

# The Impact of Employment Protection Legislation on the Unemployment Rate in Selected OECD Countries\*

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The findings of the existing literature on the relationship between employment protection legislation and the unemployment rate are mixed. This study analyzes the relationship between employment protection legislation measured by the OECD Employment Protection Index and the unemployment rate between 2001 and 2008. After controlling country fixed effects, I find that more stringent employment protection legislation may not be a significant factor for higher a unemployment rate. The estimated model included output gap, government size, openness of the economy, real minimum wages, urbanization rate, population density, population, unemployment benefit generosity, and tax wedge as explanatory variables. I find that the output gap, as a measure of business cycle, and government size are significant factors determining the unemployment rate in selected 15 OECD countries. These findings suggest that employment protection legislation, especially in developed countries, may not be affective policy instrument for policy makers when combating unemployment.

Jel Classification: J65, J68, J52

Key Words: Employment protection, unemployment, labor market flexibility.

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## I. Introduction

The substantial rise in the unemployment rates during the Great Recession has revived the interest in analyzing the determinants of the unemployment rate in advanced economies.<sup>1</sup> The Great Recession, which started in 2007, has had dramatic impacts on labor markets around the world. The crisis originally emerged in the United States (U.S) and had a global impact through the channels of trade and financial flows. As a result of this global downturn in economic activity, unemployment rates in Organization for Economic Co-operation and Development (OECD) countries reached a high of 8.2 percent in 2009 up from 5.7 percent in 2007.<sup>2</sup> To solve the unemployment problem in these advanced economies, demand side policies, supply side policies, and labor market institutions have been discussed extensively. Since the 1990s, reducing labor market rigidities, in other words, increasing labor market flexibility, has been recommended as a policy instrument to reduce the unemployment rate. The 1994 Jobs Study of OECD triggered a discussion that strict labor market institutions were the main cause for the high unemployment rate in advanced economies (Freeman, 2005). However, there are different findings on the impact of labor market institutions on unemployment. In this study, the relationship between labor market protection legislation and unemployment rate in 15 OECD countries is analyzed for the 2001-2008 period. The dataset used in the analysis is built by gathering information from various sources, including the OECD statistical database, World Development Indicators of the World Bank and World Economic Outlook database of the International Monetary Fund (IMF).

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<sup>1</sup> For example, in 2012, the IMF organized the Thirteen Jacques Polak Annual Research Conference on the Labor Markets with the perspective of the Great Recession. Also, the 2013 World Development Report of the World Bank focuses on jobs.

<sup>2</sup> OECD Economic Outlook, September 2012.

The Great Recession, as Ohanian (2010) highlights, was different from any other crises in the history of the U.S. and from the recent recessions in high-income OECD countries like Canada, Germany, France, Italy, Japan, and the United Kingdom. The significant decline in the U.S. output during the Great Recession mainly resulted from a higher decline in employment rather than productivity loss compared to other crises in U.S. history and the recent recession in high-income OECD countries. Ohanian (2010) points to more rigid labor markets in European countries as a plausible explanation for the variation in the unemployment rate of the Great Recession between the U.S. and Europe. This study provides evidence as to whether the unemployment rate can be influenced from the rigidity of the labor market measured by the employment protection index (EPI). The remainder of this study is organized as follows. Recent trends in the employment protection index and unemployment rates in 15 selected OECD countries are presented in the next section. The third section reviews the existing literature on the relationship between the unemployment rate and labor market institutions specifically employment protection legislations. The fourth section describes the econometric model estimated in this study. The fifth section describes the data and descriptive statistics of the variables used in the model. The sixth section presents the regression results with interpretations. The last section concludes.

## II. Recent Trends in Employment Protection and Unemployment Rates in OECD Countries

Policy choice of different options of labor market regulations leads to different labor market outcomes for a given country. Employment Protection Legislation (EPL), which also is known as job security legislation, is a type of labor market regulation. EPL can be defined as the

rules regulating the initiation, or the termination of employment contracts. EPL not only ensures employment protection by limiting firms' ability to hire new workers without job security requirements, but also makes dismissal costly for firms to protect currently employed workers (Betcherman, 2013). EPL is used as a tool, like many other labor market regulations, to enhance the welfare of workers by reducing the risk of unemployment and increase employment conditions (OECD, 2004).

Heckman & Pages-Serra (2000) provide a theoretical framework for the impact of employment protection on employment rates. According to this framework, firms have three optimal policy responses to shocks: (a) firing workers, (b) hiring workers, or (c) doing nothing. In the case of a negative shock and a decline in the marginal productivity of a worker, firms may fire workers. However, firms can be discouraged due to the existence of high mandatory dismissal costs. Therefore, the number of dismissals would be lower in this case compared to the case where firing costs are small. Economic expansion and higher worker productivity encourage firms to hire more workers; however, firms hire fewer workers to avoid future dismissal costs in case of an economic downturn. Therefore, the employment rate is expected to be lower during expansionary periods and higher during the downturns when stricter employment protection legislation is present. Stricter EPL is found to reduce turnover rates (Heckman & Pages-Serra, 2000). In summary, while more rigid labor market regulations would reduce firms' speed of adjustment to shocks, more flexible labor regulations would cause excessive layoffs during economic downturns. Furthermore, workers under flexible labor market regulations would be more likely to face income shocks and loss of benefits (health and social security) as a result of arbitrary dismissals (Venn, 2009). Reducing labor market rigidities in the OECD countries has

been widely considered as a policy option to reduce the unemployment rate. However, the findings on the impact of labor market institutions on unemployment are mixed. For example, Nickel & Layard (1999) and Bassani & Duval (2009) find no evidence of a relationship between stricter a labor market and a high unemployment rate. On the other hand, Bernal-Verdugo, Furceri and Guillaumel (2012) find that more flexible labor markets improve labor market outcomes by reducing overall unemployment, youth unemployment, and long-term unemployment. This study contributes to labor market policy discussion by using a most up-to-date employment protection and economic data for the selected OECD countries.

### *Developments in EPI and the Unemployment Rate in OECD*

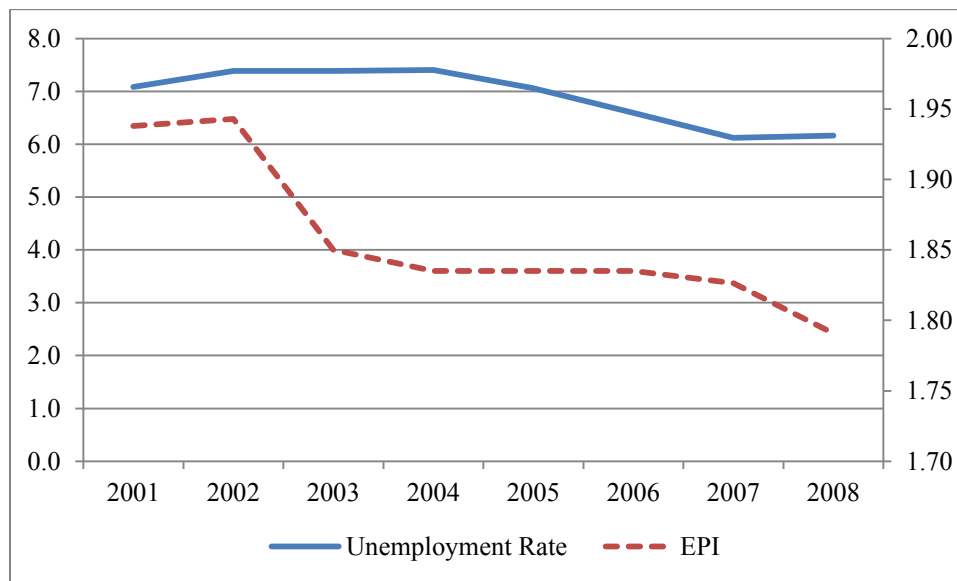
The economies of the selected OECD countries grew during the time period analyzed in this study. In 2008, the impact of the great recession started to influence the OECD countries as nearly no economic growth was observed in that year.<sup>3</sup> In terms of regulatory tendencies, a major trend in the OECD countries, over 2001-2008, is to relax employment protections in countries where employment protection is more strict. Overall the average unemployment rate of OECD countries analyzed in the study declined from about 7.1 percent in 2001 to slightly above 6.1 percent in 2008 (Figure 1). The employment protection index also decreased from 2 in 2000 to 1.85 in 2008.<sup>4</sup>

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<sup>3</sup> Total GDP of OECD countries (the US \$, constant prices, constant PPPs) increased by 0.2 percent in 2008 (OECD, 2012a).

<sup>4</sup> OECD EPI increases as hiring and firing conditions become more rigid and it changes between 0 and 6. EPI becomes stricter as employment protection index increases.

Figure 1: Overall Average Unemployment Rate (%) and Average EPI for the Selected OECD Countries between 2001 and 2008

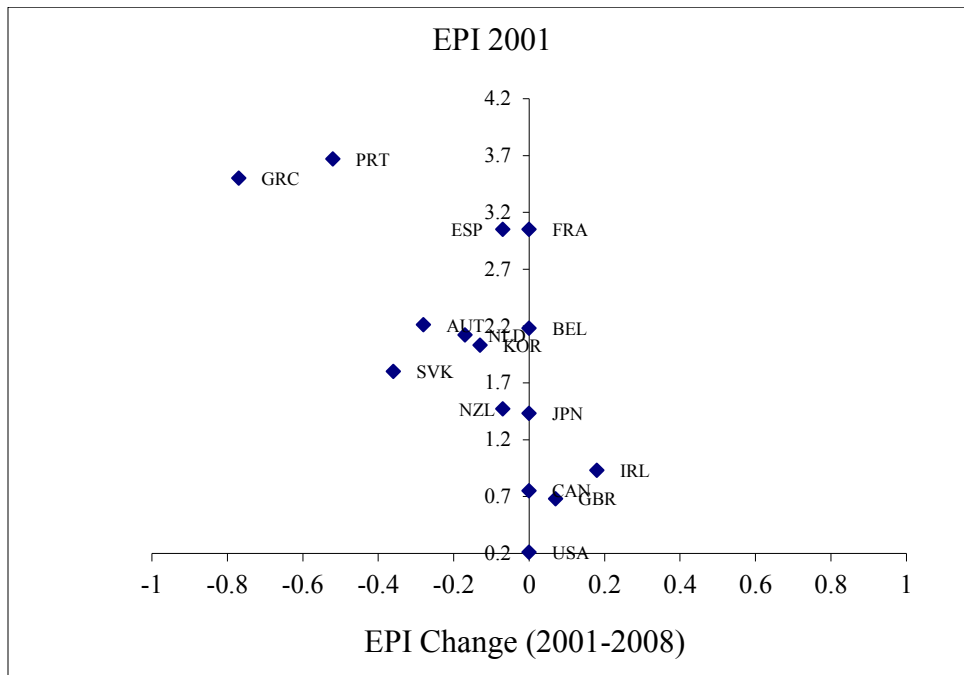


Source: OECD Employment and Labor Statistics (OECD 2012b) and OECD Indicator of Employment Protection (OECD 2012c), **and author's** calculation.

The employment protection index created by the OECD shows that there is considerable variation among OECD members in 2008 (see Table A1 in appendices). The U.S. has the most flexible labor market with the lowest score of an employment protection index, and Turkey has the highest score of the employment protection index.

In general, across the selected OECD countries, I observe a trend towards reducing employment protection, especially in countries with a high employment protection index. On the other hand, Ireland and the U.K. had more flexible labor market conditions to start with in 2001, but changed their labor market policies toward stricter employment protection legislation. Belgium, Canada, Japan, and the U.S. kept their policies about the same. Figure 2 shows the changes of the employment protection legislation measured by the employment protection index between 2001 and 2008.

Figure 2: Developments in the Employment Protection Index in Selected OECD Countries



Source: OECD Indicator of Employment Protection (OECD 2012c), and author's calculation

### III. Literature Review

While some studies, in the literature, find positive association between employment protection and unemployment rate; others argue that such relationship is not significant. Hiring and firing difficulties generally are used as proxy for employment protection.<sup>5</sup> In this section, studies on labor market institutions, especially employment protection legislations, are reviewed with respect to their impact on labor market outcomes, specifically unemployment rates.

Lazear (1990) analyzes the impact of the severance pay requirements on the employment-to-population ratio using a pooled time-series and cross section data for 22 countries over a 29-year period. The study finds that changing the mandatory severance pay requirement from “no

<sup>5</sup> For example, Lazear (1990) used severance pay as job security measure.

obligation” to “3-month advance notice” reduces the employment. Lazear (1990) also argues that while mandatory severance pay would increase unemployment by putting additional burden on employers, employers would substitute full-time workers with part-time and temporary workers.

Siebert (1997), by investigating institutional factors in the European countries, argues that reforming the key labor market institutions to have more flexible labor markets would solve unemployment problems in Europe. Similarly, Blanchard & Wolfers (2000) suggest that more strict labor market institutions are a determinant for high unemployment rates, especially in European countries.

Some studies focus on the impact of policy change for individual country. For example, Kugler (1999) analyzes the impact of dismissal costs reduction on worker turnover in Colombia following the labor market reform that occurred in 1990. She finds that a net decrease in unemployment due to increase in the hazard rates into and out of unemployment in the formal sector in comparison to the informal sector. Kugler (2000) builds a model in which stricter job security regulations lead to incentives to operate in informal sector for high-turnover firms. In this study, an informality impact of the EPL legislation is not analyzed. Di Tella & MacCulloch (2005), using a survey dataset capturing hiring and firing restrictions for 21 OECD countries over the period 1984-1990, find that a more flexible labor market increases both the employment rate and labor force participation. The labor market flexibility data in this study is taken from the World Competitiveness Report, and it is measured according to the opinion of the higher level of managers in the firms. Managers are asked the degree of companies’ flexibility for adjusting job security and payments under different economic realities. The most important control variable in their model is the unemployment benefit generosity. They also include a control for



employment taxes and its interaction with flexibility and unemployment benefits. Employment taxes are measured as the share of total tax payment of employer in total payment to employees. They find that higher employment taxes lead to lower employment rates. Change in GDP is used to control the state of the business cycle, and this does not influence the relationship between flexibility and the employment rate. Bassanin & Duval (2006) analyzed the relationship between EPL and aggregate unemployment rates, and they find significant impact of EPL on aggregate unemployment rates. Bernal-Verdugo et al., (2012) finds that more flexible labor markets improve labor market outcomes (overall unemployment, youth unemployment and long-term unemployment). They use a composite labor market flexibility indicator from the Fraser Institute's Economic Freedom, and it includes minimum wage, hiring and firing regulation, centralized collective bargaining, mandated cost of hiring, mandated cost of work dismissal and conscription.

Not all studies agree on the direction of and the degree to which EPL affects unemployment rates. For example, Bentolila & Berola (1990) find that firing costs have larger impacts on firms to fire rather than hire. Therefore, an unexpected decline in firing costs could increase a firm's willingness to hire new employees insignificantly. Addison and Grosso (1996) find little impact of severance pay on unemployment. A theoretical model by Bertola et al. (1999) predicts that stricter EPL leads to more stable employment since it diminishes both hiring and firing. Nickell (1997), in an analysis of the determinants of the unemployment in 20 OECD countries, highlights certain labor market features to explain high unemployment. A generous unemployment benefit system can lead high unemployment if there is no mandate for actively looking for job and activation interventions are not sufficient. High level of unionization for

collective wage bargaining also could increase unemployment if there is no coordination among either employers or unions in wage bargaining. A significant total tax burden on workers also is mentioned as the reason for high unemployment. Nickel (1997) suggests that high level of minimum wages hurts young people in terms of being unemployed. Additionally, poor educational outcome for lowest end of the labor market is found as a reason for high unemployment. Nickell (1997) argues that the impacts of labor market rigidities like strict employment protection legislation on average level of unemployment is not significant. Nickell & Layard (1999) find no evidence on the relationship between higher labor market rigidities and high unemployment rate. They, also, argue that more strict employment legislations diminish the labor turnover. Pissarides (2001) constructs a theoretical model to analyze the role of employment protection in job creation. He shows that optimally chosen severance pay and advance notice of termination play an insurance role and do not reduce job creation with an exogenous unemployment insurance system. Bassani & Duval (2009) find that the relationship between aggregate unemployment rate and EPL is not conclusive. In their study, institutional determinants of unemployment are unemployment generosity measure, EPL, union membership rates, and the measure of centralization/coordination of wage bargaining. Output gap also is used in order to proxy business cycle fluctuations. They find that while tax wedge and average replacement rate are positively associated with unemployment rates, EPL and union density are not significant determinants of the unemployment rate. Output gap and high corporatism are found to reduce the unemployment rate.

In conclusion, the findings on the relationship between the unemployment rate and employment protection legislation are mixed as Skedinger (2010) concludes after an extensive

review of literature on this topic. No robust relationship between aggregate employment, or unemployment, and employment protection persists.

#### IV. Model

In a country, economic growth, the structure of the economy, the role of the government on the economy, the education system building the labor force, labor market regulations including labor tax, employment protection legislations, unemployment benefit systems, minimum wages, and unions are key factors affecting the labor market outcomes such as the employment rate and the unemployment rate. A static fixed effect regression model and dynamic panel regression techniques are used in this study to analyze the relationship between the unemployment rate and the employment protection index in the selected OECD countries.

In the static regression, the effect of labor market flexibility on the unemployment rate is analyzed through following reduced regression form:

$$(1) \quad Unemp_{it} = \beta_0 + \beta_1 EPI_{it} + \beta_{it} Z_{it} + \mu_i + \nu_t + \varepsilon_{it},$$

where *unemp* is the unemployment rate for country *i* at year *t*,  $\mu_i$  is the country fixed effects, and  $\nu_t$  is the year fixed effects,  $Z_{it}$  is a vector of control variables, which includes output gap, openness, share of industrial output, population density, urbanization rate, real hourly minimum wage, size of government measured by the general government expenditure in GDP, net unemployment benefit replacement rate measuring generosity of unemployment benefit system, and average personnel income tax rates. This specification is similar to the specification used in Verdugo et al. (2012) but adds average tax wedge and unemployment benefit generosity

following the guidance of Di Tella & MacCulloch (2005), Bassanin & Duval (2006), and Nickel (1997).

Changes in the unemployment rate also can cause policy makers to change employment protection legislations to address the adverse developments in the labor market, and therefore, unemployment rate. In such cases, the direction of causality from the unemployment rate to employment protection legislations creates the endogeneity problem in regression estimations. To address the endogeneity issue, a dynamic reduced form equation is estimated by using a Generalized Method of Moments (GMM) estimator.<sup>6</sup>

$$(2) \quad \Delta Unemp_{it} = \beta_0 + \beta_1 Unemp_{it-1} + \beta_2 EPI_{it} + \beta_{it} Z_{it} + \varepsilon_{it},$$

where  $unemp$  is the unemployment rate for country  $i$  at year  $t$ ,  $Z_{it}$  is a vector of control variables listed above.

## V. Data and Descriptive Statistics

The existing data from the OECD statistical data base do not include all the analysis variables needed to estimate the models described in the previous section. Therefore, I combined the data from the World Development Indicators of the World Bank, the World Economic Outlook of the IMF, and the OECD statistical database.

### Data

*The Employment Protection Index*, which is produced by the OECD, is the key data measuring the strictness of the labor market regulations. This data measures the procedures and costs related to dismissal of a group or individuals in addition to the procedures for hiring

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<sup>6</sup> Similar to the dynamic panel model estimated in Verdugo et al. (2012).

workers with fixed-term or temporary contracts.<sup>7</sup> The EPI index is a summary measure of three different employment protection indicators. The first indicator measures the relative difference across countries of individual dismissal of workers with regular contracts, which include procedural inconveniences when firing a worker such as notification and consultation requirements, severance pay and notice periods. The second aspect is about the regulations governing temporary contracts with respect to duration and the types of work under these contracts. This measure also incorporates the information on rules and regulations on establishment and operation of temporary work agencies and conditions causing higher costs of temporary contracts in comparison to hiring workers on permanent contracts. The last aspect is the additional costs burdens on employers due to collective dismissals (CD). This measure covers costs for collective firing in case there are any additional costs compared to costs associated with individual dismissals. For example, one of the sub-components of the CD measures whether or not there are additional notification requirements to some organizations like labor unions in comparison to individual dismissal cases. This score, for instance, is 1.5 for Portugal and 6 for the Slovak Republic. Therefore, the Slovak Republic is stricter in terms of the additional requirement for the notification of collective dismissal.

The OECD calculates three versions of overall summary indicators by using weighted and unweighted averages of these sub-indicators.<sup>8</sup> In this study, the unweighted average of the sub-indicators for regular contracts and temporary contracts is used as it is available over 1985-2008. Another version is the weighted sum of three sub-indicators, and it is available over 1998-

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<sup>7</sup> Venn (2009) notes that employment protection is one of the policies influencing labor market flexibility. Therefore, EPI is not complete measure of labor market flexibility. For example, it does not include the measure of unionization, working hours, part-time contracts and social protection programs.

<sup>8</sup> See Table 2A in Appendices for more information on the detailed categorization of the overall summary indices.

2008. The last version of the summary indicator includes new data items, and it is available only for 2008.<sup>9</sup>

*Unemployment rate*, the ratio of total unemployed and total labor force, is the dependent variable of the model estimated in this study. It is compiled by the OECD using member countries' labor force statistics.<sup>10</sup> Unemployment data cover the civilian population above 15 years-old. People can be identified as unemployed under the following conditions: i) he or she does not have paid or unpaid work; ii) he or she is available for work; or iii) he or she is actively looking for a job.<sup>11</sup> The unemployed person faces various labor market choices. He or she can find a job and therefore his status changes from unemployed to employed. Alternatively, if the unemployed cannot find a job or does not accept a job offer for various reasons, then his unemployed status does not change. Lastly, the unemployed would leave the labor market if he stops looking for a job. This could result from discouragement of long-term unemployment, or availability of more attractive options outside of the labor market (Shimer, 2011).

### *Control Variables*

In order to isolate the impact of EPL on the unemployment rate, some other factors influencing the unemployment rate are controlled in this study. The controls are output gap, government expenditure as a share of GDP, openness of the economy, real hourly minimum wages, share of industry in total economy, population, population density, net unemployment benefit replacement rate, and average tax wedge.

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<sup>9</sup> A more detailed description of the employment protection index can be obtained from following website of the OECD: <http://www.oecd.org/employment/emp/oecdindicatorsofemploymentprotection.htm#details>

<sup>10</sup> The data is extracted from the OECD on 08 Oct 2012 14:43 UTC (GMT)

<sup>11</sup> The detailed definition of unemployed can be obtained from following website of the OECD <http://stats.oecd.org/metadata/publish.asp?ds=1&co=.lfun.....>

*The output gap* measures the level of economic activity relative to potential of the economy. It is calculated as actual GDP minus potential GDP as a percent of potential GDP.<sup>12</sup> These data produced by the IMF are available for 23 OECD countries in World Economic Outlook (September 2012). *Government expenditure as a share of GDP* measures the size of government activities in the economy. *Openness*, which is the share of total export and import in GDP, is used as a measure of openness of the economy. *Real hourly minimum wages* is available for 24 OECD countries from the OECD database. Nominal wages were first deflated by the national consumer price index, and then converted into a common currency unit using US \$ current exchange rates. *Share of industry in the total economy* is the total industrial value added as a share of GDP measures the sector structure of the economy. This data is received from the World Development Indicator (WDI) of the World Bank.

*Population* measures main demographic trends in the economies, and it is a crucial determinant of labor supply. *Population density* is the number of people per square km of land area in a country. Urbanization rate is the ratio of urban population to total population. This variable measures the modernization level of the country. The data of these three demographic variables are WDI database of the World Bank.

*Net unemployment benefit replacement rate* measures the generosity of unemployment benefit systems in OECD countries. It is defined as the average of the net unemployment benefit (including social assistance and cash housing assistance) replacement rates for two earnings levels, three family situations and 60 months of unemployment. The data, which are produced by the OECD, are available between 2001 and 2010 (OECD, 2012d). *Average tax wedge* is used in order to capture the impact of labor costs on unemployment. Tax wedge is defined as “the

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<sup>12</sup> Paula R. De Masi (1997) discusses the methodologies of potential output calculation.

difference between total labor costs to the employer and the corresponding net take-home pay of the employee as a percentage of total labor costs” (Paturot, Mellbye & Brys, 2013, p.8).

Average tax wedge is the summation of the income tax, social security contribution of employee and employer, and any payroll tax if it is applicable.<sup>13</sup>. In the analysis, average tax wedge of one-earner married couple at 100% of average earnings, 2 children is used. The data are produced by the OECD.

## Descriptive Statistics

In this study, the relationship between employment protection legislation and the unemployment rate is analyzed for 15 OECD countries over 2001-2008. Table 1 and 2 provide descriptive statistics of the unemployment rate, the employment protection index as well as control variables. The average of the mean unemployment rate of 15 OECD countries over 2001-2008 is 6.7 percent with a standard deviation of 3. The average of mean employment protection index over 2001-2008 is 3.5 with a standard deviation of 0.9. Portugal has the most strict labor market in the sample, whereas the U.S. has the most flexible employment protection legislation. Openness measure, which is the share of total trade in GDP, suggests that 15 OECD countries are open economies as trade accounts for 80.1 percent of GDP. There is significant variation in real minimum wage among the selected countries. The highest average real minimum wage is 10.5 US dollars per hour in Australia and the lowest average real minimum wage is 1.4 US dollars per hour in the Slovak Republic. Population also appears to vary substantially among the countries in the sample. For example, 2.6 people live in Australia per square kilometer of land on average over 2001-2008, in contrast to 496.8 in South Korea. As most of the countries in the

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<sup>13</sup> Following website of the OECD is helpful for the information on average tax wedge: <http://www.oecd.org/ctp/tax-policy/>



sample are developed countries, the urbanization rate is quite high but shows considerable variation. The average of countries' mean urbanization rates is 76.5 percent during the 2001-2008 periods.

The observed output gap across the sample was positive on average during the analysis period of the study. Other than Japan and South Korea, all the remaining countries have positive output gap. The size of the government varies substantially among 15 OECD countries. France has the biggest share of the government expenditures in GDP with more than 50 per cent; on the other hand South Korea has the lowest share with 20.6 per cent. Unemployment generosity measured by net unemployment benefit (UB) replacement rate varies within the sample. The U.S. has the least generous unemployment benefit system with 27.9 percent net UB replacement rate, whereas European countries have more generous unemployment benefit system. For example, the average net UB replacement rate in the Netherlands is 68.5 percent. Average tax wedge rates vary within the sample. France has the highest average tax wedge with 41.5 percent; while, Ireland has the lowest average tax wedge with 6.3 percent.

Table 1: Descriptive Statistics for 2001-2008: First Set of Variables

	Unemployment Rate (%)	EPI	(Trade /GDP (%))	Real Hourly Minimum Wages-US Dollar	Population Density (people per sq. km of land)
Australia	5.4	1.2	40.5	10.5	2.6
Belgium	7.7	2.2	155.4	10.0	344.0
Canada	6.9	0.8	73.0	6.6	3.5
Spain	10.2	3.0	57.8	4.1	86.3
France	8.5	3.1	53.9	10.1	114.9
United Kingdom	5.0	0.7	56.4	9.9	248.6
Greece	9.4	2.9	56.3	4.7	86.0
Ireland	4.6	1.1	158.7	9.5	60.0
Japan	4.6	1.4	27.0	5.8	350.2
Korea	3.5	2.0	77.9	3.1	496.8
Netherlands	3.9	2.1	131.2	9.7	482.1
New Zealand	4.4	1.5	60.0	7.0	15.6
Portugal	6.6	3.5	67.5	2.9	114.7
Slovak Republic	15.5	1.5	160.2	1.4	112.0
United States	5.3	0.2	26.1	6.2	32.1
Min.	3.5	0.2	26.1	1.4	2.6
Max.	15.5	3.5	160.2	10.5	496.8
Mean	6.7	1.8	80.1	6.5	170.0
St. Dev.	3.0	0.9	45.5	2.9	164.8

Source: Unemployment rate, EPI, real hourly minimum wage is from OECD Employment and Labor Statistics (OECD, 2012b). Share of trade in GDP (Trade/GDP) and population density is from World Development Indicators (World Bank, 2012).

Table 2: Descriptive Statistics for 2001-2008: Second Set of Variables

	Urbanization Rates (%)	Output Gap in Percent of Potential GDP (%)	General Government Total Expenditure of GDP (%)	Net Unemployment Benefit Replacement Rate (%)	Average Tax Wedge (%)
Australia	88.1	0.1	34.5	49.9	17.4
Belgium	97.3	0.5	49.7	62.9	41.4
Canada	80.0	1.2	40.1	45.5	21.2
Spain	76.7	1.7	39.0	50.3	32.9
France	80.9	0.1	53.0	57.6	41.5
United Kingdom	79.0	2.4	39.8	51.3	27.2
Greece	60.3	3.5	46.1	32.2	36.3
Ireland	60.4	1.9	34.4	65.7	6.3
Japan	84.8	-1.0	35.1	58.3	23.9
Korea	81.2	-0.2	20.6	36.3	16.4
Netherlands	79.7	0.4	45.8	68.5	29.1
New Zealand	86.0	1.2	30.3	56.2	9.4
Portugal	57.2	0.6	44.5	57.3	27.7
Slovak Republic	55.6	0.3	38.9	50.1	26.9
United States	80.5	0.7	36.3	27.9	18.1
Min.	55.6	-1.0	20.6	27.9	6.3
Max.	97.3	3.5	53.0	68.5	41.5
Mean	76.5	0.9	39.2	51.3	25.0
St. Dev.	11.9	1.1	7.8	11.4	10.2

Source: Urbanization rates from the World Development Indicators of the World Bank. Output gap in percent of potential GDP and general government total expenditure as a share of GDP are from the IMF's World Economic Outlook (September 2012). Net real hourly minimum wage is from OECD Employment and Labor Statistics. Net UI replacement rate is from OECD Benefits and Wages Statistics (OECD, 2012d). Average tax wedge is from OECD Tax Statistics (OECD, 2012e).

## VI. Regression Results

The impact of labor market regulations on the unemployment rate in the selected OECD countries is analyzed through the fixed effects regression model. Fixed effects technique allows controlling for observed and unobserved country characteristics that do not change over time.

Other determinants of the unemployment rate are also included in the model. I first discuss the

results of the static fixed effects regression estimation and GMM dynamic panel data estimation, and then perform several robustness checks.<sup>14</sup>

The results of the fixed effects estimations and GMM dynamic panel data estimation are presented in Table 3. The first three regressions are performed by using the fixed effects regression model controlling for the country fixed effects.<sup>15</sup> The first three regressions show the fixed effects regression of the static model for different specifications. The last regression (Model 4) in Table 3 is the output of the GMM dynamic panel estimation which accounts for endogeneity (or reverse causality) of the explanatory variables. In the GMM dynamic panel estimation, population density and openness are considered as exogenous variables, and all other variables are treated as endogenous.<sup>16</sup> The main finding in these regression results is that EPI does not have a statistically significant association with the unemployment rate for the selected 15 OECD countries. Dynamic panel estimation of EPI coefficient is consistent with the fixed effect estimations. Although there is a difference in magnitude, both regression results suggest a statistically not significant relationship between EPI and the unemployment rate. The negative EPI coefficient implies that stricter employment protection legislation is related with a lower unemployment rate. These findings are consistent with Bassani & Duval (2009) who also find a negative but not significant relationship between EPI and unemployment rates.

Model 1 of the fixed effects regression, including all the control variables in Table 3, suggests that a one unit increase in the employment protection index is associated with 0.55 unit

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<sup>14</sup> Correlation matrix of the all variables in the model is in the Table A3 in Appendix.

<sup>15</sup> Time fixed effect is not presented as joint F-test because the time dummies are not significant at conventional significance levels. Furthermore, autocorrelation also is taken into account for the models by including first-order autoregressive disturbance terms in the model. Share of industrial output dropped from the estimation because of high collinearity with openness variable.

<sup>16</sup> The GMM-system regression is estimated by using the Stata command developed by Roodman (2009).

decrease in unemployment rates on average after controlling for all other variables and country fixed effects. Stricter employment legislation, theoretically, discourages both hiring and firing (Heckman & Pages-Serra, 2000). The EPI coefficient is expected to be negative if employers are inclined to restrict firing more than hiring when job security legislations become stricter. For example, Bentolila & Berola (1990) suggest that firing costs have larger impacts on firms for firing in comparison to hiring. In Model 1, some of the explanatory variables are found to be individually insignificant. In order to investigate whether these variables are jointly significant, a joint F test is performed. After performing a joint F test, minimum wage, the interaction of minimum wage and EPI, population density and urban population are all dropped from the model. After dropping these variables, Model 2 is estimated. There are no substantial differences between the coefficients in Model 1 and Model 2. This finding suggests that the contribution of the dropped variables from Model 1 to Model 2 to explain the unemployment rate is negligible. Model 2 suggests that EPI is negatively associated with unemployment rate. After controlling country fixed effects and other explanatory variables, a one unit increase in EPI is associated with 0.6 unit decrease in unemployment rates (see Model 2 in Table 3). However, the coefficient of EPI is not statistically significant at conventional significance levels. Openness of the economy, output gap, and government size are the only significant variables in both Model 1 and Model 2.

Table 3: Determinants of Unemployment Rate in Models 1 to 4

Variables	Model 1 (FE)	Model 2 (FE)	Model 3 (FE)	Model 4 (GMM)
Lag Unemp				0.848*** (0.0427)
EPI	-0.551 (0.915)	-0.648 (0.789)		-0.0534 (0.0884)
Lag EPI			-1.520* (0.834)	
Openness	-0.0533*** (0.0198)	-0.0405*** (0.0148)	-0.0375*** (0.0142)	0.000650 (0.00292)
Minimum Wage	-0.166 (0.271)			-0.0677* (0.0343)
Epi*Minimum Wage	-0.0987 (0.158)			
Urbanization Rate	0.256 (0.291)			0.000408 (0.00677)
Population Density	0.0642 (0.118)			-0.000471 (0.000710)
Output Gap	-0.157** (0.0617)	-0.187*** (0.0584)	-0.205*** (0.0580)	-0.103*** (0.0339)
Government Size	0.164*** (0.0608)	0.136** (0.0570)	0.109* (0.0559)	0.0436** (0.00317)
Un. Replacement Rate	-0.0711* (0.0361)	-0.0611* (0.0346)	-0.0337 (0.0371)	-0.00914 (0.0128)
Tax Wedge	0.0321 (0.0380)	0.0214 (0.0374)	0.0212 (0.0365)	-0.465 (0.956)
Constant	-19.86** (9.342)	8.288*** (0.864)	9.342*** (0.769)	-0.00317
Country Fixed Effect	Yes	Yes	Yes	
Year Fixed Effect	No	No	No	
N	105	105	105	120
Hansen Test (p-value)				1.00
Arellano-bond AR(2) test (p-value)				0.957
R-squared	0.35	0.31	0.33	
Number of country	15	15	15	15

Robust standard errors in parentheses

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

Table 4: Determinants of Unemployment Rate in Models 5 and 6

Variables	Model (5)	Model (6)
EPI	-1.297* (0.671)	
Lag EPI		-1.465** (0.707)
Openness	-0.0469***	-0.0422*** (0.0126)
Output Gap	-0.156*** (0.0454)	-0.174*** (0.0451)
Government Size	0.121** (0.0466)	0.100** (0.0468)
Un. Replacement Rate	-0.0461 (0.0284)	-0.0262 (0.0294)
Tax Wedge	0.00302 (0.0368)	0.00383 (0.0367)
Constant	10.15*** (0.793)	9.907*** (0.737)
Country Fixed Effect	Yes	Yes
Year Fixed Effect	No	No
N	154	154
R-squared	0.31	0.32
Number of country	22	22

Robust standard errors in parentheses

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

Model 2 (Table 3) suggests that a one unit increase in the output gap is associated with a 0.19 unit decline in the unemployment rate after controlling for other variables and country fixed characteristics. Negative association between the output gap and the unemployment rate is consistently significant across the model specifications presented here. This finding also is consistent with previous studies in the literature [e.g. Bassani & Duval (2009), and Bernal-Verdugo et al. (2012)]. Government size, measured by the share of total government expenditures in GDP, is positively associated with the unemployment rate in all models. A one

unit increase in government size, in Model 2, is associated with a 0.14 unit increase in the unemployment rate after controlling for other variables and country fixed characteristics. The result also is consistent with some of the earlier studies [e.g. Bernal-Verdugo et al. (2012) and Feldman (2006)]. This study does not find a significant positive relationship between the unemployment rate and the average net replacement rate of the unemployment benefit. It is possible to have higher unemployment rate as unemployment benefit systems becoming more generous [e.g. Nickell (1997)]. People would tend to stay more in unemployment if their reservation wage increases with a more generous unemployment benefit system.<sup>17</sup> The average tax wedge, which measures total costs of labor including social security payments by employee and employer, personnel income tax and payroll tax, is found to be not a statistically significant. The sign of the tax wedge coefficient is consistent with the previous studies [e.g. Bassani & Duval (2009)], and these studies generally find a positive relationship between tax wedge and unemployment rate.

The GMM dynamic panel estimation (Model 4) suggests that output gap and government size are significant variables; however openness is not significant. Although real minimum wage is not significant in the fixed effect regressions, it becomes significant in the GMM estimation (Model 4). Model 1 and Model 4 find an inverse relationship between the unemployment rate and real minimum wage. A one dollar increase in the real minimum wage is related with 0.06 point decline in the unemployment rate (see Model 4 in Table 3). Theoretically, an increase in minimum wage could cause an increase in unemployment rate under various assumptions.

However, this finding depends on certain assumptions on the characteristics of labor demand and

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<sup>17</sup> Solon (1985) shows that a decrease in unemployment benefits reduces the average unemployment duration among high income unemployment insurance beneficiaries.



supply, such as elasticity as well as general equilibrium effects of real minimum wage increases.<sup>18</sup> For example, Card and Krueger (1995) did not find significant impact of minimum wage on employment rates.

To test the robustness of the static fixed effects regressions, I, first, included the lagged EPI in the model (Model 3 in Table 3). Any change in employment protection legislations may have an impact on the unemployment rate with a time lag. The estimated EPI coefficient still is negative in this specification but becomes significant only at the 10 percent level. The magnitude of the lag of EPI coefficient in Model 3 is larger than the EPI coefficients in Model 1 and in Model 2.<sup>19</sup> In this study, the sample size is restricted by data availability. As several variables, minimum wage, interaction of minimum wage and EPI, population density and urban population, are dropped from the Model 1, more countries are included in the sample in Model 5 and Model 6 (see Table 4). These aforementioned variables are dropped as their contribution to explain the dependent variable is negligible. When the regression analysis is extended from 15 OECD countries to 22 OECD countries in Model 5 and Model 6, the findings do not change. After controlling country fixed effects and other explanatory variables, the EPI coefficient is -1.30 and significant at the 1 percent level (Model 5 in Table 4). Also, openness of the economy, government size and output gap are still the significant variables. The net unemployment benefit replacement rate and tax wedge are not significant at conventional levels.

In general, I find that employment protection legislations are not a significant determinant of the unemployment rate after controlling country fixed characteristics and other economic factors. On the other hand, I find that, on average, output gap and government size are

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<sup>18</sup> Neumark & Wascher (2007) discuss the minimum wages and employment by providing broad literature review.

<sup>19</sup> The findings of the dynamic panel model including the lagged EPI are similar to those in Model 4.

significant factors affecting the unemployment rate under various specifications tested in this study. Demographic variables, such as population density and the urbanization rate, are found to be not significant factors. Contrary findings in the literature, generosity of unemployment benefits and tax wedge are found to be not significant in explaining variation in unemployment rates among the 15 OECD countries. Some caveats should be emphasized before the policy implications of the analysis. First, the employment protection index is a composite index of the regulations, but does not measure enforcement of these regulations. Stricter employment protection could lead to an increase in informal employment which creates duality in the labor market. Because of duality in the labor market, more strict employment protection may not have an impact on the official aggregate unemployment rate but it could encourage informal employment. For example, Kugler (1999) shows that liberalization of labor market regulation through reduction in severance payments cause a reallocation from informal sector to formal employment in Colombia. Therefore, for countries with high informal employment, the reallocation impact of the policy change could be significant. Another issue is the small sample size. In this study, not all OECD countries were included in the analysis for a longer time period because of the data availability. The 15 OECD countries are selected based on the availability of key variables. After dropping the insignificant variables, the sample size becomes larger and the model results remain consistent. Thus, the small sample size is not considered as setback.

## VII. Policy Discussion and Conclusion

The cross-country panel data estimations described in this study suggests that, on average, employment protection legislations are not significant determinants of higher

unemployment rates. Therefore, EPL reforms may not have the impacts of various policy recommendations suggested by the OECD (1994) on unemployment rates. On the other hand, output gap and government size are significant determinants of unemployment rates across the 15 OECD countries. The output gap measuring the business cycle fluctuations of aggregate demand is a major determinant of the unemployment rates. Therefore, reducing the output gap through macroeconomic policies like aggregate demand management appears to be a more viable strategy for reducing unemployment. Furthermore, as the government receives a higher share of total output, unemployment rates tend to increase on average. Higher government expenditures would crowd-out job creating private investments, and therefore unemployment rates, on average, could increase as governments expenditures rise (Feldmann, 2006). Generosity of unemployment benefits and tax wedge are not found to be significant in explaining heterogeneity in unemployment rates, which contradicts the common finding that generous unemployment benefits cause higher unemployment rate (e.g. Nickell (1997)). A higher tax wedge also is found to be not significant. Findings of this study suggest that policy makers, especially in developed countries, should focus on the primary goal of employment protection legislations: insuring a worker against unexpected job loss through employment protection policies rather than unemployment impacts of the EPL reform.

Employment protection legislation could affect other labor market outcomes like the employment rate. Future studies analyzing the relationship between the employment rate and the employment protection index would contribute to literature by using up-to-date data set. Furthermore, employment protection legislations would have different implications in the case of developing countries. For example, stricter employment protection legislations would be cause

of high informal employment. The future studies analyzing the impact of employment protection legislations on informality in developing countries would also contribute to the literature.

## APPENDICES

Table A1: Employment Protection Index in 2008\*

	Protection of permanent workers against (individual) dismissal	Regulation on temporary forms of employment	Specific requirements for collective dismissal	OECD employment protection index	Overall Ranking
Australia	1.37	0.79	2.88	1.38	27
Austria	2.19	2.29	3.25	2.41	13
Belgium	1.94	2.67	4.13	2.61	11
Canada	1.17	0.22	2.63	1.02	30
Chile	2.59	2.04	0.00	1.93	22
China	3.31	2.21	3.00	2.80	8
Czech Republic	3.00	1.71	2.13	2.32	15
Denmark	1.53	1.79	3.13	1.91	23
Finland	2.38	2.17	2.38	2.29	16
France	2.60	3.75	2.13	3.00	5
Germany	2.85	1.96	3.75	2.63	10
Greece	2.28	3.54	3.25	2.97	6
Hungary	1.82	2.08	2.88	2.11	20
Ireland	1.67	0.71	2.38	1.39	26
Italy	1.69	2.54	4.88	2.58	12
Japan	2.05	1.50	1.50	1.73	25
Korea	2.29	2.08	1.88	2.13	18
Luxembourg	2.68	3.92	3.88	3.39	2
Mexico	2.25	4.00	3.75	3.23	3
Netherlands	2.73	1.42	3.00	2.23	17
New Zealand	1.54	1.08	0.38	1.16	28
Norway	2.20	3.00	2.88	2.65	9
Poland	2.01	2.33	3.63	2.41	14
Portugal	3.51	2.54	1.88	2.84	7
Slovak Republic	2.45	1.17	3.75	2.13	19
Spain	2.38	3.83	3.13	3.11	4
Sweden	2.72	0.71	3.75	2.06	21
Switzerland	1.19	1.50	3.88	1.77	24
Turkey	2.48	4.88	2.38	3.46	1
United Kingdom	1.17	0.29	2.88	1.09	29
United States	0.56	0.33	2.88	0.85	31

Source: OECD (2012c).

\* For France and Portugal, 2009 data is used. Version 3 of the indicator is used here and it is explained in data section.

Table A2: Overall Summary of Employment Protection Index

Overall Summary Indicator (Unweighted Average of (A) and (B)) (0-6)				
	Regular Contracts (A)		Temporary Contracts (B)	
Variable	Sub-indicator for dismissal of employees on regular contracts - calculated as weighted sum of items relating to regular contracts (REG1-REG8).		Variable	
			Sub-indicator for strictness of regulation on temporary contracts - calculated as weighted sum of items relating to temporary contracts (FTC1-FTC3; TWA1-TWA3).	
REG1	Notification procedures		FTC1	Valid cases for use of fixed-term contracts
REG2	Delay involved before notice can start		FTC2	Maximum number of successive fixed-term contracts
REG3A	Length of notice period at 9 months of tenure		FTC3	Maximum cumulated duration of successive fixed-term contracts
REG3B	Length of notice period at 4 years of tenure		TWA1	Types of work from which temporary work agency employment is legal
REG3C	Length of notice period at 20 years of tenure		TWA2	Restrictions on number of renewals of temporary work agency contracts
REG4A	Severance pay at 9 months of tenure		TWA3	Maximum cumulated duration of successive temporary work agency contracts
REG4B	Severance pay at 4 years of tenure			
REG4C	Severance pay at 20 years of tenure			
REG5	Definition of justified or unfair dismissal			
REG6	Length of trial period			
REG7	Compensation following unfair dismissal			
REG8	Possibility of reinstatement following unfair dismissal			

Source: OECD. For more information, see [www.oecd.org/employment/protection](http://www.oecd.org/employment/protection)

Table A3: Correlation Matrix of Model Variables

	UR	Epi	Openness	Minimum Wage	Urbanization Rate	Population Density	Output Gap	Government Size	UI Replacement Rate	Av. Income Tax Rate
UR	1									
Epi	0.2883*	1								
Openness	0.2570*	0.0267	1							
Minimum Wage	-0.4223*	0.2460*	0.0596	1						
Population Density	-0.2987*	0.1563	0.2469*	0.0356	1					
Urbanization Rate	-0.4276*	0.2508*	0.2507*	0.5212*	0.2854*	1				
Output Gap	-0.0391	-0.0137	0.0444	0.128	-0.2152*	-0.2154*	1			
Government Size	0.3888*	0.4400*	0.1599	0.3049*	-0.0758	-0.0653	0.109	1		
UI Replacement Rate	-0.0507	0.1941*	0.4612*	0.3832*	0.2325*	0.1008	-0.1301	0.3376*	1	
Av. Income Tax Rate	0.4669*	0.5969*	0.0381	0.0033	0.2259*	0.0713	0.0313	0.7703*	0.0878	1

\* p<0.05

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