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Do reservation wages react to regional unemployment?

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Abstract

Reservation wages indicate the wage threshold for which individual workers are inclined to supply their working capacity. In important theoretical approaches it is assumed that this threshold depends on the unemployment rate. If this is true, the variation of reservation wages might be an important force behind the regional "wage curve", which has been estimated in many empirical studies.

Up to now, the connection of regional unemployment with reservation wages has not been tested, since research possibilities depend on survey data which were not available. With the "Labour Market and Social Security" study (PASS), a new large panel survey in Germany, information on regional reservation wages is available. The empirical analysis with this data opens up the "black box" of the wage generation process and delivers insights about its determining factors. The analysis is based on job matching and efficiency wage theory which are used to derive a relationship between unemployment and reservation wages.

Zusammenfassung

Reservationslöhne bezeichnen die Schwelle, ab der Erwerbstätige bereit sind, ihre Arbeitskraft anzubieten. In einigen theoretischen Ansätzen wird angenommen, dass diese Schwelle von der Arbeitslosenquote abhängt. Wenn diese Annahme stimmt, kann die Variation von Reservationslöhnen ein wesentlicher Mechanismus für das Entstehen der Lohnkurve sein, die bereits in vielen empirischen Studien nachgewiesen wurde.

Aufgrund der mangelnden Datenbasis konnte der Zusammenhang zwischen regionaler Arbeitslosigkeit und Reservationslöhnen bisher nicht geprüft werden. Mit dem ‚Panel Arbeitsmarkt und soziale Sicherung' (PASS), einer neuen großen Panelstudie in Deutschland, sind nun Informationen zu regionalen Reservationslöhnen verfügbar. Die empirische Analyse dieser Daten eröffnet nunmehr den Blick in die „Black Box" des Lohnentstehungsprozesses und ermöglicht Einsichten in dessen Determinanten. Der Artikel verwendet die Job-Matching- und die Effizienzlohntheorie, um erwartete Zusammenhänge zwischen Arbeitslosigkeit und Reservationslöhnen abzuleiten.

1 Introduction

Reservation wages indicate the wage threshold for which individual workers are inclined to supply their working capacity. In important macroeconomic approaches it is assumed that this threshold depends on labour market tightness or directly on the unemployment rate. In this paper we examine the relationship between regional unemployment and reservation wages theoretically and empirically. The analysis is based on the research about the "wage curve", which concerns the effects of regional unemployment on market wages. The research presented gives evidence about the mechanism generating wage curves and it is therefore an important contribution to the testing of the theories involved.

However, analyses of this kind were not possible until recently, since there is a scarcity of data on reservation wages. Information on this topic is collected rarely in surveys (about the exceptions see Sestito, Viviano 2011). Especially data giving information about relatively small regional units was not available. With the release of the first wave of the large panel survey "Labour Market and Social Security" (PASS) for Germany now there is one exception to this rule. It is used in this paper to investigate how reservation wages are affected by different levels of regional unemployment. PASS contains randomly selected respondents randomly distributed over the regions of Germany and includes many variables important for wage analyses (gender, age, qualification etc.). Wave one of PASS covers a sample of 6,804 households receiving unemployment benefits at the time of sampling and a sample of 5,990 households randomly drawn from the German residential population.

Among economists the discussion about reservation wages is mainly related to macroeconomic modelling. Here, however, we take a different perspective by transferring these models to a regional level by treating every region as a small, very open economy of its own. This has the appealing feature of adding a cross-sectional dimension to the empirical approach. The interesting relationship can be estimated with great precision on the basis of micro data. The variation of unemployment rates between German regions is huge. They cover a span from 2.0 (in the district of Eichstätt close to Munich) to 24.2 % (in the district of Uckermark, both for June 2007). The global unemployment rate was 7.2 % in West Germany and 14.6 % in East Germany.

Our analysis of reservation wages follow the track of the (regional) wage curve, which was introduced by Blanchflower & Oswald (1994). A wage curve is a decreasing convex curve of wages on regional unemployment. We use two theoretical approaches to derive conclusions on reservation and market wages and their respective relation to unemployment. As is to be shown the relation is not a trivial one.

2 Reservation wages and the wage curve

Based on micro data of individual workers Blanchflower & Oswald (1994, see also Blanchflower, Oswald 2005 & 2006) presented empirical evidence for a wage curve relationship. In most of the 12 countries under observation, including the U.S. and

Britain, the authors found an elasticity of about -0.10. This means that doubling the local unemployment rate in a region implies a drop of around 10 percent in the level of wages in that region holding everything else constant. The results were so stable that the authors claimed to have found a new "empirical 'law' of economics" (Blanchflower & Oswald 1994: 1), which included even the size of the coefficient. For the Anglo-Saxon countries, the estimates of the unemployment elasticity of earnings lie in a range from (-0.08 to -0.11) in almost all specifications. These empirical results are based on pooled cross sections of micro data.

Later, additional evidence in favour of the existence of a wage curve was presented by other authors (for Germany see Baltagi, Blien 1998 & Baltagi, Blien, Wolf 2009), whereas the precise size of the unemployment effect was a point of debate: In several countries (e. g. in Germany) the size of the effect appears to be smaller. In general it is related to the institutional conditions of the respective country. A meta-analysis on the empirical results concerning the wage curve was provided by Nijkamp and Poot (2005), recent studies include estimates for Russia (Shilov, et al. 2012).

Technically, the wage curve is simply a standard wage equation, which can be used to estimate the returns to education or the male/ female wage gap. In the case of the wage curve research the local unemployment rate is added to the set of regressors. Although, Blanchflower and Oswald (1994) present a wide range of evidence on the appropriate functional form and find non-linearities, they argue that the simple log-linear function is generally a good approximation.

2.1 Theory on labour market matching

Turning to explanations for the wage curve, often efficiency wage approaches are seen as important. The wage curve can be regarded as a substitute for a common labour supply function of a macro-model. Blanchflower & Oswald transfer the so-called "wage setting curve" of the macro-models developed by Layard et al. (1991, 2005), by Carlin & Soskice (1990, 2006) and others to regional labour markets. The incorporation of the regional dimension in the analysis of wages has the advantage of gaining variance, since the researcher is able to study many small economies instead of only a single large one. Regionalized versions of bargaining theory and efficiency wage theory can be used to explain the negative relationship between wages and unemployment. Originally, Blanchflower & Oswald also used contract theory as a third explanation of the wage curve, which was not taken up later.

Instead, we turn to a theory which has not been used to derive a wage curve as far as we know. This is the theory of labour market matching, developed mainly by Pissarides and Mortensen. In a specific sense the theory comprises the wage negotiation approach, since it also includes Nash bargaining between workers and firms. The core of the theory (following e.g. Pissarides 2000 and 2009, see also Mortensen 2010 and Zenou 2009b) can be directly used to develop a wage curve, it is only necessary to treat unemployment explicitly. In the theory, the decision of firms to

create jobs is modelled in two steps. First, the decision to open a vacancy is described by the following Bellman equation:

$$iV = -c + q(v/u)(J - V) \qquad (1)$$

A Bellman equation is a necessary condition for optimality in dynamic programming. Second, the equation for an occupied job has the following shape:

$$iJ = p - w - sJ \qquad (2)$$

In these equations J is the capitalized value of an occupied job and V is the value of a vacancy, i is the interest rate, p the product of a single worker, w the wage, v the vacancy rate and u the unemployment rate. s is the separation rate, which is calculated for occupied jobs, c is the cost of search during the time a vacancy is open, q is a special form of the aggregate labour market matching function: $m(u/v,1) = q(v/u)$. The function $m = m(u,v)$ describes the forming of matches between firms and workers, which is homogeneous of degree 1 and concave in its arguments. The calculations of workers are mapped by the following equations:

$$iW = w - s(W - U) \qquad (3)$$

$$iU = z + (v/u)q(v/u)(W - U) \qquad (4)$$

Here, W are the expected returns from holding a job and U those of being unemployed. z comprises unemployment assistance and the nonmonetary aspects of leisure. In the matching approach, a single firm and an individual worker negotiate about the size of the wage. Since it is assumed that they meet each other pair-wise, they form a double-sided monopoly, which is described as a Nash bargaining problem:

$$w = \max\{(W - U)^{\beta}(J - V)^{1-\beta}\} \qquad (5)$$

The first order condition of the maximization exercise is:

$$W - U = \beta(J + W - V - U) \qquad (6)$$

This solution depends on a parameter $0 < \beta < 1$ whose exact size is regarded as given. It characterises the relative "strength" of the two parties involved in the bargaining process.

Now we have nearly all material at our disposal to construct on the one hand a wage curve and on the other hand an expression for reservation wages. The latter one is already defined by equation (4), since this describes the lower threshold for wages. If wages are higher than iU workers are available for working. To derive expressions for market wages and for reservation wages, which could be estimated, a further assumption is needed. It is assumed that in (1) vacancy creation exhausts all available profits, therefore V is assumed to be zero. Then, (1) can be transformed to the so-called job creation condition:

$$\frac{p - w}{i + s} = \frac{c}{q(v/u)} \qquad \text{if} \qquad V = 0 \qquad (7)$$

Now, we can recalculate (4), to find a new expression for the reservation wage $R = iU$:

$$R = iU = z + \frac{\beta}{1-\beta} cv/u \tag{8}$$

For the market wage it is found:

$$w = (1-\beta)z + \beta(p + cv/u) \tag{9}$$

Pissarides calls (9) the "wage equation". He prefers not to focus directly on u, the unemployment rate, but rather on $\theta = v/u$, the labour market tightness (which is used in empirical analyses for Great Britain by Longhi 2011). Therefore, his wage equation is an increasing linear function in w, θ -space, whereas we prefer to reformulate (9) as a regional equation (r is the region index) and present it as a nonlinear decreasing function in w, u-space:

$$w_r = (1-\beta)z + \beta(p_r + cv_r/u_r) \tag{10}$$

Now, we have obtained the regional wage curve in an easy way from the Mortensen/Pissarides system. It is also possible to compare equation (10) with a regionalized version of equation (8). We have already stated that w must be greater than R in this system. By construction reservation wages are lower than market wages. It is also obvious that the derivative of R_r is different from the one of w_r.

$$\partial w_r / \partial u_r = -\beta cv_r / u_r^2 \tag{11}$$

$$\partial R_r / \partial u_r = -\frac{\beta}{(1-\beta)} \frac{cv_r}{u_r^2} \tag{12}$$

Since $0 < (1-\beta) < 1$ the first term on the right hand side of (12) is larger than β, the factor in (11). It can be concluded that reservation wages R_r react more strongly to variations in regional unemployment u_r than the market wage w_r. This is due to the fact that reservation wages do not depend directly on the actions of firms which modify the movements of market wages.

There are several extensions to the matching model available which might be of potential interest to our purpose. There are extensions developed by Y. Zenou (2009a and 2009b), who among others includes a land market in the model and is therefore able to develop an urban structure of the labour market. Since we expect labour markets being larger than city quarters, we do not use Zenou's extensions.

However, there are points of the basic matching model which can be criticised. The treatment of an individual worker like a capital asset is a particular characteristic of this approach, though there is an asymmetry between capital assets and workers. The first ones exist separately from their owners and can therefore be sold on the market, whereas the capital a worker represents is embodied in her (or in him) and cannot simply be sold on the market like a capital asset. Another point is the parameter β which has to be treated as given. In the empirical analyses we abstract from these critical points and assume the theoretical structure as given.

2.2 Efficiency Wage Theory

The basic models of Pissarides and Mortensen do not include a special mechanism establishing an incentive for workers to work with great intensity. In the model shown, merely a variable *z* is included which represents the value of leisure. However, there are good reasons why it is important to look at the level of efforts in a theoretical model of the labour market.

In empirical economies a standard wage contract does not specify the level of work intensity. Firms react to this situation by taking special measures to secure a high level which include the variation of wages which in turn influences the level of unemployment. Jobs can be very different with respect to their demands of the efforts they require. Therefore, it is better to include this effort as an economic variable in the model of the labour market. This is done in the theory on efficiency wages. In this theory, workers are motivated to work hard either by a wage premium or by the implied threat of dismissal. If the unemployment rate is high, workers who lose their jobs will obtain no income or only relatively low unemployment benefits, since it will be difficult to find another job. From the viewpoint of firms, high wages and high regional unemployment are substitutes in motivating workers. Therefore, the efficiency wage approach suggests that in regions with low unemployment rates firms would be inclined to pay more than in those regions with high unemployment rates, which gives rise to the existence of a wage curve. In the standard efficiency wage models, however, the reference to reservation wages is missing. Therefore we need a closer look at the modelling strategy chosen for efficiency wages.

Blanchflower & Oswald use a modification of Shapiro & Stiglitz' (1984) efficiency wage model to develop the wage curve. Zenou (2009b) published an extension of this model, which also provides an endogenously developed city structure. In the following, however, we would like to show that a new interpretation and slight modification of Schlicht's (1978) efficiency wage model gives very interesting insights into the role of reservation wages. His seminal paper treats wages as a continuous variable not as a binary one as it is in the context of Shapiro & Stiglitz and their followers. Schlicht's paper was included in the influential overview on the first round of efficiency wage theory published by Yellen (1984). It has the additional advantage that it is constructed around a genuine regional dimension. Though Schlicht's original aim was to explain the measures of firms to avoid labour turnover, here we use a similar model structure to deal with effort decisions of workers.

In this model, workers are assumed to be identical between firms *f* and regions *r*. They are characterized by a function $a_{rf} = a(v_{rf}, u_r)$ describing their effort decisions. Effort levels depend on the relative wage level of the particular firm $v_{rf} = w_{rf}/R'_r$, i. e. the absolute level of wages relative to a reference wage of the particular region. At the moment, we note that the reference wage *R'* we are dealing with is not necessarily the reservation wage. The other argument in the function is the regional unemployment rate u_r. Workers wish to avoid unemployment and are motivated to

work harder if the regional unemployment rate is relatively high. Then, the effort function is assumed to have the following properties:

$$\frac{\partial a_{rf}}{\partial v_{rf}} > 0, \quad \frac{\partial a_{rf}}{\partial u_r} > 0, \quad \frac{\partial^2 a_{rf}}{\partial v_{fr}^2} < 0, \quad \frac{\partial^2 a_{rf}}{\partial u_r^2} < 0, \quad \frac{\partial^2 a_{rf}}{\partial v_{rf} \partial u_r} < 0 \tag{13}$$

Behind this effort function there might even be a normative process in the sense of Akerlof's gift-exchange between firms and employees. Firms *f* located in region *r* are assumed to maximize profit *Π*, which depends on the level of production *F* given by a standard neoclassical production function, the level of prices *P*, which is assumed to be constant, and the number of employed workers *n*.

$$\Pi_{ri} = P F_r(a(v_{rf}, u_r) \cdot n_{rf}) - v_{rf} R_r' n_{rf}, \qquad F_r' > 0, \quad F_r'' < 0 \tag{14}$$

Since it is assumed that firms set wages according to profit maximization, they have two action parameters *w* and *n*. Differentiating with respect to both variables gives the 'elegant' formulation for the equilibrium condition:

$$\frac{a_{rf}}{v_{rf}} = \frac{\partial a_{rf}}{\partial v_{rf}} \tag{15}$$

This equation is a modification or generalization of the so-called "Solow condition" because in the one published by Solow (1979) not relative but absolute wages were included. Apart from this the expression is the same. Aggregation of (4) over all firms in a region gives the wage curve (WS) we are looking for:

$$WS_r(u_r) = v_r = \frac{a_r}{(\partial a_r / \partial v_r)} \tag{16}$$

A profit maximizing firm will set its wage according to this condition. It depends on the level of regional unemployment since the workers' effort decisions are determined by their probability of becoming unemployed if they are laid off. The wage curve decreases with unemployment as can be seen by differentiating using the implicit function rule:

$$\partial v_r / \partial u_r = \frac{\partial a / \partial u_r - (\partial^2 a / \partial v_r \partial u_r) v_r}{(\partial^2 a / \partial v_r^2) v_r} < 0 \tag{17}$$

However, up to now a central point of the argument, which is crucial in the present context, is still missing: What determines the reference wage? Originally, Schlicht assumed this wage R'_r is simply the long-run equilibrium market wage. To see this, it is assumed that $w_{rf}/R'_r = v_{rf} > 1$. In this case, all firms are trying to set wages higher than the regional wage R'_r, therefore the average wage level rises. However, this cannot be sustained for long either, since in parallel firms are trying to reduce costs by shifting to more capital-intensive production methods. Other firms, which are not able to do this, get under pressure and might be forced to leave the market. This process increases unemployment to a level so high, that much pressure is put onto the workers.

The threat of unemployment is motivation enough to work hard without a special wage premium. In the end a situation is reached which is characterized by an unemployment rate representing a stable situation. This rate is the threshold below which unemployment tends to rise (for more details and for a sketch of a formal exposition see Schlicht's seminal article).

Due to this argumentation the reference wage R'_r can be interpreted as the reservation wage $R_r = R$, which in the basic model is assumed to be uniform in the whole economy. Why is this interpretation possible? The reservation wage is exactly the wage for which workers can be expected to supply their working ability and work with profitable effort. We have already seen that there is a tendency of convergence: In the long run the relation between R and w is uniformly equal to unity and the unemployment rate corresponds to its equilibrium value in any region.

In contrast to the expectation about an equilibrating process, many empirical economies show no convergence with respect to the crucial labour market variables. The variables important in the efficiency wage model do not correspond to their equilibrium values. Especially unemployment rates vary much between regions. In fact, within many countries they are roughly as different as between nations (Suedekum 2005). Often it is assumed that the regional variation is the consequence of the small speed of adaptation in relation to shocks hitting the regional economies.

A different explanation for the regional variation describes the adaptation process as asymmetric. It works relatively fast in the case of low unemployment. Then it leads to higher wages and higher unemployment rates. In the reverse case of high, i.e. over average unemployment rates, however, there might be no or only a slow adaptation in the direction of lower wages. Firms are reluctant to cut wages (Bewley 1998). Even if unemployment rates are high, firms fear negative effort effects of wage reductions.

There might be further forces counteracting equilibrating processes between regions. According to the New Economic Geography (NEG – Fujita/Krugman/ Venables 1999) which is favoured by many economists, there might be spreading tendencies in an economy. The original NEG assumes full employment, whereas Suedekum (2005) integrated unemployment in models constructed later. Low wages and high unemployment weaken the market potential of a region and thus reduce its ability to reach labour market characteristics of successful regions. We will not explore this any further, only mention that processes of the kind described could explain why in a country regions with many different unemployment levels can coexist.

A wage curve exists only if the equilibrating process is blocked, since otherwise the distribution of unemployment rates would degenerate to a uniform national rate. Due to the variation of unemployment it can be expected from the efficiency wage model that the relative wage v_r varies too. Firms react to the labour market situation,

since they are interested in guaranteeing profitable incentives for the effort of workers. A wage distribution corresponds to the distribution of unemployment rates.

If, however, regional unemployment remains high for a relatively long time workers might revise their reservation wage. Then, they do no longer use the national wage rate as a basis of comparison, but reduce the expected wage rate in regions with persistent high unemployment. This is expressed in equation (18):

$$R'_r = R\,\Phi(u_r) \tag{18}$$

The function $\Phi(u_r)$ is decreasing with the unemployment rate. It could describe a process of rational calculation or of normative considerations as it was analyzed by Akerlof (1982). In any case a negative relationship between regional unemployment rates and reservation wages is obtained.

The formation of reservation wages could be generally influenced by normative elements like the one of efficiency wages. Akerlof (1982) introduced this into his analysis of efficiency wages by regarding the firms' payment of relatively high wages and the decisions of workers concerning high effort levels as a process of gift exchanges. Fehr, Kirchsteiger, Riedl (1998) argue that in economies like Germany it is not very easy to fire workers. Therefore the threat of dismissal is not dominant at least for some active workers. Their compliance to high effort standards is therefore at least partly not due to rational economic calculations but to normative considerations. They demonstrate the empirical validity of this reasoning in their laboratory experiments.

In the present context it can be assumed that in regions with high unemployment rates workers realize that in their location general business conditions are bad and therefore they cannot expect very much with respect to wages. This is the reason why we added a simple adaptation process to the efficiency wage model: In regions with high unemployment rates reservation wages are lower than in regions which approach full employment. This adaptation process also leads to a distribution of unemployment rates and a corresponding distribution of wages which is reflected by a wage curve.

2.3 Discussion

What have we learnt from the theoretical discussion about the level of reservation wages and its relation to unemployment? In both basic models reservation wages vary with the unemployment rate. In Pissarides' model there is a gap between the reservation and the market wage. He does not take into account the relation between effort, wages, and reservation wages. The difference between market and reservation wages is derived from the Nash-bargaining framework which is assumed to be important in case a firm hires a new employee.

In the efficiency wage model there is an equilibrating force which is missing in the flow models of the labour market: Wages are pushed up by limiting labour demand

and reservation wages are pushed down by unemployment until both are equal. Schlicht suggests that on a labour market with unemployment above the mentioned threshold (which he originally interpreted as the "natural rate of unemployment") wages will fall and employment will successively be increased until the equilibrium level of unemployment is reached. We have seen that this equilibrating process might be delayed or neutralized by other forces. In this case a gap remains between reservation wages and market wages too. Firms pay more than reservation wages at least in regions where unemployment rates are below their long-run equilibrium values. The function of this wage premium is to preserve an incentive for workers to work hard.

However, as we have seen, there might also be an adaptation process concerning reservation wages: Whereas in the short run only the wage-curve mechanism described by equations (15) and (16) is effective, in the long run also reservation wages are adapted according to equation (18). From the efficiency wage model it can therefore be concluded that the gap between market and reservation wages is only small, since both converge in the long run.

From the matching model there is an additional conclusion available which has already been mentioned. The reaction of reservation wages to unemployment should be larger than the one of market wages. No such conclusion can be derived from the efficiency wage model. In both approaches reservation wages would react to the level of regional unemployment.

All the previous discussions do not take into account that different groups of workers might have different levels of reservations wages, since these are expected to depend also on the personal situation of the workers. Someone who might be receiving a very low level of wage might have a relatively high reservation wage, because the paid wage might not be sufficient to nourish a family according to given cultural standards. Therefore, a distribution of reservation wages is to be expected in empirical analyses. Another reason for deviations between reservation and paid wages are adaptation processes described above.

In this paper, however, we are not primarily interested in the variation of reservation wages between different groups of workers. The target of the empirical analyses is the relation between regional unemployment and reservation wages. From the theoretical analysis above it can be derived that the expectation of the effect of unemployment on reservation wages is of the same size as is the effect on paid wages. This equality could be hidden if the economy is passing a major adaptation process, e. g. due to a turning point in the business cycle.

3 Data sources and data description

3.1 The data sources

The empirical analyses in this article are performed using data from the first wave of the panel study "Labour Market and Social Security" (PASS, see Trappmann et al.

2010), which is a new large-scale panel study in Germany conducted by the Institute for Employment Research (IAB). Its main purpose is the evaluation of a new unemployment assistance scheme for long-term unemployed and households with insufficient income (Unemployment Benefit II) that was introduced in Germany in 2005.

Due to the comprehensive design of the survey (Rudolph and Trappmann 2007) the dataset furthermore allows answering a broad range of questions concerning the labour market, the welfare state and the poverty situation in Germany. The first wave of the panel survey was conducted between December 2006 and July 2007. During this time 18,954 individuals in 12,794 households were interviewed.

The sample of the first PASS wave consists of two sub-samples: sub-sample one is a random sample of 6,804 households receiving unemployment assistance in July 2006 drawn from the registers of the German Public Employment Service. The second sub-sample is a random sample of 5,990 households of the German residential population. Both sub-samples are clustered in the same 300 randomly selected postal code areas in Germany and get predominantly identical questions though there are some extra questions for unemployment benefit recipients (which exist in both sub-samples). The participating households are interviewed yearly about a range of topics including their education, employment and unemployment histories, assets and income from different sources, programme participation (active labour market policy programmes), household composition, dwelling, health and social networks. Taking on an individual perspective as well as focusing on the household community in joint receipt, the survey includes a "household questionnaire" to be answered by the head of the household and a "person questionnaire" for each person older than 14 years. In wave one 18,954 persons were interviewed – 9,386 in the recipient sample and 9,558 in the population sample (see Christoph et al. 2008 and Hartmann et al. 2008).

The data from PASS are ideal for the purpose of this paper as they contain a large number of employed and unemployed persons distributed equally over Germany, information on their place of residence, on their reservation wage and a large set of attributes that are usually supposed to have an effect on reservation wages such as employment status, household income, education, gender, age, family size and structure. Furthermore the survey design based on the two sub-samples allows us to distinguish between the German residential population and unemployment benefit recipients in our analyses.

To capture the reservation wage in the survey, people who have ever been searching for a job were asked about their expected net-wage. Subsequently the same group of people were asked if they would also accept a lower wage offer and how high this (minimum/reservation) wage would at least have to be. The response to this question is expected to be the individual reservation wage. For people who would not accept a lower wage, the expected wage is assumed to be their reservation wage.

Based on the full sample size of 18,954 individuals participating in the first wave of the PASS, the reservation wage was generally not collected from people aged 65 years or older, full-time students and from people who denied ever having searched for a job. Furthermore we excluded retired people as well as people permanently unable to work. With implausible statements according to the reservation wage - reported reservation wages of below € 100 and over € 4,000 net wage per month - and non-respondents taken into account, almost 60 % of the original number of cases can be used in our analysis. Table 1 shows the selection of cases for the analysis. Further restrictions to the sample size may apply during the analysis due to missing values in the independent variables.

Table 1
Selection of data for analysis

Total Sample	N=18,954	100 %
Individuals older than 64 years	n=1,705	9.0 %
Fulltime-students/Never searched for a job	n=5,421	28.6 %
Occupational Status: retired/permanently unable to work/student	n=166	0.9 %
Non-respondents "don't know/refuse"	n=815	4.3 %
Implausible answer (reservation wage < € 100 or > € 4,000)	n=51	0.3 %
Analysis sample	**n=10,796**	**57.0 %**

Source: PASS (2007), own estimation.

3.2 A descriptive analysis of reservation wages

All descriptive statistics in this section are calculated by using the subsample weights. With these weights the recipient sample can be projected to all Unemployment Benefit II recipients in Germany in July 2006 and the population sample can be projected to all persons living in private households in Germany in the same year. The average reservation wage found in the sub-sample of the residential population is € 1,258 monthly net wage, whereas the average wage expectations of people from the benefit recipient sub-sample are significantly lower and account for € 980. Earlier analyses from the SOEP published by Christensen (2003) yielded a figure of € 1,240 (see also analyses by Bender et al. 2009).

Further descriptive analyses of the reservation wage by several determining variables generally show the expected results: In both subsamples women have a considerably lower reservation wage than men and reservation wages are increasing with age as well as with level of education, with a large interval between the medium and the highest educational level (see Table 2). Not surprisingly differences between these groups are larger in the residential population than for the population of benefit recipients.

Table 2
Determinants of the reservation wage

Independent Variable	Reservation Wage (mean) net wage/month in €	
	Unemployment benefit recipients (sub-sample 1)	German residential population (sub-sample 2)
Sex		
Male	1,070	1,507
Female	879	999
Age		
15-25] years	834	966
25-55] years	1,005	1,294
55-64] years	1,034	1,327
Level of qualification		
Inadequately completed general education	956	990
Low level of qualification	956	1,129
Medium level of qualification	958	1,163
High level of qualification	1,190	1,754

Source: PASS (2007), own estimation.

As we are particularly interested in the effects of regional unemployment on reservation wages the following tables will give an overview of the mean reservation wages by regions. East-Germans have a considerably lower reservation wage than people living in West-Germany. This difference can be found in both populations.

Table 3
Reservation wage by region

Region	Reservation Wage (mean) net wage/month in €	
	Unemployment benefit recipients (sub-sample 1)	German residential population (sub-sample 2)
West-Germany	1,018	1,297
East-Germany	918	1,125

Source: PASS (2007), own estimation.

A comparison of the reservation wages by regional type (see Table 4) shows, that the differences calculated for the aggregate level (East/West) can also be found at the regional level. The highest reservation wages are reported for "highly urbanised districts". And, as expected, rural regions tend to have considerably lower reservation wages.

Table 4
Reservation wage by regional type

Regional type	Reservation Wage (mean) net wage/month in €	
	Unemployment benefit recipients (sub-sample 1)	German residential population (sub-sample 2)
(1) Agglomeration region - Core city	1,033	1,306
(2) Agglomeration region - highly urbanised distr.	1,040	1,315
(3) Agglomeration region - Urbanised districts	952	1,323
(4) Agglomeration region - Rural districts	928	1,240
(5) Conurbational region - Central city	963	1,226
(6) Conurbational region - Urbanised district	958	1,257
(7) Conurbational region - Rural district	900	1,194
(8) Rural region - Urbanised district	968	1,139
(9) Rural region - Rural district	856	1,175

Source: PASS (2007), own calculation.

In the following analysis, the regional units are districts (Landkreise & kreisfreie Städte), 221 of 439 German districts are present in the sample. Therefore the coverage of regions is good. The region types of Table 6 are a classification of the districts used.

4 Empirical results

The regressions on the relationship between reservation wages and regional unemployment follow the pattern given by the wage curve research. The next equation shows the "pooled regression":

$$\ln R_{rj} = \beta_0 + \beta^u \ln U_r + \beta^x X_{rj} + \varepsilon_{rj} \qquad (19)$$

As already stated the basic model is an augmented Mincer type earnings function. The response variable is the log of the reservation wage R_{rj}, which now varies between individuals j, since it depends not only on characteristics of the region r, but also on those of the respective individual. The most important exogenous variable is the log of regional unemployment U_r. A number of further controlling variables X_{rj} is included. Among these are gender, age, age squared (divided by 100) and household income (in logs). Groups of dummy variables complete the set of variables: there are dummies indicating the type of the district (from the rural country to the metropolitan area, according to a classification for centrality and population density, see Görmar, Irmen 1991 – an updated version can be seen at the BBSR web page), the occupational status (employed with at least 16 working hours, unemployed, in education, etc.), qualification level (no formal qualification, low level of qualification, medium qualification, high qualification). Dummies for migration background, for own children under the age of 18, and for residents of the eastern part of Germany are included too. Finally, a standard error term ε_{ri} is also included. The basic model

(19) is estimated by Ordinary Least Squares (OLS). In a second version of the model we use the same variables, but assume a different error structure:

$$\ln R_{rj} = \beta_0 + \beta^u \ln U_r + \beta^x X_{rj} + \varepsilon_{rj} + \delta_r \qquad (20)$$

The error term δ_r varies only between regions and takes over unobserved influences affecting all individuals of one region to the same extent. Normally, a wage curve is estimated by using regional fixed effects.

In the present case random effects have to be used, because fixed effects would be multicollinear with the regional unemployment rate in a cross-section. Regional random effects are important to control for the unobserved heterogeneity of regions.

They take the deviating number of observations between the regional and the individual level into account (see Moulton 1990). The model is estimated by Maximum Likelihood.

Table 7 presents the results for the pooled regression with the log of reservation wages as response variable. The coefficients of the control variables show the expected signs and in most cases are very close even to the expected sizes. The reservation wage profile increases with age and with higher qualification levels. The coefficients of the regional dummies correspond closely to analyses with paid wages for the German labour market (see Blien 2001).

The unemployment rate at the district level we used in the model is a gender specific rate. This is a more accurate indicator of labour market tightness than including the variable as a global measure uniform for both sexes. The coefficient is -0.05 and is highly significant. Therefore it can be concluded that a wage curve for reservation wages exists. This conclusion is confirmed by the Maximum Likelihood estimate of the random effects model. The coefficient and the significance level are nearly the same as in the OLS estimate. Table 5 displays the results for the combined samples.

In tables 6 and 7 variations of the basic model are presented. Table 6 shows the results on some experiments with different unemployment rates. It turns out the effect is largest for gender-related unemployment, it is weak, however and not significant in the analyses for females.

Table 5

Reservation wage and regional unemployment (Basic Models)

Variable	Pooled Regression (OLS)			Random Effects (ML)		
	Coeff.	t value	P>t	Coeff.	z value	P>z
Unemployment Rate (gender-related)	-0.052	-3.59	0.000	-0.055	-3.37	0.001
Age	0.023	7.62	0.000	0.023	7.60	0.000
Age squared/100	-0.021	-5.84	0.000	-0.021	-5.81	0.000
Male	0.293	32.08	0.000	0.292	31.79	0.000
East-Germany	-0.024	-1.71	0.087	-0.025	-1.50	0.135
Immigrant	0.027	2.75	0.006	0.027	2.74	0.006
Household Income (OECD)	0.093	10.25	0.000	0.092	10.12	0.000
Children <18 years	0.071	7.17	0.000	0.071	7.14	0.000
Level of qualification						
No formal qulification	-0.266	-12.02	0.000	-0.265	-12.00	0.000
Low level of qualification	-0.228	-16.13	0.000	-0.226	-15.98	0.000
Medium level of qualification	-0.206	-15.37	0.000	-0.205	-15.29	0.000
High level of qualification	-	-	-	-	-	-
Occupational status						
Gainfully employed	-	-	-	-	-	-
Unemployed	-0.127	-10.96	0.000	-0.127	-11.00	0.000
Non-Employed	-0.218	-14.06	0.000	-0.218	-14.07	0.000
In training	-0.134	-5.33	0.000	-0.134	-5.32	0.000
Other status	-0.133	-4.92	0.000	-0.133	-4.94	0.000
Region Type Dummies						
Agg. region – core city	0.107	5.42	0.000	0.103	4.42	0.000
Agg. region – highly urbanized distr.	0.076	3.54	0.000	0.071	2.92	0.003
Agg. region – urbanized districts	0.042	1.74	0.081	0.043	1.60	0.109
Agg. region – rural districts	0.029	1.07	0.287	0.030	0.95	0.340
Conurb. region – central city	0.052	2.29	0.022	0.053	2.07	0.039
Conurb. region – urbanized district	0.048	2.44	0.015	0.046	2.08	0.038
Conurb. region – rural district	-0.025	-1,12	0.261	-0.026	-1.04	0.298
Rural region – urbanized district	0.042	1.72	0.086	0.040	1.47	0.142
Rural region – rural district	-	-	-	-	-	-
Constant	5.893	60.35	0.000	5.909	59.61	0.000
N	10,204			10,204		

Source: PASS (2007), own estimation.

Table 6

Results with different unemployment rates

Combined samples Pooled Regressions			
	Unempl. effect	t value	N
Regional Unemployment Rate	-0.030*	-1.94	10204
Regional Unemployment Rate (gender-related)	-0.052***	-3.59	10204
Regional Unemployment Rate (male)	-0.048***	-2.64	4749
Regional Unemployment Rate (female)	-0.023	-1.00	5455
Combined samples Random Effect			
	Unempl. effect	z value	N
Regional Unemployment Rate	-0.027	-1.55	10204
Regional Unemployment Rate (gender-related)	-0.055***	-3.37	10204
Regional Unemployment Rate (male)	-0.044**	-2.16	4749
Regional Unemployment Rate (female)	-0.021	-0.81	5455

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

Table 7 shows that the estimated reservation wage curve is rather flat at low levels of wages. This is the reason why there is no significant effect in Eastern Germany, for female workers and for people receiving unemployment assistance (sub-sample 1). These workers expect to earn less than the average. Taking into account cultural standards of a good or even an acceptable living, there is hardly any space for a variation due to unemployment. This effect is relevant in spite of the small coefficient for East Germany. Let us use a regression analysis on market wages with data from the German employment statistics as a benchmark. In a model similar to the one used here, a dummy indicating a working place in the East has a highly significant coefficient of -0.18. However, a corresponding dummy is only -0.024 for reservation wages and it is only significant at the 10 %-level. This result indicates that the population of Eastern Germany is still oriented towards Western standards.

In 1990 wages in the East were about one third of those in the West. However, they increased very quickly in the East, much faster than productivity. This rising wage was driven by high expectations in the East after unification and by neglecting the threat of unemployment. Many workers in the East assessed the situation according to normative standards. They thought of themselves as being of the same value as those in the West. Therefore, they concluded, they ought to earn the same wage (Blien, den Butter 2003). There seems to be remainders of this normative pattern, which is mirrored here by a relatively small value of the dummy for Eastern Germany. The descriptive results (see Table 3) mirror this finding since the difference of the average reservation wages between East and West Germany is also relatively small.

Table 7
Results with gender-related unemployment rates and different populations
Dependent Variable: Reservation wage
Pooled Regressions

Model	Unempl. effect	t value	N
Germany all	-0.052***	-3.59	10204
Germany unempl. benefit recipients (sub-sample 1)	-0.016	-0.88	6457
Germany residential population (sub-sample 2)	-0.053**	-2,20	3747
Eastern Germany all	-0.002	-0.07	3200
Western Germany all	-0,050***	-2.89	7004

Random Effects

Model	Unempl. effect	z value	N
Germany all	-0.055***	-3.37	10204
Germany unempl. benefit recipients (sub-sample 1)	-0.015	-0.77	6457
Germany residential population (sub-sample 2)	-0.056**	-2.12	3747
Eastern Germany all	-0.002	-0.07	3200
Western Germany all	-0.054***	-2.84	7004

* p<.1; ** p<.05; *** p<.01

In the case of unemployed people it is obvious that there is a considerable reduction of reservation wages. The related dummy in Table 5 has a coefficient of -0.13, therefore the threat of unemployment, emphasized in Schlicht's model, is effective. These people are forced to find a new job and are therefore inclined to reduce their

wage aspirations. After this reduction no reservation wage curve could be found since the wage expectations are relatively low anyway.

The results on female workers stick out, since in the analyses of Table 5 the coefficient indicating the wage gap is 0.29 in favour of male workers. This is larger than the gap with paid wages. It seems as if female workers are more "modest" in their wage claims which may be due to a lesser intensity of competitive orientations. The reference group of female workers is not formed by male workers.

5   Final remarks

The results obtained can be related to those received on the wage curve for paid wages. Baltagi, Blien & Wolf (2009) use panel data about West Germany for a long period. The coefficient they got is about -0.04, which seems to be in line with the results received in the present context. However, this is the long run effect. The one Baltagi et al. obtained in the short run is only about one half of this. This figure should be compared to the one found in the present context. On the basis of this comparison, it can be concluded that the expectation derived from the matching model is confirmed: The reaction of reservation wages to regional unemployment is larger than the one of market wages. Apart from this, reservation wages and paid wages follow similar patterns, both react to regional unemployment.

Whereas the stronger reaction of reservation wages supports the matching model (though it does not contradict the efficiency wage model), the relatively small difference between market wages and reservation wages we found in the descriptive analyses is favouring the efficiency wage approach. There, in the long run equilibrium workers are motivated to work hard by the pressure of unemployment not by a wage premium, which vanishes in the long run. Then the shape of the wage curve reflects the shape of the reservation wage curve which is used by the firms to set wages according to their own calculation. Both models come to similar conclusions, though the causal processes they respectively describe are different. The efficiency wage model emphasizes the role of firms for the determination of the wage level and of the level of unemployment. In the matching model workers play also active roles.

Though it is not possible to decide definitely between the two models on the basis of the empirical analyses, the results obtained are of general importance. They open the veil which covers the wage generation process, since they show in detail the results of the calculations and expectations of workers. It is remarkable that there is a significant reaction in the reservation towards regional unemployment. The expectations of workers are influenced by the unemployment rate in the area their working places are located. Firms are able to use this regional variation, which is one of the reasons why a wage curve for market wages is present. We have seen, that there are some exceptions from this rule for populations of workers affected by relatively low wages. Due to high unemployment rates in East Germany wages are considerably lower than the average, therefore there is no tolerance for further (small-scale regional) variation of reservation wages. In the regions with average wages, however, a reservation wage curve is present.

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