The Puzzling No-Effect of The Minimum Wage: Rational Expectations and Employment Protection Legislation

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1 Introduction

Minimum wages were first introduced in Australia and New Zealand in the late 19th century, and are now in force in more than 90% of all countries. Despite its widespread use, the minimum wage is a debated issue. Its supporters assert that it helps prevent the excess of exploitation in the labor market, and increases the living standards of the lowest paid up to some minimum acceptable standards. Detractors claim that the minimum wage may price low-skill workers out of market, harming rather than helping the poorest workers.

Economic theory does not provide a clear prediction about the employment effects of the minimum wage: in a competitive labor market, a binding minimum wage reduces employment, but this is not necessary the case in a monopsonistic labor market (Dickens et al. (1994)), neither in an efficiency wage framework (Rebitzer and Taylor (1996)).

Empirical literature is abundant and can be divided in two waves: the first one ending in 1982, with the review of Brown, Gilroy and Kohen (1982) and the second one, the "New Minimum Wage Research", starting in November 1991 with the "New Minimum Wage Research Conference" (ILR-Cornell Institute for Labor Market Policies and Princeton University's Industrial Relations Section) and summarized in Neumark and Wascher (2007).

The former bulk of studies relied mainly on time-series variation in the minimum wage in US and aggregate data; and built a consensus around the idea that minimum wages reduce teenage employment. The latter used cross-section and panel-data to identify the effects of the minimum wage in several countries with controversial results. Long panel studies that incorporate both state and time variation in minimum wages (e.g. Neumark and Wascher (1992)) tend, on the whole, to find negative and statistically significant employment effects from minimum wage increases, while the majority of the U.S. studies that found zero or positive effects of the minimum wage on low-skill employment were either short panel data studies (e.g. Card (1992)) or case studies of a state-specific change in the minimum wage on a particular industry (e.g. Katz and Krueger (1992); Card and Krueger (1994)).[1]

This paper proposes a mechanism capable of reconciling those conflicting findings. Disemployment effect and neutrality of the minimum wage are both reasonable once one take into account expected versus unexpected change in the minimum wage. As any other policy, the minimum wage changes can often be foreseen. This is particularly true in countries such as France and Spain, where the statutory minimum wage is set to be updated every year; or in Italy and Germany, that have no minimum wage laws but rely on employer groups and trade unions collective agreements, which have a defined duration. Therefore, if agents are rationale, they will form expectations about minimum wage movements and adjust their current behaviour to the future economic environment. As a result, the disemployment effect after the increase in the minimum wage will be small: it has been anticipated. Viceversa, when the policy is unexpected, it will have stronger real effects, ex post.

The model we develop is an extension of the Mortensen and Pissarides (1994) model. We study and compare an expected and an unexpected increase in the minimum wage.

But other labor market policies or institutions may influence the employment effect of the minimum wage, as suggested by Neumark and Wascher (2004) in their cross-country analysis. Using a panel over seventeen OECD countries, they find support for disemployment effect of the minimum wage on teenager and young workers. But

[1] In their review, Neumark and Wascher argue that the lack of significant employment losses found in some analysis could be due to the short time horizon cutting off part of the adjustment process.

substantial variation across countries is related to other labor market institutions interacting with the minimum wage. In particular, more restrictive labor standards strengthen the disemployment effect, while employment protection legislation and investment in active labor market policies help to offset these effects.

These findings are coherent with the model. In particular, we show that, when the variation in the minimum wage is expected, higher employment protection is associated with more conservative behaviour. Then, when the policy becomes effective, a lower adjustment will be necessary and firms prevent from paying high adjustment costs, i.e. firing costs.

The prediction of the model are tested on Spanish data. The role played by expectations is identified through a natural experiment: the unexpected increase in the Spanish minimum wage following the election of José Luis Rodríguez Zapatero. Furthermore, the dual nature of the Spanish labor market, allows to disentangle the interaction of employment protection regulations with the minimum wage policy, whether expected or unexpected.

The plan of the paper is as follows. Next section discuss the centrality of expectations in economics. In Section 3, we present the model, both with and without expectations, and compare the resulting disemployment effect of the minimum wage. Section 4 discusses the role of employment protection. The empirical analysis is detailed in section 5. Section 6 concludes.

2 The role of expectations

The role of expectations in shaping the behavior of economic agents is well documented and has been extensively used to understand a variety of situations in which speculation about the future is a crucial factor in determining current action. The theory of rational expectations was first proposed by John F. Muth in the early sixties and, in 1995, Robert E. Jr. Lucas won a Nobel prize for his studies on expectations and monetary policy.

It is widely recognized that the effect of a policy depends on agents' expectations. The "policy ineffectiveness proposition" by Lucas(1972) states the neutrality of economic policies that have their effects solely by inducing forecast errors. But also policies that operate by affecting incentives have to take into account agents' expectations. For istance, the "permanent income theory of consumption" predicts that a tax-cut is going to have a marginal effect on consumption, if agents expect it to be temporary.

Despite that, expectations have not been introduced in the analysis of the minimum wage policy. This is surprising, especially because variations in the minimum wage are often scheduled and announced in advance.

Table 1 shows that in many countries the minimum wage is revised on regular basis, tipically once a year. The frequency of adjustment is fixed by law, when the minimum wage is statutory, or by collective contracts, if the minimum wage is negotiated. Furthermore, the criteria guiding the minimum wage revision are often stated by law. This is the case in Belgium, Luxemburg, Netherlands, France, Portugal, Spain, Canada and other countries.[2]

In the light of these features, the minimum wage policy cannot be considered as an unpredictable shock. Agents operating on the labor market have many information to form expectations about the timing and the magnitude of future minimum wage changes. And they have the incentive to form expectations, because the profitability of an employment relationship depends also on the future wage. When the minimum wage is expected to increase, the present value of a job decreases, and less vacancies will be posted. Furthermore, some employer-employee relationship are expected to be broken, if their productivities fall below the future acceptable minimum. In a world characterized by employment protection regulation, dismissing a worker is expensive. Therefore, firms may find more convenient not to hire those marginal workers, in order to save on future costs.

Then, when the minimum wage increases, the employment adjustment will be small, because it has been partly anticipated. In particular, it will be smaller the higher is the EPL.

[2] Source: ILO database on the minimum wage policy.

3 The model

The model is built to mimic the labor market of low wage workers. It is characterized by frictions, heterogeneous stochastic matches and endogenous separation rate. The wage is fixed at the minimu wage level.

Frictions are summarized by the matching function $m(v,u)$, with constant returns to scale. Unemployed workers and firms with vacancies meet on the labour market with probability, respectively, $p = \frac{m(v,u)}{u}$ and $q = \frac{m(v,u)}{u}$. Call $\theta = \frac{v}{u}$ market tightness. The higher is θ, the higher is the probability to find a job for a worker, p, and the lower is the probability to meet a worker for a firm, q.

The productivity of a match is a stochastic drawn, x, from a known probability distribution $G(x)$, at the time of the meeting. Observing x, the pair firm-worker decides whether or not to form the match and start production. Low realization of x may be rejected because of the prospect of a better job match in the future. The minimum level of productivity such that the match is formed is called hiring standard, x_a

Match productivity x is not invariant, but can be hitten by a shock, with frequency λ and distribution $H(x)$.[3] Job separations occurs if the new productivity drawn is lower than the productivity threshold x_d. Furthermore, a match may be destroyed when the minimum wage increase if, at the new wage, the job is no more profitable.

The minimum wage is assumed to increase once and for all, therefore there will be two steady state: pre and post the increase in the minimum wage. The disemployment effect is analysed in the two cases of expected and unexpected variation of the minimum wage.

The model also allows for employment protection legislation: when a match is destroyed, the firm has to pay a tax F. The firing cost is not a transfer, but a pure waste. The implications of different level of F are studied in Section 3.

3.1 Unexpected increase in the minimum wage

There is a continuoum of identical households with total mass equal to one and a continuoum of identical firms, each one holding one job. Given our assumptions, the value of a filled job reads:

$$rJ(x) = x - w + \lambda \int_{x_d}^{x^u} J(s)\, dH(s) + \lambda H(x_d)(V - F) - \lambda J(x) \tag{1}$$

A job produces x and costs w; with probability λ it is hitten by a shock and the productivity is drawn from $H(x)$, over the support $[x_l, x^u]$. If the new productivity is below the threshold x_d, the job is destroyed and the firm gets a new vacancy and pays F; otherwise the job is continued under the new productivity.

The value of a vacancy is

$$rV = -k + q \int_{x_a}^{x^U} [J(s) - V]\, dG(s) \tag{2}$$

where k is the cost of posting a vacancy. The match productivity is drawn by $G(x)$ over the support $\left[x_L, x^U\right]$. Conditional on meeting a worker, with probability q, and observing a sufficiently high productivity, with probability $[1 - G(x_a)]$, the firm gets the value of a job.

Call W the value to a worker of being in a match; and U the value to a worker of being unemployed:

$$rW = w + \lambda H(x_d)[U - W] \tag{3}$$

$$rU = b + p[1 - G(x_a)](W - U) \tag{4}$$

[3] Note that the productivity distribution of matches, $G(x)$, is not equal to the distribution of productivity shocks $H(x)$. The former represents the characteristics of the firm and of the worker forming the match. While the latter pertains the realization of an exogenous shock. Similarly, we could model the match productivity as

$$x = \gamma + \varepsilon$$

where γ is the idiosyincratic component distributed according to $G(\gamma)$; and ε stands for the exogenous productivity shock.

It can be prooved that this representation would lead to similar results. The main difference concern the destruction threshold, ε_d, that, in this model, would be a function of x. But the effects of expectations and of employment protection on the disemployment effect of the minimum wage are qualitatively the same.

where b is the unemployment benefit and x_a is the hiring standard, below which no matches are formed.

Firms post vacancies as long as their value is positive. Competition ensures that, in equilibrium, the value of a vacant position is null.

When a worker and a firm meet, they observe the match specific productivity x and decide whether or not to form the match. Matches are formed as long as their surplus is positive. Given wage rigidity, it could happen that the match is profitable for the workers but not for the employer. Therefore, the match is formed only if the firm's surplus, $J - V$, is positive. The hiring standard solve $J(x_a) = 0$.

Then the employment relationship is continued as long as the productivity shock is high enough to compensate for the firm's outside option. Once the match is formed, the employment protection regulation become binding and the outside option reduces from V to $V - F$. Therefore, a job is destroyed only when its value fall below $-F$.

Substituting the free entry condition, $V = 0$, the match formation condition, $J(x_a) = 0$, and the job destruction condition, $J(x_d) = -F$, into the value functions (1)-(4), we get the equilibrium conditions:

$$x_d = w - rF - \frac{\lambda}{r+\lambda}\int_{x_d}^{x^u}(s - x_d)\,dH(s) \tag{JD}$$

$$x_a = w + \lambda F - \frac{\lambda}{r+\lambda}\int_{x_d}^{x^u}(s - x_d)\,dH(s) \tag{MF}$$

$$\frac{1}{r+\lambda}\int_{x_a}^{1}(s - x_a)\,dG(s) = \frac{k}{q} \tag{JC}$$

Note that the hiring standard and the job destruction threshold are linked by the relation $x_a = x_d + (r + \lambda)F$.

When the minimum wage is rised, both x_a and x_d increases: the higher labor cost makes firms more choosy about forming and continuing a match. The value of a filled job is now lower, therefore less vacancies are posted in equilibrium and the labor market tightness θ decreases.

All these movements affect the steady state unemployment rate.

In steady state, the unemployment rate is defined by the Beveridge curve:

$$u = \frac{\lambda H(x_d)}{\lambda H(x_d) + \theta q\,[1 - G(R)]} \tag{BC}$$

Unemployment is increasing in the job destruction threshold and in the hiring standard, and decreasing in the market tightness. Therefore, the steady state unemployment rate after the minimum wage shock is higher.

Let's call x_{2d} the productivity threshold in the post shock period. On impact, the minimum wage shock imply the destruction of all the jobs whose productivity is between x_d and x_{2d}. The unemployment rate increases by $[H(x_{2d}) - H(x_d)](1 - u)$.

3.2 Expected increase in the minimum wage

The minimum wage frequently moves and its variations are often predictable. This feature of the minimum wage policy is accounted by including expectations. Firms know that, with probability ϕ, the minimum wage will increase, once and for all, from w_1 to w_2.

There are two states of the world: pre and post increase in the minimum wage. Let's call them, respectively, status 1 and status 2.

In status 1, agents take into account the future variation in the value of their matches. In status 2 no changes are expected, therefore the value functions are similar to (1)-(2):[4]

$$rJ_2(x) = x - w_2 + \lambda \int_{x_{2d}}^{x^u} J_2(s)\, dH(s) + \lambda H(x_{2d})(V_2 - F) - \lambda J_2(x) \tag{5}$$

$$rV_2 = -k + q_2 \int_{x_{2a}}^{x^U} [J_2(s) - V_2]\, dG(s) \tag{6}$$

The equilibrium conditions read:

$$x_{2d} = w_2 - rF - \frac{\lambda}{r+\lambda} \int_{x_{2d}}^{x^u} (s - x_{2d})\, dH(s) \tag{JD$_2$}$$

$$x_{2a} = w_2 - \frac{\lambda}{r+\lambda} \int_{x_{2d}}^{x^u} (s - x_{2d})\, dH(s) + \lambda F \tag{MF$_2$}$$

$$\frac{1}{r+\lambda} \int_{x_{2a}}^{x^u} (s - x_{2a})\, dG(s) = \frac{k}{q_2} \tag{JC$_2$}$$

Note that $x_{2a} = x_{2d} + (r+\lambda)F$.

In status 1, the value of a job is a mixture of equations (1) and (5):

$$\begin{aligned} rJ_1(x) &= x - w_1 + \lambda \int_{x_d}^{x^u} J_1(s)\, dH(s) + \lambda H(x_d)(V_1 - F) + \phi \max\{V_1 - F; J_2(x)\} - (\lambda + \phi) J_1(x) \qquad (7) \\ &= \begin{cases} x - w_1 + \lambda \int_{x_d}^{x^u} J_1(s)\, dH(s) + [\lambda H(x_d) + \phi](V_1 - F) - (\lambda + \phi) J_1(x) & \text{if } x < x_{2d} \\ x - w_1 + \lambda \int_{x_d}^{x^u} J_1(s)\, dH(s) + \lambda H(x_d)(V_1 - F) - (\lambda + \phi) J_1(x) + \phi J_2(x) & \text{if } x \geq x_{2d} \end{cases} \end{aligned}$$

A filled job yields a net production $x - w_1$, that may change due to a productivity shock, with probability λ, or due to the increase in the minimum wage, with probability ϕ. The firm decides whether to continue or not the job, comparing the current productivity of the match with the threshold x_d, after the productivity shock, or x_{2d}, following the minimum wage shock. Where x_d is derived from the condition $J_1(x) = -F$, while x_{2d} solves $J_2(x) = -F$.

Equations (5) and (7) are depicted in Figure 1. The job value in status 1 changes slope at $x = x_{2d}$. The first segment pertains to the low productivity matches that won't be profitable after the minimum wage shock and will be destroyed. The second segment represents the high productivity matches that will be continued after the policy shock.

The value of a job in status 1 is always higher than the respective value in status 2, because, at least in the current period, the firm pays a lower wage. Therefore, $J_1(x)$ is to the left of $J_2(x)$ and the productivity thresholds x_{1a} and x_{1d}, are unambiguously smaller than x_{2a} and x_{2d}. But the exact location of $J_1(x)$ depends on the value of the parameters of the model, in particular w_1, w_2 and F.

[4] We omit the presentation of the value functions to the worker, because they are irrelevant to the solution of the model. Wage rigidity implies that, as long as the minimum wage is higher than the unemployment benefit, workers are always willing to form a match and to continue it, regardless of the match productivity. Their behaviour does not react to the increase in the minimum wage.

In this model we abstract from workers' decision about optimal search effort. When the minimum wage increases, the value of being employed increases and could induce workers to exert more effort in searching for a job. But on the other side, higher minimum wage means also lower vacancy posting, that is detrimental to the search effort. The net effect is ambiguous and there is no consensus on the empirical evidence.

Neumark and Wascher (1995) found a positive and significant effect of the minimum wage on young workers' search effort and used this evidence to explain the weak disemployment effect found in some studies.

On the other hand, Portugal and Cardoso (2006) do not confirm those findings in their analysis of the youth labor market in Portugal.

There is an uncountable set of possible $J_1(x)$, but for the purposes of this study we need to distinguish only two cases: whether x_{1a} is lower or bigger than x_{2d}. In the first case, case A, the increase in the minimum wage causes the destruction of newly formed job. In the second case, case B, the initial hiring standard fully anticipate the future rise in the reservation productivity, so that matches that are unprofitable under status 2 are not formed.

Comparing equations (5) and (7), it can be prooved that $J_1(x)$ falls in case A if the following condition is satisfied:

$$w_2 - w_1 + \frac{\lambda}{r+\lambda+\phi}\int_{x_{1d}}^{x_{2d}}(s-x_{1d})\,dH(s) + \frac{\lambda}{r+\lambda}\left[\int_{x_{1d}}^{x^u}(s-x_{1d})\,dH(s) - \int_{x_{2d}}^{x^u}(s-x_{2d})\,dH(s)\right] > (r+\lambda+\phi)F \tag{8}$$

Intuitively, when the increase in the minimum wage is high with respect to the firing cost F (case A), it is convenient to form matches that will be destroyed after the policy shock, because the actual saving, i.e the lower wage paid to the worker, is higher than the future cost of separation. Viceversa, when F is high with respect to the minimum wage variation, it is optimal to form only highly productive matches, free from the policy separation shock.

The equilibrium conditions in status 1, under condition (8) are:

$$x_{1d}^A = w_1 - \lambda\left[\frac{1}{r+\lambda+\phi}\int_{x_{1d}^A}^{x_{2d}}\left(s-x_{1d}^A\right)dH(s) + \frac{1}{r+\lambda}\int_{x_{2d}}^{x^u}\left(s-x_{1d}^A\right)dH(s)\right] - rF = 0 \qquad (\mathrm{JD}_1^A)$$

$$x_{1a}^A = w_1 - \lambda\left[\frac{1}{r+\lambda+\phi}\int_{x_{1d}^A}^{x_{2d}}\left(s-x_{1d}^A\right)dH(s) + \frac{1}{r+\lambda}\int_{x_{2d}}^{x^u}\left(s-x_{1d}^A\right)dH(s)\right] + (\lambda+\phi)F \qquad (\mathrm{MF}_1^A)$$

$$\frac{1}{r+\lambda+\phi}\int_{x_{1a}^A}^{x_{2d}}\left(s-x_{1d}^A\right)dG(s) + \frac{1}{r+\lambda}\int_{x_{2d}}^{x^u}\left(s-x_{1d}^A\right)dG(s) - \left[1-G\left(x_{1a}^A\right)\right]F = \frac{k}{q_1^A} \qquad (\mathrm{JC}_1^A)$$

Note that $x_{1a}^A = x_{1d}^A + (r+\lambda+\phi)F$.

When condition (8) is not satisfied (case B), the equilibrium equations reads:

$$x_{1d}^B = w_1 - \lambda\left[\frac{1}{r+\lambda+\phi}\int_{x_{1d}^B}^{x_{2d}}\left(s-x_{1d}^B\right)dH(s) + \frac{1}{r+\lambda}\int_{x_{2d}}^{x^u}\left(s-x_{1d}^B\right)dH(s)\right] - rF = 0 \qquad (\mathrm{JD}_1^B)$$

$$x_{1a}^A = w_1 - \lambda\left[\frac{1}{r+\lambda+\phi}\int_{x_{1d}^B}^{x_{2d}}\left(s-x_{1d}^B\right)dH(s) + \frac{1}{r+\lambda}\int_{x_{2d}}^{x^u}\left(s-x_{1d}^B\right)dH(s)\right] + \lambda F + \phi\frac{A}{r+\lambda+\phi} \qquad (\mathrm{MF}_1^B)$$

$$\frac{1}{r+\lambda+\phi}\int_{x_{1a}^A}^{x_{2d}}\left(s-x_{1d}^B\right)dG(s) + \frac{1}{r+\lambda}\int_{x_{2d}}^{x^u}\left(s-x_{1d}^B\right)dG(s) - \left[1-G\left(x_{1d}^B\right)\right]F = \frac{k}{q_1^B} \qquad (\mathrm{JC}_1^B)$$

where $A = w_2 - w_1 + \frac{\lambda}{r+\lambda+\phi}\int_{x_{1d}}^{x_{2d}}(s-x_{1d})\,dH(s) + \frac{\lambda}{r+\lambda}\left[\int_{x_{1d}}^{x^u}(s-x_{1d})\,dH(s) - \int_{x_{2d}}^{x^u}(s-x_{2d})\,dH(s)\right]$. Note that $x_{1a}^B = x_{1d}^B + (r+\lambda)F + \phi\frac{A}{r+\lambda+\phi}$.

As in the model with expected policy shock, when the minimum wage actually increases, the job destruction threshold x_d and the hiring standard x_a increase, while market tightness θ decreases. Therefore, steady state unemployment increases. And unemployment increases on impact as well, through the destruction of jobs whose productivity fall between x_{1d} and x_{2d}.

Expectations do not neutralize the disemployment effect, but they reduce its magnitude, as explained in the following section.

3.2.1 Comparison

Both expected and unexpected policy shocks lead to an increase in the unemployment rate, on impact and in the steady state. Neverthless, the disemployment effect is stronger when reacting to an unexpected policy shocks.

Let's compare the unemployment increase in the two model:

$$\Delta u_{noExp} = \frac{\lambda H(x_{2d})}{\lambda H(x_{2d}) + \theta_2 q_2 [1 - H(x_{2a})]} - \frac{\lambda H(x_d)}{\lambda H(x_d) + \theta q [1 - H(x_a)]} \tag{9}$$

$$\Delta u_{Exp} = \frac{\lambda H(x_{2d})}{\lambda H(x_{2d}) + \theta_2 q_2 [1 - H(x_{2a})]} - \frac{\lambda H(x_{1d})}{\lambda H(x_{1d}) + \theta_1 q_1 [1 - H(R_1)]} \tag{10}$$

$$\Delta u_{noExp} - \Delta u_{Exp} = \frac{\lambda H(x_{1d})}{\lambda H(x_{1d}) + \theta_1 q_1 [1 - H(R_1)]} - \frac{\lambda H(x_d)}{\lambda H(x_d) + \theta q [1 - H(R)]} > 0 \tag{11}$$

It is straightforward to show that the value of a job in status 1 is bigger in the model without expectations, for any productivity level. Therefore, when $J_1(x)$ is equal to zero, i.e. $x = x_{1a}$, $J(x)$ is still positive and it is profitable to form the match. The hiring standard is lower and, similarly, the reservation productivity is lower than the respective threshold in the model with expectations. When the shock occurs, firms's optimal decision are more distant from the post shock optimal behaviour, and they need to react more to adjust to the new environment. It follows that the variation of unemployment is higher.

An expected policy shock allows firms to adapt their behaviour in advance, reducing the future adjustment.

It is worth to stress that lower disemployment effect ex-post does not mean that, overall, an expected increase in the minimum wage have a lower real effect than an unexpected increase. In the former case, the increase in unemployment has been splitted between the current period and the future.

4 The role of employment protection legislation

A recent study by Neumark and Wascher (2004) shows that the disemployment effect of an increase in the minimum wage is negatively correlated with the degree of employment protection, EPL from now on.

The innovation of Neumark and Wascher (2004) analysis consists in allowing other labour market policies to influence the impact of the minimum wage. This is in the spirit of the literature studying the variation across countries in other labor market institutions and their interaction with economic shocks. Blanchard and Wolfers (2000) and Den Haan, Haefke and Ramey (2001) develop and simulate different models to analyse how economic shocks and institutions help explaining the rise and the heterogeneity in European unemployment. In a theoretical paper, Coe and Snower (1997) emphasize complementarities among labor marker policies - including minimum wages. In particular, in their model, stricter job security measures, more generous unemployment benefits, and greater bargaining strength for incumbent employees tend to exacerbate the negative employment effects of an increase in the minimum wage.

Neumark and Wascher study the effects of the minimum wages across seventeen OECD countries over the period 1975-2000, taking account of a variety of labor market policies and institutions. As an indicator of the bite of the minimum wage, the authors adopt the Kaitz index, in line with most of the literature.[5] The dependent variable is the employment ratio of teenagers and youth.

Results from the basic regressions support the disemployment effect of the minimum wage on the youth. Somewhat different results are obtained from the model augmented by policy indexes. The estimated coefficient of EPL interacted with the minimum wage is significantly positive and can counterbalance the disemployment effect.

[5] The Kaitz index is the ratio of the minimum wage to the average wage. It is the most widely used measure of the impact of the minimum wage. The main advantage is that this index does not react to economic events that affects both the minimum wage and the average wage, mitigating potential bias. Drawbacks are discussed in Dolado et al. (1996)

The same is true for active labor market policies, ALMP. Conversely, the negative effect of the minimum wage is magnified by restrictive labor standards, LS.

These findings are coherent with the model presented in section 3. In particular, higher EPL reduce the disemployment effect when the policy shock is expected. In this case, firms know that the future value of a job will be lower and that some matches will be destroyed. To avoid paying firing costs, a firm may choose to increase the productivity requested in order to form a match. Then, the firing cost is minimized, but the firm is loosing the positive net production of jobs that are currently profitable. The optimal choice has to balance these two forces. High firing taxes magnify the cost associated with loose hiring standard, thereby increasing the optimal productivity threshold. As explained in the previous section, a stronger anticipation of the policy shock, through higher productivity thresholds, reduces the disemployment effect at the time the minimum wage actually increases.

5 Empirical analysis

The model presented in section 3 leads to two main predictions:

1. a certain increase in the minimum wage leads to a higher disemployment effect when it is unexpected than when it is expected;

2. the higher is the employment protection, the lower is the disemployment effect of an expected rise in the minimum wage.

It is clear that testing the model requires the discrimination among expected and unexpected minimum wage changes. In general, it is not possible to construct the individual expectations about policy changes, but the recent story of Spain provide a useful identification strategy.

On 14th March of 2004, three days after the terrorist attack, the Spanish socialist party won the election and José Luis Rodríguez Zapatero became the new premier. An important point in the socialist agenda was the increase of the minimum wage up to 600 euros by the end of the mandate. A few months after the election, Zapatero announced a rise in the minimum wage of 6.6%.

The previous conservative government remained in office ten years and implemented a low minimum wage policy. From the 1999 to the 2004, the minimum wage was increased according to the inflation target, that has always been lower than the real one. Thus, the real minimum wage was actually decreasing.

In Spain the minimum wage is fixed by law and revised once a year, the new amount being mandatory from the first of January. The minimum wage legislation applies to workers from all occupations, trades and economic sectors. Subminimum wages are specified for trainees. Until 1997, the Government fixed two minimum wages: one for adult workers (+18 years old) and another for workers from 16 to 18 years old. This difference was eliminated in 1998.

This particular setting suggests that minimum wage changes can be foreseen; and the prediction was trivial during the second Aznar's mandate. But the increase of the minimum wage in July 2004 was largerly unexpected, in the timing and in the magnitude.

The Economist called Zapatero "the unexpected prime minister", speculating that his success was, at least partly, related to the train bombs in Madrid. Before the attacks, opinion polls had pointed to a win for the People's Party (PP), but in a few days the election result was reversed.

In a recent paper, Montalvo(2006) identifies the effect of the terrorist attacks on the election result comparing the voting behaviour of the presential voters with respect to the absentee voters, i.e the citizens abroad. The first group voted on the 14th of March, knowing about the terrorist attacks. While the latter goup was allowed to start voting from the 2nd of March, so that they could have voted before the bombing. A difference in difference

estimator is constructed using data on voting results of Congressional elections from 1993 to 2004. The estimate shows that the terrorist attack reduced the support for the PP by approximately 5 percentage point.

Therefore, the election of the socialist party was unexpected, as the event, the bombing, that contributed to its realization. Then, the following rise in the minimum wage was also unexpected, as opposed to the widely expected variation carried out by the conservatory party in the period 1999-2004. Now we have two types of minimum wage shocks and we can test the predictions of the model concerning the influence of expectations.

5.1 Data

Data used in the empirical investigation comes from the Economically Active Population Survey (EPA) 2000-2007. EPA is a rotating quarterly survey carried out by the Spanish National Statistical Institution. Its main goal is to reveal the characteristics of the population living in the Spanish national territory.

The planned sample size consists of about 64,000 households with approximately 150,000 individuals. The survey's rotation scheme implies that every new rotation group stays in the survey for six consecutive quarters. The questionnaire is submitted to a single household respondent, who answers for all the persons living in the household. The household respondent may change between successive interviews. This allows low attrition rate, but increases the measurement error, especially in retrospective questions.

The questionnaire is composed of several sections, asking about educational attainment and working status of each individual in the household. The first quarter of each year, it also includes retrospective questions about the working status of the individual one year earlier. There are no information about the earnings.

5.2 Econometric strategy

Following most of the literature, we restrict the analysis to the young, because they are more likely to be affected by the minimum wage policy. The econometric specification is:

$$y_{it} = \alpha_0 + \alpha_1 Z + \alpha_2 W_t + \alpha_3 U_t + X_{it}\beta' + \varepsilon_{it} \tag{12}$$

where the dependent variable is the probability of individual i in period t of moving from unemployment to employment (or from employment to unemployment); Z is a dummy equal to one in the Zapatero period, 2004:2-2006:4;W is the increase in the minimum wage; U_t is the unemployment rate of adults and it is included in order to control for the business cycle; X is the set of covariates, and include gender, education and region.

The coefficient α_1 captures the effect of the unexpected (Zapatero period) increase in the minimum wage on the flow probability y.

Given that the dependent variable is a probability, a probit regression is preferred to the linear regression.

Results are presented in table 2. In column (1) the dependent variable is the probability to move from non-employment to employment. A rise in the minimum wage is expected to decrease the flow into employment and the model predicts that the negative variation is higher in the case of unexpected policy change. The effect of the minimum wage is captured by the coefficient α_2, which is not significant: there is no evidence of a decrease in job creation. Furthermore, α_1 is significantly positive: unexpected policy shocks are associated with an increase in flows.

Column (2) and (3) refer to the flows out of employment, towards, respectively, unemployment and non participation. The coefficient of Z is significantly positive, meaning that the unexpected increases in the minimum wage lead to higher flows out of employment of 7-8%

6 Conclusion

Empirical literature on minimum wages is characterized by controversial results. It is far from clear whether a policy that increase the minimum wage has a negative effect on unemployment or not. Neither economic theory provides a clear prediction.

This paper contribute to the debate by proposing a mechanism capable of reconciling conflicting findings. The key ingredient is the distinction between expected and unexpected changes in the minimum wage. The role of expectations in shaping the behaviour of economic agents has been extensively studied in a variety of subject, but is not in the analysis of the minimum wage effect.

Actually, in many countries a law determine the level of the minimum wage and the periodicity of its revision. Sometimes it also fix some criteria to be used to update the minimum wage, such as the dynamics of prices and productivity. In light of these features, it is important to understand how expectations about the future change in the minimum wage affect the employment effect of this policy.

The model proposed include expectations and shows that, when the change in the minimum wage is expected, the disemployment effect is going to be smaller than in the case of an unexpected change of the same magnitude. The reason is that the effect of the higher future minimum wage has been partly anticipated by agents. This does not mean that expected changes are not less detrimental to the labor market, but that it is more difficult to empirically measure their effect, because they also impact on the current agents' behaviour.

It would be safer to limit the analysis of the disemployment effect to the unexpected minimum wage changes. A clear case is the increase in the Spanish minimum wage operated by the newly-elected socialist party in the July of 2004.

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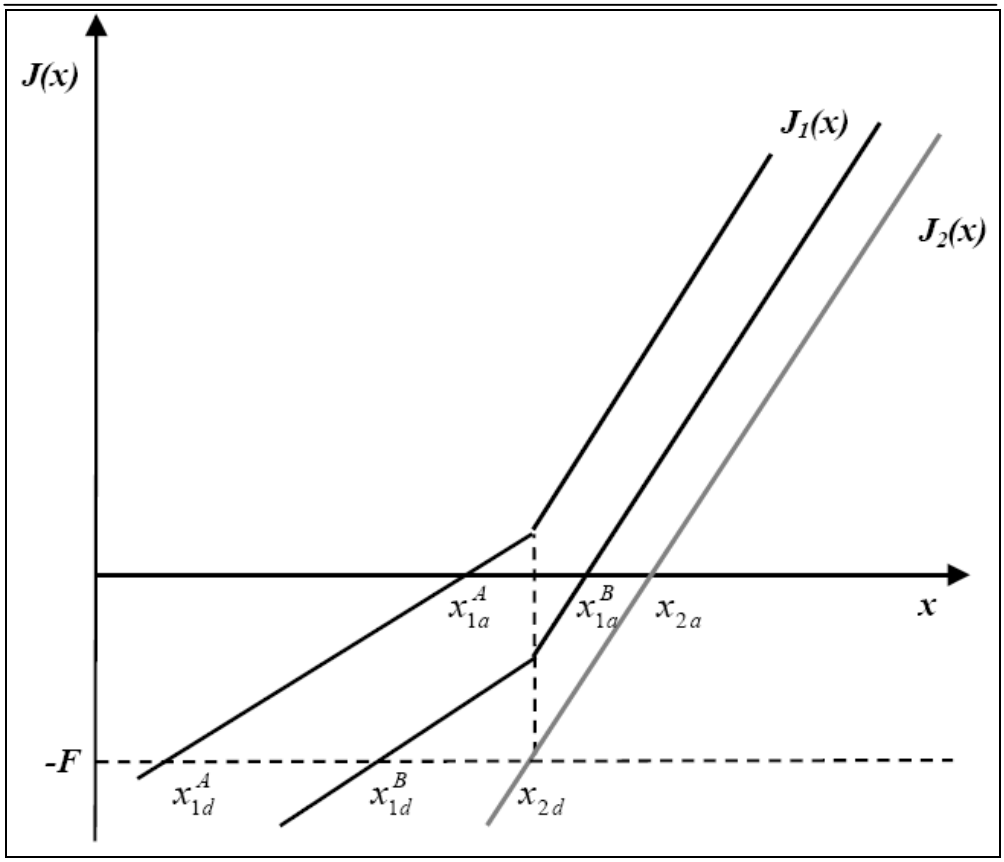
Figure 1. Job value pre and post minimum wage shock in a model with expectations



The grey line represents the value of a filled job after the increae in the minimum wage. The black lines depict the job value before the increase in the minimum wage distinguishing two cases. The line to the left correspond to the case of low firing costs with respect to the variation of the minimum wage. The other draws the job value in the case of high firing costs with respect to the variation of the minimum wage.

Table 1. The minimum wage policy

Country	Method for setting	Adjustment provision
Australia	Statute	Yearly
Belgium	Negotiated	Yearly
Canada	Statute	Not defined
France	Statute	At least yearly
Germany	Negotiated	Usually every 12 months
Greece	Negotiated	Twice a year
Italy	Negotiated	Every two years
Japan	Statute	When necessary
Luxemburg	Statute	Twice a year
Netherlands	Statute	Twice a year
New Zealand	Statute	Yearly
Portugal	Statute	Yearly
Spain	Statute	Yearly
Sweden	Negotiated	Usually every 3 years
United Kingdom	Wage Councils	Yearly
US	Statute	Not defined

Source: ILO database on the minimum wage policy.

Table 2. Probit: expectations influence on flows

	(1) nonemp_emp	(2) emp_unemp	(3) emp_olf
Zapatero	0.011	0.075	0.081
	(2.78)***	(15.36)***	(9.43)***
MW change	-0.000	0.001	0.000
	(0.16)	(4.35)***	(0.24)
Adult unemp	0.101	-0.269	0.225
	(1.93)*	(3.42)***	(1.56)
Gender	-0.008	0.009	0.009
	(6.76)***	(8.13)***	(3.08)***
Low education	0.010	-0.000	-0.002
	(1.92)*	(0.10)	(0.12)
Medium education	-0.001	-0.010	0.112
	(0.19)	(2.28)**	(7.39)***
High education	0.048	-0.008	-0.021
	(6.02)***	(1.97)**	(1.48)
Observations	80733	68346	68716

Absolute value of z statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%