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Employment Protection Legislation matters for the Phillips Curve*

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Abstract

Liberal reforms of employment protection legislation (EPL) aim at fostering the flexibility, dynamism and *fluidity* of the labor market without increasing unemployment. A New Keynesian model with search-and-matching frictions implies that such type of reforms have also a direct impact on the structural relationship between prices and unemployment, i.e. the Phillips Curve (PC). We assess empirically the existence of this channel considering 19 episodes of EPL reforms across 13 countries. Consistently with the theory, countries that experienced an employment protection liberalization witnessed a flattening of the PC just after the reform.

JEL classification: E31, E32, J63
Keywords: Employment protection, Phillips curve, labor market fluidity.

*The views expressed in this paper are those of the authors and do not necessarily reflect those of the Banque de France. All the remaining errors are ours.

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1 Introduction

Employment protection legislation (EPL) aims at improving welfare and employment conditions of workers by reducing their exposure to negative shocks. Yet, EPL affects also employers. In fact, an increase in protection limits their ability to flexibly adjust the workforce at the extensive margin, while increasing both hiring and firing costs. Therefore, stronger (weaker) EPL pushes upward (downward) pressure on firms' marginal costs, with potential consequences for markups and prices.

As a result, reforming the EPL raises a well-known trade-off between job security, lower flexibility and reduced efficiency. So far, the empirical literature on EPL effects is divided (Hopenhayn and Rogerson (1993)). Early studies show that, before the 90's, higher protection was related to an increase of unemployment (e.g. Lazear (1990)). Conversely, other works show that this effect is very mild and often not significant (e.g. Boeri and Jimeno (2005)). What the empirical literature agrees upon is the effect of EPL on fluidity: countries and firms in which employment protection increased witnessed low job flows and low turn-over rates (e.g. Cahuc and Koeniger (2007)).

This paper shows that changes in EPL – through their effects on fluidity – can affect the slope of the Phillips Curve, i.e. the structural relationship between prices and unemployment. From theory, we know that in a New-Keynesian (NK) framework with search-and-matching frictions the structure of the labor market matters for the slope of the PC (e.g. Krause et al. (2008), Blanchard and Galí (2010), Pace and Hertweck (2019) and Siena and Zago (2021)). Considering that EPL regulates the separation rate of workers in the matching process, a liberalization reform would imply higher separation rate in the model. We show analytically that –if the steady state unemployment remains constant– an increase in separation rises the fluidity of the labor market and flattens the PC. Then, we test empirically this theoretical prediction. By considering 19 episodes of liberalizations across 13 European countries between 1996 and 2013, we find that indeed the PC becomes 7.5% flatter in the 5 years following a liberalization.[1] These results are in line with the growing literature on structural transformations of the labor market as drivers of the flattening of the PC occurred in the last decades (e.g. Ravenna and Walsh (2008), Lombardi et al. (2020) and Faccini and Melosi (2020)).

2 EPL in a New-Keynesian Framework

We use the NK model with search-and-matching frictions introduced by Blanchard and Galí (2010) to show analytically how EPL – through an increase in fluidity – affects

[1] Supported by the empirical evidence available in the robustness section (and additional evidence available upon request), we assume that these countries did not experience any change in the equilibrium unemployment during our sample period or in response to EPL reforms.

the PC. We refer to the original paper for details, while here we present only the law of motion of employment. This allows us to introduce the parameter governing the separation of workers from their employees. Being N_t the stock of employment and H_t the flow of new hires, employment evolves according to:

$$N_t = (1-\delta)N_{t-1} + H_t$$

where $\delta \in (0,1)$ governs the average separation of workers from their employers. Given that EPL reforms aim at modify this separation rate, higher δ maps to EPL liberalizations. The model elegantly delivers a tractable NKPC in log-deviations from a zero inflation steady-state:

$$\widehat{\pi}_t = \kappa\widehat{u}_t + \kappa(1-\delta)(1-x)\widehat{u}_{t-1} + \Psi\widehat{a}_t \tag{1}$$

where $\widehat{\pi}_t$ is inflation, $\widehat{u}_t$ is unemployment, $\widehat{a}_t$ is productivity which influences the level of inflation through $\Psi < 0$. The slope is negative and equal to:

$$\kappa \equiv -B\mu\frac{\alpha\,(x)^{\alpha}}{\delta n}\lambda = -B\mu\frac{\alpha\left(\frac{\delta n}{1-(1-\delta)n}\right)^{\alpha}}{\delta n}\lambda \tag{2}$$

where B is matching efficiency, x is market tightness, $\alpha \in (0,1)$ is the concavity of the matching function, μ is the markup. $\lambda = (1-\beta\theta)(1-\theta)/\theta$, where β is the discount factor and θ is the Calvo parameter. n ($u = 1-n$) is the steady state level of employment (unemployment).

2.1 EPL and the slope of the Phillips Curve

As shown in equation (2), changes in δ have an effect on the slope κ, which regulates the contemporaneous relationship between prices and unemployment.

Proposition 1. *If a change in δ does not affect the steady state level of unemployment u, an increase in δ due to an EPL liberalization leads to a flattening of the PC.*

Proof. If $\frac{\partial u}{\partial \delta} = 0$, the derivative of the slope of the PC is

$$\frac{\partial \kappa}{\partial \delta} = -\mu\lambda B\frac{\alpha(\delta n)^{(\alpha-2)}n}{(1-(1-\delta)n)^{1+\alpha}}\left[(\alpha-1)(1-(1-\delta)n) - \alpha\delta n\right]$$

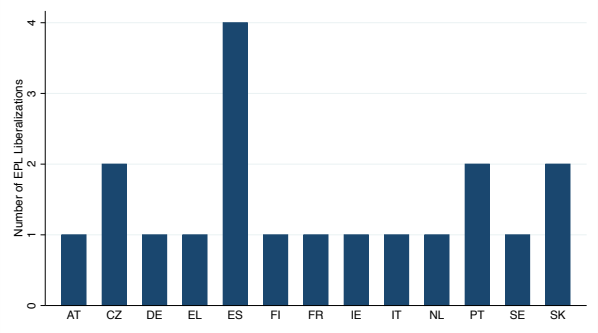
which is positive since $0 < \alpha < 1 < \frac{1-n+\delta n}{1-n}$. □

In words, higher δ makes the labor market more fluid as it increases employment-to-unemployment transitions and the hiring rate x, i.e. $\partial x/\partial\delta > 0$. Higher fluidity reduces the elasticity of the marginal cost to economic conditions as the labor demand becomes flatter.

3 EPL and the Phillips Curve

EPL reforms. We use the dataset of Duval et al. (2018), which gives information on the year of EPL liberalizations across OECD countries. We focus on the only 13 European Union (EU) countries available: Austria, Czechia, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, Slovakia, Spain, Sweden. We refer to this group as EU13. We consider the sample of reforms starting from 1996 to match the available data on the PC. Figure 1 shows the 19 liberalizations reforms by country. Notably, Czech Republic, Netherlands, Portugal and Spain witnessed more than one reform.

Figure 1: EPL LIBERALIZATIONS ACROSS 13 EU COUNTRIES



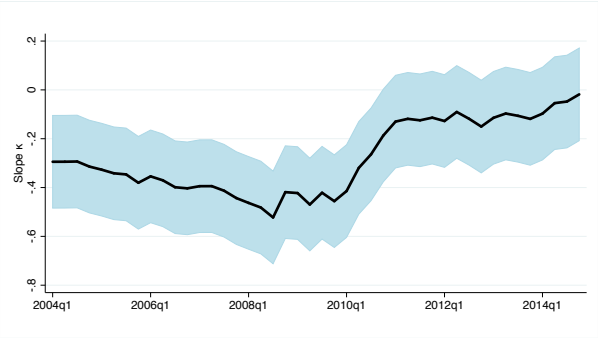
Notes: Figure 1 plots the frequency of Employment Protection Legislation (EPL) liberalization episodes occurred between 1996 and 2013 in 13 EU countries. Data from Duval et al. (2018).

Phillips Curve We use quarterly data from Eurostat for the EU13 countries –for which data on EPL reforms is available– spanning from 1996 to 2021. For each country i, 8-year rolling window τ and observations between t and $t+\tau$, we estimate a Phillips Curve similar to equation (1):

$$\pi_{i,s} = \alpha_{i,\tau} + \kappa_{i,\tau} u_{i,s} + \eta_{i,\tau} \bar{u}_{i,s-4} + \chi_{i,\tau} \Delta TFP_{i,s} + \varepsilon_{i,s} \quad \forall s \in (t, t+\tau)$$

where $\pi_{i,s}$ is core inflation, i.e. the year-on-year log-change of the price index (energy and food price excluded), $u_{i,s}$ is the unemployment rate, $\bar{u}_{i,s-4}$ is the 4-quarter moving average of unemployment in $s-4$, $\Delta TFP_{i,s}$ is the percentage change in TFP constructed following Bergeaud et al. (2016) and $\varepsilon_{i,s}$ is the error term. As the contemporaneous relationship between unemployment and inflation is endogenous, we use GMM with three lags of output gap to instrument $u_{i,s}$. Hence, for each time window and country, we collect all $\kappa_{i,\tau}$. As from Figure 2, the slope of the PC increases over time across countries. In particular, it was significantly negative (-0.4) before 2010 (the end of Great Recession (GR)), while it became not significantly different from zero afterwards. As a final step, in order to match this data with the EPL dataset, we take yearly averages by country. Thus, we end up with a year-country panel dataset.

Figure 2: THE SLOPE OF THE PHILLIPS CURVE ACROSS 13 EU COUNTRIES



Notes: Figure 2 plots the slope of the Phillips Curve estimated over 8-year rolling windows for 13 EU countries along with its 95% confidence interval. Data is quarterly.

3.1 Testing the predictions of the model

In order to study the impact of EPL on the PC, we need an empirical model that takes into account two facts. First, a country can implement a reform in multiple years. Second, as explained in Siena and Zago (2021), in Europe the PC has progressively flattened following a trend and this process can be partially explained by recessions, events that cause structural breaks in the relationship between prices and unemployment.

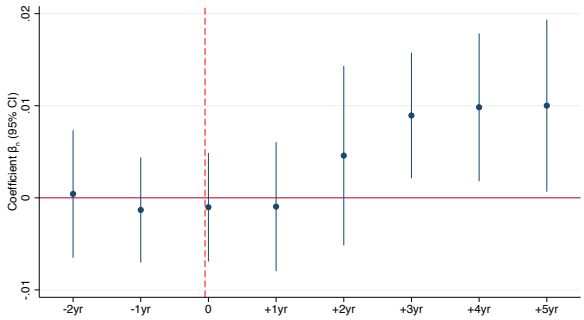
A dispersed lead-lag model allows to correctly identify the entire dynamic response of the dependent variable following an EPL reform, while controlling for other past or future reforms and other factors influencing the slope (the trend and the Great Recession).

$$y_{i,t} = \theta_i + \sum_{n=-5}^{N=2} \beta_n \mathbb{I}(EPL_{i,t+n}) + \gamma Year + \mathbb{I}(Year > 2009) + \varepsilon_{i,t} \tag{3}$$

where θ_i is the country fixed-effect; $\mathbb{I}(EPL_{i,t+n})$ is a dummy taking value one if there was an EPL liberalization in year $t+n$ in country i. We control for five lags and two leads; $Year$ controls for the trend, whereas $\mathbb{I}(Year > 2009)$ takes value one for periods after 2009 and controls for the structural break in the level of the dependent variable after the GR. $\varepsilon_{i,t}$ is the error term.

We estimate model (3) with $y_{i,t} = \Delta\kappa_{i,t}$, the change of the slope. Figure 3 plots the estimated coefficients along with their 95% confidence intervals. Notably, there is absence of systematic pre-liberalization effect. In other words, once controlling for an overall trend and the post-GR structural break, the slope of the PC is stable in the two years before the EPL liberalization and equal to the cross country mean of -0.40. The reform does not have any contemporaneous effect, but the slope significantly and persistently flattens from the third year after its introduction. The cumulative effect over the 5 years following the reform is equal to a positive change in the slope of 0.03, which

Figure 3: EPL LIBERALISATIONS AND THE PC



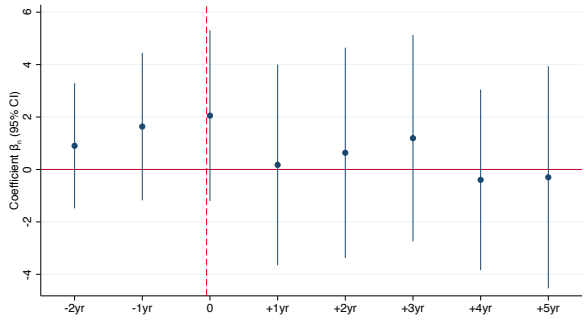
Notes: Figure 3 plots the estimated coefficients of equation (3) –along with the 95% confidence intervals– when the dependent variables is the change of the country-level slope of the Phillips Curve. The red-dashed line indicates the year of the EPL reform.

tested significantly different from zero at the 99% confidence level. This corresponds to a 7.5% flattening of the (average) slope. Hence, we conclude that EPL liberalizations affect and flatten the PC.

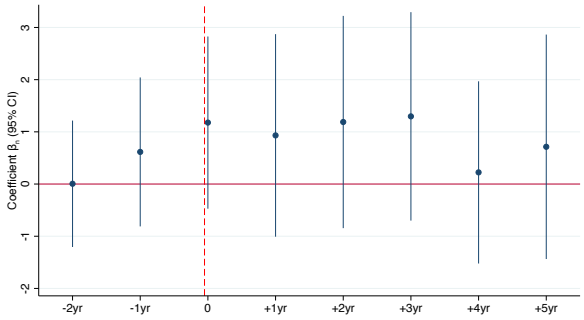
3.2 Robustness

Figure 4: EPL LIBERALISATIONS AND UNEMPLOYMENT

(a) Unemployment



(b) Unemployment Change



Notes: Figure 4a and 4b plot the estimated coefficients of equation (3) –along with the 95% confidence intervals– when the dependent variables are the unemployment rate and its percentage change. The red-dashed line indicates the year of the EPL reform.

We re-estimate model (3) with $y_{i,t} = u_{i,t}$ and $y_{i,t} = \Delta u_{i,t}$ as dependent variables. This allows to clarify if (i) countries "self-select" into an EPL reform based on the level or change in unemployment, and if (ii) the reform has significant impact on unemployment dynamics. While (i) is important for the validity of our identification strategy, (ii) is a test on the theoretical condition under which Proposition 1 of Section 2.2 holds (i.e. $\partial u/\partial \delta = 0$). Results are shown in Figure 4a and 4b: countries do not "self-select" and our assumption of constant unemployment is satisfied.

4 Conclusion

EPL liberalizations –through an increase in labor market fluidity– weaken the structural relationship between prices and unemployment, i.e. flatten the Phillips Curve. This paper shows that this is true both theoretically and empirically.

References

Bergeaud, Antonin, Gilbert Cette, and Rémy Lecat, "Productivity trends in advanced countries between 1890 and 2012," *Review of Income and Wealth*, 2016, *62* (3), 420–444.

Blanchard, Olivier and Jordi Galí, "Labor Markets and Monetary Policy: A New Keynesian Model with Unemployment," *American Economic Journal: Macroeconomics*, April 2010, *2* (2), 1–30.

Boeri, Tito and Juan F Jimeno, "The effects of employment protection: Learning from variable enforcement," *European Economic Review*, 2005, *49* (8), 2057–2077.

Cahuc, Pierre and Winfried Koeniger, "Feature: Employment protection legislation," *The Economic Journal*, 2007, *117* (521), F185–F188.

Duval, Mr Romain A, Davide Furceri, Bingjie Hu, João Tovar Jalles, and Huy Nguyen, *A narrative database of major labor and product market reforms in advanced economies*, IMF, 2018.

Faccini, Renato and Leonardo Melosi, "Bad Jobs and Low Inflation," Working Paper Series WP 2020-09, Federal Reserve Bank of Chicago March 2020.

Hopenhayn, Hugo and Richard Rogerson, "Job turnover and policy evaluation: A general equilibrium analysis," *Journal of Political Economy*, 1993, *101* (5), 915–938.

Krause, Michael U., David Lopez-Salido, and Thomas A. Lubik, "Inflation dynamics with search frictions: A structural econometric analysis," *Journal of Monetary Economics*, July 2008, *55* (5), 892–916.

Lazear, Edward P, "Job security provisions and employment," *The Quarterly Journal of Economics*, 1990, *105* (3), 699–726.

Lombardi, Marco Jacopo, Marianna Riggi, and Eliana Viviano, "Bargaining power and the Phillips curve: a micro-macro analysis," BIS WP 903, BIS November 2020.

Pace, Federico Di and Matthias Hertweck, "Labor Market Frictions, Monetary Policy, and Durable Goods," *Review of Economic Dynamics*, April 2019, *32*, 274–304.

Ravenna, Federico and Carl E Walsh, "Vacancies, unemployment, and the Phillips curve," *European Economic Review*, 2008, *52* (8), 1494–1521.

Siena, Daniele and Riccardo Zago, "Job Polarization, Labor Fluidity and the Flattening of the Price Phillips Curve," *Banque de France Working Paper*, 2021.