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Employment Labor Protection and Innovation

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Abstract

Employment labor protection (ELP) has recently been a focus of policy formation, in particular in respect to its impact on the incentives for firms to invest in productivity enhancing innovation and growth. Yet, the true relationship is still unclear, and the debate is ongoing. Thus, the main objective of this study is to examine the relationship between strict employment rights and new radical innovations in the Organization for Economic Co-operation and Development (OECD) countries for the period from 2006 to 2014. The study employed the between estimator (BE) of panel data analysis and found that strict employment rights and interest rates are negatively correlated with new radical innovation in the country.

Keywords: Innovation, Labor Rights, Employment Labor Protection, Panel Data

JEL Codes: O30, O31, O32, J00, J01, J08

1. Introduction

Employment labor protection (ELP) has recently been a focus of policy formation, in particular in respect to its impact on the incentives for firms to invest in productivity enhancing innovation and growth. Yet, the real relationship remains unclear, and the debate is ongoing. There are two important factors that a firm takes into account prior to an innovation decision. First, the hiring and firing costs of employees increase when employment rights are respected. Second, any adjustment costs to the employment made by the firm increase the job security of existing employees as well.

Thus, academic scholars disagree with each other with respect to the real effect of ELP on innovative activities. On one hand, some argue that ELP introduces new adjustment costs to the employment and, therefore, reduces the probability of firms making investments in radical innovations that require skills, high costs, and research and development (R&D) expenditures. On the other hand, efficiency wage arguments suggest that a secure job market is likely to motivate employees to increase their (unobservable) effort which, in return, leads to required skills coming to light that increase the return of innovation for the firm.

Therefore, the main objective of this paper is to investigate the relationship between ELP and the amount of innovation in thirty Organization for Economic Co-operation and Development (OECD) countries for the period from 2006 to 2014. The main contribution of this study is as follows: first, the study employs the between estimator (BE) of panel data analysis to capture only between or cross-sectional variation in the data; second, as the effect of ELP may depend on the nature of the innovation, this study takes patent applications as proxies for new radical investments rather than R&D expenditures that may compromise expenditures for both radical innovations and incremental innovations.

The rest of the paper is organized as follows: Section 2 discusses the findings of previous studies regarding the effect of ELP on innovation; Section 3 explains the data and methodology; Section 4 presents the empirical findings; and, finally, the last section concludes with the study's main findings and implications.

2. Literature Review

Previous studies do not have a common result with respect to the real effect of ELP on the innovative activities of firms. Two opposing views are debated in the literature. One is based on the efficiency wage argument that there is a trade between labor market flexibility and job security as a working motivation that concerns the generation of innovation. The studies of Akerloff (1982), Shapiro and Stiglitz (1984), Saint and Paul (1996), Acemoğlu (1997), Agell (1999), Boeri and Jimeno (2005), and others have all suggested that jobs secured by higher labor rights will motivate existing employees to increase their efforts in innovative activities. A recent study by Wachsen and Blind (2011) examined the impact of financial flexibility, in terms of wage rigidity, on research and innovation. The study showed that wage flexibility is positively associated with innovation and that it varies by type of innovation.

The second view claims that there is a negative correlation between ELP and innovation activities. It argues that the impact of ELP is strongly tied to the type of the innovation. Aghion and Howitt (1998) pointed out the difference between radical and incremental innovation and noted that radical innovations require high cost investments. In addition, an increase in ELP will increase the adjustment cost of employment for firms when they have to fire existing employees and hire new employees. The studies of Saint and Paul (1997), Caballero et al. (2004), Samaniego (2006), Cunat and Melitz (2007), and Bartelsman et al. (2008) express the common view that strict labor rights are correlated with the innovative activities of employees.

3. Data and Methodology

3.1 Data

Patent applications to the European Patent Office (EPO) are determined as the dependent variable which is used as a proxy that accounts for radical innovation in thirty OECD countries.[1] Patent applications and ELP index as the main explanatory variables of interest are obtained from the OECD statistical data dissemination tool (www.oecd.org). The study also employs gross domestic product (GDP) growth, inflation, openness, interest rates, real exchange rate (REX), labor cost, and country risk (CR) index as control variables. While the statistical data on GDP growth, inflation, openness, and REX are taken from the World Bank data dissemination server (www.worldbank.org), labor cost data are again obtained from OECD statistics. The remaining CR index is a composite index of economic, financial, and political risk ratings of each country and is available from the Political Risk Services data retrieval tool (www.prsgroup.com). All variables are measured in US dollars. The descriptive statistics of the variables are presented in Table 1 below:

Table 1. Descriptive Statistics of the Variables

Variable	Observation	Mean	Std. Dev.	Min.	Max.
Patent	228	52.7761	110.469	0.1741	572.6588
ELP	228	2.1449	0.7329	0.2566	4.4166
GDP	228	146.754	287.4547	1.6958	1676.805
Growth (%)	228	1.3728	3.4691	-14.7375	10.6811
Inflation (%)	228	1.9789	2.1579	-5.2049	11.3476
Openness	228	101.1338	61.2671	24.7658	371.4397
Interest (%)	228	4.1934	2.3056	0.22	22.5
REX	204	96.6602	5.7247	80.1583	125.7275
Labor Cost	228	44.1005	21.8502	9.054	93.968
CR index	228	77.7331	6.8003	56.625	92

As seen in Table 1, the variables take on values within expected ranges, and there are no missing values except for REX (24 missing values). From the standard deviations and the minimum and maximum values of patent applications, it is obvious that patent (i.e., innovation) is the most volatile variable. Thus, one can assume that the variation in the cross-sections (country-specific variations) is extremely high. Again, from Table 1, it is clear that this study's explanatory variable of ELP is the least volatile variable. And, the difference between minimum and maximum values implies that cross-sectional variation in the ELP data is small. This is not a surprise since the country groups in the analysis are similar to each other in terms of development levels that adapt similar labor market policies. The same explanation is valid for the CR index as well. This means that the economic, financial, and political confidence level of the OECD countries in the analysis are similar.

3.2 Methodology

To estimate the impact of ELP on the amount of innovation for the period from 2006 to 2014, unbalanced panel data were obtained from a pool of thirty OECD countries. The main reason for collecting a panel data set is generally to allow unobserved factors (here, country-specific factors, denoted by a_i), to be correlated with the explanatory variables. In

[1] OECD country list: Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Israel, Italy, Japan, Korea, Luxemburg, Mexico, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom, and United States.

panel data analysis, unobserved factors are allowed to affect the dependent variable with the existence of two types. The first are those that are constant over time, and the second are those that change over time. Consider an unobserved effect model with *k* explanatory variables:

For each i ,

$$y_{it} = \beta_1 x_{it1} + \beta_2 x_{it2} + ...\beta_k x_{itk} + a_i + u_{it}, t = 1, 2..........., T. \quad ....(1)$$

Here the parameters of interest $\beta_k x_{itk}$ cannot be estimated by pooled ordinary least squares (OLS) because OLS assumes that a_i is uncorrelated with the explanatory variables. Therefore, the results will be biased and inconsistent with OLS, and the resulting bias is called heterogeneity bias. However, there are two panel data models that are used to eliminate the problem of heterogeneity bias in pooled OLS. These are called the fixed effect (FE) transformation and random effect (RE) models. While FE eliminates the unobserved effect of a_i just by transformation, RE simply assumes that a_i is uncorrelated with each explanatory variable in all the periods. The superior side of the random effect across the fixed effect is to allow us to include unobserved variables in the model that are constant over time.

The Lagrange Multiplier (LM) test and the Hausman (1978) test are carried out to determine the existence of a random effect and to determine which model is superior to the other. While rejection of the LM test implies that there are country-specific differences and heterogeneity to account for, failing to reject the Hausman (1978) test means that the RE and FE estimates are similar.

However, the parameters of interest $\beta_k x_{itk}$ can be explained by OLS by employing BE. The BE uses only between or cross-section variation in the data and the OLS estimator from the regression of $\bar{y}_i$ on $\bar{x}_i$. If one fails to reject the Hausman (1978) test, BE becomes appropriate. In other words, BE is inconsistent in the FE model and consistent in the RE model.

Since patent application (proxy for innovation data) is the most volatile variable and has a high level of variation in the cross-sectional information, employing the BE is superior to the RE effect in order to capture information in the cross-sections rather than cross-sectional information in the time series. Therefore, the model can be formulated as follows:

$$\bar{y}_i = \alpha + \bar{x}_i \beta + (\alpha_i - \alpha + \bar{\varepsilon}_i) \quad (2)$$

where the *i* subscript accounts for country-specific variations and $\bar{x}_i \beta$ represents a set of explanatory variables. Here the error term is $(\alpha_i - \alpha + \bar{\varepsilon}_i)$. And, consistency requires that the error term $(\alpha_i - \alpha + \bar{\varepsilon}_i)$ should not be correlated with $\bar{x}_{it}$.

4. Empirical Results

Prior to the estimations, the LM test is conducted to ensure the existence of cross-sectional differences (country-specific differences) in the data. At the second step, since BE is only consistent in the RE model, both the RE and FE models are applied and, in turn, the RE model is selected based on the Hausman (1978) test's statistical results. All test statistics (FE OLS, RE GLS, and BE OLS) and their results are presented below in the three columns of Table 2, respectively.

Table 2. Panel regression

Variables	FE OLS	RE GLS	Between OLS
ELP	-11.34	-22.59	-62.91
	(0.262)	(0.016)	(0.033)
GDP Growth	1.4970	1.6501	-22.49
	(0.004)	(0.001)	(0.142)
Inflation	0.3191	0.2102	0.1137
	(0.690)	(0.797)	(0.994)

Openness	-0.1786	-0.3074	-0.3476
	(0.288)	(0.034)	(0.307)
Interest Rate	-0.6197	-1.0742	-49.29
	(0.437)	(0.180)	(0.030)
REX	0.5352	0.5473	-4.8493
	(0.032)	(0.028)	(0.443)
CR index	-1.1969	-1.2610	-10.01
	(0.006)	(0.002)	(0.099)
R^2 (within)	0.0988	0.0913	0.0000
R^2 (Between)	0.2296	0.2967	0.5930
R^2 (Overall)	0.2126	0.2883	0.2356
F Test	2.33	24.84	3.10
Probability	0.0213	0.0008	(0.0239)
No. of Obs.	204	204	204
No. of Groups	26	26	26
LM Test statistics	0.559		
Probability value	(0.000)		
Hausman Test	14.40		
Probability value	(0.0719)		

Note: FE OLS refers to fixed effects OLS; RE GLS refers to random effects generalized least squares (GLS). Probability values of the coefficients are given in parentheses.

As seen in Table 2, the study rejects the LM test but does not reject the Hausman (1978) test. This means that there are cross-sectional differences in the data and both RE GLS and FE OLS are similar so that RE GLS results may be selected to FE OLS. The confirmation of RE GLS makes the study able to perform BE. As noted previously, high cross-sectional variation in the patent application (innovation) data necessitates capturing this variation. Even though RE GLS estimations give a higher overall R square, the BE enables us to capture between (cross-sectional variations) by a higher between R square. Furthermore, one may argue that dependent variables and regressors may vary over time and in individuals. Variation over time or in a given individual is called *within variation*. Again, as seen in Table 2, within variation values of FE OLS and RE GLS seem to be very low (0.0988 and 0.0913), which means that there is no need to take within variations into account, but, rather, it is necessary to deal with between variations. Thus, this study will rely on the results of the BE rather than the RE GLS model.

According to BE estimation results, ELP and interest rates have a significant negative effect on radical innovation (patent applications).The negative effect of ELP on radical innovation is confirmed by the RE GLS estimation results as well. That means that, as the labor rights are more respected, hiring and firing costs of employees also increase, and a higher adjustment cost to the employment made by the firms is likely to reduce the revenue available for radically new innovations.

The negative effect of interest rates on innovation can be seen. Since the firms need to invest for high cost R&D expenditures, funds may have to be borrowed from financial institutions to underwrite radical innovation expenditure. As interest rates increase, the cost of financing R&D activities will also increase.

5. Concluding Remarks

The impact of ELP on innovation has gained deserved attention from academic scholars as dependence of the competition of the firms on new radical innovations accelerates in the global environment. Yet, the real effect is still undetermined and debate is ongoing. Thus, the main objective of this paper is to investigate whether ELP has a positive or negative effect, or no effect at all, on the innovation activities of thirty OECD countries for the period from 2006 to 2014.

The study attempts to fill the gap in the literature by employing a BE model to capture the cross-sectional variations (country-specific variation) in the data. Furthermore, since the ELP is associated with innovation activities by its possible indirect effect on the cost side, this study uses radical innovations rather than incremental innovations.

Finally, the study found that the ELP is negatively correlated with new radical innovation activities. Hence, as the ELP increases, adjustment costs for employment (hiring and firing costs) made by the firms also increase and that reduces the ability of the firm to finance the high cost of R&D activities.

Moreover, study indicates that high interest rates have a negative effect on the amount of innovation as well. In other words, firms may underwrite R&D expenditure costs by borrowing from financial institutions. Thus, higher interest rates may reduce the ability of the firms to be able to afford to finance costly R&D activities.

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