On the importance of the dual labour market for a country within a monetary union

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Abstract

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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 other markets' flexibility for the smoothness of adjustment to asymmetric shock. 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 shock, 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 currently observed high popularity of fixed-term contracts in selected EMU countries is the outcome of the evolution of labour market institutions that has taken place since early 1970s. As discussed in Blanchard (2006), the increase in the unemployment rate from levels fluctuating 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: they stayed

[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.

at elevated levels long after the expiration of the shocks. It became evident that earlier changes had made unemployment more persistent, hence the pressure arose to reverse these changes. 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 contracts. The best-known example of such a reform was introduced in Spain in 1984. It caused a rise in the proportion of temporary workers in total employment to around 30%(see Dolado et al., 2002; Bentolila et al., 2011, for an extended discussion). Even though in other EMU countries the use of FTC is less pronounced, over the last three decades temporary employment has gained importance in most of them.

The introduction of FTC had a non-negligible effects on the functioning of the labor market (labor turnover, unemployment level, its volatility and persistence) and the economy in general (e.g. output volatility). These effects has been extensively analyzed in the literature, which can be divided into three strands. The first group of studies 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 consider in more detail the frictions associated to 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 this literature.

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 EPL labor demand of a given firm is more stable, and surprisingly, on average higher, than in the 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. Finally, it is 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 by the temporary ones. These theoretical findings are to a large extent confirmed by the empirical study of Kahn (2010) using data on individuals from the European Community Household Panel. It was found that FTC reforms, while touted as a way of jump-starting individuals' careers in the job market, appear rather to encourage a substitution of temporary for permanent jobs.

Matching articles. This strand of the literature follows the seminal paper of Mortensen and Pissarides (1994) that presents the matching model of unemployment explicitly describing the process of job creation and destruction. Cahuc and Postel-Vinay (2002) and Blanchard and Landier (2002) were the first to incorporate labor market duality to the matching framework. 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 intuition behind this result is simple: firms rarely transform temporary jobs into permanent ones. The limitation of the above two studies is that they focused solely on the effects of labor market reform on the stationary equilibrium and do not consider the effects on the business cycle fluctuations. This topic was addressed by Costain et al. (2010) and Sala et al. (2012), who extend the matching model with dual labor market by introducing the aggregate productivity shocks. 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.[2] The intuition behind these findings is that employment growth during booms is concentrated on temporary, low-productivity jobs that are destroyed during downturns. The FTC jobs are very fragile, hence play a disproportionate role in employment fluctuations. The above results are in line with the findings of three related studies of Thomas (2006), Veracierto (2008) and Zanetti (2011) which show that high firing costs reduce the volatility of unemployment, investment and output in the business cycle. Finally, in this short review of the literature it is 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 further confirm the conclusion that labor market duality increases employment volatility.

Panel regressions. The third strand of the literature is more empirical and uses panel data to estimate the impact of stringent EPL (but not labor market duality itself) on the economy. Blanchard and Wolfers (2000) were among the first to

[2]Under the benchmark parameterization of the model the increase amounts to 21% in Costain et al. and 66% in Sala et al..

empirically investigate the importance of EPL and other labour market institutions for the propagation of shocks in the economy. Their main finding is 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 system, high tax wedge on wages and rigid product market. Even though the impact of EPL on the level of the unemployment rate in the above mentioned studies was found insignificant, Fiori et al. (2007) report that high EPL leads to its higher 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. In general, it might be claimed that the panel data results generally support the implications of the theoretical models.

Our reading of the above literature is that the introduction 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 analyzing the effects of the dual labor market on the economy of a country within a monetary union. In particular, on the basis of longitudinal data for EMU countries we analyze how labor market duality affects the relationship between economic activity and employment. Second, we build a dynamic model that takes into account the relationship *[to be completed]*.

Our results confirm the earlier findings from the theoretical literature, i.e. that duality leads to higher volatility and lower persistence of unemployment, and has no significant impact on its level. Moreover, we show *[To be completed with results from section 4]*. We believe that these results are of special importance in light of recent debate on the reform of EMU institutions. They point to a need to *[to be completed]* Moreover, they also might be helpful for countries planning to adopt the euro in the future that are characterized by two-tier labor market. In this context it is worth noting that e.g. Poland has the highest share of workers with FTC among EU countries. Our results indicate that prior to EMU accession, Poland should *[to be completed]*

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. Section 5 concludes. Data are described in the appendix to the article.

2 The dual labor market in EMU countries

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 data for the member states. We start by discussing how we measure duality is this paper. Our principle is to identify the percentage of workers, who are less protected in terms of firing costs than regular workers. The broadest measure of duality is the share of temporary workers and self-employed in total employment. Including self-employment is motivated by the fact that the tax code as well as looser employer-employee relationship may result in apparent fictitious self-employment (German: Scheinselbstandigkeit). It is obvious, however, that including self-employment leads to an upside bias of duality for economies with more dominant role of zero-employees enterprises, which are typically widespread in such sectors as agriculture, construction, retail trade or some business services. The second definition is the share of temporary workers in total employment. This measure, however, would distort the picture as there are various reasons for using FTC: probationary period, education or training, preferences or inability to find a permanent job. E.g. it would introduce an upward bias for the Netherlands, where FTC are widespread due to the relatively intensive use of probationary employment, as well as for the German-speaking countries, in which FTC are standard contracts for vocational training, or in Ireland, where FTC are frequently chosen because of employees' preferences. This is the reason why in our work we have decided to define duality in a narrow sense, i.e. as the share of 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 16 to 24) in eleven EMU countries in the period 1995-2012. It can be seen that the rate was visibly the high-est in Spain, standing on average at 23%. Moreover, a half of young Spanish workers had a temporary contract because they could not find a permanent job. This might explain 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 Belgium, France, Finland and Greece the duality rate was close to the euro area average and amounted to between 6% 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. Finally, Germany, Ireland and especially Austria were the countries with the lowest duality rate, which was below 5% both for working age and the young employees. The question arises how these differences affected labor market performance.

Let us focus first on the relationship between the duality and unemployment rates. The motivation for the introduction of FTC was 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. However, the findings of the literature indicate that the effects of labor market duality on the unemployment rate are be ambiguous. 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 (see 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 the next step we look at the relationship between the duality rate and unemployment volatility in the EMU countries. In line with the implications of the theoretical literature, the left panel of Figure 3 points to a significant, positive correlation. Once again, Spain and Austria are on the two corners of the regression line. In this analysis Ireland seems to be an interesting case: it is characterized by high volatility, even though the level of labor market duality is very low. The reasons are twofold: the EPL (as measured by the OECD index) for permanent workers in Ireland is the lowest among the analyzed countries and the volatility was raised by the boom and bust on the housing market. As regards the correlation between the duality rate and output volatility, it is also positive (in line with the literature) but the relationship is not very strong (see right panel of Figure 3).

In the last step we analyze whether labor market duality influences the relationship between unemployment rate (U_t) and the output gap (GAP_t), which can be described by a simple model of the following form:

$$U_t = \alpha + \rho U_{t-1} - \beta GAP_t + \epsilon_t.$$

The left panel of Figure 4 shows that the response of the unemployment rate to the output gap (β) is an increasing function of the duality rate, whereas the right panel of the Figure indicates that unemployment persistence (ρ) decreases with the duality rate. This is exactly in line with the implications of the literature.

3 Empirical results

In the previous section we have illustrated that there are some correlations between the duality rate and selected measures of labor market and macroeconomic performance It should be noted, however, that these relationship could be distorted by other factors, which were not accounted for. In this section we address this issue by using panel data regressions. In particular, we estimate the parameters of the following model:

$$
\begin{aligned}
U_{it} = {} & \rho U_{i,t-1} + \alpha_1 GAP_{it} + \alpha_2 Dual_{i,t-1} + \\
& + \alpha_3 GAP_{it} \times Dual_{i,t-1} + \alpha_4 U_{i,t-1} \times Dual_{i,t-1} + \\
& + \sum_{k=1}^{K} \gamma_k \times control_{k,i,t-1} + \phi_1 \times t + \phi_2 \times t^2 + \mu_i + \epsilon_{it}
\end{aligned} \tag{1}
$$

where i and t are country and time indices, μ_i denotes country fixed effects and ϵ_{it} stands for the error component. The above regression explains the unemployment rate (U) by the position of the economy in the business cycle measured by the output gap (GAP), the share of involuntary temporary workers in the total number of employees ($Dual$) and control variables describing labor market institutions. Moreover, by including the interaction variables in the above specification we capture whether the intensity of labor market duality changes the cyclical volatility of unemployment ($GAP \times Dual$) and unemployment persistence ($UR_{-1} \times Dual$). In the choice of control variables, 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 ($ReplRate$), implicit tax on labour ($TaxWedge$), the level of coordination in wage setting ($WageCoord$) and union density ($UnionDens$).

3.1 Data

A widely discussed problem of the panel studies on the effects of institutions on the economy is how to create a comparable dataset for a broad group of countries and extensive time coverage. In fact, long time series on regulations and institutions are often limited to high-income countries. Moreover, indices that act as a proxy for the regulatory environment are usually only a summary of subjective measures for what is perceived to be an important factor shaping this environment. In our study, however, since we are interested in the group of initial members of EMU (to be precise, we included Greece but excluded Luxembourg), the availability and comparability of the data on institutions is not a serious problem. We can use regulatory indices from the OECD and Eurostat databases. Moreover, in the case of missing data we extrapolate the series with the Bassanini and Duval (2006) dataset, which also covers earlier years. As a result, we are able to construct a panel of data covering years 1995-2012 for eleven EMU countries.

The parameters of regression (1) are estimated on the basis of annual data from the period 1995-2012 covering eleven euro area countries. The main regression is for the working age population, but we also analyze the fluctuations of the unemployment rate for the group of age 15-24 years, which is particularly exposed to fixed term contracts in selected European countries.

Most of the data are taken from the Eurostat. These are the unemployment rate, the share of temporary workers in total employment, the share of temporary workers that could not find a permanent job and the implicit tax rate on labor. The measures for output gap are taken form OECD Economic Outlook database. As regards wage coordination and union density measures, we have used the ICTWSS database (Visser, 2013). Finally, the unemployment benefit replacement rate and the ratio of active labour market policies spending were calculated by combining OECD and Bassanini and Duval (2006) database. The complete dataset is available upon request from the authors.

3.2 Econometric issues

The use of panel data in macroeconomic studies on the importance of institutions for the overall performance of an economy is restricted by two major obstacles. Here we describe these obstacles and our way to address them.

First, it is widely recognized that the big advantages of panel regressions is that they enable to control for the unobserved heterogeneity. However, it must be noted that this might also pose a problem. The inclusion of country-specific effects usually lowers explanatory power of independent variables, especially those variables that are relatively stable in the sample, e.g. describing institutional features of the economy. Consequently, the importance of selected regressors might be marginal in comparison to the country-specific effect. In the case of our study, however, the main interest is on the interaction variables that describe the cyclical behavior of the unemployment rate, which are relatively volatile in the sample. However, it is possible that the fixed effects will kill the significance of other (control) regressors, which are relatively stable in the sample.

Second, a very important issue in this kind of studies is that the effect of institutions on the economy has a dynamic structure. This has to be addressed by an appropriate choice of model specification and econometric estimation technique. In fact, it is widely known that adding the lagged dependent variable to the set of regressors makes pooled OLS and FE estimators inconsistent and biased (Nickell, 1981). In our study, the additional complication is that specification (1) allows for the interactions of the lagged dependent variable with the other regressor. For such a specification the bias-corrected LSDV estimator might remain biased (see Bun and Kiviet, 2003, 2006, for a wider discussion). The solution would be to apply the Anderson and Hsiao (1982) first-difference estimator. However, if the instruments are weak, the Anderson-Hsiao estimator is inefficient and biased (Staiger and Stock, 1997; Stock et al., 2002; Stock and Yogo, 2002). Finally, due to small cross-section and relatively long time dimension of our dataset the system GMM estimator of Blundell and Bond (1998) can be inefficient (Roodman, 2009). 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 fol-

lows. We take into account two facts. First, the Nickell bias is diminishing with the time span of the sample. Second, an upward bias of the pooled OLS estimator and a downward bias of the FE estimator may provide an upper and lower bounds for an unbiased estimator. Our goal is to obtain possibly close estimates for the OLS and FE methods, which would prove that both the time dimension is large enough not to worry about the Nickell bias and that country-specific effects are not the most important element of the model. This is why we will concentrate on the comparison of pooled OLS and FE estimates. We will also present the estimation results from other methods: bias-corrected least squares dummy variable (BC-LSDV), Anderson-Hsiao (AH) and system GMM. However, given above remarks, our preferred method of estimation is the FE.

The other issue that has to be addressed when working with panel data relates to the need for controlling possible trends in time series. We add the linear and quadratic time trends to control for a possible common movement of unemployment in all countries under considerations. We prefer this solution to the specification with time dummies because it allows to compute cluster robust standard error corrected for country-specific autocorrelation and allows for a larger number of degrees of freedom. Finally, in our specification it is possible that regressors such as output gap or labor market institutions might be endogenous. Indeed, firms may be more prone to offer and workers will more likely accept temporary jobs in times of high unemployment (see Holmlund and Storrie, 2002, for Swedish experience) and GDP gap might depend on the general situation on the labor market. To address the endogeneity problem of the control variables, which describe labor market institution, we have decided to use their values from the previous year. In the case of the output gap and its interaction with the duality rate, we have used instrumental variables method for our preferred FE model and have not found any significant problem of endogeneity using Hansen-Sargan-Basmann C test.

3.3 The results

Tables 1 and 2 present the estimation results of model (1) for working age population and the young, respectively. In the case of both tables, the baseline results are in the first column, which includes FE estimates. The second column, which presents OLS results, is used to check whether the Nickell bias pose a problem. Columns (3)-(5) serve only as a cross check, and illustrate whether the use of other (less relevant in our case) methods changes qualitatively our main findings for FE estimates.

Let us start from discussing the econometric issues related to the results included in Table 1. The comparison of OLS and FE estimates leads to the following two observations. First, the Nickell bias seems to be negligible for the working age population: the autoregressive parameter (ρ) in Table 1 is almost the same for pooled OLS and FE methods. Second, the OLS and FE estimates for other parameters are close to each other, which may suggest that country-specific effects are not

the core part of the model. In fact, the country dummy was found significant only for one country. This is also confirmed by the comparable and high values of R^2 coefficient. As regards the numbers in columns (3)-(5), they show that the estimates of parameters of our main interest (α_k, $k = 1, 2, 3, 4$) are of the same sign and comparable values as in the case of FE estimates. This confirms the reliability of the FE estimates. It is also worth to notice that, in line with our previous discussion, the precision of A-H estimates (but not GMM) is relatively low, which can be explained by the weak identification problem. The last issue relates to the autocorrelation of residuals, which was indicated by the Arellano-Bond test. We have investigated the problem by estimating regression (1) extended for additional lags of the dependent variable, but found that the FE estimates of the second lag are not significant and the estimates for the other parameters of the model are broadly unchanged.[3] Consequently, we tackle the problem of autocorrelation by reporting autocorrelation consistent standard errors. To conclude, it might be argued that both the estimation method (FE) and model specification are appropriate.

Let us now focus on the economic interpretation of the baseline results for the working age population (column 1 of Table 1). First, we have found a significant relationship between output gap and the unemployment rate. At the 10% significance level, this relationship is strengthened by the duality rate of the labor market. The estimates of the parameters ($\hat{\alpha}_1 = -0.207$ and $\hat{\beta}_1 = -2.868$) would suggest that the instantaneous response of unemployment to output fluctuations in a country characterized by a 20% duality rate is about twice higher than in a country in which the rate is at 5%. Second, our results indicate that the duality of the labor market decreases the persistence of the labor market (at the 5% significance level). The estimates of the persistence parameters ($\hat{\rho} = 0.991$, $\hat{\alpha}_4 = -1.872$) would suggest that the pace of mean-reversion of unemployment in a country characterized by a 20% duality rate is about four times higher than in a country in which he duality rate is at 5%. This heterogeneous response of unemployment rate to output fluctuations is illustrated by the left panel of Figure 5. It presents the shape of the reaction function for Spain (1995-2012 average duality rate at 22.8%), Germany (2.7%) and the euro area (7.2%). It can be seen that a common shock leading to a decline of output by 1% and its steady return to the long-term path leads to an abrupt and sizeable reaction of the unemployment rate in Spain (peak reaction in the second year in which the rate is 1.06 percentage point above its long-term level) and a more gradual and muted reaction in Germany (peak reaction in the fifth year in which the rate is 0.62 percentage point above its long-term level). The model-based response of unemployment in the euro area is an intermediate case (peak reaction in the fourth year in which the rate is 0.77 percentage point above its long-term level). This asymmetric reaction to common shocks might pose a serious problem for a smooth functioning of the monetary union. We will come back to this issue in the next sec-

[3]The relevant tables are available upon request.

tion of this article. The third finding is that the direct effect of duality on the level of unemployment rate is insignificant and positive ($\hat{\alpha}_2 = 8.532$). Finally, it might be noted that the coefficient on $ReplRate$ is significant and positive, which indicates that generous unemployment benefits raise unemployment. In the case of spending on active labor market policy ($ALMP$), the density of labor unions ($UnionDens$), the tax rate ($TaxWedge$) or wage coordination scheme ($WageCoord$), the impact on the unemployment rate was found insignificant. These results are broadly consistent with the earlier studies.

The results from the model estimated for the young workers are broadly similar, with few important exceptions. First, inertia of the unemployment process is somewhat lower ($\hat{\rho} = 0.9$). Second, the interaction variable between lagged unemployment and duality rates is negative, but not significant. This would suggest that the effect of labor market duality on the persistence of youth unemployment process is less pronounced than for total unemployment. The estimated pace of mean-reversion of youth unemployment in a country with 5% youth duality is 0.13 compared to 0.22 in a country with 20% youth duality rate. Third, the estimates of the parameter measuring the elasticity of youth unemployment with respect to the output gap is about twice higher than for total unemployment rate ($\hat{\alpha}_1 = -0.431$). This means that, intuitively, youth unemployment is more volatile in the cycle than total unemployment. Moreover, this reaction is strengthened by higher duality at the 5% significance level. As regards the effect of duality on the level of unemployment rate, once again we have not identified any significant relationship. The above estimates are illustrated by the right panel of Figure 5, 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 (where 1995-2012 average youth duality rate was at 14.4%) by almost 1.5 percentage point two years after the shock. For comparison, in Spain (youth duality equal to 50%) the peak reaction is 2.5 percentage point one year after the shock, while in Germany (youth duality was equal to 3%) the maximal deviation is 1.0 percentage point and occurs 3 years after the shock. It is worthy to notice that the reaction of youth unemployment to output shocks is about twice higher than the reaction of total unemployment rate.

To conclude, our results, based on the panel for eleven euro area countries with data from 1995 to 2012, confirm the earlier findings from the literature on the importance of the two-tier labour market on the dynamic behavior of the unemployment rate. We have shown that the duality rate increases the reaction of unemployment to output fluctuations, at the same time decreasing unemployment persistence. This effect is even more pronounced for the unemployment rate among the young population. The question arises, how this heterogeneous business cycle developments of the labor market in euro area countries affects the functioning of the monetary union. We address this question in the next section.

4 Policy implications

5 Conclusions

References

Anderson, T. W. and Hsiao, C. (1982). Formulation and estimation of dynamic models using panel data. *Journal of Econometrics*, 18(1):47–82.

Bassanini, A. and Duval, R. (2006). Employment patterns in oecd countries: Reassessing the role of policies and institutions. Oecd economics department working papers, OECD Publishing.

Bassanini, A. and Duval, R. (2009). Unemployment, institutions, and reform complementarities: re-assessing the aggregate evidence for OECD countries. *Oxford Review of Economic Policy*, 25(1):40–59.

Bentolila, S. and Bertola, G. (1990). Firing costs and labour demand: How bad is eurosclerosis? *Review of Economic Studies*, 57(3):381–402.

Bentolila, S., Cahuc, P., Dolado, J. J., and Barbanchon, T. L. (2012). Two-tier labour markets in the great recession: France versus spain. *Economic Journal*, 122(562):F155–F187.

Bentolila, S., Dolado, J. J., and Jimeno, J. F. (2011). Reforming an insider-outsider labor market: The spanish experience. CEPR Discussion Papers 8691, C.E.P.R. Discussion Papers.

Bentolila, S. and Saint-Paul, G. (1992). The macroeconomic impact of flexible labor contracts, with an application to spain. *European Economic Review*, 36(5):1013–1047.

Blanchard, O. (2006). European unemployment: the evolution of facts and ideas. *Economic Policy*, 21(45):5–59.

Blanchard, O. and Landier, A. (2002). The perverse effects of partial labour market reform: fixed–term contracts in france. *Economic Journal*, 112(480):F214–F244.

Blanchard, O. and Wolfers, J. (2000). The role of shocks and institutions in the rise of european unemployment: The aggregate evidence. *Economic Journal*, 110(462):C1–33.

Blundell, R. and Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics*, 87(1):115–143.

Boeri, T. and Garibaldi, P. (2007). Two tier reforms of employment protection: a honeymoon effect? *Economic Journal*, 117(521):F357–F385.

Bun, M. J. and Kiviet, J. F. (2006). The effects of dynamic feedbacks on ls and mm estimator accuracy in panel data models. *Journal of Econometrics*, 132(2):409–444.

Bun, M. J. G. and Kiviet, J. F. (2003). On the diminishing returns of higher-order terms in asymptotic expansions of bias. *Economics Letters*, 79(2):145–152.

Cabrales, A. and Hopenhayn, H. A. (1997). Labor-market flexibility and aggregate employment volatility. *Carnegie-Rochester Conference Series on Public Policy*, 46(1):189–228.

Cahuc, P. and Postel-Vinay, F. (2002). Temporary jobs, employment protection and labor market performance. *Labour Economics*, 9(1):63–91.

Costain, J., Jimeno, J. F., and Thomas, C. (2010). Employment fluctuations in a dual labor market. Banco de Espana Working Papers 1013, Banco de Espana.

Dolado, J. J., Garcia-Serrano, C., and Jimeno, J. F. (2002). Drawing lessons from the boom of temporary jobs in spain. *Economic Journal*, 112(721):F270–F295.

Fiori, G., Nicoletti, G., Scarpetta, S., and Schiantarelli, F. (2007). Employment outcomes and the interaction between product and labor market deregulation: Are they substitutes or complements? IZA Discussion Papers 2770, Institute for the Study of Labor (IZA).

Holmlund, B. and Storrie, D. (2002). Temporary work in turbulent times: The Swedish experience. *Economic Journal*, 112(480):F245–F269.

Kahn, L. M. (2010). Employment protection reforms, employment and the incidence of temporary jobs in europe: 1996-2001. *Labour Economics*, 17(1):1–15.

Mortensen, D. T. and Pissarides, C. A. (1994). Job creation and job destruction in the theory of unemployment. *Review of Economic Studies*, 61(3):397–415.

Nickell, S. J. (1981). Biases in dynamic models with fixed effects. *Econometrica*, 49(6):1417–26.

Nicoletti, G. and Scarpetta, S. (2005). Product market reforms and employment in OECD countries. OECD Economics Department Working Papers 472, OECD.

Nunziata, L. and Staffolani, S. (2007). Short-term contracts regulations and dynamic labour demand: Theory and evidence. *Scottish Journal of Political Economy*, 54(1):72–104.

Roodman, D. (2009). A note on the theme of too many instruments. *Oxford Bulletin of Economics and Statistics*, 71(1):135–158.

Sala, H., Silva, J. I., and Toledo, M. (2012). Flexibility at the margin and labor market volatility in OECD countries. *Scandinavian Journal of Economics*, 114(3):991–1017.

Staiger, D. and Stock, J. H. (1997). Instrumental variables regression with weak instruments. *Econometrica*, 65(3):557–586.

Stock, J. H., Wright, J. H., and Yogo, M. (2002). A survey of weak instruments and weak identification in generalized method of moments. *Journal of Business & Economic Statistics*, 20(4):518–29.

Stock, J. H. and Yogo, M. (2002). Testing for weak instruments in linear iv regression. NBER Technical Working Papers 0284, National Bureau of Economic Research, Inc.

Thomas, C. (2006). Firing costs, labor market search and the business cycle.

Veracierto, M. (2008). Firing costs and business cycle fluctuations. *International Economic Review*, 49(1):1–39.

Visser, J. (2013). Data base on institutional characteristics of trade unions, wage setting, state intervention and social pacts, 1960-2011 (ictwss). http://www.uva-aias.net/208. version 4.0.

Zanetti, F. (2011). Labor market institutions and aggregate fluctuations in a search and matching model. *European Economic Review*, 55(5):644–658.

Table 1: Estimation results for the working age population (age from 15 to 64)

Dependent variable	Unemployment rate U				
	(1) FE	(2) OLS	(3) BC-LSDV	(4) A-H	(5) GMM
U_{-1}	0.991***	0.985***	1.077***	0.936*	0.929***
	(0.0669)	(0.0352)	(0.0447)	(0.479)	(0.0658)
GAP	-0.207**	-0.239**	-0.214***	-0.159	-0.254***
	(0.0888)	(0.103)	(0.0716)	(0.0965)	(0.0922)
$Dual_{-1}$	8.532	10.41	9.476	14.76	8.032
	(7.708)	(11.22)	(7.305)	(15.59)	(10.09)
$GAP \times Dual_{-1}$	-2.868*	-2.356	-2.590***	-3.012**	-2.268
	(1.488)	(1.660)	(0.814)	(1.462)	(1.531)
$U_{-1} \times Dual_{-1}$	-1.872**	-0.691	-2.267***	-3.287	-0.337
	(0.825)	(0.795)	(0.508)	(2.951)	(0.741)
$ALMP_{-1}$	-0.280	-0.423	-0.399	0.141	-0.213
	(0.430)	(0.504)	(0.581)	(1.156)	(0.481)
$ReplRate_{-1}$	0.0728*	0.00162	0.0688**	0.0799***	-0.00426
	(0.0369)	(0.0106)	(0.0275)	(0.0261)	(0.0127)
$UnionDens_{-1}$	0.0328	-0.00257	0.0280	0.0621	-0.000793
	(0.0779)	(0.00733)	(0.0520)	(0.148)	(0.00689)
$TaxWedge_{-1}$	0.0690	-0.0161	0.0863	-0.0486	-0.0164
	(0.0554)	(0.0201)	(0.0785)	(0.0867)	(0.0186)
$WageCoord_{-1}$	0.0338	0.0521	0.0512	-0.267*	0.0173
	(0.208)	(0.151)	(0.134)	(0.156)	(0.136)
t	0.121	0.176**	0.162	-0.00436	0.166**
	(0.106)	(0.0689)	(0.115)	(0.0614)	(0.0668)
t^2	-0.00422	-0.00848**	-0.00592	0.000594	-0.00800**
	(0.00410)	(0.00344)	(0.00533)	(0.00296)	(0.00345)
Nobs	154	154	154	143	143
R-squared	0.960	0.944		0.690	
Std. Err.	cluster	cluster	bootstraped	robust	robust
Instruments				U_{-2}	U_{-2}; U_{-3}
p-val. for A-B test for AR(1)	0.019	0.015		0.226	0.026
p-val. for A-B test for AR(2)	0.925	0.041		0.472	0.404

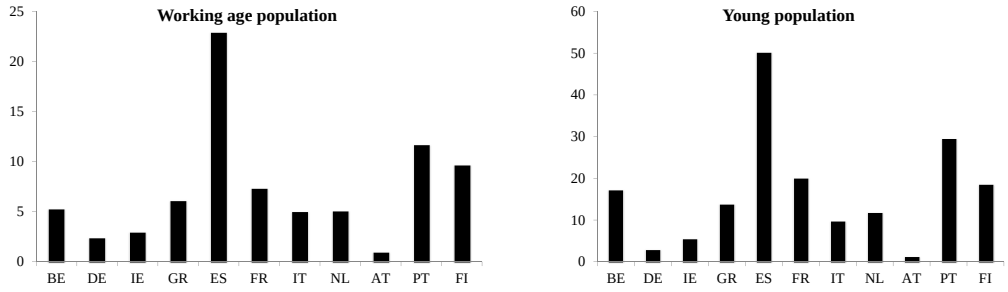
Notes: Asterisks ***, ** and * denote 1%, 5% and 10% significance level, respectively. $ALMP$ stands for active labor market policy expenditures (as percent of GDP), $ReplRate$ is unemployment benefit replacement rate, $TaxWedge$ is implicit tax on labour (social security contributions to total wage 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). For A-H: $p-value$ of under-indentification test 0.0293, F-statistic for weak identification 5.25 (problem of weak instruments).

Table 2: Estimation results for the young employees (age from 15 to 25)

Dependent variable	Unemployment rate U				
	(1) FE	(2) OLS	(3) BC-LSDV	(4) A-H	(5) GMM
U_{-1}	0.900***	0.984***	0.996***	1.049*	0.839***
	(0.0549)	(0.0348)	(0.0728)	(0.546)	(0.113)
GAP	-0.431**	-0.448**	-0.431**	-0.263	-0.519***
	(0.157)	(0.143)	(0.200)	(0.195)	(0.167)
$Dual_{-1}$	5.549	8.335	6.615	19.16	5.706
	(6.797)	(8.848)	(10.21)	(23.93)	(8.991)
$GAP \times Dual_{-1}$	-3.046**	-2.658**	-2.751**	-3.882***	-2.548**
	(0.988)	(1.006)	(1.128)	(1.178)	(1.152)
$U_{-1} \times Dual_{-1}$	-0.589	-0.272	-0.912***	-2.074	0.0911
	(0.327)	(0.286)	(0.352)	(1.617)	(0.323)
$ALMP_{-1}$	-1.538	-1.662	-1.832	-0.563	-0.795
	(0.879)	(0.936)	(1.806)	(3.211)	(1.291)
$ReplRate_{-1}$	0.172**	0.00714	0.171**	0.213*	-0.0503
	(0.0768)	(0.0304)	(0.0750)	(0.119)	(0.0634)
$UnionDens_{-1}$	0.143	-0.00533	0.140	0.0638	0.0203
	(0.168)	(0.0139)	(0.152)	(0.388)	(0.0219)
$TaxWedge_{-1}$	0.310*	-0.0110	0.283	-0.0430	-0.00153
	(0.152)	(0.0520)	(0.214)	(0.259)	(0.0592)
$WageCoord_{-1}$	0.287	0.109	0.267	-0.638	-0.177
	(0.530)	(0.361)	(0.407)	(0.432)	(0.333)
t	0.0675	0.274	0.0872	0.0227	0.166
	(0.342)	(0.205)	(0.348)	(0.196)	(0.246)
t^2	0.00228	-0.0121	0.00282	0.00254	-0.00726
	(0.0145)	(0.0107)	(0.0159)	(0.0104)	(0.0121)
Nobs	154	154	154	143	143
R-squared	0.966	0.955		0.445	
Std. Err.	cluster	cluster	bootstraped	robust	robust
Instruments				U_{-2}	U_{-2}; U_{-3}
p-val. for A-B test for AR(1)	0.6594	0.1362		0.0972	0.0485
p-val. for A-B test for AR(2)	0.4216	0.1208		0.0671	0.274

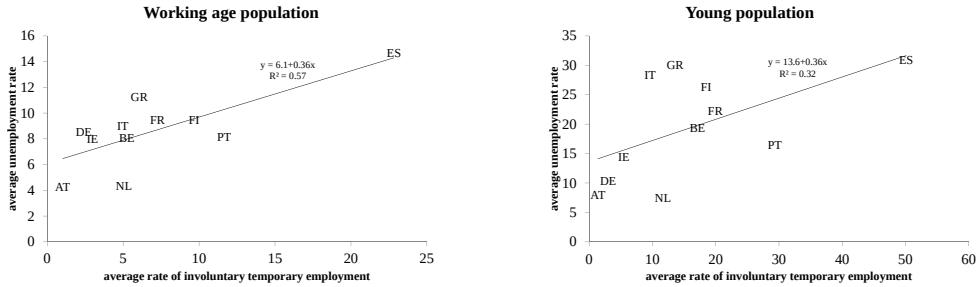
Notes: Asterisks ***, ** and * denote 1%, 5% and 10% significance level, respectively. Notes: Asterisks ***, ** and * denote 1%, 5% and 10% significance level, respectively. $ALMP$ stands for active labor market policy expenditures (as percent of GDP), $ReplRate$ is unemployment benefit replacement rate, $TaxWedge$ 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). For A-H: $p - value$ of underindentification test 0.0271, F-statistic for weak identification 4.83 (problem of weak instruments).

Figure 1: Duality rate



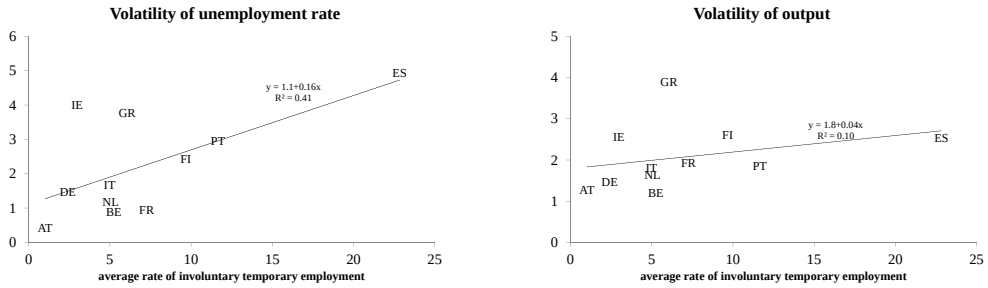
Source: Eurostat

Figure 2: Duality and unemployment



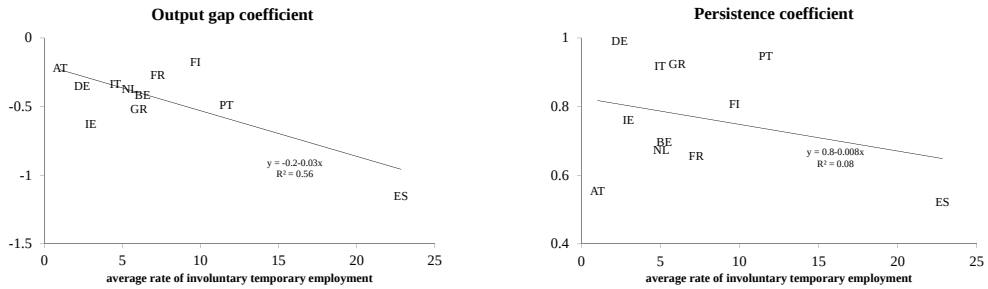
Notes: The volatility is approximated by the standard deviation. The average rates and standard deviations are calculated on the basis of annual data from the period 1995-2012.
Source: Eurostat

Figure 3: Duality and macroeconomic volatility



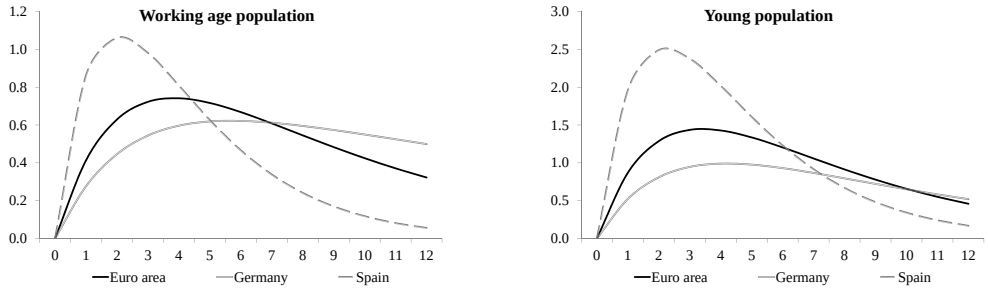
Source: Eurostat

Figure 4: Duality and output-unemployment relationship



Source: Eurostat

Figure 5: Reaction of unemployment rate to output decline



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

Appendix

Data sources

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).

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, Implicit tax rates by economic function (gov_a_tax_itr), 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)