121	0,097	0,101	0,105	0,096	0,101	0,092	0,103
	(%t-1 Waget >0)		63,43	63,65	64,38	63,88	64,28	65,15	64,38
	N	1475	1410	1362	1304	1216	1153	1079	999
Austria	Mean		9,08	8,33	8,37	8,49	8,55	8,55	8,54
	Var(Ln Earnings)		0,137	0,117	0,111	0,096	0,097	0,095	0,101
	(%t-1 Waget >0)			67,96	68,2	67,49	67,2	66,51	68,21
	N		1673	1673	1619	1520	1427	1309	1246
France[1]	Mean	10,23	9,92	9,87	10,05	10,33	10,6	10,55	10,87
	Var(Ln Earnings)	0,233	0,223	0,216	0,23	0,241	0,242	0,236	0,231
	(%t-1 Waget >0)		62,47	64,76	62	52,08	54,24	55,54	60,8
	N	2960	2845	2865	2673	2146	2066	2030	2114
Germany	Mean	9,43	9,49	9,61	9,52	9,57	9,48	9,6	9,72
	Var(Ln Earnings)	0,176	0,183	0,174	0,169	0,165	0,182	0,177	0,17
	(%t-1 Waget >0)		66,99	67,37	66,2	63,01	64,84	64,86	64,39
	N	3010	3147	3106	3025	2815	2802	2700	2550
Luxembourg	Mean		16,18	15,81	16,73	17,39	17,15	17,22	17,1
	Var(Ln Earnings)		0,214	0,23	0,225	0,213	0,24	0,249	0,233
	(%t-1 Waget >0)			64,75	69,48	69,33	69,81	68,71	70,39
	N		1712	1436	1597	1475	1516	1363	1407
Italy	Mean	7,16	6,91	6,96	7,05	7,29	7,37	7,28	7,32
	Var(Ln Earnings)	0,118	0,109	0,117	0,114	0,125	0,122	0,122	0,123
	(%t-1 Waget >0)		51,58	51,19	47,18	47,34	46,87	48,73	48,86
	N	3063	3107	3098	2858	2812	2616	2621	2433
Spain	Mean	6,83	6,95	7,09	6,89	7,18	7,37	7,45	7,42
	Var(Ln Earnings)	0,243	0,252	0,241	0,252	0,25	0,217	0,208	0,205
	(%t-1 Waget >0)		47,6	48,29	48,49	48,63	52,13	52,12	56,06
	N	2905	2756	2696	2651	2530	2527	2451	2425
Portugal	Mean	9,08	8,33	8,37	8,49	8,55	8,55	8,54	9,08
	Var(Ln Earnings)	0,25	0,27	0,258	0,26	0,262	0,241	0,258	0,266
	(%t-1 Waget >0)		57,84	57,5	57,32	56,98	59,12	60,83	62,16
	N	1912	2082	2180	2227	2253	2224	2199	2194
Greece	Mean	4,95	5,03	5,23	5,59	5,63	5,85	5,7	5,77
	Var(Ln Earnings)	0,179	0,184	0,176	0,197	0,199	0,221	0,215	0,205
	(%t-1 Waget >0)		45,83	45,69	44,98	42,09	43,52	46,06	49,72
	N	1666	1656	1577	1500	1385	1355	1315	1365

Notes:

- (i) Weighted statistics, except for N = un-weighted number of individuals with positive earnings
(ii) The mean refers to mean positive hourly earnings expressed in Euro. Var(Ln Earnings) refers to the variance of ln hourly earnings. (%t-1 |Waget >0) is the share of individuals present in the sample in year $t - 1$ which record positive earnings in year t .
(ii) The amounts for France are gross.

Table 2: Description of OECD Variables.

Source: Bassanini and Duval (2006)	
EPL= Employment Protection Legislation	OECD summary indicator of the stringency of Employment Protection Legislation. EPL ranges from 0 to 6.
Union Density	Trade union density rate, i.e. the share of workers affiliated to a trade union, in %.
Degree of Corporatism	Indicator of the degree of centralisation/coordination of the wage bargaining processes, which takes values 1 for decentralised and uncoordinated processes, and 2 and 3 for intermediate and high
Tax Wedge	The tax wedge expresses the sum of personal income tax and all social security contributions as a percentage of total labour cost.
PMR= Product Market Regulation	OECD summary indicator of regulatory impediments to product market competition in seven non-manufacturing industries. The data used in this paper cover regulations and market conditions in seven energy and service industries. PMR ranges from 0 to 6.
ALMPs = Public expenditures on active labour market policies	Public expenditures on active labour market programmes per unemployed worker as a share of GDP per capita, in %.
Average unemployment benefit replacement rate	Average unemployment benefit replacement rate across two income situations (100% and 67% of APW earnings), three family situations (single, with dependent spouse, with spouse in work)
Labour Demand Shock	Logarithm of the labour share in business sector GDP purged from the short-run influence of factor prices.
Terms of Trade Shock	Logarithm of the relative price of imports weighted by the share of imports in GDP
Total Factor Productivity Shock	Deviation of the logarithm of Total Factor Productivity (TFP) from its trend calculated by means of a Hodrick-Prescott (HP) filter (smoothing parameter $\lambda = 100$)
Real Interest Shock	Difference between the 10-year nominal government bond yield (in %) and the annual change in the GDP deflator (in %).

Table 3: Institutional Variables - Summary Statistics.

Variable		Mean	Std. Dev.	Min	Max	Observations
EPL	overall	2.423	0.956	0.600	3.854	N = 101
	between		0.944	0.621	3.739	n = 13
	within		0.251	1.537	3.211	T = 7.769
Union Density	overall	0.371	0.191	0.096	0.794	N = 108
	between		0.201	0.098	0.779	n = 14
	within		0.017	0.302	0.429	T = 7.714
Degree of Corporatism	overall	2.570	0.649	1.000	3.000	N = 93
	between		0.669	1.000	3.000	n = 12
	within		0.000	2.570	2.570	T = 7.75
Tax Wedge	overall	0.326	0.068	0.128	0.449	N = 93
	between		0.067	0.219	0.404	n = 12
	within		0.022	0.234	0.390	T = 7.75
PMR	overall	3.394	1.015	1.133	5.236	N = 93
	between		0.871	1.454	4.415	n = 12
	within		0.563	2.155	4.459	T = 7.75
ALMPs	overall	0.301	0.209	0.048	1.261	N = 93
	between		0.188	0.094	0.750	n = 12
	within		0.101	-0.035	0.812	T = 7.75
Unemployment Benefit RR	overall	0.360	0.117	0.166	0.649	N = 93
	between		0.115	0.174	0.599	n = 12
	within		0.030	0.271	0.451	T = 7.75
Labour demand shock	overall	0.062	0.062	-0.075	0.167	N = 85
	between		0.063	-0.068	0.147	n = 11
	within		0.013	0.028	0.099	T=7.727
Terms of Trade Shocks	overall	-0.094	0.040	-0.178	-0.027	N = 93
	between		0.035	-0.146	-0.042	n = 12
	within		0.022	-0.142	-0.041	T=7.75
Total Factor Production Shock	overall	0.007	0.016	-0.058	0.047	N = 85
	between		0.007	-0.001	0.019	n = 11
	within		0.015	-0.056	0.049	T=7.727
Real Interest Shock	overall	0.039	0.018	-0.016	0.080	N = 93
	between		0.007	0.023	0.045	n = 12
	within		0.017	-0.001	0.088	T=7.75

Table 4: Transitory Variance - Systemic interactions across institutions.

Direct effect of institutions	Estimate	t
EPL	-0,014 ***	-3,370
Union density	0,032 **	2,420
High Corporatism	0,017 ***	3,990
Tax wedge	0,176 ***	5,810
PMR	0,006 ***	2,850
ALMPs	0,050 **	2,590
Average replacement rate	-0,040	-1,340
Systemic interactions		
EPL	-0,607 ***	-5,960
Union density	1,460 ***	3,470
High Corporatism	-2,285 ***	-16,340
Tax wedge	6,702 ***	4,840
PMR	0,378 ***	4,050
ALMPs	2,614 ***	5,460
Average replacement rate	-3,305 ***	-3,760
Adjusted R^2	0,949	
Observations	93	

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Transitory Variance - Simulated relative reforms resulting in 1% decrease in EI relative to the average country.

Change in institutions relative to their average		Change in EI relative to the average country
EPL	1,66%	-1%
Union density	-4,75%	-1%
Tax wedge	-1,00%	-1%
PMR	-2,61%	-1%
ALMPs	-3,85%	-1%
Average replacement rate	4,00%	-1%
Corporatism	Transition from low to high	-37%

Table 6: Partial and Cross-derivatives of EI with respect to the institutional factors

Institution X_j	Institution X_k									
	EPL ¹		Union density		Tax wedge		PMR		ALMPs	
	X_j^*	$\frac{\partial EI}{\partial X_k}$	$\frac{\partial^2 EI}{\partial X_k \partial X_j}$	$\frac{\partial EI}{\partial X_k}$	$\frac{\partial^2 EI}{\partial X_k \partial X_j}$	$\frac{\partial EI}{\partial X_k}$	$\frac{\partial^2 EI}{\partial X_k \partial X_j}$	$\frac{\partial EI}{\partial X_k}$	$\frac{\partial^2 EI}{\partial X_k \partial X_j}$	Average replacement rate
EPL	min	-0,0459	0,1064	0,1064	0,5457	0,1763	-0,2028	0,0235	0,1728	-0,1700
	mean	-0,0143	0,0325	-0,0406	0,1763	0,1763	-0,2028	0,0065	0,0497	-0,0399
	max	0,0106	-0,0257	-0,0406	-0,1142	-0,1142	-0,0069	-0,0069	-0,0470	0,0625
Union density	min	-0,0031	0,0063	0,0063	0,0451	0,0451	0,0005	0,0005	0,0062	0,0059
	mean	-0,0143	0,0325	0,0325	0,1763	0,1763	0,0065	0,0065	0,0497	-0,0399
	max	-0,0314	0,0724	0,0724	0,3763	0,3763	0,0156	0,0156	0,1160	-0,1096
High corporatism	min	-0,0143	0,0325	-0,0500	0,1763	0,1763	-0,2919	0,0065	0,0497	-0,0399
	max	0,0083	-0,0175	-0,0175	-0,1156	-0,1156	-0,0021	-0,0021	-0,0206	-0,0035
Tax wedge	min	0,0258	-0,0615	-0,0615	-0,2909	-0,2909	-0,0153	-0,0153	-0,1073	0,1282
	mean	-0,0143	0,0325	0,4750	0,1763	0,1763	2,3629	0,0065	0,1100	-0,0399
	max	-0,0393	0,0910	0,0910	0,4675	0,4675	0,0200	0,0200	0,1476	-0,1446
PMR	min	0,0068	-0,0167	-0,0167	-0,0726	-0,0726	-0,0046	-0,0046	-0,0311	0,0427
	mean	-0,0143	0,0325	0,0217	0,1763	0,1763	0,1100	0,0065	0,0049	-0,0399
	max	-0,0315	0,0724	0,0724	0,3787	0,3787	0,0155	0,0155	0,1154	-0,1070
ALMPs	min	0,0027	-0,0072	-0,0072	-0,0238	-0,0238	-0,0025	-0,0025	-0,0158	0,0278
	mean	-0,0143	0,0325	0,1575	0,1763	0,1763	0,0357	0,0357	0,0497	-0,0399
	max	-0,0792	0,1838	0,1838	0,9394	0,9394	0,0408	0,0408	0,2995	-0,2979
Average replacement rate	min	-0,0282	0,0646	0,0646	0,3415	0,3415	0,0136	0,0136	0,1019	-0,0911
	mean	-0,0143	0,0325	-0,1655	0,1763	0,1763	-0,8498	0,0065	0,0497	-0,0399
	max	0,0064	-0,0154	-0,0154	-0,0694	-0,0694	-0,0041	-0,0041	-0,0279	0,0363

¹e.g. $X_k = \text{EPL}$ in columns 1-2 (EPL) and $X_j = \text{Union density}$ in row 2 (Union density); (i) the sign of the partial derivative of EI (for a country with an average mix of policies, except Union density and EPL) with respect to EPL (evaluated at average EPL) is evaluated at the minimum, mean and maximum value of Union density to check if it is changing; ii) the sign of the cross-derivative with respect to EPL and Union density is evaluated for an average mix of policies, except EPL and Union density.

²The partial derivative of EI with respect to X_k is evaluated at $X_j = X_j^*$

Table 7: Transitory Variance - Time effects interacted with institutions.

	[1]	[2]		[3]		
	Estimates		Range of institutions/ policies		Implied relative change in EI due to an adverse shock which increases EI by 1% for the average country (EI for mean institutions and shocks = 0,0630)	
		t	Min	Max	Min	Max
Time effects*	0,0118					
EPL	0,0109	0,29	-1,82167	1,4325	-1,01%	2,58%
Union density	0,1089	0,65	-0,27631	0,4212	-2,04%	5,63%
High corporatism	-0,3681***	-6,74	0	1	1,00%	-36,18%
Tax wedge	-0,2774	-0,68	-0,19774	0,1232	6,54%	-2,45%
PMR	0,0572*	1,82	-2,26252	1,8403	-12,07%	11,63%
ALMPs	0,2904*	1,77	-0,25193	0,9610	-6,39%	29,18%
Average replacement rate	-0,4354	-1,43	-0,19437	0,2892	9,55%	-11,72%
Adj. R^2	0,9366					
Obs.	93					

Note: * p<0.1, ** p<0.05, *** p<.01

Table 8: Transitory Variance - Observed shocks interacted with institutions.

	Estimates	t
EPL	-0,0576	-0,62
Union density	-0,1306	-0,39
High corporatism	-0,2104*	-1,98
Tax wedge	1,1377	1,07
PMR	0,0051	0,11
ALMPs	0,2680	0,99
Average replacement rate	-1,0866***	-2,75
LD shift	0,1094***	3,3
Terms of trade	-0,3146***	-6,94
TFP growth	-0,1789	-1,37
Real interest rate	0,4597***	4,86
Adj. R^2	0,9206	
Obs.	80	

Note: * p<0.1, ** p<0.05, *** p<.01

Table 9: The Shin & Solon measure of earnings volatility - Overall effect of institutions

	Estimate	SE
EPL	-0.014***	[0.005]
Union Density	-0.012	[0.022]
High Corporatism	-0.045***	[0.009]
Tax wedge	-0.046	[0.047]
PMR	0.019***	[0.003]
ALMPs	0.021	[0.021]
Unemployment benefit RR	-0.060	[0.040]
Constant	0.267***	[0.006]
R^2 adj.	0.611	
N	69	

* p<0.1, ** p<0.05, *** p<.01

Note: The variables for the labour market institutions are expressed in deviation from the sample mean, so that the constant captures the variances for a country with an average mix of institutions and low corporatism.

Table 10: The Shin & Solon measure of earnings volatility - Simulated relative reforms resulting in 1% decrease in EV relative to the average country.

Change in institutions relative to their average		Change in EI relative to the average country
EPL	7,87%	-1%
Union density	59,97%	-1%
Tax wedge	17,8%	-1%
PMR	-4,14%	-1%
ALMPs	-42,24%	-1%
Average replacement rate	12,36%	-1%
Corporatism	Transition from low to high	-16.85%

Table 11: The Shin & Solon measure of earnings volatility - Time effects interacted with institutions.

	[1] Estimates	[2] Range of institutions/ policies		[3] Implied relative change in volatility due to an adverse shock which increases volatility by 1% for the average country (Volatility for mean institutions and shocks = 0,2647)		
		t	Min	Max	Min	Max
Time effects*	-0,025					
EPL	-0,047***	-2,73	-1,82167	1,4325	9,68%	-5,83%
Union density	-0,064	-0,8	-0,27631	0,4212	2,78%	-1,71%
High corporatism	-0,159***	-5,63	0	1	1,00%	-15,01%
Tax wedge	-0,241	-1,35	-0,19774	0,1232	5,80%	-1,99%
PMR	0,056***	4,17	-2,26252	1,8403	-11,73%	11,35%
ALMPs	0,072	0,95	-0,25193	0,9610	-0,84%	8,00%
Average replacement rate	-0,198	-1,41	-0,19437	0,2892	4,89%	-4,78%
Adj. R^2	0,9931					
Obs.	69					

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 12: The Shin& Solon Volatility Measure - Observed shocks interacted with institutions.

	Estimates	t
EPL	-0,1548**	-2,30
Union density	-0,2846	-1,13
High corporatism	0,0058	0,07
Tax wedge	2,3162***	3,20
PMR	0,0495*	1,79
ALMPs	-0,0904	-0,47
Average replacement rate	-0,8453**	-3,06
LD shift	0,3957***	6.29
Terms of trade	-1,3439***	-12.03
TFP growth	-0,224	-0.76
Real interest rate	2,1726***	7.77
Adj. R^2	0.9837	
Obs.	58	

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

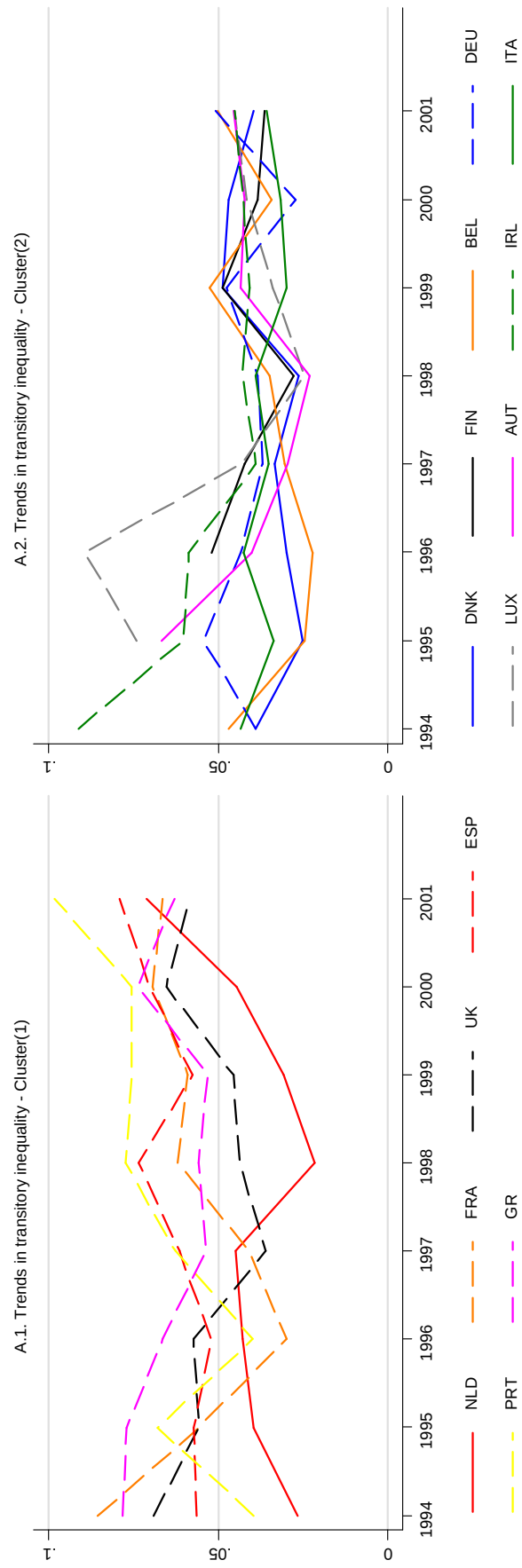


Figure 1: Evolution of earnings instability across Europe
Notes: Earnings instability is measured using the transitory variance.

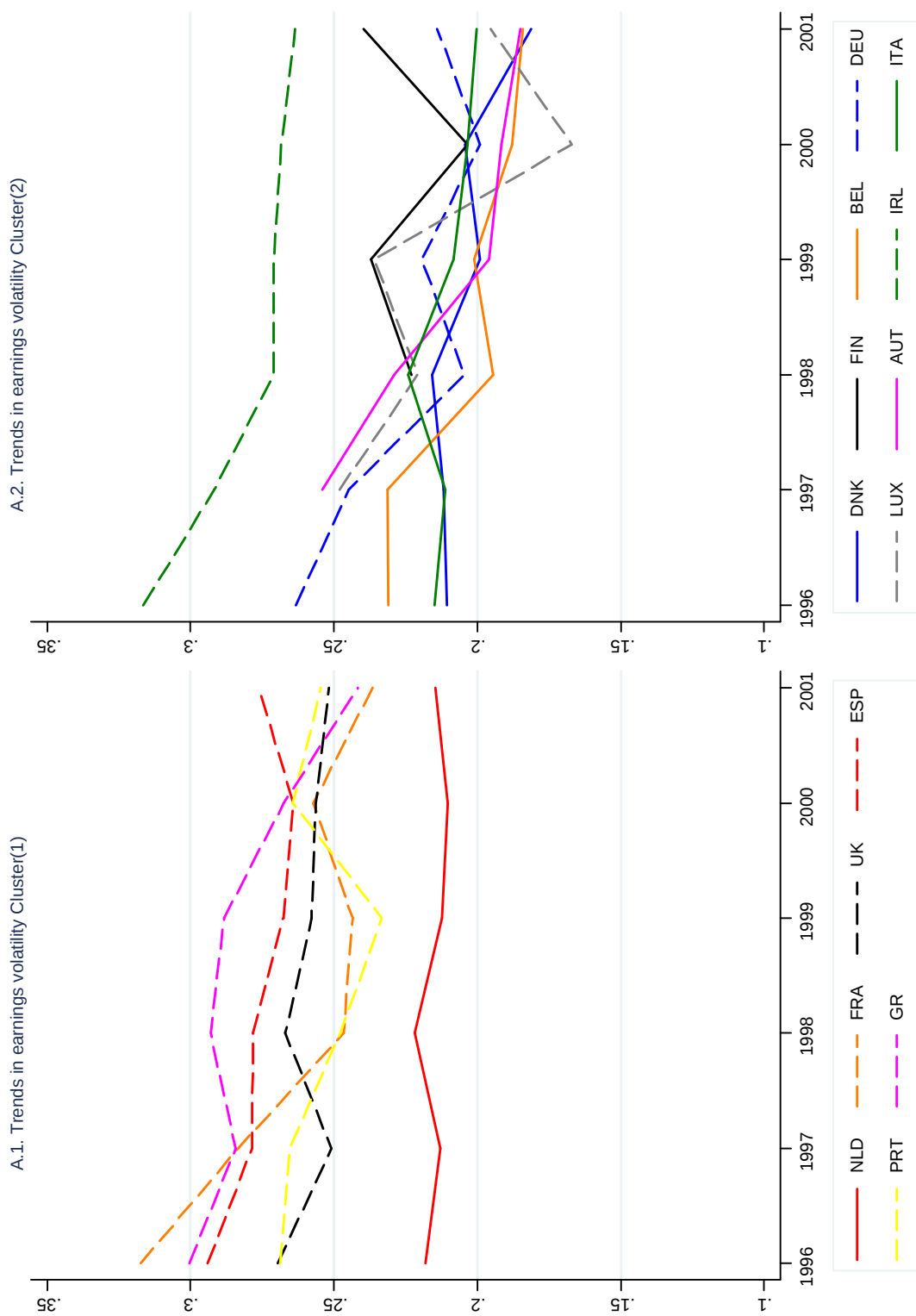


Figure 2: Evolution of earnings volatility across Europe
 Notes: Earnings volatility is measured using the standard deviation of the age-adjusted two-year change in earnings, following Shin and Solon(2011).

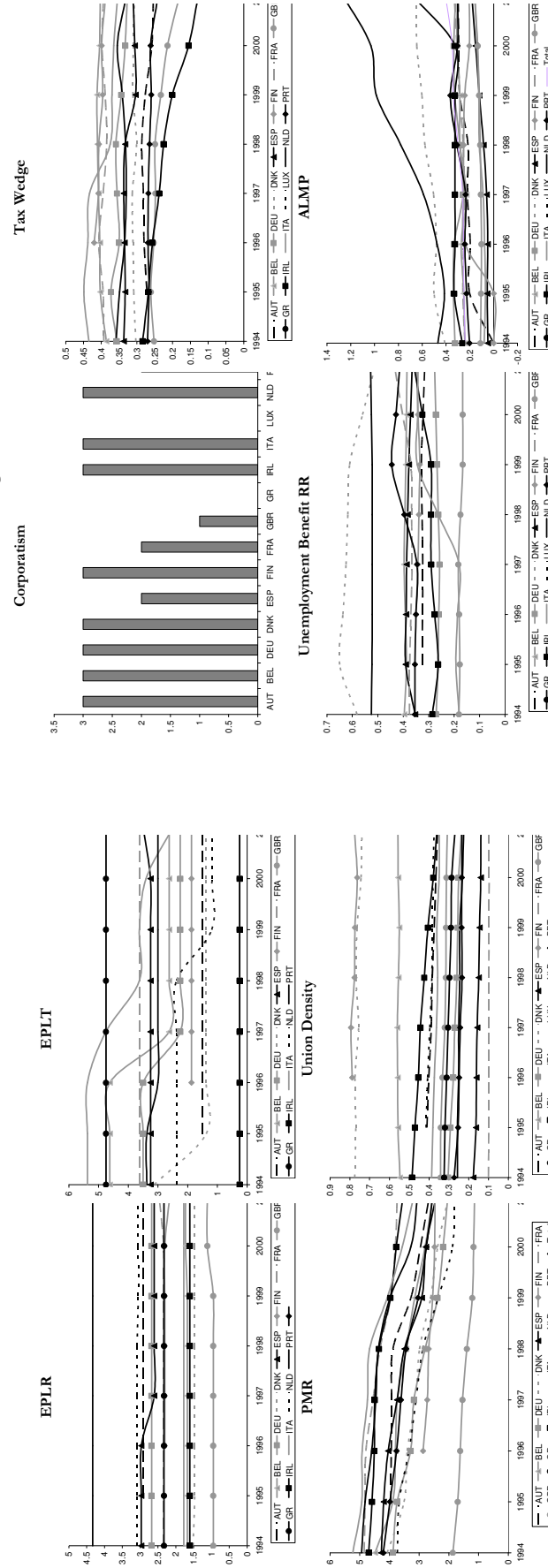


Figure 3: Evolution of labour market institutions

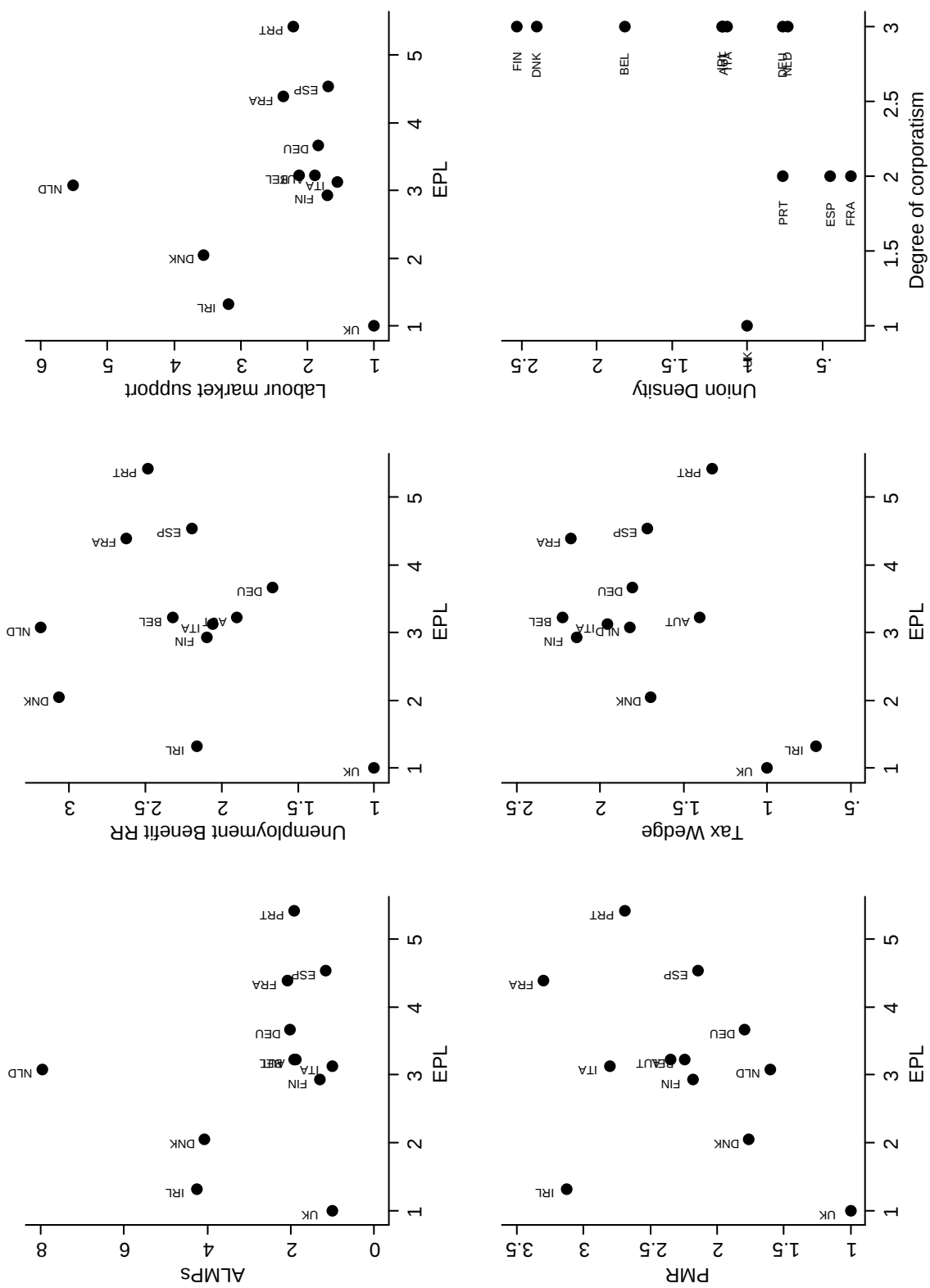


Figure 4: Labour Market Institutions in 2001

Notes: (i) The labour market indicators are re-scaled to set the UK as the base; (ii) The labour market support is the arithmetic average of ALMPs and the Unemployment benefit RR.

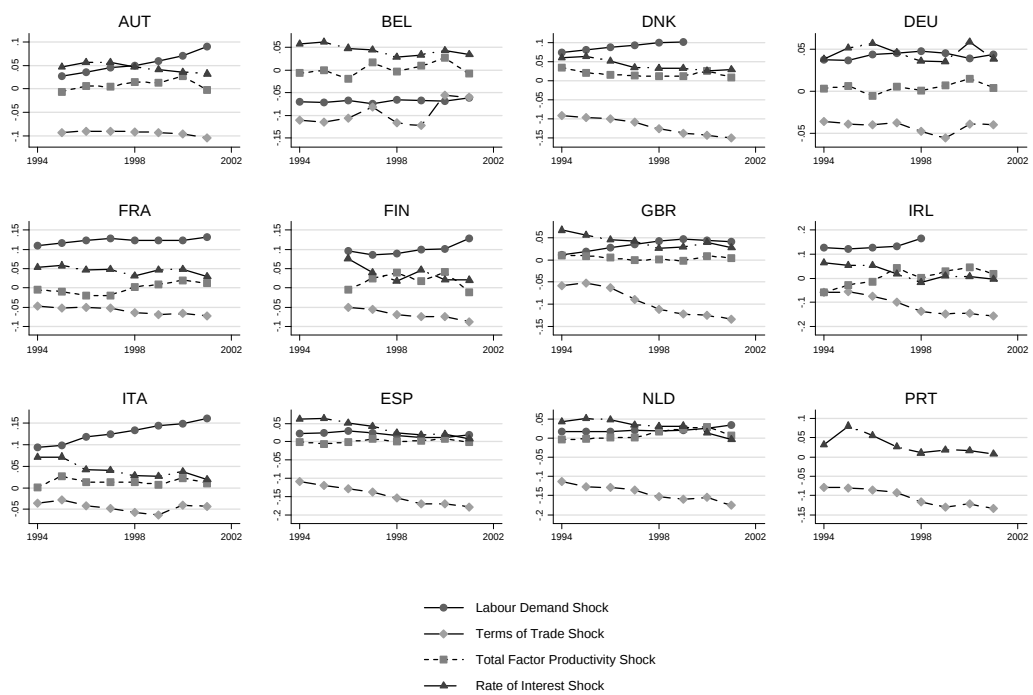


Figure 5: Evolution of macroeconomic shocks

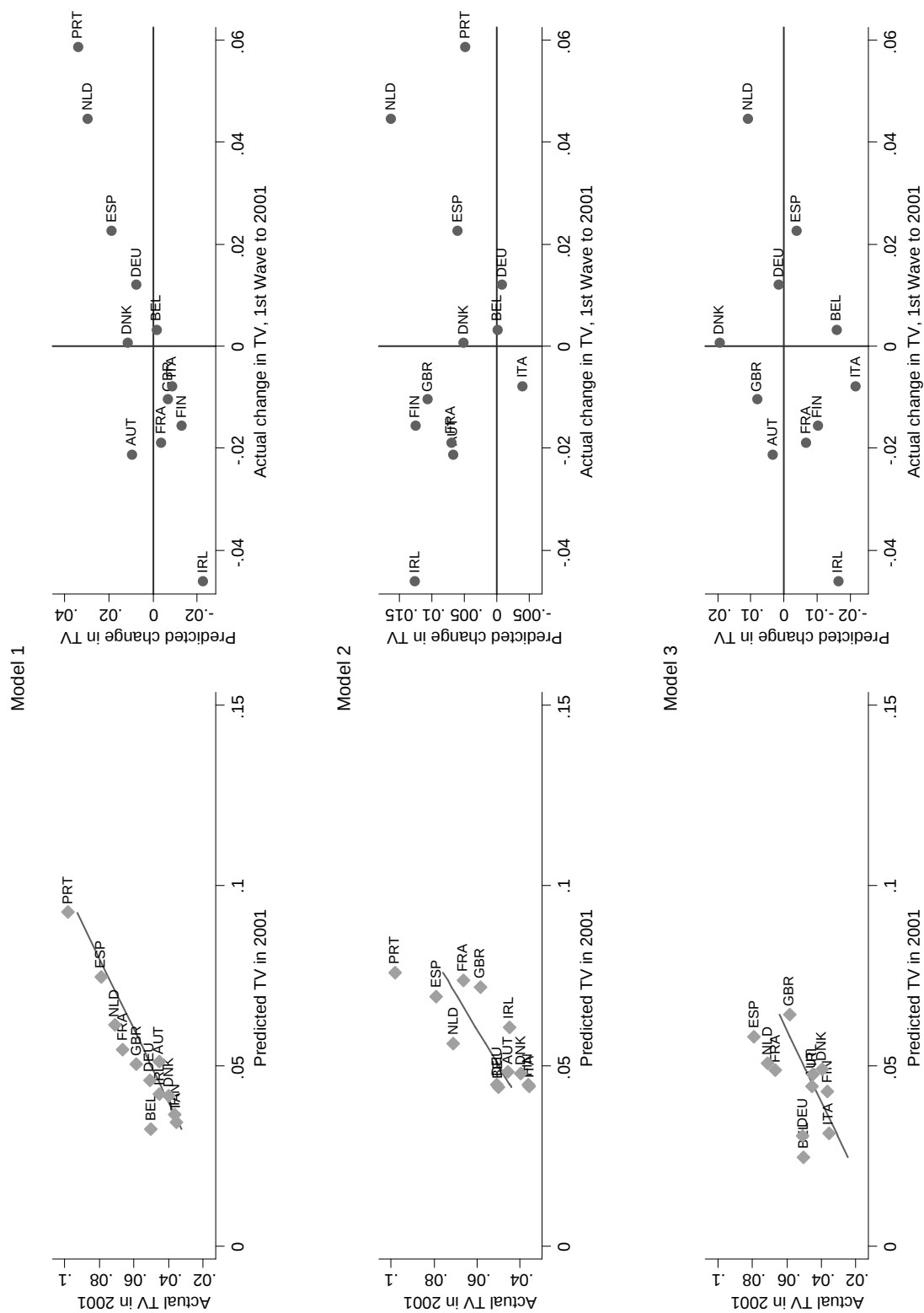


Figure 6: Actual vs Predicted Transitory Inequality - Models 1, 2, 3

Notes: For the predictions in Model 3, the missing shocks are replaced by the previous value observed.

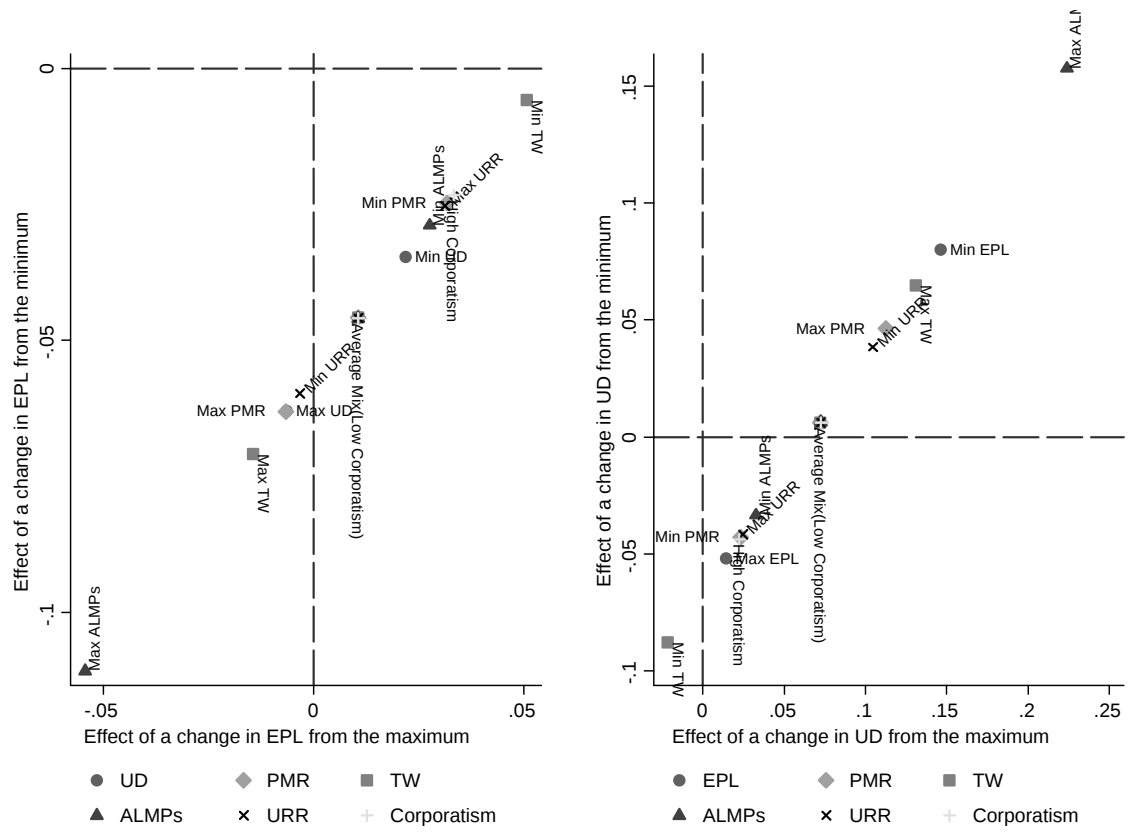


Figure 7: Effect of EPL (left) / Union Density(UD) (right) at its maximum/minimum value evaluated for min/mean/max values of other factors, ceteris paribus at the average

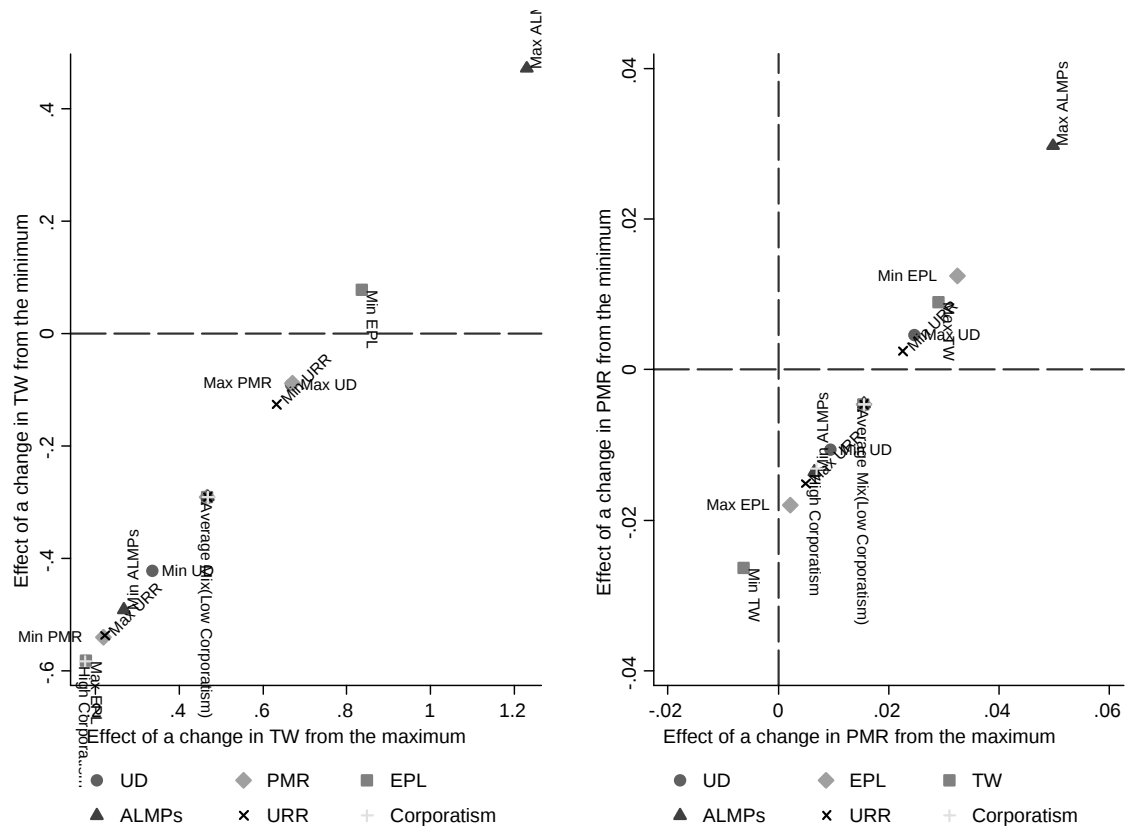


Figure 8: Effect of the Tax Wedge(TW) (left) / PMR (right) at its maximum/minimum value evaluated for min/mean/max values of other factors, ceteris paribus at the average

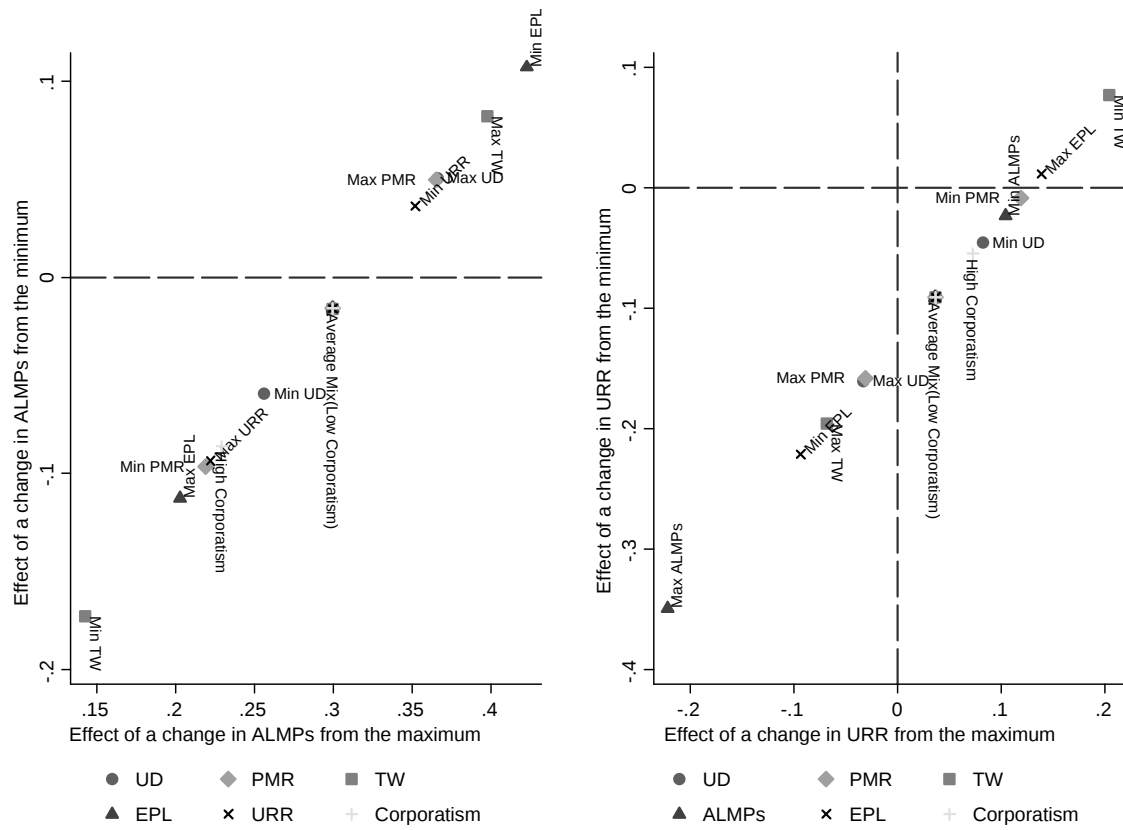


Figure 9: Effect of ALMPs (left) / Unemployment benefit replacement rate(UBRR) (right) at its maximum/minimum value evaluated for min/mean/max values of other factors, ceteris paribus at the average

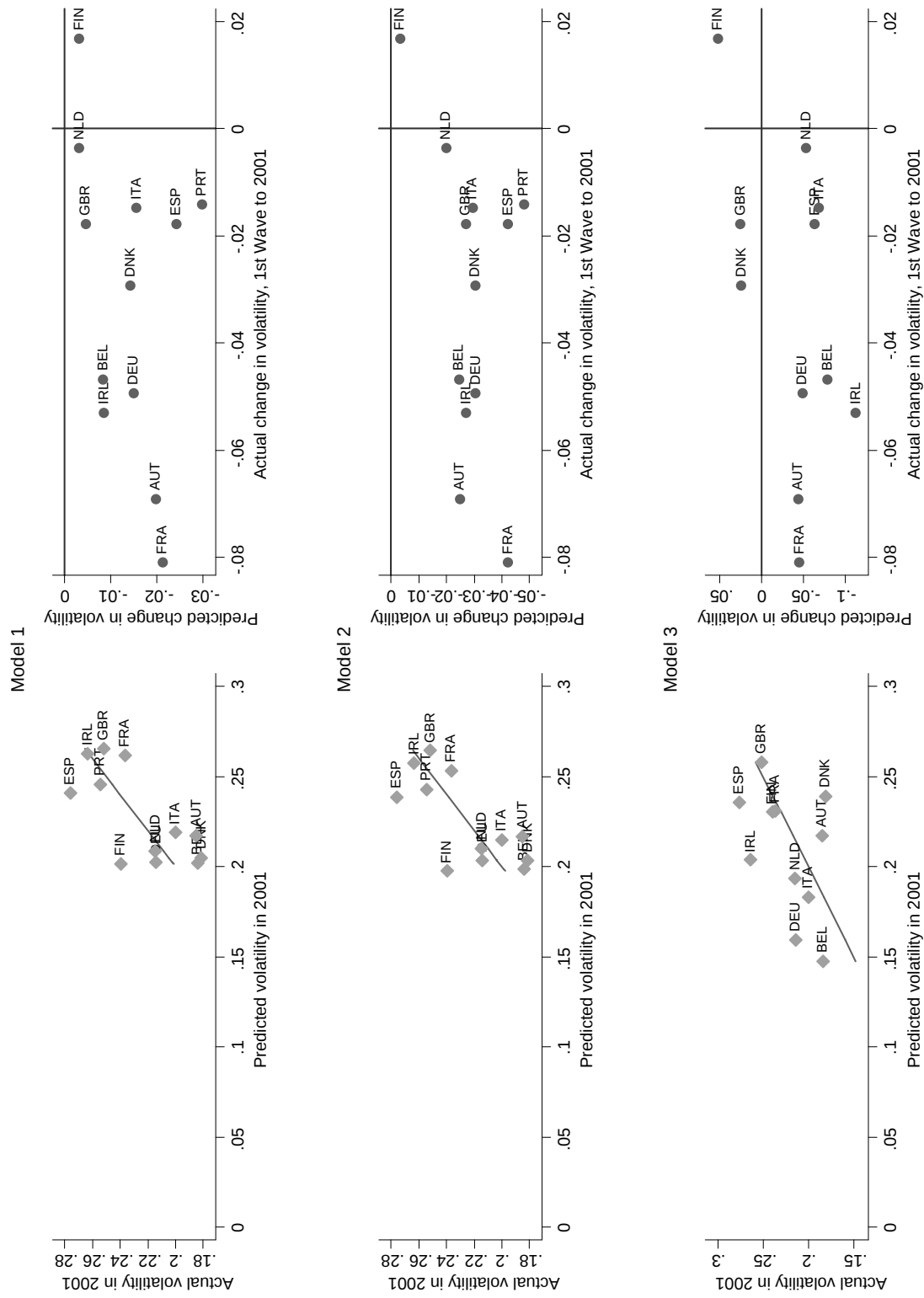


Figure 10: Actual vs Predicted Earnings Volatility - Models 2, 3

Notes: For the predictions in Model 3, the missing shocks are replaced by the previous value observed.

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3, avenue de la Fonte
L-4364 Esch-sur-Alzette
Tél.: +352 58.58.55-801
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