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Policy, Institutional Factors and Earnings Mobility

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ABSTRACT

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This paper uses ECHP and OECD data for 14 EU countries to explore the role of labour market factors in explaining cross-national differences in the dynamic structure of earnings: in permanent inequality, transitory inequality and earnings mobility. Based on ECHP, minimum distance estimator is used to decompose earnings inequality into the permanent and transitory components and compute earnings mobility. The predicted components together with the institutional OECD data are used in a non-linear least squares setting to estimate the relationship between permanent inequality, transitory inequality and earnings mobility, and labour market policy and institutional factors. The results revealed a highly complex framework, where institutions interact significantly not only with each other and with the overall institutional setting, but also with the macroeconomic shocks in shaping the pattern of the three labour market outcomes.

JEL Classification: C23, D31, J31, J60, J50, J08

Keywords: panel data, wage distribution, inequality, mobility, labour market institutions, labour market policies

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1. INTRODUCTION

The rise in earnings inequality experienced by many developed countries during the 1980s and 1990s triggered a strong debate with respect to the driving factors behind individual earnings dynamics and the implications of this increase. The empirical literature has covered extensively the driving factors behind the increase in cross-sectional earnings inequality. Factors like economic growth ("Kuznetz hypothesis"); "the shift in demand away from unskilled labour in favour of skilled workers" (Atkinson 1996) under the impact of trade liberalization, skill-biased technological change and organizational change; the role of changes in the labour market institutions, such as unionization and centralized bargaining, macroeconomic volatility, are among the main possible drivers of income inequality as identified by the empirical literature. (Freeman and Katz 1994; Freeman and Gibbons 1995; Fortin and Lemieux 1997; Gottschalk and Smeeding 1997; Katz and Autor 1999; Aghion and Williamson 2001)

Notwithstanding this, the empirical literature has neglected so far the driving factors behind the two components of earnings inequality: permanent and transitory inequality. Even less attention was given to the driving factors behind earnings mobility, which, as stated by Milton Friedman (1962), represents a very important aspect for understanding inequality. All these labour market outcomes are highly important given that the interplay between them determines the final earnings inequality outcome, both in an annual and lifetime perspective.

In this line of thought, this paper explores the role of labour market policy and institutional factors in explaining cross-national differences in the evolution of permanent inequality, transitory inequality and earnings mobility across 14 EU countries. So far, at the EU level, no

study attempted to analyse and to understand the driving factors behind the three labour market outcomes in a comparative manner.

Understanding the driving forces behind these labour market outcomes is vitally important from a welfare perspective, particularly given the large variation in the evolution of cross-sectional wage inequality across Europe over the period 1994-2001. Did the increase in cross-sectional wage inequality observed in some countries result from greater transitory fluctuations in earnings and individuals facing a higher degree of earnings mobility? Or is this rise reflecting increasing permanent differences between individuals with mobility remaining constant or even falling? What about countries that recorded a decrease in cross-sectional earnings inequalities, what lessons can we learn from them? What are the possible labour market policy and institutional factors that can explain these trends in permanent and transitory differentials, and earnings mobility?

These questions have a twofold importance. One the one hand, understanding the contributions of the changes in permanent and transitory components of earnings variation to the changes in cross-sectional earnings inequality is very useful in the evaluation of alternative hypotheses for wage structure changes and for determining the potential welfare consequences of rising inequality. (Katz and Autor 1999)

On the other hand, understanding the driving factors behind the changes in permanent and transitory inequality and earnings mobility is very useful for the design of polices and labour market institutions. Earnings mobility is perceived in the literature as a way out of poverty. In the absence of mobility the same individuals remain stuck at the bottom of the distribution, hence annual earnings differentials are transformed into lifetime earnings differentials. Understanding the factors that enhance earnings mobility, represents a step forward towards designing policies

and institutions that enable low-wage workers to escape low-wage jobs and improve their position in the distribution of lifetime earnings.

These questions are highly relevant in the context of the changes that took place in the EU labour market policy framework under the incidence of the 1994 OECD Jobs Strategy and the 2000 Lisbon Agenda, which recommended policies to increase wage flexibility, lower non-wage labour costs and allow relative wages to better reflect individual differences in productivity and local labour market conditions. The turnaround in the institutional and policy framework occurred more or less after 1995. (OECD 2004; Dew-Becker and Gordon 2008). Before 1995, Europe could have been described as making labour more expensive, accompanied by a decline in employment and an increase in productivity. Starting at different dates for different policies, Europe began the process of shifting toward making labour less expensive, accompanied by higher employment per capita but lower average productivity per hour. (Dew-Becker and Gordon 2008) Moreover, all OECD countries moved towards greater decentralization, which could result in greater inter-firm wage differentials. These trends appear to have worsened the apparent trade-off between a strong employment performance and a more equal distribution of earnings, consistent with relative labour demand having shifted towards high-skilled workers. OECD (2004)

As pointed out by Dew-Becker and Gordon (2008) and OECD (2004), the most notable change after 1995 in Europe has been increased country heterogeneity. We will investigate how the heterogeneity in main labour market policy and institutional factors translates itself in the level and components of cross-sectional earnings inequality and earnings mobility.

Using ECHP we apply equally weighted minimum distance methods to estimate the covariance structure of earnings by four birth cohorts for each country, decompose earnings into a

permanent and a transitory component and compute earnings mobility. The predicted components – permanent variance, transitory variance and earnings mobility -, together with OECD data on institutional factors, are used to estimate the relationship between these components and labour market policy and institutional factors. The relationship between the labour market policy and institutional factors and the three labour market outcomes is estimated using non-linear least squares.

The structure of this paper is as follows. Section two introduces the literature review, the theoretical background for wage differentials and the theoretical link between labour market factors and the three labour market outcomes. Section three provides a description of the ECHP and OECD data. Section four introduces the econometric specifications and estimation methods for the covariance structure of earnings and for the link between institutional and policy factors and labour market outcomes. Section five describes the dynamic structure of individual log earnings for 14 EU countries and the evolution of the labour market institutions and policies. Section six fits the error components models to the covariance structure for each country, decomposing the change in inequality into that accounted for by the change in the permanent and transitory components. Section seven presents the results on the link between policies and outcomes. Lastly, section eight offers some conclusions.

2. THEORETICAL MODEL OF THE DETERMINANTS OF WAGE DIFFERENTIALS

2.1. Literature Review

The existing literature on earnings dynamics is predominantly based on US data. (Atkinson, Bourguignon et al. (1992) provide a comprehensive survey of the literature on earnings dynamics until 1992. The most representative contributions using US or Canadian data were brought by Lillard and Willis (1978), Lillard and Weiss (1979), MaCurdy (1982), Abowd and Card (1989), Moffitt and Gottschalk (1995; 1998; 2002; 2008), Baker (1997), Baker and Solon (2003). For Europe, the most representative papers are Dickens (2000), Ramos (2003), Kalwij and Alessie (2003), Cappellari (2003), Gustavson (2004).

Finally, Sologon and O'Donoghue (2009) used ECHP for 14 EU countries to explore the dynamic structure of individual earnings and the extent to which changes in cross-sectional earnings inequality reflect transitory or permanent components of individual lifecycle earnings variation. Their main findings will be used further in this paper.

The main limitation of the existing studies on earnings dynamics is that they do not explain the main labour market policy and institutional driving factors behind the evolution of the two inequality component and earnings mobility. Our paper attempts to fill part of this gap.

2.2. Determinants of earnings inequality

As pointed out by Katz and Autor (1999), the existing literature contains many explanations for the rise in earnings inequality experienced by many developed countries during the 1980s and 1990s. The theory regarding the determinants of wage differentials goes back to Adam Smith, who provided a comprehensive discussion in his capital work, The Wealth of Nations. It was emphasized that wage differentials are determined by competitive factors relating to the

workplace (e.g. cost of training), by innate abilities and by labour market institutional factors, which regulated wages, restricted wages and labour mobility. The tension between the demand and supply factors and the institutional factors affecting wage structures that emerged from Adam Smith's analysis has remained until today one of the key themes of research on the wage structure. Following Freeman and Katz (1994), this supply-demand-institutions (SDI) explanation for the changes in the wage structure has three parts.

The first part assumes that different demographic and skill groups are imperfect substitutes in production, which implies that shifts in the demand and supply for labour skills can alter wage and employment outcomes. Potential important sources of shifts in the relative demand among skill groups include skill-biased technological change and a complementary increase in the prices of other inputs, and forces of globalization (trade and outsourcing). Sources of relative supply include cohort size variation, changes in access to education, immigration. Supply and demand factors are expected to have their largest effect on young workers as opposed to experienced workers with substantial work tenure. (Freeman 1976)

However, since most advanced countries operate in the same world markets, with similar technology, industry and occupation mixes, demand and supply factors cannot by themselves explain all the differing changes in inequality among these countries. To fully understand the differences in labour market outcomes across advanced countries something else is needed: the institutional framework.(Freeman and Katz 1994)

The second part states that the shock in the demand and supply may have different effects on wages and employment, depending on different wage-setting mechanisms and other labour market institutional factors. The stronger the wage-setting mechanism is, meaning the higher trade union density, the higher the union coverage and the higher the centralisation/co-ordination

of wage bargaining, the less impact these shocks have on wages. As argued by OECD (2004), there is a strong evidence that unions reduce wage inequality and that this compression effect is stronger in countries where union membership and bargaining coverage are high, and bargaining is centralised and/or co-ordinated (Aidt and Tzannatos, 2002; Blau and Kahn, 1999, 2002; OECD, 1997a). National labour markets characterized by decentralized wage bargaining experience also a higher skill premia and a higher responsiveness of wages to local conditions, therefore a higher wage inequality.

Thirdly, institutional changes, such as changes in the degree of unionization, the degree of centralization/co-ordination of collective bargaining, or product market regulation can have an impact on the wage structures.

Katz and Autor (1999) used the SDI model to look at cross-country differences in wage structure changes. The shift in demand for more skilled workers did not result in a sharp increase in wage dispersion for all OECD countries. The differences in the growth of skills supply appear to be an important factor in explaining cross-country differences. The same holds for labour market institutions. Countries in which unions, wage bargaining structure play a larger role in the determination of wages recorded smaller increases in inequality. However, the key issue in the interplay between demand, supply and institutions is the erroneous assumption that institutional change is exogenous. The reality is that institutions are influenced by labour market forces. As argued by Freeman and Gibbons (1995), shifts in supply and demand that raise relative wage differentials are expected to reduce the strength of the centralized collective bargaining and lower union influence on the wage setting mechanism.

2.3.Permanent and transitory components of earnings inequality

Following the terminology introduced by Friedman and Kuznets (1954), individual earnings are composed from a permanent and a transitory component. The permanent component of earnings reflects personal characteristics, education, training and other systematic elements. The transitory component captures both individual random factors (e.g. illness and accident) and random changes in the market conditions in a particular period and is expected to average out over time, with no influence on permanent earnings. In general terms, these are factors which are random to the individual perception. Hence, it is logical to require independence between the permanent component and the transitory component. (Weizsacker 1993) Following the structure of individual earnings and the independence assumption between the two components, overall inequality at any point in time is composed from inequality in the permanent component of earnings and inequality in the transitory component.

One approach for explaining changes in wage differential is to decompose overall wage inequality into the two components. The evolution of the overall earnings inequality is determined by the cumulative changes in the two inequality components. As the factors from the SDI model influence overall inequality, implicitly they influence its two components. The intriguing question that arises is which factors influence which component and to what extent. Our focus in this paper is mainly on labour market policy and institutional factors.

This section tries to establish a theoretical link between the changes in the two inequality components and earnings mobility, and labour market policy and institutional factors. First we introduce alternative specifications for decomposing inequality. Second we introduce the concept of earnings mobility and its link with permanent and transitory inequality. Finally we present the

theoretical link between institutions and the three labour marker outcomes – permanent inequality, transitory inequality and earnings mobility.

2.3.1. Alternative model specifications for the permanent and transitory components

Based on Sologon and O'Donoghue (2009), we summarize several models of earnings dynamics that have been dominating the literature on permanent and transitory earnings inequality over the past 30 years. For a full review, please refer to Sologon and O'Donoghue (2009). We begin with the simplest specification, which provides a very intuitive insight into the decomposition of earnings into their permanent and transitory components. Based on this specification earnings are being decomposed as follows:

$$Y_{it} = \mu_i + v_{it}, \quad \mu_i \sim iid(0, \sigma_\mu^2), \quad v_{it} \sim iid(0, \sigma_v^2), \quad t = 1,...,T_i, \; i = 1,...,N \tag{1}$$

where μ_i represents the permanent time-invariant individual specific component and v_{it} represents the transitory component, which is independent distributed both over individuals and time. This model imposes very rigid restrictions on the covariance structure of earnings:

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

Because μ_i is assumed to incorporate the effect of lifetime persistent individual specific characteristics such as ability, the variance of the permanent component σ_μ^2 represents the persistent dispersion of earnings or the inequality in the permanent component of earnings. The transitory shocks are captured by the transitory variance σ_v^2 and are assumed to persist only one year.

This model facilitates the understanding of the inequality decomposition into its permanent and transitory components. The variance of earnings at a certain point in time, as a measure of earnings dispersion, is composed both from a permanent and a transitory dispersion ($\sigma_\mu^2+\sigma_v^2$). The covariances, on the other hand, are determined solely by the permanent component (σ_μ^2). Therefore, the assessment of the relative importance of the two components in the overall earnings dispersion is straightforward: the ratio σ_μ^2/σ_y^2 captures the relative importance of the permanent component, whereas the ratio σ_v^2/σ_y^2 captures the relative importance of the transitory component.

Notwithstanding its attractive features, the empirical evidence rejected the rigid restrictions imposed by model (1). One of the main drawbacks of model (1) is that it does not allow for changes in earnings inequality over time. Other studies ((Katz 1994; Moffitt and Gottschalk 1995) took the model complexity further by allowing the covariance structure of earnings to vary over time. To account for these time effects, these models considered also time specific loading factors or shifters on both components, which allow the parameters of the process to change with calendar time.

$$Y_{it} = \lambda_{1t}\mu_{it} + \lambda_{2t}v_{it} \tag{2}$$

$\lambda_{kt}, k = 1, 2$ are time-varying factor loadings on the permanent and transitory components of earnings. The variance of Y_{it} implied by this model takes the form:

$$Var(Y_{it}) = \lambda_{1t}^2\sigma_\mu^2 + \lambda_{2t}^2\sigma_v^2 \tag{3}$$

An increase in either time loading factors generates an increase in the cross-sectional earnings inequality. The nature of the change in inequality depends on which of the loading factors

changes. On the one hand, a persistent rise in λ_{1t} increases the permanent or long-run inequality (inequality in earnings measured over a long period of time, such as lifetime earnings). As λ_{1t} can be interpreted as time-varying return to skills or skill price, its increase suggests that the relative labour market advantage of high skill workers is enhanced. In this situation, the autocovariances grow in greater proportion that than the variance, causing the autocorrelation to increase. As a consequence, the increase in overall cross-sectional inequality is accompanied by a decrease in mobility. On the other hand, an increase in λ_{2t} without a change in λ_{1t} increases cross-sectional earnings inequality by increasing the transitory inequality, but without any impact on long-run or permanent inequality. In this situation the rise in the variances is not accompanied by a rise in the autocovariances, hence autocorrelations decrease and the increase in the overall inequality is accompanied by an increase in mobility. (Baker and Solon 2003) As pointed out by Katz and Autor (1999), λ_{1t} maintains the rank of the individuals in the earnings distribution, but causes a persistent increase in the spread of the distribution and an increase in λ_{2t} changes the rank of the individual in the short-run. In other words an increase in the time parameters associated with the permanent component of earnings indicates a growing earnings inequality with no impact on the relative position of individuals in the distribution of permanent earnings, whereas an increase in the transitory time parameters indicates an increase in earnings mobility.

Although model (2) incorporates changes over time in the permanent and temporary components of earnings inequality, it disregards other important features of earnings dynamics. Firstly, it disregards the cohort effects. As argued by Katz and Autor (1999), the increased wage inequality may arise from increased dispersion of unobserved labour quality within recent entry cohorts, resulting from unequal school quality. Some studies brought evidence against the hypothesis that the return to education is the same for different cohorts. These changes could be attributed either

to the cohort effects or to the larger impact of the labour market shocks on younger than on older cohorts of workers. In the same line of thought, Freeman (1975) put forward the "active labour market" hypothesis, which postulates that changes in the labour market conditions, such as changes in the supply and demand for skills, affect mainly new entrants in the labour market. To account for these cohort effects, these models considered also cohort specific loading factors or shifters on both components, which allow the parameters of the process to change with cohort.

$$Y_{it} = \gamma_{1c}\lambda_{1t}\mu_{it} + \gamma_{2c}\lambda_{2t}v_{it} \tag{4}$$

where γ_{jc}, $j = 1, 2$ are cohort specific loading factors.

Secondly, regarding the permanent component, some studies brought evidence in favour of the "random growth rate model"[i] or the "profile heterogeneity model": (Hause 1977; Lillard and Weiss 1979; MaCurdy 1982; Baker 1997; Cappellari 2003; Sologon and O'Donoghue 2009) According to this model, which is consistent with labour market theories such as human capital, and matching models (Mincer 1974; Hause 1980), each individual has a unique age-earning profile with an individual specific intercept (initial earnings) and slope (earnings growth) that may be systematically related.

An alternative/additional specification for the permanent component of earnings is the "random walk model"[ii] or the "unit root model", which is used in the literature to accommodate earnings shocks that might have permanent effects. (MaCurdy 1982; Abowd and Card 1989; Moffitt and Gottschalk 1995; Baker 1997; Dickens 2000; Sologon and O'Donoghue 2009).

Thirdly, regarding the transitory component of earnings, previous research has brought evidence that transitory earnings might be serially correlated. Therefore, a more general autocorrelation structure is called for that relaxes the restriction on $v_{it}'s$ from the canonical model. For the

construction of such a structure, longitudinal studies on earnings dynamics turned to error processes from the literature on time series analysis. Based on MaCurdy (1982), the structure of the transitory component, v_{it}, is assumed to follow an ARMA(p,q) process[iii].

2.3.2. Earnings Mobility

Another aspect relevant to the evolution of earnings differentials is earnings mobility, defined by Katz and Autor (1999) as the rate at which individuals shift positions in the earnings distribution. Earnings mobility is closely related to the importance of the permanent and transitory components in earnings variation. A large contribution of the permanent component implies that individual earnings are highly correlated over time and individuals do not change their income position to a large extent experiencing low rates of earnings mobility. Therefore, the changes in earnings mobility are determined by the extent to which the changes in cross-sectional inequality are driven by changes in the permanent or transitory variance.

Earnings mobility is a very complex phenomenon, and the ways of measuring it is diverse. In this study, we look at the degree of immobility, which is measured by the ratio between permanent and transitory inequality and offers a summary of the evolution in the structure of inequality: a decrease (increase) in immobility is equivalent with a(n) decrease (increase) in the relative share of permanent differentials in overall inequality.

A rise only in permanent inequality is associated with a decline in mobility rates. From a welfare perspective, this has negative implications for people situated at the bottom of the earnings distribution: decreasing mobility rates imply decreasing chances of improving their relative position in the distribution of lifetime earnings. Moreover, in a lifetime perspective the income gap between the top and the bottom widens. A rise only in transitory variance is associated with

an increase in mobility, which is not expected to impact lifetime earnings inequality in the long run since transitory shocks are expected to fade away over time.

A rise in transitory variance and a decrease in permanent variance imply increasing mobility rates, suggesting that the current combination of labour market and institutional factors has the potential of reducing lifetime earnings differentials.

Equal proportional increases (decreases) in both components will leave mobility unchanged in spite of increasing (decreasing) overall cross-sectional instability. The first scenario has negative implications, suggesting that the increase in transitory differentials only exacerbates the permanent differentials, without helping low-wage individuals improve their relative lifetime earnings position. The second scenario implies that people's ranking is maintained over lifetime, but the distance between the top and the bottom decreases, which does not have negative welfare implications.

Decreasing permanent and transitory differentials, accompanied by an increase in mobility is the ideal situation, where mobility increases as a result of a larger decrease in permanent differentials relative to transitory differentials. Thus the set of labour market institutional factors and polices are very effective in keeping earnings volatility low and reducing permanent earnings differentials between individuals, with a reducing effect on overall inequality.

It becomes obvious that the question regarding the link between earnings mobility and earnings inequality does not have a straight forward answer and mobility is not always beneficial. It depends on the underlying factors: "changes in earnings mobility could either work to offset or to increase changes in cross-sectional dispersion", with very different implications for permanent earnings inequality. (1999) Nonetheless, no controversy surrounds the fact that mobility is

beneficial when it helps low paid individuals to improve their income position in the long-term income distribution.

2.3.3. Linking labour market policies and institutions with outcomes

To understand the differences in labour market outcomes – permanent inequality, transitory inequality and earnings mobility – across the 14 EU countries we relate to factors from the "SDI explanation of change" – the institutional setting. To our knowledge no study before tried to determine the possible links with the main labour market policy and institutions. Moreover, there is no specific theory that can explain this link. Therefore, we build our expectations based on existing labour market theories and empirical findings regarding the impact of the SDI factors on overall earnings inequality.

The rise of inequality in the permanent component of earnings may be consistent with increasing returns to education, on-the-job training and other persistent abilities that are among the main determinants of the permanent component of earnings, meaning enhanced relative earnings position of the highly skilled individuals. (Mincer 1957; Mincer 1958; Mincer 1962; Mincer 1974; Hause 1980). Thus the increase in permanent differentials may be driven by an increase in the relative demand for high-skilled labour which has outstripped the rise in supply.

Among the factors that determine shifts in relative demand are skill-biased technological changes, which enhances the relative earnings position of the highly-skilled workers, the increase in prices of the other products, which imply changes in product demands, and forces of globalization, such as reduction in trade barriers and outsourcing.(Fortin and Lemieux 1997; Topel 1997) A possible solution to the economic and social problem of rising permanent earnings differentials is to enhance the supply of high skill labour through investment in human

capital to match the rise in the demand. (Topel 1997) Shifts in the supply demand are determined by cohort variation, changes in access to education and immigration.

Another factor is the change in the interest rate. Weizsacker (1993) analysed its influence on permanent inequality and concluded that an increase in the interest rate leads to a decrease in permanent inequality within the younger cohort and to a rise in permanent inequality in the older cohorts.

As underlined by Katz and Autor (1999), the rise of earnings instability appears to be "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 could be formulated. The increase in the inequality of the transitory component of earnings may be attributed to increased earnings exposure to macroeconomic shocks and/or a rise in the temporary workforce which increases earnings exposure to shocks, increased labour market instability, increased competitiveness, globalization, increasing international capital mobility, and to the weakening of the labour market institutions (e.g. unions, government wage regulation, and internal labour markets) in filtering the impact of these shocks on earnings. (Rodrik 1997; Katz and Autor 1999)

Some of the factors influencing directly permanent inequality might impact also transitory inequality. E.g. 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 it can increase earnings instability, as firms might face uncertainty with respect to the abilities of the individual workers. (Katz and Autor 1999).

Overall, the increase in the return to persistent skills is expected to have a much larger impact on long-run earnings inequality than an increase in the transitory component of earnings. (Katz and

Autor 1999; Moffitt and Gottschalk 2002) 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. Moreover the limiting impact of these factors on both inequality components is expected to be lower for younger workers, which have a weaker attachment to the labour market compared with senior workers.

The discussion is summarized in Figure 1. Permanent earnings inequality within birth cohorts is the result of the interactions between ability distributions, lifecycle decisions, economic structures and labour market policy and institutions. Transitory inequality within birth cohorts is expected to be driven mainly by random macroeconomic and individual-specific shocks, but its final evolution depends on the ability of the labour market policy and institutions to minimize its increase.

Once we account for all these factors influencing each component, the complexity of the mechanism determining earnings mobility is revealed. The evolution of mobility, which reflects the evolution in the structure of inequality, depends on which component is influenced the most: an increase in mobility is triggered when transitory inequality becomes relatively more important than permanent differentials in the composition of overall inequality and people manage to change their position in the income distribution. An equal relative increase in both components suggests an increase in earnings instability with no change in mobility, which might point to an increase in persistent differentials which are exacerbated by transitory differentials. .

Policies and Institutions – permanent effects

Economic theory and previous empirical studies have identified a number of possible policy and institutional determinants of inequality. These include inter alia trade union bargaining power

and the structure of collective bargaining, employment protection legislation (EPL), anti-competitive product market regulation (PMR), taxes, active labour market policies (ALMPs) and unemployment benefits. We are going to investigate to what extent the patterns of changes in permanent earnings inequality, transitory earnings variability and earnings mobility are related to changes in these policy and institutional variables.

(i) Trade unions and the structure of collective bargaining

Unionization and collective bargaining represents an important institutional factor in the determination of wages and implicitly earnings inequality. It is well recognized that the stated purpose of unions is to reduce earnings disparities and that covered workers earn significantly higher wages and have less volatile profiles than the uncovered ones. Hence, unionization could be expected to lower transitory differentials.

Unions affect wage dispersion indirectly, mainly through their 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 unionization stimulates earnings mobility and increases employees' opportunity to improve their position in the permanent earnings distribution. Hence permanent earnings inequality can be reduced at any given rate of technical change. (Aghion and Williamson 2001) In conclusion, unionization could be expected to lower both permanent and enhance earnings mobility.

However, even if unions decrease within-group earnings disparities, it may still increase both overall transitory and permanent inequality by increasing between-group wage differentials, meaning between those unionized and non-unionized. Thus, the impact of unionization depends also on the wage gap between unionized and non-unionised workers.

Furthermore, strong trade unions have the ability to increase wages above market-clearing levels at the cost of lower employment, which affects mainly workers with more elastic labour supply, such as younger workers, women and older workers. (Bertola, Blau et al. 2002) Hence, by pushing these workers out of the labour market, both components might be expected to decrease for those still in the labour market. Similarly with overall inequality, because of these potentially offsetting effects, the impact of unionization on permanent differentials, transitory differentials and earnings mobility can only be resolved empirically.(Fortin and Lemieux 1997)

Existing studies brought evidence that a high union density is usually associated with a low overall earnings inequality, which results from claims for high wages and earnings stability for covered workers. OECD (2004)

Nonetheless, it has long been argued that, in practice, union influence on wage formation depends on the structure of collective bargaining. On the one hand, a low degree of corporatism, meaning a decentralized wage bargaining at the firm level is expected to prevent excessive wage claims since this would lead to a loss of market shares to competitors with detrimental effects on employment. This implies that wages are less uniformly distributed, meaning that there is a higher dispersion in the returns to skills and in earnings variability.(Bassanini and Duval 2006) Therefore we can expect countries with low degrees of corporatism to display high levels of permanent earnings inequality, a high variability and a high degree of earnings mobility.

The impact of coupling a high union density with low corporatism can be argued either way. On the one hand, a high or increasing union density could decrease the level of the high permanent and transitory inequality associated with low corporatism and might stimulate earnings mobility. On the other hand, even if union density increases, in the absence of coordination, this might lead to even higher permanent and transitory differentials. Moreover, as mentioned above, the

wage gap between those unionized and those non-unionized is expected to play a significant role as well in determining the final outcome.

On the other hand, a very high degree of corporatism, meaning a very centralized and coordinated bargaining system is associated with a compressed wage structure across qualification levels because it is expected to exclude low skilled workers from the labour market. (Calmfors, 1993). Therefore we can expect permanent and transitory earnings inequality and mobility to be lower the higher is the degree of centralization/coordination and the effect to be stronger the stronger the unionization. Again, the union-non-union wage gap might play a role.

Nonetheless, a very high degree of corporatism is more likely to lead to wage modernization, because they induce unions to internalize the detrimental macroeconomic effects of excessive wage pressure by restraining the wage demands. In this situation the degree of permanent inequality under high corporatism might be similar as under low corporatism. Thus the relationship between the degree of corporatism and wages may not be monotonic, but follow a "U-shaped" pattern, similar with employment.

For employment, an intermediate level of corporatism is expected to trigger the worst labour market outcomes, as they do not benefit from either of the advantages of low and high corporatism: when bargaining takes place at the firm level (without coordination), the high elasticity of demand in the product market implies that any price increase resulting from higher wages would result in severe drops both in output and employment. By contrast, when the bargaining takes place at the industry level, unions are able to secure higher wages because product demand elasticity is generally lower, given the lower substitution possibilities compared with the firm level. (Bassanini and Duval 2006); Calmfors and Driffill, 1988). Thus it is reasonable to expect both higher transitory and permanent differentials for intermediate levels of

corporatism compared with low and high levels. Given the high earnings volatility, we might expect also higher levels of earnings mobility for intermediate corporatism compared with the other two.

(ii) Employment protection legislation (EPL)

EPL is one of the factors which affect the elasticity of labour demand to the bargained wage. It is considered to be a key factor in generating labour market rigidity by incurring costs to employers when dismissing workers. Two consequences emerge. On the one hand, employers might offer lower wages in order to compensate for the firing costs. On the other hand, employees might feel better protected and push for higher wages, which in turn puts a pressure on employers. Employers will reduce hiring rates, thus increase unemployment spells. Consequently, the cost of unemployment becomes too high, which might create an incentive for employees to accept lower wages to maintain their wage. Hence the equilibrium is restored. (Blanchard 1999) Therefore, theory predicts that EPL increases the cost of hiring and of layoffs, and consequently lowers labour turnover, which might reduce transitory inequality and earnings mobility, and wages, which might reduce permanent inequality. This is consistent with OECD (2004) findings, which state that a strict EPL is usually associated with a low overall inequality. Moreover, the low turnover is expected to affect mainly workers with temporary contracts, because they have a weaker protection in the labour market.

In conclusion, an increase in the strictness of the EPL can be expected to decrease both permanent and transitory earnings inequality and earnings mobility. However, the overall impact of the EPL depends on the difference in regulating regular (EPLR) and temporary contracts (EPLT), which affects the labour market structure with respect to the type of contract. A higher

share of transitory contracts is expected to bring along a higher transitory inequality, given the higher exposure of these workers to the economic shocks.

If a strict EPLR coexists with a low EPLT, this represents a strong disincentive for employers to train temporary workers, as the cost of their layoff is low. Consequently, temporary workers are trapped in this type of contracts, without a chance towards permanent contracts, meaning without a chance towards increasing their human capital and, at the same time, facing more earnings instability under the impact of macroeconomic shocks. However, this type of earnings instability is not expected to increase mobility rates that could help these individuals improve their relative position in the distribution of lifetime earnings. At the same time, workers with a permanent contract might benefit from higher bargaining power and might push towards higher wages. Thereby, permanent differentials and earnings instability are expected to be enhanced, and earnings mobility to be reduced by an increase in the relative difference between EPLR and EPLT.

(iii) Tax wedge

An increase in the tax wedge, defined as the sum of the personal income tax and all social security contributions as a percentage of total labour cost, results in employers paying more and employees receiving less. The resulting impact on permanent inequality is twofold. On the one hand, tax wedge influences permanent inequality through its influence on human capital price. An increase in the tax wedge lowers human capital price. Weizsacker (1993) proved within the context of an explicit comparative dynamic inequality analysis that a decrease in human capital price results in a decrease in permanent inequality within age groups.

On the other hand, an increase in the tax wedge suggests that the cost to employers increases to a larger extent than the increase of the wage offered. This has detrimental effects especially for

employment, pushing minimum wage workers, for which the rise in payroll taxes cannot be shifted onto, into unemployment. (Bassanini and Duval 2006) Thus an increase in the tax wedge is expected to push low wage workers into unemployment and to decrease permanent earnings inequality for the working population. These effects might be exacerbated by strong unions. Similarly with the findings for employment, its effects are expected to depend also on the degree of corporatism. No direct effect is expected on transitory income.

(iv) Product market regulation (PMR)

A good example of the impact of product market regulation on wage inequality is the comparison between public and private sector: the public sector, which is highly regulated, displays a more compressed earnings structure. Hence, we expect highly regulated sectors to display reduced permanent and transitory differentials.

Lower product market regulations (PMR) are expected to determine an increase in competition in the previously regulated sectors, and consequently lower market rents, which in turn determine lower wage claims, aimed to close the gap between productivity and real wages that generates unemployment. Therefore a decrease in product market regulation is expected to shift labour demand, increase its elasticity to wages, increase the returns to skills, and consequently increase permanent differentials in the previously regulated sectors. At the same time, increased competition is expected to increase transitory inequality. In the same line of thought, more competitive environments are expected to determine higher levels of earnings mobility.

These effects might hold in the previously regulated sectors, but the impact on the overall level of inequality, including also those which were not regulated, might be different. The final effect depends on a large extent on the ex-ante wage gap between regulated and non-regulated sectors. Moreover, interaction effects with other institutions cannot be neglected. For example, previous

findings showed that the effect of deregulation on wage differentials depend on union density and the degree of corporatism. For example, Fortin and Lemieux (1997) found that deregulation increases overall inequality, but the effect is larger among unionized male workers.

(v) Active labour market policies (ALMPs)

Active Labour Market Programs (ALMP), which typically consist of job placement services and labour market programmes such as job-search, vocational training or hiring subsidies can reduce permanent earnings differentials by improving the efficiency of the job matching process and by enhancing the work experience and skills of the unemployed. Thus by increasing human capital of low wage individuals and decreasing permanent wage differentials, ALMP is expected to increase their wage mobility, helping them improve their position in the distribution of permanent earnings.

However, these reintegrated workers are the ones with least protection in the labour market and they are expected to be the most affected by macroeconomic shocks. Hence, in the face of macroeconomic shocks, their presence in the labour market might exacerbate permanent and transitory differentials.

Another aspect to be considered are interactions with other factors: the effects of the ALMP depend on the other labour market policies and institutions. For example, a strict EPL is expected to dampen the effect of active labour market policies aimed to reintegrate the unemployed into the labour market (Bassanini and Duval 2006). On the one hand, the increase in the ALMP increases employability and on the other hand the low EPL facilitates their labour market reintegration. Hence, an increase in ALMP coupled with a low or decreasing EPL could be expected to reduce permanent differentials and increase earnings mobility.

(vi) Unemployment benefits

The expected impacts of the unemployment benefits on labour market outcomes are not so straightforward. On the one hand, generous unemployment benefits are expected to weaken the job-search intensity and decrease the employability and human capital for the unemployed, thus increase permanent differentials. Moreover, generous unemployment benefits are expected to increase the economic cost of employment, which in turn may put an upward pressure on worker's wage claims and exacerbate the increase in permanent earnings dispersion.

On the other hand, longer and more generous unemployment benefits represent incentives not to accept low-paid jobs and improve the job-matching, thus increasing the likelihood of a more stable employment and earnings patterns. (Bassanini and Duval 2006) In this situation, both transitory and permanent differentials are expected to be reduced. Moreover, if they are coupled with active labour market programs they are expected to increase human capital even further, thereby reducing permanent differentials.

Regarding the interactions between all these policy and institutional factors that are expected to impact permanent inequality, transitory inequality and earnings mobility, based on the standard wage-setting/price-setting (WS/PS) model (Layard, Nickell et al. 1991), any factor that affects the slope of the wage-setting curve - the elasticity of wage claims to employment (e.g. unemployment benefits, unionization, degree of corporatism, PMR) and/or the slope of the price-setting curve – elasticity of labour demand to bargaining wage (e.g EPL, PMR, tax wedge) may be expected to interact with policies and institutions that affect the level of the wage-setting - level of wage claims (e.g. unemployment benefits) and the level of price-setting curve – level of labour demand (e.g. PMR). (Bassanini and Duval 2006)

Similar with the conclusions reached by Bassanini and Duval (2006) regarding the impact of the labour market institutional and policy factors, the overall lessons that emerge are that, in theory, all possible interactions across policies and institutions can affect permanent inequality, transitory inequality and earnings mobility. And which policies complement each other should be established empirically.

Interactions between polices, institutions and macroeconomic shocks – temporary effects

From what has been presented so far, policies and institutions appear to play a major role in shaping primarily permanent differentials and earnings mobility. However, for transitory differentials and earnings mobility a big part of the story is missing. Besides their permanent effects, policies and institutions may also have a temporary impact via their interactions with a series of macroeconomic shocks which have affected the OECD countries. We are going to consider the impact of globalization, technological changes, interest rate, labour demand shocks, aggregate supply and demand shocks. These macroeconomic shocks are expected to explain to a larger extent the evolution of the transitory variance and earnings mobility compared with permanent variance, which appears to be shaped at a larger extent by institutional and policy factors.

The effects of these shocks on all three elements are expected to be "filtered" by the labour market policies and institutions, which are put in place to protect earnings against the exposure to the possible adverse effects of these shocks.

We expect that strong unionization, a high degree of corporatism, strict EPL, strict PMR and high unemployment benefits will have a dampening effect on the sensitivity of wages to general economic conditions, thus limiting the increase or even reducing transitory variance, and thus reducing earnings mobility. The effectiveness of these policies and institutions is expected to be

lower for the youngest cohort compared with more experienced workers, as younger workers are expected to be affected the most by demand and supply shocks.

3. DATA

The estimation of the permanent variance, transitory variance and earnings mobility is done using the European Community Household Panel (ECHP)[iv] over the period 1994-2001 for 14 EU countries. Not all countries are present for all waves. Luxembourg and Austria are observed between 1995 and 2001 and Finland between 1996 and 2001. Following the tradition of previous studies, the analysis focuses only on men.

A special problem with panel data is that of attrition over time, as individuals are lost at successive dates causing the panel to decline in size and raising the problem of representativeness. Several papers analysed the extent and the determinants of panel attrition in ECHP. Behr, Bellgardt and Rendtel (2005) found that the extent and the determinants of panel attrition vary between countries and across waves within one country, but these differences do not bias the analysis of income or the ranking of the national results. Ayala, Navrro and Sastre (2006) assessed the effects of panel attrition on income mobility comparisons for some EU countries from ECHP. The results show that ECHP attrition is characterized by a certain degree of selectivity, but only affecting some variables and some countries. Moreover, the income mobility indicators show certain sensitivity to the weighting system.

In this paper, the weighting system applied to correct for the attrition bias is the one recommended by Eurostat, namely using the "base weights" of the last wave observed for each individual, bounded between 0.25 and 10. The dataset is scaled up to a multiplicative constant[v] of the base weights of the last year observed for each individual.

For the empirical analysis, individuals are categorized into four birth cohorts, which are followed through time. Ideally, one should use birth cohorts formed from people born in a particular year. The limited number of observations forces us to group more birth years in one birth cohort. The first birth cohort are people born between 1940-1950, the second one people born between 1951-1960, the third cohort people born between 1961-1970 and lastly people born between 1971-1981. This grouping allows the analysis of the earnings covariance structure for individuals of the same age, followed at different points in time.

For this study we use real log hourly wage adjusted for CPI of male workers aged 20 to 57, born between 1940 and 1981. Only observations with hourly wage lower than 50 Euros and higher than 1 Euro were considered in the analysis. The resulting sample for each country is an unbalanced panel. The choice of using unbalanced panels for estimating the covariance structure of earnings is motivated by the need to mitigate the potential overestimation of earnings persistence that would arise from balanced panels where the estimation is based only on people that have positive earnings for the entire sample period.

Details on the number of observations and mean yearly hourly earnings are provided in Table 1. Mean hourly earnings appear to increase in all countries except for Austria where it records a slight decrease. Based on Sologon and O'Donoghue (2009), the highest attrition rates from one year to the next are recorded in Ireland, Italy, Greece, Spain and Portugal, where, on average, less than 60% of those who were in the sample in the previous year reported positive earnings in the current year. For more descriptive statistics please refer to Sologon and O'Donoghue (2009).

The link between the evolution of the two inequality components and the labour market policies and institutions is investigated using the estimated components from the first part of the analysis and the OECD data on the labour market indicators, which is a combination of two data sets. The

first dataset is the one used by Bassanini and Duval (2006) [vi] and the second one is the Lindert-Allard OECD data set 1950-2001[vii].

The following institutional variables are included in the analysis: employment protection legislation overall (EPL), for temporary (EPLT) and for regular contracts (EPLR), the relative difference between EPLR and EPLT, trade union density, product market regulation (PMR), tax wedge, degree of corporatism, degree of bargaining coverage, average unemployment benefit replacement rate and spending on active labour market programmes (ALMP). The macroeconomic shock variables included are: labour demand shock, terms of trade shock, total factor production shock, real interest shock, aggregate demand shock and aggregate supply shock. These variables are observed at the country level, over the period 1994-2001.

A description of the variables is included in Table 2. For a more detailed description, please refer to Bassanini and Duval (2006) and the Lindert-Allard OECD data sets 1950-2001. The summary statistics of the institutional variables and shock variables are illustrated 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 labour demand shock.

Additional control variables by cohort are included in the final estimations estimation: the share of university degrees, the share of upper-secondary degrees, share of permanent contracts, share of private employees and share of employees by occupation. The summary statistics for the control variables are presented in Table 4.

4. ECONOMETRIC SPECIFICATIONS AND ESTIMATION METHODS

The aim of this section is twofold: first, to fit a parsimonious model to the autocovariance structure of earnings for all cohorts and for all countries, decompose overall earnings inequality into its permanent and transitory components and compute earnings immobility; second to estimate the relationship between these estimated components and the main labour market policy and institutional factors.

4.1.Econometric specifications and Estimation methods of covariance structures

4.1.1. Econometric Earnings Specification

The methodology used to estimate earnings inequality, its permanent and transitory component, and earnings mobility by cohorts and for each country follows Sologon and O'Donoghue (2009; 2009). This paper represents a follow-up of their analysis. Basically, we use the same data and the models identified by Sologon and O'Donoghue (2009; 2009) as the best fit for each country to estimate the two inequality components and earnings mobility. A summary of this methodology is provided below.

The inspection of the covariance structure of earnings, included in section 5.1, suggests the following features of the data, which must be incorporated in the model:

(vii) the elements of the autocovariance structure decrease with the lag at a decreasing rate and

(viii) they converge gradually at a positive level;

(ix) the lag-1 autocovariance drops to a larger extent compared with higher order autocovariances, which decline more gradually;

(x) the autocovariances and mean earnings vary over the sample period, so they cannot be assumed to be stationary over sample period;

(xi) the autocovariances vary with age controlling for the period effect, hence they cannot be assumed to be stationary over the life cycle;

(xii) the variance covariance structure appears to be cohort specific.

Each of the above features are incorporated in the general model. Feature (i) suggests the presence of an AR(1) process, but the presence of feature (iii) calls for an ARMA (1, 1) process. Feature (ii) can be captured by the presence of the permanent component. Feature (vi) is captured by incorporating period specific parameters, meaning that the permanent individual component and the transitory component of earnings are allowed to vary with time. The life cycle non-stationarity of the autocovariance structure of earnings mentioned in feature (v) can be captured by modelling the permanent individual component as random walk and/or random growth in age. Cohort heterogeneity is incorporate by parameters that allow the permanent and transitory components to vary between cohorts.

The following general specification encompasses all the relevant aspects of earnings dynamics considered above.

$$\begin{aligned} &Y_{ict} - \overline{Y_{ct}} = r_{ict} = \gamma_{1c}\lambda_{1t}[\mu_i + \varphi_i age_{it} + u_{iat}] + \gamma_{2c}\lambda_{2t}v_{it}, \quad t = 1,...,T_i, \; i = 1,...,N_c \\ &\mu_i \sim iid(0,\sigma_\mu^2), \quad \varphi_i \sim iid(0,\sigma_\varphi^2), \quad E(\mu_i,\varphi_i) = \sigma_{\mu\varphi} \end{aligned} \tag{5}$$

$$u_{iat} = u_{i,a-1,t-1} + \pi_{ia}, \quad \pi_{ia} \sim iid(0,\sigma_\pi^2), \quad E(u_{i,a-1,t-1},\pi_{iat}) = 0 \tag{6}$$

$$v_{it} = \rho v_{it-1} + \varepsilon_{it} + \theta\varepsilon_{it-1}, \quad \varepsilon_{it} \sim (0,\sigma_\varepsilon^2), \quad v_{i0} \sim (0,\sigma_{0,c}^2) \tag{7}$$

Y_{ict} is the natural logarithm of real hourly earnings of the *i*-th individual, from the ***c***-th cohort in the *t*-th year, $\overline{Y_{ct}}$ is the year-cohort specific mean and r_{ict} is an error term which represents the individual-specific deviation from the year-cohort specific mean. The demeaned earnings r_{ict} are

assumed to be independently distributed across individuals, but autocorrelated over time. Earnings differentials within each cohort can be characterised by modelling the covariance structure of individual earnings $VarCov(Y_{ict}) = E(r_{ict}, r_{ict-s}),\ s = 0,...,T_c - t_{0c}$.[viii]

Based on equation (5), earnings can be decomposed into a permanent component $\gamma_{1c}\lambda_{1t}[\mu_i + \varphi_i age_{it} + u_{iat}]$ and a transitory component $\gamma_{2c}\lambda_{2t}v_{it}$. The component $\mu_i + \varphi_i age_{it}$ models an individual profile heterogeneity as a function of age, called also a random growth (see (Baker 1997), (Moffitt and Gottschalk 1995)), where μ_i and φ_i are time invariant individual intercept and slopes with variance σ_μ^2 and σ_φ^2. Besides the random vector of intercepts and slopes (μ_i, φ_i) the parameterization of individual earnings dynamics includes also a random walk process (Equation (6)). (Moffit and Gottschalk (1995), Baker and Solon (2003)) The variance of the first period shock (assumed to be at age 20, which is also the lowest age observed in our dataset) is estimated together with the σ_μ^2 and is considered part of the unobserved heterogeneity.

Equation (7) specifies the transitory component of earnings which evolves as an ARMA(1,1) process, where the serial correlation ρ parameter captures the decreasing rate of decay of the covariances with the lag, the moving-average parameter θ captures the sharp drop of the lag-1 autocovariance compared with the other autocovariances, and ε_{it} are white-noise mean-reverting transitory shocks. The variance $\sigma_{0,c}^2$ measures the volatility of shocks at the start of the sample period for each cohort, σ_ε^2 the volatility of shocks in subsequent years and ρ the persistence of shocks. Measurement error in this model is captured by the transitory component.

When working with ARMA(p,q) processes in the context of panel data, MaCurdy (1981), MaCurdy (1982) and Anderson and Hsiao (1982) underlined the need for the treatment of initial

conditions[ix]. Following MaCurdy (1981), MaCurdy (1982) and Sologon and O'Donoghue (2009; 2009), we treat the initial transitory variances of the 4 cohorts as 4 additional parameters to be estimated.

The non-stationary pattern of earnings is accommodated using time specific loading factors, both on the permanent and transitory component of earnings, $\lambda_{kt,\ k=1,2;\ t=0,7}$, normalized to 1 in the first wave for identification[x]. Cohort heterogeneity is accommodated by allowing both the permanent and the transitory component to vary with the cohort. $\gamma_{jc},\ \ j=1,2$ are cohort loading factor, normalized to 1 for the cohort born in 1940-1949 for identification.

4.1.2. Specification and Estimation of the Covariance Structure of Earnings

Following Sologon & O'Donoghue (2009), the covariance structure for the first sample period takes the form:

$$Var(Y_{ic0}) = E(r_{ic0}r_{ic0}) = \sigma_{\mu}^2 + \sigma_{\varphi}^2 E(age_{i0}^2) + 2\mathrm{cov}(\mu_i\varphi_i)E(age_{i0}) + (a-20)\sigma_{\pi}^2 + \sigma_{0,c}^2) \ \ if\ t=0 \quad (8)$$

The covariance structure for subsequent years can be expressed as follows:

$$\begin{aligned} Var(Y_{ict}) = E(r_{ict}r_{ict}) = \gamma_{1c}^2\lambda_{1t}^2[\sigma_{\mu}^2 + \sigma_{\varphi}^2 E(age_{it}^2) + 2\mathrm{cov}(\mu_i\varphi_i)E(age_{it}) + \sigma_{\pi}^2(a-20)] + \\ + \gamma_{2c}^2\lambda_{2t}^2[\rho^2 Var(v_{it-1}) + \sigma_{\varepsilon}^2(1+2\rho\theta+\theta^2)] \ \ if\ t>0 \end{aligned} \quad (9)$$

$$\begin{aligned} &Cov(Y_{ict}Y_{ict-s}) = E(r_{ict}r_{ict-s}) \\ &= \gamma_{1c}^2\lambda_{1t}^2\{\sigma_{\mu}^2 + \sigma_{\varphi}^2 E(age_{it})E(age_{it-s}) + \mathrm{cov}(\mu_i\varphi_i)[E(age_{it}) + E(age_{it-s})] + \sigma_{\pi}^2(a-s-20)\} + \\ &+\gamma_{2c}^2\lambda_{2t}\lambda_{2t-s}[\rho Cov(v_{it-1}, v_{it-s})] \ \ if\ t>0 \ \ \&\ \ s>1 \end{aligned} \quad (10)$$

$$\begin{aligned} &Cov(Y_{ict}Y_{ict-1}) = E(r_{ict}r_{ict-1}) = \\ &= \gamma_{1c}^2\lambda_{1t}^2\{\sigma_{\mu}^2 + \sigma_{\varphi}^2 E(age_{it})E(age_{it-1}) + \mathrm{cov}(\mu_i\varphi_i)[E(age_{it}) + E(age_{it-1})] + \sigma_{\pi}^2(a-1-20)\} \\ &+\gamma_{2c}^2\lambda_{2t}\lambda_{2t-1}\{\rho Var(v_{it-1}) + \theta\sigma_{\varepsilon}^2)\} \ \ if\ t>0 \ \ \&\ \ s=1 \end{aligned} \quad (11)$$

Basically the parameters that are estimated are: $\gamma_{1c}, \lambda_{1t}, \sigma_{\mu}^2, \sigma_{\varphi}^2, \mathrm{cov}(\mu_i\varphi_i), \sigma_{\pi}^2, \gamma_{2c}, \lambda_{2t}, \rho, \theta, \sigma_{\varepsilon}^2, \sigma_{0,c}^2$

The parameters of the models are fit to the covariance structure for each cohort by country using equally weighted minimum distance methods of estimation. The methodology used is the same as that utilized by Cappellari (2003), Baker and Solon (2003), Ramos (2003), Kalwij and Alessie (2003), Dickens (2000), Baker (1997), Abowd and Card (1989), Cervini, Ramos (2006) and Sologon and O'Donoghue (2009) adapted to unbalanced panels.

This paper used only the specification that fit the data the best for each country, as found by Sologon and O'Donoghue (2009). For the full description on the methodology and the strategy on selecting the model for each country, please refer to Sologon and O'Donoghue (2009).

4.2.Estimation of the links between policy, institutions and outcomes

This section describes the methodology used to estimate the relationships between labour market policy and institutional factors as independent variables and permanent inequality, transitory inequality and earnings mobility, as dependent variables. Each model is estimated independently, for all cohorts and countries pooled together. The unit of analysis is the cohort. Hence we have four cohorts for each country, observed over 1994-2001[xi].

The analysis follows a general to specific strategy. First, we test weather policies interact with the overall institutional framework, controlling for the cohorts effects and for all the unobserved shocks. Second, we test whether there are any specific interactions between different institutional factors, and between the institutional factors and the observed aggregate shocks in shaping the pattern of the two inequality components and earnings mobility.

4.2.1. Systemic Interactions

In macroeconomic equations interactions between institutions are usually specified in a multiplicative form between deviations of institutions from their sample mean, which enables the

interpretation of the marginal effects of each institution when the others are kept constant at the sample mean. Before analysing the specific cross-interactions between all institutions, we want to get a grasp of the systemic interactions, meaning the interactions between each institution and the overall institutional setting.

Systemic reform complementarity patterns are explored by estimating a separate non-linear equation for each labour market outcome, pooling all cohorts, where each institution is interacted with the overall institutional framework, defined as the sum of the direct effects of institutions.

$$y_{it} = \delta_c \tau_t (\sum_{k=1}^{K} \upsilon_k X_{kit} + \sum_{j=1}^{J} \varphi_j (X_{kit} - \overline{X_k})(\sum_{k=1}^{K} \upsilon_k (X_{kit} - \overline{X_k})) + \mu_i + v_{it} \qquad (12)$$

y_{it} represents the labour market outcomes -permanent variance, temporary variance and wage immobility of the cohort i in year t. The parameters υ_k, φ_j, δ_c and τ_t are estimated simultaneously. υ_k denotes the direct effect of institution X_k on y_{it}, for a country with an average mix of policies and institutions, while φ_j indicates the strength of the interaction between X_k and the overall institutional framework, expressed as the sum of direct effect of policies and institutions, expressed in deviation form in the interaction. X_k is measured at the country level. A negative and significant effect suggests that there is a systemic reform complementarity between X_k and the overall framework in reducing permanent variance, temporary variance and earnings immobility, at the cohort level. δ_c and τ_t represent cohort and respectively period shifters, which capture cohorts heterogeneity and all the unobserved shocks that might affect permanent variance, transitory variance and earnings immobility by altering the slopes of the direct and indirect effects.

The estimation results are included in Table 8.

4.2.2. Specific 2-by-2 interactions between institutions, and between institutions and shocks

This section attempts to open the black box of the systemic interactions investigated in the previous section and explore the specific interactions between institutions and between institutions and shocks, which are expected to shape the pattern of permanent inequality, transitory inequality and earnings mobility. We start with a relatively simple model in which we explore the direct effect of institutions, shocks and the interactions between shocks and institutions. Moreover, we allow the effects to differ by cohorts to account for cohort heterogeneity. The model is expressed as follows:

$$y_{it} = \delta_c[\sum_{k=1}^{K} \upsilon_k X_{kit} + \sum_{s=1}^{S} \psi_s (Z_{sit} - \overline{Z_s})(1 + (\sum_{k=1}^{K} \gamma_k (X_{kit} - \overline{X_k}))] + \mu_i + v_{it} \quad (13),$$

where $\sum_{s=1}^{S} \psi_s (Z_{sit} - \overline{Z_s})$ is a set of observed macroeconomic shocks expressed in deviation from their mean, which are interacted with policy and institutional factors. δ_c, υ_k, ψ_s and γ_k are estimated simultaneously. As before δ_c represent the cohort shifters, normalized to 1 for the oldest cohort for identification, υ_k represents the direct effect of institution X_k when the other intuitions and shocks are at their sample means, ψ_s captures the direct effects of shocks and γ_k capture the interaction effects between institution X_k and the aggregate effects of macroeconomic shocks. The estimation results are presented in Table 9.

The final model augments model (13) by adding also the 2-by-2 interaction effects between institutions and policies. Moreover, additional controls are added, which are aimed to control for educational structure (proportions of university and upper-secondary graduates), for sector structure (proportion of private employees), for the structure of the type of contract (proportion

of employees with a permanent contract), for the structure of employment status (proportion of unemployed) and for occupational structure, by cohort. The estimation results are presented in Table 10

One note needs to be made. μ_i captures the unobserved unit-specific heterogeneity, in our case cohort-specific heterogeneity. One might argue that our model suffers from unobserved heterogeneity bias. We tested for unobserved heterogeneity for each model, by cohort, using the Breusch and Pagan Lagrangian multiplier test for random effects. The test rejected the presence of unit-specific effects at 5% level of confidence.

Another problem is the endogeneity between institutions and overall inequality that is expected to be transferred to the estimation of the two inequality components. The lack of good instruments prevented us from correcting for this problem. Hence, our estimates should be interpreted with caution as they might be biased.

5. RESULTS - DESCRIPTIVE

5.1.The dynamic autocovariance structure of hourly earnings

We begin with the description of the dynamic structure of individual log hourly earnings for all 14 countries under analysis. This description is used to confirm that the model used to fit the autocovariance structure of earnings for all cohorts is consistent with the trends observed in the dynamic autocovariance structure. For a full description of the overall and cohort autocovariance structure of earnings please refer to Sologon and O'Donoghue (2009). The overall autocovariance structure of earnings is presented in Figure 2. We summarize the main findings as follows.

The overall autocovariance structure of earnings displays both similar and diverging patterns across countries. In the beginning of the sample period, the overall inequality appears to be the highest in Portugal, followed by Ireland, Spain, France, Luxembourg, UK, Greece, Germany, Austria, Italy, Belgium, Netherlands, Finland and Denmark. The variance of log hourly earnings appears to decrease over the sample period in Germany, Denmark, Belgium, France, UK, Ireland, Spain and Austria, to increase in Netherlands, Luxembourg, Greece, Portugal and Finland. At the end of the sample period, Portugal still records the highest inequality, followed by Luxembourg, France, Greece, Spain, UK, Italy, Germany, Ireland, Netherlands, Finland, Belgium, Austria and Denmark.

In summary, the description of the dynamic structure of individual earnings for men for each country suggests five main common features of the data, which were incorporated in our model, as mentioned previously:

- First, the covariance elements are not the same at all lags. They decrease with the lag at a decreasing rate and converge gradually at a positive level, suggesting the presence of a transitory element which is serially correlated and of a permanent individual component of earnings. The most popular specification for the serially correlated term is the AR(1) process. However, the fact that the lag-1 autocovariance drops to a larger extent compared with the other autocovariances and that the autocovariances at high orders decline very slowly suggest that earnings cannot be modelled simply as a first-order autoregressive process. Therefore a an ARMA (p=1, q=1) process might be a better choice, where p represents the order of the autoregressive process and q the order of the moving average process.
- Second, as the autocovariances and mean earnings vary over the sample period, they cannot be assumed to be stationary over sample period. The stationarity assumption was tested and

rejected using the methodology introduced by MaCurdy (1982). One way to capture this feature is to incorporate period specific parameters, meaning that the permanent individual component and the transitory component of earnings are allowed to vary with time.

- Third, as autocovariances vary with age controlling for the period effect, they cannot be assumed to be stationary over the life cycle. This non-stationarity can be captured by modelling the permanent individual component as random walk and/or random growth in age.
- Lastly, the variance-covariance structure appears to be cohort specific, which can be incorporated by parameters that allow the permanent and transitory components to vary between cohorts.

5.2.The evolution of the main labour market and institutional factors

This section presents the evolution of the main labour market policy and institutional variables that will be used to explain the differences in labour market outcomes – permanent inequality, transitory inequality and earnings mobility – across the 14 EU countries.

The evolution of the labour market policy and institutional factors is summarized in Figure 3

Over the period 1994-2001, the OECD index of employment protection legislation decreased in most countries under analysis, except for Austria, France, Ireland and Greece, where it was constant and UK, where it increased slightly. Employment protection legislation (EPL) exhibited a sharp turnaround around 1995 in Denmark, 1996 in Portugal, 1997 in Belgium, Germany and Spain, 1999 in Netherlands, 2000 in Finland, which marked the year when EPL started decreasing. For Italy the decrease continued through the rest of the period, whereas for the others

the evolution was roughly stable. An increase in EPL was recorded in Spain in 2001 and in Ireland in 2000.

Employment protection legislation for regular contracts (EPLR) did not change much, except for Spain and Finland, where it decreased in 1997, respectively in 2001, and France and UK, where it increased in 2000, respectively in 1999.

The greatest changes were recorded for employment protection legislation for temporary contracts (EPLT). A decrease was recorded in Denmark, Portugal, Germany, Belgium, Italy and Netherland, and an increase in Spain. The rest remained constant. Denmark recorded a sharp drop in 1995, Belgium and Germany in 1997, Italy in 1997-1998, Portugal in 1996, Netherlands in 1998.

As a result, an increasing or stagnant positive relative difference between EPL for permanent contracts and for temporary contracts was recorded in Austria, Ireland, Netherlands, Portugal, UK and Finland. Drastic changes occurred in Denmark, Germany and Netherlands around 1995, 1997, respectively 1999. Belgium, France, Italy, Spain and Greece exhibited a less strict EPL for permanent contracts compared with temporary contracts for the entire period, which appears to decrease in absolute value, except for Spain and Greece, where it was constant.

A decrease in union density is reported in all countries, except Belgium. The degree of corporatism was characterized by stable rates in all countries. The tax wedge exhibited a high turnaround in 1995 for all the countries, except the continental ones. The largest decline was in the Anglo-Saxon countries, followed by Nordic and Mediterranean countries. Exceptions are Austria, Belgium, Denmark and France, where the tax wedge increased. The index of product market regulation (PMR) declined through the entire period, but the rate of decrease appears to intensify after 1998 for most countries. Unemployment benefits replacement rates rose in all

countries, except Denmark, Finland and UK. Sharp increases were recorded around 1998-1999 in Italy and Portugal, and around 2000-2001 in France and Ireland. Active labour market policies (ALMP) developed in all countries, except Germany, where it decreased. The largest increases were recorded in Netherlands, Denmark and Ireland.

The possible static effects of these policies are raising employment and reducing productivity, whereas the possible dynamic effects are raising investment following the raise in employment and raising incentives for adoption of new technologies, which implies a shift in the demand for skills. (Dew-Becker and Gordon 2008) Hence all these are expected to influence permanent earnings inequality and volatility and earnings mobility.

Nevertheless, institutional factors do not exist in a vacuum. They are expected to interact with external factors, such as macroeconomic shocks. The evolution of the macroeconomic shocks illustrated in Figure 4. Changes in demand and supply factors, in technology, in terms of trade, in real interest do not differ significantly among countries; hence they cannot by themselves explain all the changes in the inequality components. These trends are not surprising, given that all these countries operate in the same world markets, with similar technology, industry and occupation mixes.

For example, all countries experience the same turning points in both demand and supply shocks. The supply shocks had three turning points: a decrease until 1996, followed by a decrease until 1998, an increase until 2000, and a drop thereafter. The supply shocks converged in a decreasing trend for all countries towards 1999, followed by an increase in 2000, and a slight decrease in 2001. The convergence in the trends was maintained until 2001. Overall, the highest demand and supply shocks are experienced by Ireland, followed by Belgium, Austria and Netherlands.

One country stands out with respect to its evolution in total production factors shock: Ireland. It records a sharp increase until 1997, followed by stabilization towards 2001. Similarly for the real interest shock, which drops towards 1998 and stabilizes afterwards. These trends are most likely related to the Celtic Tiger.

The OECD data on education attainment by country reveals that the average level of education has an increasing trend and evolves parallel for all countries. Three clusters can be identified. A high average level is achieved in Germany, followed by Finland, Denmark, then very closely Ireland, UK and Belgium. A medium level of medium level is recorded in Greece, Austria, France, Spain and Italy. The lowest level is in Portugal.

To sum up, labour market policy and institutional factors are expected to interact significantly with each other and with the macroeconomic shocks in shaping the patterns of permanent inequality, transitory inequality and earnings mobility.

6. RESULTS OF COVARIANCE STRUCTURE ESTIMATION

6.1.Estimation results

The general specification of the error component model outlined in section 4.1.2 that encompasses all relevant aspects of earnings dynamics considered above is fit to the elements of the covariance matrix for all four cohorts pooled together[xii], by country. We present only the models that fit the data the best for each country, as identified by Sologon and O'Donoghue (2009; 2009)s. The estimation results are illustrated in Table 5. Following Dickens (2000), all variances are restricted to be positive by estimating the variance equal to the exponent of the parameter. The reported variance estimates in Table 5 represent the exponent of the parameter and the reported standard errors correspond to the parameter estimates.

The formulation of the permanent and transitory components of earnings differs between countries.

Permanent component

In Germany, Netherlands, UK, Ireland, Italy, Greece, Spain and Finland, the permanent component follows a random growth model with time and cohort specific loading factors. The estimated coefficients for the permanent component of earnings show that time-invariant heterogeneity and age-earning profile heterogeneity plays a significant role in the formation of long-term earnings differentials in all these countries. Individual specific heterogeneity plays the highest role in Germany, followed by Spain, Netherlands, Greece, UK, Ireland and Italy, which suggests that in Germany there is a higher dispersion in the time-invariant individual specific attributes that determine wage differentials.

The estimated random slope variance implies that hourly earnings growth for an individual located one standard deviation above the mean in the distribution of φ is the largest in Germany, where it is with 4.89%[xiii] faster than the cohort mean, followed by Greece, Ireland, Spain, Netherlands, UK and Finland with rates between 1% and 1.41% and Italy with 0.89%. All these countries have a negative covariance between the time invariant individual specific effect and the individual specific slope of the age-earning profile, which implies that the initial and lifecycle heterogeneity are negatively associated. This negative association corresponds to the trade-off between earnings early in the career and subsequent earnings growth and is consistent with the on-the-job training hypothesis (Mincer, 1974). Therefore, this suggests the presence of mobility within the distribution of permanent earnings over the sample period. These findings reinforce the results from previous studies.

Therefore for these countries the evolution of the permanent component without the time loading factors could be either increasing or decreasing. The time-specific loading factors for the permanent component are highly significant with values close to 1 in all countries. The trends of the returns to the permanent component vary to a large extent across countries. One common feature is that they reflect, as was emphasized before, trends in the high-order autocovariances in the data. These estimates show that overall, controlling for age and cohort effects, the returns to skills decreased over the sample period in Netherlands, UK, Ireland, Italy, Greece, Spain and increased in Germany and Finland. The trends over one year intervals differ between countries, some records a smooth evolution, others noisier. For example, Netherlands experienced decreases in returns almost every second year. In UK, the returns increased in 1997 and 2001 and decreased in the rest. Ireland recorded a decrease until 1996, a boost in 1997 and a clear decline thereafter. In Italy, 1998 and 1999 appear to be years with increases in return to skills, in Greece

every second year, in Spain 1996 and 1998. Germany experienced increasing returns to human capital until 2000, and Finland in 1997 and 2001. Therefore, in these years, the relative position of the highly skilled individuals was enhanced.

In Denmark the permanent component follows a random walk in age. The variance of the innovation in the random walk is significantly larger than zero. As the variance of a variable that follows a random walk is the sum of the variances of the innovation term, this finding implies that permanent inequality increases over lifetime. In Denmark, the variance at the age of 20 is higher than the variance at subsequent ages, suggesting the presence of larger permanent shocks at younger ages, which is consistent with matching models, in which the information revealed about a worker's ability increases with time. The final trend in the permanent variance depends on the period specific loading factors, which reveal that overall, the relative position of the highly skilled individuals decreased over the sample period in Denmark. The yearly evolution revealed a smooth decrease until 2000, followed by a small increase in 2001.

In Belgium, France, Luxembourg, Portugal and Austria the persistent dispersion of earnings follows the canonical model, where the permanent component is time-invariant. The highest variance in the time invariant characteristics is recorded in Portugal, followed by France, Luxembourg, Austria and Belgium. In this case, the time-specific loading factors determine the final trend of the permanent differentials: they decreased in Belgium and Austria, and increased in France, Luxembourg and Portugal. With respect to the yearly evolution, France records an increase in the returns to skills until 1997 and again in 2001, Luxembourg until 2000, Belgium in 1995 and 2001, Austria during most of the period, except 1998-1999, and Portugal in 1996 and 1998.

The estimates of the cohort-specific shifters for the permanent earnings are highly significant in all countries. However, the trends suggested by these estimates differ between countries. The permanent component of earnings appears to increase over the life cycle in Germany, France, Luxembourg, Portugal and Austria. In Denmark, Netherlands, Belgium and Spain the permanent component of earnings has an inverted-U shape evolution over the life cycle. These trends confirm the expectation that permanent earnings differentials play a much larger role in the formation of overall earnings differentials of older cohorts compared with younger ones, which experience higher earnings volatility due to temporary contracts. We expect the opposite to hold in the case of cohort-specific shifters for transitory earnings.

The permanent component of earnings appears to decrease over the life cycle in UK, Ireland, Italy, Greece and Finland. One possible explanation is that younger cohorts have more heterogeneous skills. Another explanation is that younger cohorts might experience larger permanent shocks even if they do not have a larger dispersion of skills. This could be the case if the labour market has become tougher over time, such as in the case of the Italian labour market, which is characterised by high rates of youth unemployment.

Transitory component

The formulation of the temporary component of earnings differs between countries. It follows an AR(1) process with time and cohorts loading factors in all countries, except for Italy, Greece and Spain, where it follows an ARMA(1,1). Except for Spain, Portugal and Austria, where all cohorts share the same initial conditions, the other countries are characterized by heteroskedastic initial conditions. The estimated coefficients for the transitory component of earnings are all significant, suggesting that the initial variance(s), the AR(1) process, respectively the

ARMA(1,1) process and the time and cohort loading factors contribute significantly to earnings volatility in all countries.

The variance of initial conditions, which represents the accumulation of shocks up to the starting year of the panel, is smaller than that of subsequent shocks in all countries. However, the pattern of the heteroskedstic initial conditions differs between countries. In Denmark, Luxembourg, UK, Ireland, Italy, Portugal and Finland it follows the inverted-U shape: the variance of initial conditions increases over the lifecycle and decreases at the end. The opposite holds for France, where the oldest and the youngest cohorts have the highest initial variances.

In Germany, Netherlands and Finland the pattern of the heteroskedstic initial conditions illustrates a general decreasing trend over the lifecycle, suggesting that the initial variance plays a larger role in the formation of earnings differentials for the youngest cohort compared with the oldest. In Belgium the reverse holds: the heteroskedastic cohort initial conditions appear to play the largest role in the formation of earnings differentials for the oldest cohort and the smallest for the youngest cohort.

The magnitude of the autoregressive parameter varies between countries. A large autoregressive parameter, which suggests that shocks are persistent, is recorded in Spain with 26.9% of a shock still present after 8 years, in Portugal with 8.5% and in Austria with 5.7%. A moderate autoregressive parameter suggesting that shocks die out rather quickly is recorded in Italy with 2.8% of a shock still present after 8 years, in Belgium with 2.4%, and in Greece with 1.4%. A very small autoregressive parameter is present in Luxembourg, Ireland, Finland, Netherlands, Germany, France, UK and Denmark, where between 0.0008% and 0.8% of a shock is still present after 8 years. The negative sign of the MA component implies that the autocovariances

decline sharply over the first period, confirming the trends observed in the previous section for Italy, Greece and Spain.[xiv]

The time-specific loading factors for the transitory component are highly significant and display a higher variation than for the permanent component in all countries. The trends of the transitory inequality vary to a large extent across countries. These estimates show that overall the transitory variance decreased over the sample period in Germany, Denmark, Netherlands, Belgium, France, UK, Italy, Greece, Spain, Portugal, Austria and Finland. It increased in Luxembourg and Ireland.

The estimates of the cohort-specific shifters for the transitory earnings are highly significant in all countries. The estimates of the cohort-specific shifters for the temporary component indicate that earnings volatility appears to be higher for younger cohorts, thus confirming the pattern observed in the dynamic description of the autocovariance structure of earnings, where autocovariances were found to be lower for younger cohorts. This result is expected, given that younger people experience in general more frequent job changes, and consequently less stable earnings.

6.2. Inequality Decomposition into Permanent and Transitory Inequality

Having estimated a suitable error component model for earnings in each country, next we use these parameters estimates to decompose the variance-covariance structure of earnings into its permanent and transitory components, assess their relative importance and analyse their contribution to the evolution of the overall inequality over the sample period. Basically, we want to assess which is the component that plays the largest role in the declining/rising overall cross-sectional inequality between 1994 and 2001.

6.2.1. Absolute Decomposition

Following Sologon & O'Donoghue (2009), the absolute decomposition of the variance, together with the actual and predicted variance of earnings by cohort are presented in Figure 5.

For all countries, the evolution of the predicted variance follows closely the evolution of the actual variance, which is not surprising given the high fit of the models indicated by the very low sum of square residuals. Earnings inequality measured by the actual variance decreased overall in Germany, except for the cohorts born in 1941-1950 and 1961-1970 where it increased; in Denmark; in Belgium, except for the youngest cohort where it increased; in France, except for the cohort born in 1961-1970; in UK, except for the youngest two cohorts where it increased; in Ireland; in Spain except the youngest cohort, and in Austria. Earnings inequality measured by the actual variance increased overall for all cohorts in Netherlands, Luxembourg, Italy, Greece, Portugal and Finland, except the youngest cohort. These are countries where wages appear to be more responsive to market forces.

In 1994, the highest average permanent inequality[xv] was recorded in Portugal and Spain, followed by France, Ireland, Germany, UK, Greece, Italy, Netherlands, Belgium and Denmark. The highest transitory variance was recorded in France, Ireland, Greece, UK, Germany, Spain, Denmark, Belgium, Netherlands, Italy and Portugal.

In 2001 the rankings looks slightly different. Portugal records the highest average permanent differentials, followed by Luxembourg, France, Spain, Ireland, Germany, Greece, UK, Italy, Finland, Netherlands, Austria, Belgium and Denmark. In terms of transitory inequality, Portugal appears to be the most dispersed, followed by Spain, Netherlands, France, Greece, UK, Germany, Belgium, Luxembourg, Austria, Ireland, Denmark, Finland and Italy.

The decrease in overall cross-sectional inequality appears to be the result of decreasing both permanent and transitory differentials in Denmark and Austria, of decreasing permanent

differentials with offsetting effect over the increasing transitory differentials in Belgium and Spain, and of decreasing transitory differentials with offsetting effects over the increasing permanent differentials in Germany, France, UK and Ireland. In most countries, these trends are consistent across cohorts. Mixed trends are observed in Belgium, where the oldest cohort recorded an increase in transitory variance, in Germany, where the oldest cohort recorded an increase in transitory differentials and the second oldest a decrease in permanent differentials; in UK, where the oldest experienced a decrease in permanent differentials and the youngest an increase in transitory differentials; in Ireland, where the oldest cohort experienced a decrease in permanent variance.

In Luxembourg, Italy, Greece and Finland, the exacerbation of permanent differentials, meaning the increase in returns to skills was the dominant factor behind the increase in overall inequality, offsetting the decrease in transitory differentials, whereas in Portugal and Netherlands both components increased. These trends are consistent across cohorts, except for Luxembourg and Greece, where the youngest, respectively the second oldest recorded an increase in transitory differentials, and Finland and Netherlands where permanent differentials decrease for the youngest cohort.

To sum up so far, the decrease in overall inequality was driven by a decrease in both components in Denmark and Austria, by a decrease in permanent differentials in Belgium and Spain and by a decrease in transitory differentials in Germany, France, UK and Ireland. The exacerbation of overall inequality appears to be the result of increasing permanent differentials in Luxembourg, Italy, Greece and Finland, and of an increase in both components in Portugal and Netherlands.

6.2.2. Relative decomposition – Structure of inequality

Further, we look at the evolution of the structure of inequality. For a full description, please refer to Sologon and O'Donoghue (2009). The main findings are summarized below.

The pattern of decomposition of the overall variance was found to vary between cohorts and countries. However, some common traits emerge. Inequality in the permanent component of earnings appears to account for a higher share of the overall variance the older the cohort is, which is consistent with the evidence of lifecycle earnings divergence showing that older cohorts experience a lower earnings volatility compared with younger cohorts. Moreover, inequality in the temporary component of earnings accounts for the highest share for the youngest cohort, which reinforces the expectation that earnings volatility is higher at younger ages.

A yearly summary of the evolution of the structure of inequality is offered in Figure 6 which illustrates the degree of immobility for each cohort, measured by the ratio between permanent and transitory differentials. Basically, an increase in the immobility ratio indicates a decrease in mobility, equivalent with an increase in the share of the permanent differentials in overall inequality.

For all countries, mobility appears to be higher for younger cohorts compared with older cohorts. The evolution of the immobility ratio has a similar trend for the oldest three cohorts, whereas for the youngest the slope is much less noisy, suggesting that labour market policy and institutional factors have a much smaller impact on earnings mobility for the youngest participants in the labour market. The most similar immobility rates between the young and the old are recorded in Denmark, Finland and Greece.

Mobility decreased in Germany, France, Luxembourg, UK, Ireland, Italy, Greece, Austria and Finland. This trend is consistent across cohorts, except for the oldest cohort in Germany and the

youngest cohort in UK, where the share of the permanent component decreased, thereby enhancing mobility.

Mobility increased in Belgium, Spain, Portugal, and Netherlands and only slightly in Denmark. This holds from most cohorts, except for the oldest and second youngest cohort in Denmark and for the oldest in Belgium, where mobility decreased as a result of an increase in the share of the permanent component.

To sum up the overall trends, the decrease in cross-sectional inequality was accompanied by an increase in mobility in Denmark, Belgium and Spain, where mobility helped individuals improve significantly their position in permanent earnings distribution, and by a decrease in earnings mobility in Germany, France, UK, Ireland and Austria,, where mobility cannot be considered among the driving forces behind the decrease in overall inequality.

The increase in cross-sectional inequality was accompanied by an increase in mobility, sign of increased volatility in Netherlands and by a decrease in mobility in Luxembourg, Italy, Greece, Portugal, and Finland.

The overall evolution of the structure of inequality for countries that recorded an increase, respectively a decrease in overall inequality over the sample period is summarized in Table 6.

However, these trends in the structure of inequality were not monotonic, as can be observed in Figure 6. For Denmark and Spain, a turnaround is observed around 1998-1999, when mobility started increasing, following the increase over the period 1994-1998. For Denmark, 1998 was a year which marked the end of a period of continuous economic growth which had begun in 1993. (EIROnline) In Spain, 1999 marked the year of the approval of the National Action Plan and of the reform of Spanish legislation on temporary employment agencies, which improved the pay

for temporary workers. (EIROnline) In Belgium, the adoption of the NAP took place around 1999-2000. (EIROnline).

In France, a significant change appears to occur after 1996, when mobility started to increase. This might be explained by the rapid increase in employment which occurred in France between 1997 and 2002 as a result of the policies aimed to lower the cost of unskilled jobs and stimulate job creation. In Ireland, the significant turnaround, which occurred in 1997, might be due to the slowing down of the Celtic Tiger: the remarkable economic growth which started in 1994 favoured the rise in the share of permanent inequality, which contracted slightly after 1997. Hence, the economic growth was a shock that accentuated the share of permanent differentials between individuals and reduced earnings mobility between 1994 and 1997. After 1997, mobility increased.

A dramatic change occurred in Austria after 1998. Until 1998, the share of permanent inequality increased sharply and was accompanied by a large drop in wage mobility. During 1999, Austria has experienced a considerable rise in employment and a further decline in unemployment, which was the effect of the labour market initiatives pursued by the Austrian Government. This explains the increase in inequality after 1999: higher employment is usually accompanied by higher inequality. These measures appear to have reduced the share of permanent inequality in 1999, which stabilized thereafter.

In Netherlands, a significant changed occurred after 1998, when the share of permanent inequality started decreasing and offset the increasing trend which dominated the period before 1998. Among the important issued addressed by the labour market legislation in 1998 were part-time employment, labour market flexibility and active labour market policies. In 2001, the share

of the permanent components is the lowest among all countries which recorded an increase in overall inequality.

For Luxembourg, Italy, Portugal, Greece and Finland, a turning point occurred around 1998-1999. This period coincides with the approval of the National Action plan for employment aimed, among others, to lower labour cost, promote active labour market policies, training and increase labour market flexibility. This appears to have affected the structure of wage differentials to a large extent. Immediately after 1998-1999, the share of permanent inequality started to decrease, and consequently mobility started to increase.

These measures affected the ranking in average immobility[xvi], as illustrated in Figure 7. In 1994, Denmark was the most mobile, followed by Greece, Belgium, France, Netherlands, Ireland, Italy, UK, Germany, Spain and Portugal. In 2001, Denmark has still the highest earnings mobility, followed by Belgium, Netherlands, Austria, Spain, Greece, Finland, UK, France, Germany, Italy, Portugal, Ireland and Luxembourg. As expected, countries with the lowest mobility are among the countries with the highest permanent differentials.

7. LINKING POLICY WITH OUTCOMES

What are the factors explaining country heterogeneity in the level and the evolution of permanent differentials, transitory differentials and earnings mobility? We try to explain the differences in these labour market outcomes across countries by relating to the differences in the wage setting mechanism and other labour marker institutions and policies, such as active labour market policies and income maintenance institutions (e.g. unemployment benefits); and institutional and policy changes, such as employment protection legislation, product market regulation, tax wedge, unionization.

First we describe with the naked eye the possible associations that can be formed between the trends in the labour market outcomes identified in Section 6.2.1 (see Figure 5) and Section 6.2.2 (Figure 6 and Figure 7) and changes in the labour market policy and institutional factors identified in Section 5.2 and summarized in Figure 3.

Second, by cohorts, we estimate uncontrolled pairwise correlations to put some numbers on the observed trends and see whether the relationships differ by cohorts. Finally, using non-linear least squares, we attempt to estimate the complex relationship between the institutional factors and permanent inequality, transitory inequality and earnings mobility.

7.1.Explaining the changes and differences

First, we start with the rankings in average permanent and transitory differentials and average mobility observed in 1994 and 2001 (see Section 6.2.1). At a first glance, the diverging characteristics of the labour markets (see Figure 3) recording the highest and the lowest average permanent differentials – Portugal and Denmark -, suggest that permanent variance appears to be positively associated with employment protection legislation (EPL), employment protection legislation for regular contracts (EPLR), employment protection legislation (employment protection legislation for temporary contracts) EPLT, the relative difference between the EPLR and EPLT, and (product market regulation) PMR and negatively associated with union density, the degree of corporatism, the tax wedge, the generosity of the unemployment benefit and the level of spending for active labour market policies (ALMPs).

Similarly, temporary variance appears to be positively associated with EPLT, the unemployment benefit generosity, and negatively with union density, PMR and the degree of corporatism.

Looking at the labour markets with the highest and lowest average immobility in 1994 and 2001 (Figure 7), a positive association was found with union density, tax wedge and unemployment benefit, and a negative association with EPLR, the relative difference between EPLR and EPLT, and PMR. For the other factors the trend is less clear-cut.

Next, we try to link the evolution of the three labour market outcomes (Figure 5 and Figure 6) with the evolution of the institutional factors summarized in Figure 3.

The common factors that might explain the common trends in permanent differentials and mobility in Denmark, Belgium and Spain are the decrease in EPL, the increase in ALMP and the decrease in PMR. ALMP can reduce permanent and transitory differentials by improving the efficiency of the job matching process and by enhancing the skills of the unemployed. Moreover its effects are expected to be enhanced when they are coupled with a low or decreasing EPL. Denmark represents a proof of the efficiency of this mix in reducing both components.

The ALMP–EPL mix might also be one of the factors explaining the divergence in the transitory variance trends between these countries: Denmark exhibits a high ALMP coupled with a low EPL, whereas the other two exhibit a relatively low ALMP coupled with a medium high EPL. This suggests that the impact of ALMP on transitory inequality might decrease with the EPL. A second factor could be the interaction between the decrease in PMR and the other factors. Lower PMRs are expected to determine an increase in both components. However, these effects appear to be completely offset in Denmark, whereas in Belgium and Spain they are offset only for permanent differentials.

Third, the decrease in transitory variance in Denmark might signal the presence of strong wage bargaining structures, finding supported by the high union density, corporatism and bargaining coverage indicators. This is consistent with the OECD (2004) results, which placed Denmark as

having one of the highest collective bargaining and trade union density among all 14 EU countries under analysis. In Belgium and Spain, another potential factor explaining the increase in transitory inequality might be immigration, which increased considerably with the expansion of the European Union.

To sum up, the outstanding performance of the labour market in Denmark which assured a decreasing cross-sectional inequality by reducing both components, might be due to the so called "flexicurity approach" (OECD(2004)), which represents an interesting combination of high labour market dynamism and relatively high social protection. It is a mix of flexibility (a high degree of job mobility thanks to low EPL), social security (a generous system of unemployment benefits) and active labour market programmes, which allows individuals to improve their position in the permanent income distribution by reducing permanent income differentials, maintain at the same time a low degree of earnings volatility.

The common factors that might explain the decrease in transitory differentials and the decrease in mobility in Germany, France, UK, Ireland and Austria are the decrease in union density and PMR, the increase in ALMP and the low EPL which was roughly constant, except for Germany where the latter two factors decreased. The decrease in union density and PMR are potential factors explaining the increase in permanent differentials in Germany, France, UK and Ireland, which appear to have offset the effect of the increase in ALMP present in the latter three countries. UK, Ireland and Austria exhibit another factor with a potential increasing effect on permanent differentials: the decrease in the tax wedge.

The decrease in transitory variance, which is common to all these countries, reinforces the finding that developed increasing ALMP coupled with a relatively low EPL can be expected to dampen earnings volatility. Hence, for transitory differentials, the impact of the ALMP-EPL mix

appears to have offset the potential effects of the decrease in union density and PMR. Moreover, the dampening effect of the ALMP-EPL mix on the transitory inequality appears to be accentuated when it is coupled with an increase in the unemployment benefit generosity. It is the case in France, Ireland and Austria.

In France, other factors which might contribute to the absolute increase in the permanent component are the increase in EPLR, because of the potential reducing effect on the incidence of permanent contracts. The decrease in transitory inequality might also signal a labour market mechanism put in place to reduce transitory inequality. This is consistent with OECD (2004): France ranks the lowest on union density, but managed to increase coverage levels after the introduction of the legislation promoting collective bargaining and is now among the countries with the highest coverage rates of 90% and above, together with Austria, Belgium and Finland. Moreover, based on OECD (2004), France was found to have a low level of labour market dynamics, which might explain the reduction in transitory inequality and mobility.

In UK, the positive increasing relative difference between EPLR and EPLT, coupled with the low degree of corporatism could have accentuated the disincentive for employers to train temporary workers, and thus could have contribute to increase permanent differentials.

In Luxembourg, Italy, Greece, Finland and Portugal, the common institutional trends that might explain the increase in permanent differentials and the decrease in mobility are the decrease or constant evolution of the EPL, the decrease in union density, PMR and the tax wedge. Italy and Portugal exhibit also a decrease in EPLT relative to EPLR, which might accentuate permanent differentials. The decrease in transitory differentials might be explained by the increase in the ALMP, coupled with the increase in the generosity of the unemployment benefit, except for Finland. The divergence in transitory differentials recorded by Portugal might be due to the level

of corporatism: an intermediate level appears to accentuate transitory differentials (Italy), whereas a high level might help to reduce them.

The difference in permanent and transitory inequality, and mobility trends observed between cohorts (Figure 5 and Figure 6) might be due to the different level of responsiveness to the macroeconomic shocks and their interactions with the other labour market policy and institutional factors. Younger workers are expected to be affected to a larger extent by these shocks, compared with experienced workers, with a high attachment to the labour market and a better protection from the institutional framework. This might be another explanation for the much higher share of transitory inequality observed for younger cohorts.

Moreover, we can expect institutional factors to play a much larger role in shaping permanent differentials compared with transitory differentials and earnings mobility, given that the latter two are exposed to a much larger extent to random shocks, for which institutional factors might have a delayed response or any at all.

For example, comparing the evolution of the two components in Figure 5 with the evolution of the supply and demand shocks in Figure 4, it seems that transitory differentials are influenced positively by supply shocks, whereas permanent differentials appear to be negatively influenced by demand shocks in the short run, but positively in long run. However, the responsiveness of the two components depends on the other factors. In some countries, such as UK, characterized by a low degree of corporatism, medium low union density, low EPL, the responsiveness of the transitory component is high. Moreover, the decrease in union density appears to affect the most the youngest cohort: its transitory variance increased over time, diverging from the trends observed for the other cohorts. The increase in permanent differentials for the oldest cohort might be due to the increase in the ALMP, in the context of the very low EPL.

In Belgium, which has a high degree of corporatism and a medium high union density and EPL, transitory variance appears to evolve opposite to supply shocks, both short and long term. The link between permanent variance and demand shocks appears to be positive short term and negative long term.

Given these trends, we expect institutional factors to shape the pattern and level of permanent inequality, transitory inequality and earnings mobility not only directly, but also in interaction with macroeconomic shocks. The overall institutional factors is expected to be a "filtering mechanism" for the adverse effect that these shocks might have on the three labour market outcomes, provided that their aim is indeed to keep permanent and transitory inequality low, assuring at the same time that low wage individuals are not trapped in low pay, but have the opportunity to improve their position in the distribution of lifetime income through earnings mobility.

7.2.Correlations

Given the clear distinction in the trends of the two components and earnings immobility between the oldest three cohort and the youngest cohorts, we expect that that also the underlying factors to differ to a certain extent. Thus, it is necessary to account for cohort heterogeneity when analysing the link between the three labour market outcomes and the institutional factors.

To begin with, we compute the simple uncontrolled correlations (Table 7) comparatively between the oldest there cohorts, polled together, and the youngest one.

The associations between permanent variance and the ten labour market policy and institutional factors are significant at 5% level of confidence, except for employment protection legislation for regular contracts (EPLR) for the youngest cohort. Discrepancies between cohorts with

respect to permanent variance are recorded for the employment protection legislation factors: for the oldest cohorts permanent variance appears to be positively associated with EPL, EPLT, EPLR, whereas for the youngest the opposite holds. For the other factors the associations are consistent across cohorts: a positive relationship is found with the relative difference between EPLR and EPLT, and with product market regulation (PMR), whereas a negative one is found with union density, the degree of corporatism, tax wedge, active labour market policies (ALMP) and unemployment befit replacement rate.

For transitory variance, divergence between cohorts are found for the relative difference in regulation, which reports a positive association for older cohorts, tax wedge, ALMP and unemployment benefit replacement rate, which report a negative association for older cohorts. For all cohorts, EPL, EPLR, EPLT, PMR, appear to be positively associated with transitory variance, whereas union density and the degree of corporatism report a negative association.

For Immobility, the same factors diverge between cohorts: EPL, EPLR and EPLT exhibit a negative association for the youngest cohorts and a positive one for the rest. The rest of the association are similar as for permanent variance.

Regarding the correlations with the macroeconomic shocks, some differences do emerge between cohorts.

For permanent variance, the youngest cohort records a much stronger positive correlation with labour demand shocks compared with older cohorts. The situation is reversed for the other shocks, which appear to be negatively correlated with the permanent variance for older cohort and insignificant for the youngest.

For transitory variance, only total factor production factor and aggregate demand shocks exhibit a significant negative association. Compared between cohorts, the negative association with total factor production shock appears to be stronger for the older cohorts, whereas for the other shock they appear to be the same. More differences between cohorts emerge for earnings immobility, which appears to be associated positively with labour demand shock and negatively with real interest shock for the youngest cohort, and insignificant for older cohort. Terms of trade shock exhibits a small positive correlation for older cohorts and a similar but insignificant association for the youngest.

Nevertheless, these correlations are far from telling the true story given that the complex interactions that take place between institutions on the one hand, and between institutions and macroeconomic shocks on the other hand, is expected to change significantly the overall impact of each of these factors on the three labour market outcomes.

7.3.Estimation

This section aims to provide some empirical evidence with respect to the impact of the main labour market policy and institutional factors and their complex interactions in shaping permanent inequality, transitory inequality and earnings mobility.

7.3.1. Systemic interactions: do policies and institutions interact with the overall institutional framework?

The results regarding systematic interactions are included in Table 8. The models with systemic interactions are estimated to explain 97.8% of the overall cross-country variance of permanent inequality changes, 93.7% of transitory inequality changes and 73.7% of earnings immobility changes between 1994 and 2001.

The cohorts shifters are highly significant in all models, confirming the cohort-heterogenous trends identified previously by the error component model and summarized in Figure 5, Section 6.2.2 and Figure 6: the older the cohort, the higher the impact of permanent variance, the lower the impact transitory inequality and the higher the impact of wage immobility.

Similarly, the time effects are highly significant in all models. They indicate that, overall, at the EU level, controlling for the effects of institutional and policy factors, the unobserved shocks had a decreasing impact on permanent variance in 1995, an increasing impact until 1997 and decreasing impact thereafter. The impact of unobserved shocks on transitory inequality appears to decrease over the entire period, whereas for wage immobility it was not monotonic: it decreased in 1995, increased until 1997, decreased until 1999, increased again in 2000, followed by a drop in 2001. Overall, it appears that unobserved shocks had negative effect on both permanent and transitory dispersion, and a positive effect on wage mobility.

The direct effects, controlling for systemic interactions, indicate that, except for product market regulation (PMR) and active labour market policies (ALMPs), all other variable have a significant impact on permanent dispersion. Factors that appear to work towards reducing permanent inequality are a high union density and a high unemployment benefit. The hump shape profile of the impact of the degree of corporatism is confirmed: the intermediate level of corporatism appears to trigger the highest permanent dispersion, followed by high and low corporatism.

The systemic interaction effects for union density, the degree of corporatism, tax wedge and PMR provide evidence of reform complementarity in reducing permanent inequality. Hence the more equality-friendly the overall labour market policy and institutional framework, the greater

the reducing impact of a high union density, an intermediate and high degree of corporatism, a high tax wedge and a high PMR.

The model for transitory variance, in spite of having a similar level of explained variation as the model for permanent inequality, exhibits a smaller number of significant effects. This might be due to the period unobserved shocks and cohort effects, which are expected to explain to a large extent the evolution in transitory inequality. Random exogenous shocks increase earnings variability and the magnitude of their expected impact depends on the specific lifecycle stage a respective cohort is in.

For transitory variance, only PMR, ALMPs and unemployment benefit replacement rate have a significant direct impact. An increase in the spending for ALMPs and an increase in the unemployment benefit replacement appear to work towards increasing transitory differentials, whereas an increase in PMR appears to reduce permanent differentials. Moreover, the higher the union density and the higher the degree of corporatism are, the larger is the reduction in transitory variance. However, these effects are not significant at conventional levels.

The systemic interactions for transitory inequality indicate a reform complementarity for reducing transitory inequality between the overall framework and union density and the degree of corporatism. Hence, the more inclined the overall framework is towards reducing transitory differentials, the effect is larger the higher in the union density and the larger is the degree of corporatism. However, the effect of union density is not significant at conventional levels. The other factors appear to counteract with the overall system, but the effect is significant only for the unemployment benefit replacement rate, which appears to work towards increasing transitory differentials.

For earnings immobility, a significant positive direct effect is found for employment protection legislation (EPL), the relative difference between employment protection legislation for regular contracts (EPLR) and temporary contracts (EPLT), a high degree of corporatism and ALMPs. Similarly for PMR, but the effect is not significant. A U-shaped profile is found for the degree of corporatism: a high degree of corporatism is found to increase wage immobility compared with low corporatism, whereas an intermediate corporatism appears to decrease it. Besides intermediate levels of corporatism, other factors that appear to contribute directly to enhance earnings mobility are the union density and the unemployment benefit replacement rate.

The systemic interactions suggest that there is a complementarity in reducing wage immobility between the overall framework, union density and high and intermediate levels of corporatism. Tax wedge appears to have a similar effect, but not significant. PMR and ALMPs, when interacted with the overall framework, appear to increase wage immobility.

7.3.2. Specific Interactions

This section explores the specific interactions between institutions and between institutions and shocks which are expected to shape the pattern of permanent inequality, transitory inequality and earnings mobility. First we look only at direct effect of shocks and institutions and their interactions. Second, we enhance the model by adding cross-interactions between institutions and other controls.

Table 9 illustrates the estimates for the direct effects of institutions, shocks and the interactions between the two. The models manage to explain 97.9% of the variation in permanent inequality, 92.9% of the variation in the transitory inequality and 68.9% of the variation in wage immobility. These results indicate that these shocks affect the three labour market outcomes not only directly, but also indirectly, through their interactions with the institutional and policy factors.

As expected, permanent inequality appears to be affected directly by these shocks to a much lesser extent compared with transitory inequality and wage immobility. For transitory inequality all shocks show a highly significant effect, for wage immobility all except aggregate labour supply, whereas for permanent inequality only the terms of trade shock and aggregate demand appear to have a negative significant direct effect. Transitory inequality appears to be affected positively by the aggregate supply, terms of trade and the total factor production shocks, and negatively by the rest. Wage immobility is affected negatively by aggregate demand, labour demand and the interest rate shock, and positively by the rest.

The explanation for the lack of significance of the direct effects of shock in explaining permanent inequality is found in the interaction effects. All interaction effects are significant, except for ALMPs, suggesting that indeed these policies and institution filter out the effects of these shocks. EPL, the relative difference between EPLR and EPLT and the tax wedge have a positive significant effect on permanent variance, which appears to be amplified under the aggregate impact of these shocks. The positive significant effect of ALMPs appears to be diminished under the impact of aggregate shocks, but the interaction term is not significant at conventional levels.

If for directs effects the hump-shaped pattern of the relationship between the degree of corporatism and permanent inequality is confirmed, with the high level triggering the lowest permanent inequality, followed by low and intermediate corporatism, in interaction with aggregate shocks the degree of corporatism clearly becomes a tool for reducing permanent differentials. The higher is the degree of corporatism, the larger is the magnitude of the negative impact in reducing permanent inequality. Other factors, such as union density, PMR and unemployment benefit replacement rate, have a negative yet insignificant direct effect, but in

interaction with aggregate shocks they appear to work significantly towards increasing permanent differentials.

For transitory inequality fewer factors appear to be significant in filtering out the effects of shock compared with permanent inequality and wage immobility. The direct effect for intermediate corporatism appears to trigger the highest transitory inequality, followed by high and low corporatism. However, in interaction with the aggregate shocks, its impact becomes negative but insignificant, whereas for high corporatism it becomes negative and highly significant. This suggests that, similarly as for permanent inequality, a high corporatism appears to be an efficient tool for reducing or limiting the increase of transitory inequality under in the impact of macroeconomic shocks. Similarly for unemployment benefit replacement rate: a more generous benefit appears to have a significant positive impact on transitory inequality, but in interaction with macroeconomic shocks it becomes negative and significant.

Tax wedge does not appear to have a significant direct effect on transitory inequality, but in interaction with macroeconomic shocks, it appears to be an efficient tool in reducing or limiting the increase of transitory inequality under the impact of macroeconomic shocks. The opposite holds for PMR and ALMPs: they have a negative direct effect, but in interaction with macroeconomic shocks, they appear to have a positive impact on transitory inequality.

Wage immobility appears to be explained to a much lesser extent by the direct effects of institutions compared with permanent and transitory inequality. However, most of the indirect effects are highly significant, which suggests that wage immobility is influenced mainly by macroeconomic shocks and their interaction with the institutional setting. The only factors with a significant direct effect are the relative difference between EPLR and EPLT and unemployment benefit generosity, which appear to increase wage immobility. However, in interaction with

shocks, their effects turn negative. The effect of macroeconomic shocks on wage immobility appear to increase significantly with EPL, union density, PMR and ALMPs, and to decrease with tax wedge, unemployment benefit replacement rate and the degree of corporatism. For corporatism, an intermediate level appears to be the most effective in reducing the impact of shocks, followed by high and low corporatism.

In order to grasp more in depth the nature of the relationship between institutions and shocks, these models are augmented by including also 2-by-2 interactions between the institutional factors, and other controls. The results are illustrated in Table 10. The new model specifications manage to explain 98.9% of the variance in permanent inequality, 92.9% for transitory inequality and 68.9% for wage immobility.

Including the institutional interaction effects and other controls at the cohort level (shares of university and upper- secondary graduates, sector structure, occupational structure, share of unemployed, share of permanent contracts), several changes can be noted. First, for permanent, all six macroeconomic shocks and their interactions with institutional factors become insignificant, except for high corporatism. At the same time, the direct effects of institutions and most of their cross interactions are highly significant. This suggests that the overall institutional structure manages to filter out all direct and indirect effect of these shocks. Hence, in shaping permanent inequality patterns, not the individual interactions between shocks and each institution count, but how institutions interact with each other in dealing with the effects of these shocks. One factor which still appears to interact significantly with aggregate shocks is high corporatism. It appears to decrease the impact of aggregate macroeconomic shocks on permanent inequality to a larger extent compared with low and intermediate corporatism.

All direct effects that were insignificant in the previous specification became significant once we controlled for cross-institutional interactions. From those that were significant, EPL, the relative difference between EPLR and EPLT, high corporatism and tax wedge changed signs.

EPL appears to have now a negative direct effect on permanent inequality, which appears to be accentuated by the relative difference between EPLR and EPLT, and counteracted by the tax wedge.

Union density appears to have a positive direct effect, which appears to increase with the tax wedge and decrease with PMR and ALPMs. The interaction with the degree of corporatism confirms the hump-shaped pattern hypothesis: for a given level of union density, a high degree of corporatism determines the lowest permanent inequality, whereas intermediate corporatism exacerbates permanent differentials.

Tax wedge has a negative direct effect on permanent inequality, which appears to be complementary with PMR and the generosity of the unemployment benefit. Factors that appear to counteract with its negative effect are EPL, union density and ALMPs.

PMR has a positive direct effect which appears to be counteracted by union density, tax wedge and ALMPs. ALMPs appear to increase permanent inequality, effect which is accentuated by the tax wedge, and reduced by PMR. Also union density and unemployment benefit lower the effect of ALMP, but the effect is not significant.

Unemployment benefit has a negative direct effect on permanent inequality, which is reinforced by the tax wedge and AMPLs, and counteracted by PMR.

Similarly with permanent inequality, controlling for the interactions between institutions renders the direct and indirect effects of shocks insignificant. This reconfirms that the key role in shaping

transitory and permanent inequality patterns is played by the interplay between labour market policies and institutions in dealing with macroeconomic shocks.

The direct effects on transitory inequality modify to larger extent than for permanent inequality when these interactions are being introduced. The direct effect of EPL increases considerably and remains significant, the relative difference between EPLR and EPLT, and unemployment benefit become insignificant, the tax wedge becomes negative and significant, and the degree of corporatism becomes negative and significant. PMR is unchanged: negative and significant.

EPL increases transitory inequality, but the effect is counteracted by intermediate and high corporatism, the tax wedge and ALMPs. Other factors appear to counteract as well, but not at a significant level.

Union density does not have a positive direct effect, but most of its indirect effects are highly significant. A U-shaped profile appears to characterise the relationship between the degree of corporatism and transitory inequality: the lowest transitory inequality is triggered by an intermediate level, followed by a high level and a low level. The same profile is confirmed also for the interaction between union density and the degree of corporatism.

The tax wedge seems to reduce transitory inequality. Its effect is amplified by EPL and unemployment benefit replacement rate, and counteracted by union density.

PMR has a negative direct effect, which appears to be counteracted only by union density. ALMPs have a negative but insignificant direct effect, which is amplified by EPL. Similarly for unemployment benefit replacement rate, whose negative effect is amplified by the tax wedge.

Surprisingly, for wage immobility, the inclusion of the institutional interactions had the opposite effect compared with permanent and transitory inequality. The effects of macroeconomic shocks

increased in absolute value, it kept the same direction of influence and remained highly significant, except for aggregate supply shock, which is insignificant in both model specifications. Similarly for the interaction effects between institutions and shocks, except for the interaction between the relative EPLR-EPLT difference and aggregate shocks which is insignificant in both specifications.

Moreover, compared with the previous specification for wage immobility, which had only two direct significant institutional factors, in this model all institutional factors are highly significant, except for tax wedge and ALMPs.

EPL appears to have a strong positive effect on wage immobility, which is amplified by union density, the tax wedge and aggregate macroeconomic shocks. However, the effect of EPL appears to decrease with the degree of corporatism and PMR. An increase in the relative EPLR-EPLT difference appears to be negatively associated with wage immobility.

Union density has a negative impact on wage immobility, which is counteracted by EPL, the tax wedge and aggregate shocks.

Intermediate corporatism appears to trigger the lowest wage immobility, followed by high corporatism and low corporatism. However, the negative impact of high corporatism appears to be exacerbated by EPL and aggregate shocks to a larger extent than for intermediate corporatism.

Tax wedge has a positive, yet insignificant effect, which appears to decrease significantly with ALMPs and aggregate shocks.

PMR lowers wage immobility and this effect seems to be complementary with EPL, with union density[xvii] and a low degree of corporatism. In interaction with an intermediate corporatism the positive impact on wage immobility is stronger than in the interaction with a high corporatism.

The positive impact on wage immobility appears to be counteracted by the effects of ALMPs and aggregate shocks, as indicated by the positive and significant interaction effects.

ALMPs has a negative, yet insignificant effect. However, its interaction effects are significant: it decreases wage immobility when coupled with the tax wedge and increases wage immobility in interaction with PMR and aggregate shocks.

Unemployment benefit increases wage immobility, effect which is accentuated when coupled with a high spending on ALMPs and diminished when coupled with a high PMR. Moreover, in interaction with aggregate shocks, it appears to decrease wage immobility.

8. CONCLUDING REMARKS

This paper explores the role of labour market policy and institutional factors in explaining cross-national differences in the evolution of permanent inequality, transitory inequality and earnings mobility across 14 EU countries. In Europe, the most notable change after 1995, which is the approximate year of the turnaround in the labour market institutional and policy framework, represents the increased country heterogeneity, which translated itself in the level and the evolution of the cross-sectional earnings inequality components and earnings mobility.

Increases in inequality appear to reflect increases in permanent differentials in Luxembourg, Italy, Greece and Finland, and increases in both components in Portugal and Netherlands. Decreases in inequality appear to result from decreases in transitory differentials in Germany, France, UK and Ireland, in permanent differentials in Belgium and Spain and in both components in Denmark and Austria. In most countries, increases in inequality appear to be accompanied by decreases in mobility, except for Netherlands. Decreases in inequality are accompanied by increases in mobility only in Denmark, Belgium and Spain. However, some

common trends can be identified: the older the cohort, the higher the impact of permanent variance, the lower the impact transitory inequality and the higher the impact of wage immobility. This reinforces the expectation that earnings volatility is higher at younger ages.

How can we explain these trends in permanent inequality, transitory inequality and earnings mobility? To answer this question we analysed the link with the labour market policies and institutional factors, accounting also for the impact of macroeconomic shocks.

Labour market policies and institutions play a highly significant role in shaping the pattern of permanent inequality, transitory inequality and earnings mobility and manage to explain a very large share of the variation in these outcomes. However, the estimation results revealed that the interplay between these factors is highly complex: institutions interact with each other and also with the overall institutional setting. One proof for the degree of complexity is brought by the changes in the magnitude and the direction of influence of the direct effects of these institutions depending on which interaction effects were introduced in the model. Moreover, labour market policies and institutions not only affect these outcomes via their direct, cross and systemic effects, but also via their interactions with macroeconomic shocks.

The systemic interactions for permanent inequality revealed that the more equality-friendly the overall labour market policy and institutional framework is, the greater is the reducing impact on permanent differentials of a high union density, an intermediate and high degree of corporatism, a high tax wedge and a high product market regulation (PMR). For reducing transitory inequality, a reform complementarity with the overall framework was found for union density and the degree of corporatism. Similarly, the more earnings mobility-friendly the overall labour market policy and institutional framework is, the greater is the reducing impact on wage immobility of a high union density, and high and intermediate levels of corporatism.

Controlling only for the direct effects of institutions and shocks revealed that, the effects of the observed macroeconomic shocks on the three labour market outcomes are shaped by the policy and institutional framework. The impact is the strongest for permanent inequality, where except for terms of trade shock and aggregate demand, the impact of the other shocks is wiped out by the direct effects of institutions and their interactions with aggregate shocks. The factor which appears to be effective in reducing or limiting the increase of permanent inequality under in the impact of macroeconomic shocks is the degree of corporatism: the higher the degree of corporatism, the larger the magnitude of the negative impact in reducing the adverse effect of shocks on permanent inequality. Other factors, such as employment protection legislation (EPL), the relative difference EPLR-EPLT, union density, the tax wedge, PMR and unemployment benefits amplify the effects of adverse shocks on permanent differentials.

For transitory inequality a different mechanism appears to be at work. Factors that diminish the adverse effects of shocks are high corporatism, tax wedge and unemployment benefit, whereas factors that exacerbate the adverse effect of shocks are PMR and active labour market policies (ALMPs).

For wage immobility the impact of adverse shocks is reduced by intermediate and high levels of corporatism, tax wedge and unemployment benefit replacement rate, and enhanced by the other factors, except the relative EPLR-EPLT difference, which is insignificant.

Including the institutional interaction effects, significant changes can be noted. Most importantly, for permanent and transitory inequality, the direct effects of shocks and their interactions with the institutional factors were wiped out, and the effect appears to have been captured by the direct effects of institutions and their cross-interactions. This suggests that the overall institutional structure manages to filter out all direct and indirect effect of these shocks. Hence,

in shaping permanent and transitory inequality patterns, not the individual interactions between shocks and each institution count, but how institutions interact with each other in dealing with the effects of these shocks. Moreover, more significant direct and indirect effects are noted for permanent inequality, reinforcing the expectation that institutional factors play a larger role in shaping permanent than transitory inequality.

For wage immobility the direct effect of shocks and their interactions are still highly significant, suggesting the importance of both institutions and shocks in shaping wage immobility. Moreover, the explained variance of wage immobility is with roughly 20 percentage points lower than for the other outcomes, suggesting the presence of other institutional factors that might filter the effects of shocks and which have not been included. Factors that reduce the effects of adverse shocks on wage immobility are the degree of corporatism, the tax wedge and unemployment benefit generosity.

Controlling for interactions between institutions, and between institutions and shocks, factors with a positive direct effect on permanent differentials are union density, the degree of corporatism, PMR and ALMPs. A negative direct effect was found for EPL, the relative difference EPLR-EPLT, tax wedge and unemployment benefit. Transitory inequality is increased by EPL, and decreased by intermediate and high corporatism, tax wedge and PMR. Factors with positive direct effects on wage immobility are EPL and unemployment benefit replacement rate. The others have negative effect, except for tax wedge and ALMPs, which are insignificant. However, the overall effect of these factors on labour market outcomes is shaped by their interactions.

Permanent inequality appears to be positively influenced by the following interactions: EPL and tax wedge, union density and tax wedge, tax wedge and ALMPs, PMR and unemployment

benefit, and negatively by EPL and the relative EPLR-EPLT difference, union density and PMR, tax wedge and PMR, tax wedge and unemployment benefit, PMR and ALMPs, PMR and unemployment benefit. Moreover, the interaction between union density and the degree of corporatism confirms the hump-shaped pattern hypothesis: for a given level of union density, a high degree of corporatism determines the lowest permanent inequality, whereas intermediate corporatism exacerbates permanent differentials.

Union density coupled with tax wedge, and with PMR have a positive effect on transitory differentials, whereas the reverse holds for the tax wedge coupled with EPL, with unemployment benefit generosity, and for EPL coupled with ALMPs. The interactions between the degree of corporatism and union density and EPL reveal a U-shaped profile: the lowest transitory inequality is triggered by an intermediate level, followed by a high level and a low level.

The interaction effects with a positive impact on wage immobility are: EPL-union density, union density tax wedge, PMR-ALMPs, ALMPs-unemployment benefit. Negative effects are found for EPL and the degree of corporatism, EPL and PMR, tax wedge and ALMPs, PMR and unemployment benefit. The interaction between PMR and corporatism reveals a hump-shaped profile: for an average PMR, an intermediate corporatism triggers the highest wage immobility, followed by high corporatism and low.

These interactions highlight once more the complex institutional mechanism that is at work in shaping the pattern of the three labour market outcomes analysed in this paper. Further work could be focused on disentangling amplification from persistence mechanisms. Moreover, the link with earnings mobility can be explored further by looking at different mobility measures, including long and short period earnings mobility.

9. TABLES AND FIGURES

Table 1. Mean hourly earnings and number of individuals with positive earnings

		1994	1995	1996	1997	1998	1999	2000	2001
Germany	Mean	9.43	9.49	9.61	9.52	9.57	9.48	9.60	9.72
	N	25018	26059	25806	24889	23290	22955	21909	20703
Denmark	Mean	10.89	11.40	11.58	11.61	11.86	11.85	12.02	12.08
	N	20899	20399	19190	19062	17321	16235	15678	15380
Netherlands	Mean	9.69	9.56	9.59	9.70	10.02	9.88	10.04	9.91
	N	33277	32384	31564	30575	28731	27460	25790	33277
Belgium	Mean	8.48	8.82	8.71	8.75	8.81	8.83	8.92	9.10
	N	20221	22100	22892	22753	22863	23233	24065	24130
Luxembourg	Mean		16.18	15.81	16.73	17.39	17.15	17.22	17.10
	N		15829	13695	14489	13403	14075	12667	12992
France[xviii]	Mean	10.23	9.92	9.87	10.05	10.33	10.60	10.55	10.87
	N	20137	19270	19042	17906	14467	14012	13760	14212
UK	Mean	8.16	8.11	8.22	8.34	8.68	9.01	9.21	9.68
	N	24949	25329	25495	26010	26145	25750	25674	25264
Ireland	Mean	9.30	9.54	9.76	10.02	10.43	10.84	11.69	12.44
	N	13937	13221	12590	12515	12435	12091	10745	9727
Italy	Mean	7.16	6.91	6.96	7.05	7.29	7.37	7.28	7.32
	N	32633	32236	32111	29661	28865	26993	26912	25170
Greece	Mean	4.95	5.03	5.23	5.59	5.63	5.85	5.70	5.77
	N	27974	27654	26150	24865	22675	22001	21335	21929
Spain	Mean	6.83	6.95	7.09	6.89	7.18	7.37	7.45	7.42
	N	22559	21863	21296	20975	20371	20580	19898	20185
Portugal	Mean	9.08	8.33	8.37	8.49	8.55	8.55	8.54	9.08
	N	14653	15450	15379	15087	14837	14569	14604	14550
Austria	Mean		9.08	8.33	8.37	8.49	8.55	8.55	8.54
	N		17944	17789	17199	16209	15162	13816	13056
Finland	Mean			7.89	8.01	8.41	8.45	8.66	8.86
	N			15811	15845	15895	15546	13329	13057

Note: Mean hourly earnings are expressed in Euro.

Table 2. Description of OECD variables

OECD Variables	Description
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.
EPLR = Employment Protection Legislation for regular contracts	OECD summary indicator of the stringency of Employment Protection Legislation for regular contracts
EPLT= Employment Protection Legislation for temporary contracts	OECD summary indicator of the stringency of Employment Protection Legislation for temporary contracts
Union Density	Trade union density rate, *i.e.* the share of workers affiliated to a trade union, in %.
Union Coverage	Collective bargaining coverage rate, *i.e.* the share of workers covered by a collective agreement, in %.
Degree of Corporatism	Indicator of the degree of centralisation/co-ordination 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 %).
Lindert-Allard OECD data sets 1950-2001	
Aggregate Supply Shock	At the OECD level, amplified by openness = (INFLOECD-UNCHOECD)*OPEN/100 , INFLOECD = inflation for the OECD as a whole, averaged over the 21 countries, UNCHOECD= Three-year change in the unemployment rate for the OECD as a whole) OPEN= (exports + imports) as a percentage of GDP, from Penn World Tables
Aggregate Demand Shock	At the OECD level, amplified by openness= (INFLOECD+UNCHOECD)*OPEN/100

Table 3. Institutional Variables - Summary Statistics

Variable		Mean	Std. Dev.	Min	Max	Observations
EPL	overall	2.417	0.943	0.6	3.854	N = 104
	between		0.943	0.621	3.739	n = 13
	within		0.247	1.53	3.204	T = 8
EPLT	overall	2.5	1.446	0.25	5.375	N = 104
	between		1.41	0.25	4.75	n = 13
	within		0.489	0.747	4.031	T = 8
EPLR	overall	2.33	0.837	0.948	4.333	N = 104
	between		0.858	0.99	4.333	n = 13
	within		0.06	2.166	2.555	T = 8
[(EPLR-EPLT)/EPLT]*100	overall	0.672	1.659	-0.67	5.413	N = 104
	between		1.704	-0.553	5.413	n = 13
	within		0.214	0.162	1.466	T = 8
Union Density	overall	37.885	19.602	9.636	79.386	N = 112
	between		20.171	9.788	78.07	n = 14
	within		1.745	31.025	43.705	T = 8
Degree of Corporatism	overall	2.583	0.644	1	3	N = 96
	between		0.669	1	3	n = 12
	within		0	2.583	2.583	T = 8
Tax Wedge	overall	32.65	6.886	12.802	44.9	N = 96
	between		6.787	21.935	40.547	n = 12
	within		2.177	23.516	39.123	T = 8
PMR	overall	3.4	1.003	1.133	5.236	N = 96
	between		0.86	1.454	4.415	n = 12
	within		0.567	2.162	4.465	T = 8
ALMPs	overall					N = 96
	between	29.778	20.685	4.81	126.1	n = 12
	within		18.843	9.362	74.995	T = 8
Unemployment Benefit Replacement Rate	overall		9.949	-3.8	80.883	N = 96
	between	35.982	11.491	16.589	64.944	n = 12
	within		11.534	17.44	59.87	T=8
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
Aggregate Labour Supply	overall	1.855	2.084	-0.635	8.145	N = 101
	between		0.924	1.054	3.692	n = 13
	within		1.881	-2.472	6.308	T=7.769
Aggregate Labour Demand	overall	3.388	1.776	1.175	8.158	N = 101
	between		1.581	2.051	6.578	n = 13
	within		0.871	0.534	4.968	T=7.769

Table 4. Share of employees by educational level, by sector, by type of contract, by employment status, by occupational - for selected cohorts based on ECHP

Variable		Cohort 1940-1950		Cohort 1951-1960		Cohort 1961-1970		Cohort 1971-1981	
	Obs	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Share of University Degree	108	0.228	0.115	0.248	0.128	0.250	0.130	0.134	0.144
Share of Upper-Sec Degree	108	0.327	0.191	0.367	0.177	0.401	0.195	0.451	0.197
Share of permanent contracts	108	0.896	0.074	0.875	0.060	0.849	0.087	0.755	0.170
Share of private employees	108	0.657	0.096	0.678	0.082	0.789	0.052	0.860	0.055
Share of Unemployed	108	0.068	0.033	0.057	0.037	0.078	0.043	0.129	0.096
Occupation Structure (ECHP)									
Share of occupation 1	108	0.118	0.044	0.109	0.045	0.077	0.041	0.021	0.022
Share of occupation 2	108	0.112	0.049	0.116	0.047	0.103	0.044	0.042	0.032
Share of occupation 3	108	0.099	0.039	0.118	0.044	0.111	0.045	0.069	0.035
Share of occupation 4	108	0.057	0.028	0.069	0.040	0.072	0.026	0.056	0.026
Share of occupation 5	108	0.046	0.021	0.057	0.024	0.065	0.023	0.074	0.029
Share of occupation 6	108	0.052	0.042	0.042	0.025	0.037	0.025	0.024	0.017
Share of occupation 7	108	0.160	0.046	0.185	0.054	0.197	0.062	0.165	0.071
Share of occupation 8	108	0.093	0.029	0.102	0.025	0.101	0.024	0.066	0.021
Share of occupation 9	108	0.052	0.022	0.062	0.023	0.063	0.026	0.066	0.032

Table 5. Error-Components Models for Log Real Hourly Earnings

	Germany RG+AR1		Denmark RW+AR1		Netherlands RG+AR1		Belgium PI+AR1		France PI+AR1		Luxembourg PI+AR1		UK RG+AR1	
	Param.	SE	Param.	SE	Param.	SE	Param.	SE	Param.	SE	Param.	SE	Param.	SE
Permanent Component														
$\exp(estimate) = \sigma_\mu^2$	7.2609	0.0867	0.0097	0.5891	0.1913	0.0905	0.0698	0.0246	0.1653	0.0293	0.1071	0.0251	0.0467	0.2467
$\exp(estimate) = \sigma_\varphi^2$	0.0024	0.0968			0.0002	0.0797							0.0001	0.1032
$\mathrm{cov}(\mu, \varphi)$	-0.1313	0.0121			-0.0052	0.0005							-0.0022	0.0004
$\exp(estimate) = \sigma_\pi^2$			0.0014	0.1494										
Time shifters, $\lambda_{1,1994} = 1$														
$\lambda_{1,1995}$	1.0734	0.0084	1.0185	0.0210	0.9735	0.0158	0.9421	0.0116	1.0511	0.0129	1		0.9915	0.0082
$\lambda_{1,1996}$	1.1503	0.0112	0.9910	0.0209	0.9748	0.0172	1.0041	0.0122	1.1058	0.0130	1.0215	0.0220	0.9070	0.0103
$\lambda_{1,1997}$	1.2028	0.0142	0.9011	0.0231	0.9334	0.0159	0.9225	0.0145	1.1338	0.0144	1.1810	0.0208	0.9228	0.0126
$\lambda_{1,1998}$	1.2720	0.0215	0.9022	0.0256	0.9876	0.0169	0.8915	0.0160	1.1295	0.0173	1.2493	0.0222	0.8936	0.0146
$\lambda_{1,1999}$	1.4078	0.0188	0.7953	0.0257	0.8963	0.0184	0.7853	0.0162	1.1257	0.0181	1.3205	0.0248	0.8571	0.0154
$\lambda_{1,2000}$	1.5155	0.0222	0.7431	0.0287	0.8749	0.0193	0.9245	0.0170	1.0581	0.0188	1.3425	0.0314	0.7802	0.0163
$\lambda_{1,2001}$	1.4744	0.0280	0.7643	0.0264	0.9096	0.0208	0.9207	0.0156	1.0842	0.0186	1.2977	0.0222	0.7982	0.0175
Cohort shifters, $\gamma_{1,40-50} = 1$														
$\gamma_{1,51-60}$	0.4401	0.0145	1.0630	0.0306	1.2748	0.0424	1.0127	0.0138	0.8589	0.0139	0.9557	0.0189	1.4131	0.0301
$\gamma_{1,61-70}$	0.2031	0.0088	1.0950	0.0704	1.3168	0.1144	0.7776	0.0105	0.7796	0.0131	0.9396	0.0183	2.0459	0.0992
$\gamma_{1,71-80}$	0.0856	0.0046	0.9890	0.1467	0.7891	0.0704	0.1425	0.0387	0.5000	0.0178	0.5933	0.0183	2.4514	0.2435
Transitory Component														
$\exp(estimate) = \sigma_\varepsilon^2$	0.2578	0.5741	0.1315	0.2626	0.1262	0.3096	0.2439	0.1523	0.7969	0.5779	0.0186	0.1671	0.0702	0.1110

$\exp(estimate) = \sigma_0^2$														
$\exp(estimate) = \sigma_{0,40-50}^2$	0.0044	0.7316	0.0368	0.0732	0.0228	0.0913	0.0639	0.0437	0.1039	0.0491	0.0753	0.0638	0.0764	0.0437
$\exp(estimate) = \sigma_{0,51-60}^2$	0.0562	0.0887	0.0255	0.0810	0.0271	0.1208	0.0357	0.0663	0.0913	0.0902	0.1064	0.1109	0.0789	0.0605
$\exp(estimate) = \sigma_{0,61-70}^2$	0.0419	0.0940	0.0349	0.0725	0.0112	0.2073	0.0392	0.0535	0.0486	0.0843	0.0672	0.1136	0.0750	0.0681
$\exp(estimate) = \sigma_{0,71-80}^2$	0.0832	0.0679	0.0284	0.0705	0.0406	0.0962	0.0347	0.0596	0.0956	0.0966	0.0225	0.1220	0.0313	0.1179
ρ	0.3583	0.0223	0.5472	0.0732	0.3289	0.0118	0.6280	0.0104	0.3993	0.0254	0.2389	0.0161	0.4512	0.0125
θ														
Time shifters, $\lambda_{2,1994} = 1$														
$\lambda_{2,1995}$	0.4531	0.1298	0.3697	0.0502	0.4936	0.0756	0.2941	0.0226	0.2517	0.0739	1		0.8214	0.0418
$\lambda_{2,1996}$	0.3801	0.1088	0.3548	0.0508	0.4839	0.0771	0.2396	0.0181	0.1703	0.0504	1.9774	0.1487	0.8135	0.0475
$\lambda_{2,1997}$	0.3480	0.1008	0.3531	0.0483	0.4839	0.0756	0.2677	0.0202	0.1963	0.0572	1.4402	0.1377	0.7179	0.0406
$\lambda_{2,1998}$	0.3511	0.1013	0.3077	0.0409	0.3287	0.0505	0.2784	0.0209	0.2373	0.0676	1.0818	0.0915	0.7025	0.0359
$\lambda_{2,1999}$	0.3886	0.1121	0.4086	0.0543	0.3875	0.0605	0.3371	0.0255	0.2284	0.0650	1.2422	0.1019	0.7140	0.0377
$\lambda_{2,2000}$	0.2918	0.0841	0.3980	0.0538	0.4541	0.0710	0.2704	0.0201	0.2432	0.0696	1.3644	0.1127	0.8482	0.0482
$\lambda_{2,2001}$	0.3957	0.1147	0.3595	0.0484	0.5629	0.0877	0.3255	0.0257	0.2346	0.0675	1.4003	0.1195	0.7977	0.0453
Cohort shifters, $\gamma_{2,40-50} = 1$														
$\gamma_{2,51-60}$	0.9547	0.0299	1.1521	0.0265	1.0459	0.0294	1.0555	0.0189	0.9383	0.0293	0.8573	0.0355	0.8949	0.0171
$\gamma_{2,61-70}$	0.9643	0.0268	1.2128	0.0205	1.1180	0.0313	0.9996	0.0140	1.0469	0.0303	1.0445	0.0429	0.9938	0.0182
$\gamma_{2,71-80}$	1.3832	0.0411	1.8237	0.0325	1.7278	0.0464	1.3569	0.0233	1.5123	0.0465	1.4318	0.0595	1.1898	0.0224
SSR	0.0143		0.0068		0.0099		0.0047		0.0240		0.0222		0.0061	
χ^2	2473.7073		5872.5492		2492.7787		17769.4220		1756.3574		1632.2320		2597.3157	
LogL	459.2576		512.8864		486.0084		540.0406		421.9693		318.4753		520.5053	

Table 5. Error-Components Models for Log Real Hourly Earnings *(continued)*

	Ireland RG+AR1		Italy RG+ARMA(1,1)		Greece RG+ARMA(1,1)		Spain RG+ ARMA(1,1) $\sigma_0^2 = \sigma_{0,cohort}^2$		Portugal PI+AR1, $\sigma_0^2 = \sigma_{0,cohort}^2$		Austria PI+AR1, $\sigma_0^2 = \sigma_{0,cohort}^2$		Finland RG+AR1	
	Param.	SE	Param.	Param.	Param.	SE	Param.	SE	Param.	SE	Param.	SE	Param.	SE
Permanent Component														
$\exp(estimate) = \sigma_\mu^2$	0.0564	0.3502	0.0325	0.0325	0.0779	0.0915	0.294	0.059	0.2561	0.0303	0.0811	0.0449	0.0616	0.2703
$\exp(estimate) = \sigma_\varphi^2$	0.0002	0.1435	0.00008	0.00008	0.0002	0.0582	0.000	0.000					0.0001	0.1399
$\mathrm{cov}(\mu, \varphi)$	-0.0029	0.0007	-0.0014	-0.0014	-0.0034	0.0003	-0.006	0.001					-0.0023	0.0005
Time shifters, $\lambda_{1,1994} = 1$														
$\lambda_{1,1995}$	0.9784	0.0114	0.9529	0.0112	1.0205	0.0145	1.010	0.012	0.9767	0.0119	1			
$\lambda_{1,1996}$	0.9230	0.0126	0.9548	0.0184	0.9970	0.0194	0.973	0.017	1.0414	0.0124	1.0112	0.0244	1	
$\lambda_{1,1997}$	0.9602	0.0167	0.9085	0.0212	1.0386	0.0229	0.972	0.022	1.0176	0.0140	1.0570	0.0287	1.1265	0.0193
$\lambda_{1,1998}$	0.9141	0.0185	0.9868	0.0267	1.0104	0.0239	0.976	0.027	1.0187	0.0157	0.9843	0.0291	1.0778	0.0232
$\lambda_{1,1999}$	0.8559	0.0193	0.9983	0.0292	1.0606	0.0238	0.959	0.032	0.9875	0.0171	0.9081	0.0379	1.0173	0.0274
$\lambda_{1,2000}$	0.7928	0.0215	0.9704	0.0307	0.9236	0.0227	0.898	0.036	1.0925	0.0194	0.9403	0.0391	0.9554	0.0266
$\lambda_{1,2001}$	0.7770	0.0249	0.9476	0.0335	0.9267	0.0207	0.867	0.040	1.0758	0.0199	0.9425	0.0384	1.0297	0.0309
Cohort shifters, $\gamma_{1,40-50} = 1$														
$\gamma_{1,51-60}$	1.3594	0.0443	1.2272	0.0463	1.3261	0.0233	1.162	0.074	0.9340	0.0178	0.8921	0.0198	1.3819	0.0485
$\gamma_{1,61-70}$	2.0128	0.1621	1.3857	0.1189	1.9371	0.0811	0.988	0.120	0.7691	0.0162	0.8354	0.0262	2.4403	0.1705
$\gamma_{1,71-80}$	2.9811	0.4996	1.5606	0.2008	3.9268	0.4940	0.475	0.078	0.3140	0.0203	0.4591	0.0293	2.9792	0.7975
Transitory Component														
$\exp(parameter) = \sigma_\varepsilon^2$	0.0285	0.1649	0.0582	0.0758	0.1183	0.0750	0.099	0.006	0.2584	0.2067	0.4830	0.1811	0.0555	0.2197

$\exp(estimate) = \sigma_0^2$							0.052	0.004	0.0428	0.0974	0.0751	0.0652		
$\exp(estimate) = \sigma_{0,40-50}^2$	0.0709	0.0825	0.0314	0.0898	0.0791	0.0516							0.0550	0.0743
$\exp(estimate) = \sigma_{0,51-60}^2$	0.0688	0.0966	0.0422	0.0619	0.0574	0.0702							0.0588	0.0701
$\exp(estimate) = \sigma_{0,61-70}^2$	0.0942	0.0869	0.0521	0.0592	0.1011	0.0436							0.0707	0.0727
$\exp(estimate) = \sigma_{0,71-80}^2$	0.0801	0.1015	0.0283	0.0919	0.0695	0.1269							0.0464	0.1098
ρ	0.2912	0.0229	0.6438	0.0428	0.5995	0.0346	0.849	0.024	0.7785	0.0149	0.7009	0.0292	0.2904	0.0195
θ			-0.2506	0.0204	-0.1487	0.0242	-0.364	0.007						
Time loading factors, $\lambda_{2,1994} = 1$														
$\lambda_{2,1995}$	1.2269	0.0938	0.7692	0.0239	0.7991	0.0261	0.907	0.027	0.5061	0.0525	1			
$\lambda_{2,1996}$	1.2789	0.1050	0.8238	0.0294	0.6992	0.0277	0.815	0.024	0.3117	0.0367	0.2929	0.0291	1	
$\lambda_{2,1997}$	1.0434	0.0818	0.7296	0.0241	0.6171	0.0280	0.842	0.024	0.3536	0.0383	0.2089	0.0224	0.8849	0.0977
$\lambda_{2,1998}$	1.0924	0.0853	0.7536	0.0264	0.6269	0.0275	0.887	0.023	0.3723	0.0397	0.1724	0.0196	0.7069	0.0809
$\lambda_{2,1999}$	1.0595	0.0821	0.6516	0.0242	0.6106	0.0256	0.760	0.021	0.3555	0.0371	0.2270	0.0223	0.9301	0.0957
$\lambda_{2,2000}$	1.0816	0.0876	0.6656	0.0225	0.7195	0.0287	0.821	0.022	0.3484	0.0362	0.2203	0.0220	0.8191	0.0861
$\lambda_{2,2001}$	1.1093	0.0968	0.6998	0.0234	0.6657	0.0287	0.856	0.023	0.3921	0.0400	0.2248	0.0229	0.7937	0.0852
Cohort specific factors, $\gamma_{2,40-50} = 1$														
$\gamma_{2,51-60}$	0.9889	0.0352	0.9894	0.0204	0.9608	0.0179	1.004	0.025	0.7800	0.0383	0.8410	0.0254	0.8609	0.0253
$\gamma_{2,61-70}$	1.0987	0.0403	1.0324	0.0217	1.0187	0.0183	1.051	0.025	1.0102	0.0399	0.8986	0.0280	0.8714	0.0252
$\gamma_{2,71-80}$	1.1532	0.0458	1.3299	0.0278	0.9443	0.0256	1.330	0.030	1.1072	0.0409	1.1979	0.0416	1.2070	0.0349
SSR	0.0273		0.0017		0.0146		0.0094		0.0288		0.0052		0.0038	
χ^2	2116.2117		1576.2281		3824.4496		1984.9587		3737.5070		2229.2852		945.1045	
LogL	412.7881		611.7874		458.0054		489.8478		408.9498		399.6179		300.6177	

Table 6. Summary of the evolution of predicted permanent % of predicted overall variance by grouped by the evolution of overall inequality: 1994-2001

Inequality	Increased	Netherlands, Luxembourg, Italy, Greece, Portugal, Finland (except the youngest cohort)	Permanent (% of overall variance)	Increased ⇔ Immobility Increased	Luxembourg, Italy, Greece, Finland
				Decreased ⇔ Immobility Decreased	Netherlands, Portugal
	Decreased:	Germany (except for the cohorts born in 1941-1950 and 1961-1970), Denmark, Belgium (except for the youngest cohort), France (except for the cohort born in 1961-1970), UK(except for the youngest two cohorts), Ireland , Spain (except the youngest cohort), Austria	Permanent (% of overall variance)	Increased ⇔ Immobility Increased	Germany (except the oldest cohort), France, UK (except for the youngest cohort), Ireland, Austria
				Decreased ⇔ Immobility Decreased	Belgium (except for the oldest cohort), Spain, Denmark (except for the oldest and second youngest cohort)

Table 7. Pair wise Correlations Between the Labour Market Outcomes, Labour Market Institutional Factors and Macroeconomic Shocks

Pair wise Correlations	Permanent Variance		Temporary Variance		Immobility (PV/TV)	
	Cohort 1940-1969	Cohort 1970-1981	Cohort 1940-1969	Cohort 1970-1981	Cohort 1940-1969	Cohort 1970-1981
EPL	0.314	-0.238	0.200	0.164	0.144	-0.310
	0.000	0.017	0.001	0.102	0.012	0.002
EPL regular contracts (EPLR)	0.489	-0.162	0.181	0.255	0.230	-0.255
	0.000	0.106	0.002	0.010	0.000	0.010
EPL temporary contracts (EPLT)	0.123	-0.209	0.155	0.069	0.053	-0.250
	0.033	0.036	0.007	0.495	0.361	0.012
[(EPLR-EPLT)/EPLT]*100	0.117	0.555	0.082	-0.149	0.027	0.593
	0.041	0.000	0.155	0.136	0.647	0.000
Union Density	-0.591	-0.345	-0.306	-0.332	-0.254	-0.123
	0.000	0.000	0.000	0.001	0.000	0.207
Degree of Corporatism	-0.498	-0.443	-0.472	-0.225	-0.090	-0.204
	0.000	0.000	0.000	0.030	0.136	0.049
Tax Wedge	-0.298	-0.380	-0.250	0.095	-0.065	-0.444
	0.000	0.000	0.000	0.367	0.283	0.000
PMR	0.246	0.038	0.052	0.048	0.160	0.016
	0.000	0.719	0.385	0.651	0.008	0.880
Active Labour Market Policies	-0.269	-0.223	-0.230	0.153	-0.068	-0.189
	0.000	0.032	0.000	0.142	0.259	0.070
Average Unemployment Benefit Replacement Rate	-0.228	-0.466	-0.202	0.225	-0.125	-0.480
	0.000	0.000	0.001	0.030	0.037	0.000
Labour Demand Shock	0.174	0.597	0.027	0.006	0.064	0.569
	0.005	0.000	0.671	0.957	0.308	0.000
Terms of Trade Shock	-0.028	0.149	-0.065	-0.067	0.106	0.102
	0.637	0.153	0.277	0.522	0.077	0.332
Total Factor Production Shock	-0.244	-0.092	-0.360	-0.253	-0.046	0.154
	0.000	0.402	0.000	0.020	0.464	0.161
Real Interest Shock	-0.150	-0.143	-0.003	-0.006	-0.046	-0.225
	0.012	0.173	0.961	0.959	0.464	0.030
Aggregate Supply Shock	-0.105	-0.081	-0.004	-0.004	-0.017	-0.108
	0.069	0.419	0.948	0.967	0.774	0.284
Aggregate Demand Shock	-0.206	-0.152	-0.242	-0.237	-0.090	-0.001
	0.000	0.130	0.000	0.017	0.117	0.990

Note: P-values are reported in parenthesis.

Table 8. Systemic Effects across Institutions

	Permanent Variance		Temporary Variance		Wage Immobility	
	Parameter Estimate	SE	Parameter Estimate	SE	Parameter Estimate	SE
Systemic Interactions						
EPL	0.194***	0.059	0.025	0.018	0.116	0.075
Relative EPL	0.095***	0.024	0.008	0.008	-0.004	0.037
Union Density	-1.197***	0.345	-0.023	0.037	-1.586***	0.556
Int. Corp.	-0.897***	0.053	-0.551***	0.105	-1.173***	0.115
High Corp.	-0.559***	0.111	-0.898***	0.064	-0.818***	0.073
Tax Wedge	-1.514***	0.594	0.072	0.071	-0.736	0.745
PMR	-0.065***	0.023	0.003	0.008	0.184**	0.072
ALMPs	0.057	0.090	0.016	0.032	1.848***	0.618
Unemployment Benefit	1.069***	0.324	0.184***	0.104	0.779*	0.444
Direct Effects						
EPL	0.079***	0.021	0.052	0.067	14.902***	5.565
Relative EPL	0.053***	0.008	0.019	0.019	3.288*	1.827
Union Density	-0.342***	0.102	-0.370	0.246	-18.40**	8.767
Intermediate Corporatism	0.309***	0.080	-0.183	0.402	-6.520*	3.380
High Corporatism	0.092***	0.026	-1.049	0.890	13.149***	4.612
Tax Wedge	0.722***	0.118	0.236	0.155	30.106	18.698
PMR	0.008	0.013	-0.086***	0.025	1.721	1.506
ALMPs	0.014	0.037	0.341**	0.175	12.104**	5.658
Unemployment Benefit	-0.843***	0.250	0.801**	0.383	-130.994***	45.505
Cohort 1940-1950	1		1		1	
Cohort 1951-1960	0.885***	0.015	0.886***	0.046	0.650***	0.048
Cohort 1961-1970	0.621***	0.014	1.046***	0.050	0.385***	0.043
Cohort 1971-1980	0.205***	0.012	1.807***	0.071	0.082**	0.041
1994	1		1		1	
1995	0.961***	0.032	0.726***	0.040	0.345***	0.055
1996	0.979***	0.033	0.562***	0.036	0.546***	0.064
1997	1.023***	0.035	0.503***	0.035	0.702***	0.086
1998	0.984***	0.036	0.462***	0.035	0.679***	0.087
1999	0.921***	0.040	0.434***	0.038	0.682***	0.106
2000	0.899***	0.044	0.404***	0.037	0.790***	0.131
2001	0.880***	0.046	0.422***	0.039	0.529***	0.103
Adj. R-squared	0.978		0.937		0.737	
N	372		372		372	

Note: Estimated with non-linear least squares

Table 9. Specific interactions between institutions and shocks

	Permanent Variance		Temporary Variance		Wage Immobility	
Direct effects of institutions	Estimate	SE	Estimate	SE	Estimate	SE
EPL	0.027***	0.006	0.012***	0.004	0.416	0.877
Relative EPL	0.027***	0.002	0.012***	0.001	0.915***	0.224
Union Density	-0.013	0.014	0.001	0.009	-4.158	2.662
Int. Corp.	0.080***	0.011	0.036***	0.007	0.191	2.081
High Corp.	-0.043***	0.011	0.015**	0.007	1.297	1.966
Tax Wedge	0.125***	0.039	0.012	0.026	-0.024	7.036
PMR	-0.002	0.004	-0.011***	0.003	0.082	0.436
ALMPs	0.061**	0.032	-0.024	0.016	-2.970	2.285
Unemployment Benefit	-0.007	0.037	0.071***	0.022	9.214**	4.271
Direct effects of shocks						
Aggregate Supply Shock	-0.001	0.002	0.006***	0.002	-0.221	0.423
Aggregate Demand Shock	0.007**	0.003	-0.009***	0.003	-1.550**	0.625
Labour Demand Shock	0.005	0.082	-0.139**	0.061	-143.497***	41.320
Terms of Trade Shock	-1.092***	0.292	0.412***	0.156	206.340***	53.541
Total Factor Production Shock	0.178	0.255	0.227**	0.092	176.586**	74.340
Interest Rate Shock	-0.119	0.255	-0.475***	0.178	-353.420***	100.985
Interaction Effects						
EPL	0.464***	0.112	-0.112	0.271	0.582***	0.111
Relative EPL	0.323***	0.085	-0.128	0.122	-0.002	0.061
Union Density	1.994***	0.509	-0.381	0.555	1.057***	0.275
Intermediate Corporatism	-0.421**	0.180	-0.023	0.345	-1.067***	0.156
High Corporatism	-1.608***	0.170	-0.661***	0.129	-0.631***	0.114
Tax Wedge	3.332**	1.514	-3.296*	1.755	-4.582**	1.801
PMR	0.207***	0.077	0.578***	0.192	0.163**	0.064
ALMPs	-0.099	0.326	1.317**	0.612	0.999**	0.433
Unemployment Benefit	1.681**	0.671	-1.932*	1.152	-1.374*	0.771
Cohort 1940-1950	1		1		1	
Cohort 1951-1960	0.882***	0.016	0.937***	0.054	0.589***	0.052
Cohort 1961-1970	0.618***	0.014	1.044***	0.057	0.374***	0.048
Cohort 1971-1980	0.242***	0.012	1.918***	0.086	0.081*	0.045
Adjuster R-squared	0.979		0.929		0.689	
N	320		320		320	

Estimated with Non-Linear Least Squares

Table 10. Model with cross-interactions between institutions and between institutions and macroeconomic shocks

	Permanent Variance		Temporary Variance		Wage Immobility	
Direct effects of institutions	Estimate	SE	Estimate	SE	Estimate	SE
EPL	-0.111***	0.013	0.187**	0.080	92.018***	22.647
Relative EPL	-0.076***	0.011	0.007	0.005	-5.944***	1.405
Union Density	0.668***	0.133	0.230	0.264	-15.128***	4.906
Int. Corp.	0.761***	0.107	-0.405**	0.167	-180.138***	40.660
High Corp.	0.160***	0.051	-0.300*	0.155	-168.618***	39.571
Tax Wedge	-0.286***	0.088	-0.264***	0.059	50.973	51.564
PMR	0.022***	0.004	-0.010***	0.003	-19.803***	7.190
ALMPs	0.117***	0.035	-0.005	0.016	-5.975	7.591
Unemployment Benefit	-0.211***	0.041	-0.261	0.367	21.271**	9.375
Interactions between Institutions						
EPL*Relative EPL	-0.040***	0.007	-0.003	0.004		
EPL*Union Density			-0.057	0.041	80.163***	12.886
EPL*Intermediate Corporatism			-0.244***	0.081	-69.460***	21.389
EPL*High Corporatism			-0.156**	0.081	-105.232***	23.669
EPL*Tax Wedge	0.363***	0.094	-0.287***	0.085	24.919	21.641
EPL*PMR			0.001	0.008	-8.406***	1.725
EPL*ALMPs			-0.054**	0.026	-8.390	10.214
EPL* Unemployment Benefit			0.012	0.047	4.195	14.413
Union Density* Intermediate Corporatism	1.330***	0.370	-0.896**	0.355		
Union Density *High Corporatism	-0.950***	0.145	-0.212	0.267		
Union Density *Tax Wedge	2.322***	0.500	0.634**	0.335	263.715***	90.336
Union Density *PMR	-0.055**	0.023	0.058***	0.019	-4.699	4.773
Union Density *ALMPs	-0.150	0.144				
Union Density * Unemployment Benefit						
Tax Wedge * Intermediate Corporatism					42.410	58.534
Tax Wedge *High Corporatism					-91.419	58.678
Tax Wedge *PMR	-0.185***	0.061				
Tax Wedge *ALMPs	1.552**	0.784			-376.100***	129.645
Tax Wedge * Unemployment Benefit	-4.255***	0.987	-1.047**	0.475		
PMR * Intermediate Corporatism					23.631***	7.450
PMR *High Corporatism					16.566**	6.963
PMR *ALMPs	-0.086***	0.022			15.750***	5.145
PMR * Unemployment Benefit	0.323***	0.047			-35.136**	8.210
ALMPs * Intermediate Corporatism						
ALMPs *High Corporatism						
ALMPs * Unemployment Benefit	-0.427	0.309			291.018***	62.972
Unemployment Benefit *Intermediate Corporatism			0.462	0.390		

Unemployment Benefit *High Corporatism			0.275	0.372		
Direct effects of shocks	Estimate	SE	Estimate	SE	Estimate	SE
Aggregate Supply Shock			0.0003	0.005	1.091	0.905
Aggregate Demand Shock			-0.0003	0.004	-8.943***	1.485
Labour Demand Shock	0.240	0.232	0.0059	0.079	-387.124***	60.752
Terms of Trade Shock	-0.158	0.154	-0.0005	0.008	723.155***	118.535
Total Factor Production Shock	-0.032	0.048	0.0077	0.104	141.921**	80.707
Interest Rate Shock	-0.023	0.042	-0.0059	0.080	-1039.221***	147.930
Interactions between institutions and shocks						
EPL	-0.378	0.556	11.852	160.175	0.475***	0.080
Relative EPL			0.760	10.467	-0.032	0.037
Union Density	5.980	6.174	-67.706	918.096	1.155***	0.160
Intermediate Corporatism	8.230	9.478	67.658	929.291	-0.728***	0.066
High Corporatism	-2.026*	1.135	22.614	320.174	-0.863***	0.030
Tax Wedge	3.272	4.665	-185.221	2511.978	-3.678***	0.684
PMR	-0.067	0.276	-0.557	8.052	0.097***	0.029
ALMPs	-3.541	5.178	-2.107	38.717	2.148***	0.295
Unemployment Benefit	8.568	8.235	-32.498	446.731	-2.040***	0.330
Controls – cohort level						
Proportion of university degree					0.122	0.789
Proportion of upper-secondary degree					0.226	0.566
Proportion of private employees	-0.019***	0.007	0.015	0.012	-1.642**	0.694
Proportion of permanent contracts	0.034***	0.007	0.003	0.009	0.916	0.704
Proportion of unemployed						
Occ 1	0.135***	0.038			8.231***	2.466
Occ 2	0.051*	0.028				
Occ 3	-0.056*	0.029				
Occ 4						
Occ 5	0.132***	0.034				
Occ 6					8.560	5.797
Occ 7	-0.060***	0.016	0.021	0.025		
Occ 8			-0.038	0.039	8.736**	4.154
Occ 9			0.062	0.044	4.553	3.465
Cohort Shifters						
Cohort 1940-1950	1		1		1	
Cohort 1951-1960	0.869***	0.016	0.857***	0.081	0.163***	0.043
Cohort 1961-1970	0.601***	0.017	0.951***	0.103	0.090*	0.043
Cohort 1971-1980	0.222***	0.022	2.325***	0.260	0.018	0.045
Adjuster R-squared	0.989		0.929		0.689	
N	320		320		320	

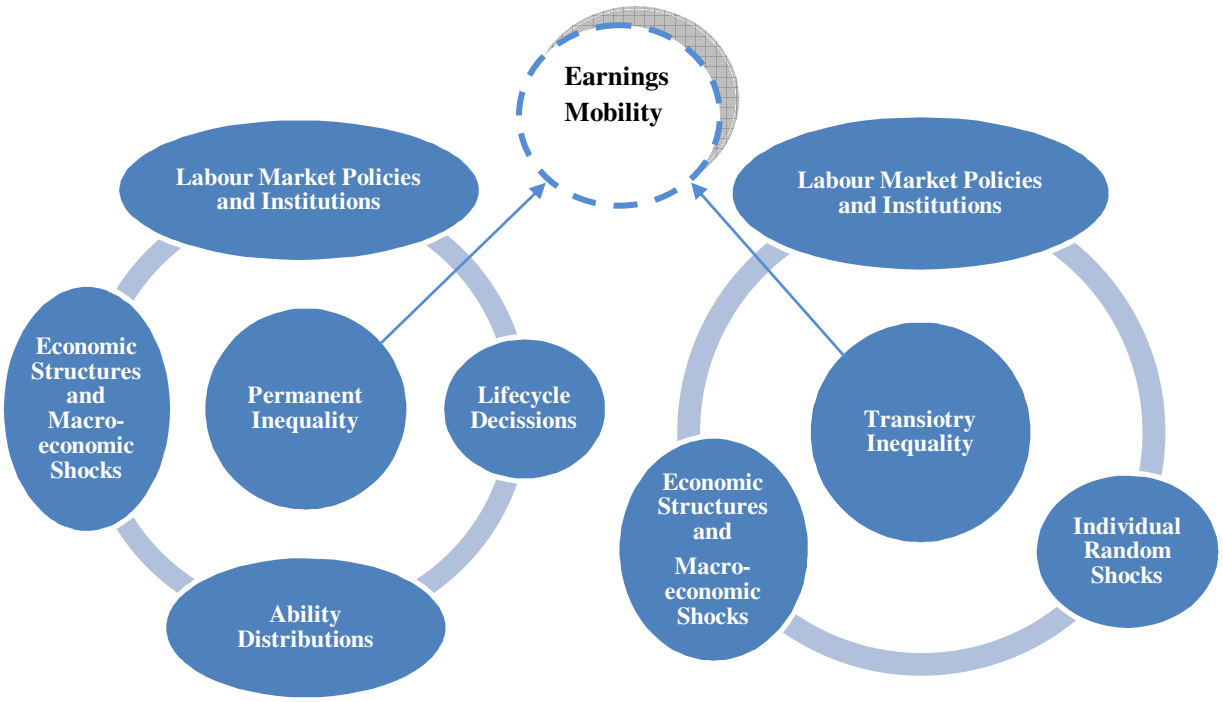

Figure 1. Determinants of Permanent and Transitory Inequality and Earnings Mobility

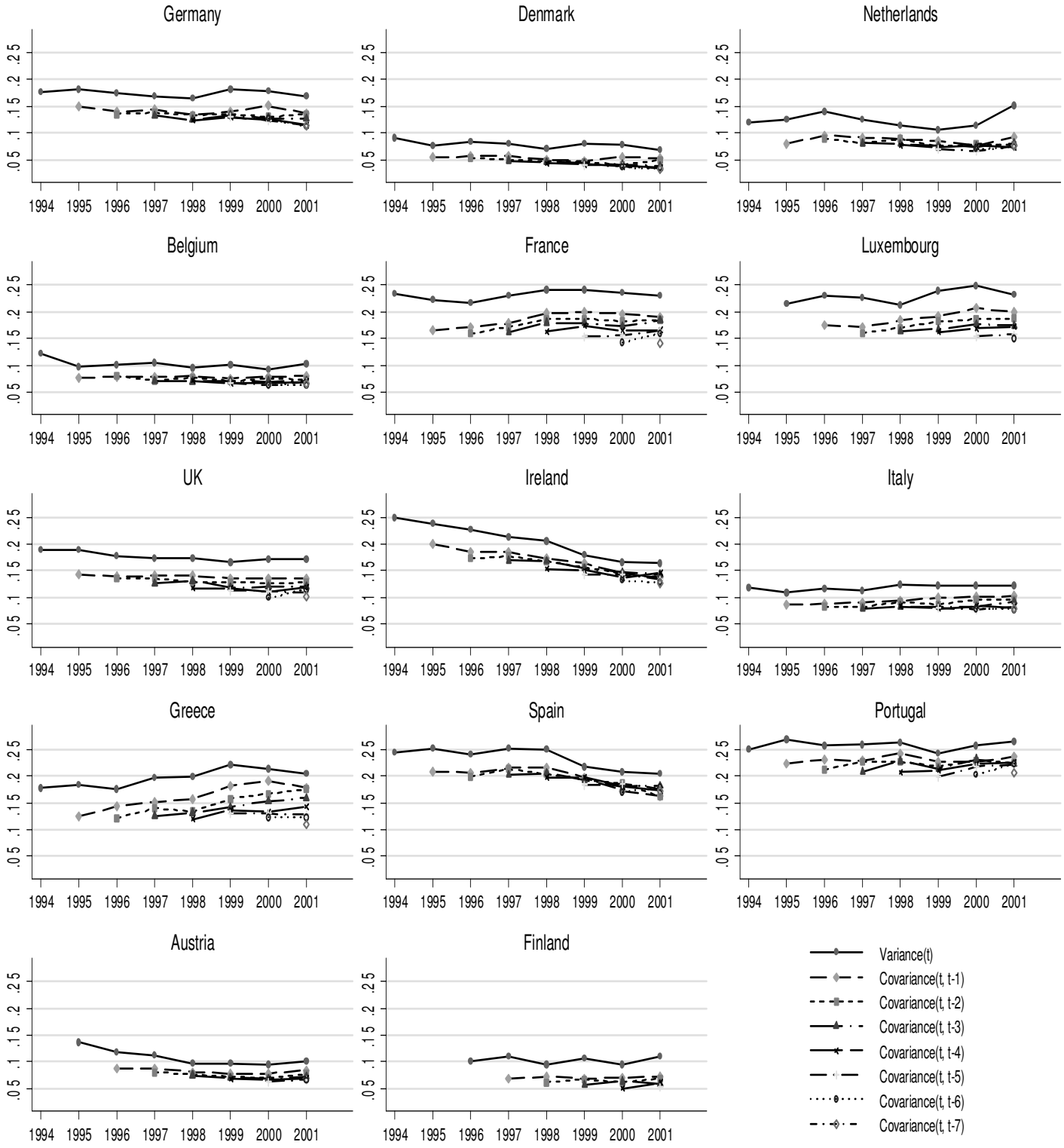

Figure 2. Overall Autocovariance Structure of Hourly Earnings: Years 1994-2001

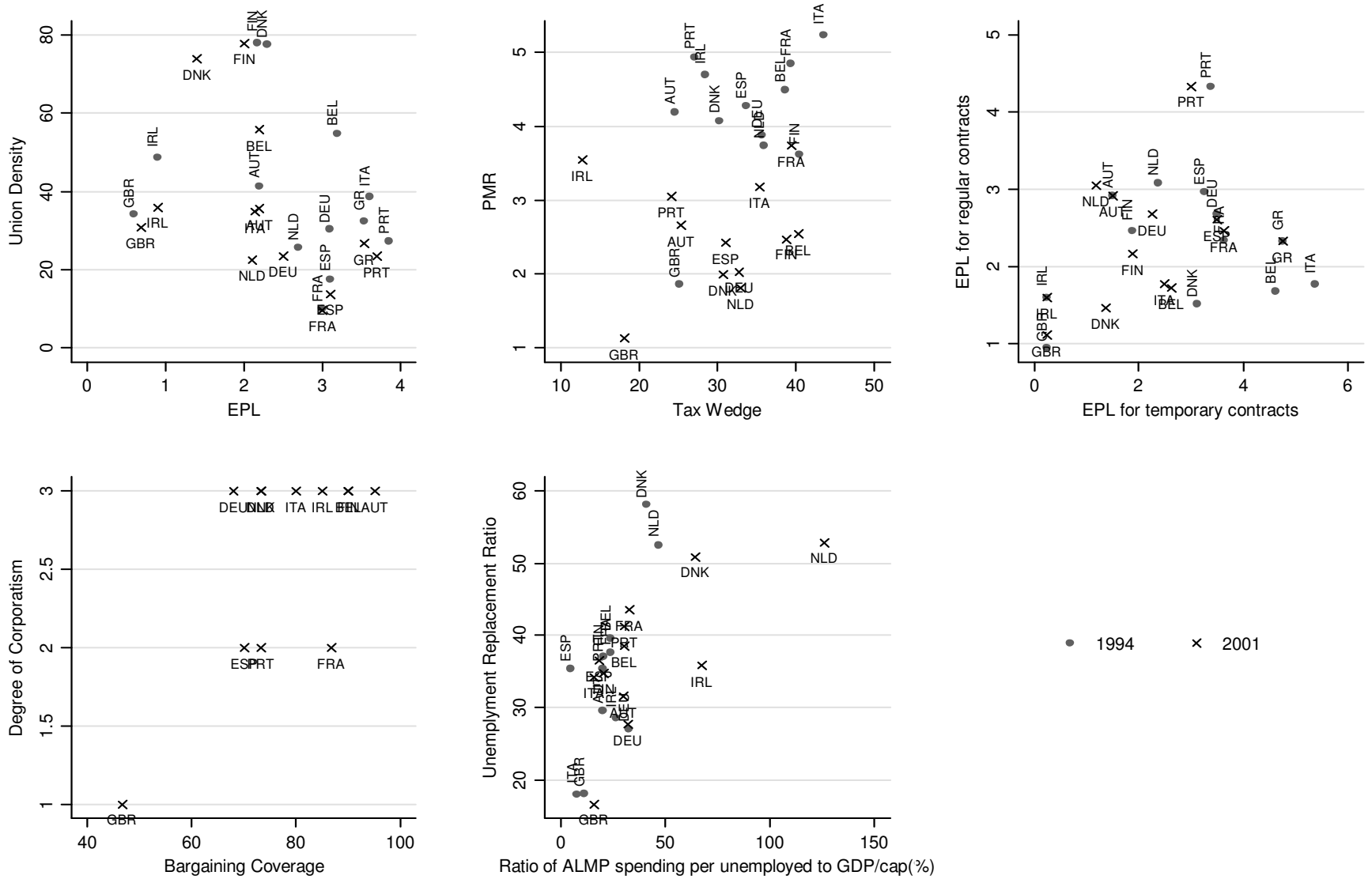

Figure 3. Labour Market Evolution: Union Density, EPL, PMR, Tax Wedge, , EPLT, EPLR, Degree of Corporatism, Bargaining Coverage

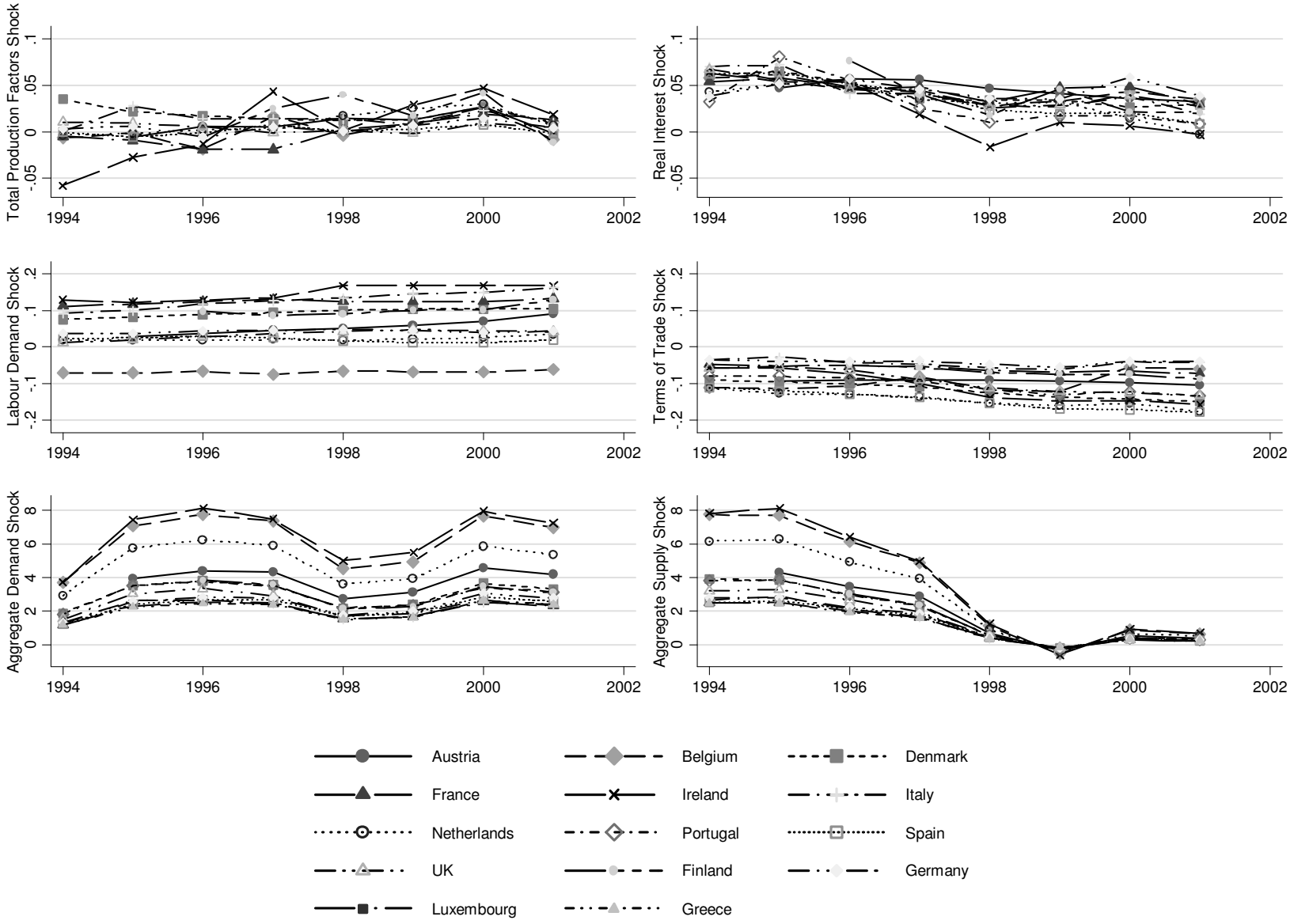

Figure 4. Evolution of macroeconomic shocks

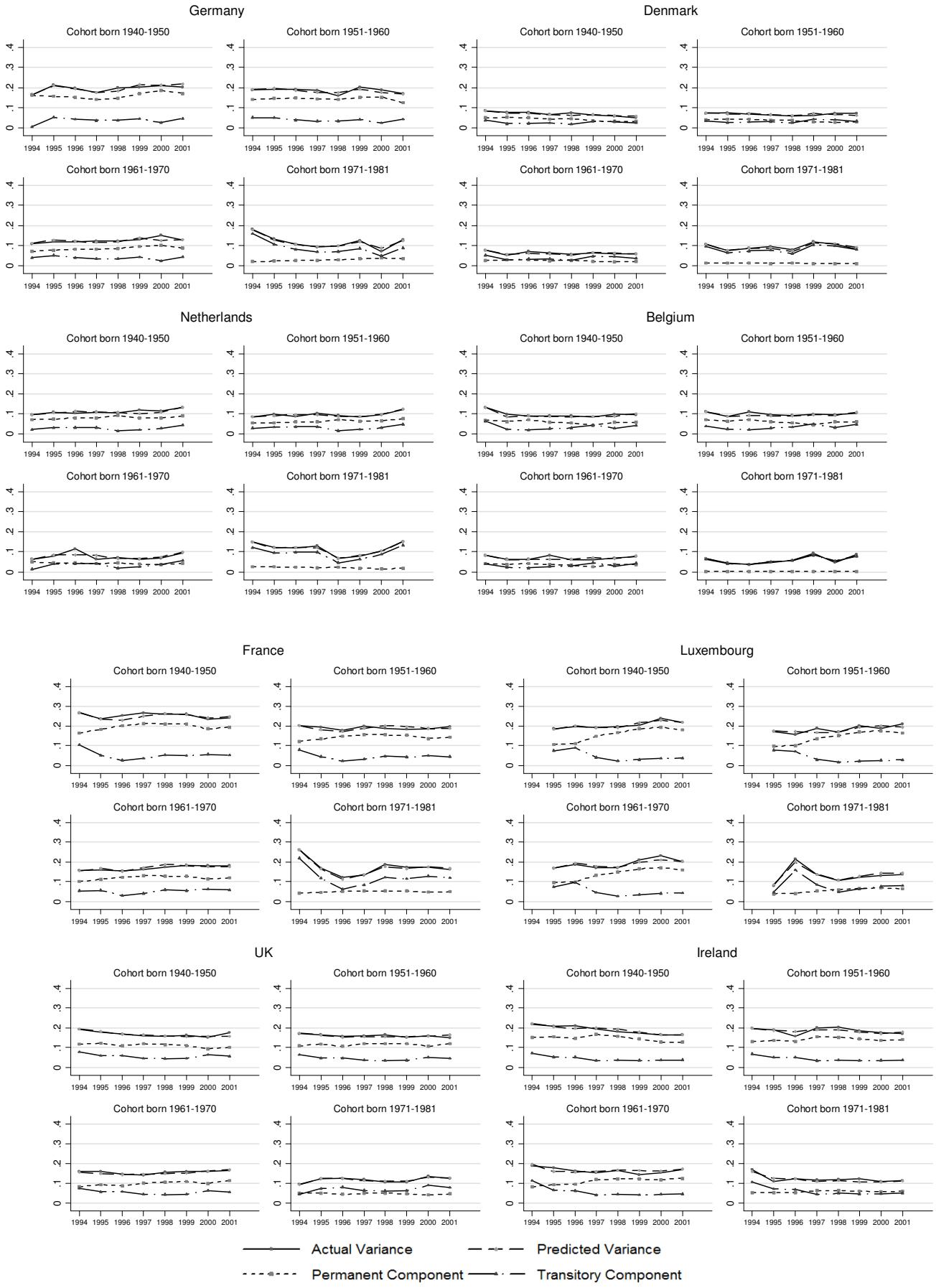

Figure 5. Actual and Predicted Variance of Earnings with Permanent and Transitory Predicted Components for Selected Cohorts: 1994-2001

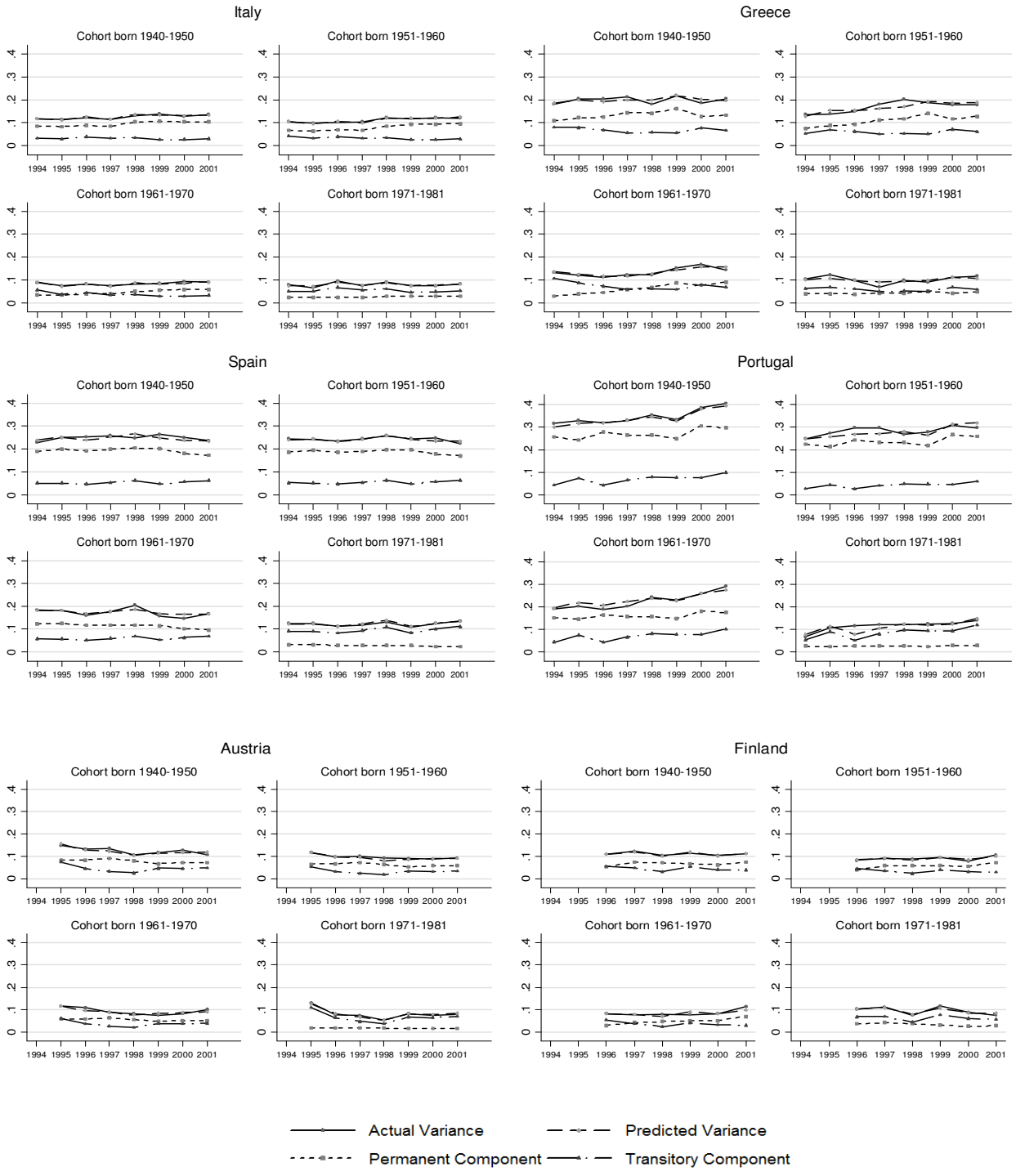

Figure 5. Actual and Predicted Variance of Earnings with Permanent and Transitory Predicted Components for Selected Cohorts: 1994-2001 *(continued)*

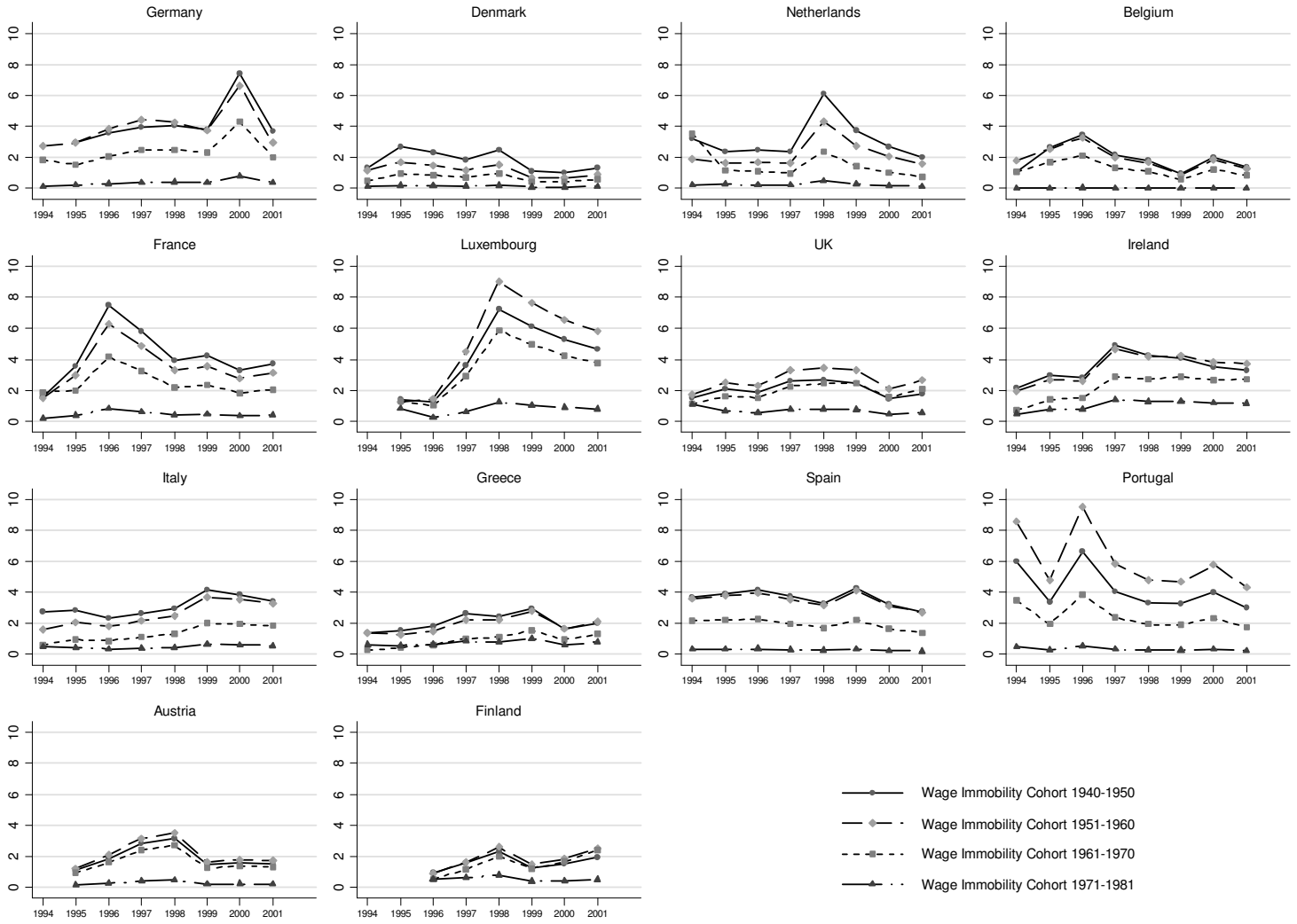

Figure 6. Ratio Between Permanent Variance and Transitory Variance Over Time For Selected Cohorts

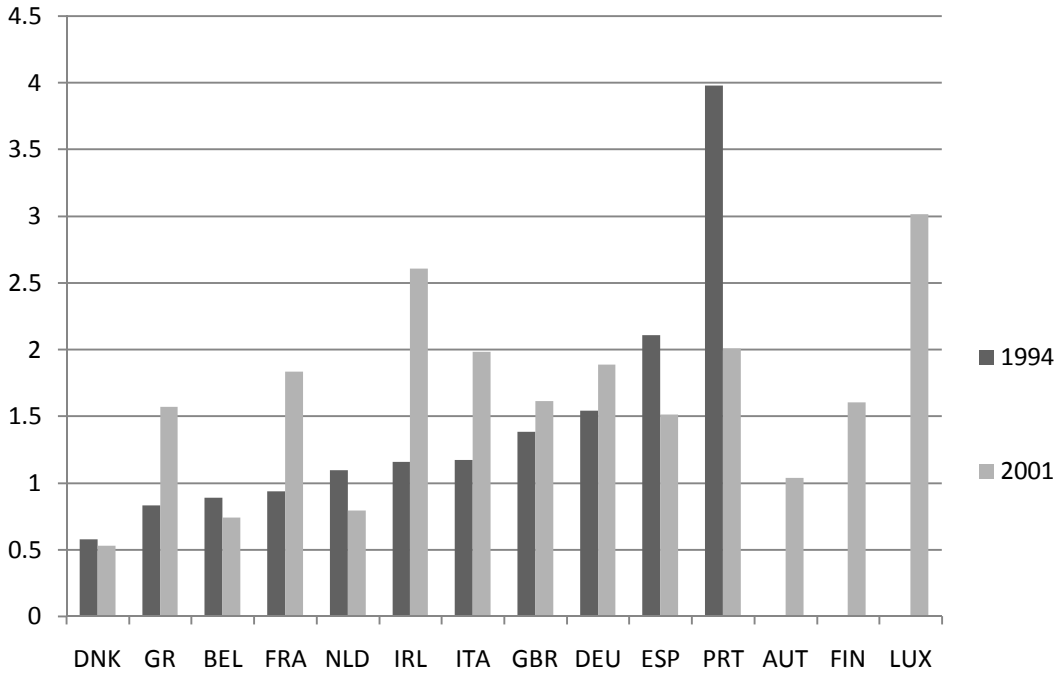

Figure 7. Earnings Immobility - Ratio between Average Permanent Variance and Average Transitory Variance over Time 1994 vs. 2001

10. REFERENCES

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Contents

Figures:

Tables:

[i] $\mu_{it} = \mu_i + \varphi_i age_{it}, \quad \mu_i \sim iid(0, \sigma_\mu^2), \quad \varphi_i \sim iid(0, \sigma_\varphi^2), \quad E(\mu_i, \varphi_i) = \sigma_{\mu\varphi}$. The variances σ_μ^2 and σ_φ^2 capture individual heterogeneity with respect to time-invariant characteristics and age-earnings profiles. A positive covariance between μ_i and φ_i implies a rising inequality in the permanent component of earnings over the life cycle, which is consistent with the school-matching models. A negative covariance implies that the two sources of heterogeneity offset each other, which is consistent with the on-the-job training. A negative covariance is expected to generate mobility within the distribution of the permanent component of earnings. Cappellari, L. (2003).

[ii] $u_{ia} = u_{i,a-1} + \pi_{ia}, \quad \pi_{ia} \sim iid(0, \sigma_\pi^2), \quad E(u_{i,a-1}, \pi_{ia}) = 0$ The current value depends on the one from the previous age and an innovation term π_{ia}, which accommodates any permanent re-ranking of individuals in the earnings distribution. The high persistency of the unit root model might result from low rates of depreciation on human capital investments or labour market conditions through implicit contacts. (Baker 1997)

[iii] $\sum_{j=0}^{p} \rho_j v_{it-j} = \sum_{j=0}^{q} \theta_j \varepsilon_{it-j}, \quad \varepsilon_{it} \sim iid(0, \sigma_\varepsilon^2), \quad v_{i0} \sim (0, \sigma_{0,c}^2)$

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

[v] The multiplicative constant equals e.g. p*(Population above 16/Sample Population). The ratio p varies across countries so that sensible samples are obtained. It ranges between 0.001-0.01.

[vi]The data was provided by email from the authors.

[vii] http://www.econ.ucdavis.edu/faculty/fzlinder/OECD%20data.htm

[viii] T_c and t_{0c} represent the total number of years and the first year observed for each cohort.

[ix] See Macurdy(1982, page 92/93)

[x] 1994 refers to t=0

[xi] Exception are countries which are not observed for all eight waves, and consequently will have less observations.

[xii] i.e. 144 auto-covariances for countries observed over 8 waves, 122 for those with 7 waves and 84 for those with 6 waves.

[xiii] $4.89 = 100 \cdot \sqrt{\sigma_{\varphi}^2}$

[xiv] For the other countries, the MA component was either rejected by the data or could not be identified due to the low number of waves.

[xv] Average permanent variance and transitory variance represent average across cohorts.

[xvi] Average immobility was computed as a ratio between average permanent variance and average transitory variance

[xvii] Not significant

[xviii] Gross Amounts