

Employment protection, atypical employment and labour productivity growth

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Abstract

In recent years, there has been a proliferation of studies analysing the impact on employment and unemployment of measures adopted to make the labour market more flexible, paying a special attention to those measures that have reduced employment protection for permanent and temporary workers. Although the literature initially focused on the effects of labour flexibility on employment and unemployment, in recent years there has been a proliferation of works analysing the effect on other economic variables, such as poverty, income distribution, or productivity growth, among others. In this sense, the paper analyses the effect of labour flexibility, proxied by the level of employment protection legislation (EPL), on the behaviour of labour productivity growth in various European economies. The novelty of our paper is that we study the effects of EPL on labour productivity growth at a national level, that is for the whole economy, but also at a sectoral level, specifically in the activities of ‘agriculture, forestry and fishing’, ‘construction’, ‘non-manufacturing industry’, ‘manufacturing’ and ‘services’. To this end, using panel data techniques, we analyse the evolution of labour productivity for the whole economy and at a sectoral level in a group of 13 European economies over the period 1985-2018.

Keywords: labour productivity growth, employment protection, Europe

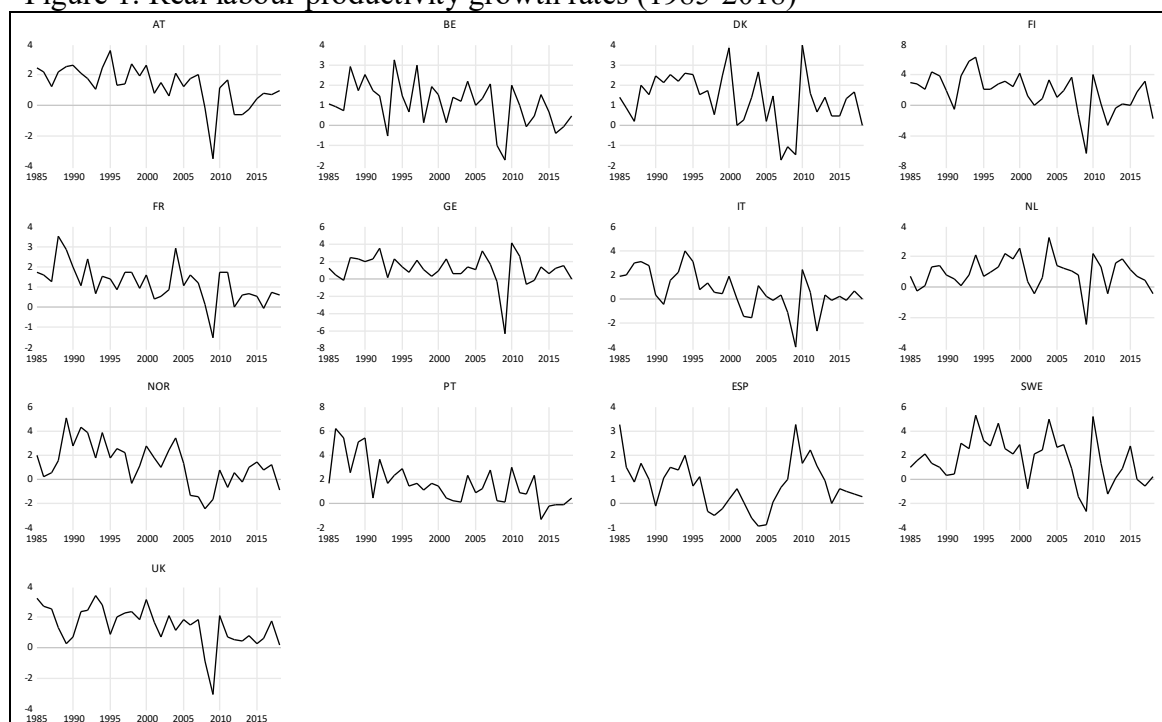
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1. Introduction

Numerous studies suggest that the general decline in productivity growth is one of the main problems affecting developed, and, particularly, European economies, impacting their short- and long-term economic growth (Chadha and Samiri 2026; Fernald et al. 2025; Goldin et al. 2024). Figure 1 shows the real labour productivity growth rates, estimated using data from the AMECO database, for the 13 European countries analysed in this study: Austria AT, Belgium BE, Denmark DK, Finland FI, France FR, Germany GE, Italy IT, Netherlands NL, Norway NOR, Portugal PT, Spain ESP, Sweden SWE, and United Kingdom UK.

Figure 1. Real labour productivity growth rates (1985-2018)



Source: Our calculations, based on AMECO Database, Eurostat

The data in the figure 1 clearly show that all countries are experiencing a downward trend in labour productivity growth.

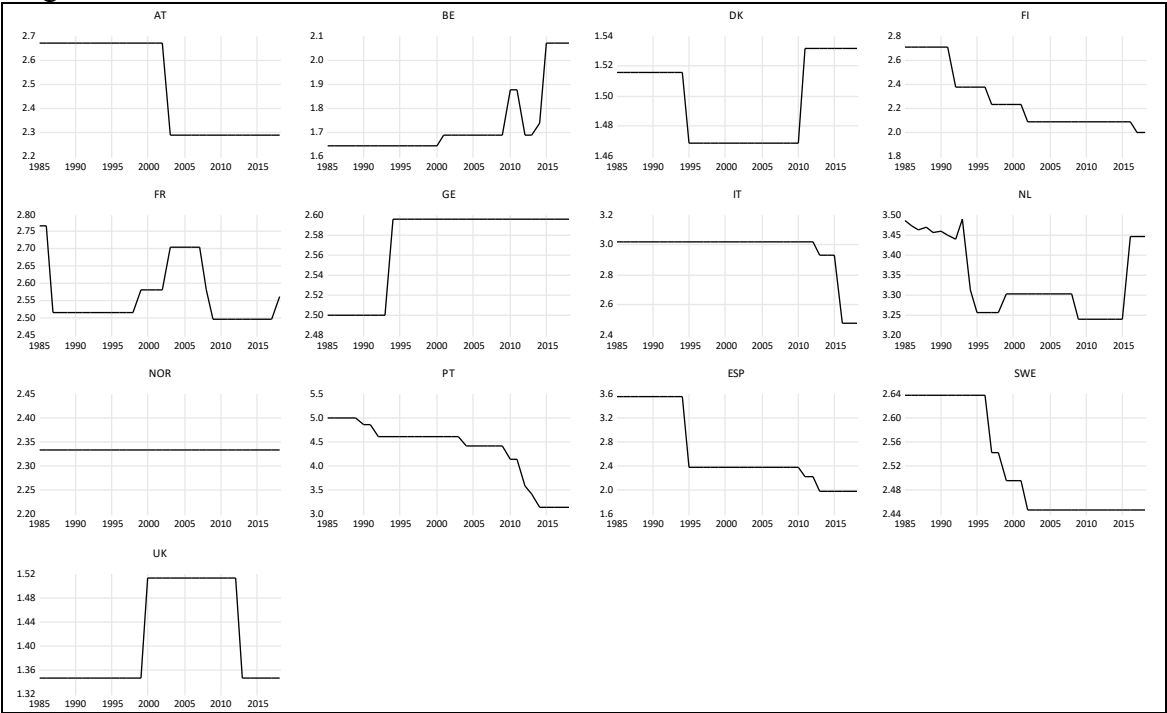
Numerous studies have attempted to explain the factors behind this decline in productivity growth, from different perspectives and approaches (Teixeira and Teixeira 2026). From a post-Keynesian perspective, the main cause would be the decline in economic growth, which is generated by lower aggregate demand for various reasons. Conversely, an orthodox perspective would identify a series of institutional rigidities, particularly in the labour market, as the main problem, as these would negatively affect the factors that determine productivity growth.

One of these factors relates to the flexibility or rigidity of the labour market with regard to employment protection. In the mid-2000s, various studies were conducted to investigate the impact of employment protection legislation on productivity growth. The aim was to determine whether the cause of the decline in productivity growth could be the inefficient operation of certain labour institutions, particularly the employment protection legislation (EPL). From an orthodox-mainstream point of view, the objective

was to test the hypothesis that a more stringent employment protection legislation, i.e. the existence of severe restrictions on dismissals and the use of non-standard employment contracts, such as temporary, agency or part-time contracts, could affect productivity growth (Bassanini et al. 2009; Storm and Naastepad 2009).

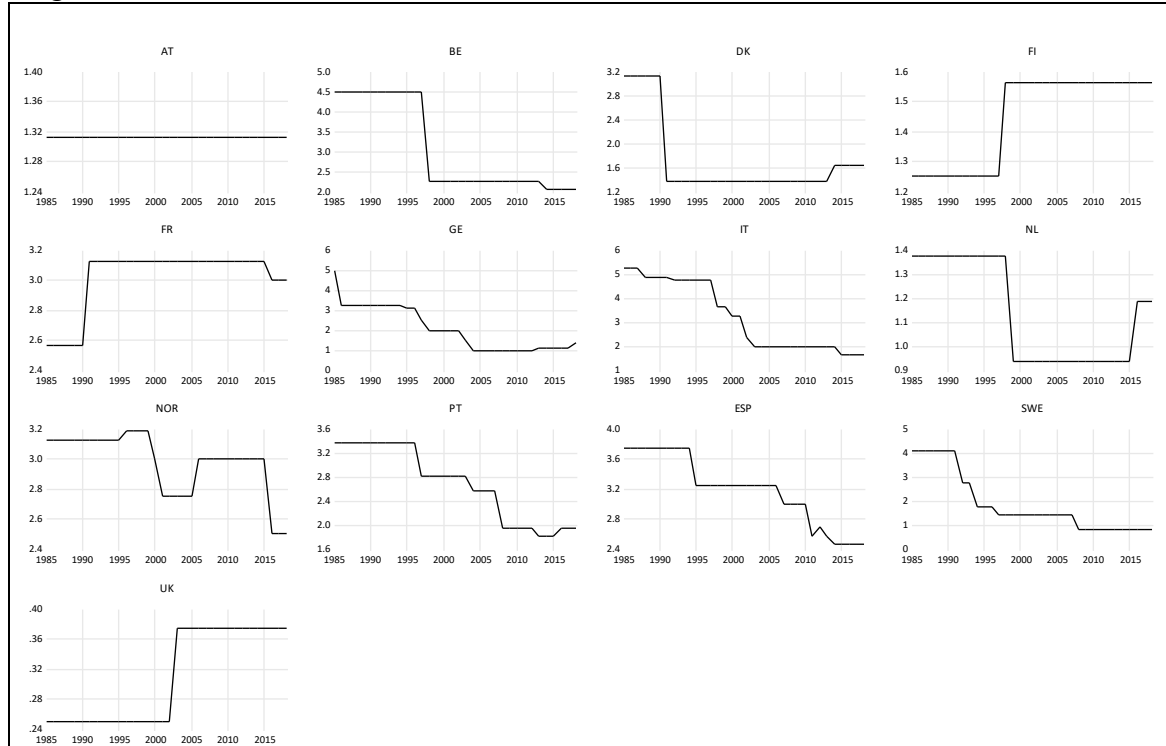
It should be noted that since the 1980s many developed countries, particularly in Europe, have introduced various measures to make the labour market more flexible. These measures have mainly focused on reducing employment protection in order to improve employment and reduce unemployment (Arestis et al. 2020, 2023). To this end, measures have been adopted to reduce the costs of dismissing workers with permanent contracts and to encourage the use of non-standard employment contracts, primarily temporary ones.

Figura 2. EPR index



Source: OECD

Figura 3. EPT index



Source: OECD

As shown in Figures 2 and 3, that show the evolution of the indices EPR (corresponding to the employment protection to permanent workers) and EPT (corresponding to the employment protection to temporary contracts) these measures have resulted in a general decline in employment protection for the countries analysed in our study since 1985, (when the OECD employment protection legislation indices became available), at least in one of the two EPL indexes.

Our work aims to empirically analyse whether employment protection for permanent and temporary workers influences the rate of labour productivity growth in the thirteen European economies mentioned above. To this end, we will examine the factors that determine real labour productivity growth in the economy as a whole and in the main economic sectors of these countries. By doing so, we will not only determine whether employment protection affects labour productivity in these countries, but also whether the effects of employment protection differ depending on the sector.

The paper is structured as follows. The second section summarises the existing literature on the impact of employment protection on productivity. The third section presents the empirical framework of our analysis. Section four presents the main descriptive data for the different variables included in the analysed models. Section five presents and analyses the main results derived from the empirical analysis. The final section summarizes and concludes.

2. Employment protection and productivity growth

In recent years, there has been a proliferation of studies analysing the impact, mainly in developed countries, on employment and unemployment of measures adopted to make the labour market more flexible, paying a special attention to those measures that have contributed to reducing employment protection for both permanent and temporary workers.

These labour reforms focused on facilitating and reducing the cost of individual and/or collective dismissals of workers with permanent contracts, as well as facilitating the use of temporary, agency or part-time contracts. These measures were based on orthodox approaches, according to which employment protection, or at least excessive employment protection, introduced a series of rigidities into the labour market that discouraged hiring and, therefore, employment, thus favouring the persistence of high unemployment rates over time, translated into higher natural unemployment rates or NAIRU rates. However, it was also recognised from this perspective that the overall effect on employment could be ambiguous, as strong employment protection could reduce both outflows (redundancies) and inflows (hiring) of workers into firms (Autor et al. 2007). In this regard, recent studies suggest that the impact of employment protection on employment may vary depending on the economic sector (Ferreiro and Gomez 2026)

Although the objective of these labour market reforms was to increase the level of employment, in order to reduce the unemployment rate, recent empirical studies conclude that the effect of measures to make it easier and cheaper to dismiss workers on employment and employment and of measures facilitating the use of non-standard labour contracts, has been, at best, nil, having, however, given rise to a number of negative microeconomic and macroeconomic side-effects, negatively affecting to variables such as labour segmentation, unemployment scars, income distribution, job quality, household consumption and borrowing, international trade and foreign direct investment flows, innovation activities, competitiveness, productivity growth, or poverty, among others (Arestis et al. 2020 and 2023; Bellocchi et al. 2025; Brancaccio et al. 2018; Damiani et al. 2016; Gonalons-Pons and Gangl 2022; Gutierrez-Barbarrusa 2016; Heyes and Lewis 2015; Hoxha and Kleinknecht 2024; Kleinknecht 2020; Liotti et al. 2024; Oliveira and Forte 2021; Pariboni and Tridico 2020; Roy 2021; Tridico 2017).

As noted, in recent years a growing number of studies have analysed the possible effect of employment protection on productivity growth and, by extension, long-term economic growth.

Mainstream economists argue that high employment protection could negatively affect productivity. They suggest that adopting measures to increase labour flexibility, reduce the cost of dismissing workers and favour temporary contracts, could boost productivity. Consequently, lower employment protection could facilitate the relocation of workers from less dynamic or productive sectors to more dynamic ones (Damiani et al. 2016; Martin and Scarpetta 2012). Conversely, reducing dismissal costs could encourage companies to adopt labour-saving innovations. Furthermore, lower employment protection could motivate workers to improve their discipline, efficiency and productivity in order to keep their jobs (Damiani et al. 2016). Finally, greater ease in hiring temporary workers would enable companies to select the most productive employees (Damiani et al. 2016). However, high dismissal costs could also have a positive effect on labour

productivity by encouraging firms to substitute labour with capital and hire highly productive workers. Consequently, the overall impact on labour productivity would be ambiguous, as is the case with employment (Autor et al., 2007).

If, as orthodox economists argue, greater labour market flexibility leads to an increase in employment or an acceleration in the rate of employment growth, then the rate of labour productivity growth could decline in the short term. However, heterodox economists, particularly post-Keynesians, argue that labour market flexibility measures do not positively affect employment. This view is supported by various empirical studies (Arestis et al. 2020, 2023; Ferreiro and Gomez 2020, 2022). According to this perspective, therefore, the potential effects of labour market flexibility on productivity growth would be explained by other transmission channels others than its impact on employment growth.

In this sense, and focusing on the consequences of the reforms in the employment protection, different authors, especially unorthodox ones, emphasize the potential negative effects on productivity of reduced employment protection (Storm and Naastepad 2009). In this regard, authors such as Dabla-Norris et al (2015) and Belot et al. (2007) suggest that there is a non-linear relationship between labour market regulation and productivity, such that productivity is negatively affected in the presence of excessive regulation or excessive labour flexibility. Thus, Sobota et al (2025) conclude that a high intensity in the use of temporary agency work in Germany has a negative impact on labour productivity growth.

Various authors have highlighted that lower employment protection, lower dismissal costs, and the ease of using non-standard temporary contracts can negatively impact wage growth and labour costs, thereby affecting productivity. Thus, lower labour costs may enable less productive companies to survive while discouraging the adoption of labour-saving innovations that increase worker productivity (Cruz 2023).

Furthermore, as Post-Keynesian and Schumpeterian economists have pointed out, greater labour flexibility can lead to a decline in real wages and the wage share. This would have a negative effect on domestic demand and investment, and therefore on GDP and productivity growth (Hein 2014; Zamparelli 2024). Moreover, the lower wages and labour costs associated with temporary and/or part-time contracts may encourage companies to prioritise low wages over competitiveness strategies involving productive investments, organisational improvements, and innovations that guarantee greater competitiveness based on productivity gains. This would negatively impact productivity growth across the economy as a whole (Damiani et al. 2016). It has been suggested that greater labour flexibility and lower labour costs can generate a process of structural change in which less dynamic, less innovative and less productive sectors gain greater weight, thereby undermining productivity growth (Angelone and Canale 2025; Kleinknecht, 1998). Tavani and Zamparelli argue that a decline in the wage share generated by lower workers' bargaining power has a negative impact on labour productivity growth since a lower wage share has a negative impact on R&D investment (Tavani and Zamparelli 2026).

Conversely, high employment protection can have positive effects on productivity by encouraging companies to invest in productive activities and innovate in terms of products and processes (Kleinknecht 1998 and 2026; Vergeer and Kleinknecht 2014).

This is because it encourages companies to invest in human capital and worker skills, especially company-specific skills, as well as promoting organisational changes that favour the functional mobility of workers. This increases their productivity (Dabla-Norris et al. 2015; Belot et al. 2007; Ikeda et al. 2024; Kleinknecht et al. 2014). Furthermore, by increasing job stability and permanence, it promotes learning through learning by doing, thereby increasing productivity (Ikeda et al. 2024; Kleinknecht et al. 2014). Job security also makes workers more receptive to innovations that increase productivity thanks to the certainty that these innovations will not jeopardise their employment. Finally, job stability encourages cooperation and collaboration between workers and management, as well as between workers themselves. This enables the adoption of teamwork strategies and ‘high-performance work systems’, which increase company productivity (Auer et al. 2005).

Existing empirical studies do not offer conclusive results on the impact of employment protection on productivity (Campos et al. 2025; Holmlund 2014). Storm and Naastepad (2009) argue that strict labor market regulation and high employment protection legislation have a positive impact on labor productivity growth. Damiani et al. (2016), however, argue that employment protection for permanent workers would not affect total factor productivity (TFP) growth, but that less protection for temporary employment would affect TFP growth in labour-intensive sectors by favouring the use of temporary contracts at the expense of companies investing in their employees’ skills. Lisi and Malo (2017), on the other hand, claim that temporary contracts have a negative impact on productivity, particularly in high skilled sectors. This is because temporary workers are less willing to cooperate with companies in developing innovations, less inclined to develop company-specific skills, and less motivated in their work, given that their contracts are short-term and they have little chance of being converted to permanent ones.

The lack of conclusive results can be attributed to the fact that, as various authors have pointed out, the impact of labour flexibility on productivity is not solely dependent on whether greater flexibility is achieved by reducing job protection for permanent or temporary workers (Damiani et al. 2016). It is also noted that the effect would differ depending on the labour intensity of companies or sectors, the weight and relevance of skilled employment within companies, and the dominant innovation regimes in each sector (Kleinknecht et al. 2014). Thus, flexible labour markets would have a negative impact on innovation (and labour productivity growth) in industries based on the accumulation of knowledge and tacit and firm-specific knowledge; although the impact would be nil or very little in low –technology and in garage business industries, which are based on general and generally available knowledge (Hoxha and Kleinknecht 2020).

3. Empirical framework

The aim of this article is double. First, we will analyse whether labour flexibility, identified with employment protection legislation (EPL), has an impact on labour productivity growth in a sample of European countries. Second, we will analyse whether the impact of EPL on labour productivity is the similar in different branches of the economy or whether, on the contrary, it has different effects, in terms of size and sign, depending on the sector analysed. To this end, we analyse the effects of EPL on labour productivity growth in the five main economic sectors. Specifically, we analyse the impact of EPL on the growth of labour productivity in five branches: ‘Agriculture, forestry and fishing’ (hereafter Agriculture), ‘Construction’, ‘Industry, including energy,

and excluding manufacturing’ (hereafter Non-Manufacturing Industry NMI), ‘Manufacturing’, and ‘Services’¹.

3.1. Baseline specification

In this regard, our baseline model for the whole economy and the five sectors mentioned above is as follows:

$$Y_{i,t} = \beta_0 + \beta_1 Y_{i,t-1} + \beta_2 GVA_{i,t} + \beta_3 EPR_{i,t} + \beta_4 EPT_{i,t} + \beta_5 X_{i,t} + \epsilon_{i,t}$$

The labour market performance, in our case the labour productivity growth, 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 . To correct for this problem, the model includes the one-period lag of the explained variable as an explanatory variable in all the equations. Therefore, we are testing a dynamic model. The various tests applied to the equations indicate the presence of serial correlation, heteroscedasticity and cross-sectional dependence². For this reason, and given that the number of years (34) far exceeds the number of cross-sections (13), all models are estimated using a cross-sectional SUR (PCSE) method in order to obtain robust estimates (Kennedy 2008, Pesaran 2015, Wooldridge 2025).

Given that we work with dynamic models, the value of the coefficients of the explanatory exogenous variables represents the contemporaneous effect of these variables on the growth rate of employment or employees. In other words, it measures the effect of the value in the explanatory variable in year t on year t outcome. However, in a dynamic model, changes to the explained variable in year t also affect its value in period t+1. Thus, the total effect of an explanatory variable is the accumulated sum of the effects generated in t, t+1, and so on. Therefore, for each exogenous variable, the total accumulated effect is calculated by dividing the value of the corresponding current coefficient by $(1-\beta_1)$, where β_1 is the coefficient corresponding to the one-period lagged endogenous variable (Pesaran 2015).

The dependent variable in the model is the real growth rate of labour productivity for either the national economy as a whole or the five analysed branches. This has been calculated using real GVA data and employment data (based on National Accounts) from the AMECO Database. Unlike other articles, our study uses productivity growth per worker, rather than productivity growth per hour worked, as the dependent variable. This is because Eurostat, the primary data source for the AMECO database, only provides data on productivity per hour worked by economic activity from 1995 onwards. However, Figures 2 and 3 show that many European countries have introduced measures to make the labour market more flexible since the mid-1980s, focusing on employment protection for both permanent and temporary workers. This is why we have chosen productivity

¹ The data used in the paper comes from the AMECO database, the annual macro-economic database of the European Commission's Directorate General for Economic and Financial Affairs. These data have been obtained at the chapter ‘National Accounts by branch of activity’ (https://dashboard.tech.ec.europa.eu/qs_digit_dashboard_mt/public/sense/app/667e9fba-eea7-4d17-abf0-ef20f6994336/sheet/f38b3b42-402c-44a8-9264-9d422233add2/state/analysis/). In the paper, we use the names of the branches as they appear at that source.

² Relevant data are available upon request.

growth per worker as the dependent variable, which allows us to analyse a longer period of time including the earliest changes to employment protection legislation.

Table 1. Variables used in the analyses

Variable	Description	Source
Δ Productivity	Rate of growth of real productivity per workers	AMECO Database
Δ GVA	Rate of growth of real gross value added	AMECO Database
EPR	OECD Employment Protection Legislation indicator for dismissing regular workers (version 1)	OECD Indicators of Employment Protection Database
EPT	OECD Employment Protection Legislation indicators for hiring temporary workers	OECD Indicators of Employment Protection Database
ProductivityUSA	Percentage of productivity in each country relative to USA productivity	AMECO Database
Union density	Percentage of employees who are members of a trade union	OECD/AIAS ICTWSS database
Central	Degree of centralisation in the collective bargaining	OECD/AIAS ICTWSS database
Coord	Degree of coordination in the wage-setting process	OECD/AIAS ICTWSS database
Social expenditure	Social expenditures as percentage points of the GDP	AMECO Database
Trade openness	Share as a percentage of GDP of the sum of exports and imports of goods and services	AMECO Database
ALMP	Public expenditure on active labour market policies as a percentage of OECD	OECD labour market policies database
PMR	Index that measures how competition-enhancing is the regulatory framework in network and services sectors	OECD Product Market Regulation database

The main explanatory variables for labour productivity growth are the real growth rate of gross value added (GVA) and the employment protection legislation (EPL) indicators developed by the OECD. Including GVA growth as a determinant of labour productivity growth extends Verdoorn's Law (Verdoorn 1949) to all economic activities. This law originally stated that growth in demand positively affects labour productivity growth in

the manufacturing sector. Both national and sectoral GVA growth data have been calculated using AMECO database data.

As indicators of employment protection, we use the Employment Protection Legislation (EPL) strictness indicators developed by the OECD³, namely versions 1 of the EPR and EPT indices, which cover the period 1985-2019. EPR index measures the protection of regular (permanent) contracts against individual dismissals, and the EPT index measures the regulation of temporary forms of employment, mainly fixed-term and temporary agency workers. Both indices are measured on a scale from 0 to 6, with higher values representing stricter regulation and 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.

To the extent that greater employment protection is associated with a less flexible (or more rigid) labour market, and vice versa, the model tests for a potential linear relationship between real labour productivity growth and labour market flexibility. From an orthodox or mainstream perspective, employment protection would negatively affect productivity growth. In contrast, heterodox approaches such as post-Keynesian and Schumpeterian ones argue that employment protection would positively affect labour productivity.

As figures 2 and 3 show, we only detect a decline in both EPL indexes in five countries: Italy, Netherlands, Portugal, Spain, and Sweden. In the other countries, there is a change in only one EPL index (Austria, Norway, and the United Kingdom), or there is an increase in one index that comes with a decline in the other index. This implies that the correlation between EPR and EPT index is low (0.26); therefore, to include both indexes in the estimated models do not create problems.

The model also includes a vector X of control variables related most of them to institutional aspects of the labour market that both theoretical and empirical studies suggest may influence labour market outcomes, and that both theoretical and empirical literature indicates that they can influence labour productivity growth. Thus, we include as an explanatory variable union density (*Union density*), which measures the percentage of employees who are members of a trade union. 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).

We also include two variables related to the degree of centralisation and the degree of coordination of collective bargaining. First, 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). As an indicator of the centralisation of collective bargaining, we include the variable *Central* from the OECD/AIAS ICTWSS database. 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

³ Available at: <https://www.oecd.org/en/data/datasets/oecd-indicators-of-employment-protection.html>

‘opening clauses’. Central ranges from 0 to 5, with higher values corresponding to a bargaining structure where centralised bargaining or national sectoral agreements predominate.

Another explanatory variable in the size in percentage points of the GDP of the social expenditures (*Social expenditure*), whose data comes from the AMECO database. This database also provides data on *Trade openness*, which measures the share as a percentage of GDP of the sum of exports and imports of goods and services.

Using employment data and real GDP, we estimate, following the Schumpeterian literature (Bassanini et al. 2009) the productivity gap with the USA (*Productivity USA*), measured as the percentage of productivity in each country relative to USA productivity for the economy as a whole and for each of the five analysed sectors. The implicit assumption is that the USA represents the most advanced economy and the technology leader (located at the frontier of production possibilities). Thus, a value of this gap below 100 implies that the level of real productivity in that country-industry is below that registered in the USA, and vice versa. We also assume that economies whose productivity is furthest from that recorded in the technology leader (the USA) have greater growth potential (Nicoletti and Scarpetta 2003). This means that a process of convergence, or ‘catching up’, would occur, resulting in those economies recording a higher rate of productivity growth.

Another control variable is public expenditure on active labour market policies (*ALMP*), measured as a percentage of GDP. Data for this variable come from the OECD. Finally, as explanatory variable we have included the OECD Product Market Regulation *PMR* index, that measure how competition-enhancing is the regulatory framework in network and services sectors in individual economies to check whether measures that promote competition boost productivity growth. The index goes from 0 (most competition-friendly regulatory set-up) to 6 (least competition-friendly regulatory set-up). Data of *PMR* index are available for the period 1978-2018.

From a mainstream perspective, it is expected that the EPL, social spending, union density, the *PMR* index of market competition and the degree of coordination and centralisation of collective bargaining would negatively affect productivity growth. Meanwhile, spending on active labour market policies and trade liberalisation are expected to stimulate labour productivity growth. The impact of the *PMR* on productivity growth would differ depending on the sector and industry (Nicoletti and Scarpetta 2003).

Since our study covers 13 countries (Austria, Belgium, Denmark, Finland, France, Germany, Italy, Netherlands, Norway, Portugal, Spain, Sweden, and the United Kingdom) over the period 1985-2018 (34 years), since *PMR* index data are available until 2018. Since union density and *ALMP* data are not available for all countries and years, we have an unbalanced panel. The dynamic models are estimated using fixed effects, since with a very long number of years ($T > 30$) and a lower number of individuals ($N = 13$) the T/N ratio is greater than 2. In this way, the results are much more consistent than those obtained using instrumental variables (IV) or GMM estimators, which are more appropriate for analyses covering much shorter time periods. It must be noted that in all

sectors, the explained variable, the rate of growth of productivity, is stationary, thus allowing the use of a dynamic fixed-effect model⁴.

3.2. Robustness checks

Our baseline models assume a linear relationship between the growth rates of labour productivity and the values of the EPL indicators. However, existing studies suggest the existence of non-linear effects between EPL and employment growth (Arestis et al. 2020, 2023). Indeed, the existence of a non-linear relationship between employment protection and the growth of employment would be justified by New Keynesian economics itself, which argues that it is the existence of an excessive level of employment protection what generates negative effects on the labour market (Belot et al. 2007; OECD 2018; Arestis et al. 2023).

In this sense, in our paper we will test the possible existence of an increasing or decreasing marginal relationship between the labour productivity and the employment protection (equation 2):

$$Y_{i,t} = \beta_0 + \beta_1 Y_{i,t-1} + \beta_2 GVA_{i,t} + \beta_3 EPR_{i,t} + \beta_4 EPR_{i,t}^2 + \beta_5 EPT_{i,t} + \beta_6 EPT_{i,t}^2 + \beta_7 X_{i,t} + \epsilon_{i,t} \quad (\text{eq. 2})$$

On the other hand, several empirical studies suggest that the effects of employment protection are conditioned by the economic context or the specific phase of the cycle that an economy is in (Arestis et al. 2023; Boeri and Jimeno 2016; de Almeida and Balasundharam 2018; Duval and Furceri 2018; Duval et al. 2020; Ferreira and Gomez 2026; OECD 2012, 2017). Indeed, Bassanini et al. (2009), argues that the impact of employment protection on productivity may differ in presence of major shocks. For this reason, both in the models testing a linear and a non-linear relation among EPL indices and labour productivity growth we will test the equations now including a dummy variable, *Recession*, that takes the value 1 if the growth of the sector's value added is negative (a recession) and 0 if it is positive (an expansion). This is to test the hypothesis that the effect of employment protection differs depending on whether the sector's GVA is rising or falling.

To test the possible existence of a differential effect of employment protection on employment depending on whether the sector is in expansion or recession, we introduce in the models a variable testing the existence of an interaction effect between the EPL indicators and the existence of a recession in this sector. This variable is constructed by multiplying the value of the EPL indicator by a dummy variable (*Recession*) that takes the value 1 if GVA growth is negative. If the corresponding coefficient is significant, this means that the effect of employment protection (regular or temporary) on employment growth is different in a recession than it would be in an expansion. The existence of a possible differential effect of employment protection in a recession is underway is tested both in models that assume a linear relationship between EPL indicators and productivity growth, and in models that test for a possible non-linear relationship. We therefore test the following two equations:

⁴ Data available upon request

$$Y_{i,t} = \beta_0 + \beta_1 Y_{i,t-1} + \beta_2 GVA_{i,t} + \beta_3 EPR_{i,t} + \beta_4 (EPR_{i,t} * \text{Recession}) + \beta_5 EPT_{i,t} + \beta_6 (EPT_{i,t} * \text{Recession}) + \beta_7 X_{i,t} + \epsilon_{i,t} \quad (\text{eq. 3})$$

$$Y_{i,t} = \beta_0 + \beta_1 Y_{i,t-1} + \beta_2 GVA_{i,t} + \beta_3 EPR_{i,t} + \beta_4 EPR_{i,t}^2 + \beta_5 (EPR_{i,t} * \text{Recession}) + \beta_6 (EPR_{i,t}^2 * \text{Recession}) + \beta_7 EPT_{i,t} + \beta_8 EPT_{i,t}^2 + \beta_9 (EPT_{i,t} * \text{Recession}) + \beta_{10} (EPT_{i,t}^2 * \text{Recession}) + \beta_{11} X_{i,t} + \epsilon_{i,t} \quad (\text{eq. 4})$$

4. Data

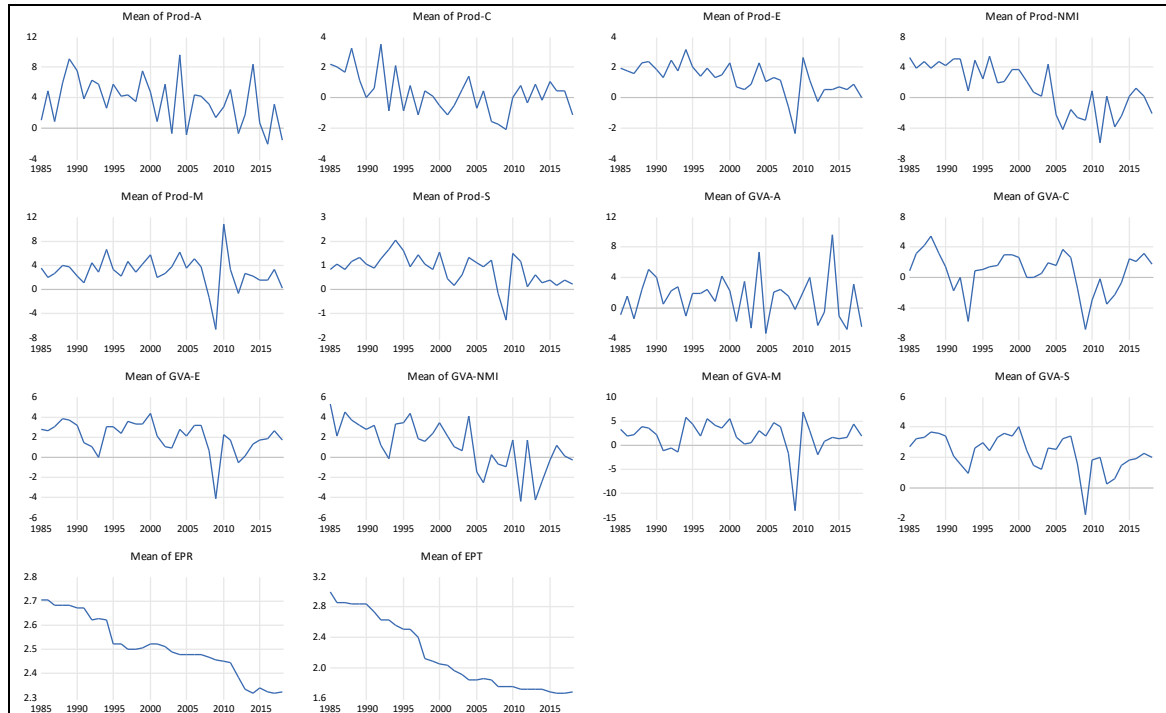
Table 2. Summary statistics (period 1985-2018)

	Mean	Median	Maximum	Minimum	Standard Deviation
Δ Productivity Economy	1.25	1.25	16.45	-13.36	1.57
Δ Productivity Agriculture	3.60	3.30	34.73	-26.09	7.79
Δ Productivity NMI	1.30	1.63	22.41	-53.44	6.75
Δ Productivity Construction	0.32	0.24	16.45	-13.36	3.76
Δ Productivity Manufacturing	2.97	2.82	25.10	-17.84	4.09
Δ Productivity Services	0.84	0.83	5.60	-3.89	1.20
Δ GVA Economy	2.04	2.12	7.83	-8.62	2.02
Δ GVA Agriculture	1.37	0.98	40.98	-26.01	7.35
Δ GVA NMI	1.23	1.40	21.98	-21.45	5.21
Δ GVA Construction	0.78	1.22	13.21	-15.83	5.00
Δ GVA Manufacturing	1.93	2.16	22.70	-23.21	4.67
Δ GVA Services	2.28	2.31	8.55	-4.39	1.70
EPR	2.46	2.45	5.00	1.35	0.70
EPT	2.13	1.94	5.00	0.25	1.12
Productivity USA Economy	79.96	79.39	168.68	20.44	24.98
Productivity USA Agriculture	72.90	68.88	254.74	7.26	38.31
Productivity USA NMI	134.81	91.08	642.64	21.61	113.58
Productivity USA Construction	78.27	75.99	178.82	17.91	28.68
Productivity USA Manufacturing	79.96	78.26	187.23	16.76	27.20
Productivity USA Services	82.19	82.51	139.83	30.98	19.78
ALMP	0.88	0.79	2.70	0.16	0.45
Central	2.74	2.50	5.00	1.00	0.71
Coord	3.47	4.00	5.00	2.00	0.95
PMR	2.80	2.28	5.69	0.55	1.44
Social expenditure	24.01	24.40	33.70	10.42	3.92
Trade openness	75.67	68.40	166.24	34.33	29.56
Union density	41.16	35.85	86.60	8.50	22.65

NMI: Non-manufacturing industry

Table 2 presents the main descriptive statistics for the variables used in the analysis. As mentioned, we analyse data on the growth rates of labour productivity over the years 1985 to 2018 in 13 European countries (Austria, Belgium, Denmark, Finland, France, Germany, Italy, Netherlands, Norway, Portugal, Spain, Sweden, and the United Kingdom). Table 1 does not provide any information on the time dynamics of the variables included in our empirical estimation, neither on the existence of trends or breaks in their evolution that could lead to significant differences at different points during the period analysed or on the existence of a cyclical pattern of behaviour.

Figure 4. Time evolution of labour productivity and GVA growth and EPR and EPT indices



Source: our calculations

Figure 4 shows the evolution over time of average value of the variables related to labour productivity growth, GVA growth and EPR and EPT indexes included in our models. Figure 4 shows a clear downward trend in labour productivity growth in the economy as a whole and in the five analysed sectors. This trend is less evident in terms of GVA growth, except in the case of the non-manufacturing industry and services. In the case of the EPL indexes, the EPR and EPT indices show a marked decline in the value of both indices: thus, between 1985 and 2018 the mean of EPR index declined from 2.70 to 2.32, and the mean of EPT index declined from 3.00 to 1.68.

From an orthodox perspective, lower employment protection should be associated with higher labour productivity growth, as a more flexible labour market should stimulate productivity growth. However, the data suggest the opposite, as the widespread process of labour market flexibilisation has been accompanied by lower labour productivity growth. This highlights the need to study the effect of employment protection on labour productivity growth.

5. Results

In this section, we will present and analyse the results obtained in the estimated models.

Table 3. Determinants of labour productivity growth rate in Economy

	(1)	(2)	(3)	(4)
C	0.1288 (1.7119)	1.2743 (2.2008)	0.0248 (1.6688)	0.9108 (2.2042)
Productivity(-1)	0.1619** (0.0640)	0.1562** (0.0648)	0.1560** (0.0618)	0.1462** (0.0625)
GVA growth	0.4335*** (0.0548)	0.4280*** (0.0550)	0.4960*** (0.0573)	0.5027*** (0.0585)
EPR	0.4588 (0.3308)	-0.4586 (1.1611)	0.4507 (0.3202)	-0.2758 (1.1573)
EPR ²		0.1534 (0.1879)		0.1291 (0.1865)
EPR*recession			0.1241 (0.1559)	-0.1226 (0.5498)
(EPR*recession) ²				-0.0094 (0.1163)
EPT	0.1142 (0.1003)	-0.5194 (0.4191)	0.0925 (0.1030)	-0.6605 (0.4211)
EPT ²		0.1070 (0.0665)		0.1327* (0.0682)
EPT*recession			0.2312 (0.1719)	1.2095* (0.6562)
(EPT*recession) ²				-0.2199* (0.1280)
Productivity USA	-0.0437*** (0.0128)	-0.0400*** (0.0132)	-0.0423*** (0.0126)	-0.0386*** (0.0130)
Social expenditure	0.0408 (0.0324)	0.0559* (0.0328)	0.0410 (0.0323)	0.0525 (0.0322)
Trade openness	0.0057 (0.008)	0.0047 (0.0008)	0.0066 (0.0079)	0.0058 (0.0080)
ALMP	-0.2033 (0.2990)	-0.2127 (0.3063)	-0.3201 (0.3013)	-0.3853 (0.0322)
Union density	0.0328*** (0.0124)	0.0403*** (0.0144)	0.0293** (0.0122)	0.038*** (0.0141)
PMR	-0.2893 (0.2192)	-0.2993 (0.2184)	-0.2614 (0.2132)	-0.2641 (0.2087)
Coord	0.1300 (0.1947)	0.1201 (0.1966)	0.0494 (0.1952)	0.0458 (0.1960)
Central	-0.0001 (0.1817)	0.0123 (0.1809)	0.0841 (0.1807)	0.1060 (0.1785)
Country fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes
R ²	0.6711	0.6739	0.6823	0.6891

Robust standard errors in parenthesis

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

The analysis of the determinants of productivity growth in the economy as a whole (table 3) reveals that productivity growth is positively influenced by economic growth and trade union density. At the same time, as we shall see, the productivity gap with the US has a negative effect (which occurs across various sectors of economic activity), confirming the existence of a catching-up process with respect to the US economy.

Regarding the employment protection indicators, a significant effect is detected only in Model 4, such that protection of temporary employment has a non-linear effect on productivity growth, but only during periods of recession. The effect would be positive below an EPT index of 5.5, a level never recorded, as shown in Table 2. The positive effect would increase up to an EPT equivalent to 2.88, and from that level onwards the effect would diminish. As shown in Figure 4, the average EPT index has fallen from 3.00 in 1985 to 1.68 in 2018. This reduced protection for temporary employment would have meant that, during periods of recession, productivity growth would have fallen by 0.27 percentage points.

In the case of agriculture (table 4), productivity growth is positively related to growth in the sector's GVA, the sector's productivity gap relative to that of the USA, social spending; and the country's trade openness. With regard to employment protection, only protection for permanent employment has a significant effect. This effect is non-linear, following an inverted U-shape, with the greatest impact occurring when the EPR reaches a level of 3.24; above this value, the effect of the EPR diminishes, although it always remains positive. Given that between 1985 and 2018 the average EPR index fell from 2.70 to 2.32, this reduced protection of permanent employment would have led to a reduction in annual productivity growth—measured by its contemporary impact—of 0.6 percentage points.

Table 4. Determinants of labour productivity growth rate in Agriculture

	(1)	(2)	(3)	(4)
C	10.686 (6.4715)	-3.5080 (6.9383)	10.8487 (6.6205)	-3.4640 (7.2980)
Productivity(-1)	0.0571* (0.0316)	0.0524 (0.0315)	0.0567 (0.0319)	0.0575* (0.0283)
GVA growth	1.0302*** (0.0297)	1.0321*** (0.0289)	1.0181*** (0.0396)	1.0432*** (0.0455)
EPR	-0.1911 (1.8706)	9.8115*** (2.9665)	-0.0997 (1.8191)	9.8380*** (3.0694)
EPR ²		-1.6298*** (0.4411)		-1.5178*** (0.4125)
EPR*recession			-0.2148 (0.3859)	1.8699 (1.9202)
(EPR*recession) ²				-0.4784 (0.3910)
EPT	0.3155 (0.2639)	0.5323 (1.0797)	0.2710 (0.2930)	1.9104 (0.6267)
EPT ²		-0.0102 (0.1794)		-0.2546 (0.2711)
EPT*recession			0.1242 (0.3394)	-1.5719 (1.9149)
(EPT*recession) ²				0.3392 (0.3474)
Productivity USA	-0.0167** (0.0060)	-0.0167** (0.0062)	-0.0169** (0.0057)	-0.0313** (0.0106)
Social expenditure	-0.1917** (0.0703)	-0.2455*** (0.0610)	-0.1922** (0.0702)	-0.2865** (0.0970)
Trade openness	-0.0464* (0.0221)	-0.0435* (0.0216)	-0.0472* (0.0222)	-0.0444* (0.02349)
ALMP	0.6389 (0.8257)	0.8439 (0.8635)	0.6723 (0.8342)	0.7073 (1.2929)
Union density	0.0457 (0.0587)	0.0577 (0.0654)	0.0459 (0.0599)	0.0479 (0.0625)
PMR	-0.4122 (0.2985)	-0.4825* (0.2295)	-0.4265 (0.2847)	-0.6301 (0.0625)
Coord	-0.7041 (0.4701)	-0.4339 (0.5224)	-0.7188 (0.4819)	-0.3419 (0.4958)
Central	0.5990* (0.2812)	0.4264 (0.2539)	0.5895* (0.2927)	0.5490 (0.3945)
Country fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	No	No	No	No
R ²	0.8898	0.8932	0.8898	0.9017

Robust standard errors in parenthesis

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

Table 5 shows the results of the models estimating the impact of the explanatory variables of the labour productivity growth in the sector of construction.

Table 5. Determinants of labour productivity growth rate in Construction

	(1)	(2)	(3)	(4)
C	-9.7800* (4.9032)	-7.4701 (4.8179)	-8.1712 (5.1237)	-7.4250 (7.4585)
Productivity(-1)	0.1997*** (0.0578)	0.2006** (0.0856)	0.1936*** (0.0567)	0.1840*** (0.0571)
GVA growth	0.4059*** (0.0470)	0.4051*** (0.0893)	0.3678*** (0.0610)	0.3556*** (0.0628)
EPR	1.3247 (1.1629)	-0.2613 (2.4836)	1.6059 (1.1544)	1.6749 (4.3346)
EPR ²		0.2603 (0.3689)		-0.0401 (0.6966)
EPR*recession			-0.9609*** (0.2848)	-3.0642*** (1.1411)
(EPR*recession) ²				0.4155 (0.2653)
EPT	0.1098 (0.2938)	0.3326 (1.3563)	-0.2953 (0.3195)	-1.4794 (1.3692)
EPT ²		-0.0426 (0.2279)		0.2266 (0.2288)
EPT*recession			0.8952*** (0.2790)	3.2588*** (1.2293)
(EPT*recession) ²				-0.4707* (0.2433)
Productivity USA	-0.1031*** (0.0220)	-0.1038*** (0.0204)	-0.1031*** (0.0214)	-0.0972*** (0.0216)
Social expenditure	0.2209** (0.1003)	0.2269 (0.1999)	0.2257** (0.0999)	0.2256** (0.1011)
Trade openness	0.0571* (0.0300)	0.0574* (0.0297)	0.0508* (0.0289)	0.0501* (0.0290)
ALMP	0.2594 (0.8999)	0.2031 (1.3749)	0.4397 (0.8750)	0.4164 (0.8683)
Union density	0.1263*** (0.0412)	0.1204 (0.0812)	0.1046** (0.0424)	0.1031** (0.0470)
PMR	-0.8827 (0.6486)	-0.8992 (0.9128)	-0.8989 (0.6366)	-0.8495 (0.6401)
Coord	1.0508* (0.6165)	1.0034 (0.9633)	0.9489 (0.6123)	1.0176* (0.6062)
Central	-0.6163 (0.5479)	-0.5955 (0.7617)	-0.4968 (0.5440)	-0.5321 (0.5378)
Country fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes
R ²	0.4360	0.4365	0.4545	0.4630

Robust standard errors in parenthesis

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

In the case of construction, growth in the sector's real productivity is positively influenced by growth in the sector's value added, social spending and trade union density, and has a positive impact on the productivity gap with the United States.

As regards the impact of employment protection, the effects are mixed. Regular employment protection would negatively affect productivity growth, but only during periods of recession. This implies that the observed reduction in the average value of the EPR index would have had a positive effect on productivity growth in the construction sector. Conversely, temporary employment protection would always have a positive effect on productivity growth during periods of recession. Therefore, lower levels of temporary employment protection would have caused productivity growth during periods of recession to decline considerably, by between 1.4 and 2.2 percentage points.

In the non-manufacturing sector (Table 6), as in the preceding sectors, the productivity gap with the United States and the sector's GVA growth have a positive effect on productivity growth. In the case of employment protection, the impact depends on the indicator. In the employment protection for regular workers, the results show that the effect of this protection is negative, but this only occurs during recessions. Therefore, the observed reduction in protection for permanent employment would have had a positive effect on productivity growth.

Table 6. Determinants of labour productivity growth rate in Non-manufacturing industry

	(1)	(2)	(3)	(4)
C	12.9404 (9.6075)	21.2465 (13.2344)	14.2157 (9.2350)	7.6960*** (2.5834)
Productivity(-1)	0.1056* (0.0611)	0.0811 (0.0610)	0.1113* (0.0606)	0.0956*** (0.0337)
GVA growth	0.8971*** (0.0576)	0.8822*** (0.0576)	0.8798*** (0.0741)	0.9012*** (0.0618)
EPR	-0.6613 (0.9129)	-5.5975 (4.3559)	-0.5809 (0.9333)	-2.8334 (1.8527)
EPR ²		0.8124 (0.6398)		0.4168 (0.3332)
EPR*recession			-0.9198** (0.4406)	-2.5496* (1.3360)
(EPR*recession) ²				0.4226 (0.2789)
EPT	0.3821 (0.5404)	-6.1252*** (2.0356)	0.1326 (0.5428)	-4.0237*** (1.0878)
EPT ²		1.1253*** (0.3234)		0.7140*** (0.2088)
EPT*recession			1.0850** (0.4926)	1.9374 (1.5983)
(EPT*recession) ²				-0.1567 (0.3287)
Productivity USA	-0.0253*** (0.0072)	-0.0232*** (0.0070)	-0.0256*** (0.0072)	-0.0073*** (0.0022)
Social expenditure	0.0033 (0.1536)	0.1112 (0.1435)	-0.0151 (0.1530)	0.0093 (0.0834)
Trade openness	0.0012 (0.0454)	-0.0113 (0.0466)	0.0107 (0.0457)	-0.0020 (0.0104)
ALMP	-0.1128 (1.8189)	-0.1103 (1.7903)	-0.3488 (1.8024)	0.3682 (0.5944)
Union density	-0.0821 (0.0777)	-0.0001 (0.0725)	-0.0947 (0.0761)	-0.0191 (0.0142)
PMR	-1.2278 (0.7470)	-1.1167 (0.7452)	-1.3368* (0.7461)	0.4856** (0.2113)
Coord	-0.8585 (0.8445)	-0.8812 (0.8587)	-0.9437 (0.8465)	0.2021 (0.3786)
Central	0.4545 (0.8523)	0.5818 (0.8531)	0.5327 (0.8440)	0.2307 (0.4537)
Country fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes
R ²	0.6578	0.6718	0.6642	0.6281

Robust standard errors in parenthesis

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

Conversely, we detect a non-linear relationship between productivity growth and employment protection for temporary workers, taking the form of a U-curve. Employment protection for temporary workers would have a negative effect on productivity growth, except for indicator values close to 6 (well above the highest value actually recorded). The greatest negative effect of employment protection would happen

for values of the EPT index between 2.7 and 2.8. Given that the average value of the EPT index has fallen from 3 to 1.68 in 2018, greater flexibility in the use of temporary contracts would have had a positive effect on productivity growth of between 1.5 and 2.3 percentage points.

Table 7. Determinants of labour productivity growth rate in Manufacturing

	(1)	(2)	(3)	(4)
C	-2.6605 (2.9315)	-1.2427 (3.8806)	-2.4993 (2.905)	1.8026 (4.0466)
Productivity(-1)	0.0102 (0.0434)	0.0093 (0.0439)	0.0027 (0.0426)	-0.0014 (0.0428)
GVA growth	0.7765*** (0.0420)	0.7736*** (0.0429)	0.8027*** (0.5392)	0.7938*** (0.0460)
EPR	0.9143* (0.5359)	-0.0267 (2.077)	1.0374* (0.2099)	0.8146 (2.1196)
EPR ²		0.1558 (0.3196)		0.0391 (0.3274)
EPR*recession			-0.2255 (0.2099)	-1.2966 (0.9118)
(EPR*recession) ²				0.1882 (0.1796)
EPT	0.2571 (0.2080)	-0.2565 (0.8672)	0.0710 (0.2206)	-1.0341 (0.9337)
EPT ²		0.0877 (0.1331)		0.2026 (0.1480)
EPT*recession			0.4913** (0.1916)	1.8502** (0.9163)
(EPT*recession) ²				-0.2725 (0.1662)
Productivity USA	-0.0293** (0.0139)	-0.0291** (0.0139)	-0.0288** (0.0137)	-0.02725** (0.0136)
Social expenditure	0.1385** (0.0636)	0.1508** (0.0656)	0.1257** (0.0622)	0.1277** (0.0641)
Trade openness	-0.0353 (0.0211)	-0.0361 (0.0219)	-0.0379* (0.0217)	-0.0391* (0.0216)
ALMP	-0.4509 (0.6615)	-0.4562 (0.6721)	-0.3065 (0.6517)	-0.2327 (0.6613)
Union density	0.0007 (0.0256)	0.0064 (0.0288)	-0.0017 (0.0253)	0.0078 (0.0285)
PMR	-0.1645 (0.4573)	-0.1619 (0.4593)	-0.1259 (0.4522)	-0.0648 (0.4501)
Coord	1.0705*** (0.3787)	1.0540*** (0.3819)	0.9950*** (0.3729)	1.0510*** (0.3818)
Central	0.0981 (0.3823)	0.1113 (0.3823)	0.2225 (0.3801)	0.1996 (0.3790)
Country fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes
R ²	0.8115	0.8119	0.8165	0.8184

Robust standard errors in parenthesis

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

In the manufacturing sector (table 7), productivity growth is positively correlated with sectoral GVA growth, social spending and the degree of coordination in collective bargaining. As regards protection of permanent employment, this has a positive impact; therefore, lower protection would have contributed to reducing productivity growth by around 0.4 percentage points. In the case of protection for temporary employment, this only affects productivity growth during periods of recession. The effect is positive; consequently, reduced protection for temporary employment would have contributed to exacerbating the negative impact on productivity during periods when there is a decline in sectoral GVA. In summary, reduced employment protection would have contributed to a reduction in manufacturing productivity growth.

In the case of the services sector (Table 8), productivity growth is directly related to the sector's GVA growth, to the productivity gap with the USA, and to trade union density. Conversely, it is inversely related to the PMR indicator, which reflects the existence of regulatory barriers to competition in goods and services.

Table 8. Determinants of labour productivity growth rate in Services

	(1)	(2)	(3)	(4)
C	1.004 (1.7800)	0.5314 (2.0962)	0.8739 (1.7364)	0.7653 (2.0389)
Productivity(-1)	0.1257** (0.0583)	0.1242** (0.0586)	0.1283** (0.0571)	0.1246** (0.0567)
GVA growth	0.4158*** (0.0461)	0.4209*** (0.0460)	0.4748*** (0.0489)	0.4927*** (0.0493)
EPR	0.2250 (0.2814)	0.5732 (1.0591)	0.1860 (0.2742)	0.5028 (1.0708)
EPR ²				-0.0443 (0.1773)
EPR*recession			0.2191 (0.1528)	-0.4441 (0.5369)
(EPR*recession) ²				-0.0159 (0.1131)
EPT	0.0663 (0.0767)	-0.4859 (0.3514)	0.0787 (0.0759)	-0.5966* (0.3564)
EPT ²		0.0981* (0.0591)		0.1211** (0.0608)
EPT*recession			0.0998 (0.1626)	1.2787* (0.6842)
(EPT*recession) ²				-0.2818* (0.1446)
Productivity USA	-0.0327** (0.0127)	-0.03291** (0.0128)	-0.0343*** (0.0125)	-0.0353*** (0.0127)
Social expenditure	0.0721** (0.0288)	0.0786*** (0.0295)	0.0696** (0.0285)	0.0714** (0.0294)
Trade openness	-0.0096 (0.0075)	-0.0103 (0.0075)	-0.0081 (0.0072)	-0.0099 (0.0073)
ALMP	-0.2465 (0.2528)	-0.2166 (0.2597)	-0.2979 (0.2468)	-0.3188 (0.2520)
Union density	0.0209* (0.0110)	0.2094** (0.0127)	0.0181 (0.0110)	0.0289** (0.0126)
PMR	-0.3415** (0.1698)	-0.3250* (0.1696)	-0.2966* (0.1613)	-0.2726* (0.1609)
Coord	0.0962 (0.1611)	0.1201 (0.1616)	0.0951 (0.1585)	0.0746 (0.1592)
Central	-0.0675 (0.1501)	-0.0720 (0.1502)	-0.0241 (0.1466)	-0.0023 (0.1466)
Country fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes
R ²	0.5656	0.5693	0.5801	0.5905

Robust standard errors in parenthesis

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

Employment protection for regular workers does not affect productivity growth in the services sector. However, a significant effect is detected in the case of employment protection for temporary workers when we jointly test the hypothesis of a non-linear relationship, conditional on the existence of a possible differential effect arising from a recession in the sector. The data in Table 8 (Equation 4) show that when the GVA of the services sector grows, the EPT exerts a U-shaped negative effect, and only when the EPT

is very high would the effect be positive. The greatest negative effect occurs with an index of 2.46. Given that the EPT would have fallen from 3 to 1.68 during the period analysed, this greater flexibility in temporary hiring would not have had any impact on productivity growth.

However, during recessions, the EPT has a positive effect on productivity growth, with an inverted U-shaped relationship, such that the greatest positive effect would occur at an EPT index of 2.28. Nevertheless, above an index of 4.2, protection for temporary employment would negatively affect productivity growth. Taking both effects together, when the EPT index does not exceed 4.2 points, temporary employment protection would have a positive effect during recessions. In any case, given that the average value of the EPT fell from 3 to 1.68, the effect of this greater labour market flexibility on productivity growth had been minimal, at less than 0.1 percentage points.

Table 9. Impact of explanatory variables on labour productivity growth

	Economy	Agriculture	Construction	Non-manufacturing industry	Manufacturing	Services
GVA growth	Positive	Positive	Positive	Positive	Positive	Positive
EPR		Positive	Negative in recessions	Negative in recessions		
EPT	Positive in recessions		Positive in recessions	Negative	Positive in recessions	Negative but Positive in recessions
Productivity USA	Negative	Negative	Negative	Negative	Negative	Negative
Social expenditure		Negative	Positive		Positive	Positive
Trade openness		Negative	Positive		Positive	
ALMP						
Union density	Positive		Positive			Positive
PMR						Negative
Coord			Positive		Positive	
Central						

Table 9 summarises the results of the effects of the explanatory variables included in the tested models on labour productivity growth. As can be seen, only two variables affect all sectors in the same way: growth in GVA, in a positive sense, and the productivity gap with the US, in this case negatively. Focusing on the effects of employment protection legislation, protection of permanent employment only affects productivity growth in agriculture, construction and non-manufacturing industry; it does not affect productivity in manufacturing, services or the economy as a whole. In the case of protection of temporary employment, the effects vary depending on the sector and the phase of the economic cycle.

6. Conclusions

Our study of the determinants of labour productivity growth has allowed us to draw a number of conclusions that we believe are highly relevant from both an economic and an economic policy perspective.

The first conclusion is that economic growth, both for the economy as a whole and for the various sectors, always has a positive impact on labour productivity growth. This implies that, at the aggregate level, the slowdown in economic growth observed in the European countries analysed would be a key factor in explaining the observed decline in labour productivity growth. Consequently, measures to stimulate economic activity, such as expansionary demand-side policies, would help to accelerate the rate of growth in labour productivity, which would have a positive effect on economic activity and growth in both the short and long term.

With regard to employment protection, employment protection of permanent workers would not influence labour productivity growth in the economy as a whole. However, employment protection for of temporary workers would have a positive effect, but only during periods of recession, which, let us recall, we identify as periods in which there is a fall in GVA. Thus, during recessions, labour productivity falls due to the decline in economic activity, but this decline is mitigated by the positive effect of employment protection for temporary workers. However, as noted, the reforms implemented to make the use of temporary contracts more flexible have reduced this offsetting effect.

It should be borne in mind that the data show a marked increase in the frequency of recessions since the year 2000, which amplifies the negative effects on labour productivity resulting from greater labour market flexibility. In this regard, to boost productivity growth, a mix of policies to stimulate aggregate demand and labour market reforms improving job protection for temporary workers would be desirable.

In this regard, from the perspective of the effects on productivity growth, the labour flexibility strategy implemented in most European countries, based on slightly reducing employment protection for permanent workers whilst making temporary hiring more flexible, proves to be clearly detrimental to economic activity in the short and medium-term, as the effects of employment protection for temporary and regular workers are not similar, a fact already confirmed by existing studies on the effects on aggregate employment.

In fact, these differences become clear when we analyse the effect of employment protection, and of other variables related to labour market institutions, on productivity across different sectors. Thus, employment protection for regular workers and temporary and fixed-term contracta, has different effects in each sector.

Given that labour productivity growth is a key factor in economic growth, at both the aggregate and sectoral levels, in light of the results obtained, it is reasonable to hypothesise that the labour market reforms implemented in European countries over recent decades may have triggered a process of structural change in these countries by affecting the growth of GVA in each sector differently. However, this is an issue which, whilst having profound implications for economic and structural policy, lies beyond the scope of this paper

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