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 the employment rate of young individuals, taking into account potential nonlinearity. In a cross-country set-up of European countries, we find a significant nonlinear relationship between minimum wages and the employment rate of young individuals. While low minimum wages can indeed have positive effects on employment, after a certain level of the minimum wage the employment effect turns to be negative. This implies that there is an optimal level of minimum wages that maximizes the employment rate of young individuals.

We additionally show that the negative effect of minimum wages on employment of young workers is stronger if labor markets are otherwise strictly regulated and when workers are relatively unproductive. Using these results, we are able to calculate country specific turning points and show that some European countries in our sample might in fact contribute to high unemployment rates among young individuals by setting minimum wages too high. While in other European countries, especially in Eastern European countries, an increase in minimum wages (up to a certain level) might even lead to higher employment rates of young individuals.

JEL Classification: J20, J38, J48

Keywords: minimum wage, employment, young workers, Europe

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 concerning today's labor market policies.

While many studies have suggested that increases in the minimum wage negatively impact employment, other studies have suggested positive effects. Recent theoretical research has stated that there is a positive effect of higher minimum wages on the supply side, while they have negative effects on the demand side, which suggests that the effect might in fact be non-linear. That is, there is a positive effect

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of minimum wages on employment as long as they are low, but as minimum wages rise, the negative effect will dominate the positive one.

In general, the employment effects of minimum wages should be especially strong for young individuals, since they are less experienced and therefore more likely to be affected by minimum wages. As Gorry (2013) showed, the effects of minimum wage increases on (un)employment are nonlinear in age and are especially high for young individuals with no experience. [2]

Manning et al. (2016) recently stated: "Of course there is some level of the minimum wage at which employment will decline significantly. The literature should re-orient itself towards trying to find that point." This is exactly the aim of this paper. First, we estimate the effects of changes in the minimum wage on the employment rate of young individuals in a selection of European countries, starting from the hypothesis that this effect might be nonlinear. Second, we estimate the level of minimum wage, at which the negative employment effect dominates the positive one, making the overall effect negative. Third, we take a closer look on whether labor-market characteristics can influence this turning point.

Theoretical research by Brown et al. (2014b)[3] serves as a baseline model for our predictions. This reasearch showed that higher wages depress the "job offer rate", while increasing the "job acceptance rate", since the value of work relative to unemployment increases. Therefore, the authors argue that "under moderate minimum wages, the latter effect may dominate the former." This is exactly the possibility of a nonlinear relationship in which we are interested.[4]

Keeping this theoretical approach in mind, we estimate whether the employment effects of an increase in the minimum wage might in fact be nonlinear, with increase from lower wages stimulating employment, whereas this effect is reversed once the wage is set too high. To anticipate the main results, we show that low minimum wages might induce employment for young individuals, while indeed reducing their employment possibilities once minimum wages reach a certain level.

Additionally, we take a closer look at country-specific labor-market characteristics, such as productivity, hiring costs, and gross replacement rates for the unemployed. We show that those characteristics significantly affect the turning point above which the employment effect of minimum wages turns negative.

While most empirical research has assumed there is a linear employment effect of minimum-wage increases within countries that might differ in terms of their institutional labor-market settings and

[2]Gorry (2013) show in a dynamic general equilibrium framework that "...the effects of a minimum wage are initially large and die out over time as workers gain experience."

[3]For a longer version of this work, please consult Brown et al. (2014a).

[4]Several other models have predicted that minimum wages have ambigous employment and welfare effects (e.g., Flinn 2006). Since in this work we abstract away from welfare considerations, we focus on the simplified framework of Brown et al. (2014b).

proportion of low-skilled and/or young workers, our analysis contributes to the discussion in several ways. Firstly, we take supply-side effects of minimum wages into account, we directly estimating whether the theoretically predicted nonlinear effects of minimum wages have evidence in the case of European countries. Explicit analysis of a nonlinear relationship could explain not only insignificant, but also heterogeneous results from previous work on the employment effects of minimum wages. Secondly, we carefully approach and correct for potential endogeneity of the covariates, for which many studies have not accounted. Finally, we estimate employment elasticities on a country–by–country basis, which allows us to formulate policy recommendations. While in many European countries, especially in Eastern Europe, minimum wages could be increased without harming employment rates of young individuals, in some others, such as Belgium, France, the Netherlands and Ireland, minimum wages already are above their turning point, indicating raises have a negative effect on the employment rates of young individuals.

This paper is structured as follows. In Section I, we give a short overview of the literature. Section II briefly presents the theoretical model and hypotheses for the empirical study. Section III presents the empirical model and the data. Afterwards, the empirical findings and a robustness analysis are discussed in Section IV. Finally, Section V concludes the paper.

I. LITERATURE OVERVIEW

There is a vast micro-data analysis of the effects of minimum wages on employment. Neumark and Wascher (2006) broadly overviewed minimum wage studies which estimate employment effects. However, even though a number of studies analyze cross-country time-series of the employment effects of different labor-market policies, comparatively few works have focused specifically on the effect of minimum wage.

The OECD (1998) analyzed minimum-wage effects on the employment of three specific groups: teenagers, young adults, and prime-age adults. The authors used a panel of nine OECD countries between 1975 and 1996. The regression model followed the state-panel models used in the U.S. minimum-wage literature (e.g., Burkhauser et al. 2000, Keil et al. 2001, Partridge and Partridge 1999). The results showed 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 were ambiguous.

Another study, from Neumark and Wascher (2004), combined the methodology of the OECD study with some additional data on different labor-market institutions and policies that might influence employment rates of young individuals, with a panel that includes 17 countries from 1976 until 2000. For all specifications, the results for teenagers as well as for youth suggest that an increase in the

minimum wage has a negative employment effect. Additionally, Neumark and Wascher (2004) estimate the effects of bargaining and subminima for young employees. While bargained minimum wages and youth subminima weaken the 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) used a panel of 16 OECD countries and looked at the period between 1970 and 2008. They estimated the employment effects of a minimum wage increase not for teenagers and young adults but for female, prime-age workers. Their results were in line with the findings of Neumark and Wascher (2004), suggesting a negative employment effect on prime-age women. 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-estimated the results of Neumark and Wascher (2004) by using panel data for 33 OECD countries from 1976 to 2008. The model they used is similar to that of Neumark and Wascher (2004), except for additional controls for the aggregated labor-market situation. Their results were in line with the findings of Neumark and Wascher (2004), suggesting that changes in the minimum wage have a negative employment effect. As a robustness test, the authors suggested using a weighted regression technique in order to control for differently sized labor markets by country. When the authors used this estimation technique, they found that a minimum-wage increase had neither a significant negative nor a significant positive employment effect. Most recently, for the European Union, Laporšek (2013) found a negative effect of minimum wages on youth employment.

II. 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. (2014b). 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", leading to lower employment. This is called the "job-offer effect" and can be summarized by the formula

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

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 worker's productivity and negatively on the wage level, as well as on hiring costs.

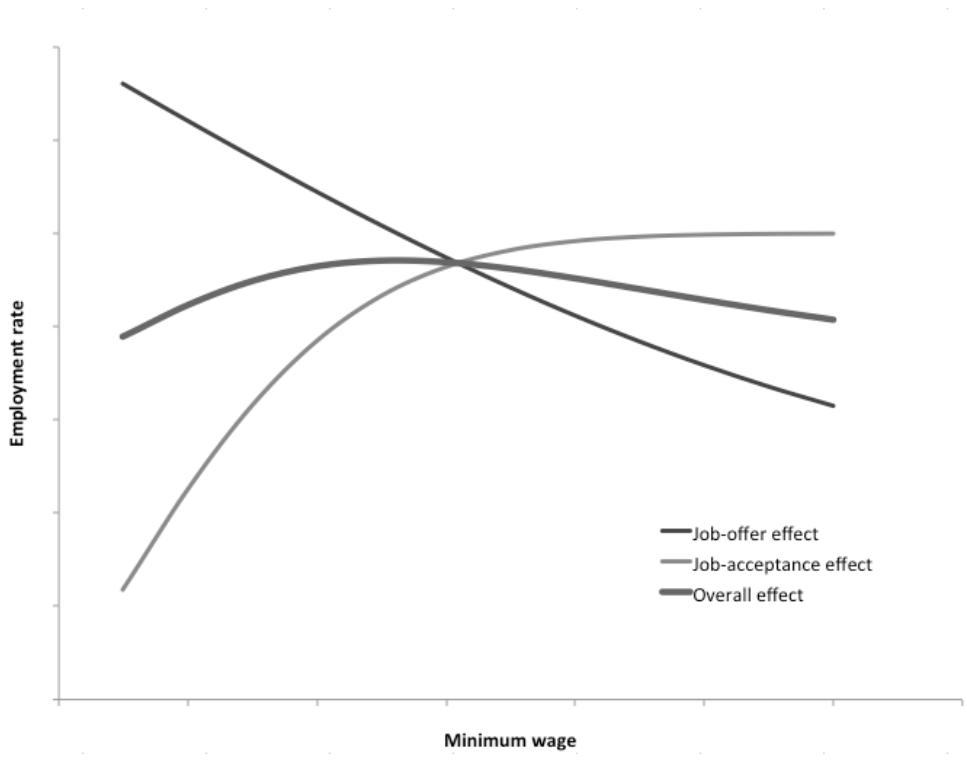
On the other hand, some workers are willing to work for the new (higher) equilibrium wage, because it is now above their reservation wages, so the job-acceptance rate increases. This leads to higher employment. This is called the "job-acceptance effect," given by

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

where J_e is the cumulative distribution of the work effort disutility shock and b stands for the unemployment benefit level. Clearly, job acceptance positively depends on the wage level and negatively depends on the level of unemployment benefits b. The "job-acceptance effect" is limited at a certain level, since the job-acceptance rate would reach 100 percent, with a sufficiently high minimum wage. [5].

The two effects countervail each other, and a non-linear, inverted U-shaped overall effect is predicted. Figure 1 shows example shapes of the two effects given that job suitability and work effort disutility are normally distributed.

Figure 1: Job-offer, job-acceptance, and the overall effect



The theoretical predictions of Brown et al. (2014b) also allow us to formulate hypotheses concerning the signs of the effects of particular labor-market institutions on employment. As the job-acceptance

[5]Brown et al. (2014a): "For lower labor-demand elasticities, the job acceptance effect is dominant for small minimum wage increases. But after some moderate increase of the minimum wage, the job acceptance rate (which is calibrated to 71%) reaches its upper bound of 100%. Thus, the job acceptance effect is no longer at work and the job offer effect starts dominating.

effect might dominate the job-offer effect for lower wages, and because the opposite might be true for case with higher minimum wages, we expect the relationship between the level of the minimum wage and employment rates of young individuals to have an inverted-U shape. Additional inspection of (1) and (2) allows us to form hypotheses concerning how other labor-market characteristics affect employment, as well as concerning the interactions between hiring costs, unemployment benefits, and worker productivity, and the minimum wage. We expect hiring costs, as well as unemployment benefits, to decrease overall employment rates, whereas the worker productivity is expected to increase employment.

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

Table 1: Predicted effects minimum wages and other labor market characteristics on the employment rates of young individuals.

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)

III. DATA AND THE EMPIRICAL MODEL

III.I. Data

Our panel compraises data on 12 EU countries with statutory minimum wages over the period 1980-2011.[6] To capture changes in the minimum wage, we first employ real annual minimum wages ($RAMW$) adjusted for purchasing power parity. As an additional measure for minimum wage, we use the Kaitz index ($MWAW$), which 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 countries with strict collective-bargaining systems for different economic sectors (e.g., Italy or Austria), as the Kaitz index is not available for these, and furthermore they might additionally

[6]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. Estonia and Slovenia, which also have a statutory minimum wage, had to be excluded for their lack of data on other labor market characteristics.

bias the estimates. Summary statistics of the annual minimum wage and the Kaitz index are presented in Table 7 in the Appendix. Moreover, Figure 8 in the Appendix presents the country-time variation of both measures of the minimum wage. We can observe substantial variation within as well as between the countries in terms of levels of the Kaitz index and real annual minimum wages. This variation allows us to explore our research question.

The main source of the data is the OECD database. Labor force data, including average worker productivity and replacement rates, were taken from the OECD Annual Labour Force Statistics, while the real annual minimum wage and Kaitz index are taken from the OECD Minimum Wage Database.[7] 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 that includes 228 observations. The source for the unbalanced panel arises from different implementation times of statutory minimum wages, not from the availability of the data.[8] The main variables used in the regressions are summarized in Tables 8 and 9 in the Appendix. It could be hypothesized that introduction of a statutory minimum wage is not random but is a result of, for example, economic developments, labor-market conditions, or political decisions. In that case, the resulting attrition would be non-random and the fixed-effects estimator would be inconsistent due to endogenous selection. We therefore test for this potential bias using a variant of the Chamberlain-Mundlak approach to handling unobserved effects. Assume that the introduction of the minimum wage follows

$$s_{it} = 1[\alpha + \mathbf{X}_{it}\beta + \overline{\mathbf{X}}_{it}\gamma + v_{it} \geq 0], \forall t \in (1, \ldots, T), \tag{3}$$

where s_{it} is the existence of a statutory minimum wage and the covariates $\mathbf{X}_{it}$ are observed in all periods, that is, also before the minimum wages had been introduced ($\overline{\mathbf{X}}_{it}$ denotes the country averages). We assume that the error term v_{it} is normally distributed and run a pooled probit model. $\mathbf{X}_{it}$ contains the control variables used later, as well as some additional economic indicators (e.g., the real GDP growth rate). In the next step, we calculate the fitted probabilities and the inverse Mills ratios, denoted $\hat{\lambda}_{it}$, which are added as additional regressors to the fixed-effects estimations on the selected sample.

[7]The original OECD series does not consider the fact that France introduced a 35-hour workweek in 2000. We have readjusted the series to this change. Additionally, the first observation for Ireland was erroneous in the original OECD series and is therefore excluded from the sample.

[8]The start of our time series for the Kaitz index is highlighted in Table 7.

Selection bias can be discarded, if $\hat{\lambda}$ is insignificant; if not, it can be corrected using the Chamberlain's procedure (see Chamberlain 1982).

III.II. The empirical model

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

$$Emp_{i,t} = \alpha + \beta * MW_{i,t-1} + \gamma * MW_{i,t-1}^2 + \delta * H_{i,t} + \zeta * AWP_{i,t} +$$
$$\eta * GRR_{i,t} + \Theta * \mathbf{X}_{i,t} + \tau_t + \alpha_i + \varepsilon_{i,t}, \quad (4)$$

where $Emp_{i,t}$ is the employment rate of young individuals at time t in country i, defined as employed people aged 15 to 24 as a percentage of the total number of people in this age group. $MW_{i,t-1}$ is the lagged minimum wage variable at time $t-1$ in country i proxied first by the Kaitz index ($MWAW$) and second by real annual statutory minimum wage ($RAMW$). $H_{i,t}$ represents the hiring costs measured by the strictness of labor-market regulations (EFW 5B index)[9], which encompasses the following components: whether fixed-term contracts are prohibited for permanent tasks, the maximum cumulative duration of fixed-term contracts and the Global Competitiveness Report question: "The hiring and firing of workers is impeded by regulations" (Gwartney et al. 2014); 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 $\mathbf{X}$ is a vector of the control variables. $PRY_{i,t}$ 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 include the output gap as business cycle control variable[10]. Additionally we control for secondary school enrolment ($SchEn$), 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).[11] 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 some delay, since it takes time for employers to adjust 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

[9]We have rescaled the index so that higher value, denote *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.

[10]The use of other variables such as prime age employment rate or the unemployment rate as controls for the business cycle did not change our results.

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

high level of employment protection in Europe would suggest the use of lagged minimum-wage variable, since as Neumark and Wascher (2004) argued, "One might think that this adjustment process would be even slower in European countries, where legal restrictions on dismissals are generally stricter than in the United States."

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: (1) the average productivity of workers, (2) hiring costs, and (3) the size of unemployment benefits. We then analyze the signs and the strength of the marginal effects of minimum wages for different levels of the other variables of interest.

As mentioned above, one of the main concerns in any analysis of the impact of minimum wages on employment rates of young individuals is potential endogeneity of the main independent variable: that is, the minimum wage itself might be endogenous with respect to employment rates of young individuals, as labor market policies might be introduced specifically to address the changes in labor-market conditions. As Lemos (2005) argued, politicians might favor or oppose minimum wage increases depending on a country's overall macroeconomic performance. Yet, irrespective of politician's reactions to macroeconomic circumstances, changes in 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 a country's economic conditions. We base our identification strategy on this latter observation (c.f. Saint-Paul 1996). Unlike Lemos (2005), however, we do not directly instrument for the minimum wage with political variables, as the latter can be codetermined by economic circumstances, i.e., e.g., voters in a country hit by high unemployment are likely to be unhappy about the performance of the government, and might wish for a change. Similarly, using the electoral cycle might not be fully exogenous, if early elections are called. Therefore, we instead propose a method, which accounts for endogeneity of the political variables.

In the second set of regressions, we make use of the above observations, adopting an instrumenting technique similar to Nunn and Qian (2014). In the first stage, we instrument the minimum wage in the following way:

$$MW_{i,t} = \alpha + \beta * Oilprice_{i,t-1} + \gamma * Oilprice_{i,t-1} \times \overline{Left}_i + \Theta * \mathbf{X}_{i,t} + \tau_t + \alpha_i + \varepsilon_{i,t}. \quad (5)$$

Variable *Oilprice* is the average real crude oil import price per barrell in US dollars[12]. In this specification, *Oilprice* measures the oil price changes, which presumably affect the labor-market situation

[12]The nominal crude oil spot price from 2003 to 2011 is for Dubai and from 1970 to 2002 for Arabian Light.

in country i (see, e.g., Raphael and Winter-Ebmer 2001), which in turn might encourage politicians to introduce changes to the minimum wage regulations. Unlike Raphael and Winter-Ebmer (2001), however, we do not measure exposure directly but simply use the oil price which is entirely exogenous. To obtain country-year varation of the instrument, we follow the interaction approach by Nunn and Qian (2014). The second term is an interaction between the oil price and the *average* left-wing orientation of the government over the analyzed period. Data regarding the political orientation of cabinets are provided by the Comparative Political Data Set (Armingeon et al. 2012) and include information on the relative power position of social democratic and other left-wing parties in government based on their seat shares in parliament, measured as a percentage of the total parliamentary seat shares of all governing parties and weighted by the number of days in office in a given year. Given that changes in government might be a reaction to changing economic circumstances, time-varying orientation of the government is not exogenous. However, since we average out changes in government composition over time, average orientation will be fully captured by the country fixed effects.[13] The interaction term itself varies by country and year, which allows us to control for time fixed effects. Conceptually, instrumenting for the minimum wage in this way, compares changes in the minimum wages between countries which are dominated by left-wing governments and countries which are right-wing-oriented, following changes in world oil prices.

With this technique we can make sure that the causation does not run from the employment to the minimum wage (via the changes in the government composition or its policy). Causal interpretation using the interacted instrumental variable relies on an exclusion restriction that, conditional on other labor-market characteristics, changes in the employment rates of young individuals following changes in oil prices do not systematically differ between countries with left- and right-wing-oriented governments. One potential channel could theoretically be the higher propensity of left-wing-oriented countries to use renewable energy and therefore reduce oil consumption. In our sample, this does not seem to be the case, as correlation between oil imports over GDP and left orientation is low, at 3.2% (p-value of 0.60). Other channels, such as the general alignment of the labor markets, are captured either through the variables describing the time-changing alignment of the labor markets, i.e., replacement rates, collective bargaining and the hiring cost index, or by the country fixed effects[14]. Moreover, since we directly analyze the interaction of minimum wages with other labor market characteristics, we can capture a large part of the latter transmission channel.

[13] That is why, we also do not include the $\overline{Left}_i$ term in the regression.

[14] We cannot fully exclude the possibility that world economic developments, such as oil prices, affect the included labor market policies. Yet, these are not the main focus of this paper, so instrumenting for them is overzealous.

The first-stage estimates are then used to instrument the minimum wages and their squared values. To avoid the "forbidden regression" problem, we proceed as follows: we derive the fitted values from the first-stage estimations and generate squared values of those, which are subsequently, together with the $Oilprice_{i,t-1}$ and $Oilprice_{i,t-1} \times \overline{Left}_i$, used as *instruments* in the second stage[15]. That is, we instrument $MW_{i,t}$ and $MW_{i,t}^2$ with $Oilprice_{i,t-1}$, $Oilprice_{i,t-1} \times \overline{Left}_i$, and $\widehat{MW}_{i,t}^2$. The latter term adds a nonlinear function of the exogenous variables to the instrument set. Similarly, interactions between the minimum wage and other analyzed characteristics, are instrumented with an interaction between the exogenous variables and the instrument. In all IV regressions, we use the Limited Information Maximum Likelihood estimator (LIML), which performs better when the instruments are weak[16]. 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, Hahn and Inoue 2002). 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).

Alternatively, we could use the control function approach to tackle the nonlinearity of the endogenous variable (see, e.g., Wooldridge 2015). Control function is likely to be more efficient, but is less robust as it requires more strict linearity assumptions. We report the control function estimates in the robustness section.

It is helpful to understand the properties of our instruments by looking at the "first–stage" estimations, which can be found in Table 14 in the Appendix. Looking at the first column, we see that an increase in the world oil price is associated with lower minimum wages. Conversely, an interacted left orientation of the government shows a positive correlation, which means that when an oil price shock is followed by an economic downturn and potentially lower minimum wages, this effect is weaker in countries with left-oriented governments on average. On the other hand, the Kaitz index is not strongly correlated with oil prices. This, in fact, further confirms that the instrument actually reflects changes to the labor market: if the minimum wage were lowered as a result of an economic downturn,

[15]See Wooldridge (2010, pp. 262)

[16]The results of the LIML estimation are comparable with the 2SLS estimates, which can be obtained upon request.

this same downturn would cause the average wages in the economy to go down, so that in such a case the Kaitz index itself would not change. On the other hand, a left-wing orientation of the government, similarly to the annual minimum wage variable, reduces the negative effects of economic circumstances on the minimum wage.

Regarding the strengh of the instruments, interpretation of the test results is not straightforward, as the test statisticts of Kleibergen and Paap (2006) cannot be directly compared to the critical values of Stock and Yogo (2005), which do not account for clustering of the standard errors. Nevertheless, we report the results of the the maximal LIML bias test based on Stock and Yogo (2005). In most cases, our instruments are associated with maximal bias of 10% for the case of the minimum wage variable, and slightly higher for the real annual minimum wage.

Another methodological issue is that the employment rate of young individuals is an average of specific microdata regarding the employment of individuals. 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. Essentially, if we do not weight the estimations, we explicitly assume that we should attach as much weight to a small country, such as Estonia, as to a large country, such as France or the United Kingdom. Dolton and Bondibene (2011) mentioned that the use of a weighted regression might be a solution to this problem, specifically weighting by the number of raw data points that are used to calculate the averages.[17] 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 in each country.

Additionally, we demonstrate the relationship between the current minimum wage and employment rates of young individuals. Previous studies of the United States and Canada have suggested that the employment effects of minimum wages take at least a year to be fully reflected in the data, presumably because of the time it takes employers to adjust factor inputs to changes in factor prices (see, e.g., Neumark and Wascher 1992, Baker et al. 1999). One might think that this adjustment process would be even slower in European countries, where legal restrictions on dismissals are generally stricter than in the United States. We are convinced that the lagged specification corresponds better to rigid European labor markets. Still in order to analyze the sensitivity of the results to this arbitrary assumption, we reassess the result using current instead of lagging 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 based on the

[17] We weight the regressions with raw data points that are used to calculate the average (or the labor market size), but we do not weight by the population of the country (Dolton and Bondibene 2011). Population might not be an appropriate weight, since population size is not necessarily a good proxy for labor market size, because retirement age differs widely across countries and, additionally, countries' demographic structure are not the same.

leverage statistic and the Cook distance. The leverage needs to be lower than $3k/N \simeq 0.73$, while Cook's distance needs to be lower than $4/N \simeq 0.018$. We drop those observations which do not satisfy these requirements and reestimate the results.

A final robustness check would involve a dynamic specification, which could better capture short-run developments in the labor market. (Un-)Employment rates in European countries tend to be persistent due to, if nothing else, comparably high degree of unionization (see, e.g., Lindbeck and Snower 1987). This means, that besides the effect of changes in the minimum wages on the employment rate of young individuals, it is itself likely to be highly dependent on its past levels. In this robustness check, we want account for this fact, and prove whether the identified effects still remain visible.

IV. EMPIRICAL FINDINGS

In this section, we present the main results concerning 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 weighted regressions and other robustness checks. Since we use not only the real annual minimum wage but also the Kaitz index as dependent variables, an important first step in this analysis involves evaluating whether the relationship between the minimum and average wages is indeed positive and linear in order to rule out the possibility that the non-linear effect works through the average wage channel.

Figure 2 visualizes the relationship between annual minimum and annual average wages for all countries in the sample, showing, the between-country effect. Figure 2 shows a strong, positive, and linear relationship between annual minimum and annual average wages. A slighly weaker relationship can be observed only for the case of the Netherlands, where the average wage increased over the whole period while the minimum wage remained relatively constant.

Figure 3 shows the relationship between the demeaned mininum and average wages, that is each data point corresponds to the difference between the minimum (average) wage and the country mean over the whole period. This representation may be directly interpretated in light of the fixed-effects model, as will be estimated. A clear linear relationship between the demeaned minimum and average wages indicates that the non-linearity does not enter through the within-country, non-linear relationship, strongly suggesting that our results are not driven by underlying nonlinearities.

Figure 2: Relationship between average and minimum wages in our sample

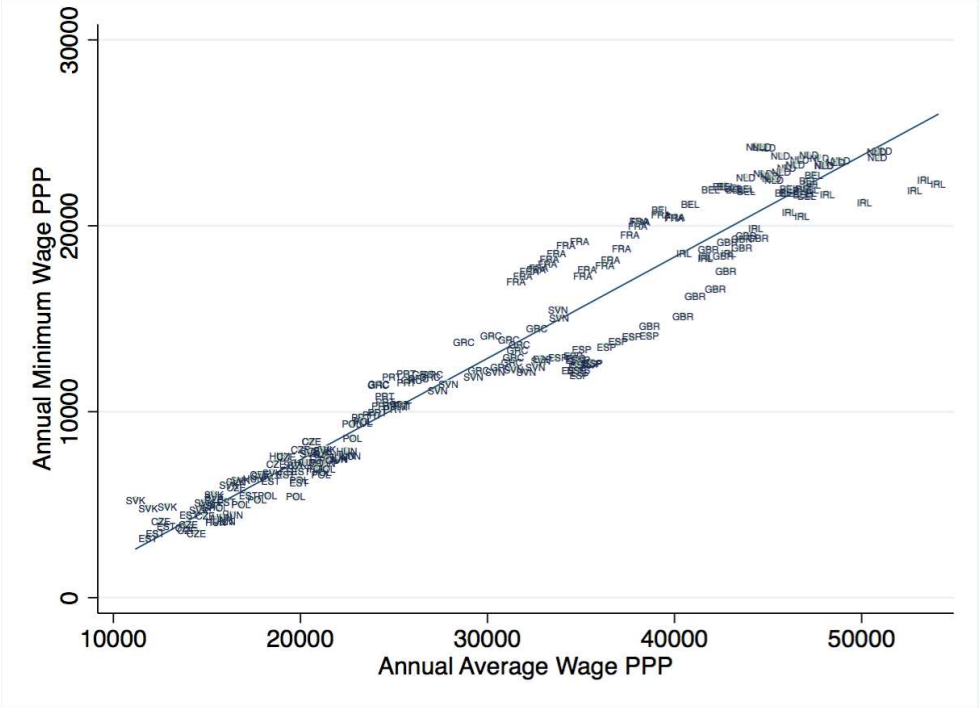
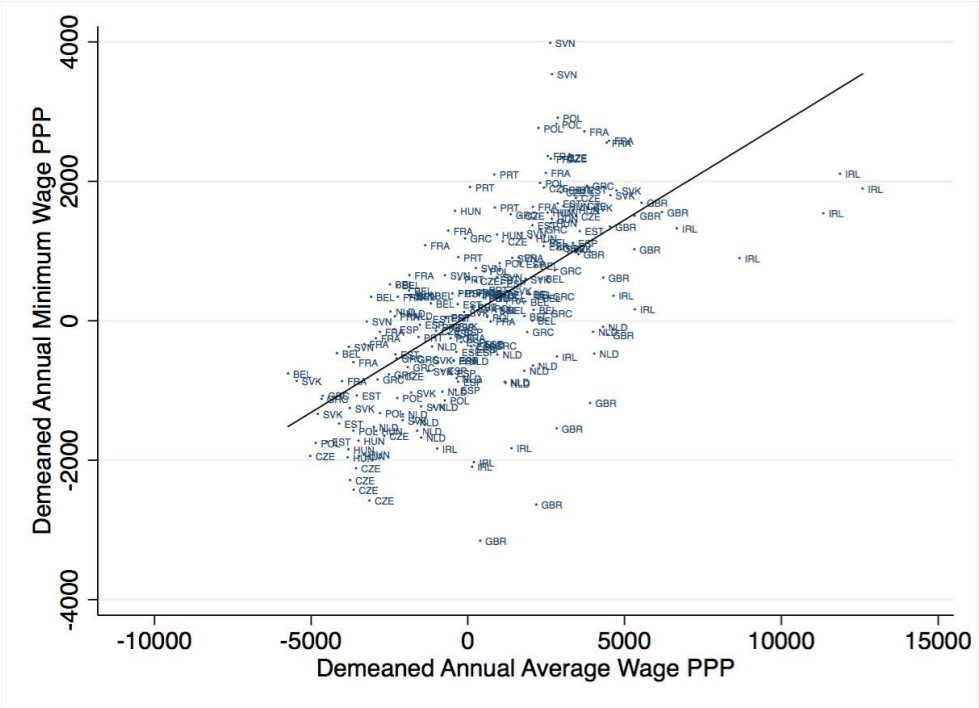


Figure 3: Relationship between demeaned average and minimum wages in our sample.



IV.I. Main findings

Table 2 presents different specifications, both controlling for time effects and allowing for country-specific trends.[18] As a dependent variable, the Kaitz index may suffer from potential endogeneity, since, as Card et al. (1993) highlighted, high average wages are often accompanied by high employment, which would result in a negative bias of the estimates. Despite controlling for general employment trends, in order to further rule out the possibility that the results are driven by the denominator of the Kaitz index, we reestimate all equations, taking as a dependent variable the level of the annual statutory minimum wage. We use both the Kaitz index –(in Columns (1) and (2)) – and the annual statutory minimum wage – (in Columns (3) and (4)) – as variables measuring the minimum wage level. The elasticities are evaluated at the averages.

Table 2 reveals a nonlinear relationship between the minimum wage and employment for young workers. At lower levels of the minimum wage, the predicted level of employment rises along with the wage level; beyond a turning point, the relationship inverses, with additional increases in the minimum wages having a detrimental effect on employment rates of young individuals. This result is consistent with the theory of Brown et al. (2014b). Using these estimates, we can calculate the effects of a change in minimum wages on predicted employment at each value of the minimum wage. These results are visualized in Figure 4,[19] which presents the relationship between minimum wages and the predicted employment rates of young individuals. In other words, the slope of the curve at each point represents the marginal effect of a change in the minimum wage on employment rates of young individuals. Please note that, in all specifications presented in Tables 2, $\hat{\lambda}$ is insignificant, which leads us to conclude that there are no reasons to believe that sample selection has meaningfully biased the estimates.

Reflecting the regression coefficients, predicted employment shown in Figure 4 changes nonlinearly along with minimum wages. The turning points of the nonlinerity are summarized in Table 3.

As expected, given that both the minimum wages and the employment rates of young individuals are jointly determined, the OLS regression underestimates (the absolute value of) both the linear and the squared coefficients. Consequently, the predicted relationship is steeper when we consider the IV estimation (blue line). Moreover, the turning point in the IV case is shifted to the right, which means that although both the positive relationship at lower levels of the minimum wage and the negative relationship at higher levels are underestimated, the bias of the positive linear term is larger.

[18]The 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 such trends greatly impacts the estimated results. Although, on the other hand, Meer and West (2013) argued that controlling for trends can bias the results, it is important to understand the sensitivity of the coefficients to this component's inclusion.

[19]For better readibility of the figure, the confidence intervals of the predictions have been suppressed.

Table 2: Employment rates of young individuals - basic results (Columns (1)-(4)) and the IV specification (Columns (5)-(8))

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
lagMWAW	1.91**	1.73**			6.02***	9.50**		
	(2.39)	(2.36)			(4.41)	(2.50)		
lagMWAW × lagMWAW	-2.40***	-2.59***		-6.20***	-9.81**			
	(-2.60)	(-2.71)			(-5.22)	(-2.56)		
lagRAMW			0.37***	0.18*			1.30*	1.30
			(5.16)	(1.90)			(1.93)	(1.47)
lagRAMW × lagRAMW			-0.12***	-0.07***		-0.27***	-0.37	
			(-5.69)	(-2.97)			(-2.96)	(-1.56)
AWP	-0.00	-0.02**	-0.03***	-0.03***	-0.00	0.05	-0.09*	-0.06**
	(-0.49)	(-2.28)	(-7.14)	(-2.66)	(-0.04)	(1.18)	(-1.80)	(-2.47)
H	0.00	-0.03	-0.00	-0.03*	0.03*	-0.06**	-0.01	-0.02
	(0.48)	(-1.47)	(-0.24)	(-1.77)	(1.86)	(-2.05)	(-0.98)	(-1.21)
GRR	-0.04***	-0.04***	-0.05***	-0.03*	-0.05***	-0.04**	-0.05***	-0.03***
	(-3.64)	(-3.80)	(-5.85)	(-1.88)	(-6.02)	(-2.14)	(-4.47)	(-2.63)
Conscription	0.00	-0.01	-0.00	-0.01*	-0.02	-0.03**	-0.02	0.02
	(0.03)	(-1.45)	(-0.30)	(-1.67)	(-1.29)	(-2.12)	(-1.17)	(1.13)
Bargaining	0.02**	0.01	0.02***	0.00	0.02*	-0.00	0.02	0.01
	(2.29)	(1.40)	(2.71)	(0.49)	(1.80)	(-0.03)	(1.19)	(0.73)
PRY	0.38	-0.41	0.69*	-0.01	0.01	0.28	0.51	1.82
	(1.07)	(-1.10)	(1.69)	(-0.01)	(0.02)	(0.70)	(1.23)	(1.09)
Recession	0.00	-0.00	0.01	-0.00	-0.00	-0.00	-0.01	0.00
	(0.66)	(-0.80)	(1.53)	(-0.59)	(-0.25)	(-0.35)	(-0.56)	(0.06)
Output Gap	0.00	0.00	-0.00	0.00	0.01*	0.00**	-0.00	-0.00
	(0.09)	(0.43)	(-0.30)	(0.58)	(1.87)	(2.16)	(-0.82)	(-0.78)
Secondary School	-0.00*	-0.00	-0.00	-0.00*	-0.00	-0.00**	-0.00	-0.00
	(-1.88)	(-1.09)	(-0.63)	(-1.72)	(-1.43)	(-2.42)	(-1.35)	(-1.09)
Constant	-1.20***	-0.56**	-1.03***	-0.55**	-2.08***	-2.55***	-2.26**	-2.05*
	(-4.89)	(-2.44)	(-7.13)	(-2.02)	(-5.79)	(-2.74)	(-2.30)	(-1.75)
FE	YES	YES	YES	YES	YES	YES	YES	YES
Time effects	YES	NO	YES	NO	YES	NO	YES	NO
Country Trend	NO	YES	NO	YES	NO	YES	NO	YES
$\hat{\lambda}$ p-val	0.98	0.12	0.45	0.15	0.44	0.55	0.66	0.56
Elasticity	-0.10	-0.23	-0.15	-0.28				
Elasticity S.E.	(0.16)	(0.17)	(0.13)	(0.11)				
Observations	228	228	228	228	228	228	228	228
K-P Wald F					7.71	4.28	2.08	1.81
Maximal LIML Bias					<10%	<15%	>25%	>25%
Sargan's χ^2 p-val					0.22	0.13	0.06	0.99
Shea's Partial R^2					0.37	0.32	0.11	0.29

Huber/White/sandwich standard errors clustered at country level, t-Stats in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$; the reported Kleibergen and Paap (2006) first-stage statistics consider the clustering of the errors; the maximal LIML bias test is based on Stock and Yogo (2005) critical values.

Figure 4: Effects of minimum wages on predicted employment rates of young individuals – Kaitz index (left panel) and annual wage (right panel)

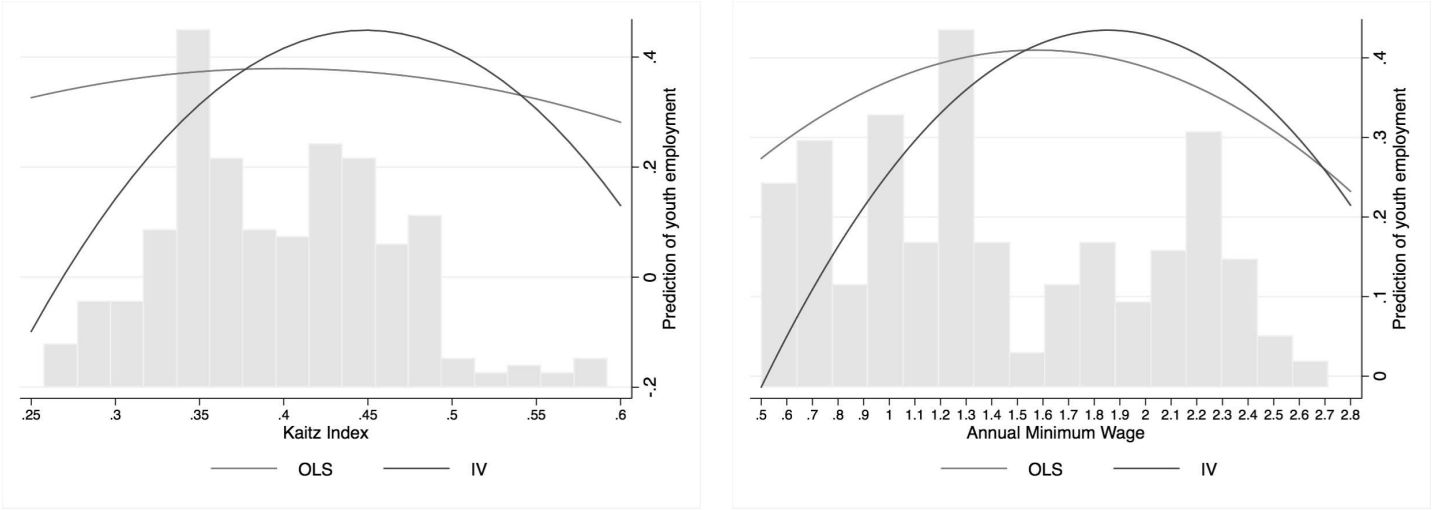


Table 3: Turning points of the employment rate of young individuals in different specifications

	(1)	(2)	(3)	(4)
	Kaitz YE	Kaitz trends	RAMW YE	RAMW trends
OLS	0.39	0.35	1.57	1.27
IV	0.48	0.44	1.85	1.50

The reservation wage plays an important role in the job-acceptance decision. 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, accepting the job offer. The reservation wage is influenced by individual preferences (e.g., work vs. leisure, financial dependence), labor-market policies (e.g., unemployment benefits, minimum wage), and outside options (e.g., education, retirement).

Young workers differ in their job-acceptance cutoffs from older generations. Young cohort members are often not eligible for unemployment benefits, are likelier to tolerate unemployment,[20] and have more outside options than prime-age workers (e.g., can stay longer in education). Moreover, younger workers have a higher probability of receiving a job offer than do older workers (Addison et al. 2004). Nevertheless, since they are in much higher proportion less skilled and have lower wages, an increase in the minimum wage makes employment more attractive to younger workers than to other age groups. Higher minimum wages increase job-acceptance probability, resulting in higher employment. This positive employment effect is counteracted by the negative job-offer effect, as firms facing increased costs for salaries will no longer offer less productive jobs. At low levels of the 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 $15700 (PPP) or at a respective Kaitz index of 0.39. After this threshold, additional increases in the Kaitz index decrease employment. The average real minimum wage is in fact slightly above this turning point, at $15700 (PPP) or a Kaitz index of on average 0.405. On average, in both specifications we would expect a decrease in the employment rate of young individuals if the minimum wage variable increased, notwithstanding the fact that this might not hold true for specific countries.

For all specifications, the estimated average elasticity of employment rates of young individuals with respect to the minimum wage is between -0.15 and -0.28, depending on the specification, and the elasticity of employment to changes in the Kaitz index is estimated between -0.10 and -0.23.[21]. These figures correspond to the previous results for young workers surveyed in Brown (1999) The results here

[20] Cosar (2010): "They have a lower discount rate, which makes them more willing to tolerate unemployment and search for productive matches. On the other hand they forgo learning when unemployed."

[21] Values together with the standard errors are listed in Table 2.

estimate the elasticity of youth employment with respect to the minimum wage between -0.07 and -0.41.[22] It is important to note, however, that previous studies have estimated a linear relationship; the average elasticity estimated here should remain the same compared to previous studies, as the average elasticity of a non-linear relationship would equal the point elasticity at the average wage for the linear estimate. That said, a linear relationship does accurately approximate either part of the non-linear curve. For instance, if we look only at the negatively sloped part of the curve, the linear approximation underestimates the negative effects of minimum wages on employment above the turning point. Moreover, the IV results suggest that the actual turning point lies much more to the right compared to the OLS estimations, implying on average positive elasticities (although insignificant in all specifications).

Hence, it is interesting to see the development of the average point elasticity of employment with respect to minimum wage changes for different reference ranges over the average annual statutory minimum wage of $15700 (PPP). Table 4 highlights the results, which are in line with those previously indicated in the literature.

Table 4: Average point elasticity in the reference ranges below and above the average annual staturory minimum wage

Reference range	-2000USD	-1000USD	+1000USD	+2000USD
Elasticity RAMW	0.106	0.068	-0.070	-0.130
Elasticity MWAW	0.110	0.065	-0.092	-0.155

Still, these are average elasticities; and they can vary for different countries, as we will show in a later subsection.

IV.II. Interaction of minimum wages with other labor-market characteristics

In this subsection, we look more closely at how country-specific labor-market characteristics, such as productivity, hiring costs, and the gross replacement rate for unemployed may alter the employment effects of minimum wages.

Tables 5 and 10 (in the Appendix) present 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 a positive sign, indicating that higher productivity shifts the turning point up,

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

since generally higher productivity of workers allows firms to pay higher wages without decreasing job offers.

The coefficient of the interaction between minimum wages and hiring costs is negative, indicating that an increase in hiring costs would lower the turning point of the minimum wage. An increase in general hiring costs would strengthen the negative job offer effect and would result in a shift to the left of the turning point.

The coefficient of the interaction between minimum wages and the gross replacement rate for unemployed persons is insignificant in most of the specifications, indicating that the effect of the net replacement rate does not affect the job-acceptance rate. One reason could be that young workers are often not eligible for unemployment benefits.

Table 5: Young workers – interactions – Kaitz Index (basic specification in Columns (1)-(6), IV specification in Columns (7)-(12))

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
lagMWAW	1.38**	0.59**	1.76***	1.31***	2.23***	1.32***	8.04	0.48	0.98 *	4.03**	7.35***	1.79**
	(2.37)	(2.23)	(2.59)	(2.94)	(2.70)	(3.47)	(1.00)	(1.14)	(1.66)	(2.23)	(4.90)	(2.00)
lagMWAW × lagMWAW	-1.79**	-0.94***	-2.17***	-1.83***	-2.78***	-1.81***	-8.34	-0.36	-1.50*	-3.97**	-8.46***	-2.08*
	(-2.51)	(-2.73)	(-2.94)	(-3.72)	(-2.96)	(-3.62)	(-1.03)	(-1.10)	(-1.93)	(-2.07)	(-5.40)	(-1.75)
AWP	-0.10***	-0.14***	-0.00	-0.04***	-0.01	-0.03**	0.14	-0.15	-0.08***	-0.01	-0.01	-0.02
	(-2.95)	(-4.15)	(-0.51)	(-4.24)	(-0.61)	(-2.19)	(0.35)	(-1.28)	(-4.59)	(-0.37)	(-0.26)	(-1.23)
H	0.01	-0.04**	0.11***	0.07**	0.00	-0.03	0.03	-0.02	0.21***	0.15	-0.02	-0.01
	(0.89)	(-2.25)	(2.93)	(2.34)	(0.05)	(-1.61)	(1.31)	(-0.81)	(3.40)	(0.91)	(-0.89)	(-0.73)
GRR	-0.03***	-0.03**	-0.02*	-0.03**	-0.07*	-0.07	-0.06**	-0.02**	-0.01	-0.02***	-0.35***	-0.01
	(-2.58)	(-2.04)	(-1.72)	(-2.28)	(-1.69)	(-1.14)	(-2.43)	(-2.09)	(-1.05)	(-3.08)	(-3.01)	(-0.08)
lagMWAW × AWP	0.27***	0.29***					-0.33	0.33				
	(2.65)	(2.94)					(-0.38)	(1.16)				
lagMWAW × H			-0.26***	-0.24***					-0.50***	-0.40		
			(-3.02)	(-3.33)					(-3.06)	(-1.04)		
lagMWAW × GRR					0.07	0.10					0.70***	-0.05
					(0.80)	(0.67)					(2.64)	(-0.16)
Secondary School	-0.00	-0.00**	-0.00	-0.00**	-0.00	-0.00*	-0.00	-0.00**	0.00	-0.00***	-0.00	-0.00**
	(-1.47)	(-2.58)	(-1.43)	(-2.12)	(-1.19)	(-1.95)	(-1.21)	(-2.22)	(0.18)	(-2.58)	(-0.86)	(-2.10)
PRY	0.06	-0.39	0.20	-0.14	0.37	-0.35	0.21	-0.37	0.28	0.26	0.15	-0.24
	(0.19)	(-1.10)	(0.78)	(-0.36)	(1.05)	(-0.87)	(0.33)	(-0.69)	(0.98)	(0.54)	(0.64)	(-0.61)
Conscription	0.00	-0.02***	0.01	-0.01	-0.00	-0.01**	-0.02	-0.01	0.01	-0.01	-0.01	-0.00
	(0.00)	(-2.97)	(0.81)	(-1.37)	(-0.04)	(-2.17)	(-1.00)	(-0.94)	(1.10)	(-0.59)	(-1.10)	(-1.20)
Bargaining	0.02**	0.00	0.03***	0.01	0.02**	0.00	0.02**	-0.01	0.04***	-0.00	0.02***	-0.00
	(2.21)	(0.23)	(3.35)	(1.00)	(2.25)	(0.45)	(2.22)	(-0.84)	(2.92)	(-0.28)	(2.64)	(-0.44)
Recession	0.01	-0.00	0.00	-0.01**	0.00	-0.01	-0.00	-0.00	-0.00	-0.01	0.02***	-0.01
	(1.12)	(-0.57)	(0.23)	(-2.03)	(1.04)	(-1.59)	(-0.82)	(-0.42)	(-0.11)	(-0.94)	(2.66)	(-1.08)
Output Gap	0.00	0.00*	-0.00	0.00*	0.00	0.00	0.01	0.00	0.00	0.00***	0.00	0.00
	(0.11)	(1.88)	(-0.06)	(1.88)	(0.10)	(1.30)	(1.35)	(1.52)	(0.22)	(2.97)	(1.62)	(1.38)
Constant	-1.01***	-0.36**	-1.01***	-0.44**	-1.29***	-0.59***	-2.64	-0.41	-0.53	-1.15**	-2.70***	-0.72***
	(-4.95)	(-2.33)	(-5.05)	(-2.07)	(-5.19)	(-3.34)	(-1.21)	(-0.46)	(-1.19)	(-2.31)	(-4.32)	(-2.72)
FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Time effects	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO
Country trends	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES
Elasticity	-0.08	-0.17	-0.09	-0.26	-0.13	-0.24						
Elasticity S.E.	(0.15)	(0.19)	(0.15)	(0.14)	(0.16)	(0.18)						
K-P Wald F							6.76	7.62	4.96	3.92	7.47	4.70
Maximal LIML Bias							<10%	<10%	<10%	<15%	<10%	<10%
N	228	228	228	228	228	228	228	228	228	228	228	228

Huber/White/sandwich standard errors clustered at country level, t-Stats in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$; the reported Kleibergen and Paap (2006) first-stage statistics consider the clustering of the errors; the maximal LIML bias test is based on Stock and Yogo (2005) critical values.

When adding the interaction term with the squared minimum wage variable (see Tables 16 and 17 in the Appendix), we can see that it is significant in most specifications. This indicates, that not only does the non-linear relation shifts for different levels of productivity, hiring costs, or replacement rates, but also that the curvilinearity between the employment rate of young individuals and the minimum wage is influenced by labor-market institutions.

Marginal effects of minimum wages for different values of AWP and H are presented in Figure 5, which reveals that the negative effect of minimum wages is particularly important when average worker productivity is low. By contrast once productivity increases, the effect turns positive. This empirical finding is again consistent with the theoretical prediction regarding the role of productivity on job offers. From (1), it follows that when a is high compared to the equilibrium wage, job offers might not disappear so easily. Finally, Figure 5 reveals that the negative effect of minimum wages on employment is particularly relevant whenever the job market is strongly regulated, a result which is consistent with our theoretical model. Our results suggest, that when overall level of regulation is low, the additional effect of the minimum wage becomes insignificant.

As mentioned above, in the next step, we allow the curvilinearity to change. Figure 6 shows that the curvilinearity is especially strong, if productivity (AWP) is low. On the other hand, when productivity is high, the curvilinearity almost disappears. This indicates that if workers are very productive, the negative job-offer effect might not be at work at all for low levels of minimum wages; employment might indeed increase at higher minimum-wage levels, because the positive job-acceptance effect simply dominates the negative but weak job-offer effect.

This also holds true for hiring costs. When hiring costs are high, the curvilinear relation becomes steeper, indicating that the negative effects of higher minimum wages are more pronounced when hiring costs are already high. This finding contrasts the findings of Neumark and Wascher (2004). They find that the disemployment effects of minimum wages are strongest in the countries with the least regulated labor markets.

To summarize these findings: productivity and hiring costs significantly influence the negative job-offer effect: a high minimum-wage level in combination with low productivity or high hiring costs strengthens the negative job-offer effect.

Figure 5: Marginal effects of minimum wages on employment rates of young individuals at levels of H and AWP: Kaitz index (top) and annual wage (bottom)

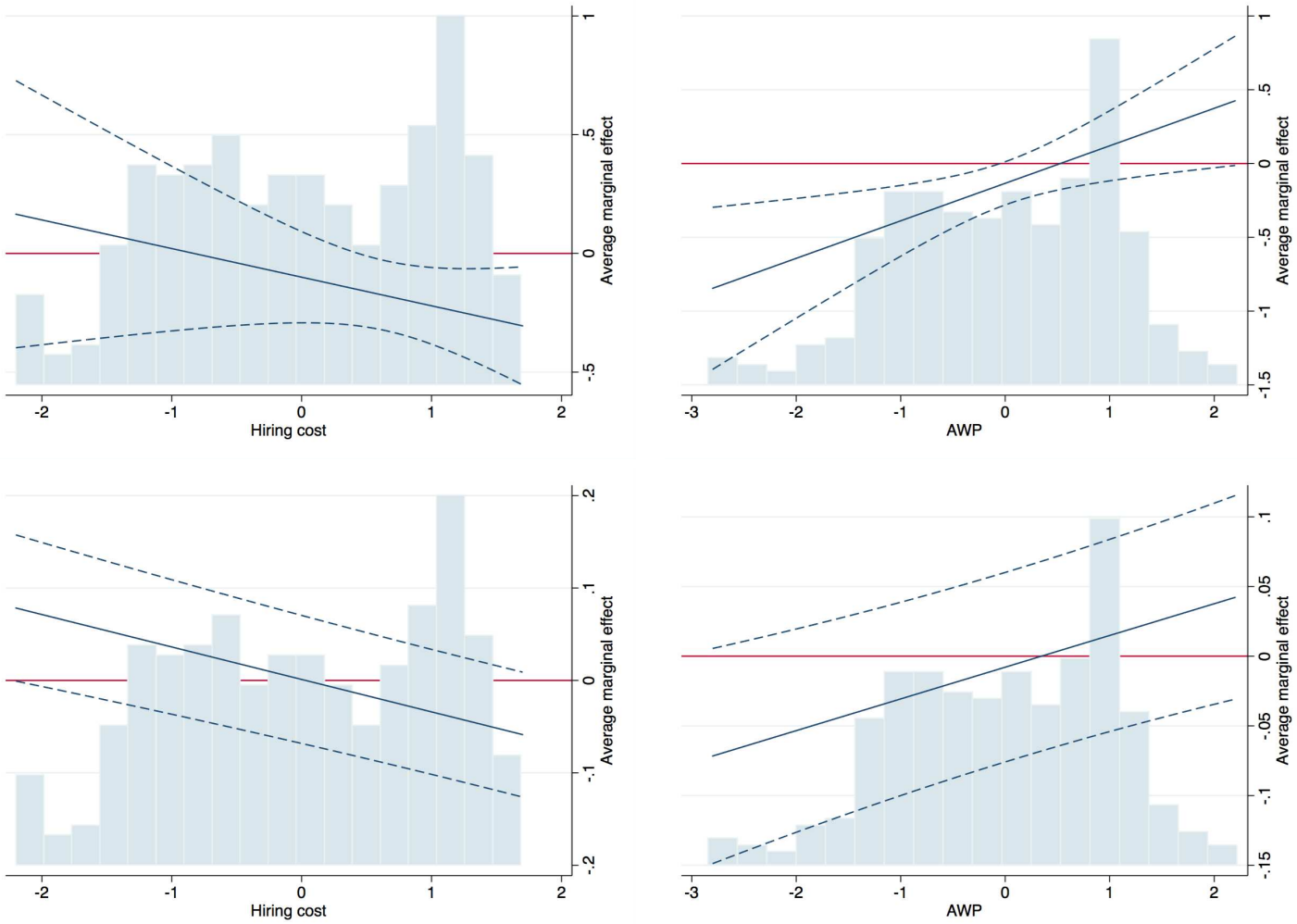


Figure 6: Effects of minimum wages on Employment at levels of H and AWP: Kaitz Index

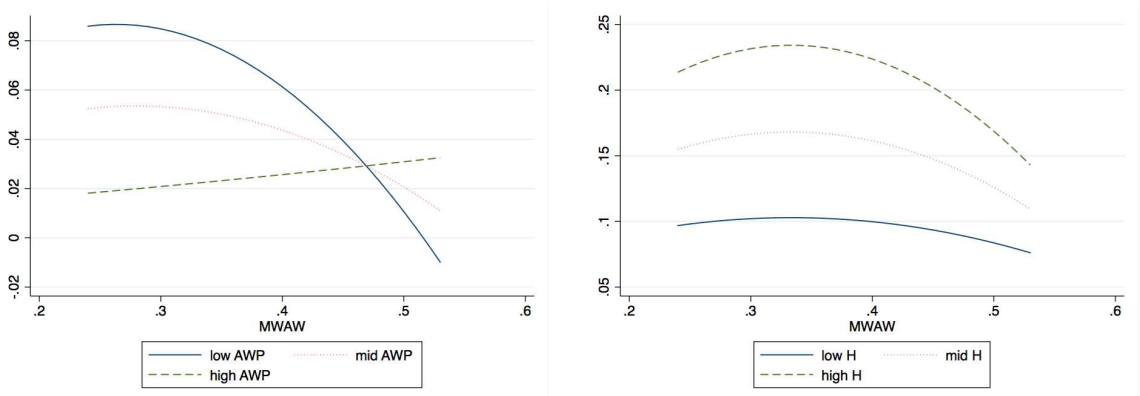
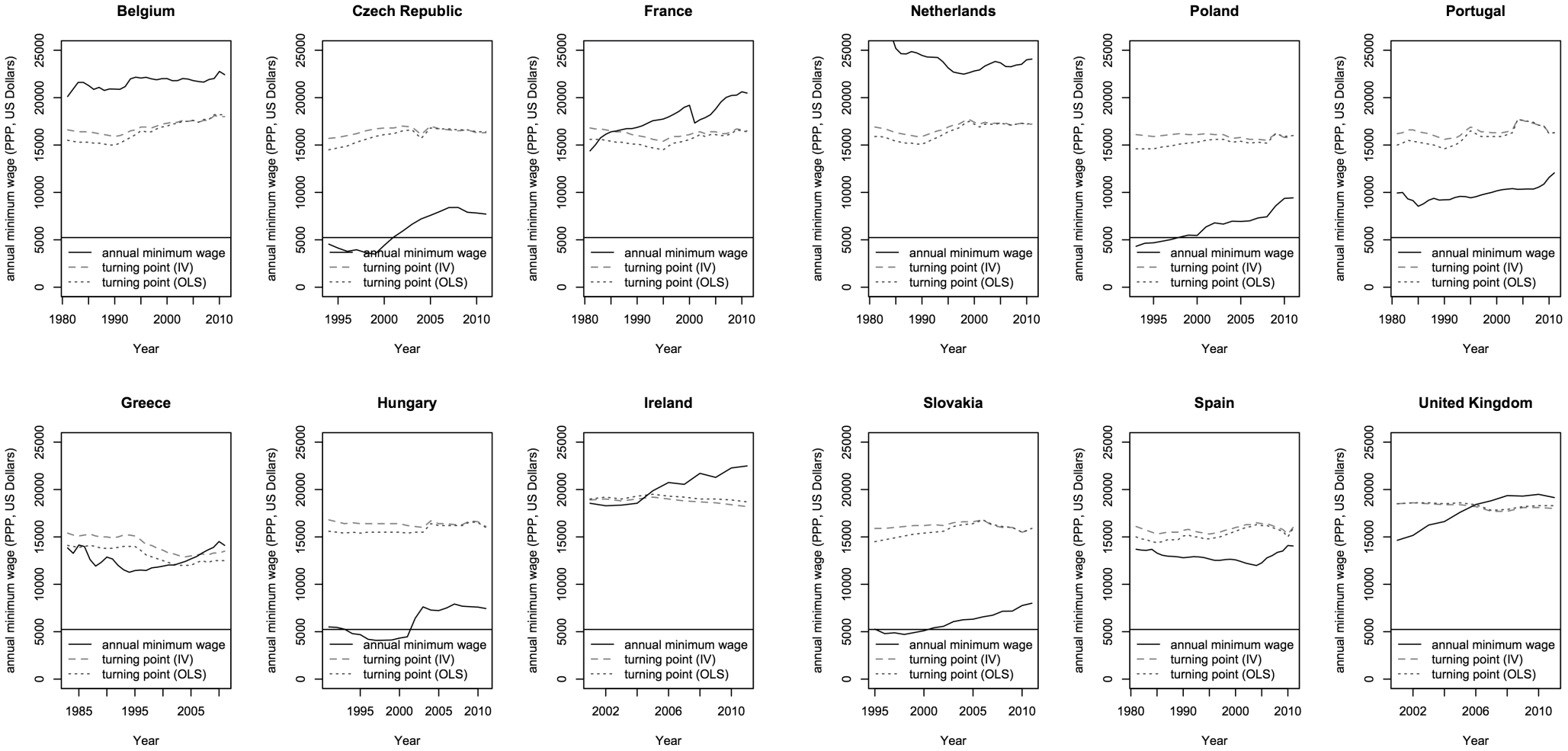


Figure 7: Turning points and actual minimum wages for young workers



IV.III. Country-specific turning points

In this chapter, 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 with other labor-market characteristics. To estimate the turning points, we use a specification with all three interaction terms for other labor-market characteristics (results can be found in Table 15 in the Appendix). The country-time differences in the turning points stem, therefore, from the impact of hiring costs, worker productivity, and replacement rates. The observed slight increase in the turning points over time is mainly due to increasing levels of productivity.

We calculate country-specific turning points for the OLS estimation, as well as the IV estimation (see Table 15). As already mentioned, the OLS estimator might be biased due to endogeneity problems. We try to overcome those problems with an instrumental variable approach, which should result in unbiased estimates. Though we show both the OLS and the IV estimates, we believe that the IV estimate is the better one.

It seems that the turning points of the OLS and IV estimators converge over time perhaps because our instrument is based on the idea that the minimum wage is a political instrument. Therefore we conclude that the longer a minimum wage is implemented, the weaker the political influence on minimum-wage setting becomes. Greece seems to be the only exception in this regard.

Figure 7 shows that in six of the countries in our sample - namely Belgium, France, Greece, Ireland, Netherlands, and the United Kingdom – minimum wages are at present higher than the OLS as well as the IV turning points, suggesting that the levels of the minimum wage in those countries is high enough to harm the employment rate of young individuals. The difference between the minimum wage and the turning point is quite small in Greece and the UK (and within the 95 percent confidence interval), indicating that those countries have close to the optimal value of the minimum wage. In Belgium, France, Ireland, and the Netherlands, there is a significant difference between the minimum wage and the turning point, indicating that a reduction in the minimum wage would increase youth employment.

In the Netherlands, we observe a rise in the turning point until 2000 alongside a decrease in the minimum wage. Still, both the IV and the OLS estimations of the turning point are lower than the actual minimum wage in the Netherlands. This is mainly driven by the high minimum wage in the Netherlands, not by low productivity or other labor- market characteristics.

In Belgium, an increase in productivity, stable development of the gross replacement rate, and a decrease in hiring costs led to an increase of the turning point over the last 20 years in both the IV and OLS estimations. Still, the actual minimum wage lies above the optimal level that would maximize youth unemployment.

In France, the turning point shows a slight upward trend since 1995, due to a slight increase in productivity alongside a slight decrease in hiring costs. Still, the minimum wage has increased over time. In the early 2000s, minimum wages for the first time were raised above the optimal level (IV estimate), and they still today remain above that level.

In Ireland, the turning point is high, close to $20.000 (PPP) due to generally high productivity, but there has been almost no improvement over time, while minimum wages rose steadily. Therefore, minimum wages in Ireland have been above the turning points (IV and OLS estimators) since 2005.

In the four countries mentioned above, decreasing the minimum wage would be expected to increase the employment rate of young individuals. For all other countries, our results suggest different policy recommendations.

In the UK, as well as in Greece, the actual minimum wage is above both the IV and the OLS estimates (but still within the 95 percent confidence interval). In Greece, there is a decrease in both the IV and the OLS turning points over time due to increasing hiring costs and poor development of productivity, especially in recent years. In the UK, productivity and hiring costs increased after 2000, while productivity stabilized. The close distance of the minimum wage to the turning point suggests that the actual minimum wage is indeed close to its optimal value, suggesting that either an increase or a decrease in the minimum wage level would result in employment losses. (A slight decrease might still lead to an increase in youth employment.) The case of the UK is particularly interesting, since the government sets the minimum wage in accordance with the low pay commission (LPC), which is a group of experts that advises the government for those concerns. This model for setting minimum-wage levels seems to result in good employment outcomes.

Especially in, suggesting Eastern European countries, there seems to be room to increase minimum wages without harming the employment of young workers – or potentially even stimulating it. The same holds true for Portugal and Spain. In those countries, either low replacement rates (e.g., in the Czech Republic, Slovakia, and Poland) or high productivity relative to the wage level lead to high turning points, therefore suggesting that employment of young workers could be further stimulated by an increase in the minimum wage. This result is also driven by the generally low minimum wages in those countries.

In Spain, the distance to the optimal value is smaller compared to the Eastern European countries, suggesting that there is only room for a slight increase of the minimum wage, without harming the employment rate of young individuals.

Additionally, due to the non-linearity in the employment effects of minimum wages, we know that the negative employment effects are higher for those countries that are above and further away from the

Table 6: Necessary increase/decrease of the minimum wage to reach the turning point in 2011 (in percent)

	IV	OLS
Belgium	-19.7	-18.9
Czech Republic	111.2	112.5
France	-19.4	-19.9
Greece	-43.0	-11.4
Hungary	116.2	114.8
Ireland	-19.1	-16.9
Netherlands	-28.5	-28.1
Poland	67.6	69.7
Portugal	35.2	35.2
Slovakia	97.4	98.6
Spain	13.9	13.2
United Kingdom	-6.0	-4.5

optimal level (turning point) than for those countries that are closer to the turning point. The negative effects on youth employment of an increase in the minimum wage would therefore be especially high in the Netherlands, Belgium, Ireland, and France.

On the other hand, we would expect a positive effect on youth employment of an increase in minimum wages for some countries, an effect which would be especially strong in the Czech Republic, Hungary, Poland, and Slovakia.

Table 6 looks more closely at the level of the minimum wage that maximizes the employment rate of young individuals (turning point) in 2011.

Countries like Hungary or the Czech Republic could more than double the minimum wage without negatively impacting the employment rates of young individuals. In Slovakia the minimum wage could be increased by almost 100 percent. In Poland, an increase by approximately 70 percent, in Portugal an increase by 35 percent, and in Spain an increase by 13 percent would be beneficial for youth employment.

In all other countries, a decrease of the minimum wage would increase the employment rate of young individuals according to our model. Especially in the Netherlands (-28 percent), France (-20 percent), and Belgium (-19 percent), our model predicts higher employment rates of young individuals after lowering the minimum wage, as Table 6 shows.

IV.IV. Robustness analysis

The first robustness check involves 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 (15 to 64 years). The results are presented in Table 11 in the Appendix. We find that weighting the regressions in this way 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 employment is significant:

it induces young employment. These interesting preliminary observations require further study.

We additionally examine the relationship between the current minimum wage and employment rates of young individuals. Though we are convinced that the lagged specification corresponds to rigid European labor markets, in order to analyze the sensitivity of the results to this somewhat arbitrary assumption, we present in Table 12 in the Appendix the current specification. Coefficients and standard errors remain similar, and the evaluated elasticities have slighly lower values on average. This result suggests, that although theoretically the effects of changes in the minimum wage should take some time to be fully reflected, we can observe a non-linear relationship in the model between the minimum wage and employment rates of young individuals beginning in the same year. This is partly due to introducing labor-market characteristics into the regressions.

Since the sample size is relatively small, we need to make sure that the results are not driven by outliers. We re-estimate all equations, correcting for outliers identified based on the leverage statistic and the Cook distance. The leverage needs to be lower than $3k/N \simeq 0.73$ and the Cook's distance needs to be lower than $4/N \simeq 0.018$. Dropping those observations which do not satisfy these requirements and reassessing the results affects none of the main conclusions.

We test a dynamic specification. We estimate the main specification considering lagged employment as an explanatory variable using a robust two-step system GMM estimator. In the level equation, we use the time effects and use the lagged output gap as IV-type instruments and the lagged employment rate of young individuals as a GMM-type instrument; in the first-differenced equation, lagged differences in youth employment are used as GMM-type instruments. The GMM instruments have been collapsed, which greatly reduces the total number of instruments, thus reducing the bias, which would otherwise be significant given the small sample size. Results of this estimation are presented in Table 13 in the Appendix, which also reports additional information regarding the number of instruments and test statistics. The main conclusions remain unchanged.

Our instruments might partially be associated with the bias of about 10% compared to the OLS estimator, in particular for the case of the real annual minimum wage variable. We check, therefore, the robustness of our results using the control function approach instead. Table 18 in the Appendix reports the estimates of the control function approach. The results remain similar and further confirm, that the general conclusion regarding the nonlinear effect of minimum wages on the employment rates of young individuals remains valid. We also test an alternative instrumental-variables specification, in which we replace the mean orientation of the government with the year of the electoral cycle in each country. Similarly to Lemos (2005), we find that minimum wages tend to rise in the election years. The results are reported in Table 19 in the Appendix and further confirm the main findings, although

in this case the Kleibergen and Paap (2006) statistics suggest that these estimates could be biased[23].

V. 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. (2014b), 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 previous studies have reported to have a detrimental effect, particularly for the young workforce. The presented results suggest that at low levels minimum wages 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-market characteristics, especially on the levels of workers productivity and labor-market regulations. The detrimental effects of high minimum wages are particularly strong if accompanied by low productivity and/or by comparatively strict labor-market regulations.

Our results suggest considering with caution some previous estimates of the elasticity of employment with respect to minimum wages. Barely negative or insignificant results can come as a result of averaging the estimates over two groups of countries: those with comparatively low minimum wages, for which we here expect an increase in the minimum wage to generate positive employment effects, and those with high minimum wages. Since the employment effects differ substantially between these two groups, a simple averaged elasticity cannot fully capture them.

Using these results, we are able to show that some European countries in our sample might in fact contribute to high unemployment rates among young individuals by setting minimum wages too high, as is the case in Belgium, France, Greece, and the Netherlands. However, in Spain, the UK, and Ireland, actual minimum wages are very close to the turning point where the negative effect of a rise in the minimum wage dominates the positive effect, suggesting that a further increase in the minimum wage could reduce employment rates in the young workforce. On the other hand, in countries which either have relatively deregulated labor markets and/or highly productive workers, higher minimum wages should not have a detrimental effect on employment. Especially in Eastern European countries, there seems to be room to increase minimum wages without harming the employment of young workers; indeed doing so may potentially even stimulate it. As a general recommendation, we conclude that policy

[23]We have tested alternative specifications, e.g., instrumenting directly for the minimum wage with the left orientation of the government replicating Lemos (2005), and the results remain similar. Full results can be obtained upon request.

makers should formulate minimum-wage policy in accordance with local circumstances, in particular by closely considering the characteristics of local labor markets.

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REFERENCES

Addison, J. T., M. L. Blackburn, and C. D. Cotti (2012). The effect of minimum wages on labour market outcomes: County-level estimates from the restaurant-and-bar sector. *British Journal of Industrial Relations 50*(3), 412–435.

Addison, J. T., M. Centeno, and P. Portugal (2004). Reservation wages, search duration, and accepted wages in Europe. *IZA Discussion Paper*.

Addison, J. T. and O. D. Ozturk (2010). Minimum wages, labor market institutions, and female employment and unemployment: A cross-country analysis.

Allegretto, S. A., A. Dube, and M. Reich (2011). Do minimum wages really reduce teen employment? accounting for heterogeneity and selectivity in state panel data. *Industrial Relations: A Journal of Economy and Society 50*(2), 205–240.

Anderson, T. W., N. Kunitomo, and T. Sawa (1982). Evaluation of the distribution function of the limited information maximum likelihood estimator. *Econometrica: Journal of the Econometric Society*, 1009–1027.

Armingeon, K., R. Careja, D. Weisstanner, S. Engler, P. Potolidis, and M. Gerber (2012). Comparative Political Data Set III 1990–2010. *Institute of Political Science, University of Berne*.

Baker, M., D. Benjamin, and S. Stanger (1999). The highs and lows of the minimum wage effect: A time-series cross-section study of the Canadian law. *Journal of Labor Economics 17*(2), 318–350.

Brown, A., C. Merkl, and D. Snower (2014a). The minimum wage from a two-sided perspective. Technical report, CESifo Group Munich.

Brown, A. J., C. Merkl, and D. J. Snower (2014b). The minimum wage from a two-sided perspective. *Economics Letters 124*(3), 389–391.

Brown, C. (1999). Minimum wages, employment, and the distribution of income. *Handbook of labor economics 3*, 2101–2163.

Burkhauser, R. V., K. A. Couch, and D. C. Wittenburg (2000). A reassessment of the new economics of the minimum wage literature with monthly data from the Current Population Survey. *Journal of Labor Economics 18*(4), 653–680.

Card, D., L. F. Katz, and A. B. Krueger (1993). An evaluation of recent evidence on the employment effects of minimum and subminimum wages. Technical report, National Bureau of Economic Research.

Chamberlain, G. (1982). Multivariate regression models for panel data. *Journal of econometrics 18*(1), 5–46.

Cosar, K. (2010). Adjusting to trade liberalization: Reallocation and labor market policies. *University of Chicago Booth School of Business, unpublished manuscript*.

Dolton, P. and C. R. Bondibene (2011). An evaluation of the international experience of minimum wages in an economic downturn. *Report prepared for the Low Pay Commission, March*.

Dube, A., T. W. Lester, and M. Reich (2010). Minimum wage effects across state borders: Estimates using contiguous counties. *The review of economics and statistics 92*(4), 945–964.

Flinn, C. J. (2006). Minimum wage effects on labor market outcomes under search, matching, and endogenous contact rates. *Econometrica 74*(4), 1013–1062.

Gorry, A. (2013). Minimum wages and youth unemployment. *European Economic Review 64*, 57–75.

Gwartney, J., R. Lawson, and S. Norton (2014). *Economic freedom of the world 2014 annual report*. The Fraser Institute.

Hahn, J. and A. Inoue (2002). A monte carlo comparison of various asymptotic approximations to the distribution of instrumental variables estimators. *Econometric Reviews 21*(3), 309–336.

Herr, H. and M. Kazandziska (2011). *Principles of Minimum Wage Policy-Economics, Institutions and Recommendations*. Number 11. Global Labour University Working Paper.

Keil, M., D. Robertson, and J. Symons (2001). *Minimum wages and employment*. Centre for Economic Performance, London School of Economics and Political Science.

Kleibergen, F. and R. Paap (2006). Generalized reduced rank tests using the singular value decomposition. *Journal of econometrics 133*(1), 97–126.

Kunitomo, N. and Y. Matsushita (2008). Improving the rank-adjusted anderson-rubin test with many instruments and persistent heteroscedasticity. Technical report, CIRJE, Faculty of Economics, University of Tokyo.

Laporšek, S. (2013). Minimum wage effects on youth employment in the european union. *Applied Economics Letters 20*(14), 1288–1292.

Lemos, S. (2005). Political variables as instruments for the minimum wage. *Contributions in Economic Analysis & Policy 4*(1).

Lindbeck, A. and D. J. Snower (1987). Union activity, unemployment persistence and wage-employment ratchets. *European Economic Review 31*(1-2), 157–167.

Manning, A. et al. (2016). The elusive employment effect of the minimum wage. Technical report, Centre for Economic Performance, LSE.

Meer, J. and J. West (2013). Effects of the minimum wage on employment dynamics. Technical report, National Bureau of Economic Research.

Neumark, D. and W. Wascher (1992). Employment effects of minimum and subminimum wages: Panel data on state minimum wage laws. *Industrial and Labor Relations Review 46*(1), 55–81.

Neumark, D. and W. Wascher (2004). Minimum wages, labor market institutions, and youth employment: A cross-national analysis. *Industrial and labor relations review 57*(2), 223–248.

Neumark, D. and W. Wascher (2006). Minimum wages and employment: A review of evidence from the new minimum wage research. Technical report, National Bureau of Economic Research.

Nunn, N. and N. Qian (2014). U.s. food aid and civil conflict. *The American Economic Review 104*(6), 1630–1666.

OECD (1998). Making the most of the minimum: Statutory minimum wages, employment and poverty. *Employment Outlook, Chapter 2*.

Partridge, M. D. and J. S. Partridge (1999). Do minimum wage hikes reduce employment? State-level evidence from the low-wage retail sector. *Journal of Labor Research 20*(3), 393–413.

Raphael, S. and R. Winter-Ebmer (2001). Identifying the effect of unemployment on crime. *Journal of Law and Economics 44*(1), 259–283.

Saint-Paul, G. (1996). Exploring the political economy of labour markets institutions. *Economic Policy 11*(23), 263–315.

Stock, J. H. and M. Yogo (2005). Testing for weak instruments in linear iv regression. *Identification and inference for econometric models: Essays in honor of Thomas Rothenberg*.

Wooldridge, J. M. (2010). *Econometric analysis of cross section and panel data*. MIT press.

Wooldridge, J. M. (2015). Control function methods in applied econometrics. *Journal of Human Resources 50*(2), 420–445.

APPENDIX

Table 7: Descriptive statistics of the Kaitz index and Real Annual Minimum Wage (in $10000 (PPP))

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
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
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 8: Description of the explanatory and instrumental variables

PRY	Cohort size aged 15–24 (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 are 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 9: 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 10: Interactions – Annual Minimum Wage (basic specification in Columns (1)-(6), IV specification in Columns (7)-(12))

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
lagRAMW	0.36***	0.18 **	0.37***	0.22**	0.35***	0.25***	0.66***	2.51*	0.76***	1.26**	1.28	1.08
	(5.56)	(2.04)	(5.09)	(2.17)	(5.54)	(2.40)	(3.72)	(1.67)	(3.55)	(2.20)	(1.64)	(1.42)
lagRAMW × lagRAMW	-0.12***	-0.07***	-0.12***	-0.08***	-0.11***	-0.10***	-0.19***	-0.69*	-0.19***	-0.35**	-0.26**	-0.31
	(-7.79)	(-3.14)	(-6.55)	(-3.16)	(-7.12)	(-3.58)	(-6.74)	(-1.73)	(-5.17)	(-2.46)	(-2.07)	(-1.55)
AWP	-0.04***	-0.03	-0.02**	-0.03***	-0.03***	-0.03***	-0.10**	0.05	-0.08***	-0.06**	-0.09*	-0.06*
	(-5.74)	(-0.60)	(-2.00)	(-3.07)	(-5.75)	(-2.59)	(-2.17)	(0.28)	(-3.19)	(-2.29)	(-1.69)	(-1.76)
H	0.01	-0.03	0.07***	0.01	-0.00	-0.04**	0.01	-0.03	0.13***	0.06	-0.01	-0.02
	(0.68)	(-1.53)	(4.99)	(0.28)	(-0.15)	(-2.23)	(0.75)	(-1.06)	(4.46)	(1.58)	(-0.56)	(-0.57)
GRR	-0.03***	-0.03*	-0.02*	-0.02*	-0.04	-0.11***	-0.04***	-0.04*	-0.01	-0.02	-0.03	0.02
	(-3.18)	(-1.93)	(-1.86)	(-1.67)	(-1.14)	(-3.09)	(-3.35)	(-1.70)	(-0.60)	(-1.59)	(-0.37)	(0.19)
lagRAMW × AWP	0.02***	-0.00					0.03*	-0.10				
	(3.25)	(-0.03)					(1.85)	(-0.80)				
lagRAMW × H			-0.04***	-0.03					-0.07***	-0.05**		
			(-5.96)	(-1.62)					(-6.37)	(-2.40)		
lagRAMW × GRR					-0.01	0.05*					-0.01	-0.03
					(-0.42)	(1.88)					(-0.29)	(-0.53)
Secondary School	-0.00	-0.00*	-0.00	-0.00*	-0.00	-0.00*	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
	(-0.70)	(-1.70)	(-0.62)	(-1.72)	(-0.65)	(-1.73)	(-0.72)	(-0.57)	(-1.25)	(-1.09)	(-1.11)	(-1.16)
PRY	0.53	-0.01	0.42	0.03	0.66	0.08	0.62	3.42*	0.28	1.70	0.43	1.49
	(1.38)	(-0.01)	(1.40)	(0.06)	(1.64)	(0.17)	(1.54)	(1.76)	(0.92)	(1.64)	(0.75)	(0.83)
Conscription	-0.00	-0.01	0.00	-0.01*	-0.00	-0.01	-0.00	0.04*	0.01	0.02	-0.02	0.02
	(-0.04)	(-1.47)	(0.57)	(-1.89)	(-0.34)	(-1.61)	(-0.22)	(1.90)	(0.46)	(1.31)	(-1.47)	(0.64)
Bargaining	0.02***	0.00	0.03***	0.01	0.02***	0.00	0.02***	0.03	0.03***	0.01	0.02	0.01
	(4.09)	(0.49)	(4.51)	(0.89)	(2.70)	(0.26)	(3.43)	(0.96)	(4.07)	(1.64)	(0.94)	(0.94)
Recession	0.01	-0.00	0.00	-0.00	0.00	-0.00	0.00	0.00	-0.01	-0.00	-0.01	-0.00
	(1.62)	(-0.60)	(1.11)	(-0.74)	(1.53)	(-0.55)	(0.35)	(0.05)	(-0.67)	(-0.35)	(-0.90)	(-0.06)
Output Gap	-0.00	0.00	-0.00	0.00	-0.00	0.00	0.00	-0.00*	0.00	-0.00	-0.00	-0.00
	(-0.37)	(0.59)	(-0.27)	(0.72)	(-0.34)	(0.90)	(0.10)	(-1.96)	(0.40)	(-0.85)	(-0.47)	(-0.62)
Constant	-0.97***	-0.55**	-0.92***	-0.51*	-1.01***	-0.71***	-1.25***	-3.54**	-1.23***	-1.82**	-2.23*	-1.73*
	(-6.78)	(-2.13)	(-6.27)	(-1.96)	(-7.14)	(-2.66)	(-3.28)	(-2.15)	(-2.93)	(-2.30)	(-1.81)	(-1.66)
FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Time effects	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO
Country trends	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES
Elasticity	-0.38	-0.31	-0.11	-0.25	-0.16	-0.25						
Elasticity S.E.	(0.11)	(0.11)	(0.13)	(0.09)	(0.13)	(0.11)						
K-P Wald F							4.51	7.37	3.29	1.86	6.81	1.33
Maximal LIML Bias							<15%	<10%	<20%	>25%	<10%	>25%
N	228	228	228	228	228	228	228	228	228	228	228	228

Huber/White/sandwich standard errors clustered at country level, t-Stats in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$; the reported Kleibergen and Paap (2006) first-stage statistics consider the clustering of the errors; the maximal LIML bias test is based on Stock and Yogo (2005) critical values.

Table 11: Basic specification: weighted regressions (Columns (1)-(4)) and outlier correction (Columns (5)-(8))

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
lagMWAW	1.98*	1.95*			2.30***	1.81***		
	(1.86)	(1.93)			(2.71)	(2.89)		
lagMWAW × lagMWAW	-2.49**	-2.67*			-3.06***	-2.68***		
	(-1.97)	(-1.95)			(-2.98)	(-3.24)		
lagRAMW			0.35***	0.35***			0.44***	0.29***
			(3.26)	(3.38)			(8.60)	(3.34)
lagRAMW × lagRAMW			-0.12***	-0.11***			-0.14***	-0.10***
			(-4.37)	(-4.35)			(-11.20)	(-4.84)
AWP	0.00	-0.01	-0.03***	-0.02**	-0.01	-0.02*	-0.04***	-0.02***
	(0.26)	(-0.75)	(-4.90)	(-2.13)	(-0.87)	(-1.78)	(-22.57)	(-4.65)
H	-0.01	-0.05**	-0.01	-0.05**	0.01	-0.03	-0.00	-0.03**
	(-0.92)	(-2.32)	(-1.09)	(-2.20)	(0.70)	(-1.57)	(-0.48)	(-2.01)
GRR	-0.03*	-0.03*	-0.04***	-0.03**	-0.03***	-0.04***	-0.05***	-0.04***
	(-1.95)	(-1.79)	(-3.94)	(-1.99)	(-3.11)	(-3.56)	(-8.15)	(-4.05)
PRY	0.33	-0.11	0.95***	0.37	0.50**	0.04	0.99***	0.53*
	(1.30)	(-0.38)	(3.69)	(0.89)	(2.10)	(0.25)	(4.28)	(1.71)
Secondary School	-0.00	-0.00**	-0.00	-0.00*	-0.00	-0.00**	0.00	-0.00*
	(-0.89)	(-1.97)	(-0.54)	(-1.66)	(-0.16)	(-2.24)	(0.26)	(-1.90)
Conscription	-0.01	-0.02*	-0.00	-0.01	0.00	-0.01*	0.00	-0.01
	(-1.40)	(-1.82)	(-0.54)	(-1.44)	(0.93)	(-1.73)	(0.30)	(-1.29)
Bargaining	0.03***	0.01**	0.03***	0.01**	0.02***	0.01*	0.02***	0.01
	(4.48)	(2.26)	(5.08)	(2.13)	(3.10)	(1.67)	(4.26)	(1.53)
Recession	0.00	0.00	0.01*	0.00				
	(0.68)	(0.10)	(1.69)	(0.11)				
Output Gap	0.00	0.00	0.00	0.00	0.00	0.00	0.00***	0.00
	(0.35)	(0.78)	(0.05)	(0.36)	(1.40)	(1.34)	(2.95)	(1.60)
Constant	-1.17***	-0.70***	-1.01***	-0.77***	-1.20***	-0.70***	-1.03***	-0.76***
	(-4.39)	(-2.88)	(-5.60)	(-3.31)	(-6.38)	(-4.24)	(-15.26)	(-3.87)
FE	YES	YES	YES	YES	YES	YES	YES	YES
Time effects	YES	NO	YES	NO	YES	NO	YES	NO
Country Trend	NO	YES	NO	YES	NO	YES	NO	YES
Elasticity	-0.08	-0.28	-0.23	-0.11	-0.27	-0.48	-0.22	-0.28
Elasticity S.E.	0.08	0.23	0.13	0.17	0.12	0.17	0.08	0.10
Observations	228	228	228	228	202	195	201	201

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

Table 12: Basic specification - minimum wage in time t

	(1)	(2)	(3)	(4)
	EmpY	EmpY	EmpY	EmpY
MWAW	0.94**	1.84**		
	(2.38)	(2.53)		
MWAW × MWAW	-1.20**	-2.25**		
	(-2.24)	(-2.54)		
RAMW			0.33***	0.17*
			(3.44)	(1.83)
RAMW × RAMW			-0.10***	-0.06**
			(-3.52)	(-2.49)
AWP	-0.02	-0.00	-0.03***	-0.02**
	(-1.55)	(-0.35)	(-7.03)	(-2.16)
H	-0.03*	0.01	-0.01	-0.03*
	(-1.67)	(0.60)	(-0.56)	(-1.71)
GRR	-0.02	-0.04***	-0.05***	-0.02
	(-1.38)	(-4.66)	(-5.64)	(-1.47)
PRY	-0.35	0.36	0.57	-0.08
	(-0.82)	(0.98)	(1.37)	(-0.15)
Secondary School	-0.00**	-0.00	-0.00	-0.00*
	(-2.05)	(-1.22)	(-0.76)	(-1.81)
Conscription	-0.01**	0.00	-0.01	-0.01*
	(-2.08)	(0.03)	(-0.59)	(-1.71)
Bargaining	0.00	0.02*	0.02**	0.00
	(0.37)	(1.79)	(2.33)	(0.32)
Recession	-0.01	0.00	0.01	-0.00
	(-1.42)	(0.85)	(1.62)	(-0.54)
Output Gap	0.00	-0.00	-0.00	0.00
	(0.98)	(-0.43)	(-0.34)	(0.55)
Constant	-0.49**	-1.20***	-1.05***	-0.53*
	(-2.07)	(-5.40)	(-6.22)	(-1.82)
FE	YES	YES	YES	YES
Time effects	YES	NO	YES	NO
Country Trend	NO	YES	NO	YES
Elasticity	-0.06	-0.03	-0.08	-0.19
Elasticity S.E.	0.20	0.15	0.16	0.14
Observations	231	231	231	231

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

Table 13: System GMM estimation

	(1) EmpY	(2) EmpY
lagMWAW	5.96*	
	(1.94)	
lagMWAW^2	-7.98**	
	(-2.06)	
lagRAMW		1.04**
		(2.29)
lagRAMW^2		-0.28*
		(-1.84)
GRR	-0.30**	-0.22
	(-2.18)	(-1.49)
H	0.11	0.07
	(1.29)	(0.48)
AWP	0.22	0.03
	(1.13)	(0.59)
L.EmpY	0.70	-0.26
	(1.04)	(-0.53)
SchEn	-0.00	0.01*
	(-0.97)	(1.65)
PRY	9.18**	16.34*
	(2.12)	(1.90)
Conscription	0.09	0.16
	(0.83)	(0.69)
Bargaining	-0.25	0.17**
	(-1.04)	(1.98)
Constant	-2.42*	-5.19**
	(-1.71)	(-2.43)
Observations	228	228
No. of instr	63	66
AR(1)	0.40	0.00
AR(2)	0.94	0.10
Sargan Statistic	207.45	540.26
J-Test p-val	0.00	0.00

Standard errors clustered at country level, z-Stats in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$; In the level equation, we use the time effects and use the lagged output gap as IV-type instruments and the employment rate of young individuals as a GMM-type instrument; in the first-differenced equation, lagged differences in youth employment are used as GMM-type instruments; the GMM instruments have been collapsed.

Figure 8: Time variation of the minimum wage variables (Kaitz index – red; annual minimum wage – blue), country by country

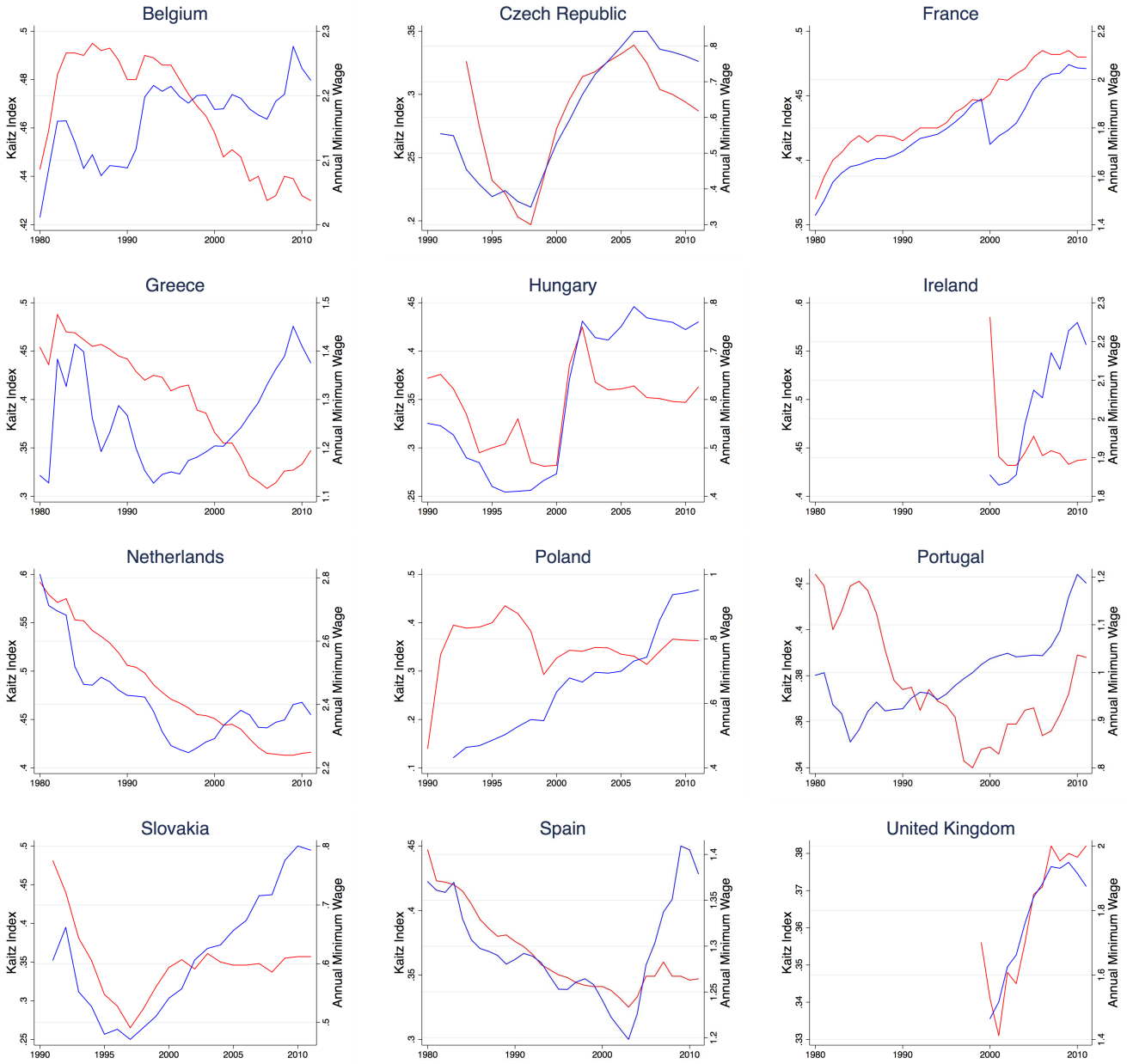

Table 14: Regression of the minimum wages on the instruments

	(1) RAMW	(2) MWAW
Left Seats × L. OilPrice	0.23**	
	(2.98)	
L. OilPrice	-0.47**	
	(-2.09)	
Left Seats × L.OilPrice		0.05***
		(5.62)
L. OilPrice		0.00
		(0.80)
PRY	8.34**	0.64**
	(3.00)	(3.49)
Secondary School	0.01***	0.00**
	(4.50)	(2.69)
AWP	0.19	-0.03
	(0.82)	(-1.62)
H	-0.01	-0.01**
	(-0.05)	(-3.14)
Conscription	0.09	0.02**
	(0.78)	(2.78)
Bargaining	0.15	0.02***
	(1.64)	(4.33)
GRR	0.03	0.01
	(0.24)	(0.49)
Recession	0.19***	0.00
	(3.55)	(0.51)
Output Gap	-0.01	-0.00
	(-0.31)	(-0.55)
Constant	3.89	-0.11
	(1.89)	(-0.41)
FE	YES	YES
Time effects	YES	YES
Observations	228	228

t-Stats in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 15: Results with all interaction terms – basic (Columns (1)-(4)) and IV specification (Columns (5)-(8))

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
lagMWAW	1.59**	1.97***			0.36	2.94*		
	(2.35)	(3.94)			(0.13)	(1.80)		
lagMWAW × lagMWAW	-2.00***	-2.61***			-0.76	-3.55*		
	(-2.68)	(-4.44)			(-0.24)	(-1.81)		
lagRAMW			0.47***	0.31***			1.00***	1.16**
			(6.55)	(2.86)			(3.72)	(2.36)
lagRAMW × lagRAMW			-0.15***	-0.11***			-0.21***	-0.31***
			(-7.99)	(-3.98)			(-5.44)	(-2.58)
AWP	-0.06*	-0.11***	-0.01	-0.03	-0.22**	-0.06	0.01	-0.02
	(-1.66)	(-3.71)	(-1.25)	(-0.79)	(-2.23)	(-0.49)	(0.18)	(-0.20)
H	0.08*	0.05*	0.09***	0.01	0.11**	0.07	0.21***	0.10**
	(1.94)	(1.72)	(4.66)	(0.33)	(2.38)	(0.70)	(2.59)	(2.02)
GRR	-0.03	-0.14***	-0.08***	-0.11***	-0.06	-0.12	-0.03	0.04
	(-0.62)	(-2.62)	(-2.94)	(-3.37)	(-0.54)	(-0.56)	(-0.47)	(0.55)
lagMWAW × AWP	0.15	0.19**			0.41*	0.07		
	(1.47)	(2.15)			(1.80)	(0.26)		
lagMWAW × H	-0.18**	-0.21***			-0.26***	-0.20		
	(-2.14)	(-3.38)			(-3.04)	(-0.83)		
lagMWAW × GRR	0.02	0.25*			0.08	0.20		
	(0.21)	(1.86)			(0.32)	(0.40)		
lagRAMW × AWP			-0.01	0.00			-0.08	-0.03
			(-1.36)	(0.10)			(-1.27)	(-0.52)
lagRAMW × H			-0.05***	-0.03**			-0.13**	-0.06**
			(-5.57)	(-2.22)			(-2.25)	(-2.53)
lagRAMW × GRR			0.03**	0.05**			0.01	-0.04
			(2.04)	(1.98)			(0.45)	(-0.90)
Secondary School	-0.00*	-0.00***	-0.00	-0.00*	-0.00	-0.00*	-0.00	-0.00
	(-1.68)	(-2.80)	(-0.40)	(-1.72)	(-0.71)	(-1.77)	(-1.55)	(-1.22)
PRY	0.07	-0.18	0.55**	0.13	0.02	-0.07	0.12	1.47
	(0.25)	(-0.50)	(2.27)	(0.30)	(0.05)	(-0.20)	(0.28)	(1.13)
Conscription	0.00	-0.01*	0.01	-0.01*	0.01	-0.00	0.00	0.02
	(0.47)	(-1.94)	(1.01)	(-1.69)	(0.71)	(-0.69)	(0.21)	(1.17)
Bargaining	0.02***	0.00	0.03***	0.01	0.02***	-0.00	0.03***	0.01
	(2.80)	(0.43)	(5.08)	(0.84)	(3.45)	(-0.20)	(2.95)	(1.12)
Recession	0.00	-0.00	0.01**	-0.00	0.01	-0.01	-0.01	-0.00
	(0.81)	(-0.87)	(2.48)	(-0.74)	(0.81)	(-0.96)	(-1.26)	(-0.86)
Output Gap	-0.00	0.00**	-0.00	0.00	0.00	0.00*	-0.00	-0.00
	(-0.01)	(2.12)	(-0.08)	(1.09)	(1.24)	(1.72)	(-0.06)	(-0.90)
Constant	-0.99***	-0.67***	-1.03***	-0.68***	-0.50	-0.93**	-1.62***	-1.62**
	(-5.53)	(-3.07)	(-7.30)	(-2.78)	(-0.55)	(-2.22)	(-4.06)	(-2.32)
FE	YES	YES	YES	YES	YES	YES	YES	YES
Time effects	YES	NO	YES	NO	YES	NO	YES	NO
Country Trend	NO	YES	NO	YES	NO	YES	NO	YES
K-P Wald F					2.81	1.83	0.99	0.98
Observations	228	228	228	228	228	228	228	228

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

Table 16: Young workers – quadratic interactions – Kaitz Index

	(1)	(2)	(3)	(4)	(5)	(6)
	EmpY	EmpY	EmpY	EmpY	EmpY	EmpY
lagMWAW	1.03*	0.49**	1.47**	1.17***	1.30**	1.21***
	(1.82)	(1.97)	(2.04)	(3.10)	(2.42)	(3.12)
lagMWAW × lagMWAW	-1.42**	-0.84***	-1.90**	-1.71***	-1.34**	-1.26***
	(-2.14)	(-2.82)	(-2.25)	(-4.35)	(-2.12)	(-2.84)
AWP	0.25**	0.03	-0.01	-0.03***	-0.00	-0.03***
	(2.50)	(0.34)	(-1.08)	(-3.08)	(-0.57)	(-2.77)
H	0.01	-0.03**	-0.27**	-0.10	-0.00	-0.04**
	(0.92)	(-2.31)	(-2.36)	(-0.96)	(-0.08)	(-1.98)
GRR	-0.03***	-0.03**	-0.02	-0.03**	-0.54***	-0.52***
	(-2.67)	(-2.04)	(-1.64)	(-2.23)	(-7.29)	(-3.13)
lagMWAW × AWP	-1.44***	-0.51				
	(-2.89)	(-1.26)				
lagMWAW × lagMWAW × AWP	2.07***	0.96*				
	(3.43)	(1.83)				
lagMWAW × H			1.53***	0.53		
			(3.06)	(1.16)		
lagMWAW × lagMWAW × H			-2.01***	-0.85*		
			(-3.76)	(-1.74)		
lagMWAW × GRR					2.39***	2.23***
					(7.51)	(2.84)
lagMWAW × lagMWAW × GRR					-2.73***	-2.55***
					(-8.12)	(-2.83)
Secondary School	-0.00	-0.00**	-0.00	-0.00**	-0.00	-0.00**
	(-1.63)	(-2.54)	(-0.95)	(-2.21)	(-1.64)	(-2.16)
PRY	0.25	-0.26	0.51*	-0.05	0.48**	0.36
	(0.88)	(-0.81)	(1.93)	(-0.14)	(2.24)	(0.61)
Conscription	0.01	-0.01***	0.01	-0.01	0.00	-0.01
	(0.82)	(-3.23)	(1.33)	(-1.13)	(0.31)	(-1.40)
Bargaining	0.02***	0.00	0.02***	0.01	0.01***	0.00
	(2.76)	(0.11)	(3.50)	(0.77)	(2.68)	(0.28)
Recession	0.01**	-0.00	0.01	-0.01	0.01*	-0.01
	(2.06)	(-0.36)	(1.25)	(-1.28)	(1.66)	(-0.94)
Output Gap	0.00	0.00	0.00	0.00*	-0.00	0.00
	(0.15)	(1.41)	(0.72)	(1.73)	(-0.21)	(0.98)
Constant	-0.87***	-0.34**	-0.93***	-0.46**	-1.07***	-0.75***
	(-4.45)	(-2.25)	(-4.67)	(-2.34)	(-7.16)	(-3.35)
FE	YES	YES	YES	YES	YES	YES
Time effects	YES	NO	YES	NO	YES	NO
Country trends	NO	YES	NO	YES	NO	YES
Elasticity	-0.19	-0.21	-0.28	-0.40	-0.01	-0.02
Elasticity S.E.	(0.09)	(0.09)	(0.11)	(0.09)	(0.08)	(0.18)
N	228	228	228	228	228	228

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

Table 17: Young workers – quadratic interactions – Annual Minimum Wage

	(1)	(2)	(3)	(4)	(5)	(6)
	EmpY	EmpY	EmpY	EmpY	EmpY	EmpY
lagRAMW	0.33***	0.14*	0.36***	0.17	0.25**	0.16
	(5.86)	(1.91)	(7.15)	(1.57)	(2.54)	(1.51)
lagRAMW × lagRAMW	-0.11***	-0.06***	-0.12***	-0.06**	-0.07**	-0.05*
	(-8.01)	(-3.01)	(-7.03)	(-2.20)	(-2.03)	(-1.65)
AWP	-0.02	0.02	-0.02**	-0.03***	-0.01	-0.02*
	(-0.73)	(0.30)	(-1.97)	(-3.17)	(-0.52)	(-1.89)
H	0.01	-0.03	0.06*	-0.03	-0.00	-0.04**
	(0.89)	(-1.61)	(1.81)	(-0.73)	(-0.50)	(-2.38)
GRR	-0.03***	-0.03	-0.02	-0.02	-0.21***	-0.24***
	(-2.66)	(-1.64)	(-1.48)	(-1.44)	(-2.61)	(-4.08)
lagRAMW × AWP	-0.02	-0.06				
	(-0.45)	(-0.95)				
lagRAMW × lagRAMW × AWP	0.01	0.02				
	(0.90)	(0.98)				
lagRAMW × H			-0.03	0.04		
			(-0.61)	(0.67)		
lagRAMW × lagRAMW × H			-0.00	-0.02		
			(-0.07)	(-1.22)		
lagRAMW × GRR					0.21**	0.23***
					(2.14)	(3.50)
lagRAMW × lagRAMW × GRR					-0.06**	-0.06***
					(-2.21)	(-3.39)
Secondary School	-0.00	-0.00*	-0.00	-0.00*	-0.00	-0.00**
	(-0.83)	(-1.87)	(-0.66)	(-1.79)	(-1.05)	(-2.05)
PRY	0.53	-0.05	0.42	0.05	0.57	0.10
	(1.34)	(-0.10)	(1.39)	(0.11)	(1.49)	(0.22)
Conscription	0.00	-0.01	0.00	-0.01	-0.00	-0.01
	(0.30)	(-1.47)	(0.56)	(-1.39)	(-0.24)	(-1.43)
Bargaining	0.02***	0.00	0.03***	0.01	0.02***	-0.00
	(3.52)	(0.07)	(4.21)	(0.71)	(3.00)	(-0.17)
Recession	0.01	-0.00	0.00	-0.00	0.01*	-0.00
	(1.50)	(-0.46)	(1.26)	(-0.85)	(1.90)	(-0.52)
Output Gap	-0.00	0.00	-0.00	0.00	-0.00	0.00
	(-0.11)	(0.60)	(-0.26)	(0.74)	(-0.05)	(1.02)
Constant	-0.94***	-0.48**	-0.92***	-0.43	-1.02***	-0.56**
	(-6.49)	(-1.98)	(-6.94)	(-1.51)	(-7.86)	(-2.39)
FE	YES	YES	YES	YES	YES	YES
Time effects	YES	NO	YES	NO	YES	NO
Country trends	NO	YES	NO	YES	NO	YES
Elasticity	-0.16	-0.25	-0.20	-0.22	-0.10	-0.15
Elasticity S.E.	(0.15)	(0.12)	(0.16)	(0.08)	(0.14)	(0.10)
N	228	228	228	228	228	228

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

Table 18: Basic specification - Estimation with control function

	(1)	(2)	(3)	(4)
	EmpY	EmpY	EmpY	EmpY
lagMWAW	4.19***	2.61**		
	(4.27)	(3.04)		
lagMWAW × lagMWAW	-4.65***	-3.12**		
	(-3.93)	(-2.69)		
lagRAMW			0.36*	0.14
			(2.30)	(0.95)
lagRAMW × lagRAMW			-0.14**	-0.07
			(-2.71)	(-1.84)
AWP	-0.01	-0.02	-0.02	-0.04*
	(-0.35)	(-1.02)	(-0.83)	(-1.95)
H	0.02	-0.00	-0.00	0.01
	(1.58)	(-0.04)	(-0.57)	(0.52)
GRR	-0.04***	-0.03*	-0.04**	-0.03**
	(-3.88)	(-2.09)	(-3.12)	(-2.34)
PRY	0.29	-0.16	0.84	0.05
	(0.78)	(-0.28)	(1.72)	(0.08)
Secondary School	-0.00	-0.00	0.00	-0.00
	(-0.57)	(-1.63)	(0.06)	(-1.34)
Conscription	-0.00	-0.00	-0.00	0.01
	(-0.66)	(-0.13)	(-0.52)	(0.70)
Bargaining	0.02**	-0.01	0.02*	-0.01
	(2.60)	(-0.47)	(2.17)	(-0.62)
Recession	-0.00	-0.01	0.00	-0.00
	(-0.38)	(-1.51)	(0.14)	(-0.36)
Output Gap	0.00	0.00	-0.00	0.00
	(0.97)	(1.57)	(-0.92)	(0.14)
v	-0.25	-0.15	0.12*	0.07
	(-1.14)	(-1.46)	(2.20)	(1.81)
v^2	8.86*	9.11	-0.00	-0.65*
	(2.04)	(1.61)	(-0.00)	(-1.90)
Constant	-1.69***	-0.92**	-1.04***	-0.48
	(-4.93)	(-3.21)	(-3.53)	(-1.23)
FE	YES	YES	YES	YES
Time effects	YES	NO	YES	NO
Country Trend	NO	YES	NO	YES
Observations	228	228	228	228

Huber/White/sandwich standard errors clustered at country level, t-Stats in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$; v denotes the first-stage residual

Table 19: Basic specification - Estimation with the electoral cycle as an instrument

	(1)	(2)	(3)	(4)
	EmpY	EmpY	EmpY	EmpY
lagMWAW	8.25**	8.79**		
	(2.44)	(2.05)		
lagMWAW × lagMWAW	-8.67**	-9.74**		
	(-2.47)	(-2.34)		
lagRAMW			1.65**	0.74
			(2.17)	(0.97)
lagRAMW × lagRAMW			-0.35**	-0.16
			(-2.52)	(-0.81)
AWP	0.00	0.01	-0.11***	-0.01
	(0.15)	(0.19)	(-2.61)	(-0.69)
H	0.04	-0.04	-0.00	0.03
	(1.57)	(-1.13)	(-0.33)	(0.92)
GRR	-0.05***	-0.05***	-0.06***	-0.03**
	(-5.04)	(-2.73)	(-5.09)	(-2.32)
PRY	-0.00	0.19	0.94	-1.23
	(-0.00)	(0.54)	(1.60)	(-0.95)
Secondary School	-0.00	-0.00*	-0.00	-0.00**
	(-1.47)	(-1.86)	(-1.48)	(-2.35)
Conscription	-0.01	-0.02	-0.01	-0.00
	(-0.97)	(-0.86)	(-0.55)	(-0.52)
Bargaining	0.02***	0.01	0.03***	0.02
	(2.72)	(0.59)	(2.61)	(1.32)
Recession	-0.01	-0.01	-0.01*	-0.01
	(-1.31)	(-1.27)	(-1.81)	(-0.81)
Output Gap	0.01	0.00**	-0.00	0.00
	(1.59)	(2.12)	(-0.45)	(1.41)
Constant	-2.49***	-2.24**	-2.51**	-2.50
	(-3.23)	(-2.23)	(-2.51)	(-0.52)
FE	YES	YES	YES	YES
Time effects	YES	NO	YES	NO
Country Trend	NO	YES	NO	YES
K-P Wald F	1.31	0.56	1.21	0.72
Maximal LIML Bias	>25%	>25%	>25%	>25%
Observations	228	228	228	228

Huber/White/sandwich standard errors clustered at country level, t-Stats in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$; first-stage excluded instruments: oil price interacted with the year of the electoral cycle; instruments in the second stage: oil price interacted with the year of the electoral cycle, and squared first-stage fitted values of the dependent variable