Does employment protection legislation affect employment and unemployment?[1]

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ABSTRACT

The article analyses the impact of employment protection legislation (EPL) on labour market outcomes. Despite widespread reforms that have reduced employment protection, the evidence on the effects of such reforms is inconclusive. Using data from sixteen European countries over the period 1985–2019, we analyse the impact of EPL on the dynamics of employment, employees and unemployment rates. In contrast to existing studies, we analyse both the existence of a linear relationship between EPL and labour market outcomes and the existence of a non-linear relationship, as well as interaction effects between EPL and economic growth. Our results show that employment protection does not explain the changes in employment, employees and unemployment rates. Therefore, labour reforms that have reduced employment protection by reducing dismissal costs and facilitating the use of temporary contracts have not had the presumed positive effects on employment and unemployment rates.

1. Introduction

According to New Keynesian Economics, employment and unemployment outcomes are explained by the interaction of economic shocks with labour market institutions. Poor job creation and high unemployment rates would be generated by the combination of low rates of economic growth and inefficient-unproductive labour market institutions that generate rigidities in the functioning of labour markets (Blanchard and Wolfers, 2000). On the contrary, countries with efficient labour institutions, i.e. more flexible labour markets, would have the best employment and unemployment outcomes. The policy recommendations are obvious: in order to enjoy low and stable unemployment rates, labour markets should be reformed to make them more flexible by addressing those legal and institutional elements that generate rigidities in the wage-setting process and in the adjustment of firms' workforces.

Spurred by these arguments and the recommendations of international organisations such as the European Commission, the International Monetary Fund and the Organisation for Economic Co-operation and Development (OECD), many countries have adopted reforms to make their labour markets more flexible with the aim of reducing unemployment rates in the long run. These reforms targeted what were considered to be the main sources of labour market rigidities: unemployment benefit systems, collective bargaining and employment protection legislation (Brancaccio et al., 2018; Gehrke et al., 2019; Kugler, 2019; McBride and Watson, 2019; Tridico and Pariboni, 2017).

However, the evidence on the impact of labour institutions on employment and unemployment is inconclusive (Avdagic and Salardi, 2013; Bertola, 2017; Kugler, 2019). For post-Keynesian economists, labour institutions are not a key determinant of labour market outcomes and only an increase in capital accumulation, fuelled by expansionary demand-side policies, increases employment and reduce unemployment rates (Girardi et al., 2020; Hein, 2017; Stockhammer et al., 2014). This recommendation is shared by mainstream economists, such as Ball (2009, 2014) and Blanchard and Summers (2017), who argue that the high unemployment rates in many European countries can be explained by the hysteresis effects generated by restrictive demand-side policies and that a change in the relevant macroeconomic policy strategies is therefore necessary.

Furthermore, many studies argue that labour market institutions have positive effects on the labour market and economic activity, such as lower unemployment, higher employment, smoother fluctuations of economic activity, more egalitarian distribution of income, higher accumulation of human and physical capital, as well as more innovation (Brancaccio et al., 2018; Ciminelli et al., 2018; Dosi et al., 2017, 2018; European Commission Directorate-General for Employment, Social Affairs and Inclusion, 2015; Flaschel et al., 2012; Kugler, 2019; Lavoie, 2017).

Mainstream studies have paid particular attention to the impact of employment protection legislation (EPL) on employment and unemployment. Based on the argument that high employment protection has negative micro and macroeconomic effects, many countries have passed reforms to reduce such protection, making it easier and cheaper to dismiss permanent workers and facilitating the use of fixed-term contracts and agency workers (Piasna and Myant, 2017).

The aim of this paper is to test the New Keynesian hypothesis of the existence of a negative effect of EPL on the evolution of employment and unemployment, investigating whether EPL is a significant determinant of the dynamics of employment, employees and unemployment rates in Europe over the period 1985–2019. The results of this analysis are important from a policy point of view. As noted above, recent publications have highlighted the negative consequences of excessive labour flexibility. It could be argued that these negative effects could be outweighed by the benefits of higher employment and lower unemployment rates, but if these positive effects are not found the labour reforms that have reduced employment protection for workers could be qualified as negative.

The paper is structured as follows. In section 2, we provide a brief literature review on the impact of employment protection legislation on employment and unemployment rates. Section 3 presents the methodology of our empirical research. Section 4 presents the data of the variables used in our estimations. Section 5 presents the results of the estimations of the impact of EPL on unemployment rates growth. Section 6 presents the results of the estimations of the impact of EPL on employment and employee growth. The final section summarizes and concludes.

2. Literature review

According to New Keynesian economics, which is largely based on the monetarist approach to the existence of a natural rate of unemployment (Friedman, 1968), there is a long-run equilibrium rate of unemployment, the non-accelerating inflation rate of unemployment (NAIRU), which is determined by structural-institutional elements that prevent wages from adjusting quickly in response to demand and supply shocks. In the absence of changes in these structural elements, the NAIRU remains stable in the long run and the current unemployment rate temporarily deviates from the equilibrium rate as a result of demand shocks. Both monetarist and New Keynesian economists argue that the imperfections in the labour market that lead to rigidities in nominal and real wages and sluggish adjustments to economic shocks determine the unemployment rate in the long run, and therefore the higher the rigidities, the higher the NAIRU (Ferreiro and Gomez, 2020). This reasoning implies that labour institutions that increase the flexibility of the labour market, allowing for a quick adjustment of wages in the presence of an economic shock, lead to higher employment levels and lower unemployment rates.

While monetarists argue that temporary changes in the current unemployment rate relative to the natural rate of unemployment do not affect the natural rate of unemployment, New Keynesian authors argue that changes in economic activity caused by demand shocks, especially if they are long-lasting and intense, can affect the NAIRU. In this approach, the rigidities created by labour market institutions, both in terms of the behaviour of nominal and real wages and in terms of hiring and firing, are a key determinant of high and persistent unemployment. Thus, it is

argued that the dynamics of unemployment are explained by the interaction of adverse shocks with adverse labour market institutions. These inefficient institutions amplify the duration of the effects of shocks on current unemployment and thus, through hysteresis effects, increase the NAIRU. This implies that the greater the rigidities created by labour institutions, the greater the negative impact of demand shocks on unemployment and employment in both the short run and long run.

For New Keynesian economists, therefore, the level (and changes) of employment and the unemployment rate, in both the short and long run, depend on the rigidities created by labour market institutions. One of these institutions is employment protection legislation (EPL), which is the set of rules that govern the hiring and firing of workers in each country. The hiring rules are the conditions for the use of standard (full-time permanent contracts) and non-standard (part-time, fixed-term and temporary agency workers, etc.) employment contracts. The dismissal rules govern the individual and collective dismissal of workers on permanent contracts. This legislation aims to provide workers with a certain level of protection and security in their jobs by setting out the requirements that employers must observe and respect when hiring and dismissing workers.

Blanchard and Wolfers (2000) argued in their seminal article that the increase in structural unemployment experienced since the oil crises by European economies was the result of the implementation of employment protection measures adopted to mitigate the adverse effects of these crises on unemployment. They argued that although this higher protection could have reduced the negative impact of downturns on unemployment in the short term, it had a negative impact on hiring in the long term (and on capital accumulation and productivity growth), leading to higher unemployment. Overall, the magnitude of hysteresis effects, and hence equilibrium or structural unemployment, would be directly related to strong employment protection (Anderton et al., 2012). These arguments were accepted by international organisations, which recommended reducing employment protection, mainly for permanent workers, to ensure lower and more stable unemployment rates (European Commission, 2012; OECD, 2006, 2012, 2017, 2018).[2]

Despite the generalisation of these reforms, there is no clear empirical evidence on the impact of these measures on employment and unemployment (Bertola, 2017; Boeri et al., 2015; Heimberger, 2017; Heyes and Lewis, 2015; OECD, 2018; Paternesi Meloni et al., 2022), and recent studies conclude that high employment protection has no negative impact on employment and unemployment (Adams et al., 2019; Avdagic, 2015; Avdagic and Salardi, 2013; Bertola, 2017; Boeri et al., 2015; Ferreiro and Gomez, 2020, 2022; Flaschel et al., 2012; Heimberger, 2017; Heyes and Lewis, 2015; Myant and Brandhuber, 2016; Piasna and Myant, 2017). This would mean that labour market reforms implemented since the 1980s would have not contributed to reducing high unemployment rates. Indeed, many contributions focus on the negative economic consequences of these reforms, highlighting the impact on labour segmentation,[3] unemployment scars, income distribution, job quality, household consumption and borrowing, international trade and foreign direct investment flows, innovation, competitiveness, productivity growth and poverty (Arestis et al., 2020a; Brancaccio et al., 2018; Damiani et al., 2016; Gonalons-Pons and Gangl, 2022; Gutierrez-Barbarrusa, 2016; Heyes and Lewis, 2015; Kleinknecht, 2020; OECD, 2018; Oliveira and Forte, 2021; Roy, 2021; Tridico, 2017).

It should be noted that mainstream economists do not categorically claim that employment protection has a negative impact on the labour market. Blanchard and Wolfers (2000) and Blanchard (2018) argue that it is *likely* that the higher employment protection registered in the

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[2] Recommendations to reduce employment protection have also been directed to emerging and developing economies (Duval and Loungani, 2021).

[3] In cases where reforms have encouraged the use of temporary contracts, and where severance payments for terminating temporary contracts are lower than dismissal costs for open-ended contracts.

seventies increased the natural rate of unemployment. For the OECD (2018), employment protection for permanent workers "tends to have either no or a small negative effect on employment" (p. 124); and *excessive* employment protection for these workers can have negative consequences for job quality, inclusiveness and productivity if it is accompanied by lower protection for temporary workers. Other studies argue that the effects of the EPL differ between groups of workers, depending on gender, age, skills or type of employment contract, with uncertain effects on aggregate employment or unemployment (Arestis et al., 2020b; Boeri et al., 2015; d'Agostino et al., 2018; Gal and Theising, 2015).

Recent studies focusing on the period after the onset of the Global Financial Crisis have reinforced the doubts about the effects of EPL. Anderton et al. (2012), Boeri and Jimeno (2016), and Sharma and Winkler (2018) argue that high employment protection for permanent workers is associated with a higher increase in unemployment in Europe during that period. In contrast, Stockhammer et al. (2014) find no significant effect of EPL on unemployment rates in OECD countries. For Blanchard (2018), replicating the work of Blanchard and Wolfers (2000), EPL is not a significant determinant of unemployment rates when the period analysed is extended to 2015. Ferreiro and Gomez (2022) show that, during the Great Recession, employment protection did not have a significant impact on employment growth and that, in terms of unemployment, only employment protection of permanent workers against individual dismissals had a significant impact on unemployment, with higher employment protection leading to lower unemployment rates.

Finally, some recent papers (Boeri and Jimeno, 2016; De Almeida and Balasundharam, 2018; Duval and Furceri, 2018; Duval et al., 2020; OECD, 2012, 2017) argue that the impact of employment protection depends on the phase of the business cycle; hence, it does not affect employment and unemployment in the long run.

Our paper attempts to advance the study of the effects of employment protection on labour market outcomes by carrying out an empirical analysis that can be considered novel. Unlike most existing empirical studies, our paper analyses not only the impact of EPL on the variation of unemployment rates, but also on employment growth.

Moreover, our paper analyses the impact of EPL on both total employment and employees. Most existing papers analyse the impact of EPL on total employment (the sum of employees and self-employment). However, the EPL regulates the hiring and dismissal conditions of employees, so the direct impact should be on employees. Only if we assume that self-employment is not affected by the EPL, the change in employees must lead to a similar change in total employment. In other words, if the coefficient of EPL is significant in estimating the determinants of employees, the coefficient of EPL should be equally significant and with the same sign in estimating total employment.

Problems would arise if the significance level of the coefficients is not similar and/or the sign of the coefficient is opposite. This result implies that the effects of the EPL on employment and employees are opposite, with changes in self-employment more than offsetting changes in employees. To the best of our knowledge, there is no study that rigorously analyses the mechanisms through which employment protection affects the growth of self-employment. This means that we lack the analytical tools necessary to interpret such a result, beyond concluding that the results are not robust and that no categorical conclusion can be drawn about the effects of EPL on job creation.

Another novelty of our paper is the use of two different sources of data on employment and employees. All existing studies use a single data source, either Labour Force Surveys (LFS) or National Accounts (NA) data. This implies the assumption that the choice of the data source does not affect the validity of the results obtained. However, our paper analyses data from both sources. This approach allows us to adequately test the robustness of the results obtained. If the sign or the degree of significance of the different explanatory variables were different depending on the data source, this would raise serious doubts about the

true effect of employment protection legislation.

Another contribution of our paper is the use of Gross Domestic Product (GDP) and Gross Fixed Capital Formation (GFCF) growth rates as variables related to economic growth. Furthermore, we do not only investigate a linear relationship between the dependent variables and employment protection, but also the existence of a non-linear relationship, as well as the existence of interaction effects between employment protection legislation and economic growth. In this way, we test the validity of the hypotheses that employment protection has negative effects when its level is excessive and that the effects of employment protection depend on the phase of the cycle in which the economy finds itself.

We would also like to point out that almost all existing papers analyse short time periods, using methods such as Generalized Method of Moments (GMM) models. However, our paper focus on a very long period (35 years). The existence of a long panel avoids the problem faced by most studies which, by focusing on a shorter period, are faced with the question of whether the results obtained are conditioned by the specific choice of the dates analysed. On the other hand, the availability of long-time series allows us to use methods other than the usual GMM models to analyse dynamic models, as in our case.

3. Empirical methodology

3.1. Baseline specification

The aim of this paper is to analyse whether employment protection legislation is a significant determinant of the dynamics of employment, employees and unemployment rates in European countries. Therefore, the growth rates of employment and employees and the growth in percentage points of unemployment rates are the explained variables of the empirical analyses that we will carry out in the paper. The choice of the growth rate of the dependent variables, rather than their level, is based on the fact that New Keynesian models suggest that labour market outcomes are explained by the interaction between economic growth and labour institutions, in this case EPL. That is, for a given rate of economic growth, the variation in employment and unemployment rates would depend on the level of employment protection. Thus, for a given (positive) growth rate of economic activity, the lower the EPL indices, the higher the growth in employment and employees and the higher the fall in the unemployment rate, and vice versa.

Although the New Keynesian approach argues that the impact of EPL on employment and employees' growth is negative, with EPL reducing employment and employee growth rates, existing papers only test the impact of EPL on one of the two variables. This implicitly assumes that, given the high correlation between the two variables,[4] if EPL has a significant impact on one variable (e.g. employment), the impact on the other variable (employees) should also be significant and its coefficient should have the same sign. However, if the sign, magnitude and significance of the coefficients of the EPL indices were significantly different in the case of employment and employee growth, this discrepancy would raise serious doubts about the robustness of the results, calling into question any conclusions about the true effect of EPL.

In our analysis we use two sources of data on employment and employees: Labour Force Surveys (LFS) and National Accounts (NA) statistics. Although the data are very similar and highly correlated,[5] the results of the estimations may differ depending on the source of the data. Therefore, we test separately the determinants of the employment and employee growth rates measured by the LFS and the NA, which will

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[4] In our sample, the correlation between the employment and employee growth rates is 0.829 (data from LFS) and 0.813 (data from National Accounts).

[5] In our sample, the correlation between the employment growth rates calculated using LFS and NA is 0.857, and the correlation between the employee growth rates calculated using LFS and NA is 0.834.

allow us to assess the robustness of the results to the impact of the explanatory variables. The employment and employee growth rates based on the LFS are taken from the OECD data on total employment and employees. The exception is Switzerland, whose data on employees are taken from the ICTWSS database (Visser, 2019). National Accounts data on employment and employees are taken from the AMECO database. Unemployment rates are taken from the AMECO database, except for Germany, for which data are taken from the OECD.

The mainstream postulates that, for a given rate of economic growth, countries with more flexible labour markets, i.e. with lower employment protection, will experience higher employment and employee growth and a larger decline in unemployment. However, the literature suggests that labour market outcomes can be influenced by other factors of a demographic, economic and institutional nature. For this reason, our model will include control variables related to the growth of the working-age population (Pop), trade openness (Trade), a set of variables related to labour institutions (LabInst) and, finally, variables related to the structure and coordination of collective bargaining (CollBarg).

$$Y_{i,t} = \beta_0 + \beta_1 Economic growth_{i,t} + \beta_2 EPL_{i,t} + \beta_3 Pop_{i,t} + \beta_4 Trade_{i,t}$$
$$+ \beta_5 LabInst_{i,t} + \beta_6 CollBarg_{i,t} + \varepsilon_{i,t}$$

In our study we use Gross Domestic Product (GDP) and Gross Fixed Capital Formation (GFCF) growth rates as explanatory variables related to economic activity. Although most papers use GDP growth, post-Keynesian studies emphasise the role of capital accumulation as the main driver of employment and unemployment. In any case, we expect that both GDP and GFCF growth rates have a significant positive impact on employment, employees, and unemployment rates. Given the high correlation between GDP and GFCF growth rates,[6] these two variables cannot be included in the same equation, and, consequently, for each dependent variable we test two equations that differ in the variable used to measure the effect of economic growth: GDP or GFCF growth rate. This raises the possibility that the results on the impact of EPL may be influenced by the chosen variable related to economic growth. In this way, we test not only the validity of the post-Keynesian studies, but also the robustness of the conclusions on the impact of EPL on employment, workers and unemployment. Thus, a robust effect of employment protection on the labour market exists if the sign and significance of the coefficients on the EPL indices are the same regardless of whether we use GDP or GFCF growth as the explanatory variable. Real GDP and GFCF data are taken from the AMECO database, except for Germany where data are taken from the OECD.

In order to analyse the effects of employment protection on labour market outcomes we use the Employment Protection Legislation (EPL) strictness indicators developed by the OECD. The OECD EPL indicators measure the strictness of employment protection for regular (permanent) and temporary contracts by constructing synthetic indicators based on the values assigned to different items. Each indicator is measured on a scale from 0 to 6, with higher values representing stricter regulation and hence a more rigid labour market. The score of each index is calculated on the basis of the legislation in force on 1 January of each year.

Given the common methodology used to construct the indexes, they make it possible to compare employment protection legislation between countries and to track the evolution of national EPL indexes, which are linked to legal reforms affecting the conditions for dismissing or hiring a worker using one of the available employment contracts. Although these indexes have problems in measuring the true flexibility-rigidity of labour markets, such as the inability to measure employment protection based on norms other than legal ones, and the failure to take into account procedural requirements in assessing the difficulties and costs of

carrying out individual and collective dismissals (Harcourt et al., 2021; Myant and Brandhuber, 2016), their use in empirical analyses is widespread and thus allows for the comparison of the results of different studies.

The OECD calculates several indices: the EPRC index, which measures the protection of regular-permanent employees against individual and collective dismissal, and the EPT index, which measures the regulation of temporary forms of employment, mainly fixed-term and temporary agency workers. In addition, the EPRC index is split into two indexes: the EPR index, which relates to the protection of permanent employees against individual dismissal; and the EPC index, which relates to the specific additional requirements for collective dismissals of permanent employees. In our case, in order to analyse a long period of time, we will use versions 1 of the EPRC and EPT indices, which cover the period 1985–2019.

An analysis of labour market performance based only on changes in economic activity and labour market flexibility assumes that labour supply is constant. However, changes in labour supply due to demographic changes in the population, migration flows, ageing, etc., can affect labour markets. In order to account for these problems, we include in our estimations the growth of the working age population as an explanatory variable. The variable $Pop_{i,t}$ is the growth rate of the population aged 15–64 in country i in year t (data from the AMECO database).

In order to control for the possible influence of other variables on the evolution of employment and unemployment rates, we have included several variables that have been highlighted in the literature as possible determinants of labour market outcomes. The first variable is trade openness ($Trade_{i,t}$), measured as the percentage of GDP of the sum of exports and imports of goods and services. This percentage was calculated using data on exports and imports from the AMECO database (from the OECD for Germany).

In the case of population growth, the sign of the coefficient is expected to be positive, so that growth in labour supply is reflected in higher employment and a higher unemployment rate. Regarding the sign of the coefficient on trade openness, several studies point to the negative effects of the globalisation process on the labour market, so that the expected sign would be negative for employment and employee growth and positive for the unemployment rate, slowing down job creation and increasing the unemployment rate.

The remaining control variables correspond to variables related to labour market institutions. One such variable is union density ($Union_{i,t}$), which measures the percentage of employees who are members of a trade union. The data are taken from the OECD and AIAS, Institutional Characteristics of Trade Unions, Wage Setting, State Intervention and Social Pacts (ICTWSS) database (OECD and AIAS, 2021). Another control variable is public expenditure on active labour market policies ($ALMP_{i,t}$), measured as a percentage of GDP. Data for this variable come from the OECD.

The last variables included in the models relate to collective bargaining, both in terms of the structure and centralisation of wage bargaining and the coordination of the wage-setting process. We include the variable Coord, which measures the degree of coordination in the wage-setting process. This index, available in the OECD/AIAS ICTWSS database, ranges from 1 (corresponding to fragmented wage bargaining at the enterprise or plant level with no coordination) to 5 (corresponding to the existence of binding norms resulting from centralised bargaining between unions and employers' associations or government-imposed wage growth guidelines).

Regarding the centralisation of collective bargaining, the OECD/AIAS ICTWSS database provides several indices. Central is a summary index that takes into account the incidence and control of additional bargaining at the enterprise level, the 'space' that central or sectoral agreements allocate, delegate or allow for such additional bargaining, and the extent to which agreements can be perforated through the use of 'opening clauses'. Central ranges from 0 to 5, with higher values

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[6] In our sample, the correlation between the GDP and GFCF growth rates is 0.708.

corresponding to a bargaining structure where centralised bargaining or national sectoral agreements predominate. Level is an index that reflects the predominant level at which bargaining takes place (in terms of coverage of employees), with values ranging from 1 (company or enterprise level) to 5 (centralised or cross-industry bargaining). Another index is Multilevel, which reflects the combination of levels at which collective bargaining on pay takes place, with values ranging from 1 (company level) to 7 (cross-sectoral, with centrally determined binding norms or ceilings that all other agreements must respect). The high correlation between the three variables means that they cannot all be included in the same equation. On the other hand, given that there may be a relationship between the degree of centralisation of collective bargaining and the coordination of wage bargaining, we have chosen to include the Multilevel variable in our initial model, as it is the variable with the lowest correlation with Coord (see Table 1).

In the case of variables related to labour market institutions, following an orthodox point of view, we would expect the sign to be negative for employment and employee growth and positive for unemployment growth, i.e., they would slow down job creation and increase the unemployment rate.

The dynamics of labour market outcomes are characterised by inertia and high persistence of labour market outcomes. This leads to a potential problem of serial correlation, which affects the consistency of the results. Indeed, the existence of serial correlation was found in all the models examined.[7] In order to correct this problem, the one-period lag of the explained variable was included as an explanatory variable in all the equations. In this way, we transform the tested models into dynamic models:

$$Y_{i,t} = \beta_0 + \beta_1 Y_{i,t-1} + \beta_2 Economic growth_{i,t} + \beta_3 EPRC_{i,t} + \beta_4 EPT_{i,t} + \beta_5 Pop_{i,t}$$
$$+ \beta_6 Trade_{i,t} + \beta_7 Union_{i,t} + \beta_8 ALMP_{i,t} + \beta_9 Coord_{i,t} + \beta_{10} Multilevel_{i,t} + \varepsilon_{i,t}$$

Most empirical studies of the impact of EPL on the labour market use GMM models to solve the problem of introducing the lagged dependent variable as an explanatory variable. GMM models are suitable for short panels with a large number of countries and a small number of time periods. However, for long panels where the number of years (T) is large, above 30, and the number of individuals (N) is significantly smaller than the number of periods, being the T/N ratio above 2, the estimation of dynamic models using fixed effects provides much more consistent results than alternative procedures, such as instrumental variables (IV) or GMM estimators, because the bias of the GMM estimators increases with the number of periods (Baltagi, 2005; Hsiao, 2014; Kennedy, 2008; Pesaran, 2015; Wooldridge, 2010). Given that we have a panel with 35 years and 16 countries, our models are estimated using fixed effects.

On the other hand, European economies are highly interlinked and can be affected by common shocks. Therefore, in cases where the panel tests confirmed the existence of cross-sectional dependence, we have used SUR estimators to correct for contemporaneous correlation between cross-sections[8] (Kennedy, 2008).

One issue that may affect the validity of the results is the possible endogeneity of EPL (Roy, 2021). EPL indices are not immune to the criticism that they may be subjected to measurement error and thus may not correctly reflect the true degree of flexibility in hiring and firing. Moreover, it is plausible that there is an inverse causal relationship between labour market outcomes and EPL indices, as policymakers may reform hiring and firing conditions based on labour market performance. Therefore, following Wooldridge (2010, 2013), we test for possible endogeneity of the EPRC and EPT indices using two instrumental variables. The first is Compensations of Employees as a percentage of GDP (data from the OECD), and the second is the Type index from the OECD/AIAS ICTWSS database, which measures the type of

wage-setting coordination. The tests carried out show that these instruments are related to the EPL indicators and that they are exogenous, since they do not affect the growth of employment and unemployment.[9] The tests carried out allow us to conclude that the EPRC index is exogenous in all the estimations. In the case of the EPT index, we only find an endogeneity problem in the estimations of unemployment growth. This result would imply that European countries have made the labour market more flexible in order to reduce the unemployment rates, and to do so they have facilitated the use of temporary contracts. This hypothesis is consistent and compatible with the increasing segmentation and dualisation of a large part of European labour markets (Eichhorst and Marx, 2021). Indeed, in our sample of countries and years, the average value of the EPRC index fell from 2.56 to 2.23 between 1985 and 2019, while the average value of the EPT index fell from 2.825 to 1.724, indicating the intensity of reforms that have facilitated temporary hiring.

Therefore, in the case of unemployment growth estimates, in addition to OLS models, we estimate the equations using an instrumental variable (IV) approach based on a Two-Stage Least Squares (TSLS) specification with fixed effects. In this case, we use the Compensation of Employees and Type variables as instruments for the EPT index. The choice of this procedure, as explained above, is based on the existence of a large panel with long time series[10].

3.2. Robustness checks

Our baseline models assume a linear relationship between EPL indicators and employment and employee growth and the unemployment rate. However, existing studies suggest the existence of non-linear effects between EPL and employment and unemployment growth. By including a quadratic relationship between employment protection and labour market outcomes, we test the hypothesis whether there is an increasing or decreasing marginal relationship between these variables, and whether there is a threshold at which the effects of EPL on employment and unemployment increase or decrease. We therefore test the following equation:

$$Y_{i,t} = \beta_0 + \beta_1 Y_{i,t-1} + \beta_2 Economic growth_{i,t} + \beta_3 EPRC_{i,t} + \beta_4 EPRC_{i,t}^2$$
$$+ \beta_5 EPT_{i,t} + \beta_6 EPT_{i,t}^2 + \beta_7 Pop_{i,t} + \beta_8 Trade_{i,t} + \beta_9 Union_{i,t} + \beta_{10} ALMP_{i,t}$$
$$+ \beta_{11} Coord_{i,t} + \beta_{12} Multilevel_{i,t} + \varepsilon_{i,t}$$

Moreover, given that some empirical studies suggest that the effects of employment protection depend on the economic context or the phase of the cycle in which the economy finds itself, we also test for the existence of interaction effects between employment protection and economic growth. The existence of these effects would indicate that the impact of employment protection on the labour market differs depending on the rate of economic growth and, consequently, on the phase of the cycle in which the economy finds itself. The equation to be estimated is therefore:

$$Y_{i,t} = \beta_0 + \beta_1 Y_{i,t-1} + \beta_2 Economic growth_{i,t} + \beta_3 EPRC_{i,t}$$
$$+ \beta_4 Economic growth_{i,t} * EPRC_{i,t} + \beta_5 EPT_{i,t} + \beta_6 Economic growth_{i,t} * EPT_{i,t}$$
$$+ \beta_7 EPop_{i,t} + \beta_8 Trade omic_{i,t} + \beta_9 Union_{i,t} + \beta_{10} ALMP_{i,t} + \beta_{11} Coord_{i,t}$$
$$+ \beta_{12} Multilevel_{i,t} + \varepsilon_{i,t}$$

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[7] Relevant data are available upon request.
[8] Relevant data are available upon request.

[9] Data available upon request.
[10] The existence of long time series raises the possibility of non-stationarity of the variables, which would require the use of other methods (cointegration methods and error correction models) to analyse the short- and long-term relationships between the variables in the model. However, the tests carried out show that the series of growth rates of employment and employees and the growth of unemployment rates are stationary. Data available upon request.

Table 1
Correlation among explanatory variables.

	Trade	ALMP	Central	Coord	EPRC	EPT	GDP	GFCF	Level	Multilevel	Pop	Union
Trade	1.00	0.07	0.04	0.36	−0.34	−0.38	0.23	0.25	0.12	0.04	0.21	0.01
ALMP	0.07	1.00	0.06	0.29	−0.05	0.00	0.01	−0.02	0.17	−0.00	−0.09	0.49
Central	0.04	0.06	1.00	0.49	0.11	0.32	0.11	−0.01	0.94	0.75	0.29	0.18
Coord	0.36	0.29	0.49	1.00	−0.14	−0.11	0.04	0.00	0.62	0.41	0.19	0.42
EPRC	−0.34	−0.05	0.11	−0.14	1.00	0.350	−0.14	−0.11	0.07	0.08	−0.22	−0.24
EPT	−0.38	0.00	0.32	−0.11	0.35	1.00	−0.11	−0.04	0.30	0.34	−0.09	−0.06
GDP	0.23	0.01	0.11	0.04	−0.14	−0.11	1.00	0.68	0.04	0.05	0.31	0.03
GFCF	0.25	−0.02	−0.01	0.04	−0.11	−0.04	0.68	1.00	−0.04	−0.02	0.19	0.01
Level	0.12	0.17	0.94	0.62	0.07	0.30	0.04	−0.04	1.00	0.74	0.23	0.25
Multilevel	0.04	−0.00	0.75	0.41	0.08	0.34	0.05	−0.02	0.74	1.00	0.13	0.29
Pop	0.21	−0.09	0.29	0.19	−0.22	−0.09	0.31	0.19	0.23	0.13	1.00	−0.05
Union	0.01	0.49	0.18	0.42	−0.24	−0.06	0.03	0.01	0.25	0.29	−0.05	1.00

Source: Own calculations

4. Data

To analyse the impact of employment protection on the dynamics of employment, employees and unemployment rates over the longest possible period, we use versions 1 of the EPRC and EPT indices. Given the availability of data, we analyse the determinants of labour market performance in 16 European countries (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom) between 1985 and 2019 (35 years). As not all variables are available in all countries for the total number of years analysed, we have an unbalanced panel.

Table 2 presents the main descriptive statistics of the variables included in our analysis. Total employment and employees grew at an average annual rate of just under 1%, while the unemployment rate remained virtually unchanged. Economic activity grew at an average annual rate of 2.2% and productive investment at a slightly higher rate of 2.7%, although in this case with greater dispersion.

Regarding wage bargaining, the coordination of the wage-setting process (Coord) is characterised by the existence of non-binding norms and guidelines issued by the government and/or employers' associations and trade unions. The degree of centralisation of bargaining (Multilevel) is characterised by an intermediate structure in which bargaining by sector or industry predominates.

Table 2 does not provide any information on the temporal dynamics of these variables, in particular on the existence of trends or breaks in their evolution that could lead to significant differences at different points during the period analysed. With this objective in mind, we have plotted in Fig. 1 the evolution over time of the average value of the variables included in our models for the 16 countries studied.

The three dependent variables fluctuate in a stable, cyclical manner around the average rates for the period. A similar result can be observed for the GDP and GFCF growth rates. For the remaining explanatory variables, however, there are clear trends. For example, the growth rate of the working age population fell sharply from 2008 onwards. Trade openness, on the other hand, is characterised by a continuously increasing path, reflecting the acceleration of the process of economic globalisation. Regarding the variables related to labour market institutions, a clear downward trend can be observed for all of them. The decline in the EPRC and EPT indices reflects a general trend to reduce employment protection and the commitment to make the use of temporary contracts more flexible. The data also show a decline in trade union density. As regards expenditure on active labour market policies, public expenditure on these items has been declining since 1993, when it peaked (1% of GDP), and stood at 0.7% of GDP in 2018. Finally, with regard to collective bargaining, the degree of coordination of the wage-setting process is gradually declining, along with a move towards greater decentralisation of collective bargaining.

From a New Keynesian perspective, the decline in employment protection should have translated into an acceleration in job creation

and a reduction in unemployment rates, a process facilitated by the greater flexibility in wage bargaining processes and the loss of workers' bargaining power associated with lower union density. However, as Fig. 1 shows, the growth of employment, employees and unemployment rates have remained fairly stable over the long term.

5. Employment protection legislation and growth of unemployment rate

According to the New Keynesian approach, the coefficients of the EPRC and EPT indicators should always be significant, with a negative sign in the estimations of the determinants of employment and employee growth rates, and a positive sign in the case of the growth of the unemployment rate. This implies that employment protection has a negative impact on employment, employees and unemployment rates, and that those labour reforms that have reduced employment protection would have contributed to speeding up the process of job creation and reducing unemployment rates.

Table 3 shows the results of the equations testing the determinants of the evolution of the unemployment rate. The data show the high inertia of the change in the unemployment rate, given the positive value of the lagged change in the unemployment rate. As expected, economic growth, whether measured by GDP or productive investment growth rates, has a significant inverse effect on the evolution of the unemployment rate, contributing to its reduction[11].

Regarding the impact of EPL, the results of our analysis clearly show that employment protection for permanent and temporary workers does not have a significant impact on the growth of the unemployment rate. These results can be considered robust and conclusive, as they are not affected by the use of GDP or investment growth rates as explanatory variables, or by the type of model (OLS with fixed effects or IV-TSLS).[11]

Regarding the control variables, the effect of the working-age population on the dynamics of the unemployment rate is significant and direct, so that the growth of the working-age population increases the unemployment rate. In contrast, the remaining control variables are not significant, so they would not affect changes in the unemployment rate. Only in Multilevel, the variable related to the centralisation of collective

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[11] It is important to note that the coefficients of GFCF growth are smaller than those of GDP growth. This result is also obtained in the estimations of the determinants of the growth of employment and employees. One explanation for this result could be that investment is basically geared towards promoting a less labour-intensive production model, a phenomenon fuelled by economic globalisation and the relocation of the most labour-intensive stages of production to emerging economies. However, it could be due to the greater dispersion of the data for GFCF growth, as shown in Table 2, and the consequent existence of extreme data or outliers in this variable. In any case, despite the relevance of this result, an explanation of the lower value of the coefficients of GFCF growth is beyond the scope of this paper.

Table 2
Summary statistics.

	Mean	Median	Maximum	Minimum	Std. Dev.	Obs.
ΔEmployment LFS	0.91	0.93	13.51	−8.86	2.11	560
ΔEmployment NA	0.87	0.99	8.15	−7.84	1.75	553
ΔEmployees LFS	1.14	1.14	29.57	−13.37	2.70	560
ΔEmployees NA	1.03	1.16	7.27	−8.01	1.91	546
ΔUnemployment rate	−0.03	−0.10	6.60	−3.30	1.14	560
ΔGDP	2.16	2.20	25.18	−10.15	2.56	560
ΔGFCF	2.68	2.80	74.87	−25.37	7.64	560
EPRC	2.39	2.41	5.00	1.10	0.82	560
EPT	2.08	1.63	5.25	0.25	1.25	560
ΔPop15-64	0.40	0.36	3.30	−1.33	0.57	560
Trade openness	80.23	69.77	252.34	34.33	35.97	560
Union density	38.97	33.80	86.60	8.50	21.46	521
ALMP	0.81	0.74	2.70	0.06	0.45	533
Coord	3.29	4.00	5.00	1.00	1.06	560
Multilevel	3.00	2.00	6.00	1.00	1.42	560

Source: Own calculations
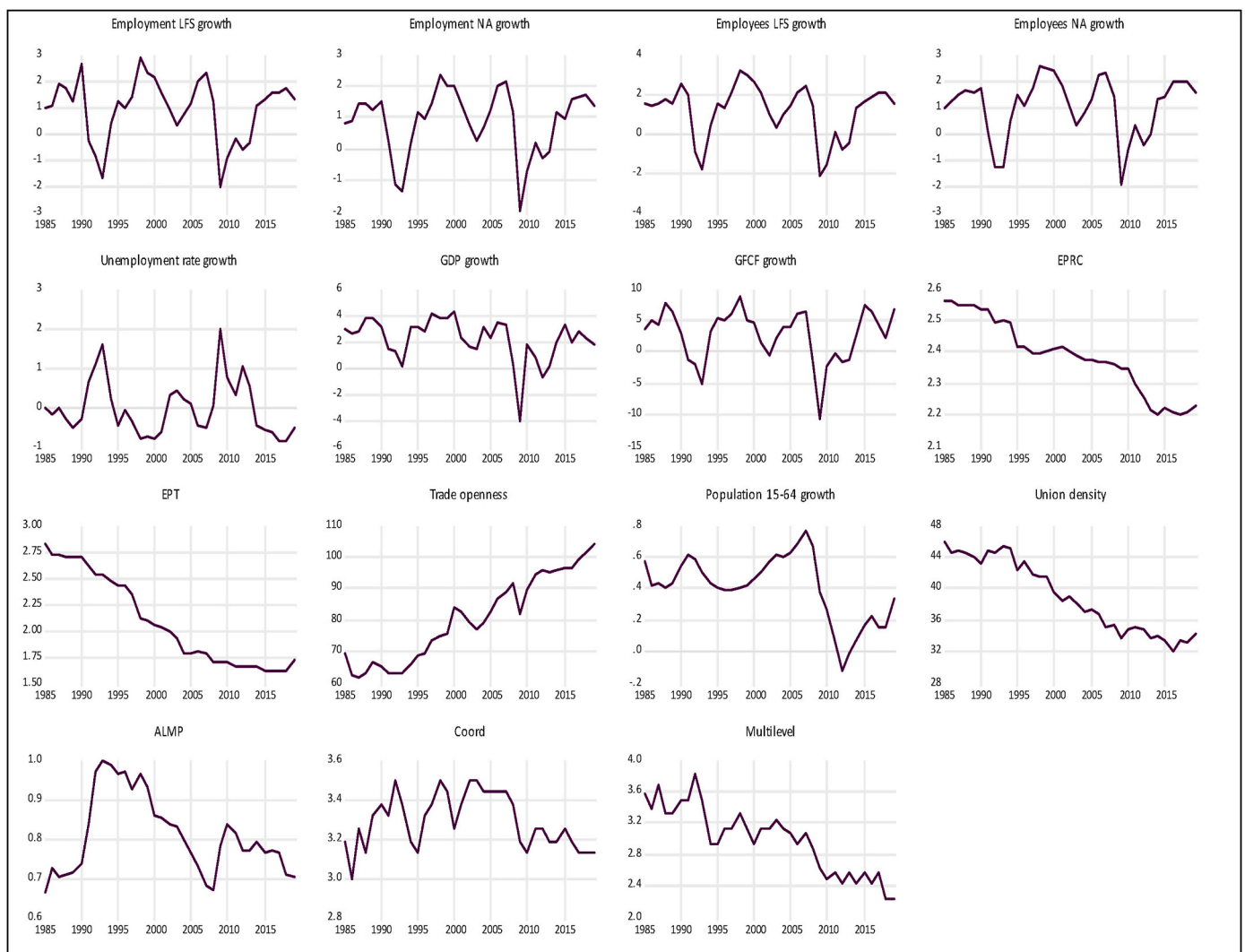
Fig. 1. Evolution of the average.
Source: Own calculations.

Table 3
EPL and growth of unemployment rate.

	OLS		IV TSLS	
	(1)	(2)	(3)	(4)
C	−0.003	−0.252	0.377	−0.083
	(0.175)	(0.182)	(0.643)	(0.370)
Unemployment (-1)	0.462***	0.469***	0.460***	0.472***
	(0.063)	(0.063)	(0.063)	(0.064)
GDP growth	−0.170***		−0.181***	
	(0.024)		(0.034)	
GFCF growth		−0.047***		−0.047***
		(0.008)		(0.008)
EPRC	0.068	0.070	0.123	0.030
	(0.051)	(0.050)	(0.121)	(0.137)
EPT	−0.024	0.026	−0.253	0.034
	(0.031)	(0.033)	(0.405)	(0.040)
Population 15–64	0.314***	0.229**	0.333***	0.211**
	(0.097)	(0.095)	(0.105)	(0.10)
Trade openness	0.001	0.001	−0.001	0.001
	(0.001)	(0.001)	(0.003)	(0.002)
Union density	0.001	0.002	−0.001	0.001
	(0.002)	(0.002)	(0.003)	(0.003)
ALMP	0.064	0.002	0.156	0.014
	(0.080)	(0.080)	(0.182)	(0.091)
Coord	−0.070	−0.053	−0.118	−0.048
	(0.053)	(0.054)	(0.091)	(0.056)
Multilevel	0.057*	0.023	0.145	0.030
	(0.030)	(0.031)	(0.150)	(0.034)
Country fixed effect	No	No	No	No
Year fixed effect	Yes	Yes	Yes	Yes
Prob. J-Statistics			0.646	0.130
R^2	0.677	0.672	0.647	0.671
Obs.	484	484	482	482

Robust standard errors in parenthesis.
***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.
Source: Own estimation

Table 4
EPL and growth of unemployment rate: non-linear and interaction effects.

	(1)	(2)	(3)	(4)
C	0.177	−1.344	−0.180	−0.388
	(0.328)	(1.388)	(0.196)	(0.725)
Unemployment (-1)	0.461***	0.459***	0.451***	0.451***
	(0.064)	(0.064)	(0.061)	(0.060)
GDP growth	−0.169***		−0.104**	
	(0.025)		(0.044)	
GFCF growth		−0.048***		−0.004
		(0.008)		(0.015)
EPRC	−0.094	0.567	0.102	0.442*
	(0.248)	(0.848)	(0.066)	(0.263)
EPRC²	−0.031	−0.024		
	(0.047)	(0.120)		
EPRC*GDP			−0.011	
			(0.021)	
EPRC*GFCF				−0.013*
				(0.007)
EPT	−0.016	0.660***	0.069	0.127**
	(0.118)	(0.227)	(0.048)	(0.061)
EPT²	−0.000	−0.105***		
	(0.025)	(0.039)		
EPT*GDP			−0.038**	
			(0.017)	
EPT*GFCF				−0.016***
				(0.005)
Population 15–64	0.309***	0.158	0.307***	0.203
	(0.097)	(0.131)	(0.098)	(0.127)
Trade openness	0.001	0.001	0.001	−0.001
	(0.001)	(0.004)	(0.001)	(0.004)
Union density	0.001	−0.015	0.001	−0.013
	(0.002)	(0.010)	(0.002)	(0.008)
ALMP	0.067	−0.084	0.067	−0.090
	(0.081)	(0.150)	(0.080)	(0.143)
Coord	−0.058	−0.051	−0.073	−0.116
	(0.057)	(0.104)	(0.052)	(0.098)
Multilevel	0.054*	0.074	0.054*	0.078
	(0.030)	(0.056)	(0.030)	(0.057)
Country fixed effect	No	Yes	No	Yes
Year fixed effect	Yes	Yes	Yes	Yes
R^2	0.679	0.689	0.687	0.708

Robust standard errors in parenthesis.
***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.
Source: Own estimation

bargaining, is found to be a significant effect. However, this effect only appears in the equation estimated by OLS that includes GDP growth as an explanatory variable and, therefore, cannot be considered robust.

Given that the impact of employment protection may vary depending on the level of employment protection or its interaction with economic growth, we have estimated the impact of EPL on the growth of the unemployment rate, testing for the existence of non-linear effects of EPL and interaction effects between employment protection and economic growth (Table 4).

Regarding non-linear effects (equations 1 and 2), the results rule out the existence of a non-linear relationship between the EPRC index and the growth of unemployment rates. In the case of protection for temporary workers, we have found the existence of a decreasing marginal effect, such that employment protection for temporary workers contributes to reducing the unemployment rate when the EPT index is above 3.15. However, this is not a robust and conclusive result, as no such effect is found when GDP growth is used as explanatory variable.

Regarding the interaction effects (equations 3 and 4), the results change depending on whether we use GDP or investment growth. If we use GDP growth, both economic growth and the growth of the working age population affect employment growth as expected. Employment protection for permanent workers has no significant effect on the unemployment rate, and protection for temporary workers alone has no effect, although we do find an interaction effect, meaning that the higher the level of employment protection for temporary workers the greater the reduction in the unemployment rate as a result of economic growth. All other control variables have no effect, except for multilevel, which implies that greater centralisation of collective bargaining contributes to higher unemployment.

However, the results change if we use the growth of productive investment. With GFCF growth, the growth of working-age population and the other control variables are no longer significant. The estimates show

that EPL indices and the interaction between EPL indices and GFCF growth are significant. Employment protection would increase unemployment rates, although this effect would be smaller the higher the investment growth, especially in the case of the protection for temporary workers. However, the results are far from conclusive for several reasons. First, the growth of investment alone has no effect on the growth of the unemployment rate; so, these results should be treated with caution. Moreover, the coefficients corresponding to the EPRC index and its interaction with GFCF growth are not significant at the usual 5% probability level. As far as the EPT index is concerned, although protection for temporary workers increases the unemployment rate, this effect is smaller the higher the growth of productive investment, so that at investment growth rates of 8% or more, protection for temporary workers reduces the unemployment rate. Thus, the effect of EPT on the unemployment rate depends on the growth of investment.

In summary, these results allow us to conclude, first, that employment protection does not increase unemployment rates, and, second, that labour market reforms aimed at making the labour market more flexible by reducing employment protection for permanent and temporary workers have not contributed to reducing unemployment rates in Europe. Therefore, the only effective and viable strategy to reduce unemployment rates in Europe is to implement economic policies that favour economic growth.

6. Employment protection legislation and employment and employee growth

Table 5 analyses the determinants of employment growth[12]. As expected, employment growth is directly related to economic growth, whether measured by GDP or investment growth. The growth of the working-age population has a positive effect on employment growth.

Regarding employment protection, the coefficient of the EPRC index is not significant. This result implies that protection for permanent employment does not explain employment dynamics and that poor job creation cannot be blamed on high protection for permanent workers. In the case of the EPT index, it is only significant, with a positive sign, when we use LFS data and GDP growth is used as an explanatory variable. This result implies that greater protection for temporary workers is associated with greater job creation, the opposite of what mainstream economists argue. However, this result is not robust because EPT is not significant when investment growth and National Accounts data are used. With regard to the other control variables, the results are inconclusive, because they change with the use of GDP or GFCF growth and the use of data from Labour Force Surveys or National Accounts.

From a policy perspective, as in the case of unemployment, these results imply that employment protection has no impact on job creation, and that, contrary to the expectations of their promoters, labour reforms that have reduced employment protection for permanent and temporary

Table 5
EPL and employment growth.

	Employment LFS		Employment National Accounts	
	(1)	(2)	(3)	(4)
C	−0.171	0.344	2.657**	2.957***
	(0.330)	(0.352)	(1.070)	(1.065)
Employment (-1)	0.284***	0.293***	0.427***	0.448***
	(0.051)	(0.054)	(0.058)	(0.059)
GDP growth	0.358***		0.299***	
	(0.051)		(0.045)	
GFCF growth		0.089***		0.081***
		(0.016)		(0.013)
EPRC	−0.045	−0.046	−0.439	−0.433
	(0.093)	(0.096)	(0.307)	(0.301)
EPT	0.112**	0.009	−0.049	−0.113
	(0.056)	(0.060)	(0.093)	(0.097)
Population 15–64	0.443**	0.636***	0.380**	0.425**
	(0.172)	(0.180)	(0.186)	(0.192)
Trade openness	−0.004	−0.003	−0.011	−0.013*
	(0.003)	(0.003)	(0.007)	(0.007)
Union density	−0.008**	−0.010**	−0.020*	−0.017
	(0.004)	(0.004)	(0.012)	(0.011)
ALMP	−0.290**	−0.162	0.082	0.220
	(0.167)	(0.172)	(0.198)	(0.203)
Coord	0.273***	0.224**	0.221	0.253
	(0.100)	(0.107)	(0.168)	(0.170)
Multilevel	−0.104*	−0.038	−0.331***	−0.317***
	(0.061)	(0.067)	(0.089)	(0.091)
Netherlands 1987	12.639***	12.375***		
	(1.641)	(1.747)		
Country fixed effect	No	No	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes
R^2	0.663	0.642	0.729	0.723
Obs.	484	484	477	477

Robust standard errors in parenthesis.

***p < 0.01, **p < 0.05, *p < 0.1.

Source: Own estimation

workers in Europe have not contributed to accelerating employment growth and that only policies aimed at accelerating economic growth can increase employment.

These conclusions are derived from estimates based on a linear relationship between EPL and the growth of employment. However, as noted above, some studies suggest that negative effects of EPL on labour market outcomes are generated when employment protection is excessive. Moreover, the effects of EPL may differ depending on the growth rate of the economy. Therefore, as we made in the case of unemployment, in Table 6 we now present the results obtained when estimating the models by testing, first, for the existence of a non-linear quadratic relationship between the EPL indices and the growth of employment and, second, for the existence of interaction effects between economic growth and the EPL indices.

In these estimates, the only significant variables are GDP growth and working-age population growth, both of which have a direct effect on employment growth. Strikingly, investment growth is only significant when testing for the existence of non-linear EPL effects using LFS data[13].

The results rule out the existence of a non-linear relationship between EPL and employment growth, a result that is robust as it is registered in all models regardless of the proxy for economic growth and the source of the employment data. This finding undermines the argument that excessive employment protection hampers job creation, while at the same time providing no justification for advocating labour reforms that reduce employment protection in countries with high levels of employment protection.

Regarding the interaction effects between EPL and economic growth, in the case of employment protection for permanent workers, the EPRC index and the interaction effect are significant only when using National Accounts data and the investment growth rate. Therefore, we can conclude that EPRC does not affect employment growth. As for the interaction effects between employment protection for temporary workers and economic growth, the estimates show that, although the EPT index alone is not significant, the sign of the interaction coefficient between EPT and economic growth is always positive and significant. This means that protection for temporary workers contributes to increasing the positive effect of economic growth on job creation. Nonetheless, there are doubts about the robustness of this result. The reason is that when we use GFCF growth as the explanatory variable, investment growth alone has no impact on job creation, as is the case with GDP growth.

Finally, with regard to the remaining control variables, the estimation results do not allow us to reach a firm conclusion, since the results change depending on the source of the employment data, which prevents us from obtaining robust results, i.e. independent of the specific specification of the model.

In summary, the results of our study allow us to conclude that employment protection is not a significant determinant of employment growth. This means that the reforms implemented to reduce employment protection have not had the expected effect of speeding up the job creation process and, if anything, may have contributed to slowing it down, especially those reforms that have reduced protection for temporary employment. As in the case of unemployment, a faster pace of job creation would imply higher economic growth, hence the need for measures to stimulate economic activity.

Finally, we have analysed the impact of employment protection legislation on employee growth[14] (see Table 7). As expected, whether we focus on GDP or GFCF, economic growth has a significant direct

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[12] We have included a dummy variable to capture the effect of a change in the Dutch employment series in 1987, based on LFS due to purely statistical factors.

[13] See footnote 10.

[14] Among the determinants of employee growth based on Labour Force Surveys we have included three dummies to capture the effect of a change in Netherlands in 1987 and in Switzerland in 2010 due to purely statistical factors, and to capture the effect on the German employees series in 1991 due to the reunification process.

Table 6
EPL and employment growth rate: non-linear and interaction effects.

	Employment LFS				Employment National Accounts			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
C	−0.166	0.500	0.237	0.451	2.067	3.037*	2.666**	2.485**
	(0.607)	(0.644)	(0.384)	(0.375)	(1.766)	(1.781)	(1.046)	(1.050)
Employment (-1)	0.283***	0.291***	0.266***	0.272***	0.427***	0.448***	0.415***	0.433***
	(0.051)	(0.054)	(0.049)	(0.053)	(0.059)	(0.060)	(0.057)	(0.057)
GDP growth	0.356***		0.205**		0.300***		0.175**	
	(0.051)		(0.093)		(0.046)		(0.083)	
GFCF growth		0.089***		0.034		0.081		0.028
		(0.016)		(0.032)		(0.013)		(0.025)
EPRC	0.025	−0.022	−0.116	−0.064	−0.034	−0.414	−0.551*	−0.508*
	(0.450)	(0.473)	(0.113)	(0.098)	(1.041)	(1.031)	(0.298)	(0.276)
EPRC^2	−0.011	0.001			−0.067	−0.004		
	(0.079)	(0.084)			(0.164)	(0.158)		
EPRC*GDP			0.024				0.038	
			(0.037)				(0.032)	
EPRC*GFCF				0.013				0.019**
				(0.014)				(0.010)
EPT	−0.023	−0.290	−0.107	−0.072	−0.021	−0.366	−0.122	−0.128
	(0.256)	(0.264)	(0.085)	(0.070)	(0.449)	(0.449)	(0.100)	(0.100)
EPT^2	0.030	0.069			−0.004	0.047		
	(0.054)	(0.056)			(0.082)	(0.083)		
EPT*GDP			0.091***				0.048**	
			(0.029)				(0.024)	
EPT*GFCF				0.025***				0.014**
				(0.009)				(0.007)
Population 15–64	0.442***	0.625***	0.481***	0.664***	0.374**	0.433**	0.379**	0.426**
	(0.170)	(0.178)	(0.169)	(0.174)	(0.189)	(0.197)	(0.185)	(0.189)
Trade openness	−0.004	−0.004	−0.004	−0.002	−0.011	−0.013*	−0.012	−0.010
	(0.003)	(0.004)	(0.003)	(0.003)	(0.007)	(0.007)	(0.007)	(0.007)
Union density	−0.008**	−0.010**	−0.009**	−0.010***	−0.020	−0.014	−0.016	−0.013
	(0.004)	(−0.004)	(−0.004)	(0.004)	(0.014)	(0.014)	(0.011)	(0.011)
ALMP	−0.287*	−0.154	−0.298*	−0.165	0.073	0.227	0.074	0.244
	(0.170)	(0.175)	(0.169)	(0.171)	(0.201)	(0.204)	(0.192)	(0.195)
Coord	0.283**	0.258**	0.283***	0.219**	0.223	0.252	0.313*	0.321*
	(0.115)	(0.121)	(0.100)	(0.105)	(0.169)	(0.171)	(0.163)	(0.164)
Multilevel	−0.109*	−0.053	−0.095	−0.031	−0.329***	−0.321***	−0.365***	−0.332***
	(0.060)	(0.066)	(0.062)	(0.068)	(0.088)	(0.091)	(0.089)	(0.091)
Netherlands 1987	12.656***	12.433***	12.633***	12.420***				
	(1.640)	(1.748)	(1.598)	(1.731)				
Country fixed effect	No	No	No	No	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.663	0.643	0.678	0.656	0.729	0.723	0.737	0.735

Robust standard errors in parenthesis.
***p < 0.01, **p < 0.05, *p < 0.1.
Source: Own estimation

effect on employee growth. However, the growth of the working age population only has a significant effect when the employees data are from the LFS, so the results of this variable are not conclusive.

The results of the impact of employment protection on employee growth are far from robust and conclusive. Looking at employment protection for permanent workers, we find a significant negative effect when analysing LFS-based employee data, but a significant effect is not found when looking at employees data based on National Accounts. Focusing on employment protection for temporary workers, we find a significant negative effect when the growth of productive investment is used as an explanatory variable, but this effect if the GDP growth rate is used as an explanatory variable. All in all, these results do not allow us to state categorically that employment protection has a (negative) effect on the growth of employees, as the results differ depending on the economic growth variable (GDP or GFCF growth rate) and the source of the employee data (LFS or National Accounts). Therefore, it cannot be argued that reforms that have reduced employment protection for permanent and temporary workers have accelerated the process of salaried jobs creation. Therefore, as in the case of employment, only measures to accelerate economic growth would increase the pace of growth in salaried employment.

With regard to the control variables, none of them can be considered

as determinants of the evolution of employees, as either their coefficients are never significant or they become non-significant when the source of data or the variable related to economic activity growth.

Table 8 shows the results of the estimations testing non-linear and interaction effects of EPL on employee growth. Although GDP growth is a significant determinant in all estimations, GFCF growth is not significant in the equations testing for interaction effects with the EPL indices.

The data show that there is no non-linear relationship between EPL and employee growth, a result identical to that obtained in the analysis of the determinants of total employment growth. This result is found for both the EPRC and EPT indices, regardless of whether data from LFS or national accounts are used or whether GDP or GFCF growth is used as the explanatory variable. However, we find the existence of interaction effects, although the results are inconclusive because they differ depending on the use of GDP or GFCF growth rates and the source of the data on employees.

In the case of employment protection for permanent employees, we do not find the interaction effect when using GDP growth, and, although the coefficient of the EPRC index is significant when we use LFS data, however it is not significant with national accounts data. With GFCF growth and National Accounts data (equation 8), the coefficients of EPRC and the interaction of EPRC and GFCF are significant, but the

Table 7

EPL and employee growth.

	Employees LFS		Employees National Accounts	
	(1)	(2)	(3)	(4)
C	4.102**	4.362**	3.180***	3.406***
	(1.787)	(1.765)	(1.117)	(1.091)
Employees (−1)	0.153*	0.161***	0.501***	0.531***
	(0.082)	(0.040)	(0.055)	(0.055)
GDP growth	0.448***		0.313***	
	(0.134)		(0.047)	
GFCF growth		0.108***		0.083***
		(0.018)		(0.013)
EPRC	−0.896**	−0.895**	−0.416	−0.406
	(0.334)	(0.452)	(0.342)	(0.332)
EPT	−0.165	−0.248*	−0.130	−0.194*
	(0.221)	(0.139)	(0.100)	(0.104)
Population 15–64	0.984***	1.110***	0.263	0.297
	(0.289)	(0.271)	(0.189)	(0.197)
Trade openness	−0.005	−0.005	−0.011	−0.013*
	(0.006)	(0.010)	(0.007)	(0.007)
Union density	0.043*	0.040**	−0.019	−0.015
	(0.023)	(0.009)	(0.013)	(0.013)
ALMP	−0.475	−0.314	0.022	0.157
	(0.334)	(0.318)	(0.206)	(0.206)
Coord	0.132	0.186	0.082	0.129
	(0.242)	(0.235)	(0.174)	(0.175)
Multilevel	−0.053	−0.033	−0.292***	−0.287***
	(0.178)	(0.132)	(0.089)	(0.093)
Netherlands 1987	10.860***	10.742***		
	(0.457)	(1.975)		
Germany 1991	27.307***	28.478***		
	(0.476)	(1.817)		
Switzerland 2010	−14.036***	−14.003***		
	(0.439)	(1.347)		
Country fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes
R^2	0.758	0.739	0.772	0.765
Obs	484	484	470	470

Robust standard errors in parenthesis.

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Source: Own estimation

coefficient of investment growth is not significant. Indeed, according to the estimates of equation 8, EPRC does have a negative effect on employee growth, but this effect is smaller the higher investment growth is: when investment growth is above 18.9%, employment protection for permanent workers has a positive effect on employee growth. In any case, given that the results are not conclusive and robust, it can not be concluded that employment protection for permanent workers has an impact on employee growth.

In the case of employment protection for temporary workers, in all the models, as in the case of total employment, there is a significant interaction effect with economic growth, which accelerates the growth of employees. However, the results are not robust. Thus, using GDP growth as the explanatory variable and LFS data (equation 3), EPT alone does not affect employee growth, but the interaction effect is significant and positive, so that the effect of GDP growth on employees growth is greater the higher the EPT index is. However, when using national accounts data (equation 7), the results are different: EPT slows down employee growth, but this negative effect is smaller the higher invest-ment growth is. Thus, the overall effect of EPT on employee growth is positive when GDP grows by more than 3.75% per year. However, when we use investment growth as an explanatory variable, the results are different. Whether we use LFS (equation 4) or NA data (equation 8), investment growth is not significant, the individual effect of EPT is significant and negative, and the interaction effect between EPT and investment growth is significant and positive. This implies that the higher the investment growth, the smaller the overall negative effect of EPT. In other words, the final effect on employees' growth of

employment protection for temporary workers depends on the produc-tive capital accumulation. Thus, with LFS data, EPT contributes to an increase in employees when investment grows at a rate higher than 8.75%; but if we use national accounts data, EPT increases employees when investment grows at a rate higher than 14.39% per year.

In summary, the results obtained allow us to rule out the New Keynesian hypothesis of a negative effect of employment protection on employees. If anything, but with serious reservations, it could be argued that the effect of employment protection for temporary workers con-tributes to accelerating the growth of employees resulting from eco-nomic growth, so that for a given rate of economic growth, the higher the employment protection for temporary contracts, the higher the employee growth, a result similar to that obtained for total employment.

7. Summary and conclusions

The results of our study show conclusively that, contrary to New Keynesian approaches, employment protection does not affect the dy-namics of the evolution of the unemployment rate, with economic growth being the main determinant (together with the growth of the working-age population) of the variation in the unemployment rate. We can therefore conclude that labour reforms that have reduced employ-ment protection for permanent and temporary workers have not contributed to reducing European unemployment rates.

As far as the impact on employment is concerned, EPL does not affect employment growth. With regard to employees, it cannot be argued that the EPL has a negative impact on employee growth, as the results are not robust because they depend on the use of GDP or investment growth as explanatory variables and the data source (Labour Force Surveys or National Accounts).

Regarding the models testing non-linear relationships and interac-tion effects, the results are not robust and conclusive. The only statement that can be made, albeit with reservations, is that the higher the growth of GDP/GFCF and the higher the protection of temporary workers, the greater the fall in the unemployment rate. As far as employment and employee growth are concerned, the results also do not allow us to claim that EPL affects employment growth. Again with reservations, we can only say that the higher the EPT, the greater the effect of economic growth on employment and employees.

These results imply not only that the main determinant of labour market outcomes is economic growth, but also that we cannot assess the effectiveness of labour market reforms that have made hiring and firing more flexible through their effects on employment and unemployment, since the results indicate the absence of such effects.

As noted above, most of the labour market reforms implemented in Europe in recent decades have been aimed at stimulating job creation and reducing unemployment rates by reducing employment protection. Our study shows that it cannot be concluded that they have achieved this result. What is certain, however, is that our results show the neutrality of EPL on employment and unemployment outcomes, that is, it cannot be concluded that they have had a positive or negative effect on employ-ment, employees and unemployment. It should be noted that the inability to detect a robust causal relationship between EPL and labour market outcomes results from a panel data study. This means that it is possible that such a relationship can be found in specific economies. If this is the case, our study suggests that the existence of such a causal relationship would not be extrapolable to any other single country or to a group of countries.

This does not mean that it is not necessary or useful to reform the labour markets, either by making it more flexible or by reforms that reverse previous flexibility measures, in order to achieve other micro or macroeconomic effects than the effect on employment or unemploy-ment. Indeed, as pointed out in the paper, there is a large body of literature confirming that measures to reduce employment protection have contributed to generating a series of negative effects on both the supply and the demand side, especially in cases where flexibilisation

Table 8
EPL and employee growth: non-linear and interaction effects.

	Employees LFS				Employees National Accounts			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
C	4.156	5.451*	3.780*	3.321*	3.078	4.052**	3.201***	2.913***
	(2.600)	(2.990)	(1.802)	(1.692)	(1.891)	(1.871)	(1.081)	(1.051)
Employees (-1)	0.154*	0.163***	0.139*	0.142***	0.501***	0.531***	0.488***	0.518***
	(0.082)	(0.040)	(0.073)	(0.039)	(0.055)	(0.055)	(0.053)	(0.051)
GDP growth	0.443***		0.266**		0.314***		0.168**	
	(0.139)		(0.118)		(0.048)		(0.085)	
GFCF growth		0.106***		0.018	()	0.083***	()	0.015
		(0.018)		(0.036)		(0.013)		(0.025)
EPRC	−0.828	−1.427	−0.911**	−0.996**	−0.375	−0.799	−0.540	−0.508*
	(0.966)	(1.646)	(0.393)	(0.406)	(1.125)	(1.099)	(0.330)	(0.298)
EPRC^2	−0.013	0.084			−0.007	0.065		
	(0.119)	(0.256)			(0.173)	(0.163)		
EPRC*GDP			−0.005				0.040	
			(0.062)				(0.031)	
EPRC*GFCF				0.025				0.027***
				(0.016)				(0.010)
EPT	−0.554	−1.068	−0.443	−0.306**	−0.030	−0.385	−0.225**	−0.208**
	(0.828)	(0.674)	(0.283)	(0.137)	(0.464)	(0.464)	(0.106)	(0.105)
EPT^2	0.073	0.152			−0.018	0.034		
	(0.138)	(0.125)			(0.084)	(0.085)		
EPT*GDP			0.157**				0.060**	
			(0.071)				(0.025)	
EPT*GFCF				0.035***				0.014*
				(0.137)				(0.007)
Population 15–64	0.996***	1.141***	0.961***	1.091***	0.260	0.307	0.265	0.297
	(0.308)	(0.272)	(0.265)	(0.259)	(0.194)	(0.201)	(0.188)	(0.191)
Trade openness	−0.004	−0.003	−0.007	0.002	−0.011	−0.013*	−0.012	−0.009
	(0.007)	(0.010)	(0.006)	(0.010)	(0.007)	(0.007)	(0.007)	(0.007)
Union density	−0.038	−0.031	−0.032*	−0.031	−0.020	−0.013	−0.014	−0.011
	(0.024)	(0.022)	(0.018)	(0.019)	(0.015)	(0.015)	(0.012)	(0.012)
ALMP	−0.469	−0.289	−0.508	−0.273	0.018	0.171	0.010	0.190
	(0.318)	(0.321)	(0.313)	(0.309)	(0.208)	(0.207)	(0.202)	(0.200)
Coord	0.129	0.175	0.309	0.316	0.083	0.125	0.187	0.203
	(0.244)	(0.235)	(0.216)	(0.224)	(0.175)	(0.176)	(0.166)	(0.167)
Multilevel	−0.057	−0.046	−0.101	−0.054	−0.291***	−0.291***	−0.331***	−0.306***
	(0.177)	(0.131)	(0.172)	(0.130)	(0.089)	(0.093)	(0.089)	(0.093)
Netherlands 1987	10.932***	10.859***	11.002	11.060***				
	(0.389)	(2.021)	(0.415)	(2.007)				
Germany 1991	27.389***	28.615***	26.256	28.016				
	(0.602)	(1.758)	(0.471)	(1.773)				
Switzerland 2010	−14.062***	−14.054***	−14.087***	−14.152***				
	(0.419)	(1.325)	(0.445)	(1.291)				
Country fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.758	0.741	0.774	0.756	0.772	0.765	0.782	0.780

Robust standard errors in parenthesis.
***p < 0.01, **p < 0.05, *p < 0.1.
Source: Own estimation

measures have been very intense or have led to excessive labour segmentation. It is these effects that would qualify such labour reforms as negative. In these circumstances, it would be justified to adopt measures to increase labour market protection in order to reduce the negative effects of excessive labour flexibility, as such measures would not have a negative impact on employment or unemployment.

If the reforms that have reduced employment protection for workers had had positive effects on employment and unemployment, but also negative effects (e.g. in terms of lower job quality or more unequal income distribution), then we would be talking about a kind of trade-off between the positive and negative effects of these reforms, and one could even argue that it is necessary to accept these 'costs' in order to generate more employment and less unemployment. However, in the absence of positive effects, it can be argued that labour reforms may have had an overall negative impact on European economies and societies.

Declaration of competing interest

None.

Data availability

Data will be made available on request.

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