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Contents

Abstract

The paper investigates whether differences in the popularity of fixed term contacts on the labour market can be a source of divergent dynamics of unemployment among European Monetary Union economies. For that purpose we construct a database of labor market institutions for a group of eleven euro area countries and years 1995-2013 to conduct a series of dynamic panel regressions. We find a robust and significant impact of duality on unemployment dynamics: high duality rate amplifies its responsiveness to output shocks and lowers its persistence. The heterogeneous unemployment developments, in turn, are a challenge for the conduct of common monetary policy. We conclude that improved stability at both the euro area and country level may be obtained by a coordinated shift to 'single-contract' that closes the disproportion between temporary and regular contracts.

Keywords: Dual labour market, Monetary Union, Panel Data.

JEL classification: C23, F02, J68.

1 Introduction

The creation of the Economic and Monetary Union (EMU)[1] was preceded by a wide discussion on whether the countries that were to adopt the euro shared desirable features to function smoothly with a single currency. This debate focused predominantly on the importance of labor and product market flexibility for the smoothness of adjustment to asymmetric shocks. Much less emphasis was put on the fact that the differences in labor market regulations among EMU countries could lead to asymmetric responses to common shocks, monetary policy changes for instance. One area of such institutional heterogeneity with potentially strong implications for the functioning of EMU is the duality of labor market, resulting from the use of fixed-term contracts (FTC).

The current high popularity of FTC in selected EMU countries is the outcome of the evolution of labour market institutions that has taken place since early 1970s. As discussed by Blanchard (2006), the increase in the unemployment rate from below 5% to double-digit territories throughout the 1970s, which was triggered by the oil shocks, led to major changes in institutions, among others more stringent employment protection legislation (EPL). The changes, however, did not lead to the fall in unemployment rates: the latter stayed at elevated levels long after the shocks expired. It became evident that earlier changes had made unemployment more persistent, hence the pressure arose to reverse them. But the reversal did not take the form of a return to earlier institution, but resulted in the introduction of two types of labor contracts: highly protected permanent and less protected temporary ones. The best-known example of such a reform was introduced in Spain in 1984. It caused the proportion of temporary workers in total employment rose to around 30% (Bentolila et al., 2011). Even though in other EMU countries the use of FTC is less pronounced, over the last three decades it has markedly gained in importance in most of them.

Introduction of FTC had a non-negligible effect on the functioning of the labor market and the economy in general. These effects have been extensively analyzed in the literature, which can be divided into three strands. The first group of studies

[1] Throughout the article the terms EMU and euro area countries are used synonymously - albeit in legal terms EMU refers to the chapter of EU Treaty which applies to all EU members, although with varying extent.

uses firm-based models, in which firms are subject to idiosyncratic productivity or demand shocks that give rise to adjustment in firm-level employment. The second group of studies uses matching models, which focus on the individual match between a worker and a firm and analyze in more detail the frictions associated with match formation. The third group of studies uses panel regressions to check for the direction and significance of the relationship between institutions and labor market outcome. Below we briefly review the main findings from the selected studies.

Firm-based models. This strand of the literature follows the seminal paper of Bentolila and Bertola (1990), who propose a partial-equilibrium model in which firms face idiosyncratic demand shocks, to which they adjust by changing employment, subject to firing costs. They obtain the well-know result that in the environment of high employment protection labor demand of a given firm is more stable, and surprisingly, on average higher, than in an environment of no firing costs. Bentolila and Saint-Paul (1992) extend these findings by proposing a model with two labor contracts (permanent and temporary) and aggregate shocks. They find that the introduction of FTC increases the size and decreases the persistence of employment response to aggregate shocks. A similar model, i.e. incorporating two labor contracts and aggregate shocks, was also a subject of the study by Cabrales and Hopenhayn (1997). The results of their simulations show that the introduction of FTC does not lead to any important rise in average labor demand but induces a threefold increase in employment volatility. It is also worthy to mention the study of Boeri and Garibaldi (2007), which points to a transitional honeymoon effect after the introduction of FTC. In particular, in the initial years after the reform firms exploit hiring flexibility, but cannot exploit firing flexibility since they are constrained by the stock of insider workers. During the next periods, however, the employment gains are dissipated by the greater firing flexibility along with the declining share of insider workers. In the long-run, the introduction of FTC leads to the substitution of permanent workers with the temporary ones. These theoretical findings are to a large extent confirmed by the empirical study of Kahn (2010), who uses the data on individuals from the European Community Household Panel and finds that FTC reforms appear to encourage a substitution of temporary for permanent jobs.

Matching articles. Cahuc and Postel-Vinay (2002) and Blanchard and Landier (2002) were the first to incorporate labor market duality to the matching framework proposed by Mortensen and Pissarides (1994). Both articles show that the introduction of FTC fosters both job creation and destruction. Since under some parameterization (e.g. stringent EPL for permanent workers) the second effect dominates, the reform leads perversely to an increase in unemployment and welfare loss. The reason is that firms rarely transform temporary jobs into permanent ones. Costain et al. (2010) and Sala et al. (2012) extend the matching model with dual labor market to include aggregate productivity shocks with the aim to analyze the impact of duality on business cycle fluctuations. Both papers show that unemployment in the model economy with two labor contracts is significantly more volatile than in the identical economy with a single contract. The intuition behind these findings is that employment growth during booms is concentrated on temporary, low-productivity jobs that are destroyed during downturns. It is also worth to mention the study of Bentolila et al. (2012) that investigates the strikingly different response of Spanish and French unemployment during the recent crisis. The authors argue that differences in FTC and EPL regulations can explain up to 45% of the much higher rise of Spanish unemployment, which would indicate that labor market duality increases employment volatility.

Panel regressions. The third strand of the literature uses panel data to investigate the importance of labour market institutions for the functioning of the real economy. Blanchard and Wolfers (2000) show that the reaction of the labour market to demand and supply shocks depends significantly on its institutional setup. A number of works, e.g. Nicoletti and Scarpetta (2005), Fiori et al. (2007), Bassanini and Duval (2009), use panel regressions to test whether selected institutions have a significant impact on the level of unemployment. The common conclusion of these works is that unemployment tends to be elevated in the environment of generous unemployment benefits, high tax wedge on wages and rigid product market. Even though the impact of EPL on the level of the unemployment rate was found insignificant, Fiori et al. (2007) report that high EPL leads to its greater persistence. Finally, it is worth to mention the results of Nunziata and Staffolani (2007), who show that high EPL significantly increases the number of temporary jobs, but at the expense of the permanent ones so that the effect on the aggregate labour demand is negligible.

Our reading of the above studies is that the high share of FTC (i.) increases flows on the labour market, (ii) has ambiguous effect on the level of unemployment (apart from the honeymoon effect), (iii) leads to a substitution of permanent jobs by temporary ones, (iv.) raises the volatility of employment and output in the business cycle, and (v.) limits unemployment persistence.

In this article we contribute to this literature by discussing the potential effects of the dual labor market on the economy of a country within a monetary union. On the basis of longitudinal data for EMU countries we show that the dynamic response of unemployment to output shocks depends on the labor market institutions, in particular the share of FTC. In other words, the heterogeneity of EMU countries in terms of labor market institutions induces their asymmetric reaction to common shocks, which increases macroeconomic instability. We believe that these results are of special importance in light of the recent debate on the reform of EMU institutions, including proposals for partial harmonization of the labor market institutions. Moreover, the results might be helpful for countries planning to adopt the euro. For instance, given that Poland has the highest share of workers with FTC among EU countries, our results would suggest that prior to EMU accession it would be justified to consider labor market reform limiting the popularity of the FTC in this country.

The structure of the article is as follows. Section 2 presents descriptive statistics on the effect of labor market duality on the EMU economies. Sections 3 presents the empirical strategy and the results of panel regressions. Section 4 discusses policy implications for a country in a monetary union. The last section concludes. Data are described in the appendix to the article.

2 The dual labor market in EMU

In this section we look at the data related to labor market duality in EMU countries and use visual methods to check, whether implications from the literature are confirmed by selected statistics for the EMU member states. We start by discussing how to measure the duality. The broadest measure of duality is the share of temporary workers and self-employed in total employment. Including self-employed might be justified as selected institutional factors, preferential taxation of entrepreneurial income for instance, might be reflected in a high number of fictitiously self-employed. It is obvious, however, that fictitious self-employment constitute only a fraction of total self-employment. Consequently, including self-employment in the duality measure leads to an upside bias of duality for economies with more dominant role of zero-employees enterprises.[2] The second, probably the most popular, measure of duality is the share of temporary workers in total employment. This measure, however, also distorts the picture as there are various reasons for using FTC: probationary period, education or training, preferences or inability to find a permanent job. As a result, this measure introduces an upward bias for the German-speaking countries, in which trainees and apprentices constitute the most of temporary employees, or in Ireland, where FTC are frequently chosen because of employees' preferences. This is the reason why in our study we have decided to define duality rate in a narrow sense, i.e. as the share of those temporary workers that could not find a permanent job in total employment.

The two panels of Figure 1 present the average duality rates for working age population (people aged 15 to 64) and young employees (people aged 15 to 24) in eleven EMU countries over the period 1995-2013.[3] It can be seen that the rate was visibly the highest in Spain, standing on average at 23%. For the young Spaniards the ratio was much higher: more than half of them had a temporary contract because they could not find a permanent job. This explains why the Spanish experience with the FTC is so extensively discussed in the literature. Portugal is the country with the second highest duality rate, standing on average at just below 12% and almost three times more for the young. In France, Finland and Greece the duality rate was close

[2]Zero-employees enterprises are widespread in such sectors as agriculture, construction, retail trade or some business services, hence the duality rate would be affected by the sectoral structure of the economy.

[3]The data are described in detail in point 3.1 and the Appendix.

to the euro area average and amounted to between 5% and 10% and at least twice more for the young. Italy and the Netherlands were characterized by a relatively low rate of duality at about 5% for all workers and around 10% for the young. Duality rate for working age population in Belgium was also close 5% but over three times higher for the young. Finally, Germany, Ireland and especially Austria were the countries with the lowest duality rate, which was well below 5% for working age and only slightly higher for the young employees. Two questions arise: what is the reason of these differences and how they affect labor market performance?

As regards the first question, it seems that the main reason is that the regulation of FTC differs substantially across the euro area countries. As illustrated by Table 1, there is a substantial heterogeneity in terms of: specification of reasons for using FTC, maximum number or the maximum duration of successive FTCs. The institutional heterogeneity persists in spite of the presence of common EU principles as set by the EU Council directives on the use of fixed-term work (1999/70/EC) and temporary agency work (2008/104/EC). As for the second question, let us look at the relationship between the duality and unemployment rates. Introduction of FTC was motivated by intention to increase the job creation rate without decreasing job security of the insiders. Consequently, the use of FTC was supposed to raise employment and decrease the unemployment rate. The simple correlation analysis between average duality and unemployment rates in EMU countries shows, perversely, that the unemployment rate tends to be higher in countries with elevated share of involuntary temporary employees in total employment, both for working age population and the young (see the upper panels of Figure 2). This is especially evident for Spain, which was characterized by extremely high duality rate and the highest unemployment in the sample of countries. On the other extreme, the unemployment and duality rates in Austria were the lowest among the eleven member states. In turn, the bottom-left panel of Figure 2 points to a significant and positive correlation between the duality rate and unemployment volatility in the EMU countries. Once again, Spain and Austria are on the two corners of the regression line. Finally, the bottom-right panel of Figure 2 indicates that labor market duality influences the relationship between unemployment rate and the output gap. It shows that the response of the labor market to demand fluctuations is the higher in countries characterized by a high share of FTC. In the next sections we take a closer look at these findings and formulate policy implications.

3 Panel regressions

In the previous section we have illustrated that there are some correlations between the duality rate and selected measures of labor market performance. It should be noted, however, that these relationship could be distorted by other factors, which cannot be accounted for in a simple correlation analysis. Here we address this issue by using panel data regressions. In particular, for working age and young population we estimate the parameters of the following model:

$$\begin{aligned} U_{it} = {} & \rho_1 U_{i,t-1} + \rho_2 U_{i,t-1} \times Dual_{i,t-1} + \\ & + \alpha_1 GAP_{it} + \alpha_2 GAP_{it} \times Dual_{i,t-1} + \\ & + \beta_1 Dual_{i,t-1} + \mu_i + \sum \gamma_k \times control_{k,i,t-1} + \epsilon_{it} \end{aligned} \tag{1}$$

where i and t are country and time indices, μ_i denote country fixed effects and ϵ_{it} stands for the error component.

The model can be described as follows. The unemployment rate (U) is explained by its past values, the position of the economy in the business cycle (GAP), the share of involuntary temporary workers in the total number of employees ($Dual$) as well as control variables representing other labor market institutions. Moreover, we introduce two interaction variables to explain the heterogeneity of unemployment dynamics among EMU countries. The interaction variable $Dual_{t-1} \times GAP$ captures the impact of duality on the cyclical volatility of unemployment, whereas the interaction variable $Dual_{t-1} \times U_{t-1}$ is introduced to measure the impact of duality on unemployment persistence.

In the choice of control variables explaining differences in the average level of unemployment rate between EMU countries, we follow the literature (Blanchard and Wolfers, 2000; Nicoletti and Scarpetta, 2005; Fiori et al., 2007; Bassanini and Duval, 2009) and use the following measures describing labor market institutions: expenditures on active labour market policies ($ALMP$), unemployment benefit replacement rate ($ReplRate$), the level of coordination in wage setting ($WageCoord$) and union density ($UnionDens$). Additionally, to account for factors influencing the level of structural unemployment, we include a proxy for the level of human capital, either the share of population with upper secondary and tertiary education (ISCED levels

3-6) for the working age population regression or the percentage of early leavers from education and training aged 18-24 for the young population regressions (*Educ*).

3.1 Data

The parameters of regression (1) are estimated on the basis of annual data from the period 1995-2013 covering eleven initial euro area members (to be precise, we included Greece but excluded Luxembourg). Most of the data are taken from Eurostat. These are: the unemployment rate, the share of temporary workers in total employment[4], the share of temporary workers that could not find a permanent job, the ratio of active labour market policies spending to GDP, implicit tax on labour and the two variables for education attainment. The measure for output gap is taken form the OECD Economic Outlook database. We also use the index of employment protection for regular workers compiled by the OECD. As regards wage coordination and union density measures, we combine data from the OECD and the ICTWSS database (Visser, 2013). Finally, the unemployment benefit replacement rate is calculated by combining the OECD and Bassanini and Duval (2006) database. The complete dataset is available upon request from the authors. The list of data sources and series names is provided in the Appendix.

3.2 Econometric issues

An important characteristic of specification (1) is that it includes country fixed effects μ_i, hence the econometric model explains the variability of the unemployment rate in time rather than cross-sectional dimension. Table 2, which provides the descriptive statistics for variables included in regression (1), illustrates that there is also substantial cross-country heterogeneity in labor market institutions, which is probably an important source of unemployment rate differences among euro area countries. However, given that our main focus is on the dynamic relationship between output gap and the unemployment rate, which is rather a time dimension feature, we do not investigate this topic in this study.

The dynamic structure of the econometric model (1) needs to be addressed by an appropriate choice of econometric estimation technique. It is widely known that

[4]Precisely, employed persons except contributing family workers.

in a dynamic panel data models the pooled least squares (LS) estimator of the autoregressive parameter tends to be biased upwards in the presence of unexplained heterogeneity. At the same time, the fixed effects (FE) estimator yields downward-biased estimates for the autoregressive parameter (Nickell, 1981). In our study, the additional complication is that specification (1) allows for the interactions of the lagged dependent variable with the other regressors. For such a specification the bias-corrected FE (BC-FE) estimator of Bruno (2005) might remain biased (Bun and Kiviet, 2006). One solution is to apply the Anderson and Hsiao (1982) first-difference estimator (AH). However, if the instruments are weak, it is also biased (Stock and Yogo, 2002). Moreover, the asymptotic efficiency of the AH estimator depends on the cross-section dimension of the sample, which is rather small in our analysis. Similarly, due to small cross-section and relatively long time dimension of our dataset, the system GMM estimator of Blundell and Bond (1998) is prone to overidentification problems, hence is inefficient (Roodman, 2009). Last, as noted by (Bun and Kiviet, 2006), in a dynamic setup the unexplained heterogenity may pose significant problems for estimators other than FE and BC-FE, LS or system GMM for instance. As a result, while choosing the method of estimation we need to decide on the lesser evil.

Taking into account the above considerations, our estimation strategy is as follows. Our preferred method of estimation is the FE. However, to check the robustness of the FE results, the scale of the Nickel bias in particular, we compare them to the BC-FE and AH estimates. It might be noted that the choice of FE estimation technique might pose a problem, as the inclusion of country-specific effects usually lowers the explanatory power of independent variables that are relatively time-invariant, e.g. those describing institutional features of the economy. Even though our main interest is on the interaction variables that describe the cyclical behavior of the unemployment rate, which are relatively volatile, it is possible that the FE will kill the significance of selected control regressors.

The other issue that we had to address relates to the endogenity of the explanatory variables. As firms may be more prone to offer and workers will more likely accept temporary jobs in times of high unemployment (Holmlund and Storrie, 2002), we use a one-year lagged value of the duality rate. Similarly, for the control variables, we use their one-year lagged values.

3.3 Baseline results

Table 3 presents the estimation results of model (1) both for working age population (columns 1-3) and the young (columns 3-6). The output of the FE regression (columns 1 and 4) is treated as a baseline, whereas the BC-FE and AH estimates are used to check whether the Nickell bias poses a problem or the use of alternative (less relevant in our case) methods changes qualitatively the main results. The comparison of FE and BC-FE estimates suggests that the Nickell bias is negligible for both samples. Moreover, the baseline FE results are to a large extent confirmed by the AH estimates. This confirms that the application of the FE estimator is justified.

Let us now focus on the economic interpretation of the baseline results for the working age population (column 1 of Table 1). We have found that both interaction variables have a significant impact on the unemployment rate at the 1% significance level. Moreover, the estimates of the interaction variables are of the expected sign: an increase in the duality rate strengthens the instantaneous response of unemployment to output fluctuations as well as decreases the persistence of this response. A comparison of countries characterized by a 20% and 5% duality rates, respectively, points to a substantially different response of the labour market to output fluctuations. The instantaneous response of unemployment to output gap ($\alpha = \alpha_1 + \alpha_2 \times Dual$) in the first country (-1.00) is almost four times higher than in the second one (-0.28), whereas the persistence of the unemployment rate ($\rho = \rho_1 + \rho_2 \times Dual$) is much lower (0.35 vs 0.76). As a result, the dynamic response of unemployment to output gap changes is markedly divergent. This is illustrated by the left panel of Figure 3. It presents the shape of the reaction function for Spain (1995-2013 average duality rate at 22.9%), Germany (2.7%) and the euro area (7.7%). It can be seen that a common shock leading to a temporary decline in output of 1% leads to an abrupt and sizeable reaction of the unemployment rate in Spain (peak reaction in the first year in which the rate is 1.14 pp. above its long-term level) and a more gradual and muted reaction in Germany (peak reaction in the forth year in which the rate is 0.26 pp. above its long-term level). The model-based response of unemployment in the euro area is an intermediate case (peak reaction in the third year in which the rate is 0.56 pp. above its long-term level). As regards the direct effect of duality on the level of unemployment rate, it was found to be positive, but insignificant. Finally, it might be noted that the coefficients on *ReplRate* and

$WageCoord$ are positive and significant at 10% significance level, which indicates that generous unemployment benefits and wage coordination at central level raise unemployment. In the case of spending on active labor market policy ($ALMP$), the density of labor unions ($UnionDens$), the tax rate ($TaxWedge$) or education attainment ($Educ$), the impact on the unemployment rate was found insignificant.

The results for the model estimated with the sample of young workers are somewhat different. We have found that the inertia of the unemployment process is lower, whereas the interaction of the duality rate with the lagged unemployment is insignificant. As regards the estimates of the parameter measuring the response of youth unemployment to changes in the output gap, it is higher than for total unemployment rate, which means that, intuitively, youth unemployment is more volatile in the cycle. This is illustrated by the right panel of Figure 3, which presents the reaction of youth unemployment rate to a 1% negative output gap shock. It shows that this kind of shock raises youth unemployment in euro area (characterized by the average youth duality rate of 15.5%) by almost 1.1 percentage point two years after the shock. For comparison, in Spain (50.4%) the peak reaction is 2.40 percentage point one year after the shock, while in Germany (2.7%) the maximal deviation is only 0.5 percentage point and occurs 3 years after the shock. Thus, the reaction of youth unemployment to output shocks is about twice higher than the reaction of the unemployment rate for the working age population. One of the reasons is that the share of involuntary temporary workers among the young is much higher than for working age population. Simple calculations suggest that the sole difference in duality rates among the two age groups is responsible for about one-third of the difference in the instantaneous response of unemployment rate to output shock.

3.4 Extended results

We have already shown that the level of the duality rate has a significant impact on the dynamic response of unemployment to output fluctuations. However, it can be argued that the way the duality rate affects the response of the labour market to demand and supply shocks depends on the protection of permanent workers. In other words, in a country characterized by low protection of regular workers the volatility of the unemployment rate might be relatively high, even though the duality rate is low in comparison to countries with high level of permanent workers protection

(Lochner, 2014). In this point we address this issue by adding the Employment Protection Legislation index for regular workers (EPL), elaborated by the OECD, and its interactions with lagged unemployment rate and output gap to the specification of the baseline model. In particular, we estimate the parameters of the following regression:

$$\begin{aligned} U_{it} = {} & \rho_1 U_{i,t-1} + \rho_2 U_{i,t-1} \times Dual_{i,t-1} + \rho_3 U_{i,t-1} \times EPL_{i,t} + \\ & + \alpha_1 GAP_{it} + \alpha_2 GAP_{it} \times Dual_{i,t-1} + \alpha_3 GAP_{it} \times EPL_{i,t} + \\ & + \beta_1 Dual_{i,t-1} + \beta_2 EPL_{i,t} + \mu_i + \sum \gamma_k \times control_{k,i,t-1} + \epsilon_{it}. \end{aligned} \tag{2}$$

In this specification the persistence parameter amounts to $\rho = \rho_1 + \rho_2 Dual + \rho_3 \times EPL$, whereas the instantaneous reaction of the unemployment rate to output changes is equal to $\alpha = \alpha_1 + \alpha_2 Dual + \alpha_3 EPL$.

In Table 4 we present the estimation results of model (2). As in the previous subsection, columns 1-3 contain estimates for working age population and columns 4-6 for the age group 15-24 years. Once again, the analysis of output from FE, BC-FE and AH regressions confirms the reliability of the FE estimates. The comparison of Tables 3 and 4 shows that adding the EPL and its interactions to the baseline specification had a negligible effects on the estimates of the remaining parameters of the model. An increase in the duality rate is still strengthening the instantaneous response of unemployment to output fluctuations. It also decreases the persistence of this response, whereas the replacement rate and wage coordination remained the only significant control variables. As regards the role of EPL in determining the level and dynamics of the unemployment rate, even though all relevant coefficients are insignificant, they are of expected sign. In particular, the stringent EPL for regular workers, *ceteris paribus*, is increasing the persistence of the unemployment rate. Surprisingly, it does not lower the instantaneous response of employment to output fluctuations. Thereby, the extension for the EPL allows for situations that were not possible in the baseline model. For instant, it is possible that unemployment is both highly persistent and very sensitive to output fluctuations. This undesirable situation would characterize a country with high duality rate and high level of permanent workers protection. This is illustrated by Figure 4, which presents the reaction of the unemployment rate of working age population to a 1% negative output gap

shock. In comparison to Figure 3, we have added two countries: Ireland, which is characterized by low duality rate (3.1%) and low level of EPL (1.38), and Portugal, where the duality rate is relatively high (11.3%) and the EPL for regular workers is the highest among the euro area countries (4.36). The resulting coefficients describing the dynamic response of the unemployment rate to output gap changes are $\alpha = -0.25$ and $\rho = 0.69$ for Ireland and $\alpha = -0.53$ and $\rho = 0.83$ for Portugal. As a result, the peak reaction of the unemployment rate to the negative output gap shock is at 0.90 percentage point in the forth year for Portugal and merely at 0.34 percentage points in the third year for Ireland.

4 Policy implications

The asymmetric response of the unemployment rate to fluctuations in economic activity raises a following question: does it constitute a problem for a smooth functioning of the monetary union? In this section we elaborate on this problem.

Let us start by noting that heterogeneous regional business cycle developments are a normal feature of currency unions. Regions forming currency unions, be it subfederal units or regions within unitary states, are often hit by idiosyncratic shocks or react differently (asymmetrically) to common macroeconomic disturbances due to their heterogeneous institutions or economic structures. For example, the federal states of the US are shown to exhibit relatively high degree of heterogeneity in response to monetary policy shocks (Owyang and Wall, 2009). In the US such divergences do not pose visible challenges for economic governance nor generate risks for macroeconomic and political stability. In the case of the euro area, however, heterogeneous reaction to common shocks can be expected to bring direr consequences as the instruments that could prevent business cycle divergence from becoming persistent or self-reinforcing are either missing or not effective. Here, following three points have to be made.

First, euro area's institutional design does not include centralized fiscal arrangements that could mitigate divergent business cycle developments among the member states. Although (Cottarelli and Guerguil, 2014) show that net fiscal transfers smooth relatively small portion of idiosyncratic shocks in fiscal federations (5-10 per cent), they are more important as an insurance mechanism against the negative, asymmetric effects of common shocks (20 per cent). Second, private risk sharing of country-level shocks is less effective in the euro area than in other currency unions. A number of studies show that in the US and other federal states private risk sharing allows to smooth a higher proportion of regional shocks than public risk sharing arrangements (Asdrubali et al., 1996; Melitz and Zumer, 2002; Hepp and von Hagen, 2013). In turn, in the euro area, low cross-border ownership of capital and international credit market freezes during recessions translate into a relatively large portion of shocks that remain unsmoothed (estimated at two thirds by Furceri and Zdzienicka, 2013). Third, adjustment mechanisms at the country level are not sufficient to prevent self-reinforcing divergence of business cycles and to compensate for the lack of risk sharing trough centralized fiscal arrangements or low effectiveness of

private risk sharing. Price and wage rigidities remain higher in the euro area than in the US and mobility of production factors, capital and labour, is hampered by institutional factors (e.g. lack of full portability of pension and other entitlements, missing harmonization of bankruptcy and corporate governance law) or language barriers. At the same time, space for national fiscal policy adjustment is limited by a combination of weak fiscal position of some euro area member states and fiscal rules.

With the lacking or not efficient stabilizing mechanisms, heterogenous response of euro area countries' labour markets to shocks becomes an unwelcome feature of EMU, possibly calling for a policy intervention. To the extent that - as we have showed - differences in the intensity of labour market dualism cause heterogenous labour market reactions to shocks, they may be expected to worsen stabilizing properties of common monetary policy and thus give rise to persistent business cycle divergence. Although the literature dealing with consequences of asymmetric labour market structures for the functioning of a currency union is scarce, the available research provides some indirect evidence supporting this intuition. The reasoning rests on the presumption that varying degrees of protection of workers and intensity of labour market dualism translate into differences in hiring and firing costs between euro area countries. As shown on a theoretical grounds by Abbritti and Mueller (2013), asymmetries in hiring costs and resulting asymmetries in the intensity of flows into and out of unemployment increase the volatility of inflation differentials between euro area countries, which constitutes a welfare cost for euro area member states. Indeed, Faia et al. (2014) indicate that in the presence of hiring and firing costs central banks face a trade-off between stabilizing inflation on the one hand and employment and output on the other. Under such conditions, optimal inflation volatility is an increasing function of labour turnover costs, ie. higher inflation volatility should be allowed for in a country characterized by high labour turnover costs. Compared to the optimal Ramsey plan the policy focused solely on maintaining price stability incurs welfare losses. The latter can be expected to be higher in a monetary union characterized by heterogenous labour turnover costs.

In view of the above considerations an immediate policy implication of our results is to reduce heterogeneity of labour market response to shocks in euro area countries that stems from differing intensities of labour market duality. A policy option usually brought forward in the context of labour market segmentation is to

make the use of temporary contracts more difficult or costly. In the case of fighting heterogeneous levels of dualism in euro area countries, such an option would additionally require coordinated reforms or harmonization of regulations. Our results imply however that flexible regulations on the use of fixed-term contracts do not necessarily translate into high labour market responsiveness to economic shocks. As illustrated by Figure 4, the mildest reaction of unemployment to GDP shocks can be expected in Ireland and Germany, countries with low level of protection of temporary workers compared to other euro area economies. From this we reckon that if temporary contracts are used predominantly for apprentices, trainees or interns or if the overall level of employment protection is very low, flexible regulations on temporary contracts do not cause greater labour market volatility since they do not generate involuntary temporary employment. This speaks against convergence of regulations on the use of FTC in the euro area. Given that the FTCs are more common among younger, less-educated and low-skilled workers (OECD, 2014), restricting access to such contracts without the broader reforms of EPL could worsen the position of this weakest segment in the labour market.

Another policy option for reducing labour market segmentation is to relax regulations on dismissal of permanent workers. Thus tackling divergent intensity of labour market dualism in the euro area could be achieved by inducing convergence in those regulations. The net effects of such a move for countries with currently higher levels of protection of permanent workers is however hard to determine ex ante. On the one hand, relaxing regulations on dismissal of permanent workers should limit the involuntary temporary employment and labour market volatility induced by it. On the other hand, lower level of protection of permanent workers might itself increase unemployment's response to changes in economic activity. This makes the calibration of such harmonized regulations challenging. Should the preference for low unemployment responsiveness to economic shocks be given priority, a more welcome solution to introducing liberal regulations on permanent workers dismissals in the euro area could be the so called 'single contract'. Although no unified definition of 'single contract' exists in the literature, the general idea behind this instrument is to reduce the gap in turnover costs between fixed-term and regular, open-ended contracts. With 'single contract' as an intermediate solution between fixed-term and open-ended contracts, some part of flexibility of firms' adjustment to economic shocks that is now related to the use of FTC will be preserved. The same

will apply to the property of FTC being a screening device for workers with short working experience. At the same time, job security of workers currently on FTC will be improved and of those on regular contract will not be significantly diminished. Several different proposals have been put forward on how to achieve it. They differ in details as they have been targeted specifically at overcoming challenges characterizing labour markets of individual euro area economies: France (Blanchard and Tirole, 2003; Cahuc and Kramarz, 2004), Italy (Boeri and Garibaldi, 2008) or Spain (Bentolila et al., 2011). In general, the idea of the 'single contract' lies in replacing both open-ended and fixed-term contracts with a unified employment contract that grants high flexibility to employers in terms of dismissal (at least during the probationary period) and assumes severance payment to employees, which are non-linear in seniority.

The issue of harmonizing the use of FTC and EPL in the euro area, e.g. through the introduction of a 'single contract', requires further research. Because labour market models of the euro area member states differ significantly, in some cases reducing asymmetries could not be confined to harmonization of key features of the EPL only. For some countries such harmonization would entail less flexibility in terms of firing and hiring workers or at least certain group of workers, which could require strengthening of alternative adjustment mechanisms (reforming institutions governing the adjustment through wages or via the intensive margin, i.e. hours worked). For other countries it would mean significant reduction of security of incumbent workers, generating a need for strengthening alternative insurance against risk of redundancy (i.e. unemployment insurance). Moreover, given that involuntary temporary employment has higher incidence among least productive and least skilled workers, an important policy option for tackling labour market dualism and its differing intensity in the euro area is also to increase investments in human capital in countries with disproportionately high levels of low-skilled and low-educated workforce. Notwithstanding the above reservations, it is worth noting that the benefits of harmonization of some key labour market regulations in the euro area would most likely go beyond the macroeconomic stabilization function. Harmonizing key features of labour contracts could also possibly strengthen market integration by supporting labour mobility and creating more level field for competition.

5 Conclusions

In this article we have analyzed the potential effects of the dual labor market on the economy of a country forming a monetary union. On the basis of panel data for eleven EMU countries over the period 1995-2103 we have shown that the dynamic response of unemployment to output shocks depends on the labor market institutions. In particular, we have found that the share of involuntary fixed-term employees increases the reaction of unemployment to output fluctuations, at the same time decreasing unemployment persistence. This finding is robust with respect to the estimation method and model specification.

The consequence of heterogeneity in terms of labor market institutions among EMU countries is that they react asymmetrically to common shocks, which increases macroeconomic instability. In the euro area, this is amplified as the instruments that would mitigate the effects of business cycle divergence are either missing or not effective. As a consequence, we believe that our results contribute to the recent debate on the reforms of EMU institutions, among other partial harmonization of labor market regulations. As they suggest that asymmetries in labor market structures are destabilizing the functioning of EMU, they point to a need of coordinated reforms or harmonized regulations across the EMU member states that would limit the degree of asymmetry in labor market institutions.

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Table 1: Selected key features of fixed-term contracts in chosen euro area countries.

	Specification of reasons for using FTCs	Maximum number of successive FTCs	Maximum duration of successive FTCs
DE	**No**	**4** No legal limit in case of objective reason	**2 years** No legal limit in case of objective reason
FR	**Yes** FTC can be used i.a. for temporary replacement, temporary increase in workload, seasonal work	**2** The renewal restricted to specified cases	**1.5 years** From 9 to 24 months depending on the reason of using FTC
IT *	**Yes** First contract does not need justification if its duration does not exceed 1 year	**No legal limit** One extension possible if its duration is shorter than 36 months. No extensions possible for first contract.	**3 years** Possible further renewal with agreement of employment office. 12 months in case of first contracts.
ES	**Yes, specified valid cases** FTC can be used in case of i.a. specific work, replacement, temporary change in market conditions, training, hiring workers with disabilities.	**Dependent on the reason for using the FTC** Temporary increase in workload and training: 2 successive FTCs possible, no limits in case of professionalizing and specific tasks or service contracts.	**Dependent on the reason for using the FTC** Increase in workload: 12 months, specific task or service: 48 months, training: 36 months and professionalizing contracts: 24 months.
NL	**No**	**3** Fourth renewal or renewal exceeding 3 years automatically converts FTC into permanent contract.	**3 years**
PT	**Yes, specified valid cases** FTC can be used in case of i.a. replacement, seasonal activity, temporary increase in workload, performing occasional tasks and services.	**4**	**On average over 3 years** In case of a person searching for a first job: 18 months.
IE	**No in case of initial contract**	**No legal limit for successive FTC if objective grounds justify removal**	**4 years** This period may be extended in case there are justified grounds for renewal of FTC.

Notes: * In May 2014 reforms have been implemented that allow for entering a FTC with a duration of up to 36 without providing any justification and for multiple FTC extensions within the limit of 36 months, provided they are justified with objective reasons. Up to 5 extensions are possible. No notification to the employment office is required if a FTC is renewed. Further reforms of employment protection regulations will be implemented in early 2015. A new labour contract for permanent workers will be introduced with dismissal protection increasing with tenure.
Source: Own compilation based on OECD EPL database, update 2013.

Table 2: Descriptive statistics of variables used in regressions

		Total sample			Cross-country 1995-2013 av.		
	av.	std. dev.	min.	max.	std. dev.	min.	max.
U	9.1	4.5	2.1	27.7	3.3	4.3	16.1
$Dual$	7.2	6.1	0.7	25.0	6.0	1.0	22.8
GAP	0.2	3.4	-14.2	9.5	0.7	-0.5	2.1
EPL	2.6	0.7	1.3	4.6	0.7	1.4	4.4
$ALMP$	0.63	0.24	0.06	1.23	0.21	0.17	0.86
$TaxWedge$	36.2	6.6	21.6	45.3	6.7	23.0	43.1
$ReplRate$	54.0	15.0	11.2	77.5	15.8	20.4	68.3
$WageCoord$	3.5	1.0	2.0	5.0	0.8	2.0	4.9
$UnionDens$	31.7	17.8	7.5	80.4	18.4	7.9	73.3
$Educ$	59.1	14.9	19.3	82.0	14.6	27.2	77.1
Young population							
U	20.0	10.6	5.0	58.3	8.8	7.7	32.0
$Dual$	16.2	14.2	1.1	58.1	13.9	1.4	50.0
$Educ$	17.4	9.1	7.3	46.6	8.8	9.7	36.7

Notes: U is the unemployment rate, $Dual$ stands for the share of temporary employees that could not find permanent job in total employment, GAP denotes the output gap, EPL is OECD strictness of employment protection index for regular contracts, $ALMP$ stands for active labor market policy expenditures (as percent of GDP), $ReplRate$ is unemployment benefit replacement rate, $TaxWedge$ is implicit tax on labour (social security contributions to total wage bill), $WageCoord$ is the level of coordination in wage setting (1-fragmented coordination or coordination on firm-level only, 5- highly centralized or regulated bargaining), $UnionDens$ is union density (i.e. share of employees belonging to trade unions), $Educ$ is the share of population with upper secondary and tertiary education (working age) and the percentage of early leavers from education (young). Source: see Appendix.

Table 3: Estimation results for the baseline specification

Dependent variable	Unemployment rate (U)					
Age group	Working age			Young		
Column number	(1)	(2)	(3)	(4)	(5)	(6)
Estimation method	FE	BC-FE	AH	FE	BC-LSDV	AH
U_{-1}	0.895***	0.895***	0.822***	0.730***	0.730***	0.519***
	(0.143)	(0.064)	(0.117)	(0.123)	(0.085)	(0.092)
$Dual_{-1} \times U_{-1}$	-2.731*	-2.739***	-3.638***	-0.601	-0.591	-0.633*
	(1.448)	(0.904)	(1.101)	(0.574)	(0.724)	(0.334)
GAP	-0.044	-0.044	-0.125	-0.232	-0.233	-0.360***
	(0.088)	(0.079)	(0.081)	(0.181)	(0.295)	(0.136)
$Dual_{-1} \times GAP$	-4.790***	-4.793***	-3.552***	-3.901**	-3.870	-2.941***
	(1.510)	(1.280)	(0.809)	(1.482)	(2.378)	(0.922)
$Dual_{-1}$	12.24	12.19	13.28	0.534	0.254	3.176
	(16.18)	(12.40)	(12.54)	(10.51)	(20.83)	(11.13)
$ALMP_{-1}$	-0.096	-0.082	-0.841	-1.817	-1.801	-0.950
	(0.616)	(1.410)	(1.012)	(1.508)	(5.027)	(1.821)
$ReplRate_{-1}$	0.094*	0.094*	0.076**	0.197**	0.197	0.159*
	(0.048)	(0.053)	(0.036)	(0.077)	(0.201)	(0.087)
$TaxWedge_{-1}$	-0.005	-0.017	-0.126	-0.215	-0.221	-0.152
	(0.103)	(0.127)	(0.086)	(0.190)	(0.479)	(0.147)
$WageCoord_{-1}$	0.503*	0.506**	0.353***	0.604	0.612	0.594*
	(0.235)	(0.219)	(0.123)	(0.447)	(0.860)	(0.311)
$UnionDens_{-1}$	0.028	0.027	0.180*	0.010	0.006	0.490**
	(0.034)	(0.097)	(0.093)	(0.098)	(0.305)	(0.221)
$Educ_{-1}$	0.036	0.033	0.004	-0.133	-0.127	0.023
	(0.0331)	(0.0581)	(0.0676)	(0.124)	(0.333)	(0.0961)
Nobs	174	174	155	174	174	155
R-squared	0.967		0.698	0.977		0.740

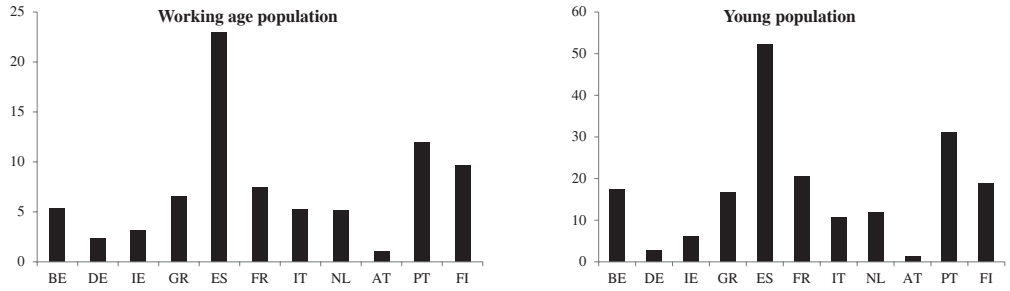
Notes: Panel robust standard errors in brackets. Asterisks ***, ** and * denote 1%, 5% and 10% significance level, respectively. For the AH model: F-statistic for weak identification at 17.3 and 27.7 does not indicate at problem of weak instruments; the p-value of Hansen J test is 0.36 and 0.80, respectively; the set of instruments consists of ΔU_{-2}, ΔGAP_{-1} and $\Delta(Dual \times U)_{-2}$

Table 4: Estimation results for the extended specification

Dependent variable	Unemployment rate (U)					
Age group	Working age			Young		
Column number	(1)	(2)	(3)	(4)	(5)	(6)
Estimation method	FE	BC-FE	AH	FE	BC-LSDV	AH
U_{-1}	0.610*	0.682***	1.139**	0.433	0.433***	0.334
	(0.284)	(0.0749)	(0.544)	(0.261)	(0.0932)	(0.336)
$Dual_{-1} \times U_{-1}$	-2.977**	-2.976***	-2.916***	-0.545	-0.550	-0.742**
	(1.263)	(1.079)	(0.924)	(0.457)	(0.940)	(0.291)
$EPL \times U_{-1}$	0.127	0.118**	-0.185	0.118	0.118	0.075
	(0.095)	(0.049)	(0.190)	(0.096)	(0.092)	(0.127)
GAP	-0.146	-0.0982	-0.207	-0.565*	-0.563	-0.721***
	(0.208)	(0.114)	(0.177)	(0.303)	(0.445)	(0.259)
$Dual_{-1} \times GAP$	-4.464**	-4.420***	-3.520***	-3.911**	-3.928*	-3.427***
	(1.858)	(1.252)	(1.151)	(1.558)	(2.365)	(0.803)
$EPL \times GAP$	0.027	0.0107	0.035	0.128	0.128	0.178*
	(0.078)	(0.059)	(0.069)	(0.136)	(0.237)	(0.106)
$Dual_{-1}$	5.853	5.554	10.51	-1.242	-1.165	8.691
	(13.96)	(12.24)	(13.42)	(8.024)	(19.38)	(10.78)
EPL	-2.025	-2.163**	1.345	-4.303*	-4.184	-3.490
	(1.189)	(0.923)	(1.712)	(2.043)	(3.239)	(2.684)
$ALMP_{-1}$	-0.643	-0.710	-0.560	-2.776**	-2.794	-0.693
	(0.438)	(1.047)	(1.199)	(1.130)	(3.521)	(1.818)
$ReplRate_{-1}$	0.125***	0.126***	0.0481	0.233**	0.237	0.156
	(0.039)	(0.045)	(0.041)	(0.083)	(0.168)	(0.099)
$TaxWedge_{-1}$	-0.0184	-0.0130	-0.132	-0.191	-0.193	-0.159
	(0.101)	(0.095)	(0.121)	(0.206)	(0.343)	(0.164)
$WageCoord_{-1}$	0.400**	0.395**	0.345**	0.510	0.519	0.411
	(0.167)	(0.183)	(0.141)	(0.404)	(0.676)	(0.295)
$UnionDens_{-1}$	0.037	0.018	0.186*	0.025	0.025	0.385*
	(0.048)	(0.070)	(0.110)	(0.115)	(0.220)	(0.214)
$Educ_{-1}$	0.017	0.007	0.049	-0.023	-0.019	0.011
	(0.035)	(0.045)	(0.083)	(0.163)	(0.247)	(0.131)
Nobs	174	174	156	174	174	156
R-squared	0.970		0.680	0.978		0.754

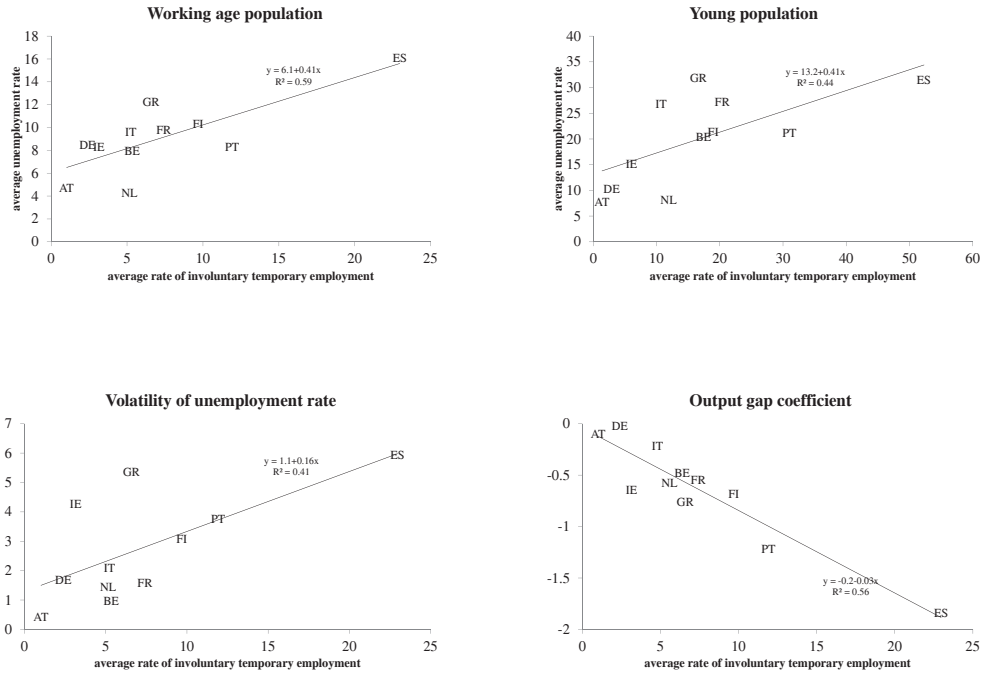
Notes: Panel robust standard errors in brackets. Asterisks ***, ** and * denote 1%, 5% and 10% significance level, respectively. For AH model: F-statistic for weak identification at 16.5 and 9.1 does not indicate at problem of weak instruments; the p-value of Hansen J test is 0.694 and 0.745, respectively; the set of instruments consists of ΔU_{-2}, ΔGAP_{-1} and $\Delta(EPL_{-1} \times U_{-2})$

Figure 1: Duality rate (1995-2013 average)



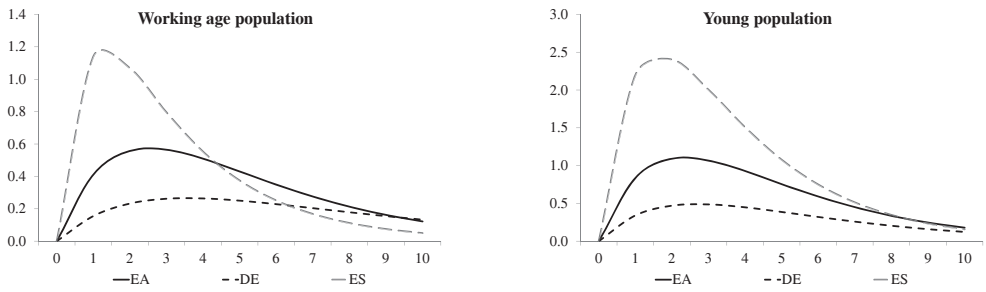
Source: Eurostat

Figure 2: Duality and unemployment characteristics



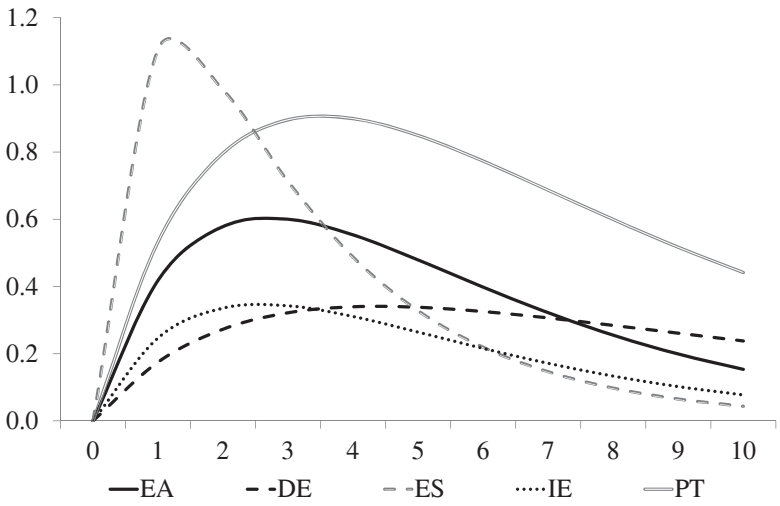
Notes: The volatility is approximated by the standard deviation of annual unemployment calculated for the period 1995-2013. The output gap coefficients were obtained from country-by-country regressions of the following form: $U_t = \alpha + \beta GAP_t + \epsilon_t$.
Source: Eurostat

Figure 3: Reaction of unemployment rate to output decline in baseline specification



Notes: Output decline is defined as a demand shock that decreases output gap by 1 percentage point, whereas the deviation of output from its potential level is eliminated at pace 33% per year, so that $GAP_{t+1} = 2/3GAP_t$.

Figure 4: Reaction of unemployment rate to output decline in extended specification



Notes: Output decline is defined as a demand shock that decreases output gap by 1 percentage point, whereas the deviation of output from its potential level is eliminated at pace 33% per year, so that $GAP_{t+1} = 2/3GAP_t$.

Appendix

Data sources

Unemployment rates

Eurostat, Unemployment rates by sex, age and nationality (%) (lfsa_urgan), From 15 to 64 years, Eurostat, Unemployment rate by sex and age groups - annual average, % [une_rt_a], Less than 25 years.

GAP

OECD, "Economic Outlook No 96 - November 2014", variable: "Output gap of the total economy"

Duality rate

Eurostat, Temporary employees by sex, age and highest level of education attained (lfsa_etgana)
Eurostat, Main reason for the temporary employment - Distributions by sex and age (%)(lfsa_etgar), variable: "Could not find permanent job"
Eurostat, Employment by sex, age and nationality (1 000) (lfsa_egan).

EPL

OECD, "Strictness of employment protection - individual dismissals (regular contracts)", variable: "Version 1 (1985-2013)"

ALMP

Eurostat, Public expenditure on labour market policies, by type of action, % of GDP (tps00076), variable: "LMP measures: categories 2-7"
Bassanini and Duval (2006) database (slmp1to5).

TaxWedge

Eurostat, Taxation trends in the European Union, variable: "Implicit tax on labour"

ReplRate

OECD, "Benefits and Wages: OECD Indicators"; variable: "The AW-based GRR summary measure of benefit entitlements"
Bassanini and Duval (2006) database (arr).

WageCoord

ICTWSS database (Visser, 2013, , Coord)

UnionDens

ICTWSS database (Visser, 2013, , UD)

Education

Eurostat, Population with upper secondary or tertiary education attainment by sex and age [edat_lfse_08], variable: "Upper secondary, post-secondary non-tertiary, first and second stage of tertiary education (levels 3-6)",
Eurostat, Early leavers from education and training by sex and labour status [edat_lfse_14].

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