

## How to explain Wage Growth Slowdown in Austria?

### A sectoral-panel analysis of collectively bargained minimum wages.

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#### **Abstract:**

*This paper studies the relationship between union power, unemployment and wages. We find many theoretically well-established links suggesting that unemployment negatively affects bargaining power. As an empirical strategy we use Austrian data from 1966 until 2015 on the development of collectively bargained minimum wages. This data directly reflects the result of a bargaining process between unions and employer organizations, and enables us to show the link between bargaining power and unemployment. Moreover, it allows for further discussion on the potential influence of other macroeconomic and institutional variables, such as trade openness and union density.*

#### **Keywords:**

CROSS-SECTIONAL MODELS, UNEMPLOYMENT, WAGES, TRADE AND LABOR MARKET INTERACTIONS, LABOR-MANAGEMENT RELATIONS, TRADE UNIONS, AND COLLECTIVE BARGAINING

JEL: C31, E 23; J5

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## 1. Introduction

Since the beginning of the financial and economic crisis we have observed a dramatic increase in unemployment and at the same time a significant slow-down in wage growth in most OECD- and European countries (OECD 2016). This development is in line with the wage-Phillips curve, which assumes that the bargaining power of workers depends on labour market conditions. When unemployment is high, it is easier for firms to replace employees and more difficult for employees to find a new job (Blanchard 2000: 112ff.). Such circumstances affect the distribution of bargaining power accordingly. A similar explanation is provided by Marx (1962: 661ff.) who pointed out that the size of the 'reserve army' is positively related to the bargaining power of capital in the wage-setting process. Moreover, Marx (1962: 665) as well as Kalecki (1943) attested unemployment to have a disciplining effect on workers. So there are at least two causal connections between unemployment and wages: an individual aspect and a collective power aspect. In this paper we focus on the latter.

Much research has been done to explain the declining labour share on the basis of cross-country-analysis (EC, 2007; IMF, 2007; ILLS 2011; Kristal 2010; OECD, 2012 and 2015; Stockhammer 2009). The result is a very complex picture that explains changes in labour share by globalization, productivity, technological change, financial markets, unions and welfare institutions. Most of the time unemployment is not integrated as an explaining variable because of methodological problems.

A second relevant research approach does not focus on the labour share but on the individual real wages (Gregg 2014, Blanchflower/Oswald 1995), which means that this approach also captures individual power aspects in the bargaining process.

In Austria, little research has been done on the relationship between unemployment and wages, though some relevant work has been conducted with various approaches and relevant constraints (Knell/Stiglbauer 2012; Materbauer/Walterskirchen 2003; Pernicka/Traxler 2004; Onaran 2016). Materbauer and Walterskirchen (2003) showed, on the basis of a time-series analysis, that macro-economic variables like unemployment, GDP-growth and productivity explain up to 80 percent of the development of labour share and unit labour costs in the time period 1970 to 2000. However, changes of institutions or of political frameworks were not considered in their work. Thus Pernicka and Traxler (2004) aimed to fill in these gaps, but they could not find any significant influence of trade unions in Austria. They explain the absence of a significant effect by too little variation in the union density rate over time. Knell and Stiglbauer (2012) followed a new approach and were able to show that wage setting in Austria is strongly influenced by reference norms for the time period 1980 to 2006. Thereby they did not focus on either the labour share or the individual development of wages, but on the development of minimum wages, which brings certain advantages. They neither

accounted for institutional aspects nor applied analysis to the post crisis period. Recently, Onaran (2016) provided empirical evidence on the basis of panel data in Austria for the period 1976 to 2005. Data revealed that imports and foreign direct investment have negative effects on wages without including unemployment. A long-term explanation (including the post crisis period) of wage-trends accounting for unemployment as well as economic and institutional aspects in Austria is still missing. The underexposure of Austria is surprising because in Austria the slow-down of wage growth was very strong between 1967 and 2015 despite well-developed corporatist industrial relations (Gerlich/Grande/Müller 1988; Tálos 2008).

The current article aims to deepen knowledge about Austria concerning the influencing factors on wages by answering the following questions: How can the long-term trends in wages in Austria be explained? And what relationship exists between wage growth, unemployment and power?

In this article we add at least three different points to the current discussion on the slow-down of wage-growth. First, contrary to most cross-country studies, the focus here is on the long-term trend of a single country. Second, we use a broad concept, which includes economic and institutional aspects, enabling a comprehensive explanation of wage developments. Third, and probably most important, instead of the labour share or the individual real wages, we use the “index of agreed minimum wages” (Tariflohnindex) in our empirical work. This provides a large number of disaggregated wage-setting units on a sectoral level. The major advantage of using this data is that it directly reflects the collectively bargained wages and therefore in a sense the union power relations. While in contrast, the wage share or real wage developments are also influenced by structural changes (e.g. rising manager wages) or by changes of the composition of the labour force.<sup>2</sup> The data allows us to focus only on the collective power aspect and therefore we reduce macroeconomic noise in the dependent variable and we can use the unemployment rate as a regressor in the equation without running into methodical problems.

## **2. Theoretical perspectives**

### **2.1 Unemployment and wages**

In economic theory there is a consensus that wages are a result of bargaining processes that are dependent on labour market conditions. According to theory, wages depend on two power aspects.

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<sup>2</sup> The composition effect means that average real wages change not only because of an increase or decrease of the wage of employees but also because of changes in the composition of the labour force. If low-paid employees are the first to lose their jobs in a recession, the average wage of the remaining employees will automatically increase and vice versa (ILO 2015).

First, it depends on the nature of the job, i.e. is it easy to replace an employee because he or she is doing mainly routine activities in comparison to a higher wage job that requires high skills, creativity and commitment. Second, a good labour market situation with a low unemployment rate makes it easy for employees to find a new job, and if they are unsatisfied with the current wage, job changes are more frequent. Therefore, a firm trying to keep employees will pay higher wages. Consequently, a low unemployment rate increases the individual and collective bargaining power of employees and leads to higher wages and vice versa. This negative relation between the unemployment rate and wages is also visible in the simple AS-AD-Model. In the AS-AD-model, wages depend on expected prices, the unemployment rate and a catchall variable, the latter of which summarizes aspects like unemployment benefits or the form of collective bargaining (Blanchard 2000; Mankiw 2003). Besides the introductory macro-models, the relationship between unemployment and bargaining power also plays a central role in game theoretic models (see e.g. Rubinstein 1990) and job search models (see e.g. Pissarides 2000). Shapiro and Stiglitz (1984) carved out these relations between unemployment and the power distribution on the labour market more clearly. In a famous article, Shapiro and Stiglitz (1984) argue that unemployment works as a worker discipline device, and the costs of unemployment avoid shirking on the work place. The neoclassic theory raises questions of power concerning imperfect markets or concerning bargaining results between groups on the labour market. Nevertheless, they do not analyze power in a fundamental sense with its consequences on the whole social system (Rothschild 2002).

This gap is filled by the thoughts of Marx and Kalecki. For Marx it was obvious that during capitalistic development unemployment will occur. The reasons for this are the changing composition of capital because of technological changes, the tendency of concentration and the centralization of the capital itself. Accordingly, the capital accumulation tends to overproduction, which goes hand in hand with a surplus-worker-population, namely the so-called "reserve army of labor". The unemployed or the "reserve army of labor" are not only an automatic result of capitalism; in Marx' view they are also a central lever of capital accumulation. High unemployment enables capitalists to keep wages at the exchange value of labour, thereby generate a higher surplus value from workers and have enough disposable workers if an extension of production requires it (Marx 1962: 658ff.). In a similar vein, Kalecki explains why in a capitalist system full employment is rather the exception than the norm. In his inspiring work "Political Aspects of Full Employment", Kalecki (1943) mentioned three arguments for the resistance of capitalists against policies aiming for full employment. First, they dislike government interference in the problem of employment as such; second, they dislike the direction of government spending; and, third, they dislike the social and political changes resulting from full employment. Especially the last point illustrates the consequences of unemployment or full employment on the distribution of power in society: "Indeed, under a regime of permanent full

employment, the 'sack' would cease to play its role as a disciplinary measure. The social position of the boss would be undermined, and the self-assurance and class-consciousness of the working class would grow. Strikes for wage increases and improvements in conditions of work would create political tension" (Kalecki 1943: 326).

If we compare the neoclassic with the Marx-Kaleckian view, we see a consensus that unemployment has a disciplinary function on the workers, and that higher unemployment rates decrease wages. But Marx and Kalecki go beyond this view by seeing unemployment as a fundamental and functional ingredient of a capitalist economy.. To formulate it more precisely: "(...) Marx and Kalecki also share a common conclusion with natural rate proponents, in that they would agree that positive unemployment rate are the outgrowth of class struggle over the distribution of income and political power. (...) To put it in nutshell, mass unemployment results in the Friedmanite/New Classical view when workers demand more than they deserve, while for Marx and Kalecki, capitalists use the weapon of unemployment to prevent workers from getting their just due" Pollin (1998: 5f.).

In bringing these theoretical aspects to our concrete research question, we have to consider that there is more than one causal relation between unemployment and the development of wages. This is in line with Blanchflower and Oswald (1995), who in their famous analysis refer to at least two different reasons for predicting that high unemployment will tend to lead to low pay. The Marxist theory of the reserve army predicting union bargaining power is only one. Another refers to the role of unemployment as a disciplinary force on an individual level. When unemployment is low and employees therefore can assume that there are many other jobs open to them, firms might tend to pay more to ensure that individual workers exert enough effort at work.

In our work we only focus on union bargaining power. The individual aspects would not lead to an increase in minimum wage, but instead to an increase in optional excess payment over bargained minimum wage. It therefore has nothing to do with union bargaining power in minimum wages. In other words, it only results in effective real wages, but does not result in minimum wages. We need to bare this in mind, as this is another major difference of this study compared to other research which focuses on the labor share or individual real wages, where both the individual and the union aspects are accounted for.

Empirically, OECD (2016) showed, on the basis of panel-data for OECD-countries, that the rise in unemployment has gone hand-in-hand with lowering wages since the beginning of the financial and economic crisis in 2008. In Austria, Materbauer and Walterskirchen (2003) were able to explain changes in the wage share mainly by GDP-growth, productivity and unemployment.

## 2.2 Institutions, class power and wages

Although macroeconomic variables have a high explanatory power, they seem to be only part of the puzzle to explain wage growth slow-down. The New Keynesian approach focuses strongly on labour market institutions for explaining wages. Accordingly, wages not only reflect marginal productivity but also depend on the power of labour unions (Blanchard/Givazzi 2003). This focus is also shared in sociology and political science where wages are mainly explained by the quality of industrial relations and by (political) institutions that represent the interests of employees (Ebbinghaus/Visser 1999; Soskice 1990; Wallerstein 1999; Western/Healy 1999). The main idea is that workers and employers have conflicting interests concerning the development of wages. Workers want to expand their real wages and employers want to keep production costs low. Unions use their organizational strength and threat of strikes to bargain higher wages. We can therefore expect that strong unions lead to higher wages (Card 2001; Rubin 1986; Western/Healy 1999). To measure the power of workers, union density is commonly used as an indicator for a worker's capacity for collective action (Ebbinghaus/Visser 1999). Wage developments are therefore closely linked to social relations among classes. Sometimes also strike activities are taken into account (Kristal 2010; Wallace/Leicht/Raffalovich 1999), but strike activities do not make sense for Austria because Austria has traditionally low and constant strike activities. It is the unobservable credibility of a strike threat which determines bargaining power rather than the actual strike activity.

Another aspect capable of hampering the bargaining power of unions is the international openness of economies. Even though international trade may foster wealth gains (Francois et al. 2013; Ossa 2014), it is also observable that international trade can increase profits relative to wages by increasing imports of cheap products from developing countries. By importing goods from developing countries, firms are reducing production costs and bringing workers from developed and less developed countries into direct (wage) competition (Kristal 2010). Consequently, the global competition between workers through international trade can lead to a race to the bottom concerning wages and labor standards (Kapeller/Schütz/Tamesberger 2016). Following this argumentation, Egger and Kreckemeier (2012) showed that trade liberalization increases global wage inequalities because wages only increase in the exporting countries and not in the importing countries. Onaran (2016) provides similar findings for Austria. Contrary, Brülhart, Carrère and Trionfetti (2010) used the fall of the Iron Curtain in 1990 as a natural experiment and came to the conclusion, that the increased liberalization has boosted both employment and nominal wages in Austrian border regions.

Against this backdrop, we formulate the following hypothesis to explain wage slowdown in Austria:

**H1:** An increase of unemployment leads to lower wage growth (negative sign).

**H2:** Both reference values in the union bargaining process (inflation, productivity) are positively correlated (positive sign) with the minimum wage growth.

**H3:** Union density is positively correlated with wage growth (positive sign), which means that decreasing union density leads to lower wage growth.

**H4:** The Degree of trade openness is negatively associated with wage growth in Austria (negative sign).

### **3. Method and data issues**

For the empirical part of this paper we use data on bargained wages. In Austria about 99 percent of all employees are covered by collectively bargained agreements (Pernicka/Traxler 2004). These ("Kollektivverträge" in German) cover agreements about minimum wages, general wage increases, working time and many other employer-employee relations. The main players in this bargaining process are trade unions and employer organizations. There is only one union in Austria, the ÖGB, which is legally entitled to bargain. But there are seven subdivisions which actually negotiate with the employers organizations. The union of private sector employees is the largest trade union, and it bargains many different agreements, for example, agreements, often in coordination with the relevant blue collar unions, for white collar workers in retail companies in the health sector and banking. Altogether there are many hundreds of single agreements renegotiated almost every year. These negotiations take place over the whole year but the agreements for the metal sector usually mark the start of the 'bargaining season'. This season lasts until May when most of the agreements have been made (Knell/Stiglbauer 2012).

#### **3.1 Data issues**

For the purpose of our empirical analysis we use annual data from 1966 until 2015 on an aggregated level. We use an index of the collectively agreed minimum wage on a sectoral level differentiated by blue and white collar workers. This index is a weighted average of many single agreements, and by using this aggregation we end up with annual observations for 15 sectors. As this data only reflects the development of minimum wages, we might end up with biased estimates if actual wages increase (or decrease) faster than minimum wages. On this issue Knell and Stiglbauer (2012) came to the conclusion that the increase in the effective wage is usually very similar to that of the minimum wage, and therefore this data can be used to describe the general development of all bargained

wages. Later we will use  $w_{it}$  as the annual percentage increase in the minimum wage in sector  $i$ , for  $i = 1, \dots, 15$  and  $t = 1966, \dots, 2015$ . This data is publicly accessible through Statistik Austria.

This is different to the data used in the literature in two ways. First we only measure the development of wages bargained by unions, as we are interested in a measure of union bargaining power, and second we use growth rates rather than log-differences. It is important to keep these differences in mind when we compare our results to those in the literature. We also show the nominal increase in minimum wages, and therefore it is necessary to control for price changes. The inflation rate is included rather than the real wage growth, and we later discuss the results of this approach.

Unemployment  $u_t$  is the unemployment rate in year  $t$  taken from AMECO. The inflation rate  $i_t$  is also taken from AMECO. Productivity growth  $p_t$  is measured as GDP per hour worked and has been provided by WIFO. Union density  $ud_t$  is measured as the rate of union members to the total number of employed people and is taken from OECD and trade openness.  $to_t$  is measured as the ratio of export and imports of goods and services to GDP and is also taken from AMECO. More detailed information about our data can be found in table 1.

**Table 1:** Variable Overview

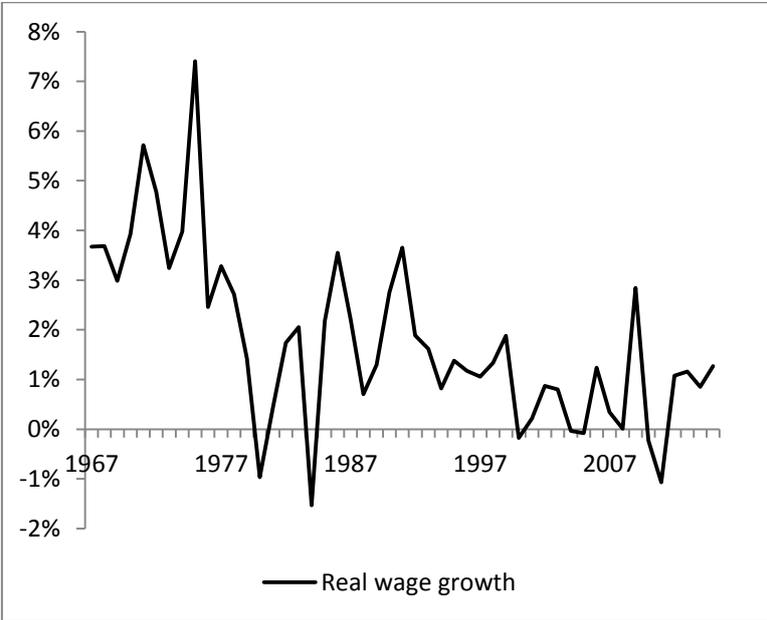
Variable	Operationalisation	Source	Mean SD	Min Max
DEPENDENT VARIABLE (727 observations)				
<b>Minimum Wage Growth</b>	annual growth rate of minimum wages (Tariflohnindex), sectoral	STATISTIK Austria	.050 (.034)	.0002 .2040
INDEPENDENT MACRO VARIABLES (49-50 observations)				
<b>Unemployment</b>	annual unemployment rate (international definition), national	AMECO	3.48 (1.42)	1.10 5.70
<b>Inflation</b>	annual inflation rate, national	AMECO	.034 (.021)	.0050 .0952
<b>Productivity</b>	annual growth rate of GDP per hour worked, national	WIFO	.025 (.020)	-.0143 .1019
<b>Trade Openness</b>	rate of export and imports of goods and services to GDP, national	AMECO	.735 (.174)	.458 1.050
INDEPENDENT INSTITUTIONAL VARIABLE (48 observations)				
<b>Union Density</b>	rate of union members to total number of employees	OECD	46.66 (11.70)	27.84 65.84

In constructing this panel set, we roughly followed Knell and Stiglbauer (2012) and included more variables, which are supposed to influence the bargaining power (see chapter 2). We assume that the

macroeconomic situation of Austria as a whole is relevant for the wage negotiations rather than the specific situation within one sector.

Figure 1 shows the development of the ex post increases in real minimum wages, measured as the average of the bargained minimum wages over all sectors. We show the real growth rate of minimum wages (in the empirical model we use it in nominal terms), as it is a more convenient graphical representation. At first glance we see a slowdown of wage growth around 1976 and no clear pattern after that. We also see losses in real wages in some years including the aftermath of the current financial and economic crisis.

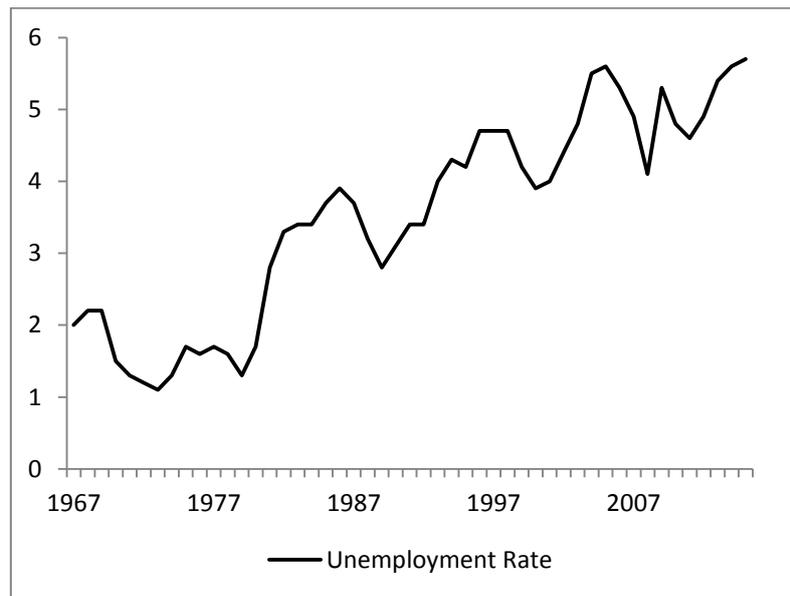
**Figure 1:** Average real growth of minimum wages in Austria 1967-2015.



**Source:** Statistik Austria.

Figure 2 shows the development of the unemployment rate. Here we can identify an upward trend and strong movements around this trend. Especially after 1980 we see a fast increase in the unemployment rate.

**Figure 2:** Unemployment rate Austria 1966-2015.



**Source:** AMECO.

We see a steady decline with little variation in union density in our data. In 1966 union density was at roughly 65 percent, and in 2013 it was down to around 28 percent.

Because Austria is a small and open economy, the trade openness index – which according to Wallerstein (1999) should be measured as the rate of imports and exports of goods and services to GDP – is high. We see a general rise in trade openness and, especially after Austria joined the European Union in 1995, we see an accelerated increase. As is typical of an open economy, we see that the variable for trade openness is very sensitive to changes in global demand and reacts strongly to global recessions.

### 3.2 Method

With these variables we construct a panel data set with  $N = 15$  and  $T = 49$ . As we use growth rates in  $w_{it}$  we lose the first observations for 1966. Ultimately we want to identify the drivers of real minimum wage growth and especially try to estimate the impact of unemployment on wage growth. We assume the following relationship:

$$w = f(u, i, p, to, ud)$$

We estimate a model of the following form:

$$w_{it} = \beta_2 u_{t-1} + \beta_3 X_t + \alpha_i + \varepsilon_{it} \quad (1)$$

where  $\alpha_i$  are sector specific fixed effects and the vector  $X_t$  contains our set of control variables listed in table 1. We use the first lag of unemployment as an independent variable for several reasons.

First, we have seen in first analysis that the first lag of the unemployment rate offers more explanatory power, and the unemployment rate at  $t$  becomes insignificant if we include both. Second, we follow Gregg et al. (2014) in assuming that using the lagged unemployment reduces potential endogeneity problems. This is a widely used approach in the literature, for example, in Marterbauer and Walterskirchen (2003).

As we cannot reject the presence of unit roots in our panel, we have to address this issue. A first difference estimator (FD) will be the baseline specification. After first differencing, the panel unit root tests reject the null hypothesis of unit roots, and therefore we avoid running into spurious regression problems by using a first difference estimator.

We also report the results of a fixed effects estimation and include different time variables to account for several trends in our variables. This is in line with the literature on this subject. Knell and Stiglbauer (2012) use decade dummies, and Gregg et al. (2014) report different specifications using a linear trend and year dummies. In our results we report these different specifications and show that the results do not change much, and thus support our approach. These results are also in line with those of the first difference estimator, and we conclude that our results from the fixed effect specification are not spurious. Clustered standard errors are used to account for serial correlation and heteroscedasticity.

As additional robustness checks we estimated single time series for all sectors, a specification that included both a trend and year dummies, and a specification in log-differences of the levels for the whole panel. All checks confirm our results. An analysis of our residuals shows no signs of autocorrelation or heteroscedasticity.

## 4. Results

### 4.1 Determinants of Minimum Wage Growth

Table 2 shows that there is a strong negative relation between unemployment (in the previous year,  $t-1$ ) and the collectively bargained minimum wage growth in Austria, referring to the period of 1967 to 2015. A rise in unemployment in period  $t-1$  results in a smaller growth in minimum wages in period  $t$ . The coefficients range between  $-.011$  and  $-.002$ , depending on the model. All coefficients are significant at a 99 percent level. The fact that the unemployment-coefficient is relatively stable over the four models in the table (controlling for time trends in the data in various ways, see method) further proves that there is a robust relationship between the two variables. These results confirm our first hypothesis and are therefore in line with the theory and the postulated effect of

unemployment on the union bargaining power. Everything else held constant, higher unemployment results in less union power in the wage setting process.

Furthermore, there is a strong positive correlation between inflation and the minimum wage. The higher the inflation rate is in a period, the higher the minimum wage growth in the same period. The coefficients range between .396 (in the first differences model) and .880. All coefficients are significant at a 99 percent level. Similar coefficients in the models indicate robust results and thus support our second hypothesis. The inflation rate is the main reference value that is accounted for by unions in the bargaining process. A higher inflation rate, however, cannot be interpreted as a rise in union power in the wage setting process, as the inflation rate first determines the *real* minimum wage growth. The higher the inflation rate, the higher the wage agreement needs to be so as not to result in a loss of real wage for employees. That is why a control of inflation is essential and why a coefficient close to one (in the fixed effect level-level-model) makes sense: A one percentage point increase in the inflation rate shall cause the nominal minimum wage growth rate to increase by about the same size. As the coefficients are slightly below one, everything else held constant, the real minimum wage would decrease over time. Especially for lower wage groups, this is in line with the Austrian wage data. The first tercil (for which the minimum wage is most important) was faced with a decrease in real wage (Rechnungshof 2016).

In model (3) inflation is dropped from the regression analysis because of collinearity resulting from the inclusion of the year dummies. As discussed above (see method), the inclusion of year dummies is to be seen as the strongest control for possible time trends. The obstacle, however, is that the inclusion also results in a loss of variation, as only little variation is not due to developments in any of the periods. The same is true for the other two independent macro variables: productivity and trade openness.

The correlation between the growth rate of productivity and the minimum wage is positive as well. The higher the productivity growth is in a period, the higher the minimum wage growth in the same period. Analog to the results of the inflation rate, this result is plausible, as the productivity growth is also used as a reference value in the bargaining process; further support that hypothesis 2 holds. The results, however, only give significant correlations in model (2), where the time trend is controlled for by the introduction of a linear trend (the weakest control). In all other models the variable either yields no significant results or is dropped from the equation because of collinearity

Trade openness is negatively correlated with the minimum wage growth. The higher the trade openness, the lower the growth rate of minimum wages. The coefficients range between -.031 and -.077, all at a 99 percent level of significance. This can be seen as support for hypothesis 4.

The union density, however, does yield instable and somehow implausible results in the various models. Models (1), (2) and (4) give a negative correlation between the union density and the minimum wage growth. Model (3), conversely, gives a positive relation between the two variables. Nonetheless, the coefficients are very small with most being highly significant. The underlying assumption in hypothesis 3 was that high union density results in more union power in the wage setting process and therefore in higher minimum wage growth.

The literature on this topic suggests that in Austria union density does (so far) not affect the wage level, as there is too little variation in the union density over time (Pernicka/Traxler 2004). Even though union density is falling, it is doing so on a stable path and accompanied by the fact that union power is highly institutionalized by the Trade Union Federation and by the Chamber of Labour (Talós 2008). Furthermore it might be the case that a fall in union density needs to reach a critical level before it has a significant negative effect on the union power in the wage setting process. Another explanation lies in the possibility of reversed causality: adequate high minimum wage growth rates might cause employees to underrate their union membership. The better the performance, the less importance people attach to unions. This might especially be true in the Austrian case, where we have traditionally strong unions, very high coverage of collective bargain agreements and high union density.

**Table 2:** Determinants of Minimum Wage Growth in Austria

VARIABLES	Dependent Variable: Minimum Wage Growth; 1967-2015			
	(1) First Differences	(2) Fixed Effects	(3) Fixed Effects	(4) Fixed Effects
Unemployment (t-1)	-0.0106*** (0.00117)	-0.00734*** (0.000704)	-0.00984*** (0.00109)	-0.00236*** (0.000615)
Inflation	0.396*** (0.0924)	0.848*** (0.0515)	-	0.880*** (0.0547)
Productivity	0.142 (0.0894)	0.178*** (0.0543)	-	0.0987 (0.0616)
Trade Openness	-0.0708*** (0.0232)	-0.0306*** (0.00970)	-	-0.0771*** (0.0149)
Union Density	-0.00262* (0.00131)	-0.00412*** (0.000488)	0.000551*** (0.000128)	-0.000797** (0.000341)
Constant	-0.00120 (0.000909)	6.820*** (0.924)	0.0577*** (0.00540)	0.116*** (0.0223)
Sector FE		YES	YES	YES
Linear Time Trend		YES	NO	NO
Year Dummies		NO	YES	NO
Decade Dummies		NO	NO	YES
Observations	684	699	699	699
R-squared	0.097	0.772	0.880	0.789
Number of ID		15	15	15

Robust standard errors in parentheses

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

#### 4.2 Elasticities of the minimum wage growth determinants (log-log-model)

The coefficients in the above results (table 2) are difficult to. The log-log model in table 3 allows for a relational interpretation. As a time trend control we have chosen the decade dummies in the log-log model. This seemed to be an adequate compromise between using year dummies, where too many variables would have been dropped, and using the simple linear trend, which would have been the weakest control for a time trend. We did not want to lose too many variables, because of the focus on the relational interpretation.

We see that in our model inflation has the strongest effect on minimum wage growth, with a coefficient of .487. This is what was intuitively expected (see above for a discussion on why). The effect of trade openness (-.458) is also substantial, which is also discussed as one of the major determinants in the literature. Contrary to Brühlhart, Carrère and Trionfetti (2010), who focused on the 1990s, we found a strong negative correlation between trade openness and wages in Austria for

the time period 1966 until 2015. Union density is again difficult to interpret (see a more comprehensive discussion above), even though the coefficient in the log-log model is relatively large (-.323). The significance, however, is smaller compared to all other coefficients. The least relevant determinant of the minimum wage growth seems to be the productivity growth rate with a coefficient of .077 (also with weaker significance).

The unemployment rate has a coefficient of -.252 and is highly significant. A one percent decrease in the unemployment rate therefore results in a .252 percent increase in the growth rate of minimum wage; everything else held constant. It is difficult to compare our results to those of Blanchflower and Oswald (1995) as they use gross monthly earnings in their widely noticed comprehensive analysis, instead of a growth rate of minimum wages. According to our estimation a ten percent increase in the unemployment rate would lead to a decrease of 2,52 percent in the growth rate of minimum wages and in the case of Blanchflower and Oswald it would lead to a 0,1 percent loss in monthly gross earnings. We have already discussed the differences in the variables but we want to emphasize these differences once more. In the model of Blanchflower and Oswald an increase in the unemployment rate could also lead to an absolute loss in earnings. For Austria this does not seem plausible, as trade unions would never sign off on such an agreement. We see that a high unemployment rate significantly lowers the growth rate of minimum wages but we don't expect losses in nominal wages.

**Table 3:** Elasticities of determinants

Dependent Variable: Log Minimum Wage Growth	
VARIABLES	(1) Fixed Effects 1967-2015
Log Unemployment (t-1)	-0.252*** (0.0412)
Log Inflation	0.478*** (0.0277)
Log Productivity	0.0765** (0.0257)
Log Trade Openness	-0.458*** (0.128)
Log Union Density	-0.323** (0.115)
Constant	-0.123 (0.572)
Sector FE	YES
Linear Time Trend	NO
Year Dummies	NO
Decade Dummies	YES
Observations	670
Number of ID	15
R-squared	0.712

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

## 5. Conclusion

In this paper we attempted to shed light on the development of minimum wages in Austria. It has been guided by research questions regarding determinants of long-term trends in wages in Austria and concerning the relationship between wage growth, unemployment and power?

We contribute to the literature by focusing on the development of minimum wages, which themselves are the result of a complex bargaining process between unions and employer organizations. As real wages in Austria behave very similar to minimum wages, our results can be interpreted on a broader level. The aim of this paper was to show that the bargaining power of unions, measured by the outcome of these negotiations, namely minimum wages, depends on several macroeconomic and institutional variables. Our approach is different to the works of Gregg (2014) or Blanchflower and Oswald (1995) who focused on individual real wages meaning that they

captured also individual power aspects in the bargaining process and not only the bargaining power of unions.

The empirical results indicate that the main influencing factors on collectively bargained minimum wages in Austria are inflation, trade openness and the unemployment rate in the previous year. Whereas the inflation rate serves as the main reference value in the bargaining process, the correlation between inflation and wages is not surprising. The result concerning unemployment and trade openness goes beyond this. Both factors seem to impair the power of trade unions. Concerning the negative influence of unemployment on the bargaining power of trade union we are in line with both the theory and similar results in the literature. Austria is a special case in this regard, as the bargained wage agreements cover almost 99 percent of all employees. Despite the decline in union density over the years, the role of unions in the wage setting process is still crucial and highly institutionalized. Nevertheless, we find robust results that the unemployment rate has a negative influence on minimum wage growth, thus confirming our hypothesis. For the Austrian case it is very interesting that there is no difference between union and non-union members, as the result of the bargaining process is binding for all employees regardless of their union membership. Other results from the literature suggest that – at least on the basis of individual data for effective wages – the effect of unemployment on wages seems to be higher for non-union members (Blanchflower/Oswald 1995). This leads to the suggestion that the institutional wage setting process in Austria has stabilized wages and that a decline in the coverage of collective bargaining agreements would lead to a stronger reaction of wages to unemployment.

The article shows that international trade decreases collectively bargained minimum wages in Austria in the long run. From this result we conclude that increasing trade openness weakens the bargaining power of trade unions which is in line with the diagnosis of Rothschild (2005). He emphasized that because of globalization the balance of power is shifting in favor of big transnational companies because “they can move their activities with comparative ease from one country to another in a way which is not open to the state and the great majority of the workers”(Rothschild 2005: 445). Our results are different to those of Brülhart, Carrère and Trionfetti (2010) which can be explained by the fact that they focused on the time-period around the fall of the Iron Curtain in 1990 and on border regions. We have focused on long-term trends in wages in whole Austria.

Finally, some limitations should be taken into account. Further research should also consider a possible non-linear relationship between unemployment and wage growth. It seems plausible that beyond a certain threshold wages react stronger to changes in the unemployment rate (Milan 2012). It would also be interesting to do a cross-country analysis regarding the development of minimum wages and unemployment with a similar data base as the Tariflohnindex in Austria.

The unstable and unclear results concerning union density indicate the necessity for further research on this aspect. The case of Austria illustrates that it is not sufficient to use only union density as an indicator for the power of trade unions. There are also other institutional factors relevant like coverage of collective bargaining agreements or the link between union strength and political parties according to power resource theory (Esping-Andersen 1985). Further research should focus more on these complex issues.

## 6. References

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