# Employment effects of minimum wages in Europe revisited

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**Abstract**

The aim of this paper is to estimate the effect of minimum wage on employment rates taking into account potential nonlinearity. Focusing on three age groups, we find a significant nonlinear relationship between the minimum wage and employment for the young (15-24 years) and older working-age (55-64 years) groups, whereas for the prime-age workers (25-54 years) the minimum wage does not have a significant non-linear effect. 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 different age groups in a selection of European countries. We estimate the effects on the employment rates of young workers aged 15 to 24 years, but also for prime working age group (25 to 54 years) and for older workers (55 to 64 years). Moreover, 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 in a cross–country set–up.

Theoretical research by Brown, Merkl, and Snower (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

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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 minimum wage literature (see e.g. Burkhauser, Couch, and Wittenburg, 2000; Keil, Robertson, and Symons, 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.

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 estimate and compare the employment effects of a minimum wage increase of three different age groups: youth, prime-age workers, and older workers. Secondly, 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. Finally, we carefully approach and correct for potential endogeneity of the covariates, which in many studies has not been accounted for.

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 $J_{\varepsilon}$ denotes the cumulative distribution of the job suitability shock, $a$ is the average workers' productivity, $w$ is the equilibrium wage, $\delta$ is the time discount factor, $h$ are the hiring costs, and $\sigma$ 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.

# 3 Data and the empirical model

## 3.1 Data

Our panel contains data on 14 EU countries with statutory minimum wages[1] over the period 1980-2011. The Kaitz index ($MWAW$) is used as an index of the minimum wage, and it 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 (Italy or Austria) as for these the Kaitz index is not available and might additionally bias the estimates. The summary statistics of the Kaitz index are presented in Table 6 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 Kaitz index is taken from the OECD Minimum Wage Database. Labor market regulation data come from the Economic Freedom of the World (EFW) database by the Fraser

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

Institute (Gwartney, Lawson, and Norton, 2014), and macroeconomic indicators are taken from the World Economic Outlook (WEO) database. 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.[2]

We study the effect of the minimum wage on employment rates, *Emp*. We distinguish between three different age groups: young (aged between 15 and 24 years, *EmpY*), prime–aged (aged between 25 and 54 years, *EmpM*), and older (aged between 55 and 64 years, *EmpO*).

Other variables used in the regressions are summarized in Tables 7 and 8 in the Appendix. Additionally, the changes in the Kaitz index in all countries over time can be seen in Figures 7 and 8 in the Appendix.

[2]The start of our time series for the Kaitz index is highlighted in Table 6.

## 3.2 The empirical model

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

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

where $Emp_{i,t}$ is the employment rate at time $t$ in country $i$, and $MWAW_{i,t-1}$ is the lagged minimum wage variable at time $t-1$ in country $i$. $H_{i,t}$ stands for the hiring costs measured by the strictness of labor market regulations (EFW 5B index)[3], $AWP$ 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. $U_{i,t}$ is the control variable for the overall labor market situation, namely the unemployment rate at time $t$ for country $i$, $PR_{i,t}$ is the size of the respective cohort: young (aged between 15 and 24 years, $PRY$), middle (aged between 25 and 54 years, $PRM$), and old (aged between 55 and 64 years, $PRO$). Additionally we control for the strength of collective wage bargaining and the strength of conscription regulations (which is particularly relevant for the young cohort). Finally, $\tau_t$ stands for the time effects and $\alpha_i$ are country-specific fixed effects.

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 Baker, Benjamin, and Stanger, 1999; Neumark and Wascher, 1992). 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 $MWAW$ 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 unemployment and employment rates for specific age groups 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 unemployment rate 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 unemployment rate itself. Additionally, we reassess all results instrumenting for the unemployment 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 unemployment rate, the output gap, and the exposure variable are presented in Table 2. We can observe that oil shock exposure is negatively correlated with the unemployment rate and positively with 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[4].

[3] We have rescaled the index so that higher value denotes *more* regulation.

[4] 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.

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.[5] As a robustness check we add, therefore, estimates of regressions weighted by the sizes of the labor markets, measured as the number of persons aged 15 to 64.

To additionally test the robustness of our results regarding changes in the wage structure we estimate our model with an alternative Kaitz index, the ratio of the minimum wage to the median wage. If changes in the Kaitz index are mainly driven by changes in the wage structure, the estimates should differ for both models. If changes in the wage structure have only a small influence on the Kaitz index, the results should be the same.

# 4 Empirical Findings

In this section we present the main results of the effects of minimum wages on employment of the three age groups. In the second subsection we additionally analyze the interaction terms

Anderson, Kunitomo, and Sawa, 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).

[5]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 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.

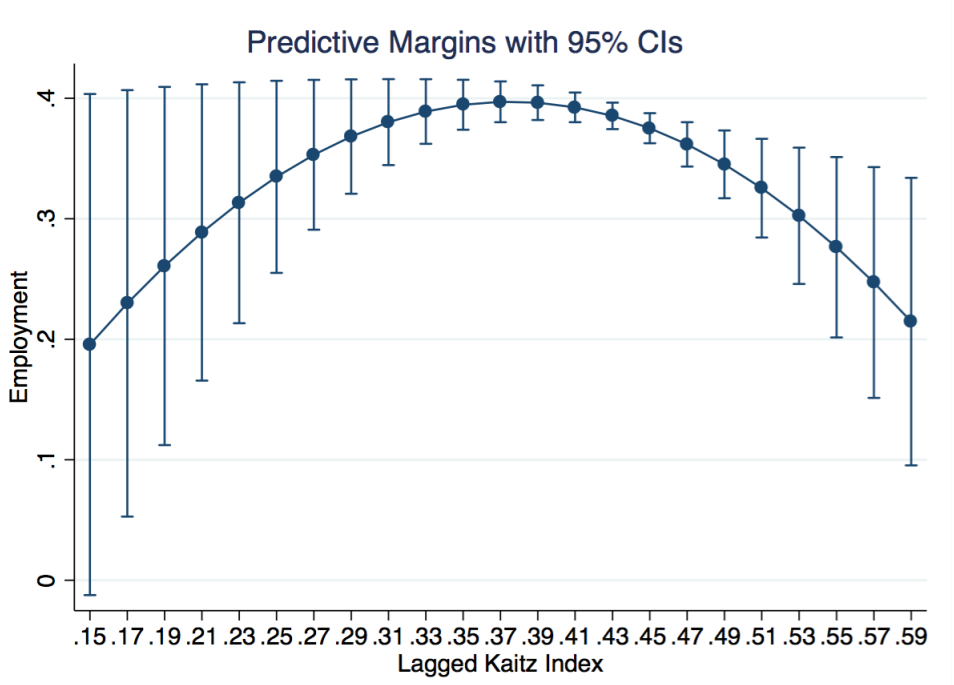
with other variables of interest. Finally, the third subsection contains the instrumental variable specifications and the weighted regressions, by which we test the robustness of our results.

## 4.1 Main findings for the age groups

Tables 3 and 4 present the main specifications for the age groups, with and without time effects.

Tables 3 and 4 reveal a nonlinear relationship between the minimum wage and the employment for young and older 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 for the three age groups. These results are visualized in Figures 1, 2 and 3.

Figure 1: Effects of minimum wages on prediction of employment– young workers




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. higher education, retirement).

Young workers are often not eligible for unemployment benefits, and are likely to tolerate unemployment[6], 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, Centeno, and Portugal, 2004). Hence, an increase of the minimum wage makes employment more attractive as in other age groups. Higher minimum wages increase the

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

Figure 2: Effects of minimum wages on prediction of employment – prime–aged workers

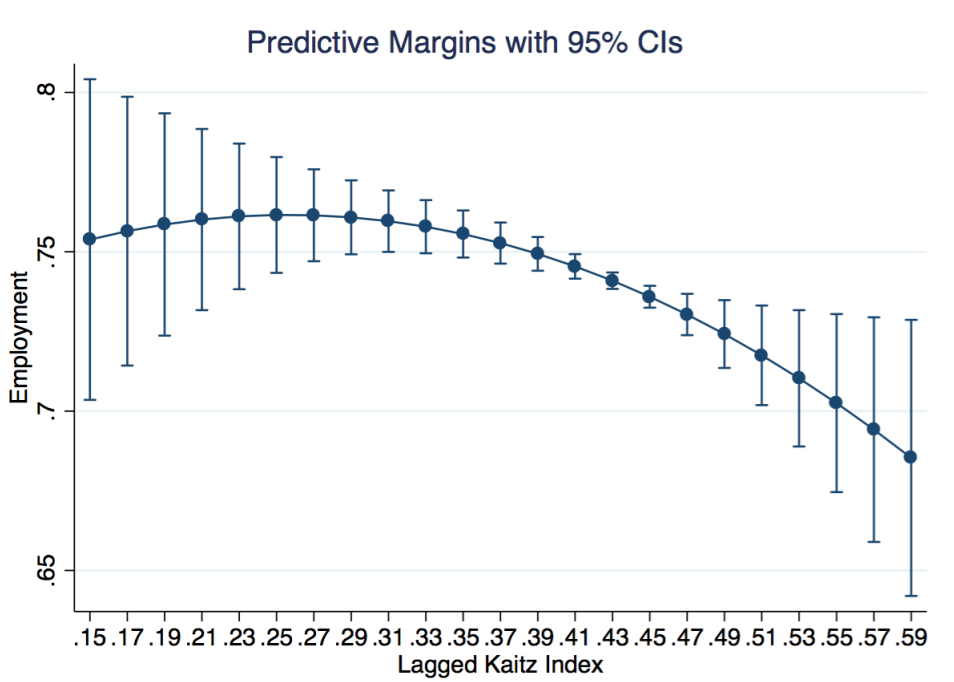
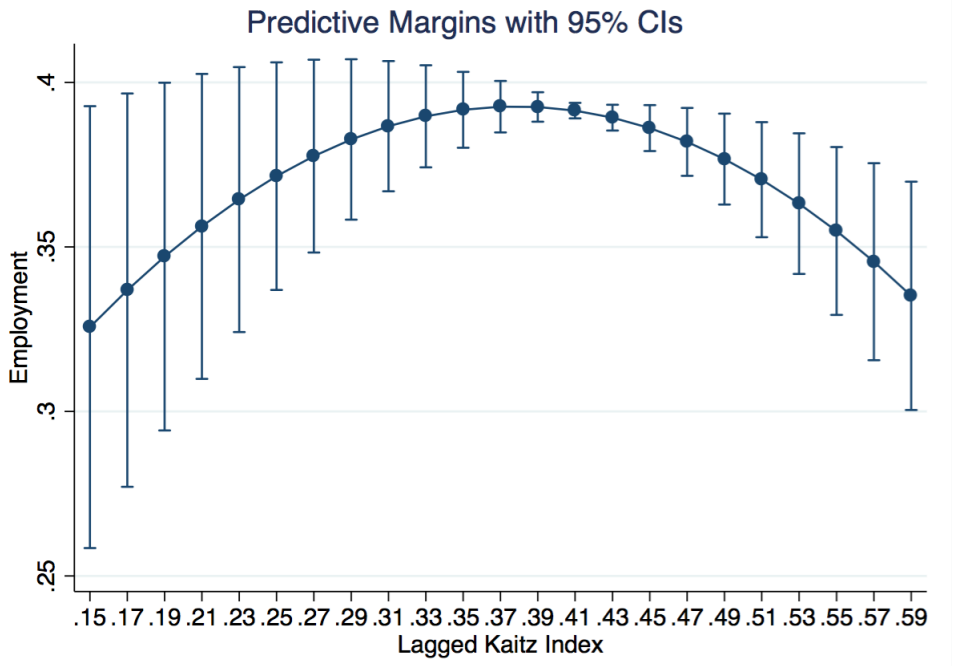



Figure 3: Effects of minimum wages on prediction of employment – older workers



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 attained for the Kaitz index of 0.38. At this threshold level an additional increase of the Kaitz index decreases employment. The marginal effect of a change in the minimum wage is visualized in Figure 1 and the respective values of the marginal effects can be found in Table 9 in the Appendix.

Older workers at the end of their working life have retirement as an outside option, i.e. they can decide between remaining in the job market or retirement. De Coen, Forrier, and Sels (2013) find that older workers set higher reservation wages when they move closer towards the retirement age. With higher minimum wage the job market becomes more attractive, and the people are more willing to postpone retirement. This influences the employment in this group positively. Nevertheless, an increase of the minimum wage forces firms to cut the low productive jobs leading to a decrease in employment. At a threshold level the negative job offer effect overwhelms the positive job acceptance effect. This turning point for the older workers is attained for the Kaitz index of about 0.41. The marginal effect of a change in the minimum wage is visualized in Figure 3 and the respective values of the marginal effects can be found in Table 10 in the Appendix.

For the group of prime age workers the marginal effects are not significantly different from zero.[7] As prime age workers have constrained outside options (might be too early for retirement and/or too late for education), the job acceptance level of this working age group might already by high. As such, an additional increase of the minimum wage might have only a modest influence, eliminating the positive effect of job acceptance rate. On the other hand, the negative job offer effect is not eliminated. Hence, an increase of the minimum wage influences the employment of prime age workers negatively. The linear effects are highlighted in Table 11 (in the Appendix).

Comparison of the employment effects for the group of young and older workers suggests that younger workers are more strongly affected by the increases in the minimum wage and the balance between the job acceptance and job offers is shifted to the left. Following De Coen et al. (2013), older workers have a higher reservation wage, and thus increases at the lower levels of minimum wage affect only the job acceptance behavior of young workers, which yields that the positive employment effects should be higher than for the older workers. On the other hand, as argued by Addison et al. (2004), as young workers have a higher probability of receiving a job offer, the negative job offer effect affects this group more heavily and cancels the positive job acceptance effect more strongly.

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

### 4.2.1 Young workforce

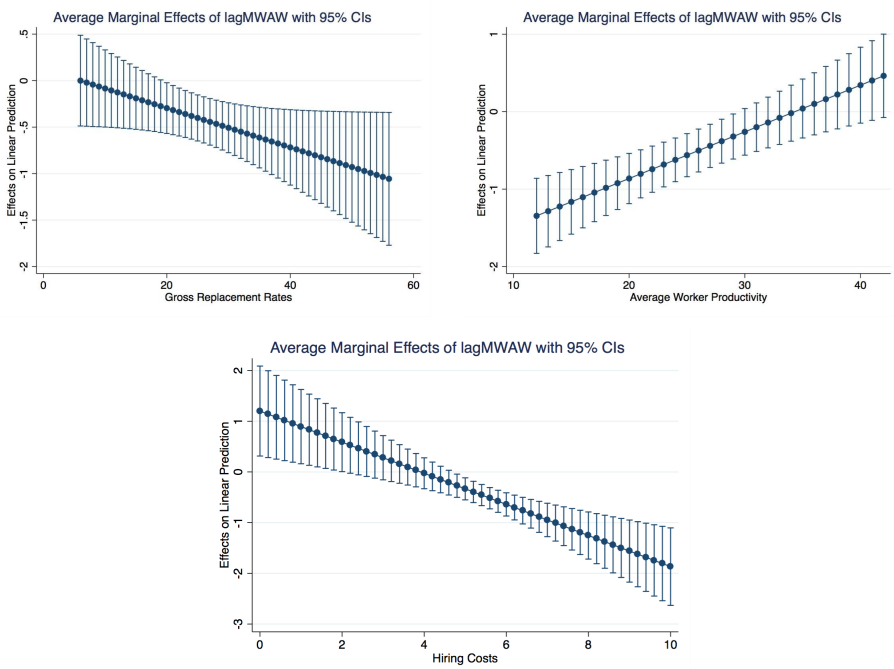
Table 5 presents the results of the interaction between the level of the minimum wage and the replacement rates, workers' productivity, and labor market regulations for the young workforce. Once the interaction with GRR is included, the turning point at which the minimum wage starts to have a detrimental effect on employment shifts towards the lower level of the minimum wage: the turning point is attained for the Kaitz index of about 0.36 (marginal effects are presented in Table 12 in the Appendix). When we include the interaction with AWP, on the other hand, the turning point shifts to the right to the level of 0.39, as predicted by the theory (see Table 13 in the Appendix). Interaction with the hiring costs index shifts the turning point to the left, to a level of 0.36 (marginal effects are presented in Table 14 in the Appendix).

The effect of the replacement rates has the expected negative sign. Productivity of the workers enters with a positive sign in specification (3), however turns insignificant once the time effects are included. This result is consistent with the fact that productivity in the analyzed countries has

[7] The respective marginal effects of a change in the minimum wage for prime-age workers are depicted in Figure 2.

been constantly rising in the analyzed period. Additional control variables do not seem to affect the employment levels, except for the conscription index in the case of young workers.

Figure 4: Marginal effects of minimum wages at levels of GRR, AWP, and H – young workers



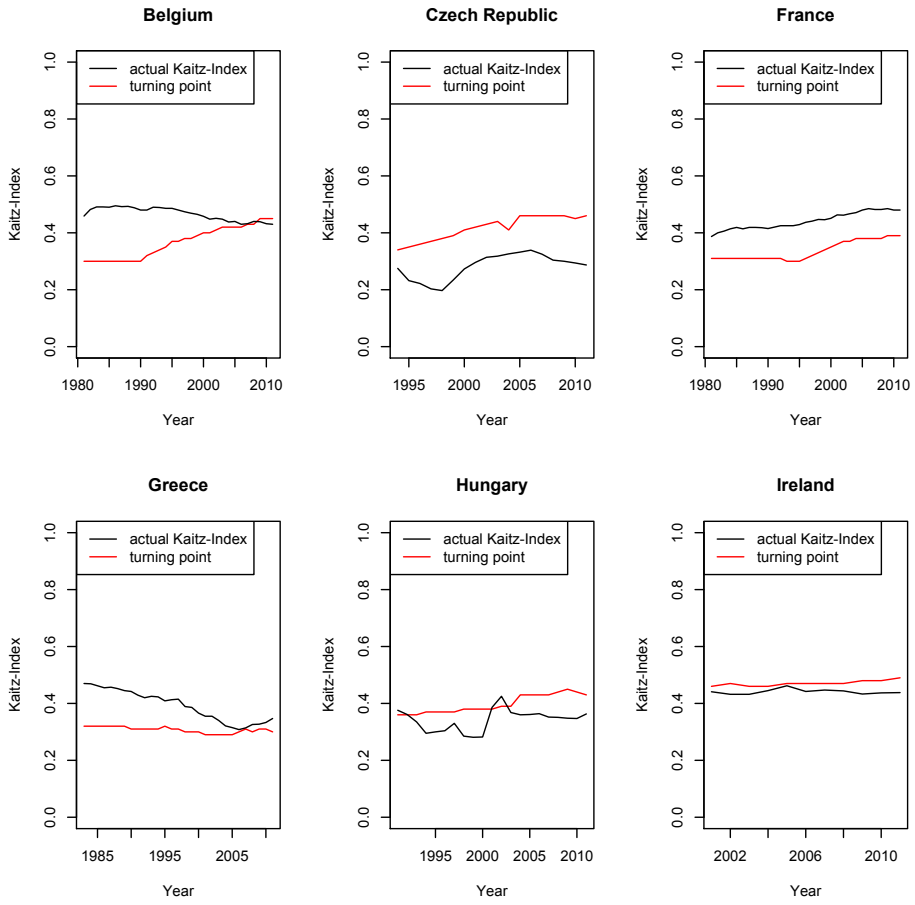

Marginal effects of the minimum wages for different values of GRR, AWP, and H are presented in Figure 4. We can observe that the effect of minimum wages for different levels of the replacement rates remains negative, though not significantly different from zero. On the other hand, inspection of Figure 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 disappears. 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 in fact turns *positive*.

In what follows, we shall concentrate on the effects for the young workers only, as only these groups, as suggested by the results in Table 3 are significantly affected by the minimum wages. Many countries have subminimum wages for young workers in place, but these are not included in our analysis. The subminimum wages differ broadly across the age groups and also in size within the age groups. While most countries introduce subminimum wages for workers younger than nineteen, others include workers under the age of 23. Moreover, the level of reduction in the minimum wage for younger workers differs across countries. Therefore, a serious analysis of the effects in a cross–country set–up is very difficult.

In Figures 5 and 6 we compare the predicted turning points for the young workforce with the actual Kaitz index values for European countries, taking into account the joint effect of the minimum wage and other labor market characteristics. For the values of the hiring costs, replacement rates, and workers' productivity we estimate the effects. 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 increase of the turning point over time is mainly due to the increase in productivity. Still, the southern European countries do not follow the upward trend of the turning points.

Figure 5: Turning points and actual Kaitz index for young workers (aged 15 to 24 years) I

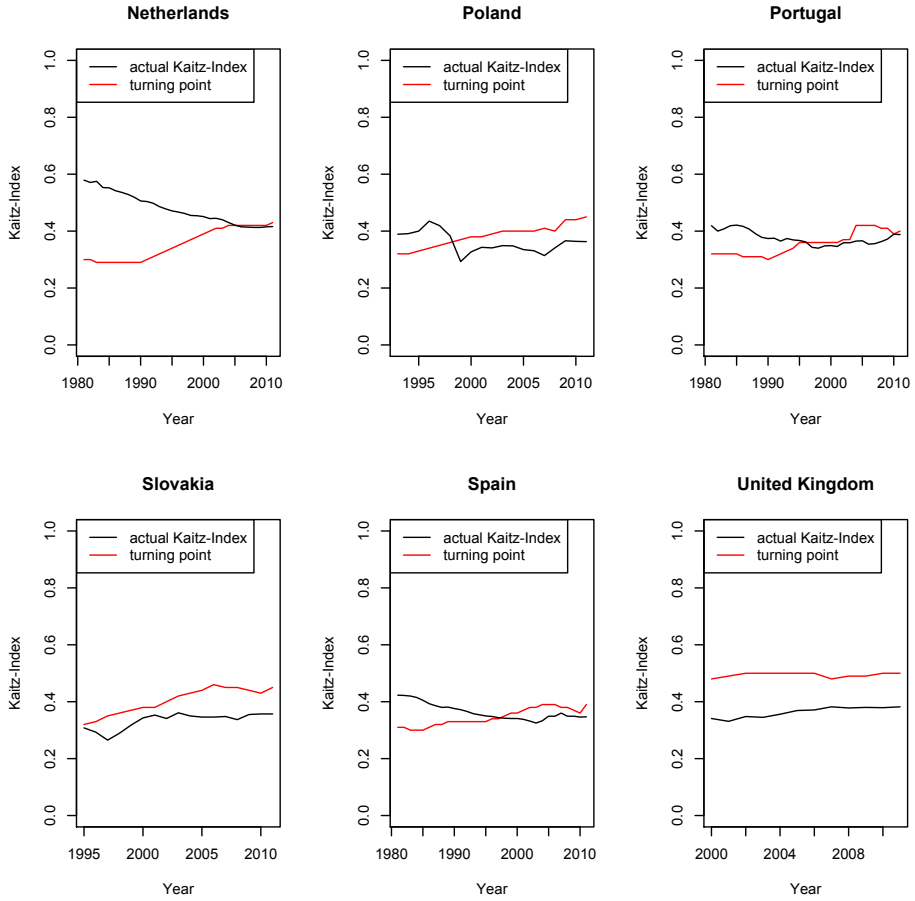



In two of the countries in our sample, France and Greece, the minimum wages are at a level higher than the turning point. In these cases decreasing the minimum wage is expected to increase the employment levels of young workers. As the driving forces of these results, we can identify high replacement rates and strict job market regulations for the case of France and very low productivity levels and strict job market regulations in Greece. In other countries, either because of high productivity of the workers (e.g. in Belgium and the Netherlands), 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), the turning points are to the right of the actual Kaitz indices, and employment for the young workers could be even be further stimulated with an increase in the minimum wage. However, it is important to notice that for Belgium, the Netherlands, Portugal, and Spain, the actual Kaitz index is very close to the turning point, suggesting that a further increase in the minimum wage could already reduce the employment rates of the young workforce.

## 4.3 Robustness analysis

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

Figure 6: Turning points and actual Kaitz index for young workers (aged 15 to 24 years) II




section, therefore, we compare the main results which 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. Finally, we also check whether our results remain the same when we use the alternative specification of the Kaitz index, namely the ratio of the minimum wage to the median wage. In Table 26 (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 $lagMWAW2$ instrumented with the left orientation of the cabinet. Results suggest that the main results for the young workforce do not differ much from the IV results, however the effect disappears for the older workers.

The next 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 27 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. 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.

A final robustness check consist of using an alternative variant of the Kaitz index, that is the ration of the minimum wage to the median wage. The main result for the young workforce is robust to this change.

# 5 Concluding Remarks

The goal of this paper was to estimate the sensitivity of employment to changes in minimum wages not only for young workers, but also for other age groups. Additionally, 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 unemployment benefits and labor market regulations. Detrimental effects of high minimum wages are particularly strong if accompanied by high unemployment benefits and/or comparatively strict labor market regulations. Weighted regressions have additionally revealed that the collective bargaining processes and strictness of labor market regulations might have different effects for different age groups. This preliminary result will be further addressed in subsequent research.

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 France and Greece. However, for Belgium, the Netherlands, Portugal, and Spain, the actual Kaitz index is very close to the turning point suggesting that a further increase in the minimum wage could already 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 (e.g. the United Kingdom), higher minimum wages should not have a detrimental effect on employment. 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.


# Acknowledgements

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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) |

Table 2: Cross-correlations of the instruments (Significance at 0.05 level)

| Variables | Unemployment | Output gap |
|---|---|---|
| Output Gap | -0.41* | |
| Oil shock | -0.14* | 0.18* |

Table 3: Main results

| | (1) EmpY | (2) EmpY | (3) EmpM | (4) EmpM | (5) EmpO | (6) EmpO |
|---|---|---|---|---|---|---|
| lagMWAW | 2.48* | 2.70** | 0.26 | 0.46 | 0.02 | 1.23*** |
| | (1.82) | (2.13) | (0.40) | (1.24) | (0.02) | (3.97) |
| lagMWAW × lagMWAW | -3.53** | -3.73** | -0.77 | -0.81 | -0.05 | -1.51*** |
| | (-2.04) | (-2.31) | (-0.91) | (-1.64) | (-0.05) | (-4.64) |
| AWP | -0.05*** | -0.05*** | 0.01 | -0.03*** | 0.00 | -0.00 |
| | (-5.97) | (-4.30) | (0.92) | (-5.47) | (0.21) | (-0.01) |
| GRR | -0.08*** | -0.08*** | -0.02*** | -0.02*** | -0.03** | -0.02* |
| | (-5.85) | (-5.95) | (-3.92) | (-4.99) | (-2.25) | (-1.93) |
| Hiring Cost | 0.01 | 0.01 | -0.01 | -0.00 | -0.03*** | -0.03*** |
| | (0.52) | (0.63) | (-1.62) | (-0.15) | (-2.58) | (-3.73) |
| Unemployment | -1.21*** | -1.13*** | -0.77*** | -0.79*** | -0.33*** | -0.50*** |
| | (-7.26) | (-6.64) | (-10.18) | (-12.39) | (-2.97) | (-2.79) |
| Conscription | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | -0.01 |
| | (0.40) | (0.28) | (1.45) | (0.54) | (0.20) | (-0.89) |
| Collective Bargaining | 0.01 | 0.01 | -0.00 | -0.00 | -0.01* | -0.01** |
| | (0.93) | (0.86) | (-0.49) | (-0.82) | (-1.73) | (-2.44) |
| PRY | 0.17 | 0.11 | | | | |
| | (0.45) | (0.26) | | | | |
| PRM | | | 0.35*** | 0.14* | | |
| | | | (2.77) | (1.92) | | |
| PRO | | | | | 1.32*** | 0.76** |
| | | | | | (2.69) | (2.21) |
| Constant | 0.12 | 0.06 | 0.59*** | 0.73*** | 0.26 | 0.18*** |
| | (0.56) | (0.34) | (3.96) | (7.24) | (1.54) | (3.33) |
| FE | YES | YES | YES | YES | YES | YES |
| Time effects | NO | YES | NO | YES | NO | YES |
| Observations | 228 | 228 | 228 | 228 | 228 | 228 |
| K-P Wald F | 198.70 | 196.4 | 190.65 | 192.67 | 191.36 | 194.95 |
| Hansen J p-val | 0.65 | 0.89 | 0.12 | 0.29 | 0.04 | 0.08 |

Robust clustered SE, z-Stats in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4: Main results with oil shock exposure

| | (1) EmpY | (2) EmpY | (3) EmpM | (4) EmpM | (5) EmpO | (6) EmpO |
|---|---|---|---|---|---|---|
| lagMWAW | 3.17** | 3.17** | 0.72 | 0.60 | -0.68 | 0.88** |
| | (2.02) | (1.99) | (0.93) | (1.34) | (-0.51) | (1.97) |
| lagMWAW × lagMWAW | -4.19** | -4.08** | -1.21 | -0.90 | 0.67 | -1.25** |
| | (-2.19) | (-2.12) | (-1.24) | (-1.53) | (0.48) | (-2.50) |
| AWP | -0.04** | -0.07*** | 0.02*** | -0.02** | 0.00 | 0.02* |
| | (-2.28) | (-2.81) | (4.07) | (-2.40) | (0.16) | (1.92) |
| GRR | -0.07*** | -0.08*** | -0.02*** | -0.03*** | -0.03* | -0.02* |
| | (-7.89) | (-8.82) | (-3.18) | (-9.81) | (-1.72) | (-1.80) |
| Hiring Cost | 0.01 | 0.01 | -0.00 | 0.00 | -0.04* | -0.03*** |
| | (1.37) | (0.85) | (-0.43) | (0.77) | (-1.82) | (-5.11) |
| Unemployment | -1.38*** | -1.07*** | -0.87*** | -0.83*** | -0.37*** | -0.73*** |
| | (-5.92) | (-3.72) | (-11.98) | (-9.79) | (-3.54) | (-5.27) |
| Conscription | 0.00 | -0.00 | 0.01 | 0.00 | -0.00 | -0.01 |
| | (0.24) | (-0.25) | (1.12) | (0.47) | (-0.28) | (-1.48) |
| Collective Bargaining | 0.01 | 0.01 | -0.00 | -0.00 | -0.01 | -0.01* |
| | (0.50) | (0.69) | (-0.60) | (-0.68) | (-0.66) | (-1.78) |
| PRY | 0.02 | 0.03 | | | | |
| | (0.04) | (0.06) | | | | |
| PRM | | | 0.18 | 0.15* | | |
| | | | (1.19) | (1.81) | | |
| PRO | | | | | 1.46*** | 1.07*** |
| | | | | | (2.70) | (5.73) |
| Constant | 0.02 | -0.02 | 0.60*** | 0.68*** | 0.38 | 0.22*** |
| | (0.06) | (-0.07) | (2.78) | (5.25) | (1.37) | (2.60) |
| FE | YES | YES | YES | YES | YES | YES |
| Time effects | NO | YES | NO | YES | NO | YES |
| N | 216 | 216 | 216 | 216 | 216 | 216 |
| K-P Wald F | 2.28 | 2.25 | 2.28 | 2.26 | 2.30 | 2.26 |

Robust clustered SE, z-Stats in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Young workers – interactions

| | (1) EmpY | (2) EmpY | (3) EmpY |
|---|---|---|---|
| lagMWAW | 2.62*** | 2.69* | 2.10** |
| | (3.00) | (1.92) | (2.00) |
| lagMWAW × lagMWAW | -3.48*** | -3.72** | -3.08** |
| | (-3.38) | (-2.10) | (-2.21) |
| lagMWAW × Hiring Cost | -0.45*** | | |
| | (-3.76) | | |
| lagMWAW × GRR | | -0.00 | |
| | | (-0.02) | |
| lagMWAW × AWP | | | 0.32* |
| | | | (1.81) |
| Hiring Cost | 0.20*** | 0.01 | 0.02 |
| | (3.63) | (0.49) | (0.98) |
| GRR | -0.05*** | -0.08 | -0.07*** |
| | (-2.84) | (-1.09) | (-4.56) |
| AWP | -0.05*** | -0.05*** | -0.16** |
| | (-4.44) | (-4.19) | (-2.50) |
| Unemployment | -1.10*** | -1.13*** | -1.15*** |
| | (-9.92) | (-6.56) | (-7.12) |
| Conscription | 0.01 | 0.00 | 0.00 |
| | (0.84) | (0.27) | (0.26) |
| Collective Bargaining | 0.03** | 0.01 | 0.01 |
| | (2.21) | (0.86) | (0.69) |
| PRY | -0.10 | 0.11 | -0.19 |
| | (-0.37) | (0.26) | (-0.46) |
| Constant | 0.14 | 0.07 | 0.27* |
| | (0.92) | (0.28) | (1.65) |
| FE | YES | YES | YES |
| Time effects | YES | YES | YES |
| N | 228 | 228 | 228 |
| K-P Wald | 192.94 | 185.27 | 189.47 |
| Hansen J p-val | 0.40 | 0.59 | 0.49 |

Robust clustered SE, z-Stats in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

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# Appendix

Table 6: Descriptive statistics of the Kaitz index defined as MinWage/AvWage (first line) and MinWage/MedianWage (second line)

| Country | Mean | SD | Min | Max | Range |
|---|---|---|---|---|---|
| Belgium | 0.465 | 0.022 | 0.430 | 0.495 | 0.065 |
| (1983) | 0.539 | 0.025 | 0.498 | 0.572 | 0.074 |
| Czech Republic | 0.284 | 0.045 | 0.197 | 0.339 | 0.142 |
| (1993) | 0.329 | 0.058 | 0.218 | 0.398 | 0.180 |
| Estonia | 0.300 | 0.028 | 0.258 | 0.344 | 0.086 |
| (1999) | 0.368 | 0.032 | 0.320 | 0.413 | 0.093 |
| France | 0.388 | 0.073 | 0.252 | 0.485 | 0.233 |
| (1983) | 0.483 | 0.090 | 0.323 | 0.608 | 0.285 |
| Greece | 0.471 | 0.115 | 0.308 | 0.707 | 0.399 |
| (1983) | 0.610 | 0.128 | 0.441 | 0.851 | 0.410 |
| Hungary | 0.342 | 0.036 | 0.281 | 0.425 | 0.144 |
| (1992) | 0.439 | 0.058 | 0.365 | 0.570 | 0.205 |
| Ireland | 0.453 | 0.042 | 0.432 | 0.585 | 0.153 |
| (2000) | 0.527 | 0.051 | 0.476 | 0.675 | 0.199 |
| Netherlands | 0.530 | 0.079 | 0.413 | 0.686 | 0.273 |
| (1971) | 0.582 | 0.076 | 0.470 | 0.702 | 0.232 |
| Poland | 0.338 | 0.080 | 0.082 | 0.435 | 0.353 |
| (1992) | 0.407 | 0.093 | 0.097 | 0.478 | 0.381 |
| Portugal | 0.385 | 0.033 | 0.340 | 0.497 | 0.157 |
| (1975) | 0.545 | 0.045 | 0.480 | 0.700 | 0.220 |
| Slovakia | 0.349 | 0.047 | 0.265 | 0.481 | 0.216 |
| (1994) | 0.433 | 0.058 | 0.325 | 0.588 | 0.263 |
| Slowenia | 0.432 | 0.026 | 0.401 | 0.472 | 0.071 |
| (2005) | 0.521 | 0.038 | 0.485 | 0.582 | 0.097 |
| Spain | 0.424 | 0.089 | 0.325 | 0.626 | 0.301 |
| (1972) | 0.533 | 0.111 | 0.412 | 0.785 | 0.373 |
| United Kingdom | 0.363 | 0.018 | 0.331 | 0.382 | 0.051 |
| (1999) | 0.441 | 0.023 | 0.402 | 0.467 | 0.065 |
| Total | 0.414 | 0.098 | 0.082 | 0.707 | 0.625 |
| | 0.507 | 0.111 | 0.097 | 0.851 | 0.754 |

Table 7: Description of the variables

| | |
|---|---|
| PRY | Cohort size aged 15–24 (OECD) |
| PRM | Cohort size aged 25–54 (OECD) |
| PRO | Cohort size 55–64 (OECD) |
| Unemp | Unemployment rate as defined by ILO (WEO) |
| 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) |
| 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) |

Table 8: Means of variables by country

| Country | PRY | PRM | PRO | Unemp | GRR | AWP | Bargaining | Conscription | H | Output Gap | Left2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Belgium | 0.20 | 0.63 | 0.17 | 0.08 | 38.88 | 38.49 | 4.29 | 7.16 | 4.98 | 137.91 | 1761.75 |
| Czech Republic | 0.21 | 0.62 | 0.17 | 0.06 | 6.12 | 22.31 | 6.31 | 4.82 | 6.13 | . | 2517.32 |
| Estonia | 0.21 | 0.61 | 0.17 | 0.08 | . | 19.67 | 8.08 | 2.59 | 4.33 | 2024.28 | 1658.30 |
| France | 0.20 | 0.63 | 0.16 | 0.09 | 36.42 | 34.61 | 5.19 | 6.06 | 4.46 | -91.48 | 4149.19 |
| Greece | 0.19 | 0.62 | 0.18 | 0.09 | 10.76 | 22.03 | 4.23 | 0.72 | 3.89 | 274.35 | 6071.63 |
| Hungary | 0.20 | 0.62 | 0.17 | 0.08 | 10.11 | 17.43 | 6.24 | 5.82 | 6.07 | . | 4085.27 |
| Ireland | 0.26 | 0.61 | 0.13 | 0.10 | 33.25 | 29.18 | 4.89 | 10.00 | 6.76 | 147.17 | 282.90 |
| Netherlands | 0.21 | 0.64 | 0.15 | 0.06 | 46.01 | 36.34 | 4.41 | 5.25 | 4.49 | -521.58 | 939.53 |
| Poland | 0.21 | 0.63 | 0.15 | 0.13 | 10.54 | 15.87 | 6.36 | 3.09 | 5.36 | . | 3624.55 |
| Portugal | 0.22 | 0.61 | 0.17 | 0.06 | 35.16 | 17.25 | 5.33 | 3.91 | 4.23 | 87.48 | 3951.66 |
| Slovakia | 0.23 | 0.63 | 0.14 | 0.14 | 9.73 | 22.22 | 6.36 | 4.18 | 5.77 | 359.74 | 747.40 |
| Slowenia | 0.18 | 0.65 | 0.17 | 0.06 | . | 28.98 | 4.51 | 5.86 | 4.04 | 630.99 | 3288.48 |
| Spain | 0.21 | 0.63 | 0.16 | 0.16 | 33.00 | 27.44 | 5.18 | 4.91 | 4.24 | -1465.02 | 6422.50 |
| United Kingdom | 0.19 | 0.64 | 0.17 | 0.07 | 15.06 | 29.82 | 6.78 | 10.00 | 7.40 | 147.81 | 3934.33 |
| Total | 0.21 | 0.63 | 0.16 | 0.09 | 25.46 | 26.97 | 5.47 | 5.45 | 5.13 | 32.68 | 3177.73 |

Table 9: Young workers – Marginal effects of lagMWAW

| | |
|---|---|
| 0.35_at | 0.22 |
| | (0.93) |
| 0.36_at | 0.13 |
| | (0.60) |
| 0.37_at | 0.04 |
| | (0.20) |
| 0.38_at | -0.05 |
| | (-0.26) |
| 0.39_at | -0.14 |
| | (-0.74) |
| 0.40_at | -0.23 |
| | (-1.21) |
| *N* | 228 |

Table 10: Older workers – Marginal effects of lagMWAW

| | |
|---|---|
| 0.39_at | 0.06 |
| | (0.55) |
| 0.40_at | 0.03 |
| | (0.34) |
| 0.41_at | 0.00 |
| | (0.09) |
| 0.42_at | -0.01 |
| | (-0.20) |
| 0.43_at | -0.04 |
| | (-0.53) |
| 0.44_at | -0.07 |
| | (-0.90) |
| *N* | 216 |

Table 11: Prime-age workers – Linear Specification

| | (1) EmpM b/t | (2) EmpM b/t |
|---|---|---|
| lagMWAW | -0.39*** | -0.23*** |
| | (-3.81) | (-4.03) |
| AWP | 0.01 | -0.03*** |
| | (0.91) | (-6.60) |
| Hiring Cost | 0.01*** | 0.01 |
| | (2.92) | (0.96) |
| GRR | -0.02*** | -0.03*** |
| | (-4.24) | (-6.26) |
| Unemployment | -0.76*** | -0.78*** |
| | (-9.79) | (-11.84) |
| Conscription | 0.00 | 0.00 |
| | (0.98) | (0.44) |
| Collective Bargaining | -0.00 | -0.00 |
| | (-0.74) | (-1.23) |
| PRM | 0.34*** | 0.14* |
| | (2.58) | (1.77) |
| Constant | 0.73*** | 0.86*** |
| | (7.54) | (15.37) |
| FE | YES | YES |
| Time effects | NO | YES |
| N | 228 | 228 |
| K-P Wald F | 187.79 | 232.44 |
| Hansen J p-val | 0.13 | 0.03 |

Table 12: Young workers – Marginal effects of lagMWAW with GRR

| | (1) |
|---|---|
| 0.34_at | 0.23 |
| | (0.55) |
| 0.35_at | 0.15 |
| | (0.38) |
| 0.36_at | 0.07 |
| | (0.19) |
| 0.37_at | -0.01 |
| | (-0.04) |
| 0.38_at | -0.09 |
| | (-0.30) |
| 0.39_at | -0.17 |
| | (-0.60) |
| *N* | 216 |

Table 13: Young workers – Marginal effects of lagMWAW with AWP

| | (1) |
|---|---|
| 0.37_at | 0.22 |
| | (1.30) |
| 0.38_at | 0.14 |
| | (0.86) |
| 0.39_at | 0.06 |
| | (0.39) |
| 0.40_at | -0.01 |
| | (-0.08) |
| 0.41_at | -0.09 |
| | (-0.52) |
| 0.42_at | -0.17 |
| | (-0.93) |
| *N* | 216 |

Table 14: Young workers – Marginal effects of lagMWAW with H

| | (1) |
|---|---|
| 0.34_at | 0.15 |
| | (0.94) |
| 0.35_at | 0.09 |
| | (0.60) |
| 0.36_at | 0.03 |
| | (0.24) |
| 0.37_at | -0.01 |
| | (-0.11) |
| 0.38_at | -0.07 |
| | (-0.44) |
| 0.39_at | -0.13 |
| | (-0.73) |
| *N* | 216 |

Table 15: Belgium

| Variables | Unemp | Output Gap | MWAW | Left2 |
|---|---|---|---|---|
| Unemp | 1.00 | | | |
| Output Gap | -0.61 | 1.00 | | |
| | (0.00) | | | |
| MWAW | 0.48 | -0.44 | 1.00 | |
| | (0.01) | (0.01) | | |
| Left2 | -0.52 | 0.35 | -0.21 | 1.00 |
| | (0.00) | (0.05) | (0.25) | |

Figure 7: The Kaitz index (MWAW) I

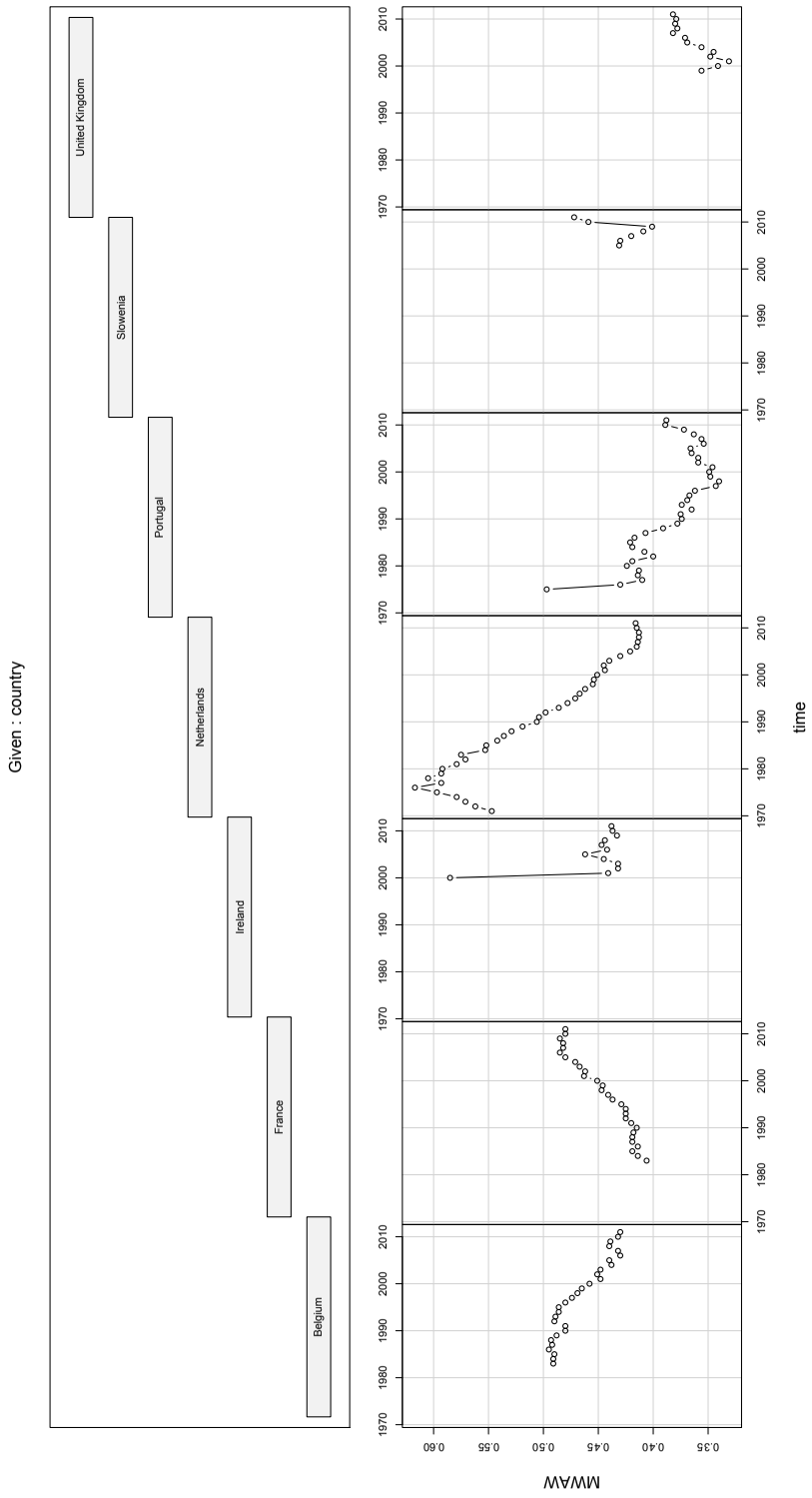

Figure 8: The Kaitz index (MWAW) II

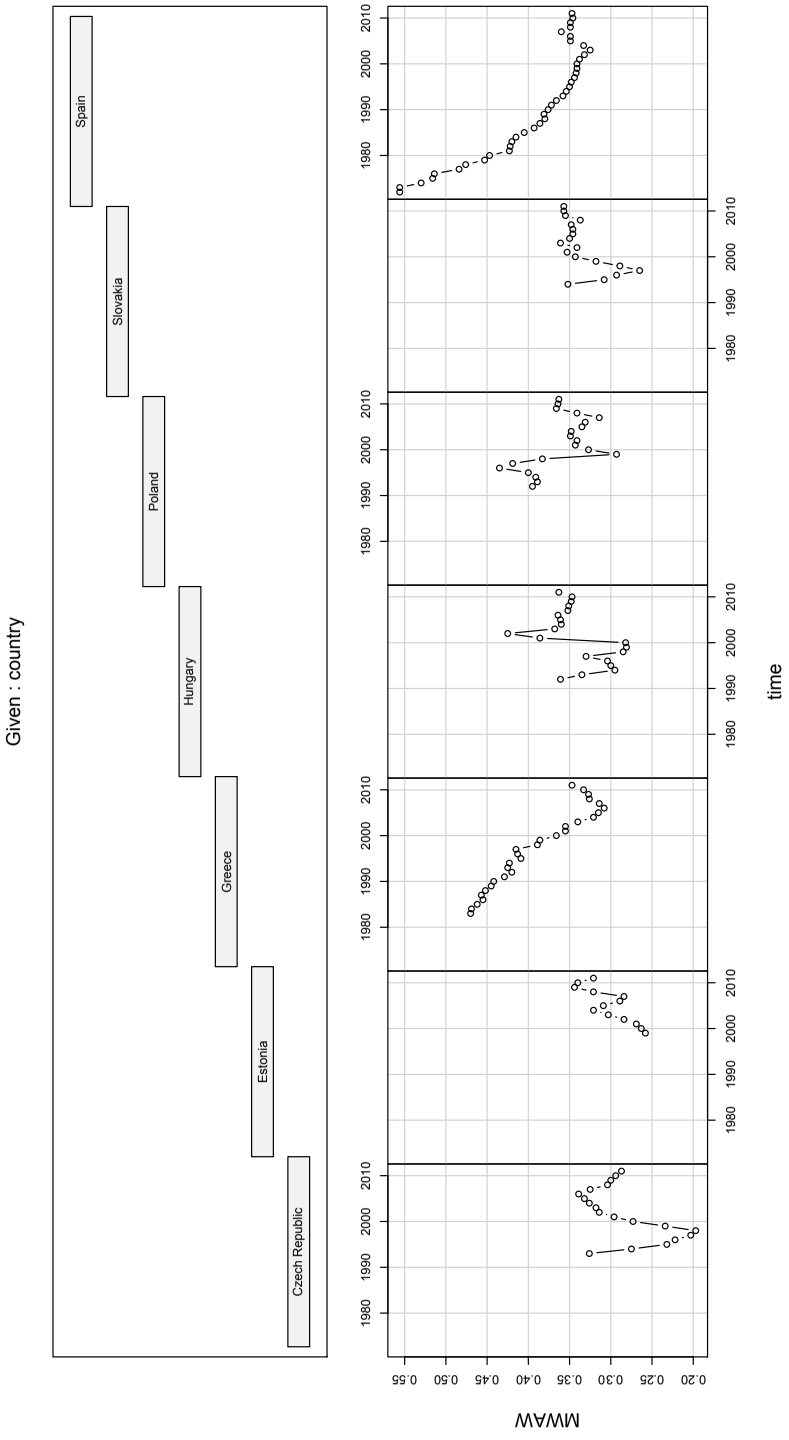

Table 16: Czech Republic

| Variables | Unemp | Output Gap | MWAW | Left2 |
|---|---|---|---|---|
| Unemp | 1.00 | | | |
| Output Gap | -0.91 | 1.00 | | |
| | (0.00) | | | |
| MWAW | 0.09 | -0.34 | 1.00 | |
| | (0.77) | (0.26) | | |
| Left2 | -0.01 | 0.09 | -0.70 | 1.00 |
| | (0.98) | (0.73) | (0.01) | |

Table 17: Estonia

| Variables | Unemp | Output Gap | MWAW | Left2 |
|---|---|---|---|---|
| Unemp | 1.00 | | | |
| Output Gap | -0.63 | 1.00 | | |
| | (0.00) | | | |
| MWAW | 0.60 | -0.38 | 1.00 | |
| | (0.03) | (0.20) | | |
| Left2 | -0.83 | 0.55 | -0.44 | 1.00 |
| | (0.00) | (0.00) | (0.13) | |

Table 18: France

| Variables | Unemp | Output Gap | MWAW | Left2 |
|---|---|---|---|---|
| Unemp | 1.00 | | | |
| Output Gap | -0.48 | 1.00 | | |
| | (0.01) | | | |
| MWAW | -0.07 | 0.06 | 1.00 | |
| | (0.72) | (0.73) | | |
| Left2 | 0.08 | 0.34 | -0.38 | 1.00 |
| | (0.68) | (0.06) | (0.03) | |

Table 19: Greece

| Variables | Unemp | Output Gap | MWAW | Left2 |
|---|---|---|---|---|
| Unemp | 1.00 | | | |
| Output Gap | -0.21 | 1.00 | | |
| | (0.26) | | | |
| MWAW | -0.57 | -0.55 | 1.00 | |
| | (0.00) | (0.00) | | |
| Left2 | 0.34 | -0.72 | 0.28 | 1.00 |
| | (0.06) | (0.00) | (0.12) | |

Table 20: Ireland

| Variables | Unemp | Output Gap | MWAW | Left2 |
|---|---|---|---|---|
| Unemp | 1.00 | | | |
| Output Gap | -0.51 | 1.00 | | |
| | (0.00) | | | |
| MWAW | -0.26 | 0.18 | 1.00 | |
| | (0.41) | (0.58) | | |
| Left2 | 0.26 | -0.65 | -0.14 | 1.00 |
| | (0.15) | (0.00) | (0.67) | |

Table 21: Netherlands

| Variables | Unemp | Output Gap | MWAW | Left2 |
|---|---|---|---|---|
| Unemp | 1.00 | | | |
| Output Gap | -0.47 | 1.00 | | |
| | (0.01) | | | |
| MWAW | 0.57 | -0.19 | 1.00 | |
| | (0.00) | (0.29) | | |
| Left2 | -0.34 | 0.10 | -0.30 | 1.00 |
| | (0.06) | (0.60) | (0.09) | |

Table 22: Portugal

| Variables | Unemp | Output Gap | MWAW | Left2 |
|---|---|---|---|---|
| Unemp | 1.00 | | | |
| Output Gap | -0.46 | 1.00 | | |
| | (0.01) | | | |
| MWAW | 0.54 | -0.19 | 1.00 | |
| | (0.00) | (0.31) | | |
| Left2 | 0.05 | 0.01 | -0.56 | 1.00 |
| | (0.80) | (0.97) | (0.00) | |

Table 23: Slovakia

| Variables | Unemp | Output Gap | MWAW | Left2 |
|---|---|---|---|---|
| Unemp | 1.00 | | | |
| Output Gap | -0.84 | 1.00 | | |
| | (0.00) | | | |
| MWAW | 0.28 | -0.29 | 1.00 | |
| | (0.25) | (0.25) | | |
| Left2 | -0.52 | 0.57 | -0.08 | 1.00 |
| | (0.02) | (0.01) | (0.73) | |

Table 24: Spain

| Variables | Unemp | Output Gap | MWAW | Left2 |
|---|---|---|---|---|
| Unemp | 1.00 | | | |
| Output Gap | -0.74 | 1.00 | | |
| | (0.00) | | | |
| MWAW | 0.86 | -0.43 | 1.00 | |
| | (0.01) | (0.33) | | |
| Left2 | -0.44 | 0.38 | -0.05 | 1.00 |
| | (0.06) | (0.13) | (0.92) | |

Table 25: United Kingdom

| Variables | Unemp | Output Gap | MWAW | Left2 |
|---|---|---|---|---|
| Unemp | 1.00 | | | |
| Output Gap | -0.59 | 1.00 | | |
| | (0.00) | | | |
| MWAW | 0.12 | -0.46 | 1.00 | |
| | (0.53) | (0.01) | | |
| Left2 | 0.29 | 0.06 | 0.11 | 1.00 |
| | (0.11) | (0.75) | (0.56) | |

Table 26: IV estimations: Kaitz Index instrumented with the left orientation

| | (1) EmpY | (2) EmpY | (3) EmpM | (4) EmpM | (5) EmpO | (6) EmpO |
|---|---|---|---|---|---|---|
| lagMWAW | 3.37** | 3.04** | 0.46 | 0.86* | -0.41 | -0.77 |
| | (2.49) | (2.37) | (0.72) | (1.75) | (-0.73) | (-1.34) |
| lagMWAW× lagMWAW | -4.44*** | -4.15*** | -1.06 | -1.39** | 0.62 | 0.88 |
| | (-2.67) | (-2.59) | (-1.27) | (-2.16) | (0.96) | (1.48) |
| AWP | -0.07 | -0.07* | -0.02 | -0.03*** | 0.03 | 0.00 |
| | (-1.15) | (-1.82) | (-0.43) | (-4.73) | (0.61) | (0.02) |
| Hiring Cost | 0.05 | 0.07 | 0.01 | 0.00 | -0.07 | -0.04 |
| | (0.54) | (0.91) | (0.18) | (0.02) | (-1.41) | (-1.07) |
| GRR | -0.05 | -0.00 | 0.00 | -0.02 | -0.08* | -0.08 |
| | (-0.73) | (-0.05) | (0.03) | (-1.58) | (-1.89) | (-1.34) |
| Unemployment | -1.41*** | -1.19** | -0.87*** | -0.82 | -0.61*** | -0.72 |
| | (-5.58) | (-2.10) | (-6.54) | (-0.44) | (-3.93) | (-1.11) |
| Conscription | 0.06 | 0.07 | 0.03 | 0.00 | -0.01 | -0.05 |
| | (0.46) | (0.76) | (0.68) | (0.16) | (-0.38) | (-0.61) |
| Collective Bargaining | 0.06 | 0.06 | 0.01 | -0.01 | -0.07 | -0.08 |
| | (0.56) | (0.90) | (0.18) | (-0.46) | (-1.03) | (-0.78) |
| PRY | -0.88 | -1.58 | | | | |
| | (-0.89) | (-0.49) | | | | |
| PRM | | | 0.69 | 0.79 | | |
| | | | (1.20) | (0.09) | | |
| PRO | | | | | 1.09* | 0.69 |
| | | | | | (1.86) | (0.24) |
| Constant | -0.51 | -1.36 | 0.92 | 0.66** | 0.74 | -0.01 |
| | (-0.51) | (-0.93) | (1.28) | (2.21) | (0.81) | (-0.00) |
| FE | YES | YES | YES | YES | YES | YES |
| Time effects | NO | YES | NO | YES | NO | YES |
| N | 228 | 228 | 228 | 228 | 228 | 228 |
| K-P Wald F | 694.37 | 779.68 | 590.51 | 940.76 | 490.55 | 867.66 |
| Hansen J p-val | 0.80 | 0.84 | 0.37 | 0.27 | 0.21 | 0.26 |

Robust clustered SE, z-Stats in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 27: Weighted estimations

| | (1) EmpY | (2) EmpY | (3) EmpM | (4) EmpM | (5) EmpO | (6) EmpO |
|---|---|---|---|---|---|---|
| lagMWAW | 2.45 *** | 2.59 *** | 0.81 | 0.58 | -0.08 | 1.44*** |
| | (4.70) | (2.58) | (1.22) | (1.41) | (-0.10) | (4.50) |
| lagMWAW × lagMWAW | -3.51** | -3.67* | -1.26 | -1.01* | 0.23 | -1.65*** |
| | (-2.34) | (-1.80) | (-1.57) | (-1.93) | (0.28) | (-4.34) |
| AWP | -0.05*** | -0.04*** | 0.02*** | -0.02*** | -0.01 | -0.03 |
| | (-6.11) | (-3.54) | (2.76) | (-5.83) | (-0.72) | (-1.37) |
| Hiring Cost | -0.01 | -0.01 | -0.01 | -0.00 | -0.03** | -0.02** |
| | (-0.48) | (-0.69) | (-1.28) | (-0.57) | (-2.24) | (-2.23) |
| GRR | -0.07*** | -0.06*** | -0.02*** | -0.02*** | -0.04** | -0.03** |
| | (-3.12) | (-2.60) | (-3.80) | (-3.03) | (-2.54) | (-2.07) |
| Unemployment | -1.08*** | -0.96*** | -0.79*** | -0.75*** | -0.25** | -0.27** |
| | (-10.28) | (-8.27) | (-17.72) | (-15.49) | (-2.43) | (-1.98) |
| Conscription | -0.00 | -0.00 | 0.00 | 0.00 | 0.01 | -0.00 |
| | (-0.42) | (-0.40) | (0.16) | (0.98) | (0.90) | (-0.63) |
| Collective Bargaining | 0.03** | 0.03** | -0.00 | -0.00 | -0.02** | -0.01*** |
| | (2.49) | (2.33) | (-0.53) | (-0.73) | (-2.28) | (-3.00) |
| PRY | 0.27 | 0.00 | | | | |
| | (1.06) | (0.01) | | | | |
| PRM | | | 0.41** | 0.12 | | |
| | | | (2.53) | (1.55) | | |
| PRO | | | | | 1.32*** | 0.89** |
| | | | | | (3.23) | (2.52) |
| Constant | 0.05 | 0.04 | 0.41** | 0.71*** | 0.25 | 0.12 |
| | (0.21) | (0.14) | (2.36) | (7.02) | (1.63) | (1.34) |
| FE | YES | YES | YES | YES | YES | YES |
| Time effects | NO | YES | NO | YES | NO | YES |
| N | 228 | 228 | 228 | 228 | 228 | 228 |
| K-P Wald F | 59.90 | 92.16 | 387.49 | 196.07 | 123.67 | 69.05 |
| Hansen J p-val | 0.54 | 0.24 | 0.54 | 0.38 | 0.76 | 0.27 |

Robust clustered SE, z-Stats in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 28: Estimations with Minimum Wage to Median Wage ratio

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | EmpY | EmpY | EmpM | EmpM | EmpO | EmpO |
| lagMWMW | 1.37*** | 1.52*** | -0.10 | 0.19 | 1.44* | 1.30* |
| | (2.78) | (3.98) | (-0.28) | (0.63) | (1.91) | (1.65) |
| lagMWMW × lagMWMW | -1.27* | -1.11 | 0.04 | -0.23 | -1.37*** | -1.51*** |
| | (-1.80) | (-1.50) | (0.11) | (-0.80) | (-2.97) | (-4.23) |
| AWP | -0.04*** | -0.05*** | 0.02** | -0.03*** | 0.00 | -0.01 |
| | (-3.49) | (-3.08) | (2.34) | (-4.42) | (0.33) | (-0.39) |
| GRR | -0.09*** | -0.10*** | -0.03** | -0.03*** | -0.03** | -0.03*** |
| | (-4.62) | (-5.54) | (-2.41) | (-4.02) | (-1.98) | (-3.15) |
| Hiring Cost | -0.02 | -0.02 | -0.02** | -0.01 | -0.03*** | -0.03*** |
| | (-1.13) | (-0.84) | (-2.13) | (-0.87) | (-2.72) | (-4.07) |
| Unemployment | -1.25*** | -1.15*** | -0.80*** | -0.82*** | -0.37*** | -0.53*** |
| | (-6.52) | (-6.75) | (-8.99) | (-11.91) | (-3.42) | (-3.31) |
| Conscription | -0.03* | -0.03* | -0.01 | -0.01 | -0.00 | -0.01 |
| | (-1.70) | (-1.69) | (-0.94) | (-0.86) | (-0.02) | (-1.34) |
| Collective Bargaining | -0.01 | -0.01 | -0.01** | -0.01*** | -0.01** | -0.01*** |
| | (-0.87) | (-0.86) | (-2.38) | (-2.97) | (-2.07) | (-2.89) |
| PRY | -0.65 | -0.66 | | | | |
| | (-0.95) | (-1.02) | | | | |
| PRM | | | 0.56*** | 0.21*** | | |
| | | | (3.87) | (2.76) | | |
| PRO | | | | | 1.37*** | 0.89*** |
| | | | | | (2.78) | (3.00) |
| Constant | 0.38 | 0.26 | 0.53** | 0.63*** | 0.01 | -0.09 |
| | (1.34) | (1.02) | (2.36) | (7.10) | (0.04) | (-0.67) |
| FE | YES | YES | YES | YES | YES | YES |
| Time effects | NO | YES | NO | YES | NO | YES |
| N | 228 | 228 | 228 | 228 | 228 | 228 |
| K-P Wald F | 1691.41 | 1842.31 | 1700.58 | 1710.74 | 1671.06 | 1605.14 |
| Hansen J p-val | 0.26 | 0.22 | 0.47 | 0.16 | 0.07 | 0.13 |

Robust clustered SE, z-Stats in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$