The Effect of Employment Protection Legislation on Unemployment

An Empirical Analysis of NBER Data

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Abstract

This paper examines the relationship between Employment Protection Legislation (EPL) and unemployment rates across OECD countries from 1996 to 2019. The literature presents conflicting views, with theoretical models often suggesting that strict EPL raises unemployment due to labor market rigidity, while empirical evidence remains mixed. Using a dataset spanning 26 countries, this study employs a two-stage least squares (2SLS) model to account for endogeneity in EPL. The results indicate a significant positive correlation between stringent EPL and unemployment: A 10 basis-point increase in the EPL index (scale 1 through 5) is associated with a 55 basis-point rise in the unemployment rate. These findings underscore the importance of context-specific labor market reforms and suggest that easing EPL in countries with high unemployment could reduce joblessness. However, further research should explore the broader effects of EPL on job quality, worker satisfaction, and economic well-being, as well as the long-term impacts of regulatory changes on labor markets. The study's findings contribute to the ongoing debate on labor market flexibility and unemployment, offering insights for policymakers aiming to balance employment protection with economic efficiency.

Keywords: *Employment Protection Legislation (EPL), unemployment, labor market regulation, OECD countries, labor market flexibility, labor market reforms, two-stage least squares (2SLS), endogeneity, job security, economic growth, severance pay, active labor market policies (ALMPs), employment protection reforms, worker productivity, labor market outcomes*

1 Introduction

Employment Protection Legislation (EPL) plays a critical role in shaping labor market outcomes, particularly in developed economies where labor regulations significantly influence employment dynamics. EPL refers to laws and regulations designed to protect workers from arbitrary or unjust dismissals, typically by imposing restrictions on layoffs, mandating severance pay, and offering safeguards for workers under various contract types. While the primary intention of EPL is to provide job security and protect workers' rights, its broader implications for unemployment remain a contentious issue in economic research.

Theoretical models suggest that stringent EPL can increase unemployment by raising the costs associated with hiring and firing, leading firms to be more cautious when adjusting their workforce in response to economic changes. Proponents of this view argue that higher dismissal costs create labor market rigidity, prolonging unemployment during downturns. On the other hand, some empirical studies suggest that the effects of EPL on unemployment are minimal or context-dependent, with non-institutional factors such as macroeconomic conditions playing a larger role in determining unemployment levels.

This paper aims to investigate the relationship between EPL and unemployment across OECD countries, using a comprehensive dataset from 1996 to 2019. By employing a two-stage least squares (2SLS) approach to address potential endogeneity, this study provides new insights into how varying levels of employment protection impact labor market outcomes. The analysis not only explores the direct effects of EPL on unemployment but also considers broader economic factors such as GDP growth, investment, and country-specific institutional contexts. Through this empirical investigation, the paper seeks to contribute to the ongoing debate on the role of labor market regulations and their impact on economic efficiency and employment stability.

2 The EPL Index

Employment Protection Legislation (EPL) defines the legal framework governing hiring and dismissals in labor markets, balancing worker protection with employer flexibility. According to the OECD, EPL measures the strictness of rules in three main areas: protection of regular workers against individual dismissal, regulation of temporary contracts, and additional requirements for collective dismissals. These components are further subdivided into specific criteria, such as procedural inconveniences, notice and severance pay for individual dismissals, and limitations on temporary contracts and collective dismissals. The scale of the indicator is 0 to 5, with 0 being completely unregulated and 5 representing the heaviest restrictions. 1 provides a visual overview of this framework.

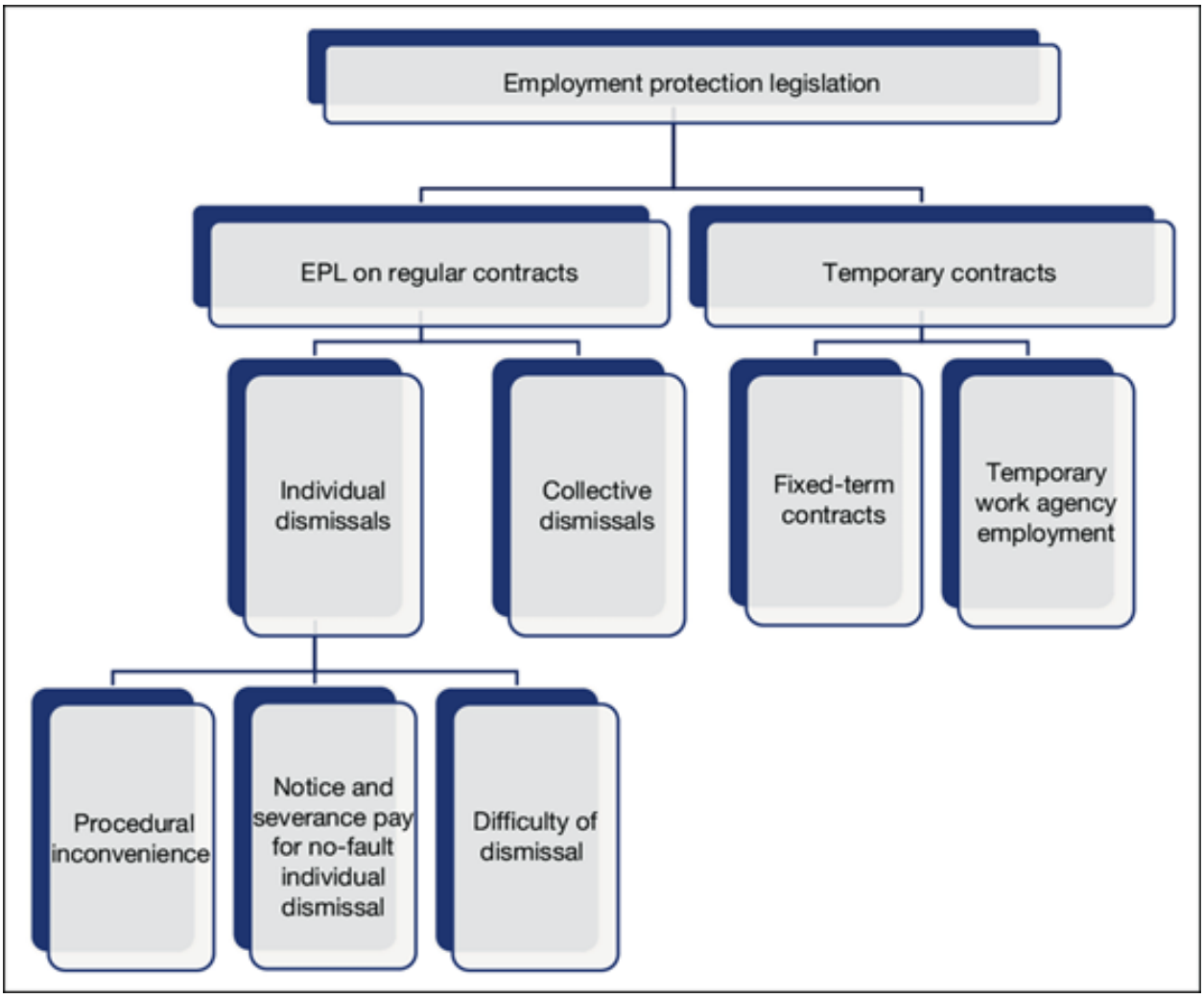

Figure 1: Components of the OECD Employment Protection Legislation Indicator.

3 Literature Review

The relationship between EPL and unemployment has been a subject of extensive research, yielding a spectrum of findings that often appear contradictory. This literature review aims to synthesize different studies to highlight the complexities surrounding EPL's impact on unemployment rates. The existing literature can be categorized into theoretical frameworks that propose mechanisms through which EPL affects labor markets and empirical analyses that seek to validate these theories through data.

3.1 Theoretical Findings

The theoretical discourse on EPL predominantly suggests that stringent employment protection can lead to increased unemployment. Ferreiro and Gomez, along with Apergis and Apergis [17], argue that labor market imperfections, such as those introduced by EPL, create

wage frictions that hinder the labor market's ability to adjust swiftly to economic fluctuations. This rigidity can result in prolonged periods of unemployment during economic downturns, as firms are reluctant to lay off employees due to high dismissal costs. Cahuc et al., Filomena and Picchio [29], and Bassanini and Duval [19], as well as Sahnoun and Abdennadher [39], support this view, positing that high EPL discourages hiring by increasing the costs associated with dismissals, thereby leading to a decrease in overall employment opportunities. Conversely, Burda and Koutentakis [35] present a nuanced perspective, suggesting that while EPL introduces frictions, it can also lead to adjustments in severance pay structures that may mitigate its impact on unemployment rates. Blanchard et al., and Brey and Hertweck [25] further complicate the narrative by identifying opposing effects of EPL: while lower EPL may lead to increased layoffs in the short term, it could foster greater hiring in the long term by making labor markets more attractive to firms. Voigt and Zohlnhöfer [44], offer an alternative interpretation, positing that higher EPL could reduce worker productivity by reducing the effect of layoffs as a "worker-discipline device", which paradoxically could lead to reduced unemployment as firms require more workers to maintain output levels.

3.2 Empirical Findings

Empirical investigations into the effects of EPL on unemployment provide a mixed bag of results, with many studies indicating an insignificant relationship. For instance, Baker et al. [18] and Bertola and Koeniger [21], along with Bassanini and Duval [19], and Kolbe and Kayran [34], found that variations in structural unemployment rates could largely be attributed to non-institutional factors, such as macroeconomic conditions and country-specific characteristics, rather than EPL itself. This sentiment is echoed by Berger and Danninger [20], Radulescu and Robson [38], and Amable et al. [16], as well as Chung and Mau [27], who similarly conclude that the influence of EPL on unemployment is minimal when controlling for other variables.

However, some empirical studies have identified weakly significant effects of EPL on employment dynamics. Fiori et al. [30] and Lastauskas and Stakėnas [37] suggest that while EPL may increase non-agricultural employment, its overall impact on unemployment is context-dependent, particularly in industrialized nations like those in the OECD. Bordon et al. [24] and Garibaldi [31] take a different approach by examining structural reforms within EPL, concluding that such reforms can lead to a notable decrease in unemployment rates over time. De Serres et al. [28] and Bjuggren and Skedinger [22] argue that stronger EPL on regular contracts can reduce unemployment by stabilizing employment relationships, particularly in contexts where temporary contracts are prevalent.

The inconclusiveness of these findings highlights the need for further investigation into the nuanced interactions between EPL, labor market dynamics, and broader economic conditions. For instance, Sahnoun and Abdennadher [39] emphasize that the impact of EPL is sensitive to national contexts, suggesting that the effects observed in one country may not be generalizable to others. This is particularly relevant in the context of varying labor market institutions and cultural attitudes towards employment protection across different nations.

3.3 Recent Developments and Future Research Directions

Recent studies have begun to explore the complexities of EPL in the context of broader labor market reforms and economic conditions. For example, Brey and Hertweck [25] analyze the role of short-time work schemes during economic downturns, suggesting that such measures can mitigate the adverse effects of EPL on unemployment volatility. Voigt and Zohlnhöfer [44] delve into the political dimensions of EPL, examining how partisan politics and electoral competition shape employment protection policies and their subsequent effects on labor market outcomes. Moreover, the interplay between EPL and active labor market policies (ALMPs) has garnered attention. Apergis and Apergis [17] argue that for ALMPs to be effective, they must be complemented by less stringent EPL, highlighting the importance of a balanced approach to labor market regulation. This perspective aligns with findings from Koutentakis [35], who posits that weak EPL can facilitate firings during recessions and hiring during expansions, suggesting a dynamic relationship between EPL and unemployment that warrants further exploration.

In summary, the literature on EPL and unemployment presents a complex and often contradictory landscape. While theoretical frameworks predominantly suggest a negative impact of strict EPL on unemployment, empirical evidence remains mixed, with many studies indicating insignificant relationships. Future research should focus on the contextual factors that influence these dynamics, including the interplay between EPL, ALMPs, and broader economic conditions, to develop a more nuanced understanding of how employment protection shapes labor market outcomes.

4 Data

The dataset utilized in this analysis is derived from the OECD data bank, encompassing 26 countries that are either members of the OECD or exhibit similar developmental characteristics, allowing a robust cross-country comparison. The dataset comprises annual observations spanning from 1996 to 2019, resulting in over 5,800 observations across 14 variables. This extensive dataset allows for a comprehensive examination of the relationship between EPL and unemployment across diverse economic contexts.

4.1 Unemployment and EPL

To ensure clarity and comparability, it is crucial to define the specific measurement of unemployment employed in this study. The definition adopted follows the OECD's criteria, which categorizes individuals of working age who are without work, available for work, and have actively sought employment. This definition explicitly excludes discouraged workers, thereby providing a more accurate representation of unemployment rates [28]. Utilizing this standardized definition enhances the international comparability of the results. The data on unemployment is sourced from labor force surveys (LFS), with Eurostat estimates applied for EU countries.

As described above, EPL is quantified using an indicator developed by the OECD, which ranges from 0 (very loose) to 5 (very strict). The theoretical implications of EPL on un-

employment, as discussed in the literature review, remain inconclusive, underscoring the necessity for empirical investigation.

My sample of 852 observations highlights the stability of EPL over time, with less than 10% of cases showing year-over-year changes. Most adjustments are minor, typically ranging from 10 to 40 basis points, as shown in 1. The observed stability in EPL is particularly advantageous as it provides a strong basis for the application of instrumental variables later.

Table 1: Distribution of Year over Year Changes in EPL

YoY change in EPL	**Frequency**	**Percent**
< -0.4	7	0.85
-0.4 to -0.1	36	4.52
0	754	91.84
0.1 to 0.4	20	2.43
> 0.4	3	0.37

4.2 Control Variables and Theorized Signs

In addition to EPL, it is essential to control for other factors that may influence unemployment rates. Heimberger [6] conducted a meta-analysis summarizing various studies on the EPL-unemployment relationship, identifying key control variables such as unemployment benefits, GDP growth, real interest rates, capital accumulation, and product market regulation. In this study, I have adapted some of these variables, although some with different measurements.

For instance, instead of focusing solely on unemployment benefits, I have employed a broader measure of labor market policy spending as a percentage of GDP. This measure encompasses various government programs, including housing support, which allow for a more comprehensive understanding of labor market policy impact on unemployment. Other important variables included in this analysis are GDP growth, real interest rates, trade openness, union density, and investment levels, among others, all of which are expected to influence unemployment in diverse ways, depending on their respective macroeconomic contexts. A full list of control variables used, and their theorized signs is provided in 2.

Additionally, to enhance the robustness of the analysis and mitigate potential assumption violations, such as heteroskedasticity, several variables have been transformed using lags and logarithms. Furthermore, country and year dummies will be incorporated to account for unobserved individual effects that are not captured by the macroeconomic and institutional control variables.

The control variables, as summarized in 2, provide a comprehensive foundation for investigating the relationship between EPL and unemployment. By employing standardized definitions and robust statistical methods, this study aims to contribute valuable insights into the ongoing discourse regarding the impact of employment protection on labor market outcomes.

Table 2: Control Variables and Their Expected Signs with Rationale

Variable	**Expected Sign**	**Rationale**
Labor Market Policy Spending (LMP) as % of GDP	Positive	Higher benefits may reduce the incentive to seek employment.
Real Long-Term Interest Rate	Positive	High interest rates are often associated with contractionary monetary policy.
Trade Openness	Ambiguous	Increased competition from outsourcing may impact domestic labor markets.
Export Orientation Rate	Negative	A strong export orientation can stimulate capital and reduce unemployment.
Growth of Fixed Capital Formation (GFCF)	Negative	Increased investment typically increases growth.
Lagged Cross-Sector Population Growth	Ambiguous	Similar ratio to labor force participation growth.
Union Density	Ambiguous	Unions may prevent layoffs but could disincentivize hiring.
GDP Growth	Negative	GDP growth is viewed as a countercyclical indicator.
GDP per Labor Force	Positive	Fewer workers are needed to achieve the same output, "worker discipline device" (Voigt et al. hypothesis [44]).
Debt-to-GDP Ratio	Positive	High debt may indicate dysfunctional institutions.
Annual Hours Worked	Negative	Increased hours may indicate fewer workers are needed for the same output.
Output Gap	Negative	Larger output gap typically correlates with higher cyclical unemployment.

4.3 Estimation Method and Addressing Endogeneity

The functional form of the regression model is a critical component in empirical analysis, as it determines how the relationship between the dependent variable Y_t (unemployment rate) and the independent variable X_t (Employment Protection Legislation, EPL) is modeled. Theoretical and empirical considerations guided the exploration of several candidate specifications [45, 32]. The baseline models tested include:

$$\text{Linear:} \quad Y_t = \beta_0 + \beta_1 X_t + \sum_{k=2}^{K} \beta_k C_{k,t} + \varepsilon_t, \tag{1}$$

$$\text{Logarithmic:} \quad Y_t = \beta_0 + \beta_1 \ln(X_t) + \sum_{k=2}^{K} \beta_k C_{k,t} + \varepsilon_t, \tag{2}$$

$$\text{Quadratic:} \quad Y_t = \beta_0 + \beta_1 X_t + \beta_2 X_t^2 + \sum_{k=3}^{K} \beta_k C_{k,t} + \varepsilon_t. \tag{3}$$

Exploratory data analysis, including scatter plots, suggested potential non-linearities in the relationship between X_t and Y_t. Among the tested specifications, the quadratic model in Equation 3 exhibited the best fit, as measured by the adjusted R^2 and the significance of the estimated coefficients. The non-linear relationship implies that the marginal effect of EPL on unemployment, $\frac{\partial Y_t}{\partial X_t} = \beta_1 + 2\beta_2 X_t$, varies with X_t. The turning point of the quadratic relationship is given by:

$$X^* = -\frac{\beta_1}{2\beta_2},$$

indicating the level of EPL where its effect on unemployment transitions from positive to negative or vice versa [41]. This theoretical framework aligns with findings in the literature that suggest EPL may have both protective and distortionary effects depending on its level [26, 33].

Table 3: Regression Results: Linear OLS, Quadratic 2SLS, and Linear 2SLS Models

Variable	**Linear OLS**	**Quadratic 2SLS**	**Linear 2SLS**
EPL	5.800878**	14.55956**	5.522012*
EPL^2	-0.7370318*	-1.594915*	–
% of GDP spent on LMP (lagged)	1.054083	0.9928203	-0.2879513
Real LT interest rate	0.1178606	-0.1911244*	0.1404068
LF participation rate growth	-0.2660143	-0.2102175	-0.2718022
Gross fixed capital formation (lagged, logged)	-12.01255***	-14.43486***	-14.36897***
Working age population growth (lagged)	0.1538487	-0.1538053	0.1885924
Union density	-0.2118976**	-0.2050355**	-0.1874358*
GDP growth in %	-0.0450278	-0.0852432	-0.087813
GDP/labor force	0.0003787*	0.0004639*	0.0004734*
Debt / GDP	0.0031392	0.0070166	0.0038288
Output gap in % of potential GDP	-0.4300777***	-0.4243889***	-0.4676073***
Constant	11.49143	3.96086	15.03797*
Within R^2	0.54	0.72	0.72
Significance levels:	* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$		

However, endogeneity in X_t poses a significant challenge to causal inference. Endogeneity arises when $\mathbb{E}[\varepsilon_t | X_t] \neq 0$, violating the Gauss-Markov assumption of strict exogeneity.

Sources of endogeneity include omitted variable bias, measurement error, and simultaneous causality, the latter of which could pose an issue here [41]. EPL may not only influence unemployment but also be influenced by policy adjustments as a direct response to changes in unemployment, introducing simultaneity bias. To address this, a Two-Stage Least Squares (2SLS) approach was employed, using instrumental variables (IV) to isolate the exogenous variation in X_t.

Let Z_t denote the instrumental variable. For Z_t to be valid, it must satisfy two conditions: (1) relevance, $\text{Cov}(X_t, Z_t) \neq 0$, and (2) exclusion, $\text{Cov}(Z_t, \varepsilon_t) = 0$. In this study, $Z_t = X_{t-3}$, the three-period lag of EPL, was selected as the instrument. The relevance condition is supported by the persistence of EPL over time, as shown in 1 earlier. The exclusion restriction is justified by the assumption that lagged EPL affects unemployment only indirectly through its influence on current EPL.

The 2SLS procedure involves two stages. In the first stage, X_t is regressed on Z_t and the control variables $\sum_{k=2}^{K} C_{k,t}$ to obtain the predicted values $\hat{X}_t$:

$$X_t = \pi_0 + \pi_1 Z_t + \sum_{k=2}^{K} \pi_k C_{k,t} + \eta_t,$$

where η_t is the first-stage error term. In the second stage, Y_t is regressed on $\hat{X}_t$ and the control variables $\sum_{k=2}^{K} C_{k,t}$:

$$Y_t = \beta_0 + \beta_1 \hat{X}_t + \sum_{k=2}^{K} \beta_k C_{k,t} + \varepsilon_t.$$

The strength of the instrument was evaluated using the first-stage F-statistic, where a value of $F = 12.32$ exceeds the conventional threshold of 10, indicating a strong instrument. To account for unobserved heterogeneity, a Random Effects (RE) model with year and country dummies was employed [41]. The final model is expressed as:

$$Y_{i,t} = \beta_0 + \beta_1 \hat{X}_{i,t} + \sum_{k=2}^{K} \beta_k C_{k,i,t} + \alpha_i + \gamma_t + \varepsilon_{i,t},$$

where α_i captures country-specific random effects, γ_t controls for year fixed effects, and $\varepsilon_{i,t}$ is the idiosyncratic error term.

After implementing the 2SLS regression, the results indicated that the linear specification provided a fit comparable to the quadratic model. This finding underscores the importance of accounting for endogeneity when selecting the functional form. While the quadratic model initially appeared superior in the OLS framework, the IV regression revealed a linear relationship between EPL and unemployment. The methodological rigor of addressing endogeneity ensures that the estimated coefficients are consistent and unbiased, reinforcing the reliability of the empirical findings.

4.4 Assumption Violations and Diagnostic Tests

In addition to potential specification errors, it is essential to rigorously test for violations of the classical assumptions underlying the regression model. These include multicollinear-

ity, heteroskedasticity, and autocorrelation, as their presence can bias coefficient estimates, inflate standard errors, or reduce the efficiency of statistical inference. [45, 32]

4.4.1 Multicollinearity

Multicollinearity arises when two or more independent variables exhibit strong linear relationships, leading to inflated standard errors of the estimated coefficients. To assess multicollinearity, the Variance Inflation Factor (VIF) is calculated for each independent variable. The VIF for a variable X_k is given by:

$$\text{VIF}(X_k) = \frac{1}{1 - R_k^2},$$

where R_k^2 is the coefficient of determination obtained by regressing X_k on all other independent variables. High VIF values (VIF > 10) indicate problematic multicollinearity [41]. In this study, high VIF values were observed for variables such as lagged labor market policy spending, union density, lagged logarithmic Gross Fixed Capital Formation (GFCF), and the debt-to-GDP ratio. To further investigate, the correlation matrix of the independent variables was analyzed. Pairwise correlations exceeding 0.6 were noted but were not the primary source of concern. Instead, multicollinearity appeared to stem from the combined effects of multiple variables, as reflected in their VIF values.

To mitigate multicollinearity, variables deemed redundant or theoretically overlapping were excluded. For instance, union density, which is conceptually and empirically related to EPL, was omitted. However, variables such as GFCF were retained due to their significance in capturing unique investment effects not addressed by other controls.

The results of the VIF test are presented in Table 4.

Table 4: Variance Inflation Factor (VIF) Results

Variable	**VIF**
% of GDP spent on LMP (lagged)	11.45
Real long-term interest rate	2.47
Export orientation	4.39
LF participation rate	1.15
GFCF (lagged, logged)	22.09
Working age population growth (lagged)	2.35
Union density	12.83
GDP growth in %	2.86
Debt / GDP	15.23
Outputgap in % of potential GDP	6.47

4.4.2 Heteroskedasticity

Given the diversity of countries in the dataset, groupwise heteroskedasticity is a plausible concern. Heteroskedasticity violates the assumption $\text{Var}(\varepsilon_{i,t}) = \sigma^2$, where the variance of the error term is constant across observations [32]. The presence of groupwise heteroskedasticity

was tested using the modified Wald test, which is well-suited for panel data. The null hypothesis of homoskedasticity is expressed as:

$$H_0 : \sigma_i^2 = \sigma^2 \quad \text{for all } i,$$

where σ_i^2 represents the variance of the error term for group i. The test statistic is calculated as:

$$\chi^2 = \frac{1}{2} \sum_{i=1}^{N} \left(\frac{\hat{e}_i^2 - \bar{e}^2}{\bar{e}^2} \right)^2,$$

where $\hat{e}_i^2$ is the variance of the residuals for group i and $\bar{e}^2$ is the mean residual variance. The results strongly rejected the null hypothesis ($p < 0.01$), confirming the presence of heteroskedasticity.

The results of the test are presented in Table 5.

Table 5: Modified Wald Test for Groupwise Heteroskedasticity

Test	**Results**
Null Hypothesis	$\sigma(i)^2 = \sigma^2$ for all i
χ^2 statistic	23690.71
Degrees of Freedom	27
p-value	0.0000

Additionally, the Breusch-Pagan LM test was conducted to assess the independence of residuals across panel units. The null hypothesis for this test is independence of residuals, and the results also strongly rejected the null hypothesis ($p < 0.01$), suggesting significant correlations between panel units.

The results of the test are presented in Table 6.

Table 6: Breusch-Pagan LM Test of Independence

Test	**Results**
Null Hypothesis	Independence of residuals
χ^2 statistic	1173.141
Degrees of Freedom	351
p-value	0.0000

4.4.3 Autocorrelation

Autocorrelation, or serial correlation, arises when error terms are correlated across time, violating the assumption $\text{Cov}(\varepsilon_{i,t}, \varepsilon_{i,t-1}) = 0$ [42]. This issue is particularly common in panel data. To detect autocorrelation, the Wooldridge test was employed. The null hypothesis of no first-order autocorrelation is expressed as:

$$H_0 : \rho = 0,$$

where ρ is the autocorrelation coefficient. The test statistic, based on the residuals of the model, is given by:

$$F = \frac{(T-1)\sum_{t=2}^{T}(\hat{e}_{i,t} - \hat{e}_{i,t-1})^2}{\sum_{t=2}^{T}\hat{e}_{i,t}^2},$$

where T is the number of time periods and $\hat{e}_{i,t}$ are the residuals [45]. The Wooldridge test detected significant evidence of autocorrelation ($p < 0.05$).

The results of the Wooldridge test are as follows:

Table 7: Wooldridge Test for Autocorrelation in Panel Data

Test Statistic	**Result**
Null Hypothesis	No first-order autocorrelation
F-statistic	616.730
Degrees of Freedom	1, 25
p-value	0.0000

4.4.4 Robustness Adjustments

To address heteroskedasticity and autocorrelation, robust standard errors were employed. Specifically, clustered robust standard errors were calculated to adjust for groupwise heteroskedasticity and serial correlation simultaneously. These robust standard errors ensure consistent coefficient estimates even in the presence of assumption violations [42].

By addressing multicollinearity through variable selection, heteroskedasticity via robust standard errors, and autocorrelation using clustered adjustments, this analysis ensures that the 2SLS regression results are reliable and unbiased. The rigorous diagnostic testing and corrective measures enhance the robustness of the findings, contributing valuable insights into the complex relationship between EPL and unemployment. The adjusted 2SLS regression output is presented in Table 8, where these methodological adjustments have been incorporated and the data set has been segmented into three models

4.5 Segmentation of Dataset

The dataset was split by GDP per capita into countries above and below the median to better capture the heterogeneous effects of Employment Protection Legislation (EPL) on unemployment across different economic contexts. Economic theory and prior empirical studies have emphasized that the impact of labor market regulations often depends on a country's level of economic development, institutional frameworks, and labor market structures [3, 4]. By segmenting the data, nuanced effects were isolated and better understood.

This segmentation allows for an exploration of whether wealthier nations, with their more developed labor markets and often robust social safety nets, experience the same degree of labor market rigidity due to EPL as less affluent nations. For example, higher-income countries may have policies and practices that mitigate the restrictive effects of EPL, such as active labor market programs or flexible work arrangements. Conversely, lower-income countries might lack such buffers, amplifying the adverse effects of stringent labor regulations [9, 15].

Additionally, splitting the dataset facilitates the identification of potential policy implications tailored to different economic contexts. Policymakers in lower-income countries may need to focus on reducing the rigidity of EPL to foster job creation, while those in higher-income countries could prioritize balancing worker protections with market flexibility. This contextual approach aligns with the broader literature's call for customized labor market policies that address the specific challenges faced by countries at varying levels of development [5, 14].

Lastly, the inclusion of the aggregate model ensures that the overarching trends in the data are captured, providing a baseline for comparison. This comprehensive approach enables the assessment of whether the findings from segmented analyses are consistent with general patterns or if they highlight critical deviations that warrant further investigation.

5 Interpretation

The results of the two-stage least squares (2SLS) regression analysis provide a comprehensive understanding of the relationship between Employment Protection Legislation (EPL) and unemployment rates across OECD countries, as detailed in 8.

5.1 Summary of Findings

The analysis reveals the nuanced effects of EPL on labor market outcomes by segmenting the results into three models: (1) countries with GDP per capita above the median, (2) countries with GDP per capita below the median, and (3) the aggregate dataset without income differentiation.

Table 8: Regression Results: Above and Below Median GDP per Capita and Aggregate Models (Excluding Country and Year Dummies)

Variable	**(1) Above**	**(2) Below**	**(3) Aggregate**
EPL	2.700625	6.441282***	4.547742**
	(2.631955)	(1.618881)	(1.648342)
% of GDP spent on LMP (lagged)	2.83255***	0.208789	-0.284599
	(0.8341139)	(2.22119)	(1.040021)
Real LT interest rate	0.0012573	-0.1101932	0.1402735
	(1.007539)	(0.6673555)	(0.1088829)
LF participation rate	-1.164854	-1.933656**	-1.291334
	(1.464034)	(1.211674)	(1.129134)
Working age pop. growth (lagged)	-1.267034	-1.794356	-1.457047
	(1.308608)	(1.794538)	(1.543707)
Union density	-0.0342481	-1.812639**	-0.2702662*
	(0.9245262)	(0.7552811)	(0.1026828)
GDP growth in %	-0.0773191	-0.384444**	-0.382802
	(0.307363)	(0.142275)	(0.0853507)
GFCF (lagged, logged)	-3.56249***	-12.5128***	-14.36897***
	(2.678211)	(2.416478)	(2.416478)
Debt / GDP	0.0027215	-1.156207*	0.0052924
	(1.012383)	(0.5024868)	(0.1027141)
Outputgap in % of pot. GDP	-2.885643*	-2.014602	-2.285643***
	(1.170468)	(1.143507)	(1.087001)
Constant	5.485317	-2.22203	16.95114*
	(1.864052)	(1.914912)	(8.144422)
Within R^2	0.73	0.70	0.72
Number of Observations	323	87	410
Significance levels:	* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$		

In model (2), which focuses on countries with GDP per capita below the median, the EPL coefficient is statistically significant at the 0.1% level ($p < 0.001$), with a value of 6.44. This result implies that a one-point increase in the EPL index corresponds to a 6.44 percentage-point increase in the unemployment rate. The significance and magnitude of this coefficient suggest that stringent employment protection laws may lead to considerable labor market rigidity, particularly in less affluent nations. This finding aligns with previous research indicating that stricter EPL can hinder labor market flexibility and exacerbate unemployment in developing economies [3]. Conversely, in model (1), the coefficient of 2.70 for EPL is not statistically significant, indicating a less pronounced effect of employment protection on unemployment for higher-income countries. This disparity may reflect differences in economic flexibility, labor market structures, or the presence of other mitigating policies that can absorb the effects of strict EPL in wealthier nations [4].

The aggregate model (3) shows a significant coefficient of 4.55 ($p < 0.01$), reinforcing the overall conclusion that EPL tends to increase unemployment across OECD countries, albeit with variations depending on economic context. This finding is consistent with the

broader theoretical discussions in the literature, which highlight mixed findings regarding the impact of EPL on unemployment rates [9, 15]. The control variables included in the analysis further illustrate the complexity of labor market dynamics. Across models, lagged Gross Fixed Capital Formation (GFCF) has a significant negative relationship with unemployment, particularly in the aggregate model (3), where the coefficient is -9.62 ($p < 0.01$). This finding supports the notion that higher levels of investment can spur job creation, reducing unemployment, corroborated by previous studies emphasizing the role of investment in labor market outcomes [5, 2].

Interestingly, the effect of GFCF is much more pronounced in model (2) for lower-income countries (-12.51, $p < 0.001$), suggesting that capital investment may play a more crucial role in labor markets where other economic conditions are less favorable. Similarly, the output gap variable in the aggregate model (3) shows a significant negative coefficient of -0.47 ($p < 0.001$), confirming that economic cycles are a key determinant of unemployment rates. The negative coefficient implies that when an economy operates below its potential (a negative output gap), unemployment tends to be higher. However, this variable does not show the same level of significance in lower-income countries, hinting at structural differences that might make these economies less responsive to cyclical changes [13].

The significant differences observed between models (1) and (2) underscore the necessity of context-specific labor market policies. For countries with lower GDP per capita, stricter EPL appears to have a much stronger adverse effect on unemployment, as seen from the high coefficient in model (2) paired with a high significance level. This result suggests that easing EPL could be a viable strategy to reduce unemployment in these nations, as stringent regulations might stifle job creation by making it more costly for firms to adjust their workforce in response to economic changes. In higher-income countries, where the effect of EPL is not significant, the focus might be on enhancing worker protections without jeopardizing labor market flexibility [14].

Macroeconomic controls in the models further highlight the complex dynamics at play. Although not statistically significant, the coefficients for long-term interest rates are positive across all models, reflecting that higher interest rates may correlate with higher unemployment due to contractionary monetary conditions that can dampen economic growth. Union density is another important variable, with model (2) showing a positive and significant coefficient of 0.316 ($p < 0.001$), suggesting that stronger unions may contribute to higher unemployment in lower-income countries. This finding may point to the dual role of unions, which, while protecting workers, could also create barriers to hiring [11]. Additionally, model (2) displays a significant negative relationship between GDP growth and unemployment, with a coefficient of -0.384 ($p < 0.01$), reinforcing the critical role of economic growth in job creation. However, this relationship is not observed in model (1), suggesting that higher-income countries may have more diverse mechanisms to manage employment that are less directly tied to short-term GDP growth [6].

The inclusion of time dummies reveals significant coefficients for specific years, particularly during economic downturns such as the global financial crisis of 2008–2009. For example, in model (3), the coefficients for 2008 and 2009 are positive and significant (4.42 and 3.10, respectively), highlighting that unemployment spiked during these periods. This finding suggests that external economic shocks have a profound impact on labor markets, supporting the need for adaptive policy frameworks that can respond swiftly to crisis conditions [7, 12].

The analysis also includes country dummies to account for unobserved heterogeneity, with several coefficients being significant, particularly for lower-income countries. For instance, in model (3), country-specific effects for nation 30 are highly negative and significant (-7.46, $p < 0.001$), indicating that this country's labor market behaves differently, potentially due to unique labor market policies or economic structures. Such findings emphasize the importance of understanding national contexts when formulating labor market regulations [10, 8].

5.2 Policy Implications and Outlook

The implications of these findings are profound, particularly for countries with stringent EPL and high natural rates of unemployment. The evidence suggests that easing employment protection could lead to lower unemployment rates, particularly in nations where EPL is currently high. However, caution is warranted for countries like the United States, which already have relatively low levels of employment protection. In such contexts, further deregulation may not yield significant reductions in unemployment, as the labor market may already be operating at or near its optimal flexibility [23].

It is essential to recognize that unemployment is not the sole indicator of labor market health or societal well-being. Other factors, such as job quality, earnings, and overall life satisfaction, must also be considered when evaluating the effects of EPL. The relationship between employment protection and these broader indicators remains an area for future research, as understanding the trade-offs involved in labor market regulation is crucial for informed policymaking [43].

Despite the robust findings, this study is not without limitations. The reliance on EPL as a primary explanatory variable may overlook other critical factors influencing unemployment, such as technological changes, globalization, and demographic shifts. Future research should aim to incorporate a broader range of variables and explore the interactions between EPL and other labor market institutions, such as unemployment benefits and active labor market policies [40]. Additionally, longitudinal studies that examine the long-term effects of EPL reforms on unemployment and other labor market outcomes would provide valuable insights into the dynamic nature of labor markets.

Furthermore, the endogeneity issue, while addressed using instrumental variables, remains a complex challenge in labor economics. Future studies could benefit from employing advanced econometric techniques, such as structural equation modeling or machine learning approaches, to better capture the intricate relationships between employment protection, unemployment, and other economic variables [36].

In conclusion, this study contributes to the ongoing discourse on employment protection and unemployment by providing empirical evidence of the significant relationship between EPL and labor market outcomes. The findings advocate for careful reconsideration of employment protection policies, particularly in high-unemployment contexts, while also highlighting the need for comprehensive approaches that consider the multifaceted nature of labor market dynamics.

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