

# Analysis of employment protection laws and unemployment benefits

Yoon-Kyung Chung<sup>a,b</sup>, Jinook Jeong<sup>b,\*</sup>

<sup>a</sup> Department of Economics, University of California, Davis, United States

<sup>b</sup> School of Economics, Yonsei University, Seoul, 120-749, Republic of Korea

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## Abstract

This paper presents an empirical model that analyzes the relationship between Employment protection legislation and unemployment benefits. We emphasize the censoring and arbitrary weights problems and propose an alternative method that resolves both problems simultaneously. © 2007 Elsevier B.V. All rights reserved.

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## 1. Introduction

Employment protection legislation (EPL) and the unemployment insurance system (UI) are two major institutions employed by countries around the world to protect workers against labour market risk. Since EPL reduces the risk of involuntary job loss by making it costly for firms to lay off workers and unemployment benefits (UB) protect the workers against the income risk that comes with ‘firing,’ they, along with trade unions, are often blamed for creating rigidities in the labour market causing a high unemployment rate (OECD, 1994). A number of empirical, cross-country studies have been conducted to assess the actual effects of labour market institutions on macroeconomic variables (for example, Lazear, 1990; Heckman and Pages, 2000). While most of these studies examine the effects of each labour market institution on the above variables separately, relatively fewer studies have focused on studying the relationship between the labour market institutions – EPL and UB – themselves. Theoretically, EPL and UB are possibly substitutable due to their common ‘security against risk’ nature (Blanchard and Tirole, 2004; Boeri et al., 2003): the higher intensity in one measure could substitute for the lack of the other measure, affecting the level of each institution, which in turn would influence the overall effects of these institutions on macroeconomic variables.

In this paper, we apply a new estimation method to address the censoring and arbitrary weighting problems in the UB data involved in examination of the relationship between EPL and UB. We find the following implications from the analysis. First, a high income country has the propensity to relax its employment laws and more unemployment benefits. Second, an economy biased towards high-skilled labour is more inclined to choose UB over EPL. Third, a fast-growing country prefers EPL over UB.

## 2. Model

### 2.1. Basic model

To examine the factors that influence the magnitude of UB relative to EPL, we use the following model, in the line with Boeri et al. (2003).

$$\ln\left(\frac{\text{UB}}{\text{EPL}}\right)_i = \alpha_0 + \alpha_1 \ln(\text{GDP})_i + \alpha_2 \text{GDPG}_i + \alpha_3 \text{POST2ND}_i + \varepsilon_i \quad (1)$$

where UB = the weighted average of two independent indicators — the normalized waiting period index and the normalized generosity of the benefits index,<sup>1</sup> EPL = the cost of firing 20% of the firm’s workers, calculated as the sum of the notice period, severance pay,

\* Corresponding author. Tel.: +82 2 2123 2493; fax: +82 2 313 5331.  
E-mail address: [jinook@yonsei.ac.kr](mailto:jinook@yonsei.ac.kr) (J. Jeong).

<sup>1</sup> The weights are arbitrarily given: UB = 0.25 \* waiting period index + 0.75 \* generosity of the benefits index.

and any mandatory penalties established by law or mandatory collective agreements for a worker with three years of tenure with the firm,<sup>2</sup> GDP = Year 2003 Gross Domestic Product (GDP) per capita, GDPG = Year 2000 GDP growth rate (%),<sup>3</sup> POST2ND = a share of population that has received higher than secondary education aged over 25,<sup>4</sup> and  $e \sim N(0, \sigma_e^2)$  for all  $i$ .

The data on the above variables have been collected from 85 countries around the world, from high-to low-income countries, with the dependent variables EPL and UB measured as of the year 2000. The source of all dependent variables is Botero et al. (2004).

GDP is expected to have a positive effect on the UB/EPL configuration because capital deepening, which is significantly positively correlated with GDP per capita, is expected to have a bigger impact on the relaxation of EPL than on the reduction of UBs. The effects of GDPG on the UB/EPL ratio are more ambiguous. Developing nations have a tendency to exhibit a faster GDP growth rate. On one hand, these nations, undergoing several structural changes in short time-span, need a flexible labour market calling for lenient employment laws. On the other hand, they are often financially or/administratively constrained from installing unemployment insurance schemes. Since it is much harder and more expensive to design and implement unemployment insurance schemes than to do so with employment laws, the above constraints are expected to overshadow the preference for UB over EPL. Last, the effects of POST2ND on the magnitude of UB relative to EPL would be affirmative. An economy with a skill-structure biased towards the high-skilled type permits lower EPL for any given level of unemployment insurance.

Previous studies have conventionally estimated the above model by OLS. However, the OLS estimation is not appropriate due to two problems: the censoring problem of the UB index, and the arbitrary weighting in the construction of the index. These problems are explained in the next section.

## 2.2. Censoring and weighting problems

The above regression faces two problems. First, it suffers from a censoring problem due to the nature of the UB data. There are a great number of nations, especially low-income countries, whose governments do not make UB available to the unemployed. This does not signify the non-existence of a demand for UB in those countries. The demand for UB would be observed only when the benefits were actually being provided. The data generation process on the regression model is the latent variable (demand for UB, or the desirable level of UB), not the observed level of UB. Using the latent variable, the model can be specified as follows:

$$\ln\left(\frac{UB^*}{EPL}\right)_i = \alpha'_0 + \alpha'_1 \ln(GDP)_i + \alpha'_2 GDPG_i + \alpha'_3 POST2ND_i + \varepsilon'_i \quad (2)$$

$$UB_i = UB_i^* \quad \text{if } UB_i^* > 0$$

$$UB_i = 0 \quad \text{if } UB_i^* \leq 0$$

where  $UB^*$  is the ‘desired’ level of UB (latent variable) and  $UB_i$  the observed variable.

Another problem we confront here is that the arbitrary weights placed on the sub-indices of the overall UB index lack much theoretical evidence. In measuring the ‘overall generosity of unemployment benefits,’ (inevitably a subjective judgment) a UB index is often composed of several variables.<sup>5</sup> Suppose that the UB index is calculated by a weighted average of two indicators:  $UB_i = wI_{1i} + (1-w)I_{2i}$ . Previous studies apply arbitrarily given weights for  $w$ , for example 0.25. Such a practice may of course bias the estimation results, unless the arbitrary weights are the true parameters of the data generation process. Since not much theory exists with respect to the aforementioned topic, it is best to extract the needed weights from the data; to find out the weights that enhance the probability (likelihood) of each observation of the data.

One way to resolve both problems at the same time is to combine the first step of the Heckman’s two-step estimation method, which paves the way for eradicating the censoring problem, with the ‘partial’ ML estimation method to estimate the weights as well as the parameters of the regression equation simultaneously. In elaboration, first, perform the first step of the Heckman’s two-step estimation – the probit analysis – of Eq. (1) to obtain an inverse mill’s ratio  $\lambda$ , which will control the bias of the OLS estimator:

$$H_i = \theta_0 + \theta_1 \ln(GDP)_i + \theta_2 GDPG_i + \theta_3 POST2ND_i + \zeta_i \quad (3)$$

where if  $UB_i^* \leq 0$  then  $H_i = 0$ . If  $UB_i^* > 0$  then  $H_i = 1$ .  $\zeta_i \sim N(0,1)$  for all  $i$ .

Then, using the bias-controlled equation of (4) and the weights equation of (5) mathematically derive the Eq. (6), and now, employ the ML estimation method on Eq. (4) with data  $H=1$  to approximate the weights and other coefficients simultaneously.<sup>6</sup>

$$\ln\left(\frac{UB}{EPL}\right)_i = \beta_0 + \beta_1 \ln(GDP)_i + \beta_2 GDPG_i + \beta_3 POST2ND_i + \delta \lambda_i + \eta_i \quad (4)$$

$$\ln\left(\frac{UB^*}{EPL}\right)_i = wI_{1i} + (1-w)I_{2i} \quad (5)$$

$$wI_{1i} + (1-w)I_{2i} = \beta_0 + \beta_1 \ln(GDP)_i + \beta_2 GDPG_i + \beta_3 POST2ND_i + \delta \lambda_i + \eta_i \quad (6)$$

where  $\eta \sim N(0, \sigma_\eta^2)$  for all  $i$ , and  $w$  is weight such that  $0 \leq w \leq 1$ .

<sup>5</sup> For example, in Botero et al. (2004), unemployment benefits ‘sub-index’ is the average of four different variables that ‘measure the generosity.’ For the average, arbitrary weights are placed on these variables.

<sup>6</sup> Nonetheless, because normality assumption is indeed a strong assumption it would have been better to have a variable in the binary regression that is not included in the main equation to ensure ‘identification,’ however, this paper has not managed to find the appropriate identifying instrument.

<sup>2</sup> Datasource: Botero et al. (2004).

<sup>3</sup> Datasource: WDI database.

<sup>4</sup> Datasource: Barro and Lee (2001).

### 3. Results

Table 1 shows the estimation results. The second column presents the estimates from the partial MLE with censoring-correction and simultaneously-estimated-weights. The third column presents the traditional OLS results, which are subject to the censoring bias and arbitrary weighting problem, for comparison.

### 4. Interpretation

The results from partial MLE comply with the prediction in Section 2.1. First, both  $\ln(\text{GDP})$  and POST2ND have statistically significant positive impacts on the scale of (UB/EPL) configuration, which imply that the skill composition of the country's economy and the size of its wealth determine the magnitude of that country's preference of one measure over the other. An economy biased towards the high-skilled type is more inclined to choose UB over EPL, for the job-to-job mobility rate for high-skilled workers is higher, requiring less job security than do low-skilled workers. High income countries not only have a much better chance of having a well-developed capital market that can offer protection from uncertainties of life, but can also afford to make monetary transfers to the needy and to relax their employment laws. Low income countries, on the other hand, often do not possess the means to provide monetary compensation for workers' job losses, relying on EPL instead, which leads them to have a lower UB/EPL ratio. Second, GDPG has a statistically significant negative effect on UB/EPL substitutability, empirically supporting the second conjecture given in Section 2.1.

The estimated coefficient of IMR is statistically significant at the 1% confidence level, justifying and emphasizing the necessity of eliminating the censoring problem in the regression equation. Also, the estimated weights for the two independent indicators of UB are statistically significant at the 10% confidence level. The weights, 0.14 for the waiting period sub-index and 0.86 for the generosity of the unemployment benefits sub-index, indicate that the amount of monetary compensation received matters much more than the promptness

Table 1  
Estimation results

Variable	Partial MLE	Traditional OLS
Constant	0.983 (0.034)***	2.174 (0.063)***
$\ln(\text{GDP})$	0.130 (0.005)***	0.017 (0.009)*
GDPG	-0.012 (0.007)*	-0.007 (0.004)
POST2ND	0.550 (0.169)***	0.768 (0.132)***
W	0.137 (0.077)*	-
IMR	0.407 (0.036)***	-
Goodness-of-fit	Log likelihood=49.59	$R^2=0.57$
# of observations	48	78

(Standard errors in parentheses) \*\*\*: significant at 99% \*: significant at 90%.

with which one receives that compensation, which seems commonsensical.

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