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Optimal Spatial Allocation of Labour Force and Employment Protection Legislation (EPL)

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Abstract. The paper introduces a model of how workers rationally decide to which country within an area of monetary and economic integration they will move for the purposes of living and working. Since Mundell accomplished his pivotal respective analyses, the Optimal Currency Area (OCA) literature has highlighted the importance of the reallocation of the labour force within common currency areas in order to cushion asymmetric shocks. However, several studies have put into question whether such a mobility may be considered adequately effective and efficient within the Euro Zone and, hence, political solutions have been urgently requested. This paper, using the concept of employment protection legislation (EPL), looks at the impact of the different flexibility degrees applied among national labour markets on the international labour movements within the Euro Zone, and it then proposes a reform of such in terms of the degrees of flexibility that could achieve the optimal point.

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1. Introduction

Over the latest two decades, the migration flows mainly directed to the countries of the Organization for Economic Cooperation and Development (OECD) have redesigned the anthropology of the so-called Western world, while they have simultaneously engineered the international mobility rules and trends. The socio-economic gap between developed and developing countries, along with other similar factors such as the migration costs borne by either the receiving countries or the migrants themselves, fuel the mobility in discussion. The respective data collection is still limited; however, it is urgent for the receiving states to promote relevant research that aims at improving the handling of migration flows to enhance social order, stability and citizens' quality of life (Ortega and Peri, 2012).

The present study focuses on countries where the free mobility of workers is already a reality and considers the impact of the EPL on such flows, rather than (given the data availability problems) analysing the effect of migratory policies on labour force flows. In particular, we study the most advanced case of economic integration – the Eurozone. Labour mobility is especially important in the context of the latter as a traditional mechanism of adjustment to asymmetric economic shocks. Mobility usually absorbs a certain amount of the asymmetric shocks over time. Similarly, movements associated with these shocks have increased because of the euro-monetary integration, and have a direct impact on wages due to such respective adjustments (Arpaia et al., 2016).

The latest Eurozone financial crisis is a characteristic long-term macro-economic shock carrying over asymmetric effects. This development causes severe distress to governments, which suffer competitive internal devaluation and unemployment. Labour mobility alleviates the turmoil; therefore, the way to manage such mobility is a crucial issue for the mitigation of the harmful social effects of the crisis. Plenty of gravity models correlate worker mobility, unemployment and wages (Karkazis and Baltos, 2018). In addition, lifting labour market restrictions for new member states consequently increased migration flows, while at the same time the older EU members continuously deepen their la-

bour market integration capabilities (Arpaia et al., 2018).

R.A. Mundell (Mundell, 1961) already stated the importance of labour mobility within an OCA in order to cushion asymmetric shock. A multi-level and rich literature has already dealt with this topic and a considerable part of it has focused on the role of labour mobility inside an OCA. Meanwhile, J. Pelkmans (Pelkmans, 2006), as well as R.E. Baldwin and C. Wyplosz (Baldwin and Wyplosz, 2015a), stressed that in areas of economic integration, if there is free mobility of workers, labour markets clear across countries, leading to a final equilibrium where, initially, wages and unemployment rates must be the same. Recently, P. De Grauwe and Y. Ji (De Grauwe and Ji, 2016) have proven that labour mobility is indeed an extremely important adjustment mechanism in the face of exogenous and permanent labour demand shocks that increase unemployment differentials within an OCA. De Grauwe and Ji back up the old idea of P. Kenen (Kenen, 1969), who, acknowledging that labour mobility might not always be large enough to absorb a shock, proposed the creation of fiscal transfers to tackle asymmetric shocks within a monetary union.

Recently, thanks to the improvement in data quality and on the grounds of the large asymmetric crisis suffered by the Eurozone, there has been an immense effort to clarify the factors driving the flows of workers in Europe. Most of them go beyond the traditional economic motivation behind labour migration. E. Sprenger (Sprenger, 2013) has pointed out the importance of some of these variables, such as linguistic proximity, immigrant networks and geographic factors. Moreover, M. Kahanec (Kahanec, 2013) focuses on the effect of institutional variables regarding mobility of workers within the EU. His results conclude that lifting labour market restrictions incentivises inflows of workers from new member states, although to a smaller extent than accession to the EU itself. On the other hand, A. Arpaia (Arpaia et al., 2016) analysed whether the movement of labour force within the Eurozone is an adequate tool to counteract asymmetric shocks. He contends that, although unemployment and activity rates absorb most of the shock, the responsiveness of labour mobility and wages to asymmetric crises has increased since the beginning of the EMU. In this sense, he estimates that 25% of such shocks are cushioned by

labour force migration in one year and this reaches 50% after five years. Finally, A. Arpaia (Arpaia et al., 2018) investigates other institutional features that have shaped worker mobility in Europe and its responsiveness to the current point of the business cycle. He confirms that labour migration has become increasingly responsive to unemployment after the adoption of the common currency.

Although there is broad empirical work on the field of drivers behind mobility of workers in an Economic and Monetary Union, little progress has been achieved in order to build a theory that explains how regulation of a national labour market and worker mobility interact. Moreover, the evidence shows a limited consideration of the effects stemming from such an important instrument of labour policy as is the EPL. They also demonstrate the absence of analyses on how EPL influences the economic conditions behind workers' decisions on where to live and work. Therefore, the main purpose of this paper is to contribute to the development of a theoretical framework that explains labour mobility within Economic and Monetary Unions. Moreover, we investigate the channels, arising from such a theoretical framework, through which endogenous country conditions, in particular EPL, affect fundamental economic variables and thus the decision of workers on where to live.

2. Material and Research Methods

The aim of the current study, as mentioned above, is to clarify the effect that EPL exerts over labour mobility within an EMU, i.e. how EPL influences workers' decisions about where to work and live. In order to do so, we start by reviewing the literature in a way that establishes a theoretical channel between EPL and labour mobility. The literature review helps to identify other factors, apart from the EPL, that determine labour mobility. The current research relies on the methodological tools introduced by the literature about labour mobility. Secondly, the paper builds up a micro-economic model that makes explicit the channels through which EPL affects labour force reallocation. The paper starts with a deterministic model that is later generalised to a stochastic model, considering un-

employment. In any case, we pinpoint the assumptions behind the respective models. In a third step, the model is tested using econometric techniques, and a gap analysis is provided in order to show the deviations of the units in our sample from the optimum point arising from the theoretical model. Finally, we draw not only conclusions stemming from the previous analysis but also political recommendations that could be implemented by the countries in our sample, as long as they intend to get closer to the optimum point.

The statistics employed to test the model are mainly gathered from two sources. On the one hand, data is collected from the OECD's index on strictness of employment protection against individual and collective dismissals for regular contracts (version 3). This is our measure for the EPL. Moreover, data on "Inflows and Outflows of Foreign Population by Nationality" are extracted from OECD's International Migration DataBase. Net Inflows are calculated by subtracting the second from the first. On the other hand, we gather from Eurostat the dependent variables of the model and some controls. The Net Labour Income is obtained from the series "Annual Net Earning", using the average in Euro for single people without children, and the probability of finding a job is obtained as the ratio between the series "Job vacancy statistics by NACE Rev. 2 activity, occupation and NUTS 2 regions – quarterly data¹" and the series "Unemployment by sex and age – quarterly average". Both series are recalculated in units and the ratio is expressed as a percentage. Additionally, other control variables are gathered from Eurostat. The econometric model introduced in this paper uses the series "Population by educational attainment level, sex and age (%)" to proxy the quality of the human capital in each country, "GDP and main components (output, expenditure and income)", and "Labour productivity and unit labour costs". Finally, the current research also gathers from Eurostat the series "Population change – Demographic balance and crude rates at national level".

The sample includes the following countries belonging to the Eurozone: Belgium, Germany, Estonia, Ireland, Greece, Spain, Latvia, Lithuania, Luxembourg, Netherlands, Austria, Portugal, Slovenia, Slovak Republic and Finland. The considered timeframe extends from 2008 to 2015, although for

some periods and participants data are not available.

The statistical software employed to test the econometric model is Stata.15 and the technique followed for the analysis consists in a Data Panel with Fixed Effects for countries to control for unobservable idiosyncratic variables. Some descriptive statistics and figures based on estimated results are also provided in order to carry out a gap analysis between the actual realisation of the EPL and the optimum predicted by our theoretical model.

3. Results

3.1. The Deterministic Model

In the context of understanding the role of EPL, regarding the mobility of workers through an EMU, we start by designing a simple micro-economic model of individual workers' decisions regarding where to work and live. Obviously, there are other variables not related to the labour market or the economic environment that affect such a decision (Sprenger, 2013; Nedelescu, 2015). However, for the sake of a simple and targeted analysis, our study only focuses on the employment and economic conditions of the considered territories. In general, we can think that employment decisions are made on the grounds of wages, W , and the job's related costs/efforts, C (Brown, 1980; Cahuc et al., 2014a). Therefore, an individual rational worker would choose a place to work and live from the set of available options in a way that maximises his or her net labour income (NLI).

$$\text{Max } NLI(v(p)) = W(v(p)) - C(v(p)) \quad (1)$$

where: $v = F(x_1(p), x_2(p), \dots, x_n(p))$

and $p \in EMU \subset WORLD$

and $p^* \notin EMU \mid \{p, p^*\} = P = WORLD$

To sum this up, workers maximise their NLI depending on a vector of economic and employment characteristics $v = f(x_1(p), x_2(p), \dots, x_n(p))$ that are

spatially endogenous, i.e. they are given by the place, p , where the activity is undertaken. Thus, deciding the place to work and live, workers are choosing a particular realisation of a set of variables that, initially, are continuous. However, since the number of realisations is constrained by the number of places among which the labour force can move in and settle down, there is a discrete number of finite variables for which the problem can be solved, i.e. it can be only solved in a restricted space of R^n . In this sense, the issue at hand is a problem of discrete constrained optimisation, and this constraint can be identified in the third line of the system. Such a restriction limits the range of countries, p , to those belonging to the EMU; that is, the Euro Zone in our empirical example, which is only a subset of the whole range of countries available in the world.

Moreover, two clarifications must be made in this regard. The first concerns the rationale behind the restriction itself. It can be stated as a general axiom of international labour mobility that: "the deeper the economic integration – including obviously free movement of the labour force – among a group of countries the faster the cost of migration out of the EMU tends to infinite, at least in relative terms". Hence, the differential in wages must grow at a higher order toward infinite so that the labour force has incentives to emigrate out of the area. Since the wage differential is bounded by a lower limit of zero and an upper finite limit, although unknown and variable, migration of the labour force out of the EMU is unlikely to happen after a certain degree of integration is achieved, even more so if the tendency of the world to merge into a certain and fixed number of regional economic integration areas is confirmed (Schiff and Winters, 2003).

Secondly, the larger the area of economic integration, the more likely that the set of realisations included in the vector of economic and employment characteristics approaches the whole range of R^n , though without ever converging with it. This is somehow the equivalent of the ricardian principle of a custom union's efficiency, according to which the likelihood of finding the most efficient producer is higher within a large custom union, rather than within a small one, and, therefore, the trade deviation in the former is smaller than in the latter (Schiff and Winters, 2003; Baldwin and Wyplosz, 2015b). Regarding labour mobility, the larger the

number of members in the EMU, the higher the probability of finding the country that offers the optimal combination of values of x_i in a way that maximises the NLI.

There are some assumptions and considerations behind the model that we must make explicit:

1. By restricting the set of countries that workers might move to we are implicitly assuming that the cost of working out of the EMU approaches infinity.

$$C(v(p^{**})) \rightarrow \infty \quad \forall p^{**} \notin EMU \quad (2)$$

Obviously, this is a consequence of a particular subset of the vector of X_i that shapes the cost of working. Indeed, we can split the cost of working into two categories as in all types of cost. On the one hand, we have the fixed cost linked to the job, i.e. the *investment* (I) that workers must undertake in order to get the position. Such an investment includes multiple economic activities and decisions ranging from human capital investments (university studies, professional training, etc.) to time spent on the job-seeking process (travel, interviews, specific exams, etc.) and, in particular for the interest of this study, administrative and contractual costs to finalise the labour contract. In essence, those costs are place-specific.

On the other hand, we have the variable cost, i.e. *burden of the job position or effort* (E) for each unit of working time deployed. Such an effort depends mainly on the nature of the position, the level of capital intensity of the activity, the level of riskiness associated with the job, etc. In essence, those costs are job-specific and not place-specific. Therefore, we can reformulate the assumption above:

$$C(v(P)) = I(v(P)) + E(v(P)) \rightarrow \infty \quad \forall P \notin EMU$$

where:

$$E(v(p^*)) = E(v(p)) \text{ for a given job position } | E \in (0, \infty):$$

and

$$I(v(p^*)) = I(v(p)) \mid \{I(v(p)) \in (0, \infty); I(v(p^*)) \rightarrow \infty\}. \quad (2.1)$$

The fact that the investment cost approaches infinity stems from barriers to free movement of workers between areas of economic integration due to legal restrictions like visas or quotas (Kahanec,

2013), lack of portability of social rights (Holzmann and Koettl, 2015; d'Addio and Cavalleri, 2015), differences in occupational regulation and difficulties for qualification recognition (Sweetman et al., 2015); but also from cultural gaps and asymmetric information problems with respect to foreign labour markets (Sprenger, 2013).

An important theorem arising from the previous assumption is that labour spatial allocation decision-making at micro-economic level is not influenced by the variable cost of working (E), since it is job- and not place-specific, but only by the fixed cost (investment).

2. Furthermore, the variables that determine the value of the NLI, as a combination of wage perceptions and cost undertaken, are continuous and differentiable so that we can obtain the marginal cost and benefit functions. To ensure that there is only one solution we assume that there exists an x^* such that:

$$\left. \frac{\partial W}{\partial v} \frac{\partial v}{\partial x} \right|_{x=x^*} = \left. \frac{\partial I}{\partial v} \frac{\partial v}{\partial x} \right|_{x=x^*}$$

Additionally, we assume the traditional properties of concavity for the maximisation of profits (wages in our case [W]) and convexity for the minimisation of cost (the job-related investment [I]), so that a global maximum of the NLI is guaranteed in all R^n (Tirole et al., 1988). Therefore, we can ensure that there is a maximum at x^* where:

$$\frac{W_v'' - I_v''}{W_v' - I_v'} \leq \frac{v_x''}{(v_x')^2}$$

Thus, the ratio between the difference of the second derivatives of W and I with respect to v and the difference of their first derivatives with respect to v is equal to or smaller than the ratio between minus the second derivative of v with respect to x_j and the square of its first derivative with respect to x_j .

3. We also assume that there is full employment in the countries belonging to the EMU so that workers can freely decide where they want to work. Additionally, that means that wages met the natural market equilibrium and migrating does not push them downwards at the margin (Peri, 2014). This

allows us to focus on the best allocation of resources without having to consider redistributive effects. Nevertheless, later we will dilute this assumption, including unemployment, and consider some of its effects when deciding the place to work and live.

4. Finally, the actual value of the wage and the investment on the labour market depend upon the country where the individual is working. In other words, the economic and employment conditions, which determine the part of the production outcome that goes to labour, are mediated through some national idiosyncratic features. This assumption is realistic and means that although Spain and Germany may grow at the same pace, wages and workers' investment in order to access the labour market are not the same, but that the NLI reaches a maximum at the same rate of growth. In brief, the differences in the functional income distribution across the members of an EMU arise from place-specific institutional features (education system, labour market regulation) (Guerriero and Sen, 2012), since we consider that the EMU is an OCA and that countries therefore share a very similar economic structure (Mundell, 1961).

After setting up our model and stating the underlying assumptions, we introduce the NLI's maximisation problem with the traditional micro-economic tools:

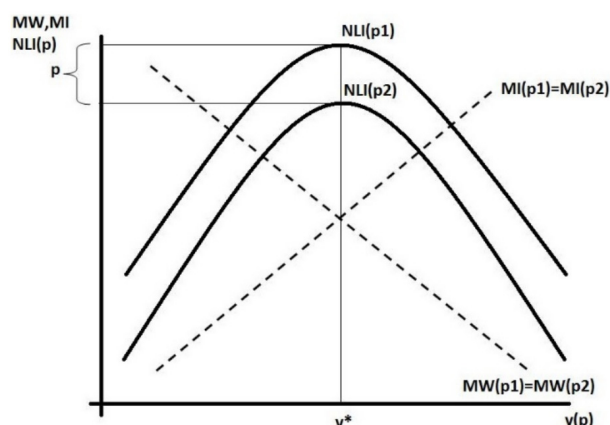


Fig. 1. Net Labour Income Optimisation

As we can see in Fig. 1, the second assumption ensures that there is a global maximum where the marginal wage gain intersects the marginal investment effort. On the other hand, the condition that the final NLI depends on the country but it is reached for all of them at the same realisation of

the vector v is represented by two features of Fig. 1. Firstly, the marginal curves are the same, independently of the country, and thus the intersection is always at the same point of v . Secondly, the NLI curve shifts vertically, down or up, depending on the country and its endogenous conditions.

How can the above be interpreted from an economic point of view? The issue that all countries maximise NLI for the same v^* arises from the theoretical implications behind the rationale for an EMU (Mundell, 1961). The preceding analysis shows that the maximum NLI depends on a vector of economic and employment characteristics. The hypothesis that such a maximising vector is the same for all countries can be defended on the grounds that within an EMU we expect a high level of convergence in fundamental macro-economic variables and political coordination to avoid spillovers (Baldwin and Wyplosz, 2015b). Therefore, if the bundle of variables v for which we maximise the NLI is not the same for all countries, but we are constraining them through integration to converge on the same v^* , an EMU would lead to a sub-optimal economic equilibrium. Additionally, the idea that the final level of NLI is determined by the country arises from non-macro-economic factors. Such factors are mainly institutions in the long run and the different competitive advantages of each territory, shaped by capital accumulation and allocation of different types of workforce in the short run. Institutional factors can almost permanently offset the reduction in NLI differences that is caused by economic convergence and integration.

3.2. The Stochastic Model

In a world as implicitly described before there is no need for EPL. In such a world there is no unemployment and the only thing that workers have to do in order to work is to decide what kind of employment they would prefer and where they would like to pursue their professional career. This is a decision that in the model above depends upon the maximisation of the NLI. However, in the real world, moving to a new country is not a guarantee of finding the desired job. The probability of finding a job depends ultimately on the rate of creation and destruction of employment in the specific country,

in particular in the sector where the job-seeking is taking place, which inevitably shapes the arrival rate of job offers (Cahuc et al., 2014b). There is a broad agreement that such rates are largely influenced by EPL (Blanchard, 2005; Pissarides, 2000). We will proxy the arrival rate of job offers by the vacancy rate in the specific country. Thus, summing up, in a stochastic world we must consider that workers not only maximise the NLI but the probability to maximise the NLI, and in order to do so they should have considered the effects of the EPL on it.

We can rewrite our maximisation problem using the concept of conditional expectation as follows:

$$\begin{aligned} \text{Max } z &= \\ &= \text{Max } E[NLI|EPL] = \\ &= \text{Max } \{NLI(v(p)) \times E[NLI(v(p))|EPL = P]\} = \\ &= \text{Max } NLI(v(p)) \times \text{Max } E[NLI(v(p))|EPL = P] = \\ &= NLI(v^*) \times \text{Max } E[NLI(v^*(p))|EPL = p] = \\ &= NLI(v^*(p1)) \times P[NLI(v^*(p1))|EPL = p1] \quad (3) \end{aligned}$$

In essence, the variable to maximise is a composition of a multivariate function, which involve two functions as an argument – the maximum NLI and the probability of obtaining it. Additionally, such a probability is determined by the level of employment protection (Blanchard, 2005; Pissarides, 2000) while the maximum NLI is shaped by the endogenous characteristic of the country, p . Such endogenous characteristics, using econometric terminology, are unobservable, but we can use different techniques to control them. In this case, we suggest using EPL as a proxy since we expect it to be correlated with such an unobservable variable that determines whether a country has better or worse economic conditions for workers. Thus, we can rewrite the previous problem as:

$$\text{Max } z(EPL) = \text{Max } z(NLI(EPL), P(EPL)) \quad (4)$$

Solving it through the chain rule and the fact that NLI and P are linked by a multiplicative relationship:

$$\frac{\partial z}{\partial EPL} = \frac{\partial NLI}{\partial EPL} \times P(EPL) + NLI(EPL) \times \frac{\partial P}{\partial EPL} = 0 \quad (5)$$

Hence,

$$\varepsilon_{NLI,P} = \frac{NLI}{P} \times \frac{\partial P}{\partial NLI} = -1 \quad (6)$$

To sum up, the condition to maximise the expected net labour income in the presence of unemployment is given by the elasticity of the NLI with respect to the probability of achieving such an NLI. The equilibrium point is where a change of 1% in the probability of obtaining the maximum NLI due to a change in the EPL leads to a change of 1% in the level of such an NLI. Furthermore, unobservable variables will be controlled using a Data Panel Fixed Effect model, where we control for the idiosyncratic unobservable variables of each country.

Moreover, there are two important implications on the grounds of political economy arising from the previous formulation of the NLI maximisation problem in the context of an EMU. On the one hand, EPL turns out to be not only a policy instrument that affects levels of employment/unemployment (Pissarides, 2000) through $P(EPL)$, but also the distribution of the social product, since it affects the maximum level of labour income that workers can obtain (Pissarides, 2000). The effect on unemployed workers is not so clear. On the other hand, we must not lose track of the fact that the model describes how workers decide where to work and live. In this sense, as EPL is a political instrument that governments manage and it determines the expected value of the net labour income, EPL becomes a tool to attract and/or repel labour force and human capital from the whole EMU. Nevertheless, if we accept that, in an EMU, cooperation should prevail over competition, or at least that the possibility of jeopardising a partner's economy should be restricted, some degree of coordination regarding EPL seems to be desirable.

3.3. Econometric Model and Hypothesis Testing

This section examines whether the suggested economic model applies to the Euro Zone. In other words, both hypotheses above will be put to the test.

On the one hand, according to the suggested economic model, it is expected that the probability of finding a job in a certain country is strongly explained by the level of EPL (Blanchard, 2005; Pissarides, 2000). The problem we must tackle here

is how to define the probability of finding a job. As we have previously pinpointed, the probability of finding a job is shaped by the rates of job creation and destruction (Blanchard, 2005; Pissarides, 2000). Thus, they determine both the vacancy rate and the number of unemployed people within an economy, while it can be rationally argued that, assuming equal workers and that job positions and unemployed are equally distributed within the economy, the probability of finding a job is the ratio between vacancies and unemployed individuals. Both sets of statistics are gathered from Eurostat. Unfortunately, due to the incompleteness of the series, only the following countries of the Euro Zone can be included in the regression: Belgium, Germany, Estonia, Ireland, Greece, Spain, Latvia, Lithuania, Luxembourg, the Netherlands, Austria, Portugal, Slovenia, Slovakia and Finland. Italy and France are excluded at this time.

As we can see in regression table 1 and Fig. 2 the best specification shows the probability of finding a job (P) as a quadratic function of the EPL (L , L^2).

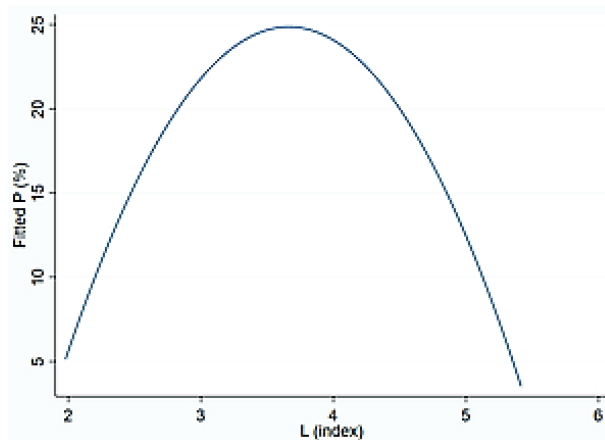


Fig. 2. Probability of finding a job

Thus, there is a level of EPL that maximises such a probability, and it is 4.03 in our sample. Getting back on track with Pissarides' model (Pissarides, 2000), which states that EPL has an ambiguous effect over the probability of finding a job since it decreases job creation and destruction, the current results appear logical, using the marginalist theory. Job destruction supposes a potential future cost for companies while hiring a new employee entails a more-or-less direct actual benefit in term of production and sales. In this sense, the marginal increase in the potential cost of firing due to an increase in

EPL, when we are at low EPL positions, is small in relation to the actual benefit reported by hiring a new employee. In other words, the company weighs future cost less than actual benefits, unless the future cost is large enough. There is, however, a turning point after which the successive increase in the strictness of the EPL leads to such a large cost of firing (although it is an uncertain possibility in the future) that it will offset the actual benefit of hiring a worker.

On the other hand, the NLI is expected to be a linear function of the level of EPL (Blanchard, 2005; Pissarides, 2000). However, a specification where the EPL is considered as the only explanatory variable of the NLI results in the non-significance of the EPL coefficient as can be observed in the regression table 2 ("Basic"). Obviously, this is due to a classical omitted variable bias, which may be correct including other regressors linked to the wage perceptions such as education level (ED), the gross domestic product of the country (GDP) and real labour productivity (RLP) ("Controls"). Indeed, we may recall that the NLI is composed of wage perceptions and other benefits minus the job's cost/effort. In this sense, the regressors included can be classified as variables driving the wage perceptions and other benefits, in the case of RLP and EPL, or the job's cost/effort, in the case of ED and GDP. Both, E and GDP are linked to the fixed cost of working. While E is clearly an investment made by workers in order to achieve a good job, GDP is a proxy for the level of competition in the labour market and therefore the level of investment that workers must undertake in order to achieve a job.

Another specification of the NLI checks if it is explained by a quadratic term of the EPL (L^2). It can be observed in regression table 2, that the quadratic term is not significant in this case ("Quadratic" and "Parsimonious"). Furthermore, the RLP is not a good predictor of the wage within Euro Zone countries ("Quadratic" and "Parsimonious"). Such a result is in line with our model, since we are introducing institutional rigidities, i.e. the EPL. Thus, salaries are not set according to the marginal productivity of labour as it is contended by the neoclassical postulates. Besides that, the linear relationship between the NLI and the EPL is confirmed and displayed in Fig. 3 below. We would like to remark that

Table 1. Regression table 1

	P	P
L		24.61* (1.89)
L2		-3.053* (-1.79)
Constant		-27.29 (-1.24)
Observations		217

t statistics in parentheses; * $p < 0.10$, * $p < 0.05$, *** $p < 0.01$

Table 2. Regression table 2

	Basic	Controls	Quadratic	Parsimonious	Final
	NLI	NLI	NLI	NLI	NLI
L	-179.6 (-0.22)	2432.0*** (3.04)	-4197.5 (-0.82)	-4426.7 (-0.88)	2385.0*** (3.01)
ED		301.7*** (5.72)	322.0*** (5.89)	324.3*** (5.99)	303.8*** (5.80)
GDP		0.00693*** (3.21)	0.00672*** (3.13)	0.00688*** (3.26)	0.00713*** (3.37)
RLP		15.60 (0.55)	12.41 (0.44)		
L2			1232.9 (1.31)	1268.7 (1.37)	
Constant	21132.8*** (9.62)	-12514.9** (-2.27)	-4729.0 (-0.59)	-3382.7 (-0.45)	-11096.3** (-2.28)
Observations	95	95	95	95	95

t statistics in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

in this case data availability allows all Euro Zone members to be included.

Finally, we display the functions estimated in a more readable form and we use them to calculate equation 6 in our sample at the average:

$$P = -27.29 + 24.61 \times L - 3.05 \times L^2 \quad (7)$$

$$NLI = -11096.26 + 2385.04 \times L + 3003.80 \times ED + 0.007 \times GDP \quad (8)$$

Hence,

$$\varepsilon_{NLI,P} = \frac{NLI}{\bar{P}} \times \frac{\partial P}{\partial NLI} = \frac{NLI}{\bar{P}} \times \frac{\partial P}{\partial EPL} \div \frac{\partial NLI}{\partial EPL} = \frac{19846.85}{16.53} \times (24.61 - 6.1 \times 16.53) \div 2385.04 = -38.37 \quad (9)$$

After testing the two main hypotheses behind our model, the relationship between EPL on the one hand and the NLI and the probability of finding employment on the other hand, we can test in a second step whether the EPL, through the channel of the expected NLI, shapes workers' decisions about where to work and live. We will examine the correlation between the average expected NLI for the period 2008–2015, calculated on the basis of our previous results, and the average migration inflow / net migration (IM/NM) for the same period. The data used are displayed in Table 3 below:

Table 3 shows in detail how the countries with the lowest $\varepsilon_{NLI,P}$ have higher expected NLI, while those with the highest $\varepsilon_{NLI,P}$ have the lowest expected NLI and, as a consequence, they attract fewer workers, in gross or net figures. However, a more synthetic insight is provided using econometric

techniques. In this sense, we build up a very parsimonious log gravity model, displayed in regression table 4 above, where distance is not considered and there are only two mass factors – the country's population and its expected NLI. We can conclude that both the migration inflow and the net migration are explained by the expected NLI, although in the second case population is not a significant variable. A 1% increase in the expected NLI leads to a 0.80% increase in the migration inflow and a 1.78% in net migration. However, we recall that we have used only average data in these regressions.

A visual insight is provided by Fig. 4. The graphs on the left show the regression line for the whole sample available, while on the right we leave Germany out of the sample since it could be considered an outlier. However, the results do not change and, again, through the average for 2008–2015, we can observe that the higher the expected NLI the higher the IM and NM are. The fit is particularly good for the NM, Germany included.

It would be interesting for future studies to test if there is a difference in the way that the NLI and the probability of finding a job reacts to changes in the EPL before and after joining an EMU. Nevertheless, due to limited space and lack of data available, we must leave this point for future studies. Additionally, the lack of consistent and homogeneous data on migration of EU workers within the Euro Zone makes it difficult to econometrically test whether workers move to countries within the Euro Zone that maximise their expected NLI. The fact that some countries, like France, Greece or Ireland, do not systematically register workers coming from other Euro Zone or EU countries, leads to doubt as to the completeness of such an analysis. Maybe future surveys and data collection works will get over this problem allowing empirical research to be carried out on that issue. In this sense, micro data on labour surveys would help to classify the workers by different features such as professional sector, level of education, skills, etc., for the sake of a deeper analysis.

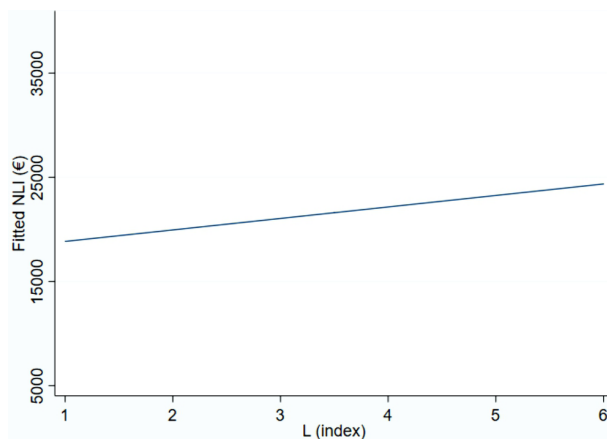


Fig. 3. Linear Relationship NLI and EPL

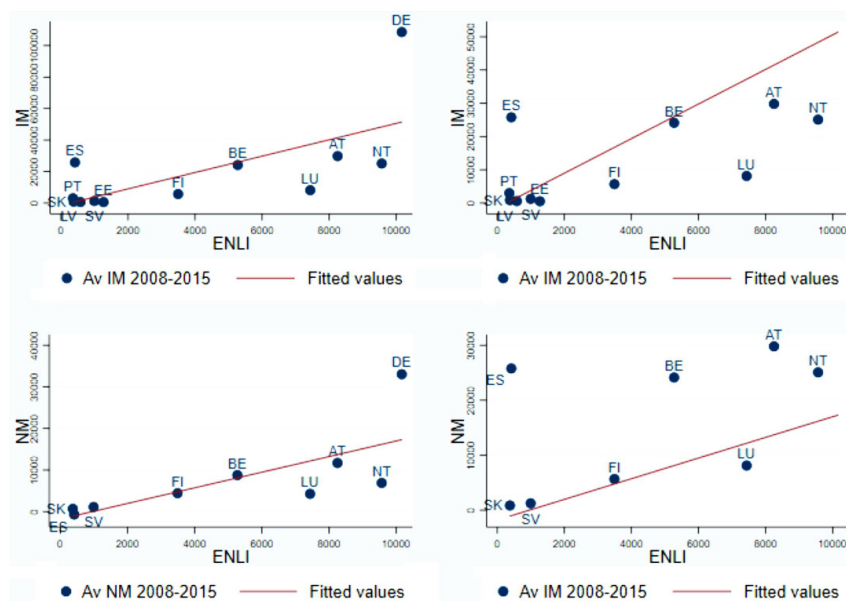
Table 3. Summary Statistics 1

	ENLI		IM	NM	Pop
BE	-52.63	5,270.72	24,119.5	8,776.25	10,986,558
DE	-59.85	10,161.02	108,579.875	33,030.75	81,132,645
EE	-16.28	1,268.47	521.25		1,326,651
ES	46.59	416.36	25,767.125	-695.375	46,446,234
LV	-9.01	581.31	562		2,075,744
LU	-75.31	7,433.27	8,115.875	4,267	520,716
NT	-70.58	9,566.19	25,064.25	6,888.25	16,670,239
AT	-59.22	8,250.15	29,795.25	11,697.13	8,415,311
PT	13.30	359.43	2,957.25		10,511,795
SV	-15.679	993.78	1,248.375	1,114.38	2,047,259
SK	-3.72	376.22	851.25	662.13	5,399,222
FI	-48.88	3,492.06	5,662.25	4,418.38	5,388,058

Table 4. Regression table 3

	log(IM)	log(NM)
log(ENLI)	0.799*** (4.91)	1.775** (2.88)
log(Pop)	0.791*** (5.18)	-0.485 (-0.90)
Constant	1.143 (0.91)	-5.471 (-1.07)
Observations	12	9

t statistics in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

**Fig. 4.** The relationship between IM/NM and ENLI

4. Conclusions

Among all the factors that drive labour migration, governments face some difficulties in controlling the wages-related ones, since they involve negotiations with multiple regulatory frameworks and stakeholders along both the public and the private sector. On the other hand, there are issues that remain even more difficult to manage, occasionally almost uncontrollable, like waves of refugees, territorial conflicts between states, or border controls. The EPL should be considered a political and managerial tool, easily adjusted with regard to current circumstances, especially under economic crisis situations.

Long ago, Robert Mundell (Mundell, 1961) prophetically stated that the mobility of labour force in the context of a unified currency area would be a very useful adjustment mechanism against asymmetric shocks, similar to the recent ones that hit Europe from 2008 to 2015. The empirical data processed in the analysis above confirm that the labour flows tend to cushion asymmetric shocks (Kahanec, 2013). The equilibrium of working force movement follows a market supply-demand pattern. The countries hit by the crisis lose forces and resources, which are transferred to other countries with comparative economic advantages in that certain moment. In terms of physics, it is a case study of “*vasi comunicanti*” where the liquid moving from one vase to another is the workers along with their needs, facing flowing constraints like bottlenecks and puzzled societies, which usually obstruct the flow to adjust to the multifaceted changes of globalisation (O’Rourke and Taylor, 2013).

Finally, yet importantly, this paper offers clear-cut evidence that have endured the model specifications as well as the robustness checks, further resulting in policy-making implications. As shown in the previous section, the Euro Zone as a whole is far from having an average EPL level that maximises the utility of workers, since the $\varepsilon_{NLI,P}$ is smaller than -1. However, the figures displayed in the table show that there is no room for a “one size fits all” policy. In this sense, we can classify countries into three groups: close to the optimal point, to the right of the optimal point and to the left of the optimal point. Therefore, each group should apply different

measures, provided they intend to maximise worker utility. While the first group can keep the *status quo*, the second one should try to reduce $\varepsilon_{NLI,P}$ and the third one to increase it. An important remark to be highlighted about the second category of countries is that trade unions are not acting as monopolists in the field of social dialogue, at least concerning EPL (Tirole et al., 1988), despite the latest complaints about their excessive power in Portugal, Spain or Greece. Moreover, such a coordinated movement could help some countries to avoid risking partners’ labour force, since it is already proven that workers move to countries with higher NLI and this, in turn, is strongly determined by the optimal choice of the EPL.

Nevertheless, there are different political tools to which governments can resort in order to get closer to the optimal point. We will list the main three that stem from our model. Firstly, they may change the level of the EPL. In this case, countries where $\varepsilon_{NLI,P} < -1$ should increase the EPL until the decrease in the probability of finding a job offsets the gain from the higher NLI; while countries where $\varepsilon_{NLI,P} > -1$ should decrease the EPL until the increase in the probability of finding a job offsets the loss from the lower NLI.

Secondly, they may act over the NLI through income and fiscal policies like minimum wages, bargained wages, employee and employer social contributions, taxes on labour, etc. Thus, countries like Spain should implement income and fiscal policies aiming to reduce the NLI, while others, like Germany, may push to increase NLI. It is worth noting that there are three channels here affecting the $\varepsilon_{NLI,P}$. On the one hand, we are directly decreasing (or increasing) the numerator of the first term of the elasticity formula, hence the latter is increasing (or decreasing). On the other hand, we are indirectly moving over the curve that links P and NLI and, as a conclusion, a decrease in the NLI leads to an increase in $\frac{\partial P}{\partial NLI}$, and *vice versa*, and thus the curve becomes flatter. Finally, after a certain time, we can expect the probability of finding a job to rise (or diminish) as a consequence of the lower (or higher) labour cost and the increase (or decrease) in hiring rates. The three channels combine to decrease (increase) the .

Last but not least, governments may try to affect the probability of finding a job. Nonetheless, they can act over such a variable only in a very indirect way and with uncertain results. For example, they can try to absorb – through public employment – part of the unemployed population who are competing in the labour market looking for a job, thus increasing the probability of the rest finding employment. The mechanism would be similar to that previously described leading to two secondary indirect effects on the $\varepsilon_{NLI,P}$. Nevertheless, since we are acting over P, we must look at the inverse of the slope of P with respect to NLI, i.e. $\frac{\partial P}{\partial NLI}$. In any case, the curve linking NLI and P will become flatter and, after a period of time, we may expect a decrease in the NLI.

The problem with the last two methods of intervention is that they imply a direct engagement of the government into the sphere of the private market and this can cause tension, especially within a context of economic crisis when governments try to reduce public employment or salaries. On the other hand, regulation through EPL is not immediately felt by either workers or employers and, hence, it is more likely to succeed as a tool that acts mildly but effectively to intervene in the labour market during a crisis.

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