Employment effects of minimum wages in Europe revisited

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Employment effects of minimum wages in Europe revisited[1]

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Abstract

The aim of this paper is to estimate the effect of minimum wage on employment rates of young individuals taking into account potential nonlinearity, as predicted by a search and matching model. We find a significant nonlinear relationship between the minimum wage and employment. Negative effect of the minimum wages on employment is stronger if the labor markets are otherwise strictly regulated and when workers are relatively unproductive.
JEL Classification: J20, J38, J48
Keywords: minimum wage, employment, young workers, Europe

1. Introduction

Currently, about 90 percent of countries worldwide have statutory minimum wages in place (see Herr and Kazandziska 2011). As such, the effects of minimum wages on employment are not only theoretically but also empirically one of the most vividly discussed topics in today's labor market policies.

The aim of this paper is to estimate the effects of changes in the minimum wage on the employment rate of young individuals in a selection of European countries. Recent theoretical research on the effects of minimum wages on employment suggests that the effect might in fact be non-linear. In this work, we make a first attempt to test this theoretical prediction.

Theoretical research by Brown et al. (2014) serves as a baseline model for our predictions. The authors show that higher wages depress the "job offer rate." On the other hand, higher wages increase the "job acceptance rate," since the value of work relative to unemployment increases. Therefore the authors argue: "Under moderate minimum wages, the latter effect may dominate the former." It is exactly this possibility of a nonlinear relationship that we are interested in.

Keeping this theoretical approach in mind, we estimate whether the employment effects of an increase in the minimum wage might in fact be nonlinear: lower wages could stimulate employment, whereas once the wage is set too high the effect is reversed. Anticipating the main results, we show that low minimum wages might induce employment for young and older workers, yet once the minimum wages are set at higher levels, the employment possibilities are indeed reduced.

Micro-data analysis of the effects of minimum wages on employment is vast. Neumark and Wascher (2006) give a broad overview of minimum wage studies which estimate the employment effects. However, even though a number of studies focus on cross-country time-series analysis of the employment effects of different labor market policies, there are comparatively few works that focus on the effect of minimum wage.

The OECD (1998) analyzes minimum wage effects on employment of three specific groups: teenagers, young adults, and prime-age adults. The authors use a panel of nine OECD countries between 1975 and 1996. The regression model follows the state-panel models used in the US

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minimum wage literature (see e.g. Burkhauser et al. 2000, Keil et al. 2001, Partridge and Partridge 1999). The results show that an increase in the minimum wage has a negative employment effect for the teenager group in all specified models. For the other age groups the effects are ambiguous.

Another study comes from Neumark and Wascher (2004) and combines the methodology of the OECD study with some additional data on different labor market institutions and policies that might influence the employment rates and a panel that includes 17 countries from 1976 until 2000. For all specifications the results for teenagers as well as for the youth suggest a negative employment effect of an increase in the minimum wage. Additionally, Neumark and Wascher (2004) estimate the effects of bargaining and subminima for young employees. While bargained minimum wages and youth subminima lead to a weaker negative employment effect of a minimum wage increase for teenagers and youths, industry and geographic wage floors seem to strengthen the negative effects.

Addison and Ozturk (2010) use a panel of 16 OECD countries and look at the period between 1970 and 2008. They estimate the employment effects of a minimum wage increase not on teenagers and young adults but on female prime-age workers. The results are in line with the findings of Neumark and Wascher (2004), suggesting a negative employment effect on prime-age females. Regarding the stronger dis-employment effects in countries with the least regulated labor markets, they did not find empirical evidence for the target group.

Dolton and Bondibene (2011) re-estimate the results of Neumark and Wascher (2004) by using panel data for 33 OECD countries from 1976 to 2008. The model they use is similar to the model of Neumark and Wascher (2004) except for additional controlling for the aggregated labor market situation. Their results are in line with the findings of Neumark and Wascher (2004), suggesting a negative employment effect of changes in the minimum wage. As a robustness test, the authors suggest using a weighted regression technique, to control for different sizes of the countries' labor markets. When the authors used this estimation technique, they found neither a significant negative nor a significant positive employment effect of a minimum wage increase. Most recently, for the European Union, Laporšek (2013) finds a negative effect of minimum wages on youth employment.

While most empirical research was based on a linear employment effect of a minimum wage increase within countries that might differ in institutional labor market settings and for the low-skilled and/or young workers, our analysis contributes to the discussion in several ways. Firstly, we directly estimate whether the theoretically-predicted nonlinear effects of minimum wages find evidence for the case of European countries. Explicit analysis of a nonlinear relationship can explain some of the insignificant results present in the previous works. Secondly, we carefully approach and correct for potential endogeneity of the covariates, which in many studies has not been accounted for. Finally, we estimate employment elasticities on a country–by–country basis, which allows us to formulate careful policy recommendations.

This paper is structured as follows: In Section 2 we briefly present the theoretical model and hypotheses for the empirical study. Section 3 presents the empirical model as well as the data. Afterwards, the empirical findings and robustness analysis will be discussed in Section 4. Finally, Section 5 concludes the paper.

2. Theoretical background and hypotheses

Before we formulate our hypotheses, it is useful to explain in more detail the hypotheses stemming from the theoretical work of Brown et al. (2014). In this model, firms only offer a job if the idiosyncratic variations in workers' suitability for the jobs are sufficiently low. As a result, since the job offer rate in the steady state negatively depends on the equilibrium wage, an increase in the minimum wage will reduce the "job offer rate" and lead to lower employment. This effect is called the "job offer effect" and can be summarized by the formula

$$\eta = J_{\varepsilon}\left(\frac{a-w}{1-\delta(1-\sigma)} - h\right), \tag{1}$$

where J_{ε} denotes the cumulative distribution of the job suitability shock, a is the average workers' productivity, w is the equilibrium wage, δ is the time discount factor, h are the hiring costs, and σ is the separation rate. It is easy to see that the job offer effect should positively depend on the average workers' productivity, and negatively on the wage level as well as hiring costs.

On the other hand, some workers are willing to work for the new (higher) equilibrium wage because it is now above their reservation wages - the job acceptance rate increases. This leads to higher employment and is called the "job acceptance effect" and is given by

$$\alpha = J_{e}\left(\frac{w-b}{1-\delta(1-\sigma-\mu)}\right), \tag{2}$$

where J_e is the cumulative distribution of the work effort disutility shock and b stands for the unemployment benefit level. Job acceptance clearly positively depends on the wage level and negatively on the level of unemployment benefits b.

The theoretical predictions of Brown et al. (2014) allow us to formulate hypotheses on the signs of the effects of particular labor market institutions on employment. As the job acceptance effect might dominate the job offer effect for lower wages, and the opposite might be true for the case of high minimum wages, we expect the relationship between the level of the minimum wage and the employment rates to have an inverted–U shape. Additional inspection of (1) and (2) allows us to form hypotheses on the signs of the other labor market characteristics on employment as well as on the interactions between the hiring costs, unemployment benefits, and productivity of the workers and the minimum wage. We expect the hiring costs as well as the unemployment benefits to decrease the overall employment levels, whereas the productivity of the workers is expected to increase employment.

Additionally, the hiring costs, unemployment benefits, and the average productivity change the strength of the two countervailing effects. *Ceteris paribus*, an increase in the average productivity of the workers strengthens the job offer effect and, subsequently, the point at which the minimum wage effect turns negative should shift to the right. Similarly, both the hiring costs (which reduce the job offers) and the unemployment benefits (which reduce the job acceptance) should shift the turning point to the left, towards lower minimum wages. The summary of the predictions is presented in Table 1.

Table 1: Predicted effects

Variable	Sign/Effect
Minimum Wage	Inverted U
Hiring Costs	Negative
Productivity	Positive
Unemployment benefits	Negative
Hiring Costs * Minimum Wage	Negative (Shift left)
Productivity * Minimum Wage	Positive (Shift right)
Unemployment Benefits * Minimum Wage	Negative (Shift left)

3. Data and the empirical model

3.1. Data

Our panel contains data on 12 EU countries with statutory minimum wages[3] over the period 1980-2011. To capture the changes in the minimum wage we first employ the real annual minimum wages ($RAMW$) adjusted for purchasing power parity. As additional measure for minimum wage we use the Kaitz index ($MWAW$) that reflects the relationship between the level of the minimum wage and the average wage and can be interpreted as the relative price of low–skilled and average–skilled labor. We do not include the countries with strict collective bargaining systems for different economic sectors (e.g. Italy or Austria) as for these the Kaitz index is not available and might additionally bias the estimates. The summary statistics of the annual minimum wage and the Kaitz index are presented in Table 9 in the Appendix.

The main source of the data is the OECD database. The labor force data, including average worker productivity and replacement rates, were taken from the OECD Annual Labour Force Statistic, while the real annual minimum wage and Kaitz index is taken from the OECD Minimum Wage Database[4]. Labor market regulation data come from the Economic Freedom of the World (EFW) database by the Fraser Institute (Gwartney et al. 2014), and macroeconomic indicators are taken from the World Economic Outlook (WEO) database. Additionally secondary school enrollment (United Nations), conscription (EFW), recesssion (WEO), collective bargaining (World Economic Forum) and annual average wages (OECD) are used as control variables. Our sample is an unbalanced panel including 228 observations. The source for the unbalanced panel arises from different implementation times of the statutory minimum wage and only partially from the availability of the data. Hence, this selectivity should not bias the estimates.[5] Main variables used in the regressions are summarized in Tables 10 and 11 in the Appendix.

[3]The countries covered in our sample are Belgium, the Czech Republic, France, Greece, Hungary, Ireland, the Netherlands, Poland, Portugal, Slovakia, Spain and the United Kingdom.

[4]The original OECD series does not consider the fact that France has introduced a 35-hour workweek in 2000. We have readjusted the whole series to this change.

[5]The start of our time series for the Kaitz index is highlighted in Table 9.

3.2. The empirical model

The theoretical predictions suggest that the relationship between the minimum wage level and the employment rates might have an inverted–U shape. The baseline model is, therefore

$$Emp_{i,t} = \alpha + \beta * MW_{i,t-1} + \gamma * MW^2_{i,t-1} + \delta * H_{i,t} + \zeta * AWP_{i,t} + \eta * GRR_{i,t} + \Theta * \mathbf{X}_{i,t} + \tau_t + \alpha_i + \varepsilon_{i,t}, \quad (3)$$

where $Emp_{i,t}$ is the employment rate at time t in country i, and $MW_{i,t-1}$ is the lagged minimum wage variable at time $t-1$ in country i proxied by first by Kaitz index ($MWAW$) and second by real annual statutory minimum wage ($RAMW$). $H_{i,t}$ stands for the hiring costs measured by the strictness of labor market regulations (EFW 5B index)[6], AWP is the average labor productivity measured as GDP per hour worked in country i at time t (at constant prices), GRR is the gross replacement rate measuring the relative size of the unemployment benefits to the wage levels, and X is a vector of the control variables. $EmpMid_{i,t}$ is the control variable for the overall labor market situation, namely the employment rate of the prime-age workers at time t for country i, $PRY_{i,t}$ is the size of the young cohort (aged between 15 and 24 years) to the working-age population (aged between 15 and 64 years). Additionally we control for secondary school enrollment ($SchEn$), the strength of collective wage bargaining ($Bargaining$) and the strength of conscription regulations ($Conscription$) and we include a recession dummy (periods with negative growth of real GDP)[7]. Finally, τ_t stands for the time effects and α_i are country-specific fixed effects. Alternatively, instead of time effects, we allow for country–specific trends.

The effects of a minimum wage, from a theoretical perspective, should take place after a delay, since it takes time for employers to adjust the factor inputs (low-skilled labor, high-skilled labor, and capital) to a change in the factor prices (see Neumark and Wascher 1992, Baker et al. 1999). Additionally, the high level of employment protection in Europe would suggest to use the lag the minimum wage variable, since as argued by Neumark and Wascher (2004): "One might think that this adjustment process would be even slower in European countries, where legal restrictions on dismissals are generally stricter then in the United States." The lagged specification additionally resolves to some extent the problem of potential endogeneity of the MW variable, which will be addressed in full further on.

In order to further explore the size and strength of the effect of minimum wages on employment, we additionally add interaction terms with the three other main variables, which as explained in the previous section determine the job offer and job acceptance effects: the average productivity of workers, hiring costs, and the size of unemployment benefits. We then analyze the signs and the strength of the marginal effects of the minimum wages for different levels of other variables of interest.

One of the concerns in our specification is that the employment rate of prime-age workers and employment rate of the young cohort are jointly determined by unobserved factors which determine the overall macroeconomic condition of a country. To avoid endogeneity bias stemming from this fact, we do not include the employment rate of prime-age workers directly, but instrument it in the first stage regressions with other macroeconomic indicators. On a basis of strong and significant correlations we use the second lag of the output gap as well as lags of the employment rate of prime age workers itself. Additionally, we reassess all results instrumenting for the employment rate with oil shock exposure in the previous period, as suggested by Raphael and Winter-Ebmer (2001), who find that fluctuations in oil prices have strong effects on employment rates. Exposure to the oil shock is measured as a lagged difference between the Brent crude import oil prices for each country, i.e. for period t this variable is defined as $price_{t-1} - price_{t-2}$. Correlations between the employment rate of prime age workers, the output gap, and the exposure variable

[6] We have rescaled the index so that higher value denotes *more* regulation. Moreover, early observations in the Fraser index are of poor quality, due to lacking data; we have recalculated the index to account for the missing components.

[7] Variables AWP, H, GRR and control variables $Bargaining$ and $Conscription$ have all been Varimax rotated, thus rescaled with mean equal 0 and variance equal 1.

are presented in Table 2. We can observe that oil shock exposure is positively correlated with both the employment rate and the output gap. This instrument might be a weaker measure of macroeconomic conditions, nevertheless its biggest advantange is a high degree of exogeneity. In all IV regressions, we use the Limited Information Maximum Likelihood estimator (LIML), which performs better when the instruments are weak.[8]

Table 2: Cross-correlations of the instruments (Significance at 0.01 level)

Variables	EmpMid	Output gap
Output Gap	-0.32*	
Oil shock	-0.29*	0.25*

As mentioned above, one of the main concerns in any analysis of the impact of the minimum wages on the employment levels is potential endogeneity of the main independent variable: minimum wage itself might be endogenous with respect to the employment levels, as labor market policies might be introduced specifically to answer the changes in the labor market conditions. As argued by Lemos (2005), politicians might favor or oppose minimum wage increases depending on the overall macroeconomic performance in a country. Yet, irrespective of the reaction of the politicians to the macroeconomic circumstances, changes in the minimum wages can be explained by the ideology of the politicians in power. Arguably, higher minimum wages are introduced by left–wing governments irrespective of the economic condition of a country. We base our identification strategy on this latter observation (see e.g. Saint-Paul 1996).

In the second set of regressions, we make use of the above observation, and instrument the minimum wage with the political orientation of the government. Data on the political orientation of cabinets are provided by the Comparative Political Data Set (Armingeon et al. 2012) and include information on relative power position of social democratic and other left parties in government based on their seat share in parliament, measured as a percentage of the total parliamentary seat share of all governing parties and weighted by the number of days in office in a given year. This instrument will be a valid exogenous source of variation provided that the left–wing politicians are not elected more often under deteriorating economic conditions. There is some evidence (Whitten and Palmer 1999) that the voters punish left–wing governments for rising *comparative unemployment* (comparative to the average for industrial democracies), but there is no evidence on a similar relationship within a country. If left–wing governments are less popular in times of high unemployment, rising unemployment might reduce the power of the left–wing parties and in turn result in a lower probability of an increase in a minimum wage. Inclusion of the control for the general macroeconomic performace should, however, capture this effect, and the residual variation would in this case be exogenous. Correlations and signifance levels of all instruments are presented in the Appendix.

Another methodological issue is that the used data is an average of specific data. This might lead to problems in the estimation methods (see e.g. Baker et al. (1999)) because the size of the labor markets differs across countries. Dolton and Bondibene (2011) mention that the use of weighted regression might be a solution to this problem. The regression should be weighted by the number of raw data points that are used to calculate the averages.[9] As a robustness check we

[8]The preference for the LIML estimator stems from two main reasons:

1. The LIML estimator has been shown to perform better if the sample size is small, as is ours (see e.g. Anderson et al. 1982). Various studies show that the the LIML estimator approaches the asymptotic normal distribution much more rapidly than two–stage least squares.
2. The LIML estimator is preferred to the 2SLS estimator whenever instruments are weak and the use of the LIML estimator potentially eliminates the usual bias associated with the use of 2SLS with weak instruments, even if the normality of the errors is violated (see e.g. Kunitomo and Matsushita 2008).

[9]We weight the regressions with raw data points that are used to calculate the average (or the labor market size), but not with the population of the country (as it is done by Dolton and Bondibene (2011)). This might not

add, therefore, estimates of regressions weighted by the sizes of the labor markets, measured as the number of persons aged 15 to 64 in each country.

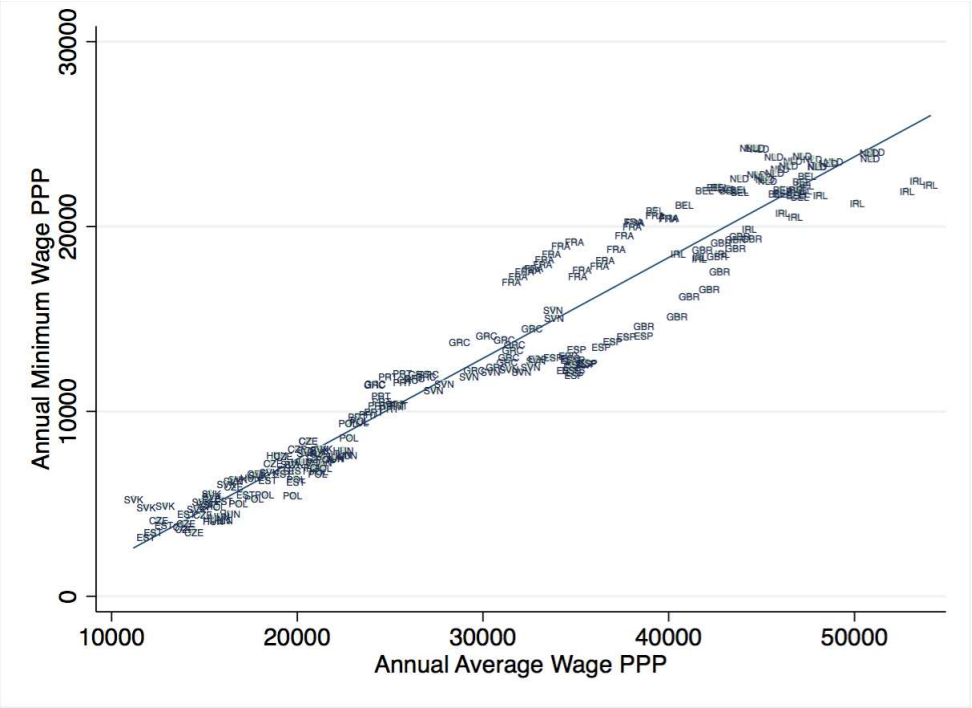
Additionally, we show the relationship between the current minimum wage and employment levels. We are convinced that the lagged specification corresponds better to the rigid European labor markets, yet to analyze sensitivity of the results to this arbitrary assumption, we reassess the result using current instead of lagged minimum wages. Finally, since the sample size is relatively small, we need to make sure that the results are not driven by outliers. We reestimate all equations correcting for outliers. We identify the outliers on a basis of the leverage statistic and the Cook distance. The leverage need to be lower than $3k/N \simeq 0.73$ and the Cook's distance needs to be lower than $4/N \simeq 0.018$. We drop the obversations which do not satisfy these requirements and reestimate the results.

be an appropriate weight, since the population size is not necessarily a good proxy for the labor market size. The retirement age differs widely across countries and, additionally, the demographic structure in the countries is not the same.

4. Empirical Findings

In this section we present the main results of the effects of minimum wages on employment of young workers. In the second subsection we additionally analyze the interaction terms with other variables of interest. Finally, the third subsection contains the instrumental variable specifications, the weighted regressions, and other robustness checks. Since we use not only the real annual minimum wage, but also the Kaitz index as a dependent variable, an important first step in this analysis involves evaluating whether the relationship between the minimum wage and average wage is indeed positive and linear, to rule out the possibility that the non–linear effect works through the average wage channel. Figure 1 visualizes the relationship between the annual minimum wages and the annual average wages for all countries in the sample.[10] Figure 1 as well as the country-by-country results show a strong, positive and linear relationship between the annual minimum wages and the annual average wages. A slighly weaker relationship can be observed only for the case of the Netherlands, where the average wage was increasing during the whole period whereas the minimum wage remained relatively constant. We, therefore rule out the possiblity that the non–linear effects stem from the fact that the relationship between the minimum wage and the average wages is non–linear.

Figure 1: Relationship between average and minimum wages.



4.1. Main findings

Tables 3 and 4 present different specifications: controlling for the time effects as well as allowing for country–specific trends.[11] The Kaitz index as a dependent variable may suffer from potential

[10] Relationships for individual countries are presented in Figure 8 the Appendix.

[11] Importance of including country–specific trends has been stressed by Addison et al. (2012), Allegretto et al. (2011) and Dube et al. (2010), who show that including country specific trends has a big impact on the estimated results. Although, on the other hand, Meer and West (2013) argue that controlling for trends can bias the results, it is important to understand the sensitivity of the coefficients to including this component.

endogeneity, since as hightighted by Card et al. (1993), high average wage is often accompanied by high employment, which would result in a negative bias of the estimates. Despite controlling for the general employment trends, to further rule out the possibility that the results are driven by the denominator of the Kaitz index, we reestimate all equations taking a dependent variable the level of the annual statutory minimum wage. We use both the Kaitz index (Columns (1) and (2)), and the annual statutory minimum wage (Columns (3) and (4)) as a variable measuring the minimum wage level. The elasticities are evaluated at the averages.

Table 3: Main results

	(1)	(2)	(3)	(4)
	EmpY	EmpY	EmpY	EmpY
lagMWAW	1.90**	1.69**		
	(2.51)	(2.52)		
lagMWAW^2	-2.38***	-2.53***		
	(-2.73)	(-2.90)		
lagRAMW			0.38***	0.20**
			(4.43)	(2.11)
lagRAMW^2			-0.12***	-0.07***
			(-4.67)	(-3.14)
AWP	-0.00	-0.02*	-0.04***	-0.03**
	(-0.26)	(-1.69)	(-3.48)	(-2.06)
H	0.00	-0.03	-0.00	-0.03*
	(0.50)	(-1.52)	(-0.29)	(-1.87)
GRR	-0.03***	-0.04***	-0.05***	-0.03**
	(-2.67)	(-3.68)	(-4.35)	(-1.98)
Conscription	-0.00	-0.01*	-0.00	-0.01*
	(-0.02)	(-1.68)	(-0.17)	(-1.72)
Bargaining	0.02**	0.01	0.02***	0.00
	(2.31)	(1.25)	(2.70)	(0.36)
SchEn	-0.00	-0.00**	-0.00	-0.00*
	(-0.97)	(-2.00)	(-0.62)	(-1.65)
EmpMid	1.58***	1.39***	1.32***	1.52***
	(3.96)	(7.33)	(5.47)	(11.13)
PRY	0.39	-0.36	0.68	0.08
	(0.92)	(-0.84)	(1.62)	(0.15)
Recession	0.00	-0.00	0.00	-0.00
	(0.42)	(-0.49)	(0.65)	(-0.37)
Constant	-1.22***	-0.61**	-0.96***	-0.65***
	(-2.63)	(-2.20)	(-4.14)	(-3.12)
FE	YES	YES	YES	YES
Time effects	YES	NO	YES	NO
Country Trend	NO	YES	NO	YES
Elasticity	-0.07	-0.21	0.00	-0.15
Elasticity S.E.	(0.18)	(0.18)	(0.12)	(0.12)
Observations	228	228	228	228
K-P Wald F	23.40	81.22	28.81	86.46

Huber/White/sandwich standard errors clustered at country level, z-Stats in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Tables 3 and 4 reveal a nonlinear relationship between the minimum wage and the employment for young workers. At lower levels of the minimum wage, the level of employment rises along with the wage level, and beyond a turning point the relation inverses and additional increases in the minimum wages have a detrimental effect on employment levels. This result is consistent with the theory of Brown et al. (2014). Using these estimates, we can calculate the marginal effects of a change in the minimum wages at each value of the minimum wage. These results are visualized in Figures 2 and 3.

Reservation wage plays an important role in the decision of a job acceptance. If the offered wage is below the reservation wage, the person decides to stay outside the job market; if it is above, then the person prefers to participate in the job market and accept the job offer. The reservation wage is influenced through individual preferences (e.g. work vs. free time, financial dependence), labor market policies (e.g. unemployment benefits, minimum wage), and outside options (e.g. education, retirement).

Young workers are often not eligible for unemployment benefits, and are likely to tolerate

Table 4: Main results with oil shock exposure

	(1) EmpY	(2) EmpY	(3) EmpY	(4) EmpY
lagMWAW	2.57***	2.79***		
	(2.61)	(2.75)		
lagMWAW^2	-2.98***	-3.77***		
	(-2.83)	(-3.16)		
lagRAMW			0.30	0.26*
			(1.49)	(1.71)
lagRAMW^2			-0.09	-0.09**
			(-1.63)	(-2.08)
AWP	-0.02	-0.04*	-0.03	-0.06***
	(-0.54)	(-1.68)	(-1.20)	(-3.82)
H	0.01	-0.00	-0.01	0.01
	(0.94)	(-0.05)	(-0.89)	(0.87)
GRR	-0.04***	-0.04***	-0.05***	-0.03***
	(-3.38)	(-4.29)	(-4.46)	(-3.06)
EmpMid	1.59***	1.45***	1.49***	1.57***
	(5.07)	(8.50)	(5.39)	(10.17)
Conscription	-0.01	0.00	-0.01**	0.01
	(-1.43)	(0.79)	(-2.46)	(1.27)
Bargaining	0.01	-0.00	0.02*	-0.01
	(1.62)	(-0.08)	(1.76)	(-0.91)
SchEn	-0.00	-0.00***	-0.00	-0.00
	(-0.69)	(-2.73)	(-0.45)	(-1.53)
PRY	0.28	-0.27	0.47	-0.02
	(0.76)	(-0.48)	(1.02)	(-0.03)
Recession	0.00	-0.00	0.01	-0.01
	(0.69)	(-0.95)	(0.83)	(-1.38)
Constant	-1.35***	-0.84**	-1.01***	-0.67*
	(-3.13)	(-2.20)	(-2.73)	(-1.91)
FE	YES	YES	YES	YES
Time effects	YES	NO	YES	NO
Country Trend	NO	YES	NO	YES
Elasticity	-0.04	-0.15	-0.00	-0.14
Elasticity S.E.	(0.22)	(0.13)	(0.11)	(0.11)
Observations	228	228	228	228
K-P Wald F	130.02	57.44	144.45	77.57

Huber/White/sandwich standard errors clustered at country level, z-Stats in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Figure 2: Effects of minimum wages on prediction of employment – Kaitz Index

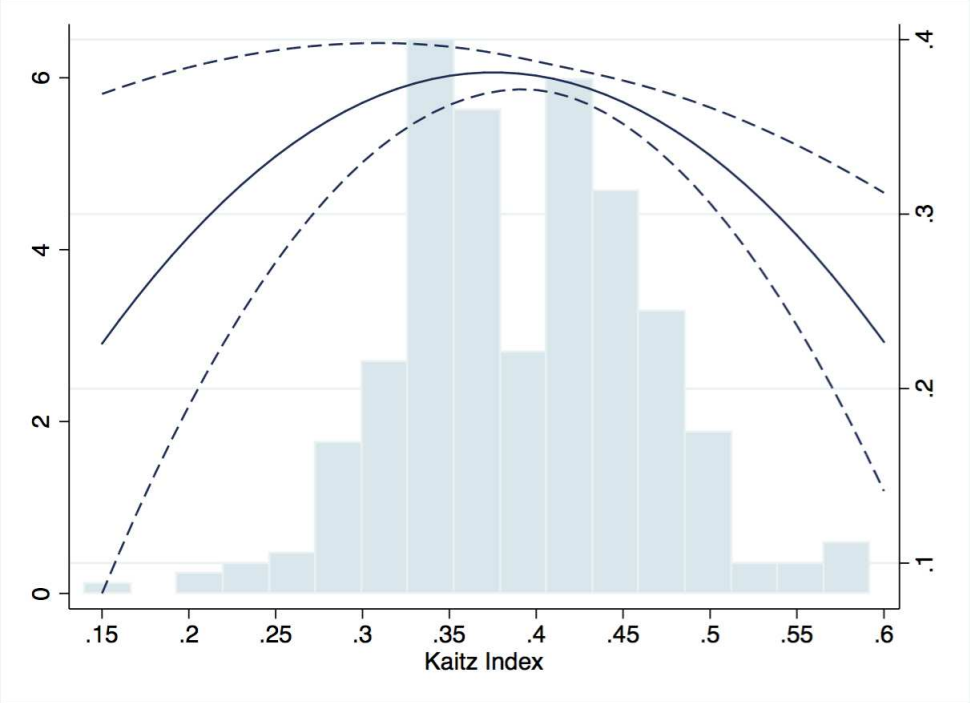
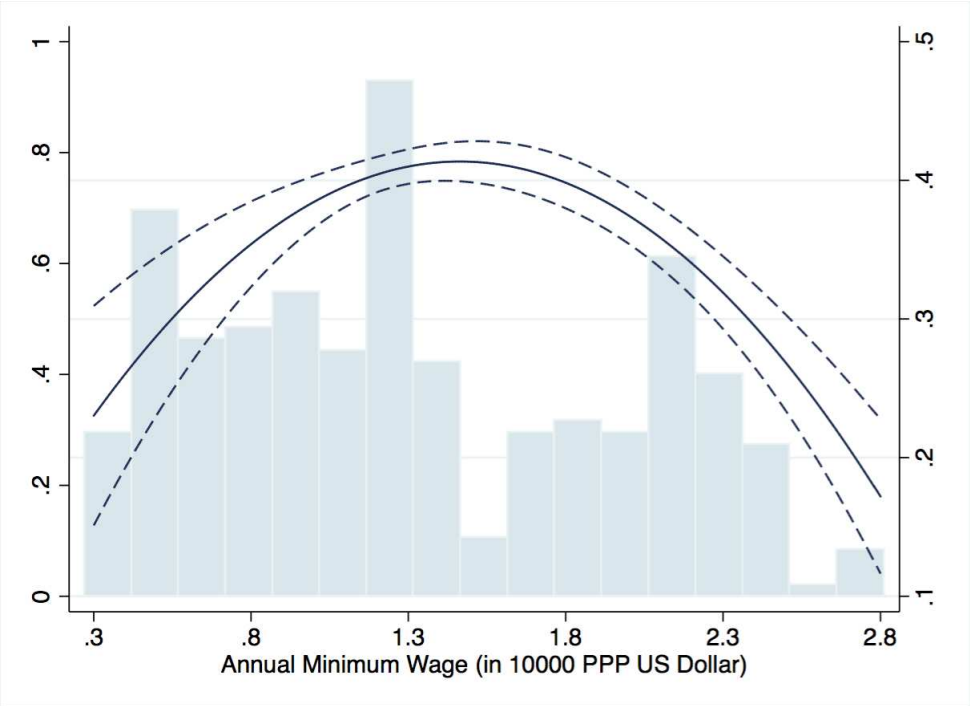


Figure 3: Effects of minimum wages on prediction of employment – Annual Wage



unemployment[12], and have more outside options than prime-age workers (e.g. can stay longer in education). Moreover, younger workers have higher probability of receiving a job offer than older workers (Addison et al. 2004). Hence, an increase of the minimum wage makes employment more attractive as in other age groups. Higher minimum wages increase the job acceptance probability, resulting in a higher employment. This positive employment effect is counteracted by the negative job offer effect, as firms facing increased costs for salaries will be no longer offer low productive jobs. At low levels of minimum wage, the job acceptance effect dominates the job offer effect resulting in a positive employment effect. We find that for the young age group the turning point is on average attained for a real annual minimum wage of 15500$ (PPP) or respectively at a Kaitz index of 0.400. At this threshold level an additional increase of the Kaitz index decreases employment.

The average real minimum wage is in fact slightly above the turning point at a level of 15700$ (PPP). The same holds true for the Kaitz index which equals on average 0.405. On average, in both specifications we would expect on a decrease in the employment rate if the minimum wage variable increased, even despite the fact that for specific countries this might not hold true.

For all specifications, the estimated average elasticity of employment with respect to the minimum wage, equals between -0.00 and -0.15 depending on the specification and the elasticity of employment to the changes in the Kaitz index is estimated at between -0.07 and -0.21. These figures correspond to the previous results for young workers surveyed in Brown (1999). The study indicates that the estimate the elasticity of youth employment with respect to the minimum wage[13] between -0.07 and -0.41. It is important to note, however, that previous studies have estimated a linear relationship, in which case, if the actual relationship is non–linear, the previous results would be underestimated - the downward–sloping part of the inverted–U relationship would have a higher negative slope, than suggested by the averaged estimates. Hence it is interesting to see the development of average point elasticity of employment with respect to minimum wage changes for different reference ranges over the average annual statutory minimum wage of 15700. Table 5 highlights the results that are in line with the ones indicated by the literature.

Table 5: Average point elasticity in the refrence ranges above the average annual staturory minimum wage

Reference range	1000USD	2000USD
Elasticity RAMW	-0.070	-0.130
Elasticity MWAW	-0.092	-0.155

4.2. Interaction of the minimum wages with other labor market characteristics

Table 6 presents the results of the interaction between the level of the minimum wage and workers' productivity, labor market regulations and unemployment replacement rates for the young workforce. The effect of the interaction between average productivity and the minimum wage has an expected positive sign in all specifications when the Kaitz index is used. In the specification where the real annual minimum wage is used, the effect is positive and significant only when time effects and country effects are used. If country time trends are included, the results are not significant any more.

The effect of the interaction between labor market regulations and the minimum wage is in line with theory and has the expected negative sign in all specifications. The results are significant no matter which minimum wage variable is used. Only the real annual minimum wage and country specific time trends are used, the coefficient turns insignificant.

[12]Cosar (2010): "lower discount rate, which makes them more willing to tolerate unemployment and search for productive matches."

[13]Neumark and Wascher (2004) estimate for OECD countries the elasticity of employment with respect to the minimum wage of teenage workers (15-19 years old) between -0.18 to -0.24 and of youth workers between -0.13 to -0.16. Similarly, OECD (1998) estimates the elasticities for teenage workers (15-19 years old) between -0.07 to -0.41 and for young adults (20-24 years old) between -0.03 to -0.1.

Table 6: Young workers – interactions: Kaitz Index

	(1) EmpY	(2) EmpY	(3) EmpY	(4) EmpY	(5) EmpY	(6) EmpY
lagMWAW	1.37**	0.47	1.76***	1.13 **	2.25***	1.51***
	(2.54)	(1.60)	(2.78)	(2.45)	(2.80)	(3.29)
lagMWAW^2	-1.77***	-0.79**	-2.18***	-1.61***	-2.81***	-2.03***
	(-2.67)	(-2.15)	(-3.23)	(-3.28)	(-2.71)	(-3.43)
AWP	-0.09***	-0.13***	-0.01	-0.03***	-0.00	-0.02
	(-2.71)	(-4.33)	(-0.43)	(-2.87)	(-0.36)	(-1.15)
H	0.01	-0.04**	0.11**	0.06*	0.00	-0.04*
	(0.91)	(-2.39)	(2.42)	(1.93)	(0.02)	(-1.86)
GRR	-0.03*	-0.03**	-0.02	-0.03**	-0.07	-0.10
	(-1.85)	(-2.06)	(-1.51)	(-2.38)	(-1.55)	(-1.48)
lagMWAW × AWP	0.27***	0.29***				
	(2.70)	(3.07)				
lagMWAW × H			-0.26**	-0.21***		
			(-2.37)	(-3.06)		
lagMWAW × GRR					0.08	0.18
					(0.71)	(1.07)
EmpMid	1.60***	1.58***	1.41***	1.55***	1.61***	1.61***
	(4.15)	(9.39)	(3.22)	(8.21)	(3.85)	(8.86)
SchEn	-0.00	-0.00**	-0.00	-0.00**	-0.00	-0.00*
	(-1.34)	(-2.49)	(-1.26)	(-2.02)	(-1.00)	(-1.93)
PRY	0.07	-0.27	0.19	-0.04	0.38	-0.25
	(0.19)	(-0.67)	(0.53)	(-0.09)	(0.91)	(-0.54)
Conscription	-0.00	-0.02***	0.01	-0.01*	-0.00	-0.02***
	(-0.05)	(-3.36)	(0.57)	(-1.91)	(-0.08)	(-2.67)
Bargaining	0.02**	-0.00	0.03***	0.00	0.02**	0.00
	(2.24)	(-0.11)	(3.32)	(0.58)	(2.28)	(0.11)
Recession	0.01	-0.00	0.00	-0.00	0.01	-0.00
	(0.63)	(-0.04)	(0.05)	(-0.87)	(0.54)	(-0.72)
Constant	-1.04**	-0.50***	-0.99**	-0.59***	-1.33**	-0.80***
	(-2.46)	(-2.98)	(-1.96)	(-2.60)	(-2.39)	(-3.99)
FE	YES	YES	YES	YES	YES	YES
Time effects	YES	NO	YES	NO	YES	NO
Country trends	NO	YES	NO	YES	NO	YES
N	228	228	228	228	228	228
K-P Wald	23.37	80.97	18.27	81.53	23.02	73.99

Huber/White/sandwich standard errors clustered at country level, z-Stats in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 7: Young workers – interactions: Annual Minimum Wage

	(1) EmpY	(2) EmpY	(3) EmpY	(4) EmpY	(5) EmpY	(6) EmpY
lagRAMW	0.37***	0.19**	0.38***	0.24**	0.36***	0.24**
	(4.85)	(2.17)	(4.75)	(2.28)	(4.64)	(2.49)
lagRAMW^2	-0.13***	-0.08***	-0.12***	-0.08***	-0.12***	-0.10***
	(-5.72)	(-3.20)	(-5.58)	(-3.20)	(-5.25)	(-3.51)
AWP	-0.05***	-0.02	-0.02*	-0.02**	-0.04***	-0.02*
	(-3.59)	(-0.53)	(-1.84)	(-2.33)	(-3.41)	(-1.67)
H	0.01	-0.03*	0.07***	0.00	-0.00	-0.04**
	(0.66)	(-1.67)	(3.93)	(0.13)	(-0.19)	(-2.32)
GRR	-0.04***	-0.03**	-0.02*	-0.02*	-0.04	-0.11***
	(-2.63)	(-2.04)	(-1.77)	(-1.84)	(-1.19)	(-3.02)
lagMWAW × AWP	0.02***	-0.00				
	(3.28)	(-0.04)				
lagMWAW × H			-0.04***	-0.02		
			(-4.52)	(-1.61)		
lagMWAW × GRR					-0.01	0.05*
					(-0.50)	(1.96)
EmpMid	1.30***	1.52***	1.24***	1.52***	1.31***	1.58***
	(4.91)	(10.62)	(4.34)	(10.25)	(5.38)	(13.78)
SchEn	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00*
	(-0.69)	(-1.63)	(-0.62)	(-1.64)	(-0.64)	(-1.65)
PRY	0.52	0.07	0.40	0.13	0.64	0.21
	(1.31)	(0.14)	(1.21)	(0.25)	(1.52)	(0.41)
Conscription	0.00	-0.01*	0.01	-0.01*	-0.00	-0.01*
	(0.10)	(-1.68)	(0.56)	(-1.93)	(-0.20)	(-1.80)
Bargaining	0.02***	0.00	0.03***	0.01	0.02***	0.00
	(4.10)	(0.37)	(4.52)	(0.70)	(2.68)	(0.04)
Recession	0.00	-0.00	0.00	-0.00	0.00	-0.00
	(0.73)	(-0.40)	(0.38)	(-0.46)	(0.52)	(-0.15)
Constant	-0.89***	-0.65***	-0.85***	-0.64***	-0.93***	-0.86***
	(-3.39)	(-3.16)	(-3.01)	(-2.96)	(-3.89)	(-3.57)
FE	YES	YES	YES	YES	YES	YES
Time effects	YES	NO	YES	NO	YES	NO
Country trends	NO	YES	NO	YES	NO	YES
N	228	228	228	228	228	228
K-P Wald	24.29	78.50	20.56	83.80	19.27	88.74

Huber/White/sandwich standard errors clustered at country level, z-Stats in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Interaction with the replacement rates is mostly insignificant. It can be explained, as mentioned, by the fact that young workers are often not eligible for unemployment benefits.

Figure 4: Marginal effects of minimum wages at levels of H and AWP: Kaitz Index

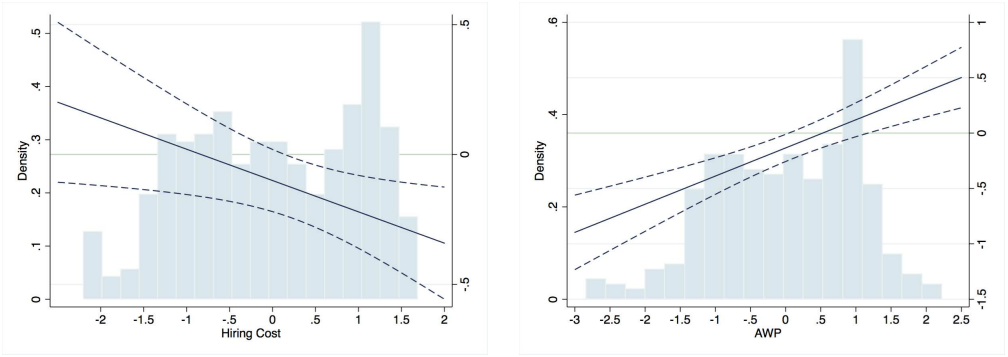
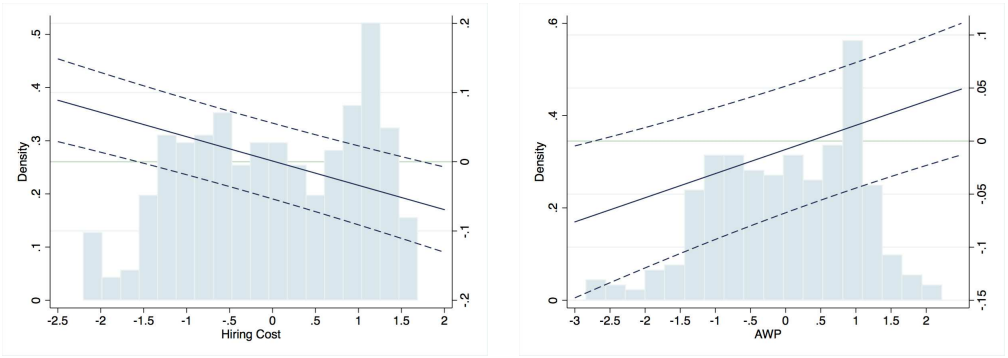


Figure 5: Marginal effects of minimum wages at levels of H and AWP: Annual Minimum Wage



Marginal effects of the minimum wages for different values of AWP, and H are presented in Figures 4 and 5. Inspection of Figure 4 reveals that the negative effect of the minimum wages is particularly important when the average workers' productivity is low, whereas once the productivity increases the effect turns positive. This empirical finding is again consistent with the theoretical prediction about the role of productivity on the job offers. From (1) it follows that when a is high compared to the equilibrium wage, job offers might not be disappearing so easily. Finally, Figure 4 reveals that the negative effect of the minimum wages on employment is particularly relevant whenever the job market is strongly regulated, a result which is consistent with our theoretical model but is not in line with the findings of Neumark and Wascher (2004). When the overall regulation level is low, the additional effect of the minimum wage turns insignificant.

In Figures 6 and 7 we compare the predicted turning points for the young workforce with the actual minimum wages for European countries, taking into account the joint effect of the minimum wage and other labor market characteristics. The differences in the turning points for the countries stem therefore from the impacts of the hiring costs, the workers' productivity, and the replacement rates. The observed increase in the turning point over time is mainly due to the increase in productivity levels.

In four of the countries in our sample - Belgium, France, Greece, and Netherlands - the minimum wages are higher than the upper limit of the 95 percent confidence interval for the turning point. In Ireland, the minimum wage level is above the turning point but within the 95 percent

Figure 6: Turning points and actual minimum wage for young workers (aged 15 to 24 years) I

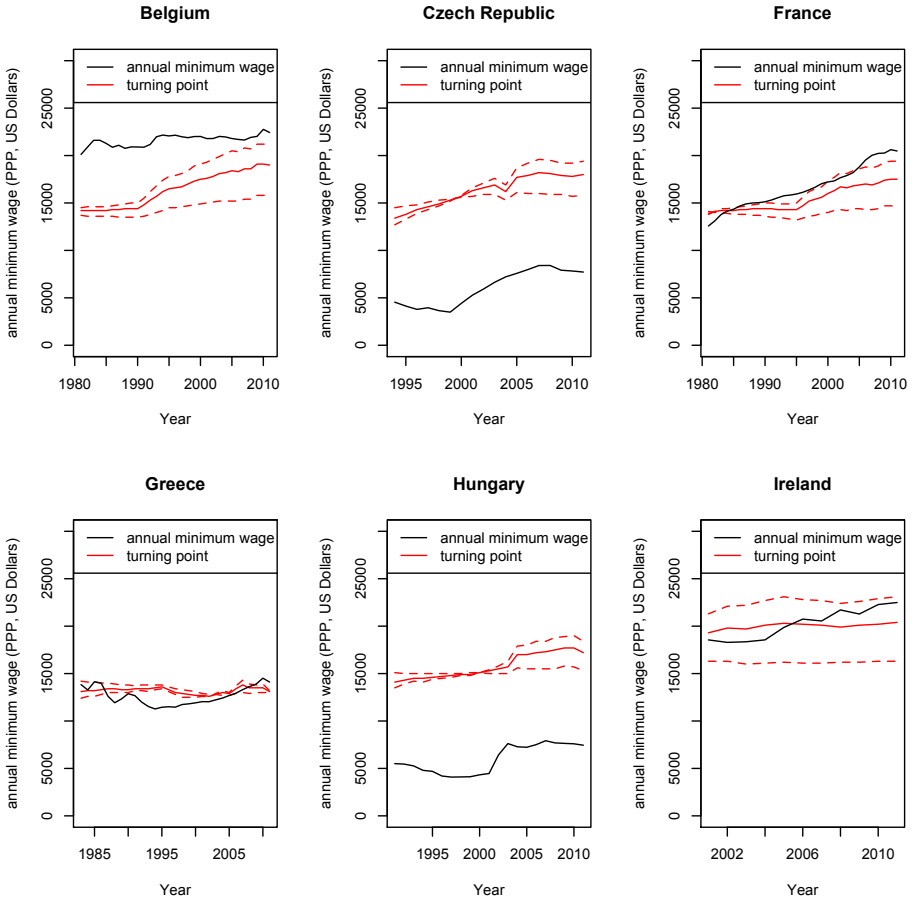
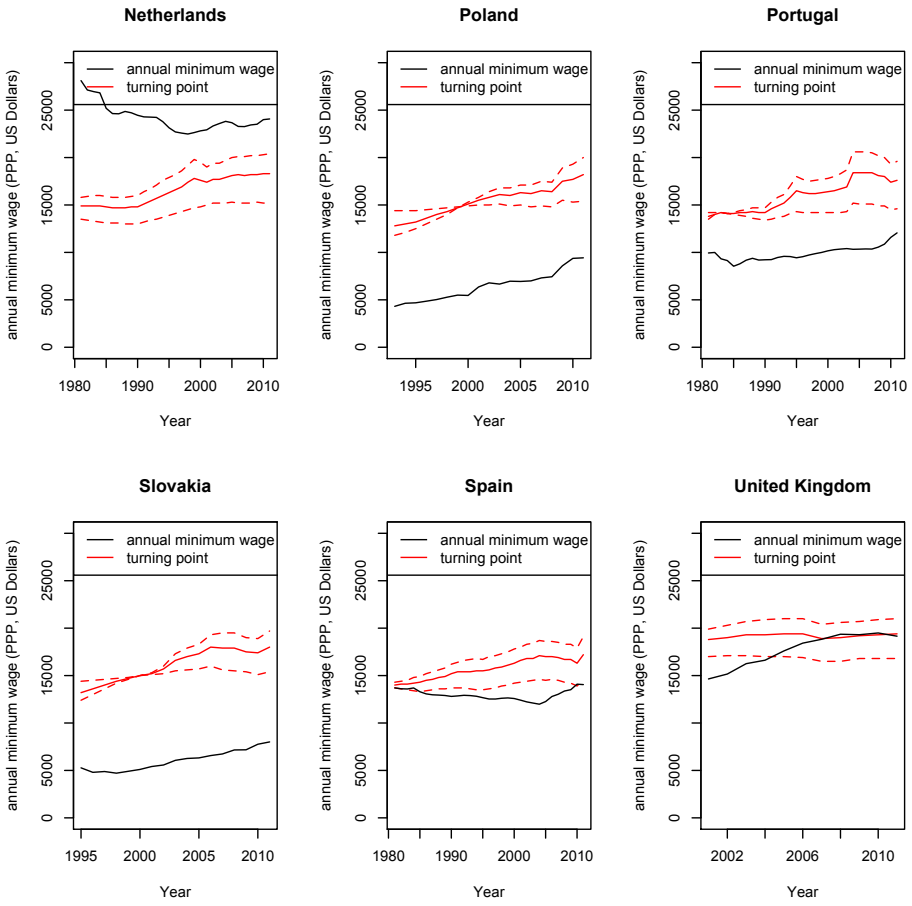


Figure 7: Turning points and actual Kaitz index for young workers (aged 15 to 24 years) II



confidence interval. Decreasing the minimum wage in these countries is expected to increase the employment levels of young workers. As the driving forces of these results, we can identify high replacement rates and strict job market regulations for the case of France and very low productivity levels and strict job market regulations in Greece or simply because of a generally high level of the minimum wage (e.g. in Belgium and the Netherlands). In other countries, either low replacement rates (e.g. in the Czech Republic, Slovakia, and Poland), or otherwise deregulated job markets (e.g. in the United Kingdom and Ireland) lead to higher turning points, and therefore suggest that employment of young workers could be further stimulated with an increase in the minimum wage. However, it is important to notice that for countries such as Spain or the UK, the actual minimum wage is below the turning point but within the 95 percent confidence interval.

Especially in the Eastern European countries, there seems to be room for increasing the minimum wages without harming the employment of young workers, or potentially even stimulating it. The same holds true for Portugal. For Spain there seems to be a possibility of increasing the minimum wage, since the actual value is almost at the lower edge of the 95 percent interval. The UK had almost the optimal minimum wage level in 2011. This indicates an increase as well as a decrease of the minimum wage level would result in employment losses. In Ireland, the minimum wage level is on the upper edge of the interval and therefore a further increase would lower the employment rate of young workers. For Belgium, France, Greece, and Netherlands decreasing the minimum wage would lead to higher employment rates of the young workforce.

Table 8 shows the optimal levels of the annual minimum wage (in 2010 US Dollars, PPP) for all countries within the sample. The highest optimal minimum wages level can be found in Ireland and in the UK, where it is above 20000$ (PPP). At the lower end, there is Greece and the Czech Republic that have the predicted optimal minimum wage level of 13200$ (PPP) and 15800$ (PPP), respectively.

Table 8: Turning points 2011 (in 2010 PPP US Dollars)

Country	LL 95%	Turning point	UL 95%
Belgium	15800	19000	21200
Czech Republic	15800	18000	19400
France	14600	17500	19400
Greece	13000	13100	13200
Hungary	15300	17200	18400
Ireland	16300	20400	23100
Netherlands	15200	18300	20400
Poland	15400	18200	20000
Portugal	14600	17600	19600
Slovakia	15400	18000	19700
Spain	14500	17200	19100
United Kingdom	16800	19400	21000

4.3. Robustness analysis

The first robustness check stems from weighting the countries by the sizes of their respective labor markets. The size of the labor market is the number of persons of working age, thus aged 15 to 64. The results are presented in Table 13 in the Appendix. We find that weighting the regressions does not change the main conclusions. The nonlinearity of the effect of the minimum wage remains visible, although at slightly lower significance levels for the Kaitz index. Interestingly, the results of the weighted regressions suggest that the effect of collective bargaining on the employment is significant: it induces young employment and reduces older workforce participation. Collective bargaining arrangements can in fact reduce employment rates of the older labor force, by forcing the industries to employ them at rates higher than otherwise stemming from their qualifications and equilibrium wages. Strict labor market regulations, on the other hand, induce

higher employment levels for the older workers. The effect here can be most probably linked to reduced possibilities of firing. In any case, these interesting preliminary observations require further study.

Secondly, as mentioned in Section 3, one of the main methodological concerns in the analysis of employment effects of minimum wages, is the potential endogeneity of the minimum wages. Another issue concerns the use of weighted regressions to account for the sizes of the labor markets. In this section, therefore, we compare the main results with those of the IV approach, in which we instrument the minimum wages with the index of left orientation of the cabinets as well as to the weighted regression approach. In Table 12 (in the Appendix) we show the results of the main estimations, keeping everything else equal to the main specification, only with the variables $lagMWAW$ and $lagMWAW2$ (and respectively $lagRMAW$ and $lagRMAW2$) instrumented with the left orientation of the cabinet. The results for the Kaitz index specification remain the same, whereas results for the annual minimum wage specification turn insignificant. The latter fact relies mostly on the weakness of the instrument in this case, and the result should be interpreted with caution.

We additionally show the relationship between the current minimum wage and employment levels. We are convinced that the lagged specification corresponds better with the rigid European labor markets, yet to analyze sensitivity of the results to this somehow arbitrary assumption, we present in Table 14 in the Appendix the current specification. Coefficients and standard errors remain similar, the evaluated elasticities have slighly lower values on the average.

Finally, since the sample size is relatively small, we need to make sure that the results are not driven by outliers. We reestimate all equations correcting for outliers. We identify the outliers on a basis of the leverage statistic and the Cook distance. The leverage need to be lower than $3k/N \simeq 0.73$ and the Cook's distance needs to be lower than $4/N \simeq 0.018$. We drop the obversations which do not satisfy these requirements and resasses the results. None of the main conclusions remains affected by this change.

5. Concluding Remarks

The goal of this paper was to estimate the sensitivity of employment to changes in minimum wages for young workers. The paper was inspired by the theoretical model of Brown et al. (2014), which suggests that the employment effects of a minimum wage are positive if the minimum wage is sufficiently low.

Our results contribute to the discussion of the effects of minimum wages on employment, which have been reported in previous studies to have a detrimental effect, in particular for the young workforce. The presented results suggest that low levels of minimum wage have in fact a positive effect, as they stimulate job acceptance rates. On the other hand, high minimum wages decrease the demand for labor and destroy employment possibilities. Moreover, we show that the minimum wage effect is conditional on other labor markets' characteristics, in particular on the levels of workers productivity and labor market regulations. Detrimental effects of high minimum wages are particularly strong if accompanied by low productivity and/or comparatively strict labor market regulations.

Our results highlight the fact, that some previous estimates of the elasticity of employment with respect to the minimum wages must be considered with caution. Barely negative or insignificant results come as a result of averaging the estimates over two groups of countries: with comparatively low minimum wages for which we expect positive employment effects of an increase in the minimum wage, and those with high minimum wages. The employment effects differ substantially between these two groups, and a simple averaged elasticity cannot fully capture these effects.

Using these results, we are able to show that some European countries in our sample might in fact contribute to unemployment rates of young individuals by setting too high levels of minimum wages, as is the case in Belgium, France, Greece, and Netherlands.

However, in Spain, the UK and Ireland, the actual minimum wage is very close to the turning point, suggesting that a further increase in the minimum wage could reduce the employment rates of the young workforce. On the other hand, in countries which either have relatively deregulated job markets and/or highly productive workers, higher minimum wages should not have a detrimental effect on employment. Especially in the Eastern European countries, there seems to be room for increasing the minimum wages without harming the employment of young workers, or potentially even stimulating it. The same holds true for Portugal, while for Spain there seems to be no (or only a small) possibility of increasing the minimum wage. The UK had almost the optimal minimum wage level in 2011. This indicates an increase as well as a decrease of the minimum wage level would result in employment losses. As a general recommendation, it can be concluded that policy makers should formulate the minimum wage policy in accordance with local circumstances, and in particular closely considering the characteristics of the local labor markets.

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Appendix

Figure 8: Relationship between average and minimum wages: country by country

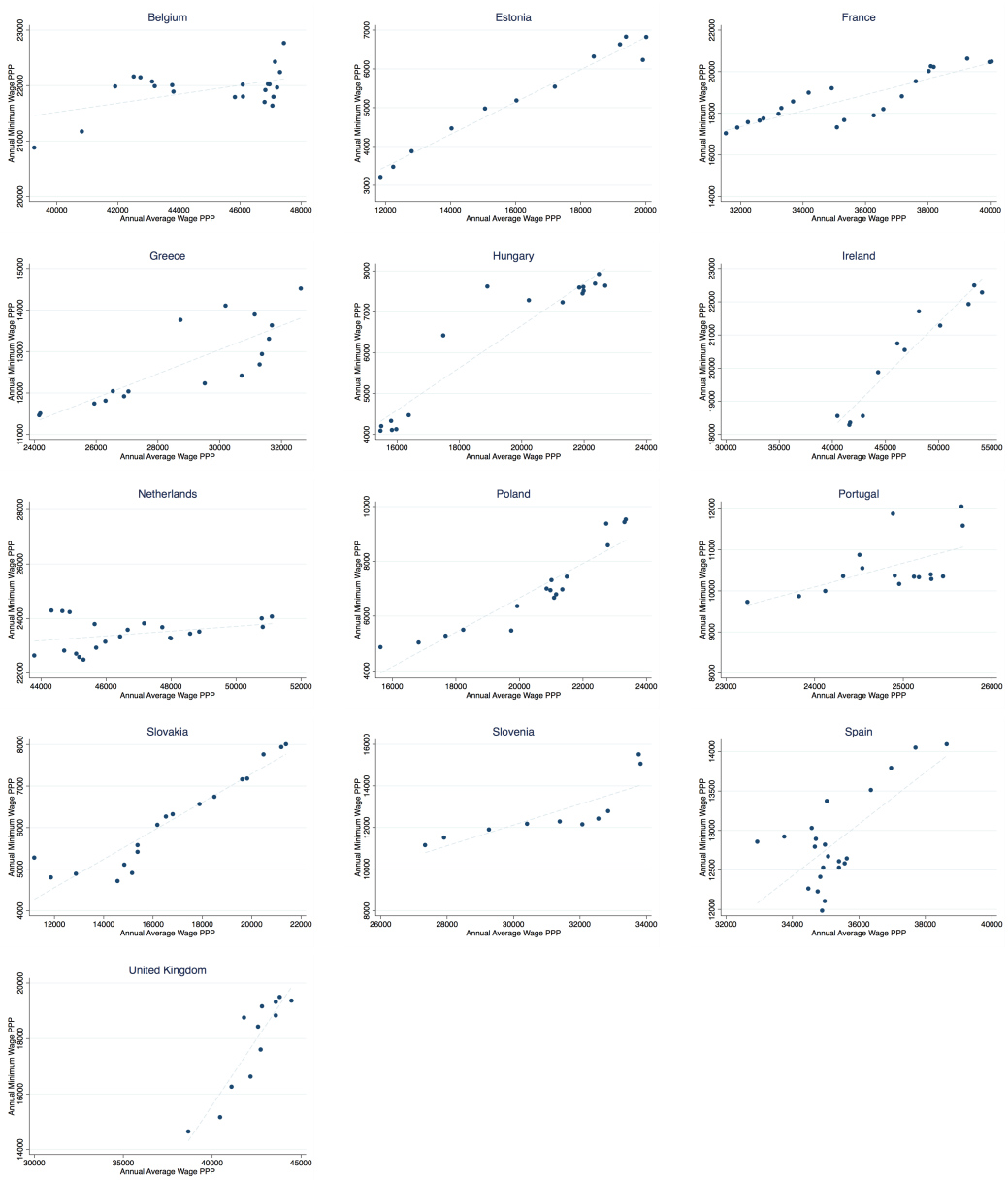

Table 9: Descriptive statistics of the Kaitz index and Real Annual Minimum Wage (in 10000 PPP US Dollars)

Country	Variable	Mean	SD	Min	Max
Belgium	Kaitz index	0.47	0.02	0.43	0.49
(1983)	Minimum Wage	2.16	0.06	2.01	2.28
Czech Republic	Kaitz Index	0.28	0.05	0.20	0.34
(1993)	Minimum Wage	0.61	0.18	0.35	0.84
Estonia	Kaitz Index	0.30	0.03	0.26	0.34
(1999)	Minimum Wage	0.49	0.15	0.27	0.68
France	Kaitz Index	0.44	0.03	0.37	0.48
(1983)	Minimum Wage	1.79	0.16	1.44	2.06
Greece	Kaitz Index	0.40	0.06	0.31	0.49
(1983)	Minimum Wage	1.26	0.10	1.13	1.45
Hungary	Kaitz Index	0.34	0.04	0.28	0.42
(1992)	Minimum Wage	0.60	0.15	0.41	0.79
Ireland	Kaitz Index	0.44	0.01	0.43	0.46
(2001)	Minimum Wage	2.04	0.16	1.83	2.25
Netherlands	Kaitz Index	0.48	0.06	0.41	0.59
(1971)	Minimum Wage	2.42	0.14	2.25	2.81
Poland	Kaitz Index	0.35	0.06	0.14	0.43
(1992)	Minimum Wage	0.66	0.17	0.43	0.95
Portugal	Kaitz Index	0.38	0.03	0.34	0.42
(1975)	Minimum Wage	1.00	0.08	0.85	1.21
Slovakia	Kaitz Index	0.35	0.05	0.27	0.48
(1994)	Minimum Wage	0.61	0.11	0.47	0.80
Slowenia	Kaitz Index	0.43	0.03	0.40	0.47
(2005)	Minimum Wage	1.15	0.18	0.90	1.55
Spain	Kaitz Index	0.37	0.03	0.33	0.45
(1972)	Minimum Wage	1.30	0.06	1.20	1.41
United Kingdom	Kaitz Index	0.36	0.02	0.33	0.38
(1999)	Minimum Wage	1.78	0.17	1.46	1.95
Total	Kaitz Index	0.39	0.07	0.14	0.59
	Minimum Wage	1.34	0.64	0.27	2.81

Table 10: Description of the explanatory and instumental variables

PRY	Cohort size aged 15–24 (OECD)
EmpMid	Employment rate of workers aged 25–54 (OECD)
Output Gap	Output gap in percent of potential GDP (WEO)
Oil Price	Crude oil import prices (IEA)
GRR	Gross replacement rates (OECD)
AWP	GDP per hours worked, constant prices (OECD)
H	Labor market regulations EFW B (higher value - more regulation)
SchEn	Gross Secondary School Enrollment (UN)
Conscription	World Survey of Conscription and Conscientious Objection to Military Service, EFW Index
Bargaining	Global Competitiveness Report question: Wages in your country are set by a centralized bargaining process (= 1) or up to each individual company (= 7)
Left2	Relative power position of social democratic and other left parties in government based on their seat share in parliament (CPDS I and III)
Recession	Equals 1 in periods with negative growth of real GDP (WEO)

Table 11: Means of the variables by Country

Country	EmpYoung	PRY	EmpMid	AWP	Hiring	GRR	Bargaining	Conscription
Belgium	0.29	0.20	0.74	-0.02	0.33	0.90	-0.90	0.33
Czech Republic	0.35	0.21	0.83	0.25	-0.75	-1.42	1.10	-0.09
France	0.31	0.20	0.79	-0.14	0.75	0.72	-0.19	0.05
Greece	0.27	0.19	0.70	0.07	1.03	-1.06	-0.97	-1.27
Hungary	0.27	0.20	0.73	0.00	-0.46	-1.14	0.75	0.05
Ireland	0.42	0.26	0.67	-0.73	-1.04	0.50	-0.43	1.04
Netherlands	0.56	0.21	0.75	0.10	0.59	1.40	-0.81	-0.15
Poland	0.25	0.21	0.73	0.16	-0.20	-1.11	0.89	-0.58
Portugal	0.43	0.22	0.78	0.04	0.46	0.63	-0.08	-0.49
Slovakia	0.29	0.23	0.77	0.42	-0.54	-1.19	1.37	-0.10
Spain	0.35	0.21	0.64	0.45	0.62	0.48	-0.19	-0.24
United Kingdom	0.60	0.19	0.78	-0.23	-1.50	-0.79	1.08	1.04
Total	0.38	0.21	0.75	-0.00	-0.00	0.00	0.00	-0.00

Table 12: Main results: IV with left orientation

	(1) EmpY	(2) EmpY	(3) EmpY	(4) EmpY
lagMWAW	15.63**	16.21*		
	(2.08)	(1.78)		
lagMWAW^2	-20.71***	-22.74*		
	(-2.59)	(-1.75)		
lagRAMW			1.43	2.40
			(0.47)	(1.42)
lagRAMW^2			-0.42	-0.77
			(0.03)	(-1.60)
AWP	-0.06	-0.04	0.07	-0.11**
	(-0.71)	(-0.68)	(0.26)	(-1.98)
H	0.12*	-0.02	0.06	-0.05**
	(1.94)	(-0.36)	(0.95)	(-2.33)
GRR	0.07	-0.13*	-0.02	-0.11**
	(1.10)	(-1.95)	(-0.37)	(-2.28)
Conscription	0.11	0.04	0.06	0.03
	(0.80)	(0.96)	(1.26)	(0.85)
Bargaining	0.08	0.02**	0.05	0.02
	(1.29)	(2.15)	(1.63)	(1.09)
SchEn	0.00	-0.00	0.00	-0.00
	(1.01)	(-1.06)	(1.18)	(-0.41)
PRY	3.18	1.10	3.04	3.95*
	(1.36)	(0.66)	(1.42)	(1.78)
Recession	0.04**	0.03*	0.06	0.02
	(2.43)	(1.70)	(1.27)	(0.92)
EmpMid	1.01	1.13***	0.41	1.48***
	(0.85)	(4.42)	(0.52)	(7.97)
Constant	-3.75*	-3.38*	1.79	-3.47*
	(-1.66)	(-1.80)	(0.54)	(-1.78)
FE	YES	YES	YES	YES
Time effects	YES	NO	YES	NO
Country Trend	NO	YES	NO	YES
Elasticity	-0.05	-0.20	-0.03	-0.15
Elasticity S.E.	0.10	0.14	0.08	0.18
Observations	228	228	228	228
K-P Wald F	0.62	3.07	0.60	2.15

Huber/White/sandwich standard errors clustered at country level, z-Stats in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 13: Main results: weighted regressions

	(1) EmpY	(2) EmpY	(3) EmpY	(4) EmpY
lagMWAW	1.94*	1.91**		
	(1.86)	(2.05)		
lagMWAW ^{2}	-2.41*	-2.64**		
	(-1.90)	(-2.11)		
lagRAMW			0.35***	0.37***
			(2.61)	(3.93)
lagRAMW^2			-0.12***	-0.11***
			(-3.07)	(-4.94)
AWP	0.01	-0.00	-0.03*	-0.02*
	(0.44)	(-0.39)	(-1.90)	(-1.69)
H	-0.01	-0.05**	-0.01	-0.05**
	(-0.91)	(-2.34)	(-1.07)	(-2.26)
GRR	-0.03*	-0.03*	-0.04***	-0.03**
	(-1.87)	(-1.77)	(-4.04)	(-2.01)
EmpMid	1.55***	1.50***	1.35***	1.50***
	(6.06)	(11.81)	(6.22)	(14.17)
PRY	0.39	-0.04	0.96***	0.43
	(1.19)	(-0.12)	(2.85)	(0.96)
SchEn	-0.00	-0.00**	-0.00	-0.00*
	(-0.80)	(-2.02)	(-0.52)	(-1.66)
Conscription	-0.01	-0.02*	-0.00	-0.01
	(-1.45)	(-1.91)	(-0.60)	(-1.44)
Bargaining	0.03***	0.01*	0.03***	0.01**
	(4.04)	(1.92)	(4.39)	(2.08)
Recession	0.00	0.00	0.01*	0.00
	(0.78)	(0.42)	(1.70)	(0.28)
Constant	-1.26***	-0.76***	-1.03***	-0.83***
	(-3.70)	(-3.01)	(-5.74)	(-4.64)
FE	YES	YES	YES	YES
Time effects	YES	NO	YES	NO
Country Trend	NO	YES	NO	YES
Elasticity	-0.05	-0.30	-0.08	-0.03
Elasticity S.E.	0.10	0.23	0.09	0.16
Observations	228	228	228	228
K-P Wald F	18.36	45.14	21.19	53.59

Huber/White/sandwich standard errors clustered at country level, z-Stats in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 14: Main results: current specification

	(1) EmpY	(2) EmpY	(3) EmpY	(4) EmpY
MWAW	1.86**	2.32***		
	(2.44)	(3.26)		
MWAW^2	-2.29**	-3.30***		
	(-2.46)	(-3.75)		
RAMW			0.35***	0.18**
			(2.93)	(2.11)
RAMW^2			-0.11***	-0.07***
			(-2.94)	(-2.90)
AWP	-0.01	-0.02	-0.03**	-0.02*
	(-0.70)	(-1.16)	(-2.57)	(-1.68)
H	0.01	-0.03	-0.01	-0.03*
	(0.54)	(-1.63)	(-0.63)	(-1.80)
GRR	-0.04***	-0.04***	-0.05***	-0.02
	(-4.01)	(-3.09)	(-3.99)	(-1.59)
EmpMid	1.47***	1.42***	1.39***	1.55***
	(4.94)	(9.03)	(5.67)	(11.72)
Conscription	0.00	-0.01	-0.00	-0.01*
	(0.24)	(-1.51)	(-0.47)	(-1.72)
Bargaining	0.02*	0.01	0.02**	0.00
	(1.67)	(1.22)	(2.31)	(0.17)
SchEn	-0.00	-0.00**	-0.00	-0.00*
	(-1.21)	(-2.19)	(-0.76)	(-1.75)
PRY	0.31	-0.26	0.55	0.00
	(0.76)	(-0.63)	(1.31)	(0.00)
Recession	0.00	-0.00	0.01	-0.00
	(0.14)	(-0.36)	(1.13)	(-0.33)
Constant	-1.10***	-0.77***	-0.99***	-0.62***
	(-3.21)	(-2.98)	(-4.61)	(-2.91)
FE	YES	YES	YES	YES
Time effects	YES	NO	YES	NO
Country Trend	NO	YES	NO	YES
Elasticity	-0.03	-0.03	-0.04	-0.04
Elasticity S.E.	0.17	0.20	0.13	0.14
Observations	231	231	231	231
K-P Wald F	18.36	45.14	21.19	53.59

Huber/White/sandwich standard errors clustered at country level, z-Stats in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 15: Main results: outlier correction

	(1) EmpY	(2) EmpY	(3) EmpY	(4) EmpY
lagMWAW	2.06***	1.63***		
	(2.99)	(3.03)		
lagMWAW^2	-2.69***	-2.46***		
	(-3.27)	(-3.47)		
lagRAMW			0.40***	0.32***
			(7.24)	(3.29)
lagRAMW^2			-0.13***	-0.11***
			(-7.53)	(-4.20)
AWP	0.00	-0.01	-0.03***	-0.01
	(0.40)	(-0.75)	(-4.06)	(-1.39)
H	0.01	-0.03*	-0.00	-0.03**
	(0.73)	(-1.80)	(-0.26)	(-2.15)
GRR	-0.02***	-0.04***	-0.04***	-0.04***
	(-2.92)	(-3.58)	(-7.39)	(-4.68)
EmpMid	1.71***	1.68***	1.56***	1.71***
	(6.28)	(8.03)	(14.24)	(9.83)
PRY	0.61**	0.20	1.03***	0.75**
	(2.19)	(0.95)	(3.54)	(2.28)
SchEn	0.00	-0.00**	0.00	-0.00*
	(0.09)	(-2.19)	(0.24)	(-1.72)
Conscription	0.00	-0.01**	-0.00	-0.01
	(0.06)	(-2.26)	(-0.31)	(-1.34)
Bargaining	0.02***	0.01	0.02***	0.01
	(3.27)	(1.04)	(3.83)	(1.05)
Recession	0.01*	0.00	0.01***	0.00
	(1.73)	(0.55)	(3.36)	(0.74)
Constant	-1.42***	-0.88***	-1.27***	-1.03***
	(-4.18)	(-3.96)	(-10.39)	(-5.91)
FE	YES	YES	YES	YES
Time effects	YES	NO	YES	NO
Country Trend	NO	YES	NO	YES
Elasticity	-0.16	-0.43	0.05	-0.03
Elasticity S.E.	0.18	0.18	0.09	0.11
Observations	202	195	201	201
K-P Wald F	18.36	45.14	21.19	53.59

Huber/White/sandwich standard errors clustered at country level, z-Stats in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$