The Effect of Employment Protection Legislation on Unemployment

An Empirical Analysis of NBER Data

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Author Note

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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.*

The Effect of Employment Protection on Unemployment

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.

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 with the heaviest restrictions. Figure 1 provides a visual overview of this framework.

My sample of 852 observations highlights the stability of EPL over time, with only 10% of cases showing year-over-year changes. Most adjustments are minor, typically ranging from 10 to 20 basis points. As shown in *Table 1*, the absolute level of EPL is normally distributed. The observed stability in EPL is particularly advantageous as it provides a strong basis for the application of instrumental variables later.

Literature Review

The relationship between EPL and unemployment has been a subject of extensive research, giving 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.

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 (2020), 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 (2022), and Bassanini and Duval (2006), as well as Sahnoun and Abdennadher (2019), 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 (2012) 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 (2018) 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. Groenewold, as well as Voigt and Zohlnhöfer (2020), 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.

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. (2004) and Bertola and Koeniger (2004), along with Bassanini and Duval (2006), and Kolbe and Kayran (2019) 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 (2005), Radulescu and Robson (2019), and Amable et al. (2004), as well as Chung and Mau (2014), 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. (2012) and Lastauskas and Stakénas (2018) 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. (2015) and Garibaldi (2004) 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. (2014), Bjuggren and Skedinger (2018), 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 (2019) 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.

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 (2018) 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 (2020) 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 (2020) 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 (2012), 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.

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, thereby facilitating 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.

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 (OECD, 2023). 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 unemployment, as discussed in the literature review, remain inconclusive, underscoring the necessity for empirical investigation.

Control Variables and Theorized Signs

In addition to EPL, it is essential to control for other factors that may influence unemployment rates. Heimberger (2020) 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 listed in *Table 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 *Table 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.

Empirical Results

Estimation Method and Endogeneity

In the initial stages of this analysis, it is imperative to select an appropriate functional form for the regression model. Given the inconclusive and mixed findings from the literature review regarding the relationship between Employment Protection Legislation (EPL) and unemployment, finding the correct functional form proved challenging. Visualizing the primary variables through a scatter plot suggested a non-linear relationship. Preliminary OLS regressions were conducted using both linear, logarithmic, and other non-linear specifications of EPL. Among these, the quadratic model initially revealed a superior fit, indicated by a higher R^2 value and a lower p-value. This led to the adoption of a quadratic regression equation at this stage. The theoretical underpinning for this choice is rooted in the notion that EPL may exert opposing effects on unemployment depending on the prevailing level of protection, as evidenced by the mixed outcomes reported in previous studies (Chai et al., 2021; Hoeffler, 2002).

However, a significant challenge in this analysis is the potential endogeneity of EPL, which can lead to biased coefficient estimates and inflated p-values. Endogeneity arises when an explanatory variable is correlated with the error term, violating the classical assumption of independence between the error term and the explanatory variables. This correlation can stem from several sources, including omitted variable bias, measurement error, and simultaneous causality (Moreno-Galbis & Sneessens, 2007; Fosu & Twumasi, 2022). In the context of this study, it is crucial to determine whether unemployment is influenced by EPL or if certain EPL policies are implemented in response to specific unemployment levels.

To address these endogeneity concerns, I employed a two-stage least squares (2SLS) model with instrumental variables (IV). The literature suggests that using lagged values of the endogenous variable, in this case, EPL, can serve as a valid instrument (Prettner et al., 2012; Ayres et al., 2007). Specifically, I utilized EPL lagged by three periods as the instrumental variable. This choice is justified by the relatively stable nature of EPL over time; within countries, EPL changes only for about 10% of observations, making even highly lagged values strongly correlated with current EPL levels. Furthermore, the lagged EPL does not directly affect the more volatile unemployment rates but influences them indirectly through its impact on current EPL levels, thus it serves as a valid instrument.

Upon implementing the 2SLS regression to address endogeneity, it was observed that the linear specification provided a similar fit compared to the quadratic model, see *Table 3.* Thus, to keep the model

simple I chose the linear 2SLS regression model. This adjustment underscores the importance of accounting for endogeneity when choosing the functional form. While the quadratic model initially seemed appropriate, the IV regression highlighted the linear relationship between EPL and unemployment.

The effectiveness of the chosen instrumental variable can be assessed using the first-stage F-test, which evaluates the strength of the instrument. A significant result indicates a good fit for the IV. Additionally, to distinguish between fixed effects (FE) and random effects (RE) models, the Hausman test was employed. The rejection of the null hypothesis of non-systematic coefficients suggests that the FE or RE model with year dummies is appropriate. Given the diverse nature of the dataset, which encompasses a wide range of countries, it is essential to account for country-specific characteristics. Therefore, I opted for the RE model with country dummies, allowing for varying coefficients and significance levels across individual countries while still controlling for year effects. The adjusted 2SLS regression output is shown *Table 4*.

Assumption Violations

In addition to specification errors, it is essential to examine classical assumption violations, including multicollinearity, autocorrelation, and heteroskedasticity. Given the number of independent variables in the model, multicollinearity is a concern. A Variance Inflation Factor (VIF) test is conducted to assess multicollinearity among the independent variables. High VIF values for lagged labor market policy spending, union density, lagged logarithmic gross fixed capital formation (GFCF), and debt-to-GDP ratios indicate potential multicollinearity issues. The correlation matrix is analyzed to ensure that no correlation exceeds 0.6, that multicollinearity arises from the interplay of multiple variables rather than direct pairwise correlations.

To mitigate the effects of multicollinearity, I omitted the least relevant collinear controls or those that overlap significantly in their theoretical impact. For instance, since union density is closely related to EPL, it may be redundant in the model. However, Gross Fixed Capital Formation (GFCF) is highly significant and captures investment effects not accounted for by other variables, so it is retained in the analysis.

Given the diverse nature of the countries included in the dataset, groupwise heteroskedasticity is a concern. To test for this, I utilize the modified Wald test, which is more suitable for pooled time series data compared to the Breusch-Pagan test. The results of the Wald test indicate that there is strong evidence for groupwise heteroskedasticity. Additionally, the Wooldridge test was employed to assess autocorrelation within the panel data. If significant evidence of autocorrelation is found, robust standard errors are used to adjust for both heteroskedasticity and autocorrelation, ensuring more reliable coefficient estimates.

In summary, addressing endogeneity using instrumental variables, particularly lagged EPL, is crucial for obtaining unbiased estimates of the relationship between EPL and unemployment. The selection of appropriate estimation methods, alongside rigorous testing for specification errors and assumption violations, enhances the robustness of the analysis. By carefully considering these methodological challenges, this study aims to contribute valuable insights into the complex dynamics between employment protection and labor market outcomes. The 2SLS regression output with the above adjustments implemented can be seen in *Table 4.*

Interpretation and Conclusion

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 *Table 5*. 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. This stratified approach is essential for identifying whether the impacts of EPL are consistent across different economic contexts, echoing findings in the literature that emphasize the importance of contextual factors in labor market dynamics Bernal-Verdugo et al. (2012) Betcherman, 2014).

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 (Betcherman, 2014). 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 (De et al., 2021).

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 (Lehmann & Muravyev, 2012; Wang, 2015). 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, which is corroborated by previous studies emphasizing the role of investment in labor market outcomes (Fialová, 2011; Betcherman, 2012).

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 (Qing, 2018).

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 (Uribe & Felipe, 2014).

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 (Nakano et al., 2018). 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 (Heimberger, 2020).

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 (Johnson & Schoeni, 2011; Norbäck et al., 2021). 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 (Maeda, 2023; Kitov, 2021).

The results in *Table 5* are consistent with the broader discussion presented earlier in the paper, which highlights the mixed findings in the literature regarding the impact of EPL on unemployment. The difference in the statistical significance of EPL effects between high- and low-income countries suggests that one-size-fits-all policies may not be appropriate, echoing arguments found in the literature review section (Lehmann & Muravyev, 2015; Lenhart, 2018). The empirical evidence here lends support to previous studies that advocate differentiated approaches to labor market reforms, as discussed in the section on recent developments. The significant coefficients of macroeconomic controls, such as GFCF and GDP growth, also reinforce arguments regarding the multifaceted nature of labor market outcomes and future research should consider these contextual factors. In summary, this study contributes to existing literature by providing empirical evidence on the complex relationship between EPL and unemployment rates across different economic contexts. The findings underscore the necessity for policymakers to tailor labor market regulations to the specific economic conditions of their countries, particularly in light of the varying impacts observed between high- and low-income nations.

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 (Boeters, 2015).

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 (Tsuyuhara, 2016).

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 (Schwarzmüller & Stähler, 2013). 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 (Krutova et al., 2018).

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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Tables

Table 1

Distribution of Change in EPL and Absolute Level of EPL.

Change in EPL	Frequency	Percent
-1.2	1	0.12
-1	1	0.12
-0.7	2	0.24
-0.6	3	0.37
-0.5	2	0.24
-0.4	3	0.37
-0.3	6	0.73
-0.2	14	1.71
-0.1	14	1.71
0	754	91.84
0.1	10	1.22
0.2	6	0.73
0.3	2	0.24
0.4	2	0.24
0.5	1	0.12

EPL below	Frequency	Percent
1	60	7.04
2	261	30.63
3	377	44.25
4	132	15.49
5	22	2.58

Table 2

Control Variables and their Theorized Signs

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	Positive	Increased competition from outsourcing may impact domestic labor markets.
Export Orientation	Negative	A strong export orientation can attract foreign capital and reduce unemployment.
Growth of the Labor Force Participation Rate	Ambiguous	May increase labor surplus or lead to wage adjustments.
Lagged Gross Fixed Capital Formation (GFCF)	Negative	Increased investment typically creates jobs.
Lagged Working Age Population Growth	Ambiguous	Similar 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 for the same output (Groenewold hypothesis).
Debt to GDP Ratio	Negative	High debt may indicate dysfunctional institutions.
Annual Hours Worked	Positive	Increased hours may indicate fewer workers needed for same output.
Output Gap	Negative	Larger output gap typically correlates with higher cyclical unemployment.

Table 3

Comparison of Linear OLS (1), Quadratic 2SLS (2) and Linear 2SLS (3)

```
esttab  normal sq2sls linear2sls, b(%9.0gc)se stats(N r2 r2_a F p)

------------------------------------------------------------
                      (1)             (2)             (3)
                  Unrate          unrate          unrate
------------------------------------------------------------
eplvl_v2          5.800878**      14.59586**      5.522012**
                 (2.16994)       (4.749604)      (1.778002)

epl_2             -.7370319*      -1.594915**
                 (.3705641)      (.5776099)

lag_lmppct~p       1.054083         .9929203        .8579513
                 (.8106625)        (.84228)       (.8367528)

reallongte~e       .1175606        .1911264*       .1404068
                 (.0872506)      (.0754634)       (.098757)

lfpartrate~h      -.2660143       -.2102175       -.2718022
                 (.1628287)      (.1588494)      (.1558046)

lag_loggfcf      -12.01255***    -14.43498***    -14.36837***
                 (2.681015)      (2.766501)      (2.681358)

lag_wapopg~h       .1538487        .1538053        .1585324
                 (.1159894)      (.1391408)      (.1277665)

uniondensity       .2118976**      .2050355*       .1574359*
                 (.0811278)      (.0798372)      (.0756806)

gdpgrowth_~t      -.0450278       -.0852432         -.087513
                 (.0597565)      (.0628736)      (.0596172)

gdpperlf           .0003787*       .0004639*       .0004734*
                 (.0001814)      (.0002101)      (.0002026)

debttogdp         -.0031392        .0070166        .0038288
                 (.0138518)      (.0147381)      (.0163905)

outputgapp~p      -.4300777***    -.4243589***    -.4676873***
                 (.0599227)       (.066703)      (.0800126)
-----------
_cons              11.19143         3.96096        15.03797*
                 (6.006483)      (8.380391)       (6.35359)
------------------------------------------------------------
N                     419             410             410
Within r2           .7702           .7407           .7445
Overall r2 for FE   .1082           .1189           .1143
Overall r2 for RE   .9160           .9045           .9065
------------------------------------------------------------
Standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001
```

Table 4

Adjusted Linear 2SLS Regression Output

```
xtivreg  unrate_over15 ( epl = epl_lag3) lag_lmppctgdp reallongterminterestrate lfpartrategrowth lag_wapopgrowth
uniondensity gdpgrowth_pct lag_loggfcf debttogdp outputgappctpotgdp i.time i.country,re vce(robust)

G2SLS random-effects IV regression              Number of obs     =        410
Group variable: country                         Number of groups  =         26

R-squared:                                      Obs per group:
     Within  = 0.7266                                         min =          5
     Between = 1.0000                                         avg =       15.8
     Overall = 0.9003                                         max =         25


                                                Wald chi2(24)     =    2004.90
corr(u_i, X) = 0 (assumed)                      Prob > chi2       =     0.0000

                                          (Std. err. adjusted for 26 clusters in country)
------------------------------------------------------------------------------------------
                           |               Robust
              unrate_over15 | Coefficient  std. err.      z    P>|z|     [95% conf. interval]
--------------------------+---------------------------------------------------------------
                  eplvl_v2 |     4.5474   1.648342     2.76   0.006     1.316708    7.778092
              lag_lmppctgdp |    .9396513   1.040201     0.90   0.366    -1.099104    2.978407
reallongterminterestrate |    .1604725   .1028892     1.56   0.119    -.0411867    .3621317
         lfpartrategrowth |   -.184076   .1291334    -1.43   0.154    -.4371728    .0690207
          lag_wapopgrowth |    .0838096   .1457747     0.57   0.565    -.2019035    .3695227
             uniondensity |    .1108969   .0726266     1.53   0.127    -.0314486    .2532424
             gdpgrowth_pct |    .0086222   .0653507     0.13   0.895    -.1194629    .1367074
               lag_loggfcf |   -9.620064   3.035352    -3.17   0.002    -15.56924   -3.670883
                 debttogdp |    .0052994   .0201741     0.26   0.793    -.0342411    .0448399
       outputgappctpotgdp |   -.4697956   .0870011    -5.40   0.000    -.6403145   -.2992767
                     time |
                     1998 |    1.340461   .6441171     2.08   0.037     .0780145    2.602907
                     2000 |    2.318805   .9376975     2.47   0.013     .4809513    4.156658
                     2005 |    2.827989   1.433484     1.97   0.049     .0184132    5.637565
                     2006 |     3.25607    1.48031     2.20   0.028     .3547162    6.157424
                     2007 |    4.115742   1.519615     2.71   0.007     1.137351    7.094133
                     2008 |    4.418291   1.861763     2.37   0.018     .7693021     8.06728
                     2012 |      4.1212   1.859544     2.22   0.027      .47656     7.76584
                     2013 |    4.175215   1.888171     2.21   0.027      .474468    7.875963
                     2014 |    4.091267   1.939519     2.11   0.035     .2898793    7.892654
                     2015 |    4.150374    2.00978     2.07   0.039     .2112782    8.089469
                     2016 |    4.450289   1.933333     2.30   0.021     .6610269    8.239552
                     2017 |    4.400278   1.957709     2.25   0.025      .56324     8.237317
                     2018 |    4.782565   2.030666     2.36   0.019     .8025334    8.762597
                     2019 |    4.987719   2.104206     2.37   0.018     .8635508    9.111888
                  country |
                  Austria |   -7.058772   2.730773    -2.58   0.010    -12.41099   -1.706556
                   Canada |    3.255175   1.625721     2.00   0.045     .0688201    6.441529
                  Czechia |   -10.06588   3.416884    -2.95   0.003    -16.76285   -3.368911
                  Denmark |   -9.452187    5.19737    -1.82   0.069    -19.63885    .7344711
                  Germany |   -8.435926   2.819824    -2.99   0.003    -13.96268   -2.909173
                  Hungary |   -6.880677   2.273723    -3.03   0.002    -11.33709   -2.424261
                  Ireland |    4.239466    1.66828     2.54   0.011     .9696963    7.509235
                   Israel |    -7.46118   2.012971    -3.71   0.000    -11.40653   -3.515829
                    Italy |   -10.53911   4.182111    -2.52   0.012     -18.7359   -2.342327
                    Korea |   -6.157974   1.520785    -4.05   0.000    -9.138658    -3.17729
              Netherlands |   -12.45001   4.044389    -3.08   0.002    -20.37687   -4.523152
                   Norway |   -7.377381   3.167548    -2.33   0.020    -13.58566   -1.169102
                   Poland |   -9.421798   3.546769    -2.66   0.008    -16.37334   -2.470258
                 Portugal |   -15.51994    5.31629    -2.92   0.004    -25.93967     -5.1002
                 Slovenia |   -11.23745   3.177156    -3.54   0.000    -17.46456    -5.01034
              Switzerland |    2.14422    .965609     2.22   0.026     .2516612    4.036779
                    _cons |   16.95114   8.144422     2.08   0.037     .9883671    32.91392
--------------------------+---------------------------------------------------------------
                  sigma_u |  1823079.2
                  sigma_e |  1.5156971
                      rho |          1   (fraction of variance due to u_i)
------------------------------------------------------------------------------------------
Endogenous: eplvl_v2
Exogenous:  lag_lmppctgdp reallongterminterestrate lfpartrategrowth lag_wapopgrowth
            uniondensity gdpgrowth_pct lag_loggfcf debttogdp outputgappctpotgdp 2.time
            2.country 5.country 10.country 16.country 17.country eplvl_v2_lag3
```

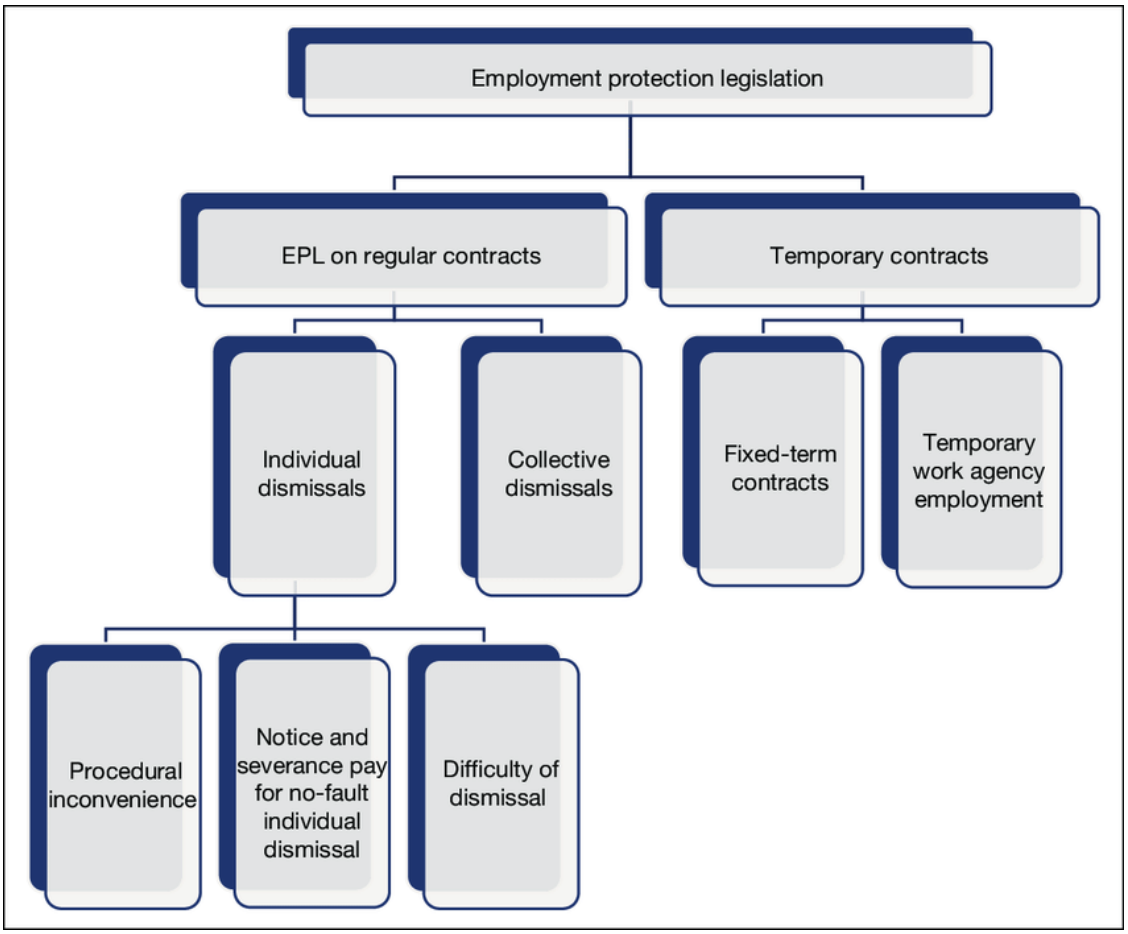
Table 5

```
esttab abovemedian belowmedian aggregate,
------------------------------------------------------------
-
                      (1)             (2)             (3)
                   unrate          unrate          unrate
------------------------------------------------------------
-
eplvl_v2          2.700025        6.441328***      4.5474**
                 (2.631955)      (1.618881)      (1.648342)

lag_lmppct~p      2.83525***       4.029788        .9396513
                 (.8341319)      (2.282119)      (1.040201)

reallongte~e      .0021573        .1109723        .1604725
                 (.1075039)      (.0673355)      (.1028892)

lfpartrate~h     -.1648561       -.9364666***     -.184076
                 (.1464034)      (.2161774)      (.1291334)

lag_wapopg~h     -.0276034       -.2199493        .0838096
                 (.1308806)      (.7949536)      (.1457747)

uniondensity      .0342181        .3161293***     .1108969
                 (.0924526)      (.0765281)      (.0726266)

gdpgrowth_~t      .0071791       -.3842444**      .0086222
                 (.0370363)       (.142275)      (.0653507)

lag_loggfcf      -3.562949       -12.51184***    -9.620064**
                 (2.478121)      (2.416478)      (3.035352)

debttogdp         .0027215        .1156207*       .0052994
                  (.012383)      (.0524868)      (.0201741)

outputgapp~p     -.2885643*       .0281064        -
.4697956***
                 (.1170468)      (.2143507)      (.0870011)

1996.time         .5734857***                     .4730909
                 (.1388974)                      (.4713071)

1997.time         .8550976**                      .9239341
                 (.3058629)                      (.8580444)

1998.time          1.0765**                       1.340461*
                 (.3902489)                      (.6441171)

2000.time         1.399411*                       2.318805*
                 (.5633159)                      (.9376975)

2004.time         .9519742        3.310724***     2.383947
                 (.8350818)      (.7148842)      (1.223386)

2005.time         1.313494        4.094787***     2.827989*
                 (.9255718)      (1.179484)      (1.433484)

2006.time         1.675158        3.963987*        3.25607*
                 (.9295397)      (1.641149)       (1.48031)

2007.time         2.421943*       3.805015*       4.115742**
                 (1.107093)      (1.480919)      (1.519615)

2008.time         2.845473*        3.56445*       4.418291*
                 (1.307512)      (1.684634)      (1.861763)

2009.time         3.063769*       2.417757        3.104485
                  (1.38405)      (2.01687)       (2.021149)

2012.time         2.627877*       4.180856         4.1212*
                 (1.139334)      (2.356348)      (1.859544)

2013.time         2.781073*       4.207585        4.175215*
                 (1.188471)      (2.546975)      (1.888171)

2014.time          2.59459*       4.051226        4.091267*
                 (1.149159)      (2.772187)      (1.939519)

2015.time         2.678167*       4.279992        4.150374*
                 (1.136589)      (2.686105)       (2.00978)

2016.time         2.880413*       3.745059        4.450289*
                 (1.128402)      (2.736557)      (1.933333)

2017.time          2.74735*       2.559615        4.400278*
                 (1.208309)      (2.666295)      (1.957709)

2018.time          2.73795*       6.240187*       4.782565*
                 (1.270501)      (2.582809)      (2.030666)

2019.time         2.874012*                       4.987719*
                 (1.348409)                      (2.104206)

4.country         -6.68947*                       -7.058772**
                 (3.196808)                      (2.730773)

16.country        -6.566517               0       -10.06588**
                 (4.806783)              (.)      (3.416884)

22.country        -6.960104*                      -8.435926**
                 (3.308272)                      (2.819824)

23.country        -.9464507       -9.209033*      -5.383652
                 (5.539906)       (3.72411)      (3.786829)

29.country         1.004129                       4.239466*
                 (1.620065)                      (1.66828)

30.country        -3.261198                        -
7.46118***
                 (3.168769)                      (2.012971)

31.country        -4.812464                       -10.53911*
                 (5.715222)                      (4.182111)

33.country        -4.030603       8.421758***     -
6.157974***
                 (2.254785)      (1.127557)      (1.520785)

41.country        -10.99816*                      -12.45001**
                 (4.913383)                      (4.044389)

44.country        -4.878213                       -7.377381*
                 (4.526181)                      (3.167548)

58.country         -.747474                        2.14422*
                 (1.036988)                       (.965609)

25.country                         .275114        -6.880677**
                                  (1.505178)      (2.273723)

45.country                        -.9618676       -9.421798**
                                  (1.447584)      (3.546769)

46.country                       -19.62712***     -15.51994**
                                  (5.811023)       (5.31629)

54.country                       -6.966869***      -
11.23745***
                                  (1.617313)      (3.177156)

_cons              5.485317       -2.22203        16.95114*
                  (6.915436)      (8.919412)      (8.144422)
------------------------------------------------------------
-
N                       323              87             410
p                         0        9.38e-13               0
------------------------------------------------------------
-
Standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001
```

Figures

Figure 1.

Components of the OECD Employment Protection Legislation Indicator (Piton and Rycx, 2019)



Do several regressions for high and low income countries: var eg. Gdp per capita. See if the policy recommendations are different for different types of countries. If not works do even quartiles.