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Institutions, unemployment and inactivity in the OECD countries

Bruno Amable*, Lilas Demmou† and Donatella Gatti‡

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Abstract

This paper provides new evidence on the linkages between a large array of institutional arrangements (on product, labour and financial markets) and employment performance. Our analysis includes unemployment, inactivity and jobless rates, thus allowing us to control for possible substitution effects across situations of non-employment and to check whether institutional rigidities affecting unemployment impact inactivity along the same line. To cope with common problems related to the inclusion of time-invariant institutional variables in fixed effects models, we present results of regressions based on three different estimators: PCSE, GLS and FEVD, the last one being a new procedure specifically designed to treat slowly changing variables. New institutional series are proposed, namely to account for unemployment insurance net replacement rates and employment protection legislation (EPL). Among other results, we find strong evidence of a positive effect of EPL on employment performance as well as of possible complementarities across product and labour markets regulation.

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1 Introduction

This paper aims to take a new look at the 'old' problem of European unemployment, by analyzing the institutional and macroeconomic determinants of joblessness and its components, i.e. unemployment and inactivity, for 18 OECD countries over the 1980-2004 period.

There is a large body of empirical and theoretical contributions in economics studying the impact of institutional arrangements on the operation of labour markets and on employment performance. The focus of the economic literature has shifted over time from the "corporatism" view of the '80 (Calmfors and Driffill, 1988) to the "markets regulation" view of the '90 (Nickell, 1997 and Siebert, 1997). While the "corporatism" view emphasized the positive impact of specific institutional arrangements - such as the degree of coordination in wage bargaining -, the more recent literature on "markets regulation" posits that the strength of institutional imperfections in European labour markets hinders the proper functioning of these markets, making them 'inflexible'. The subsequent policy recommendations are to remove obstacles to flexibility: decrease unemployment benefits, abolish job protection legislation, increase mobility of labour, improve product market competition (IMF, 2003 and OECD, 1997).

A few theoretical papers have argued that removing obstacles to a flexible labour market may be more complicated because the various sources of rigidity are complementary

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to each other (Coe and Snower, 1997; Orszag and Snower, 1999; Saint Paul, 2003). Recent contributions have also pointed out the existence of interaction effects between product and labour markets institutions (Amable and Gatti, 2006; Blanchard, 2005; Blanchard and Giavazzi, 2003; Koeniger and Vindigni, 2003) as well as labour and financial markets imperfections (Wasmer and Weil, 2004; Acemoglu, 2001).[1] Moreover, deregulation may in some cases yields perverse effects on employment: Amable and Gatti [2004] develop a dynamic efficiency wage framework where deregulation in product and labour markets boosts labour turnover and reduces job security; this mechanism pushes the incentive compatible real wage schedule upwards and may thus generate employment losses. Finally, recent papers have focused on the consequences of deregulation on wages disparities and employment opportunities for marginal workers. Schmitt and Wadsworth [2002] consider that deregulation does not necessary yields better employment opportunities for those marginal categories: greater wage disparities might be associated with greater inactivity for marginal workers, in which case more flexible wage adjustments would not be sufficient to avoid quantity adjustment (through inactivity). As a consequence, the standard deregulation view should be analysed against its implication for inactivity and joblessness as well (Faggio and Nickell, 2005; Bicakova, 2005).

A large body of literature has tested the strength of the empirical link between various institutional features representative of European labour markets, such as employment protection, the degree of centralisation of wage bargaining or union coverage, and the level of unemployment. Taking the recent literature for instance, Nickell [1997] considers the influence of employment protection, the unemployment replacement rate, unemployment benefit duration, the relative spending on active labour market policy, union density, union coverage, a measure of bargaining coordination and the total tax rate on unemployment. If employment protection is shown to have no effect, the other results confirm the expectations: active labour market policy and bargaining coordination decrease unemployment while the other institutions raise the rate of unemployment. Elmeskov, Martin and Scarpetta [1998]'s results differ from those of Nickell [1997] to the extent that they find a significant (positive) effect of employment protection on unemployment, but no effect of union density. Belot and Van Ours [2004] consider the effects of interaction between several institutional variables and distinguish between models with and without fixed effects. When the latter are introduced, all institutional variables turn non significant. When they are omitted, the tax rate, replacement rate and union density variables are significantly positively correlated to unemployment, but the coefficients for the wage coordination and employment protection variables are significantly negative. The results concerning the interaction effects are for the most part inconclusive.

Nickel *et al.* [2005] use annual data and estimate a fixed effects model with lagged dependent variable. The authors find a significantly positive influence of the unemployment benefit replacement rate, benefit duration and the tax variable density on unemployment, a significantly negative effect of wage coordination, but no significant influence of employment protection or union density. Control variables include various measures of macroeconomic shocks, which turn out to have significant coefficients. What comes out of the estimations is that half of the rise in unemployment between the 1960s and the 1990s can be explained by macroeconomic factors, the other half depends on institutional variables concerning the labour market. The assessment of the effect of institutional variables independently of macroeconomic factors is made more complex if the two types of influences interact with each other. This issue is tackled in Blanchard and Wolfers [2000]. According to their results, labour market institutions produce high unemployment only in interaction with macroeconomic shocks. However, their findings are very sensitive to changes in specifications, and the use of time-varying institutional variables considerably weaken their results.

The basic results of the orthodox view may be summarised as follows (Baker *et al.*, 2005): the Employment Protection Legislation (EPL), the unemployment replacement

[1] More details about theoretical channels of interactions across institutional arrangements on different markets will be given in the next Section below.

rate, the unemployment benefit duration and the tax rate influence positively the rate of unemployment whereas active labour market policy and wage coordination influence it negatively. The evidence supporting the standard view that labour markets deregulation yields a positive impact on employment is, however, seemingly not conclusive. Bertola [1990] shows that labour market regulation (i.e. job protection) may contribute to improve employment trough wage moderation. More recently, a few papers such Freeman [2005], Baker *et al.* [2004] and [2005] challenge the robustness of the empirical findings on macro data pointing labour market institutions as responsible for a high and persistent level of unemployment. Expanding the time period used until the late 1990s, Baker *et al.* [2004]'s regressions show either no significant influence of institutional variables such as employment protection, union density or the tax wedge. They even find counter-intuitive effects of the unemployment replacement ratio. The conclusion is that existing empirical results offer no compelling evidence linking labour markets institutions to unemployment: existing estimations are very sensitive to changes in the equations specification and the selection of explanatory variables is often biased.

Lack of solid results concerning the influence of employment institutions alone has led researchers to look for influences beyond the labour market. Empirical results on the consequences of joint product and labour markets deregulation are provided in a few contributions such as Boeri *et al.* [2000] and Nicoletti *et al.* [2000]. These papers make use of OECD variables capturing the intensity and strength of regulation in product and labour markets. These indexes prove to be strongly correlated, thus suggesting the existence of an interdependency between the two policy dimensions. Nicoletti and Scarpetta [2002] tackle the issue of whether the inclusion of measures of Product Market Regulation (PMR) strengthen or weaken the evidence linking labor market institutions to employment.[2] They test this hypothesis with a series of cross-country time series regressions for 1982-1998 including product market regulation variables in addition to labour market variables. When PMR variables are excluded, they find no relationship between the size of the tax wedge and the employment rate. The relationship becomes significantly negative when PMR measures are included in the regressions, but the replacement rate variable is not always significant. The union density and EPL variables are both significant in all the regressions. In a more recent paper (Nicoletti and Scarpetta [2005]) the two authors explore the issue of complementarities across product and labour markets and find some evidence supporting the idea that employment gains by deregulating product markets are stronger in highly regulated countries, i.e. countries that have rigid labour markets. Kugler and Pica [2003] show, on Italian data, that a tighter entry regulation hampers the gains associated with labour market deregulation.

The aim of this paper is to provide some new evidence on the linkages between the supposedly rigidity of a large array of institutional arrangements (on product, labour and financial markets) and employment performance. Our estimation strategy is largely inspired by Nickel *et al.* [2005]: we use annual data and estimate fixed effects models with lagged dependent variable. However, our dependent variables (measuring employment performance) include the unemployment rate as well as the rates of non-employment (joblessness) and inactivity. The reason for including jobless and inactivity rates in our analysis is that there is some evidence of international differences in participation rates. Indeed, one way to decrease unemployment figures is to remove people from the active labour force. Bicakova [2005] studies prime age men status on the labour market in the United-States, United-Kingdom and France and shows that, for this category of workers, inactivity in the United-States and United-Kingdom is greater than unemployment, whereas the reverse holds for France. A bunch of other papers focus on the question of inactivity among prime age men (see, among others, Murphy and Topel, 1997; Faggio and Nickell, 2005). Our analysis differs from the above in that we consider a panel of 18 countries and study unemployment and inactivity for the whole working age population; we will nevertheless come back to prime age men in a specific Section of the paper. Extending our empirical analysis to inactivity will allow us to control for possible substitution

[2] They use the non agricultural employment rate as dependent variable.

effects across the different situations of non-employment and check whether institutional rigidities affecting unemployment impact the inactivity rate along the same line.

Including institutional variables in estimations rises a well-known problem of consistently estimating time-invariant variables within the framework of fixed effect models. We cope with this issue in two different ways: first, we adopt a specific estimation technique designed to improve estimations of time-invariant or slowly changing variables; second, we construct a new indicator of EPL based on annual 'observations' of reforms (see below). Our estimation technique relies on a new procedure proposed by Plümper and Tröger [2004], which takes three steps: (i) estimate a fixed-effects model (ii) regress the unit effects on the time-invariant variables (iii) re-estimate the first stage including the error term of the second stage (FEVD estimator). Concerning employment protection legislation, we take as a starting point the OECD EPL indicators that are now available for three dates: end of the 1980s, end of the 1990s and 2003. Based on this indicator and on previous works by Blanchard and Wolfers [2000] as well as Nickell *et al.* [2002], we construct our own annual series by exploiting information included in the FRDB Social Reforms Database, which collects annual data about social reforms in European countries over the period 1987-2005 in the several areas among which employment protection legislation.

Contrary to existing studies, we make use of the unemployment benefit entitlement variable that has recently been proposed by Allan and Scruggs (2004) and made available by Scruggs (2004): net-replacement-rates of unemployment insurance, i.e. the percentage of foregone earnings replaced by this insurance, net of taxes and other charges. This variable proves to be far more precise than the gross replacement rates proposed by the OECD. We also include in our regressions the OECD indicator of product market regulation to account for the impact of product market competition on employment, stressed in the recent theoretical literature. In the same line, our estimations aim at providing some evidence about interactions effects across labour and product markets imperfections often neglected in the empirical literature. Moreover, we include measures of credit constraint, central bank independence and financialisation of the economies as proxies allowing us to control for financial market imperfections.

The paper is organised as follows. In the next Section we present the background for our estimations: first, we review the main theoretical arguments enlightening the expected impact of institutional and macroeconomic features on employment performance; second, we describe our database and selected variables; finally, we give more details about our estimation technique. In Section 3, we present our empirical results for unemployment, joblessness and inactivity, based on PCSE, GLS and FEVD estimations. Section 4 present a few extensions to our basic estimations: we analyse the effect of education on employment performance and subsequently disaggregate inactivity, unemployment and joblessness series to study more specifically the male population aged from 25 to 54. Conclusive remarks are presented in Section 6.

2 Analysing unemployment and inactivity

Unemployment and inactivity are strictly connected issues. Statistical definitions produce a sharp divide between the unemployed and the economically inactive, but in reality one should consider all those without work as being on a spectrum. At one end, one finds people defined as unemployed (i.e. those currently engaged in active job search) and, at the other end, one would have those who do not intend ever to look for a job (Gregg and Wadsworth, 1998). Hence, the analysis of employment performance needs to account for both unemployment and inactivity determinants. We intend to focus on two crucial questions. First, we want to know if there exists a trade-off between unemployment and inactivity, i.e. some sort of substitution across the different situations of non-employment. If one looks at the evolution of inactivity and unemployment rates for selected countries, there are indeed cases where a trade-off emerges, though this is not a general feature of

our sample (see Appendix 6.3, Figures 1 to 3). A second and connected question would be to analyse the way the institutional setting affects inactivity: are institutional rigidities impacting the inactivity rate along the same line as the unemployment rate? Answering to the latter will allow us to provide some hints about the interconnections across various situations of non-employment.

2.1 theoretical background

Labour markets imperfections. We take account of imperfections on the labour market by introducing the following institutional variables: employment protection legislation (EPL), net replacement rate, wage taxes, union density and wage coordination. There is a rich literature detailing the positive effects of reducing labour market imperfections (see Introduction above): lowering EPL, net replacement rates, wage taxes and union density should lead to a lower real wage schedule and equilibrium unemployment; however, wage coordination is frequently assumed to enhance employment performance by allowing for wage moderation (Calmfors and Driffill, 1988). However, one should note that a negative impact of increased labour market flexibility and labour turnover emerges in a few papers. Snower and Diaz-Vazquez [1996] model an economy characterized by perfect competition and wage bargaining, where stronger turnover can lower employment if fluctuations are transient and union power moderate. Fella [2000] shows that redundancy pay may improve welfare by reducing the suboptimally high rate of turnover determined by individual firms in the presence of intertemporal externalities. Amable and Gatti [2006] extend this analysis to an economy with imperfect competition on product markets (see below).

Product markets imperfections. We consider the OECD index of global product market regulation (PMR). Nickell [1999] argues that product market deregulation should shift out firms labour demand curve and/or favour the entry of new firms. The benefits of increased product market competition also depend on the wage setting process. Because more competition on the product market makes firms' labour demand more sensitive to the real wage, the negative impact on both employment and profits of any increase in wages is larger. This reduces unions' claims and the bargained level of the real wage. Hence, unionized firms which face increased competition will benefit from a higher labour demand and a lower bargained real wage schedule. Amable and Gatti [2004] develop a dynamic efficiency wage framework with imperfect competition on goods market. The authors show that an increase in product market competition boosts labour turnover and reduces job security. As a consequence, the efficiency wage schedule compatible with more intense product market competition shifts upward: this mechanism pushes real wages up to the point that increased competition may generate employment losses.

Interaction across labour and product markets imperfections. We consider possible interactions across PMR and EPL regulations, as well as interactions across EPL and replacement rate. The latter aims to account for possible complementarites across structural reforms on the labour market (Orszag and Snower, 1999; Saint Paul, 2003). Concerning the former, Blanchard and Giavazzi [2003] show that increased product market competition may have short-term costs, such as decreasing rents and wages; labour market deregulation, by lowering rents, reduces incentives to fight for capturing them and eases the implementation of deregulation policies in the product market, and *vice versa.* Koeniger and Vindigni [2003] submit that free entry makes it more difficult for firms to bear the costs associated with an "inflexible" labour market; due to the positive effect of increased product market competition on employment, incentives to protect jobs are reduced. Amable and Gatti [2006] show that engaging in a process of product market deregulation yields an implicit labour market reform leading to a more intense turnover on the labour market. This mechanism is exacerbated by increased competition on the product market but is dampened by redundancy payments. Hence, policies increasing job security may be necessary to offset the possible detrimental effects of a more intense labour turnover. In same cases, a complementarity may emerge between regulations in product and labour markets, both interacting to ensure more stable labour relations; in

other cases, product market deregulation and labour market regulation become substitute policies which means that joint deregulation policies have conflicting effects on aggregate employment.

Financial markets imperfections. We account for imperfections on financial markets by considering the role of credit constraints (variable 'credit to the economy') and financialisation (variable 'financial assets'). Concerning the impact of financial markets on employment, Wasmer and Weil [2004] consider a macroeconomic model where imperfections on both labour and credit markets interact. Imperfections rely on informational and search frictions and are modelled with the help of matching functions. Entrepreneurs must find credit before setting up a firm, and they must find workers before producing. Credit market imperfections delay the setting up of the firm and make it more expensive, which ultimately depresses labour demand and contributes to raising the unemployment rate above the level which would have resulted from the existence of labour market imperfections alone. A similar interaction between imperfections in credit and labour markets may also be found in Acemoglu [2001]. Credit market frictions hinder investment and lower the economy's capital stock, which leads to a lower employment level if labour and capital are complementary or if labour market imperfections make the real wage downward-rigid. Thesmar and Thoenig [2004] propose a model where financial market development, by improving risk sharing between firms owners, increases the willingness of these firms to take risky bets. This in turn increases firm level uncertainty in employment and profits. Amable, Ernst and Palombarini [2005] propose a model of institutional complementarities where trade unions and firms have the choice between a cooperative negotiation targeting at the long-term success of the firm and a conflictual relation targeting at maximizing the current share. One important determinant in this game is the time horizon financial investors have as they influence the realization of future gains of cooperation between workers and firms. When financial investors are patient, a pareto-superior cooperative equilibrium can be attained. On the other hand, whenever one of the two bargaining parties gets too weak, the viability even of the long-term equilibrium is threatened. We try to capture the effects of uncertainty and investors time horizon through our 'financialisation' variable.

Central Bank Independence. A traditional channel through which Central Bank Independence (CBI) might affect unemployment is a sort of Phillips curve mechanism: a more independent central bank would go along with a greater focus on price moderation and a less accommodating monetary policy (i.e. more 'conservatism'), thus yielding higher unemployment in the medium term. In the presence of nominal rigidities and economic business cycles, a trade-off emerges between conservatism (which reduces inflation) and flexibility to respond to exogenous shocks -which reduces employment variability (Svensson, 1996). Recent papers focus on the impact of central bank conservatism on equilibrium unemployment. Soskice and Iversen [2000] show that, if the central bank is non-accommodating, sufficiently large unions, bargaining independently, have an incentive to moderate sectoral money wages, and thereby expected real wages. The result is an increase in the real money supply, and hence higher demand and employment. Lippi [2003] shows that if wage setters are non-atomistic, more conservatism may either increase or decrease equilibrium unemployment, depending on certain structural features of the economy. Intuitively, a large union understands that an increase in its own nominal wages, taking as given the nominal wages of the other unions, leads to an increase in inflation and hence to a reduction in the other unions' real wages. This reduction makes the other unions' labor cheaper (triggering labor substitution) and changes the economy's overall production. Both effects influence the labor demand faced by the union and, therefore, its employment choices. Crucially, conservatism determines the magnitude of both effects (as perceived by an individual union) since it affects the inflation effect of a given nominal wage rise. The effect of more conservatism on employment is negative if the 'substitution' effect dominates the 'output' effect.

Macroeconomic determinants. We use a set of macroeconomic control variables: money supply (the OECD 'credit to the economy' time series and long-run real interest rate),

competitiveness (real exchange rate and structural trade balance), and average labour productivity. An increase in credit supply eases credit constraints and yields improved employment conditions. The effect of competitiveness can in principle go both ways: increased competitiveness (i.e. higher real exchange rate and improved trade balance) could enhance employment performance by boosting international demand for national goods; moreover, inflationary pressure in the home country are dampened by an increase in real exchange rate, yielding wage moderation and a positive impact on employment. However, increased competitiveness requires national price moderation while national authorities (governments and central bank) who are concerned with improving medium term employment might be tempted to use expansionary policies to serve domestic objectives instead of external balance constraints. In this case, an improved employment performance in the medium term could go along with a decrease in the trade balance (Carlin and Soskice, 2005). Finally, increased labour productivity should improve labour demand and employment. It should be mentioned that one could expect macroeconomic controls to act differently on unemployment and inactivity. In fact, increased competitiveness and average productivity could lead to the exclusion of low skilled workers likely to fall into inactivity.

2.2 database and variables

Our sample spans over the period 1980 to 2004 (although many data are missing after 2000) and includes 18 countries: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, Netherlands, Norway, Portugal, Spain, Sweden, United Kingdom, United States. A complete list of dependent and independent variables used in our estimations is provided below. More comments about specific indicators that are used in estimations (i.e. the EPL variable and the Central Bank independence score) are also provided. Note that the real interest rate is not included below because it turned out to be non significant in all estimations.

Dependent variables

unemployment rate	ratio of unemployed to working age population
inactivity rate	ratio of inactive working age pop. to total working age pop.
jobless rate	unemployment rate plus inactivity rate

Independent variables

EPL (0-3)	Employment Protection Legislation (based on own calculations)
PMR (0-6)	indicator of Product Market Regulation (OCDE)
RR	net replacement rates on unemployment insurance (Scruggs, 2004)
COOR (0-3)	index of coordination in wage bargaining (Nickell *et al.*, 2005)
UD	union density, ratio of total reported union members (OECD)
TW	tax wedge, various specifications (OECD)
FA	ratio of total financial assets of institutional investors to GDP (OECD)
EDUC	students enrolled in primary plus secondary educ. to total enrolled students (OECD)
CBI (1-3)	central bank independence (based on Freitag, 1999; 1=total indep.)
RER	first time difference of the real exchange rate (OECD)
Productivity	one period lag of log real GDP – log employment (OECD)
Inflation	rate of growth of consumer price index (OECD)
Credit	ratio of domestic credit to GDP (OECD)
TTB	based on the Hodrick-Prescott trend of trade balance (OECD)
LDU	long duration unemployment (OECD)
JVR	vacancy rate (OECD)

Employment Protection Legislation

There are few variables representing employment protection legislation (EPL) that are available for empirical work. The OECD have devised an EPL indicators that is available

for three dates: end of the 1980s, end of the 1990s and 2003. Blanchard and Wolfers [2000] propose an EPL measure based on the OECD indicator, then available for two dates only. They interpolated between the OECD's late 1980s and late 1990s scores for the 1990-1994 period and used the late 1980s figures for the whole 1980 decade. From the two data points proposed by the OECD, they created four five-year averages. On this basis, Nickell *et al.* [2002] created annual data points for 1980-1995. These cross-section time series measures of EPL are also used by the IMF study and by Baker et al. [2005] and Baccaro and Rei [2005]. We propose an annual measure of EPL that we constructed by taking the indicators above as a starting point. In addition to them, we considered the FRDB Social Reforms Database[3], which collects, on an annual basis, information about social reforms in European countries over the period 1987-2005 in the areas of employment protection legislation, pension systems, unemployment/non-employment benefits and migration policies. Using the information provided in the database on the reforms affecting EPL, we estimated a model explaining the evolution of the EPL indicator of Nickell et al. [2002] with the various indicators about employment protection given in the FRDB Social Reforms Database and time trends as regressors.[4] This model was used to predict a series for EPL between 1980 and 2004. In order to check the relevance of the predicted EPL series, we compared the evolutions of our new indicator with Nickell *et al.* [2002] indicator as well as with the three data points given by the OECD. In order to avoid major discrepancies between our own series and the OECD scores, we modified accordingly the specification of the estimation model by modifying the inclusion of time trends according to countries and ultimately changing a few values of the series directly. We thus obtained a cross-section time series indicator of employment protection legislation for 18 countries over the 1980-2004 period. The evolution of our EPL indicator for few countries on our sample is documented in Appendix 6.3 (Figures 4 to 6).

Central Bank Independence

This indicator is based on Freitag [1999] and commented by Armingeon *et al.* [2005]. It is a composite index constructed out of four other indicators, each of them has been divided in a category above and one under the median: 1) "bankales", by Alesina [1988], which ranges from 1 to 4, the higher, the more independent; this index considers whether the central bank has final authority over monetary policy, whether government officials sit on the governing board of the bank, and whether more than half of the members are appointed by the government; 2) "bankeff", index proposed by Eijffinger and Schaling [1996], which ranges from 1 to 5, the higher, the more independent; it is based on the location of final responsibility for monetary policy, the absence or presence of government official on the board of central bank, and the percentage of board appointees made by the government; 3) "bankgr_2", index proposed by Grilli, Masciandro and Tabellini [1991], measuring only political independence, from 0 to 8, the higher, the more independent; focuses on appointment procedures for board members, the length of members' terms to office, and the existence of the statutory requirement to pursue monetary stability; 4) "bankcuk", unweighted legal-independence index by Cukierman [1994], aggregated from sixteen legal characteristics of central-bank charters grouped into four clusters: the appointment, dismissal, and legal term of office of the governor of the central bank; the institutional location of the final authority for monetary policy and the procedures for the resolution of conflicts between the government and the central bank; the importance of price stability in comparison to other objectives; and the stringency and universality of limitations on the ability of the government to borrow from the central bank; the index ranges from 0 to 1. Given the four indexes above, the composite index of CBI that we use goes from 1 to 3, where '1' stands for a maximum of central bank independence (when all four indexes agree, that the central bank of this country is independent) and '3' stands for

[3]The FRDB Social Reforms Database has been developed by Giacomo Degiorgi, Elisabetta Frontini, Serena Fumagalli, Francesco Legrenzi, Mauro Maggioni and Francesca Mazzolari at the Fondazione Rodolfo Debenedetti. The Database is available at: http://www.frdb.org

[4]For countries not documented in the FRDB Social Reforms Database, we used only time trends and the three OECD scores.

a maximum of central bank dependence. The index has been changed in some countries due to reforms and changes in law: Austria (1985f), New Zealand (1990f) Canada (1991f), France, Finland, United Kingdom, Sweden and Belgium (1993f). Two examples of the evolution of the indicator are given in the Appendix 6.3 (Figure 7).

2.3 methodology

Testing hypotheses regarding unemployment, inactivity and jobless rates involves certain problems related with the use of Time Series-Cross Section (TSCS) data. Let $y_{i,t}$ be the observation for the time series y at time t for unit i. Let $x_{i,t}$ be the observations for a vector of independent variables. The problem is usually of the following form:

$$y_{i,t} = \alpha + \beta \cdot x_{i,t} + \epsilon_{i,t} \tag{1}$$

$\epsilon_{i,t}$ is the error term. The consideration of a pooled data model, compared to either a country-specific times series model or a pure cross section, is usually imposed by the size of the sample. Most comparative analyses deal with a limited number of countries (small N) for a not too large number of periods (small N). In this respect, one usually distinguishes TSCS data from the panels found in microeconomic applied analysis, which are characterised by a large N- (very) small T data structure. This is also why a literature has grown emphasizing that the estimators fit for panel data may pose some problems when applied to TSCS data. With respect to the latter, Beck and Katz [1995] and [1996] have become the most influential references and their "panel corrected standard errors" (PCSE) estimator is widely used in comparative political economy. This estimator is basically applying the OLS with modified standard errors to take account of panel heteroskedasticity and contemporaneous correlation of the error terms.

The first issue raised by the consideration of a model such as 1 is how relevant it is to pool data. A fully unpooled model would consider specific β_i for each unit. A partially pooled model would consider several β_js applying to as many subset of countries. When the time dimension allows for it, it is usually better to consider an unpooled model, but as mentioned before, the size of the samples considered in comparative analyses mostly forbid such a strategy. Besides, Beck and Katz [2001] show that the traditional F test for pooling too often rejects pooling and that alternative methods related to the use of a random coefficient model do not solve the problem of partial pooling. The conclusion stated by Beck and Katz [2004] is therefore that '*the gains from pooling offset the costs of pooling more than standard statistical theory asserts*'.

A simple way to deal with country heterogeneity is to include fixed effects and to consider the following model:

$$y_{i,t} = \alpha_i + \beta \cdot x_{i,t} + \epsilon_{i,t} \tag{2}$$

Estimating a fixed effect model amounts to relating intra-unit changes in y to intra-unit changes in x, without addressing the problem of the relation between the average y and the average x across countries. All cross country variance is absorbed by the fixed effects. This feature has made many comparative analysts uncomfortable with the use of such a model since no explanation of what fixed effects stand for can be given. The inclusion of country fixed effects also preclude the inclusion of time-invariant or slowly-changing variables as independent variables. Several of the variables we consider in what follows are either invariant (at least for a non negligible part of the period considered) or change slowly. Distinguishing between their influence on unemployment, inactivity or joblessness and the influence of omitted country-specific variables will thus prove difficult. If one does not include fixed effects in the model, the time-invariant variables will carry the weight of all the country specific factors determining employment and unemployment.

The question of whether fixed effects should be included in TSCS models or not arises in most comparative empirical studies. It is possible to test for the inclusion of such effects. However, Beck and Katz [2004] state that F test for the significance of fixed effects may

be too liberal in rejecting the null of no effects. Rejection is more likely in the presence of many units since a few of the fixed effects are likely to be significant. They suggest to include fixed effects when they are large and clearly significant. In this case as in others, there is no preset formula, but problems related to the omission of fixed effects are in many cases likely to be greater than those related to their inclusion (Plümper, Tröger and Manow [2005]).

Plümper and Tröger [2004] propose a procedure for analysing the effect of time-invariant variables in a model including fixed effects. Their procedure takes three steps: (i) estimate a fixed-effects model (ii) regress the unit effects on the time-invariant variables (iii) re-estimate the first stage including the error term of the second stage (xtfevd procedure).

Their Monte Carlo experiments suggest that the fixed effect vector decomposition (xtfevd) estimator is the least biased estimator when time-variant and time-invariant variables are correlated with the unit effects. When unit effects are uncorrelated with the time-variant variables, pooled OLS, random effects (RE) and fixed effects vector decomposition (FEVD) estimators give unbiased estimates whereas the Hausman-Taylor (HT) estimator gives biased estimates. When unit effects are correlated with the time-variant variables, pooled OLS and RE models perform poorly; FEVD and HT are unbiased, HT being less efficient. When unit effects are correlated with time-invariant variables, all procedures are equally biased, but HT is the less efficient. When unit effects are correlated with both time-variant and time invariant variables, FEVD is the most efficient and the least-biased estimator. FEVD is slightly worse than RE when time-variant variables are uncorrelated with the unit effects, time-invariant are correlated with the unit effects and the distribution of the unit effects is slightly skewed.

Another problem related to the use of TSCS data concerns serial correlation. Beck and Katz [1995] have advocated the inclusion of the lagged dependent variable in the regression to deal with this problem, and consider the lagged dependent (LDV) variable model with dummies which has the following form:

$$y_{i,t} = \alpha_i + \phi \cdot y_{i,t-1} + \beta \cdot x_{i,t} + \epsilon_{i,t} \tag{3}$$

It is well known that the least square estimator with dummies (LSDV) including a lagged dependent variable gives biased estimates. The usual approach with panel data is to use an instrumental variables (IV) estimator (Anderson and Hsiao [1982], Arellano and Bond [1991]). Kiviet [1995] takes a different approach. The LSDV estimator may biased but has often a smaller mean squared error than IV estimators. It is then better to estimate the bias and correct the estimation accordingly. This procedure may sometimes prove superior to the IV estimators but is somewhat heavy to implement. Besides, Beck and Katz [2004] show with the help of Monte Carlo simulations that in the case of TSCS data, i.e. with values of T greater than 10, 20 or even 30, the proposed fixes (Kiviet correction or IV methods) are not worth their costs.

3 Empirical results

In this Section, we first present an overview of our estimation strategy: the specification of our basic model and possible variations, a well as a presentation of robustness tests and estimators that we use. We then present results obtained with a PCSE estimator (and alternatively a GLS estimator). Finally, we pass on to results obtained with a FEVD estimator.

The general specification of our model follows (3). As in Nickel *et al.* [2005] we estimate the model based on annual data and include the lagged dependant variable (LDV) to account for persistence and hysteresis effects. Our basic model includes main institutional arrangements in the labour market, also considered by Nickel *et al.* [2005]: EPL, unemployment benefit replacement rate, union density, the tax wedge, and wage coordination. We consider a few additional variables as the ratio of financial assets to GDP,

product market regulation, and central bank independence. Our main macroeconomic controls are the ratio of credit to the economy to GDP, the first time difference of the real exchange rate and the lagged level of productivity. We include few interaction terms, especially involving EPL - which we interact with replacement rates and PMR. This allow us to determine wether the impact of employment protection is high when it is associated with another institutional rigidity. Finally, we introduce the trend of trade balance in order to distinguish two different channels of influence of the external balance constraint: a price channel (i.e. via the real exchange rate) and a 'price and volume' channel (i.e. via foreign demand). In addition to the previously mentioned variables, the specifications include a number of almost time-invariant variables such as PMR, Central Bank independence and the index of coordination We use annual data for each of these variables. As in IMF (2003) and Nickel *et al.* (2001), the insertion of a lagged dependent variable is supposed to take into account the hysteresis stemming from agents' current position on the labor market (unemployment, inactivity and joblessness). The introduction of a lagged dependent variable is a corollary of the use of annual data: the labor market is unable to absorb exogenous shocks in one period, and the coefficient of the lagged dependent variable captures the speed of this adjustment process. We include in each regression country and time dummies. This allows us to control both for shocks that are common to all country (time dummies) and specific to one country (country dummies). As argued in Section 2.3, the inclusion of country dummies (i.e. fixed effects) is a sensible issue, especially in relation with the introduction of time invariant variables whose estimated coefficient are sensitive to inclusion/exclusion of those dummies.

We begin our analysis by testing the order of integration of our series. We apply several panel unit root tests: Im, Pesaran and Shin [2003], Maddala and Wu [1999] and Levin, Lin and Chu [2002] with different specifications (with or without trends, with or without drift). The results are given in Appendix 6.2. Most series appear stationary (sometimes with a drift or a time trend) with the exception of financial assets and possibly union density. Therefore, we will include financial assets and union density in our regressions in levels but also, alternatively, in first differences. Results with first difference will be presented directly for PCSE, and separately in Section 3.3.4 for FEVD estimations. Since we work with annual data, we take further precautions and test the stationarity of residuals from our regressions in the same way as above. The tests show that all residuals are stationary.

We also check for autocorrelation and heteroskedasticity of residuals, by using the tests proposed by Nickell et al. [2005]. For regressions concerning jobless and unemployment rates we can not reject the assumption of autocorellation and heteroskedasticity of residuals. Autocorellation is generally not a problem for regressions explaining inactivity though residuals are still heteroskedastic. We correct for these problems in the following ways. Concerning autocorrelation of residuals, we assume either, as advocated by Beck and Katz [1995], a "common rho" for all countries (first order autocorrelation coefficient), the value of which is presented in each table, or we introduce a panel specific rho , as in Nickell et al. [2005]. The two procedures give very similar results as tables below will show. Moreover, we take care of heteroskedasticity by adopting a "robust" standard error estimator whenever possible. For all specifications of our model, we consider three different estimators : GLS, PCSE and FEVD. As argued in the previous Section, we consider that FEVD is a better suited estimator in the presence of invariant time series.[5] Nevertheless, in order to check for robustness of the results, we present regressions obtained with all estimators mentioned above.

3.1 regressions with PCSE

We start the empirical analysis by estimating our model with a standard OLS/PCSE estimator, or alternatively a GLS estimator. Results are displayed and commented below.

[5] One should also note that PCSE is sometimes considered as a better estimator than GLS which can not eliminate serial correlation and might overestimate the significance of coefficients (see for instance Bacaro and Rei, 2005).

3.1.1 unemployment

Table 1 displays the results for unemployment obtained with an OLS/PCSE estimator. As they are similar to those obtained with GLS, these are presented in Appendix 6.1 (table A1).

Regression 1 presents the results for our basic model. It shows a coefficient for the lagged unemployment rate that is significant and rather high (around 0.75-0.8), which points to a high level of unemployment persistence. This will actually be the case in all regressions for the unemployment rate. A few labour market institutions variable appear significant in this first regression, with coefficients having the standard expected signs. PMR turns out to have a positive impact on unemployment, this supporting the standard view about the beneficial role of product market deregulation. However, the coefficients of some institutional variables, such as EPL, the replacement rate, coordination or CBI, are not statistically significant. This is perhaps not surprising given that some of those variables (particularly CBI and COOR) are time invariant; the presence of country dummies makes PCSE a weak estimator for this kind of variables. Concerning our macro variables the mains results are the following. The terms of trade variable has a significantly negative coefficient, which is a standard result in the literature (Nickell et al., 2005). One can interpret this coefficient as the result of the beneficial effect on unemployment stemming from increased competitiveness, or as the consequence of a high exchange rate on wage moderation. We will try to distinguish between these two effects later on by directly introducing trade balance in the regression. The productivity term has a significantly negative coefficient, which can be interpreted as a positive technology shock pushing labour demand upwards. The credit variable also has a significantly negative coefficient, in accordance with the hypothesis that relaxing credit constraints allows firms to expand production by hiring more labour. Regression 2 presents results when one substitutes first differences of union density and financial assets to levels of these variables. A notable difference is that EPL shows up significant with a negative coefficient. This effect is at odds with the standard view that increased EPL yields higher unemployment. The variable for financialisation now appears significantly related to unemployment. An increase in the degree of financialisation of the economy yields an increase in the rate of unemployment. This effect is clearly distinct from that of the credit variable. The latter has an interpretation along the lines of the mechanisms featured in Wasmer and Weil [2004] or Acemoglu [2001]. The financial assets variable has a different interpretation. An increase in financialisation is associated with a change in agents time horizon which may lead to industrial restructuring implying layoffs. Regressions 3 and 4 include the interaction term between the replacement rate and employment protection legislation. Substituting the interaction variable to EPL makes both RR and the interaction variable significant. The replacement rate has a positive impact on unemployment whereas EPL interacted with the RR has a significant negative impact on unemployment. This result confirms the positive role played by EPL fostering employment performance. The other coefficients are similar to those in regressions 1 and 2.

Table 1. **Unemployment**

	1	2	3	4
lag unemployment	.7636835***	.8018459***	.7545725***	.7882633***
PMR	2.463291***	2.539273***	2.362411***	2.471646***
EPL	-.5667357	-1.161745***		
EPL*RR			-1.136782**	-1.767929***
RR	.5552765	.6530452	2.240818*	3.25797***
COOR	-.3654997	-.360539*	-.3121234	-.2823028
CBI	-.0576579	-.1181046	-.0673883	-.1256982
UD	.0497868***		.0442059***	
d_UD		.1279503***		.1255831***
TW	.0457226**	.0178906	.0422956*	.0151323
FA	.0046051		.0040074	
d_FA		.0118947**		.0126417**
RER	-1.416496***	-1.286505**	-1.445319***	-1.239464**
Productivity (lag)	-5.058651***	-3.817861***	-5.110538***	-3.833319***
Credit	-.0442347***	-.0379556***	-.0447262***	-.038874***
Estimator	PCSE	PCSE	PCSE	PCSE
time and country dummies	y	y	y	y
panel specific AR1	y	y	y	y
robust	y	y	y	y
Number obs.	232	226	232	226

3.1.2 inactivity

Results for the inactivity rate are found in Table 2. The specification of regressions 1 and 2 are in accordance with those displayed for unemployment. They correspond to the basic model and the model in difference for union density and finance estimated with PCSE. Moreover, we include consumer price variation in the second regression. Results show a high coefficient for the lagged dependent variable. This is not surprising given that part of the inactive population includes people who are definitely out of the labor force. However, the sensitivity of inactivity to institutional and macro variables highlights the fact that an important portion of inactive population is actually quite close to the labor market, as suggested by authors like Gregg and Wadsworth [1998]. Concerning macroeconomic variables, credit to the economy and real exchange rate are both negatively correlated with inactivity, which reflects the influence of good macroeconomic conditions on activity. Turning to institutional variables, in both regressions EPL is significantly negatively related to inactivity, while RR and union density (either in level or in difference) are positively related. In the first regression, Central Bank independence, PMR and financial assets variables all have statistically significant positive coefficients. Nevertheless, the last result is dubious considering that the financial series is almost certainly non stationary. When the model's specification is modified (regression 2), the significance of PMR and Finance coefficients vanishes. In regressions 3 and 4, we present results with a GLS estimator. These are similar to those previously obtained with PCSE.

Table 2. **Inactivity**

	1	2	3	4
lag inactivity	.8414101***	.8676585***	.8070652***	.8355943***
PMR	1.564968**	.8364729	.6844675	.2693281
EPL	-.6803178*	-1.032364***	-.910344***	-1.336465***
RR	1.523406**	1.431488*	1.48453***	1.307604**
COOR	-.3542501	-.1404765	-.1463045	-.1412095
CBI	.2015188*	.0932693	.1254675	.1118876
UD	.0356054**		.0381515***	
d_UD		.1117847**		.0885497**
TW	.019224	-.0442486**	-.0378283**	-.0574878***
FA	.0097232***		.0084001***	
d_FA		.0043145		.0044488
RER	-1.974592***	-1.708829***	-1.041635***	-1.091949***
Productivity (lag)	1.177893			
Inflation		-.0654418	-.1051478***	-.1138911***
Credit	-.0346726***	-.0313935***	-.0286229***	-.0273619***
Estimator	PCSE	PCSE	GLS	GLS
time and country dummies	y	y	y	y
panel specific AR1	n	y	n	y
robust	y	y	y	y
Number obs.	232	226	232	226

3.1.3 joblessness

Table 3 presents results for the jobless rate based on PCSE estimator (results with GLS are found in Appendix 6.1, table A2). Results are basically in line with those of the previous two tables. As before, the first two columns refer respectively to regressions in levels and differences (for Financial asset and union density). In the third regression, we apply panel specific correction for residuals autocorrelation. In the fourth column, we propose a variation of the model including the interaction term for EPL and PMR. The main results are the following. Concerning the first three columns, the replacement rate has no significant effect whereas the coordination variable has a significant negative impact in three out of four regressions (as for unemployment). The weak impact of Central Bank variable is confirmed. The significance of the tax rate is dependent on the specification of the model. Introducing the difference for union density and financial assets removes the significance of the tax variable (as for unemployment). One can note that both EPL and PMR are now highly significant, whereas the latter variable was mainly significant for unemployment and the former for inactivity. In both case, signs are in accordance with those in table 1 and 2. In column 4, substituting the interaction term to EPL yields a result in accordance with a complementarity mechanisms such as the one put forward by Amable and Gatti (2006). Increased regulation in both product and labour markets is associated with a better employment performance.

Table 3. **Joblessness**

	1	2	3	4
lag jobless rate	.4804962***	.8478554***	.8141533***	.4878916***
PMR	3.372508**	3.790282***	3.445991***	
EPL	-3.707794***	-2.241889***	-2.843671***	
EPL*PMR				-1.232287***
RR	2.314394	1.83658	2.128872	1.828228
COOR	-1.573911***	-.4780409	-.9362384***	-1.514647***
CBI	.1498346	.027039	-.1430191	.200488
UD	.1804011***			.203967***
d_UD		.2994036***	.2629805***	
TW	.1147237***	.0243538	.0356913	.0855858*
FA	.016597**			.0167462**
d_FA		.0182108**	.0177629**	
RER	-2.742293**	-2.992851**	-3.250178***	-2.545249**
Inflation	-.3814308***	.0018331	-.0222728	-.3883498***
Credit	-.1054779***	-.0717003***	-.0702153***	-.0974894***
Estimator	PCSE	PCSE	PCSE	PCSE
time and country dummies	y	y	y	y
AR1	y	y	panel specific	y
rho	.1787095	.1509307		.1753568
robust	y	y	y	y
Number obs.	238	226	226	238

3.2 regressions with FEVD

We now turn to estimations based on FEVD that allows us have a more satisfactory treatment of the time-invariant or the slowly-changing variables. Among the institutional variables that we consider, three belong to this category: product market regulation (PMR), Central Bank independence and coordination. These variables will thus be treated as time-invariant in the following regressions. Besides, we carefully check how the introduction of time invariant variables changes our results. To do that, we introduce each variable successively as time invariant (see Appendix 6.1, tables A3 and A4): our results are not affected throughout the procedure. We present below results from regressions concerning the basic model (in level) and its extensions with the inclusion of interaction terms. Results with series in difference (FA and UD) are found at the end of the Section.

3.2.1 unemployment

Table 4 shows results for the unemployment rate. As one can see, EPL now has a significant negative effect, either alone (regression 1) or in interaction with PMR (regression 2) and the replacement rate (regression 3). RR itself is only significant when the interaction term is included (as with PCSE). Union density, tax wedge, and trade balance all have significant positive effects. Credit, real exchange rate and lagged productivity have significant negative effects. Since FEVD estimator should allow us to better assess the role of time invariant variables, it is worth noting that there are indeed important differences with respect to results presented in Table 1 for those variables. In fact, the wage coordination variable now has a significant negative influence on unemployment. The same holds for Central Bank independence. The sign of CBI coefficient will appear very robust across our regressions. This points to the role of the traditional channel through which Central Bank Independence (CBI) might affect unemployment: a sort of Phillips curve mechanism implying that a more independent central bank places a greater focus on price moderation and a less accommodating monetary policy, thus yielding higher unemployment in the medium term (see also Svensson, 1996; Lippi, 2003). The sign, significance and magnitude of the third time-invariant variable (PMR) are basically unaltered with

respect to those reported in Table 1. One should also note that we control here for trade balance (variable TTB) and find it to have a positive significant effect on unemployment. This result is consistent with the idea that the external constraint might in some cases hamper domestic policies yielding a negative impact on employment. Finally, financial assets variable turns now to have a significant positive effect on unemployment, confirming our previous result (in difference) and implying that increased financialisation of the economy does not have a positive impact on labor market operation.

Table 4. **Unemployment**

	1	2	3
lag unemployment	.6942031***	.6937818***	.6665141***
PMR	2.991014***	3.283917***	2.405103***
EPL	-.5920692**		
EPL*PMR		-.2595662*	
EPL*RR			-1.070341***
RR	.5452509	.5099105	2.066288***
COOR	-2.156524***	-2.317946***	-1.812675***
CBI	-.573803***	-.5867212***	-.3366514***
UD	.0396125***	.040699***	.0407221***
TW	.0532728***	.0524322***	.0746813***
FA	.0056632**	.0060357***	.0046396**
RER	-1.302139*	-1.287773*	-1.51797**
Productivity (lag)	-5.501064***	-5.53044***	-1.600112**
Credit	-.0448293***	-.0442707***	-.044485***
TTB	.1901479***	.1976669***	.0816768*
eta	.8452574***	.8592565***	.8252756***
time dummies and fe	y	y	y
time inv. variables	y	y	y
AR1	y	y	y
rho	.3729823	.3767836	.3979176
robust	n	n	n
Number obs.	212	212	212

3.2.2 inactivity

Turning to estimations concerning the inactivity rate, we find that Central Bank independence now has a positive and significant coefficient while coordination has a significant and negative coefficient. Results concerning EPL and Financial assets, replacement rate, union density are basically unchanged. Tax wedge is now strongly significant and has the standard positive coefficient. One should note that the coefficient of lagged productivity is significantly positive, which means that, contrary to what we observe for unemployment, an increase in productivity rises the inactivity rate. The mechanism involved possibility implies that increased productivity goes along with the use of more modern equipment and up-to-date skills. This process may leave some workers aside, pushing them out of active labour force altogether rather than making them simply redundant. We will see below whether this effect persists once we control for the educational level of the workforce. In column 2, we introduce the interaction term between EPL and PMR confirming the complementarity effect which had been noticed for employment in previous regressions. Columns 3 and 4 presents further extensions of our model. We first test the influence of unemployment duration (regression 3). The coefficient turns out to be positive, which can easily be interpreted as the discouraging impact of long-term unemployment on willingness to look for a job. Second, we introduce jobs supply by including the vacancy rate in our estimations. This variable is supposed to take into account the possible disconnection between jobs supply and demand. A greater disconnection would be reflected in a positive relation between inactivity and JVR (Faggio and Nickell, 2005). As expected, we find that increased jobs supply contributes to reduce inactivity.

Table 5. **Inactivity**

	1	2	3	4
lag inactivity	.8377464***	.8421342***	.750325***	.8273024***
PMR	3.921606***	4.133229***	4.521502***	3.149622***
EPL	-.9122307***		-.7961346***	-.8606133***
EPL*PMR		-.3339745***		
RR	1.614114***	1.373754***	2.622725***	2.114287***
COOR	-.6938919***	-.9706433***	-1.185702***	-.3099849***
CBI	-.6499428***	-.6683326***	-.7238181***	-.6809977***
UD	.0499687***	.0522966***	.06511***	.0444499***
TW	.0325231***	.0290832***	.0359162***	.0202874***
FA	.0079617***	.0082769***	.0132509***	.00514***
LDU			.0375585***	
JVR				-.8145289***
RER	-2.126245***	-2.120553***	-1.834706***	-1.525553***
Productivity (lag)	2.505305***	2.355966***	3.963573***	2.954254***
Credit	-.0352157***	-.0341522***	-.03088***	-.027735***
TTB	-.0998912***	-.0844863***	-.1464787***	-.1135978***
eta	1***	1***	1***	1***
time dummies and fe	y	y	y	y
time inv. variables	y	y	y	y
AR1	n	n	n	n
robust	y	y	y	y
Number obs.	232	232	184	216

3.2.3 joblessness

Table 6 presents results for the jobless rate. Here again, the use of the FEVD estimator makes all variables considered as time-invariant significant. Unsurprisingly, PMR has a very significant positive impact on the jobless rate, whereas both coordination and Central Bank independence have very significant negative coefficients. The other coefficients confirm the findings for unemployment and inactivity: EPL decreases the rate of jobless, union density increases it and so does financialisation. It is interesting to see that the lagged productivity term is either significantly positive or non significant, which leads to suppose that the positive effect on inactivity is counterbalanced by the negative effect on the rate of unemployment. Besides, it should be noted that whereas tax rate have significant impact on inactivity and unemployment, it does not appear to be clearly significant for joblessness (except in the basic model). As before, in columns 2 and 3 we add an interaction term respectively between EPL and PMR and between EPL and RR. Results confirm the complementarity effects between these variables; once again the replacement rate turns out significant only when the interaction term is included.

Table 6. **Joblessness**

	1	2	3
lag jobless rate	.7922417***	.7940141***	.7757621***
PMR	6.69638***	6.974139***	5.879264***
EPL	-1.099581***		
EPL*PMR		-.3776544*	
EPL*RR			-1.575184***
RR	1.249857*	1.083764	3.579948***
COOR	-2.470035***	-2.841155***	-2.142346***
CBI	-1.339123***	-1.373496***	-1.107865***
UD	.078572***	.0812765***	.0781032***
TW			.0154431
TW	.0257557*	.0214023	
FA	.0137496***	.0146002***	.0125894***
RER	-3.121873***	-3.102104***	-3.362119***
Productivity (lag)	-4.95807***	-5.115138***	-.9558327
Credit	-.0787524***	-.0769784***	-.0765567***
TTB	.1286646**	.1548805***	.0515035
eta	.9496108***	.9546544***	.9514862***
time dummies and fe	y	y	y
time inv. variables	y	y	y
AR1	y	y	y
rho	.197694	.2016567	.2014893
robust	n	n	n
Number obs.	212	212	212

3.2.4 variations

Considering that the two series of financial assets and union density are very likely to integrated, we re-estimate our model including first differences for these two variables and present results in Table 7. As shown in column 1, the estimation of the replacement rate effect appears *more* significant in the unemployment regression whereas productivity, terms of trade, financial assets and CBI appear less significant. In column 2, we include the interaction term between EPL and PMR and omit real exchange rate (non significant). CBI and productivity now turn out to be significant. Results are quite similar to those presented in table 4 (column 2), except for the replacement rate and the financial assets variables. Results concerning the jobless rate are presented in column 3: the inclusion first difference for financial assets makes this variable non significant. Here again productivity become non significant. Finally, it is worth noting that the inclusion of first difference of FA in estimations for inactivity dies not alter our previous results. Hence, the negative effect of financialisation seems to work particularly through the channel of social exclusion, leading to people being pushed out of the labor force.

Table 7. **Unemployment, joblessness and inactivity**

	unemployment 1	unemployment 2	joblessness	inactivity
lag dep. variable	.7116711***	.7336925***	.8215008***	.7479784***
PMR	1.772759***	2.583478***	4.362935***	2.785884***
EPL	-1.092717***		-2.198159***	-1.317095***
EPL*PMR		-.4580989***		
RR	.7944536*	.7701987*	1.510554*	2.355744***
COOR	-.9068131***	-1.509368***	-.4039416*	-.3877047***
CBI	-.0114689	-.1733077**	-.3723321**	-.1725036***
d_UD	.1189973***	.1102253***	.2896292***	.1556017***
TW			.0097356	.0310142***
TW	.0493467***	.0317536***		
d_FA	.0085474	.0078904	.0135049	.0032071*
LDU				.0452637***
RER	-.9614067		-2.307911**	-1.872704***
Productivity (lag)	-.9237302	-4.578548***	-.4147136	4.972413***
Credit	-.0381933***	-.0392534***	-.0628818***	-.0315606***
TTB	.1542536***	.2497411***	.1478423***	-.0410016***
eta	.75017564***	.772681***	.8890494***	1***
time dummies and fe	y	y	y	y
time inv. variables	y	y	y	y
AR1	y	y	y	n
rho	.3932327	.3696085	.2697514	
robust	n	n	n	y
Number obs.	207	207	207	180

3.2.5 summary of the results

Before turning to analyse a few extensions to our basic model, we provide in table 8 below a summary of all results from previous FEVD estimations. The results show that institutional determinants are similar across unemployment and inactivity for total working age population. We find standard effects for variables such as replacement rate, coordination, union density, and tax wedge. We find that PMR alone contributes to increases unemployment, inactivity and joblessness whereas EPL acts in the opposite way. Interestingly enough, the coefficient of the interaction term PMR*EPL is negative implying that a complementarities exists between the two forms of regulation, which together contribute to enhance employment performance. More independence of the central bank is not goof for employment, hence a Phillips curve-type effect is at work which counter the positive effect of independence on union wage moderation. Moreover, financialisation leads to worse employment performance; this effect is stronger on inactivity. An increased financialisation yields a change in agents time horizon, which may lead to industrial restructuring implying layoffs. Macroeconomic variables turn out to be crucial in our regressions: increased productivity is good for employment but not for inactivity: one interpretation might be that higher productivity pushes aside low skilled workers; the same type of mechanism holds for trade balance whereas real exchange rate contributes to better employment performance possibly via wage moderation.

Table 8. **Results: total population**

	unemployment	inactivity	joblessness
EPL	negative	negative	negative
PMR	positive	positive	positive
EPL*PMR	negative	negative	negative
replacement rate	positive	positive	positive/NS
coordination	negative	negative/NS	negative
union density	positive	positive	positive
tax wedge	positive	positive	positive/NS
financial assets (Δ)	positive (NS)	positive (pos.)	positive (NS)
central bank ind.	negative	negative	negative
Δ real exch. rate	negative	negative	negative
productivity	negative	positive/negative	negative
credit	negative	negative	negative
trade balance	positive	negative	positive/NS

4 Extensions

In this Section we use the FEVD estimator to test two extensions of our basic model : first, we control for education within our basic framework, second we modify our dependant variable and consider employment performance for prime age men instead of working age population. One should note that main results presented below still hold with other estimators but might be less robust for some of our independent variables.

4.1 role of education

Table 9 presents the results of estimations including the education variable in the model with financial and union variables expressed in levels and first differences. Education plays a role with respect to inactivity and jobless rates. However, the variable is never significant in unemployment regressions. This confirms that inactivity and unemployment are two different, although close enough, situations. One should note that this result is indirectly at odds with the standard wisdom: according to this, more flexible labor markets would be (un)favourable for unskilled (un)employment because they would enable firms to pay lower wages to less attractive workers (Bicakova, 2005). If that was the case, we should see, first, a negative impact of education on unemployment and, second, a positive effect of EPL on unemployment once we control for education. However, what we find here is that education decreases both joblessness and inactivity but has no effects on unemployment. Moreover, EPL's coefficient remains negative for both dependent variables. Hence, our results are more consistent with the idea that less educated people are stepping out of the labor market and that protection may be a way to maintain them in the labor force. In the same line, it is interesting to note that the inclusion of the education variable makes the coefficient of the lagged productivity term negative in the regression for inactivity. Our previous hypothesis concerning the effect of productivity on inactivity is somewhat comforted: positive productivity shocks lead to higher inactivity by pushing low skilled out of the labour force; however, increased productivity tends to decrease inactivity once the level of education of the workforce is controlled for, because more educated workers are able to adapt to productivity-enhancing technological change.

Table 9. **Role of education**

	joblessness1	joblessness2	inactivity1	inactivity2
lag dep. variable	.6884484***	.7159852***	.8398527***	.690953***
PMR	8.936293***	5.381737***	4.153609***	3.640638***
EPL	-1.226631***	-1.947582***	-.9125961***	-1.61386***
RR	-.6086597	-1.297138	-.0391062	.1401394**
COOR	-3.090864***	-.8890789***	-.501797***	.0050574
CBI	-1.239435***	-.1955732	-.4653669***	-.1504927***
UD	.0718399***		.044082***	
d_UD		.3937268***		.2075403***
TW	.0696845***	.0695044***	.0550541***	.0655474***
FA	.0196817***		.0117785***	
d_FA		.0125496		-.0019331*
lag EDUC	-.0927176***	-.051857***	-.0887628***	-.1179373***
RER	-3.111329***	-3.365676***	-1.880565***	-1.881187***
LDU				.0419351***
Productivity (lag)	-13.98717**		-5.396729***	-1.40399***
Credit	-.0732292***	-.0590463***	-.0294443***	-.0182203***
TTB	.1526052***	.119586*	-.1786624***	-.2081411***
Inflation	-.1951608***	-.2158188***		
eta	1.010256***	.9941394***	1***	1***
time dummies and fe	y	y	y	y
time inv. variables	y	y	y	y
AR1	y	y	n	n
rho	.2310843	.3144867		
robust	n	n	y	y
Number obs.	163	159	181	147

4.2 disaggregating inactivity and unemployment

Previous results about the role of education suggest that the impact of institutional variables may be different once taken into account population heterogeneity (i.e. differences in educational attainments). An alternative way to account for the heterogeneity of working age population is to disaggregate it according to age groups. In this Section, we consider the determinants of employment performance for the male population aged 25 to 54. In fact, as argued in the Introduction, there are some interesting stylised facts concerning prime age men (PAM) suggesting that more flexible market regulations might discourage workers (and incite them to become inactive) whereas more protective labor markets would reveal more 'suitable' to keep workers away from inactivity. We investigate the issue by analysing the determinants of unemployment, inactivity and joblessness for PAM, as measured by the proportion of unemployed, inactive workers and jobless workers among the male population aged 25 to 54.

Table 10 reports results for unemployment and joblessness of PAM in a model where financial assets and union density variables are included in levels and first differences. Results are similar to those presented in tables 4 and 6 (column 1) above, with the exception of the replacement rate which appears less significant, particularly for the model including differences of FA and UD. Moreover, it should be noted that sign of PMR coefficient in the regression explaining the jobless rate becomes negative once we substitute first differences to levels of FA and UD: the negative effect of PMR on inactivity (see below) appears to dominate the positive effect of PMR on unemployment.

Table 10. **Unemployment and joblessness: male pop. 25-54**

	unemployment1	unemployment2	joblessness1	joblessness2
lag dep. variable	.6535477***	.6459099***	.618254***	.6259387***
PMR	3.934343***	1.643035***	2.412328***	-1.102098**
EPL	-1.349419 ***	-1.702109***	-1.563517***	-1.799021***
COOR	-3.071507***	-1.493533***	-5.103014***	-2.862192***
CBI	-1.234359***	-.1106663	-2.360564***	-.7057352***
RR	1.628821 ***	1.396118**	2.372739***	1.232297
UD	.0931111***		.1493283***	
d_UD		.2154918***		.2141849**
TW	.0758094***	.0502258***	.0140859	-.0274577
FA	.0065963**		.0169142***	
d_FA		.0129254		.0192601
RER	-2.536116 **	-1.601848	-4.142203***	-2.515289*
TTB		.2061269***		.309353***
Credit	-.0639791***	-.0540974***	-.0682723***	-.0584899***
Productivity (lag)	-4.740907 ***		-5.775307***	
eta	.8079197 ***	.7892653***	1.016609***	.8733332***
time dummies and fe	y	y	y	y
time inv. variables	y	y	y	y
AR1	y	y	y	y
rho	.2640239	.3158634	.3178648	.3799346
robust	n	n	n	n
Number obs.	198	193	198	193

Table 11 shows our results for inactivity. In column 1 we present results for the basic model. It appears from these results that, when it comes to inactivity, PAM do react differently from total working age population. First, the effect of tax wedge on inactivity rate becomes consistently negative. This confirms the ambiguous impact of taxes on inactivity: taxation might be an indirect measure of the magnitude of social transfers which help inactive workers to stay in the labor market and look for a job. Second, PMR and EPL show now a reverse sign with respect to previous regressions based on working age population. Labor market protection has a positive impact on the level of inactivity whereas more regulation on the product market has a negative impact. The former result is close to the standard view suggesting that job protection contributes to exclude marginal workers from the labor market, while the latter suggests that product markets deregulation would primarily harm prime age men, i.e. typical 'insiders'. One possible interpretation of our results is that typical insiders are protected from unemployment by increased 'EPL plus PMR' while those of them who "fall aside" are all the more exposed to inactivity. In columns 3, we control that changes in the specification of the model do not affect our results by including unemployment duration. Column 4 presents results based on the model with differences for financial and union density variables, and globally confirms our previous results.

Table 11. **Inactivity: male pop. 25-54**

	1	2	3	4
lag inactivity 25-54	.7882209***	.7902607***	.7870485***	.8073943***
PMR	-.3165353***	-.4723921***	-.3389388***	-1.721934***
EPL	.0164859		.2200358**	.0386984
EPL*PMR		.0797951***		
COOR	-1.410361***	-1.459226***	-.9741683***	-.3791509***
CBI	-.8064093***	-.820254***	-.4422413***	-.1837707***
RR	.5524694***	.5357002***	1.198288***	.2316863**
UD	.0765581***	.0776024***	.0767511***	
d_UD				.0510648
TW	-.0203738***	-.0211084***	-.0292401***	-.0612315***
FA	.0062784***	.0062084***	.0080637***	
d_FA				.0122617***
RER	-2.10896***	-2.111641***	-1.948382***	-2.076031***
TTB	-.2084868***	-.2036989***	-.1788297***	-.0277943**
Productivity (lag)	2.57983***	2.519966***	1.167353***	1.607787***
Inflation	-.0847598***	-.0837338***	-.0361636*	-.0700768***
LDU			.0218854***	
eta	1***	1***	1***	1***
time dummies and fe	y	y	y	y
time inv. variables	y	y	y	y
robust	y	y	y	y
Number obs.	234	234	195	195

Table 12 below presents a summary of all results for unemployment, joblessness and inactivity of male population aged 25 to 54.

Table 12. **Results: male population 25-54**

	unemp. 25-54	inact. 25-54	joblessness 25-54
EPL	negative	positive	negative
PMR	positive	negative	positive/negative
replacement rate	positive	positive	positive
coordination	negative	negative	negative
union density	positive	positive	positive
tax wedge	positive	negative	NS
financial assets (Δ)	positive (NS)	positive (pos.)	positive (NS)
central bank ind.	negative	negative	negative
Δ real exch. rate	negative	negative	negative
productivity	negative	positive	negative
credit	negative	negative	negative
trade balance	positive	negative	positive

5 Conclusions

This paper has presented regressions explaining employment performance along three different dimensions: unemployment, joblessness and inactivity. Our regressions aimed at investigating the role of institutional and macroeconomic determinants and their impact on each of the three dimensions of performance. Main results are as follows. We find that institutional determinants play, in general, a similar role across unemployment and inactivity for total working age population. Standard signs are found for the coefficients of variables such as replacement rate, coordination, union density, and tax wedge. PMR alone contributes to increase unemployment, inactivity and joblessness whereas, contrary to common wisdom, EPL acts in the opposite way. It is important to note that the

coefficient of the interaction term PMR*EPL is negative implying that a complementarities exists between the two forms of regulation, which together contribute to enhance employment performance. More independence of the central bank is not good for employment, hence a Phillips curve-type effect is at work which counters any positive effect of central bank independence on union wage moderation. Moreover, increased financialisation leads to worse employment performance; this effect is stronger for inactivity. An increased financialisation yields a change in agents time horizon, which may lead to industrial restructuring implying layoffs. Macroeconomic variables turn out to be crucial in our regressions: increased productivity is good for employment but not for inactivity: one interpretation might be that higher productivity pushes aside low skilled workers; the same type of mechanism holds for trade balance whereas real exchange rate contributes to better employment performance possibly via wage moderation.

Our extensions to the basic model yield two main insights. First, education plays an important role with respect to inactivity and jobless rates whereas the variable is never significant in unemployment regressions. This confirms that inactivity and unemployment are two different, although close enough, situations. Our results are consistent with the idea that less educated people are stepping out of the labor market and that job protection may be a way to maintain them in the labor force. In the same line, it should be noted that the inclusion of the education variable makes the coefficient of the lagged productivity term negative in the regression for inactivity: increased productivity tends to decrease inactivity once the level of education of the workforce is controlled for, suggesting that more educated workers are able to adapt to productivity-enhancing technological change. Second, by investigating determinants of employment performance for prime age men, we found that results for unemployment and joblessness are very similar to those obtained for total working age population. However, when it comes to inactivity, prime age men do react differently from total working age population: PMR and EPL show a reverse sign with respect to previous regressions. Job protection yields a positive impact on the level of inactivity whereas more regulation on the product market has a negative coefficient. This suggests that product markets deregulation primarily hurts prime age men, i.e. typical 'insiders'. One possible interpretation of our results is that typical insiders are protected from unemployment by increased 'EPL plus PMR' while those of them who "fall aside" are all the more exposed to inactivity.

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6 Appendix

6.1 further results

We present hereafter estimation results with GLS. They are very similar to PCSE estimations. We left out inflation and trend trade bal (not significant).

Table A1. **Unemployment**

	1	2
lag unemployment	.7666517***	.8027789***
PMR	2.490575***	2.532117***
EPL	-.5574729	-1.142571***
RR	.5615548	.6469247
COOR	-.371217*	-.355291*
CBI	-.0547757	-.1156923
UD	.0505002***	
d_UD		.1293355***
TW	.0442824*	.015092
FA	.0045138	
d_FA		.0119649**
RER	-1.431474***	-1.278549**
Productivity (lag)	-5.138737***	-3.795812***
Credit	-.0439399***	-.0381633***
Estimator	GLS	GLS
time and country dummies	y	y
panel specific AR1	y	y
robust	n	n
Number obs.	232	226

Table A2. **joblessness**

	1	2	3	4
lag jobless rate	.4866422***	.4793848***	.4337125***	.8483076***
PMR		3.38783	3.670804*	3.77491**
EPL		-3.679246***	-4.844235***	-2.247144***
EPL*PMR	-1.213092***			
RR	1.784014	2.273832	1.968687	1.834081
COOR	-1.509104***	-1.569203***	-1.932908***	-.4764982
CBI	.2026504	.152373	-.4587436*	.0357714
UD	.2053613***	.1817612***	.1828047***	
d_UD				.3008849***
TW	.0838275**	.1128112***	.1078879***	.0238027
FA	.0170337**	.016849**	.0110394	
d_FA				.0182737*
RER	-2.582857**	-2.779362**	-3.019062***	-2.99194***
Inflation	-.3908095***	-.3851692***	-.3903798***	-.0013268
Credit	-.0969443***	-.1049544***	-.1044767***	-.0720737***
Estimator	GLS	GLS	GLS	GLS
time and country dummies	y	y	y	y
AR1	y	y	panel specific	y
rho	.1800	.1828		.1480
robust	n	y	y	y
Number obs.	238	238	238	226

We provide below results with FEVD and various combinations of time-invariant variables. As shown, results are not substantially modified by introducing additional time-invariants.

Table A3. **Unemployment**

	1	2	3	4	5
lag unemployment	.6969249***	.6962774***	.6958681***	.6545048***	.6940865***
PMR	1.431263***	1.575556***	1.231377***	.8650613***	2.767833***
EPL*PMR		-.2615062*			
EPL	-.6386444**				-.5953656**
EPL*RR			-1.010756***	-.3711213	
RR	.5108919	.4641328	1.958688***		.5413606
COOR					-2.092683***
UD	.0401358***	.0414161***	.0398079***	.0492308***	.0400036***
TW	.04941***	.0481547***	.0483337***	.0753062***	.0532016***
FA	.0060142***	.0064734***	.0057134***	.0060862***	.0057703***
RER	-1.266998*	-1.248878*	-1.247264*	-1.528834**	-1.302915*
Productivity (lag)	-5.646568***	-5.706012***	-5.593241***	-1.348313*	-5.508423***
Credit	-.0440252***	-.043357***	-.0443978***	-.0429259***	-.0447193***
TTB	.1977797***	.208949***	.1830051***	.1322331***	.1908811***
eta	.8746397***	.8953741***	.8739777***	.9426253***	.8462894***
Estimator	FEVD	FEVD	FEVD	FEVD	FEVD
time dummies and fe	y	y	y	y	y
time inv. variables	PMR	PMR	PMR	PMR	PMR COOR
AR1	y	y	y	y	y
rho	.3707546	.3751007	.3591711	.4259401	.3736396
Number obs.	212	212	212	212	212

Table A4. **Inactivity and joblessness**

	inactivity1	inactivity2	joblessness1	joblessness2
lag dep. variable	.8505818***	.8315717***	.7886906***	.7892689***
PMR	2.65079***	3.436564***	4.648521***	6.108516***
EPL	-.6571522***	-.8367841***	-1.155387***	-1.100015***
RR	.7614515***	1.332246***	1.003952	1.164018*
COOR		-.5539013***		-2.280149***
CBI				
UD	.0422487***	.0480924***	.0760299***	.0773072***
TW	.0105069***	.0217917***	.0197965	.0220337
FA	.0062646***	.0062994***	.0135033***	.0132494***
RER	-2.114715***	-2.158624***	-3.112332***	-3.129719***
Productivity (lag)	1.851331***	2.720905***	-4.92511***	-4.857353***
Credit	-.0316334***	-.0333909***	-.0766262***	-.0775512***
TTB	-.063167***	-.1009371***	.1399267***	.1315534**
eta	1***	1***	.9327403***	.9455766***
Estimator	FEVD	FEVD	FEVD	FEVD
time dummies and fe	y	y	y	y
time inv. variables	PMR	PMR, COOR	PMR	PMR, COOR
AR1	n	n	y	y
rho			.2136607	.2076492
robust	y	y	n	n
Number obs.	232	232	212	212

6.2 unit root tests

Inactivity rate

test	lags	drift	trend	stat	conclusion
Ipshin	2			-0.327	NS
Ipshin	2		y	0.506	NS
xtfisher	2			29.41	NS
xtfisher	2		y	43.64	NS
xtfisher	2	y		79.49***	I(0)
levinlin	2			-2.63***	I(0)
levinlin	2		y	-1.7**	I(0)

Unemployment rate

test	lags	drift	trend	stat	conclusion
ipshin	2			-1.667**	I(0)
xtfisher	2	y		114.1***	I(0)
levinlin	2		y	-2.5	I(0)

jobless rate

test	lags	drift	trend	stat	conclusion
ipshin	2			-2.6***	I(0)
xtfisher	2	y		102.96***	I(0)
levinlin	2			-4.05***	I(0)

Unemployment benefit replacement rate

test	lags	drift	trend	stat	conclusion
ipshin	2			-6.53***	I(0)
levinlin	2			-6.93***	I(0)
xtfisher	2			61.96***	I(0)

Union density

test	lags	drift	trend	stat	conclusion
ipshin	2			0.829	NS
ipshin	2		y	1.02	NS
levinlin	2			-2.76***	I(0)
xtfisher	2			33.7	NS
xtfisher	2		y	17.9	NS
xtfisher pp	2			77.5***	I(0)
xtfisher	2	y		84.37***	I(0)

Income tax wedge

test	lags	drift	trend	stat	conclusion
ipshin	2			-0.308	NS
ipshin	2		y	-0.671	NS
levinlin	2			-1.74**	I(0)
xtfisher	2		y	56.9**	I(0)
xtfisher	2	y		112.8***	I(0)

Rate of inactivity for the population aged between 25 and 54

test	lags	drift	trend	stat	conclusion
ipshin	2		y	-1.0	NS
ipshin	2			0.2	NS
xtfisher	2			54.5**	I(0)
xtfisher	2	y		113.5***	I(0)
xtfisher	2	y		97.3***	I(0)
ipshin	2			-1.43*	I(0)
xtfisher	2			65.9***	I(0)
ipshin	2			-0.867	NS

Financial assets

test	lags	drift	trend	stat	conclusion
xtfisher	2	y		30.64	NS
xtfisher	2		y	30.78	NS
ipshin	2			1.009	NS
ipshin	2			64.16***	I(0)

RER

test	lags	drift	trend	stat	conclusion
ipshin	2			-5.7***	I(0)
xtfisher	2			99.5***	I(0)

labour productivity (GDP per employed)

test	lags	drift	trend	stat	conclusion
ipshin	2			2.5	NS
ipshin	2		y	1.35	NS
xtfisher	2	y		72.5***	I(0)

credit_to_economy

lags	drift	trend	stat	conclusion
2			36.8	NS
2		y	24.0	NS
2	y		98.5***	I(0)
2		y	1.23	NS

Inflation rate (Inflation)

test	lags	drift	trend	stat	conclusion
xtfisher	2			89.7***	I(0)
ipshin	2		y	-2.51***	I(0)

lag_prim_second_educ_alllevel

test	lags	drift	trend	stat	conclusion
xtfisher	2	y		86.8***	I(0)
ipshin	2			-3.49***	I(0)

6.3 figures

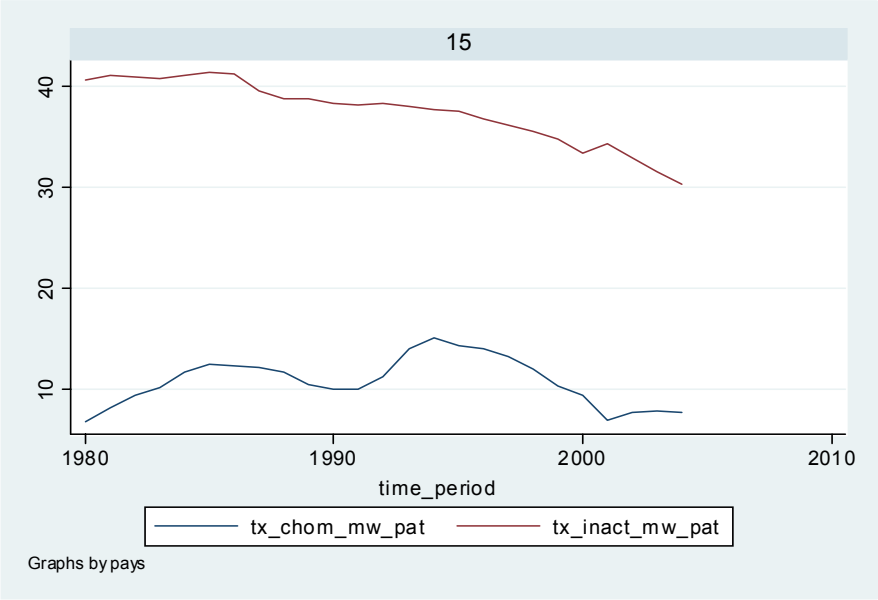

Figure 1. Unemployment and inactivity in Spain

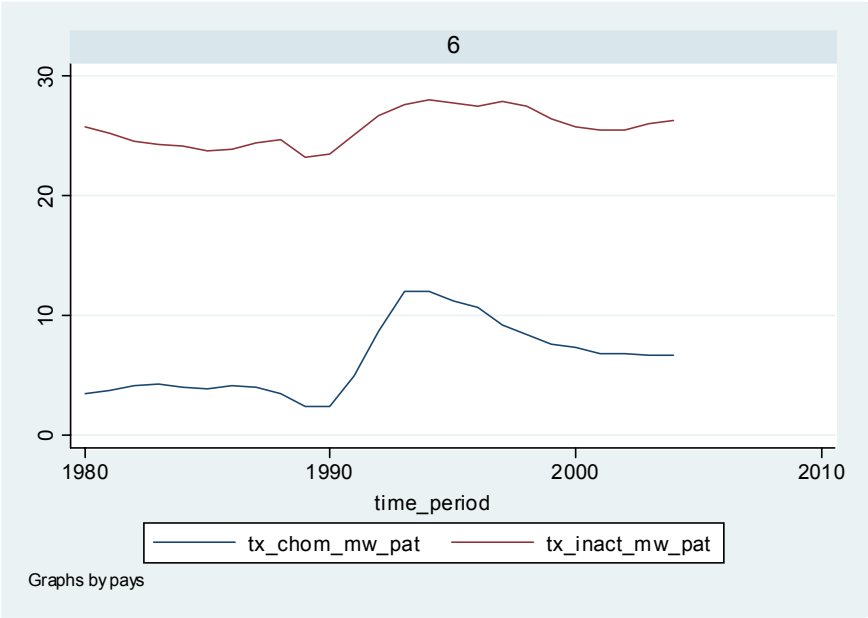

Figure 2. Unemployment and inactivity in Finland

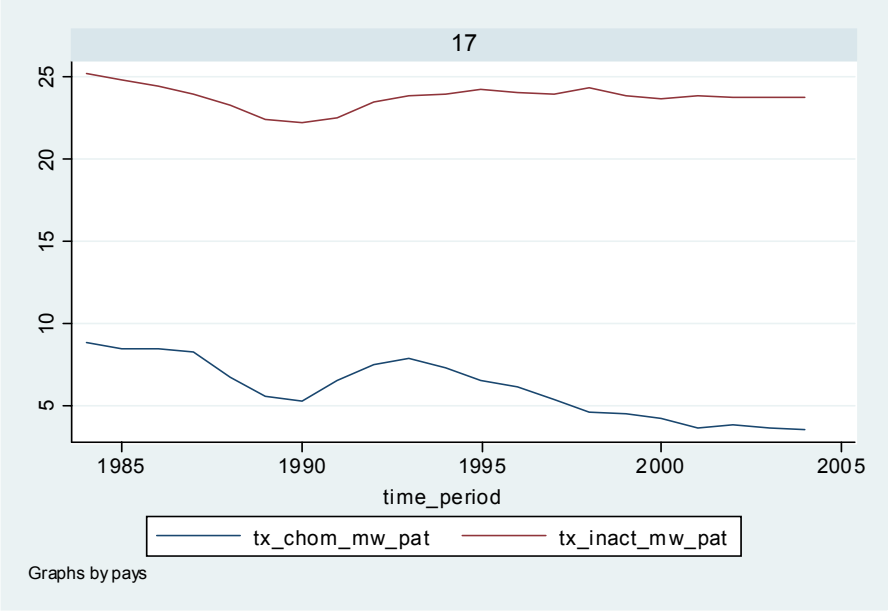

Figure 3. Unemployment and inactivity in the UK

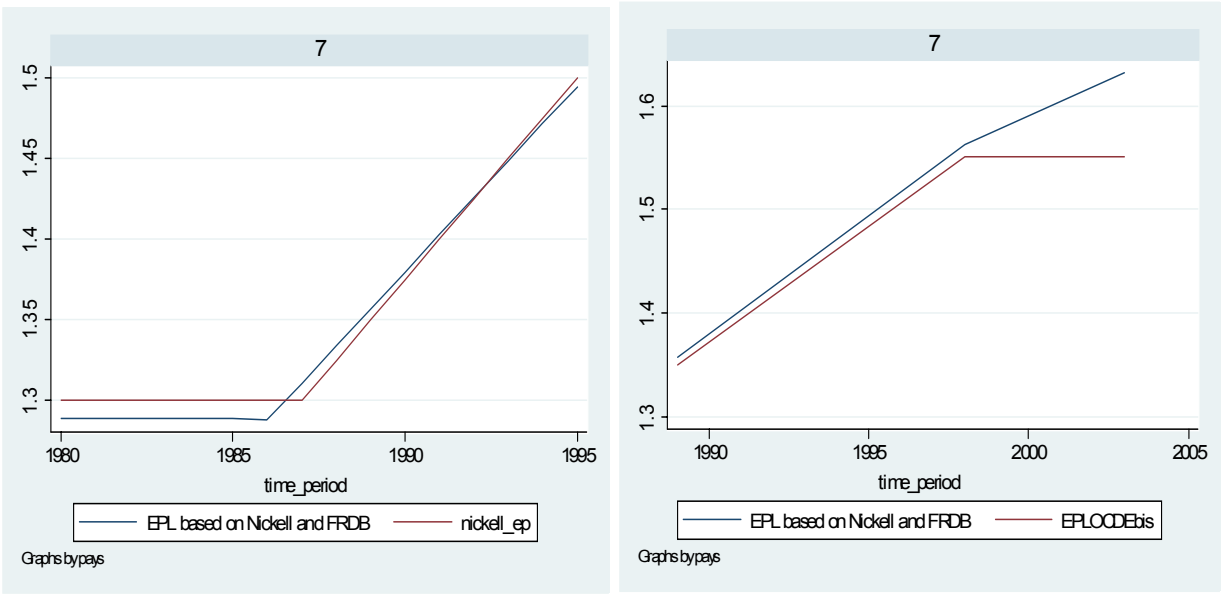

Figure 4-5. New EPL indicator for France

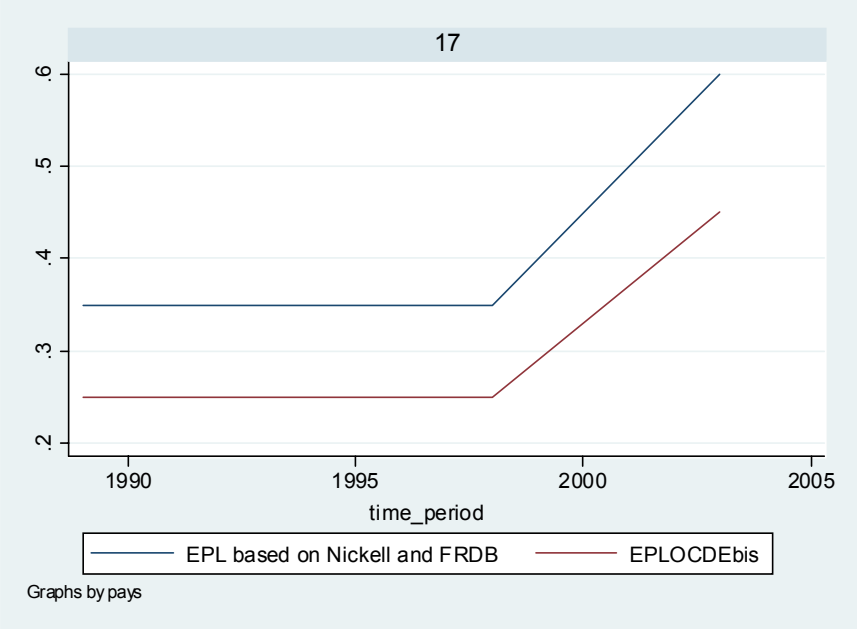

Figure 6. New EPL indicator for the UK

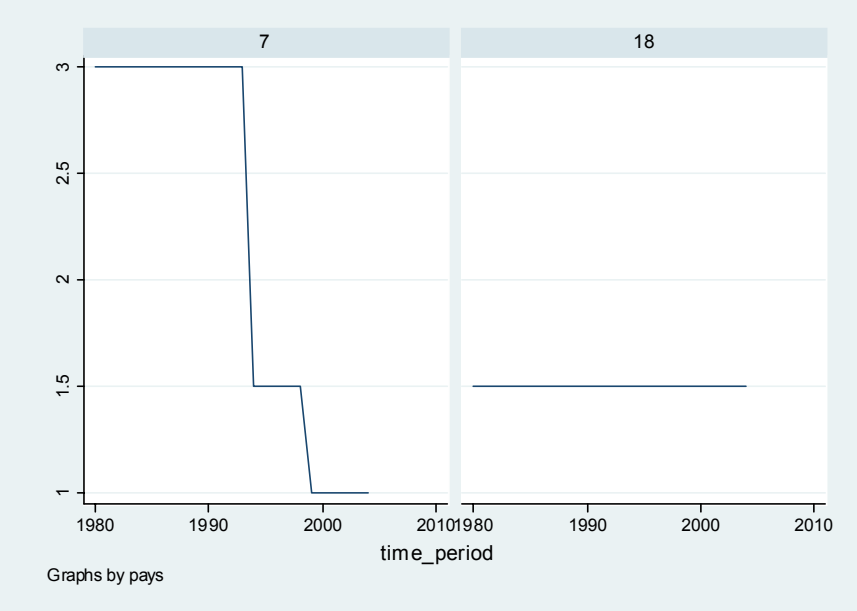

Figure 7. CBI for France (7) and the US (18)