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Reservation Wages, Offered Wages, and Unemployment Duration — New Empirical Evidence

by

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Abstract:

This paper studies the reservation wages of unemployed persons and the wages offered them in Germany from 1987 to 1998, whereby special focus is placed on unemployment duration. The results of the study indicate that in contrast to reservation wages, offered wages decline considerably with duration of unemployment. This is the main reason that ratios of reservation wages to offered wages increase rapidly with duration of unemployment; on average, reservation wages begin to exceed offered wages after nine months of unemployment. Thus, the chance that long-term unemployed persons will receive a wage offer that is higher than their own reservation wage is extremely slight.

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1.   Motivation

In international comparison, the German unemployment insurance system is considered to be generous (OECD 1999). The long period of unemployment payments with only a slight decrease in benefits over time[1] induces a high wage demand of unemployed persons (reservation wage) that almost stays constant during unemployment, as theoretical analyses show (Schneider and Fuchs 2000). These findings are verified in empirical work by Prasad (2001) and Christensen (2001), who find high reservation wages in comparison to offered respectively last wages, and no decrease in reservation wages during unemployment.

This last result is especially striking, since — from a theoretical point of view — offered wages generally fall during unemployment due to an decrease in human capital or social competence as well as a stigmatisation of unemployed persons.

The main objective of this study is to empirically analyse the relationship between reservation wages, offered wages, and unemployment duration in Germany on the basis of the Socio-economic Panel (GSOEP). For this purpose, wages after unemployment are interpreted as potential wage offers to unemployed persons. The determinants of these wages are then used as a basis for a prediction of offered wages to unemployed persons. Finally, the ratio of reservation to offered wages is calculated with special focus on unemployment duration.

The main findings are as follows: in contrast to reservation wages, the offered wages decline considerably with the duration of unemployment. After nine months of unemployment, reservation wages exceed the offered wages in mean even if the reservation wage information of the GSOEP are corrected for a potential upward bias. Moreover, the ratio of reservation to offered wages increases by 22% in every year of unemployment. Thus, for long-term unemployed persons[2] the chance of getting an offered wage which exceeds the reservation wage is extremely small due to non-declining reservation and declining offered wages.

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[1] See for example Glismann and Schrader (2000) for an overview of the development of the German unemployment benefit system.

[2] 37% of all unemployed persons in Germany are long-term unemployed, i.e. unemployed for more than 12 months (BA 2001: 19).

The remainder of the paper is organized as follows. Section 2 describes the general concept of analysis and the estimation procedures. Section 3 contains the description of the database including some descriptive findings for reservation wages, offered wages, and unemployment duration. Additionally, the validity of reservation wage information in the GSOEP is discussed. Section 4 presents the estimation results for the offered wages and the ratio of reservation to offered wages with special focus on unemployment duration. Section 5 summarizes the main findings of the paper and draws some policy conclusions.

2. The Concept of the Analysis

The main objective of this study is to generate an offered wage for each unemployed person with a reservation wage observation and to calculate the ratio of reservation to offered wages with special focus on unemployment duration.

Prasad (2001) uses a three-step approach to obtain a reservation wage/offered wage measure: (i) He estimates annual selection-corrected Mincerian wage equations. To control for a potential sample-selection bias caused by observing net monthly earnings only for employees, he uses an expanded sample including non-employed workers to estimate and correct for the selectivity bias by using Heckman's (1979) two-step procedure. (ii) Based on these estimates, he generates a predicted offered wage for each unemployed worker conditional on the observed characteristics. (iii) He constructs the differential between reservation and (predicted) offered wages for each worker who reports a reservation wage.[3]

The problem with this approach is two-fold: first, the Heckman procedure may not catch all the effects of differences in net wages respectively potential net wages between unemployed and employed persons. Second, the duration of unemployment is not taken into account in the prediction of potential offered wages.

To overcome these problems, this study uses a more straightforward approach: (i) The accepted net wage (i.e. offered wage) is generated for all

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[3] Prasad (2001) uses this difference only to plot it against the offered wages. He does not use it for an OLS estimation. See Chapter 4.2 for more details.

employees who started a new job after unemployment.[4] (ii) This data-set is taken to run a wage equation estimation whereby the unemployment duration is taken into account. (iii) For each reservation wage observation an offered wage is predicted on the basis of the wage equation estimation.

In addition the predicted offered wages are used to generate the ratio of reservation wages to offered wages for each unemployed person which will then be used as an endogenous variable in an OLS estimation with special focus on unemployment duration.

Since unemployment duration is used as one exogenous variable to determine the accepted wage after unemployment in step (ii), a problem of independence of this regressor with the error term may occur. It is plausible that unemployment duration is determined by further exogenous variables, for example skills and age. To avoid this problem an instrument variable approach is used. The idea of the instrument variable (IV) estimation is simple: in the first stage, the potentially endogenous explanatory variable is regressed on the other exogenous variables plus instruments. In the second stage, the predicted values of the first stage are used instead of the potentially endogenous explanatory variable. Thereby, the instruments should be unlikely to have further effects on the endogenous variable, except via their effects on the potential endogenous explanatory variable.

In technical terms:[5] consider a simple OLS equation

(1) $\qquad y = X\boldsymbol{b} + u$

The vector X may be partitioned as

(2) $\qquad X = \begin{bmatrix} X_1, X_2 \end{bmatrix},$

where X_2 is the vector of variables which should be replaced by instrument variables because of potential endogeneity problems and the variables in X_1 serve as instruments for themselves. The variables in the instrument variable vector Z must be correlated with those in the vector of explanatory variables X and must be uncorrelated in the limit with the disturbance

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[4] See section 3.1 for details of data generating.

[5] The presentation is taken from Jonston and DiNardo (1997: 155–157).

term u. In the first stage, each variable of the X matrix is regressed on the Z matrix to obtain a vector of fitted values:

(3) $\qquad \hat{X} = \begin{bmatrix} X_1, \hat{X}_2 \end{bmatrix} \qquad$ where $\hat{X}_2 = Z(Z'Z)^{-1} Z'X_2$

The vector $\hat{X}$ is then taken to regress equation (1) to obtain the estimation vector $\hat{b}$:

(4) $\qquad \hat{b} = \left(\hat{X}'\hat{X} \right)^{-1} \hat{X}'y$

The choice of instruments is not always explicit. The instruments should have no further effects on the accepted wage except via their effects on unemployment duration. Following some preliminary analysis for instrument relevance, unemployment insurance benefit dummies and a generated variable, which proxies household income per person during unemployment excluding unemployment benefits,[6] are chosen as instruments.

The problem of the IV estimation is the following: if the instruments are orthogonal to the error term u, one always obtains a consistent estimator. But if the treated exogenous variable, which is displaced by an instrument, is not correlated with the error term, then the two-stage estimation is less efficient than the ordinary least squares method. The Hausman test (Hausman 1978) is used to decide whether the ordinary least squares method or the two-stage estimation is the best estimation strategy. This test assesses whether ordinary least squares estimation is adequate. If the null hypothesis that both estimations are consistent is valid, the OLS estimation should be used because it is consistent and efficient. In this paper, a special variant of the Hausman test is used as described in Johnston and DiNardo (1997: 341–342): in the first step, this procedure regresses the potentially endogenous regressor on the instrument variables as given in equation (3). The residuals are retrieved from this regression. Then equation (1) is estimated including this created variable as an additional regressor. An F statistic with the number of observations n minus the number of regressors k

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[6] The household income variable is not significant in the first stage of the IV estimation, but as the results of the whole IV estimation hardly change at all when in- or excluding this instrument, I choose to include it for more variation in the data, see Table 3 in Section 4.1.

in the second stage as degrees of freedom can be used to test the significance of the predicted values from the first stage[7]

$$(5) \qquad H = \frac{RSS_r - RSS_u}{RSS_u / (n-k)} \sim F(1; n-k)$$

where *RSS* is the residual sum square and *r* marks the normal OLS estimation (1) and *u* marks the second stage of the Hausman test.

If the ordinary least squares estimation is consistent and the null hypothesis of the Hausman test thus cannot be rejected, the coefficients of the first stage residuals should be insignificant in the second stage estimation. In this case, the ordinary least squares method should be used.

3. Data Source and Data Description

Before discussing regression results, it is useful to have a closer look at the data-set which is used in the empirical analysis. The German Socio-economic Panel (GSOEP) and the generating process for the data-set is described in Section 3.1. Some descriptive statistics on unemployment duration, reservation wages, and offered wages are presented in Section 3.2 and in Section 3.3, the results of section 3.2 are discussed in comparison to the findings of Prasad (2001) and Christensen (2001). Additionally, the validity of the reservation wage data in the GSOEP is analysed in this section.

3.1 The GSOEP

The data is drawn from the German Socio-economic Panel (GSOEP: 1999).[8] This anonymous panel covers 16 waves of individual data for the period 1984 to 1999. The sample size was nearly 12,000 persons in 1984.

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[7] This equation is a special variant of the *F*-test, because only one potential endogenous explanatory variable is supposed. For the general equation, see Jonston and DiNardo (1997: 341).

[8] See for a detailed description of the GSOEP, Projektgruppe Sozio-oekonomisches Panel (SOEP) (1995) and Haisken-De New and Frick (2000). All SAS 8.01 programs for generating the data-set and more detailed information about the generating process can be provided by the author upon request.

After German unification, yearly dropouts in the sample, and a refreshment of the database (1998) nearly 14,000 persons were interviewed in 1999 (Haisken-De New and Frick 2000: 23).

Two data-sets are drawn from the GSOEP: first, a data-set is generated which contains reservation wage information from unemployed persons. Second, information about wages after an unemployment period are drawn. This wage information is used as a proxy for offered wages for unemployed persons.[9] Each data-set is combined with control variables and information on unemployment duration.

Reservation Wages:

Reservation wages are directly observed in ten waves of the GSOEP.[10] Individuals who reported that they did not have a job, but would like one, were asked the following question:[11]

> "How high would your net income or salary [per month]
>   have to be for you to take a position offered to you?"

Only individuals who reported that they are interested in a full-time job are chosen. This information is then taken to generate the reservation wage variable for the geographical region of West Germany, whereupon the wages are calculated at 1995 prices. To prevent a bias caused by early retirement, persons who are older than 58 are not included in the sample.

The unemployment duration is generated from the calendar information in the GSOEP. For each month in the year preceding the interview, the respondent is asked to enter his employment status. An individual is defined as unemployed, if he has reported being registered as unemployed at the employment office (Arbeitsamt). The unemployment duration is

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[9] Offered wages for unemployed persons are not available in the GSOEP.

[10] Information about the reservation wage is included in 1987–1989, 1992–1994, and 1996–1999. The 1999 wave is excluded due to comparability reasons (the offered wage data-set only contains data until 1998).

[11] The German question is: "Wie hoch müßte der Nettoverdienst mindestens sein, damit Sie eine angebotene Stelle annehmen würden?". Translation taken from CD-ROM GSOEP (1999), CD-ROM 2, Data file GSOEP16B:docs\quest98\p98eng.pdf, question OP1801.

measured as the duration of unemployment until the point of time at which the reservation wage information is requested.

The remaining individual control variables are calculated from the interview in which the reservation wage is asked for. The control variables are sex, age, personal status (West German, East German, foreigner), skill dummies, being married, number of children, regional unemployment rate, skill-specific unemployment rate, and yearly dummies.[12]

The reservation wage data-set contains 948 observations.

Wages after Unemployment / Offered Wages:

The wages after an unemployment period are taken from employed persons who work full-time. The wage information is only included in the sample if it is available in the first potential interview after unemployment. As reservation wages are net-wage information, wages after unemployment are taken as net wages for comparability reasons. To eliminate inflation effects, the wages are calculated at 1995 prices. These wages after unemployment are then taken as proxies to offered wages to unemployed persons.[13]

The unemployment duration is generated from the calendar information in the GSOEP, whereas censored unemployment spells are eliminated. Moreover, the unemployment spell has to end directly before the employment spell.

As individual control variables the same information is taken as for the reservation wage observations. They are generated from the interview with the new wage information. Moreover, unemployment insurance benefit dummies and a variable, which proxies household income per person during unemployment excluding unemployment benefits, are used as instruments for the IV estimation. They are generated for the last month in unemployment.

The offered wages data-set contains 1,650 observations.

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[12] For all variables, observations with missing values are eliminated (also in the offered wages data-set). All variables used are described in the Appendix with detailed information about the generating process.

[13] In the following, the notation "offered wages" is used for this variable.

3.2 Unemployment Duration, Reservation Wages, and Offered Wages – Some Descriptive Statistics

Some descriptive statistics about the reservation wages and the offered wages in the data-sets used in the present study are given in Table 1. Since reservation and offered wages cannot be observed for one and the same person at one point in time, it is not possible to generate the individual ratios of reservation wages to offered wages. But the mean and median information for both wage variables indicate that reservation wages exceed offered wages. The mean of the reservation wages is about 6% higher than the mean of offered wages. For the median the reservation wages exceed the offered wages by about 9%. At first view, these results seem confusing as reservation wages cannot exceed realized wages from a theoretical point of view.[14] But two possible explanations exist for this phenomenon: first, as the data-sets are not generated only for persons who are in both data-sets, sample selection effects can bias the ratios. Persons who have a relatively low reservation wage will get a new job quickly. Thus, the probability of being in the reservation wage data-set is small for these persons. In contrast, persons who stay unemployed because they have too high reservation wages increase the reservation wages in mean and are in the accepted wage data-set with a smaller probability. Thus, in the two data-sets, distinct groups of persons may be overrepresented leading to a bias in the ratios. But, also, a sample-selection bias with an opposite effect could exist: the unemployed persons with highly demanded skills get a new job with high offered wages very quickly. In contrast, the unemployed persons with a reservation wage observation have skills in low demand and consequently low reservation wages. Thus, the total effect is not clear. Second, there may exist a bias in the reservation wage data of the GSOEP. This aspect is analysed in the next section.

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[14] Theoretically, reservation wages are defined as minimum accepted wages to take a job offered.

Table 1 — Reservation Wages and Offered Wages in the Two Data-Sets

	Mean	Median	Observations
Reservation wages	2,337.6	2,272.7	948
Offered wages	2,198.9	2,084.7	1,650
Ratio of reservation wages to offered wages[a]	1.06	1.09	--
[a]Ratio of mean respectively median of reservation wages to offered wages.			

Source: GSOEP (1999); own calculations.

It is of interest whether there are problems in the comparability of the two data-sets, as in the following, for each observation of the reservation wage data-set an estimated offered wage should be generated on the basis of the offered wage data-set. Table 2 presents some descriptive statistics of the duration of unemployment for the two samples.

Table 2 — The Duration of Unemployment in the Two Data-Sets

	Mean	Median	Observations for unemployment duration less than or equal to…			All obser-vations
			24 months	36 months	48 months	
Reservation wage data-set	14.04	8	789	865	895	948
Offered wage data-set	6.44	4	1,591	1,634	1,643	1,650

Source: GSOEP (1999); own calculations.

It is obvious that in the offered wage data-set the duration of unemployment is significant lower than in the reservation wage data-set. The offered wage data-set has only very few observations especially for high unemployment durations. As the offered wage data-set is the basis for the prediction of offered wages in the reservation wage data-set, the whole sample is restricted to observations for less than or equal to 48 months of unemployment[15] to prevent high prediction errors for offered wages due to high estimation errors for wages after unemployment.[16]

3.3 Are Reservation Wage Data in the GSOEP Valid or is a Correction Factor Needed?

One important question when working with requested reservation wage data is how valid the reservation wage information is. Two questions have to be asked in this connection: first, whether the reservation wage data are directly biased, and second, whether there exists a bias in the generating process of the data in the GSOEP. These two aspects can be analysed on the basis of the findings of Prasad (2001) and Christensen (2001).

Prasad (2001) uses wave-to-wave information for the same persons and calculates the accepted wages minus reservation wages. He plots this differential as a percentage of the reservation wage and uses this as a measurement for the validity of reservation wage information in the GSOEP. Using a histogram, he shows a majority of the observations are clustered around zero, with more mass in the left tail of the distribution. He concludes that the reservation wage data are valid (Prasad 2001: 45–46).[17]

Christensen (2001: 18) calculates the ratio of reservation wages to the individual's last wage before unemployment. He finds a ratio of 1.18 for the mean and 1.04 for the median of all persons who worked full-time and were interested in full-time employment. Thus, the reservation wages exceed the person's last wages.

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[15] A restriction to obsercations for less than or equal to 36 months of unemployment hardly change the results of all following estimations.

[16] If all observations are included in the analyses, then the predicted offered wages could even become negative for observations with extremely long unemployment durations in the reservation wage data-set.

[17] He explains a negative differential in mean with a potential declining reservation wage over time (Prasad 2001: 45).

Taking both findings together gives a ratio of accepted wages to wages of last employment which is greater than 1, for example 1.06 for a ratio of –0.1 in Prasad's data[18] and the ratio of 1.18 for the mean in Christensen's data. This seems strange as it implies that unemployed persons gain in mean 6% in wages during unemployment.

Burda and Mertens (1999: 39) calculate the wage growth of workers who became unemployed or displaced on the basis of the IAB-Panel. They find a wage growth of 5% respectively 3%. Thus, the calculated wage growth of unemployed persons on the basis of the reservation wage data-sets from GSOEP are nearly identical. Thus, the calculations of Prasad (2001) and Christensen (2001) are generally plausible and the reservation wage data generating process does not seem to bias the data.

What does this imply for the level of reservation wage data in the GSOEP? As the reservation wage exceeds the individuals own last wage by about 18% and the new wage after unemployment exceeds the wage before unemployment by about 5%, the reservation wage data in the GSOEP seem to be biased by about 13% against the accepted wages after unemployment. Alternatively, the calculations from Prasad (2001) could be taken as a correction factor: as the wages after unemployment exceed the reservation wages by about 11%, this can be taken as a second estimate of the correction factor for the reservation wages. These correction factors should be kept in mind for the following analyses.

4. Regression Results

In this chapter, the results of the estimations described in Section 2 are reported. Section 4.1 contains the results of the offered wages estimations. In Section 4.2, the constructed ratio of reservation wages to offered wages is analysed in more detail.

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[18] This ratio is roughly valued by Figure 1 in Prasad (2001). A ratio of accepted minus reservation wages to reservation wages of –0.1 gives a ratio of accepted to reservation wages of 0.9, respectively a ratio of reservation to accepted wages of 1.11.

4.1 The Estimation of Offered Wages

The OLS estimates of equation (1) and the first stage and second stage of instrument variable estimation[19] are presented in Table 3.[20]

Before interpreting the results, it has to be investigated whether the OLS estimation or the two-stage least squares method is the appropriate estimation procedure (see Section 2). The null hypothesis of the Hausman test is that the IV and the OLS estimates are both consistent. In this case, the OLS estimation has to be used. The value of the F statistic (5.44) is significant.[21] Hence, the null hypothesis is to be rejected and the IV estimation is the appropriate estimation strategy.

The third column of Table 3 presents the results of the IV estimation approach. The results differ only slightly from the OLS estimation in the first column. Only the effect of unemployment duration is more than twice as high in the IV approach. The offered wage decreases by more than 28 DM per month of unemployment. As the mean offered wage is 2,198.9 (Table 1), one year of unemployment reduces the offered wage by 15%. This is a high reduction, especially against the background of non-decreasing reservation wages over duration of unemployment as found by Prasad (2001: 46) and Christensen (2001). The importance of the unemployment duration for the ratio of reservation to offered wages is analysed in the next section in more detail.

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[19] All estimations were calculated in EViews 3.1. The second stage of the instrument variable estimation is calculated by the procedure TSLS thus the structural residuals are used and the adjusted coefficient of determination is based on these structural residuals, see EViews (1994: 284).

[20] As the estimation of offered wages is only run to predict offered wages for unemployed persons with a reservation wage observation, the offered wages may have been estimated only for the years of reservation wage observations (see footnote 10). As neither estimates of offered wages nor predictions of offered wages for reservation wage observations significantly change by doing this in contrast to estimate offered wages for all years, I have chosen latter because of the higher number of observations.

[21] The critical value from the F distribution is $F(1; 1,614)_{0.05} = 3.847$.

Table 3 — Estimation Results for the OLS- and the IV-Estimation[a]

Variable	Ordinary Least Squares Method	First Stage of Instrument Variable Estimation	Second Stage of Instrument Variable Estimation
Dependent Variable	Offered Wage	Unemployment Duration	Offered Wage
Male	543.2[***] (34.84)	-0.513 (0.315)	533.0[***] (34.87)
Age	71.77[***] (13.29)	0.119 (0.130)	74.12[***] (13.41)
Age^2	-0.864[***] (0.179)	-0.0005 (0.002)	-0.879[***] (0.181)
Married	287.7[***] (50.16)	-0.307 (0.365)	278.7[***] (49.83)
Number of children	34.57 (21.01)	0.046 (0.170)	36.40[*] (21.29)
West German	233.5[***] (46.08)	-1.310[***] (0.330)	212.6[***] (45.71)
East German	42.66 (88.46)	-2.597[***] (0.686)	-2.225 (90.37)
Foreigner	--	--	--
Non-skilled person	-639.8[***] (186.5)	1.530 (1.258)	-632.4[***] (187.3)
Semi-skilled person	-662.5[***] (127.9)	1.691[**] (0.707)	-649.9[***] (127.2)
Skilled person	-443.3[***] (138.5)	1.500[*] (0.910)	-429.3[***] (138.0)
Highly-skilled person	--	--	--
Regional unemployment rate	-14.29[*] (7.551)	0.299[***] (0.074)	-8.463 (8.149)
Skill-specific unemployment rate	-11.42 (8.345)	0.129 (0.079)	-8.450 (8.587)
Unemployment duration	-12.36[***] (2.703)	--	-28.17[***] (7.522)
No unemployment benefits	--	1.759[***] (0.440)	--
Unemployment assistance	--	7.861[***] (0.871)	--
Unemployment insurance	--	--	--
Household income	--	0.0001 (0.0001)	--
Constant	1,192.8[***] (330.4)	-1.221 (2.631)	1,182.5[***] (332.3)
$\overline{R}^2_{adj}$	0.240	0.189	0.227
F-Statistics[b]	20.19[***]	14.16[***]	19.62[***]
Observations[c]	1,643	1,643	1,643

[a]Heteroscedasticity-consistent standard errors by White (1980) are given in parenthesis; the model also includes annual dummies; [b] F-test of overall significance; [c] as described in Section 3.2 for both data-sets only observations with less than or equal to 48 months of unemployment are used; [***], [**] and [*] denote coefficients that are statistically significantly different from zero at the 1, 5, and 10 per cent level; -- labels excluded variables or the reference value for dummy variables.

Source: GSOEP (1999); own calculations.

The remaining estimates are nearly all as expected: higher wages are offered to males. Being married and/or having children raises the offered net wage.[22] The offered wage increases with age, but at 42 years a maximum is attained. This might be due to discrimination factors against older workers, which is of cause more extreme after unemployment than during employment.[23] Foreigners obtain a lower wage after unemployment than West Germans, which can be explained by discrimination and unobserved human capital differences.[24]

The skill variables are all significant and have the expected negative signs, thus the offered wages for highly-skilled unemployed persons are higher than for less skilled persons. But the range of coefficients is unexpected: the coefficient of the semi-skilled variable is slightly lower than the coefficient of the non-skilled variable. But this result is not irritating: the impact of skill-specific labour demand is already adequately captured by the skill-specific unemployment rate. Thus, the somewhat surprising result might be caused by collinearity. In an estimation excluding the skill-specific unemployment rate, all skill dummies have the expected signs and range and are highly significant.[25]

The regional and the skill-specific unemployment rate are both insignificant in the second stage of the IV estimation.

4.2 The Ratio of Reservation to Offered Wages

As described in Section 2, an offered wage is predicted on the basis of the estimation of offered wages for each person with a reservation wage observation. Then the ratio of reservation wages to offered wages is calculated. This measure can then be used to analyse how many unemployed persons

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[22] This is due to lower income tax and benefits for families.

[23] For example Franz (1999: 78) finds also a first increasing and later decreasing age-wage function for German employees. But the maximum is reached at the early/mid-fifties.

[24] Lang (2000) finds in an empirical study that the human capital gap explains more than 75% of the wage differential between natives and foreign nationals in Germany.

[25] The coefficients and standard errors for the three skill groups in relation to highly-skilled persons are: –747.3 (134.6) for the group of non-skilled persons, –667.8 (126.4) for the group of semi-skilled persons, and –437.5 (138.0) for the group of skilled persons.

overestimate their chances of attaining their wage demands. Moreover, the determinants for this can be analysed.

Figure 1 shows some descriptive statistics for the ratio of reservation wages to offered wages.[26] The histogram of the ratio shows a distribution with most of the mass around one, the mean at 1.16, the median at 1.09, and few observations with very large ratios. As described in Section 3.3, there is some evidence that reservation wages in the GSOEP may be biased upwardly. The rough estimates were about 11% to 13%. Thus, if the ratio is corrected for this potential bias, the mean of the ratio is 1.05 to 1.03 and the median is 0.99 to 0.97. Thus, reservation wages exceed or correspond to the potential offered wages in mean.

Figure 1 — The Ratio of Reservation Wages to Offered Wages

Number of
Observations

Series: RATIO	
Observations 895	
Mean	1.161736
Median	1.094470
Maximum	3.742690
Minimum	0.414562
Std. Dev.	0.368512
Skewness	2.041908
Kurtosis	11.16602
Jarque-Bera	3108.689
Probability	0.000000

Ratio of Reservation to Offered Wages
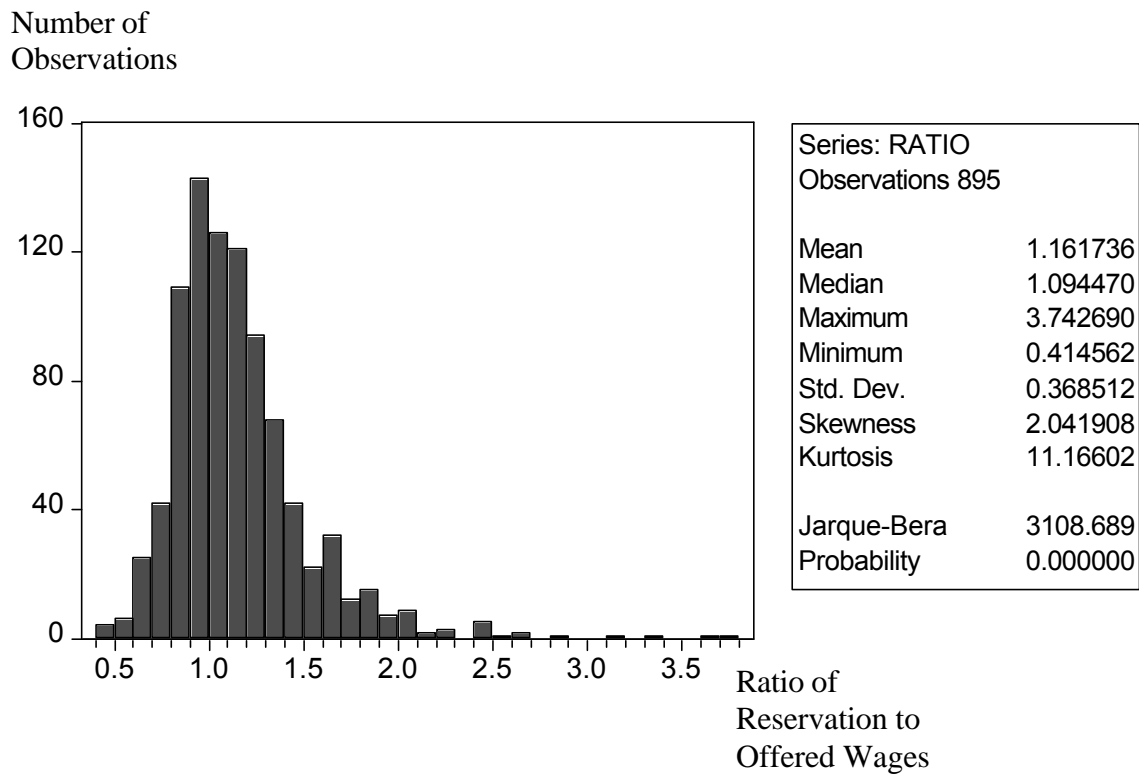
Source: GSOEP(1999); own calculations.

The most interesting question is now for which persons in which situations the reservation wages are lower or higher than the potential offered wages.

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[26] As described in Section 3.2, only observations with less than or equal to 48 months of unemployment are used for both data-sets. Thus, the number of observations for the ratio is less than 948, the number of reservation wage data.

The influence of the duration of unemployment on the ratio is of particular interest. In Figure 2, the ratio and the duration of unemployment are scattered against each other.

Figure 2 — Scatter Graph of the Ratio of Reservation to Offered Wages against the Unemployment Duration

Ratio of Reservation
to Offered Wages
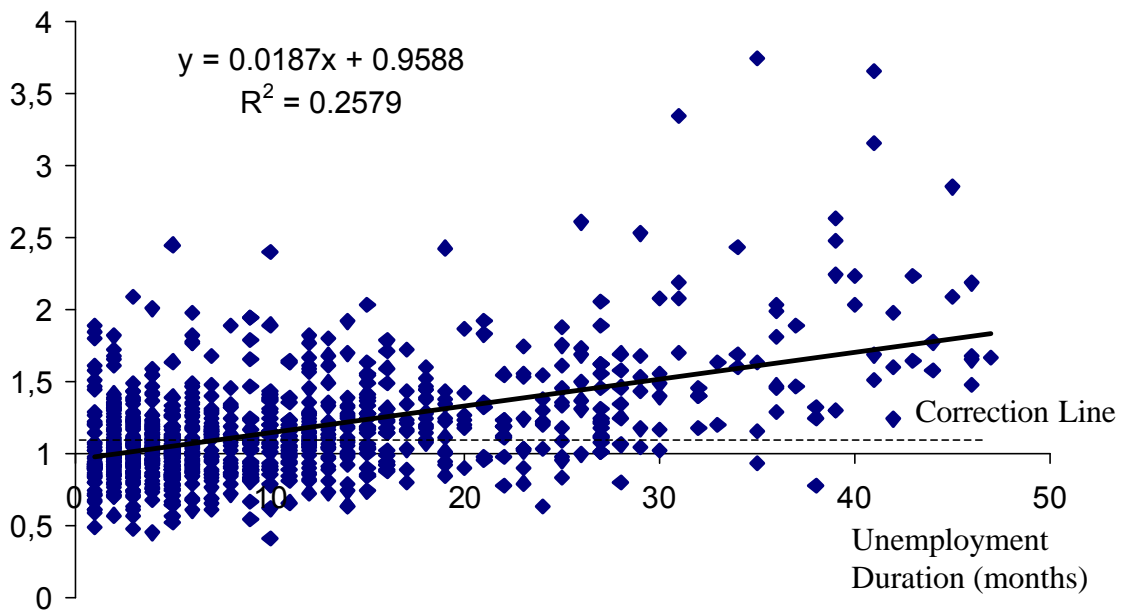
Source: GSOEP (1999); own calculations.

It is obvious that the ratio of reservation wages to offered wages increases with the duration of unemployment. Thus, with longer duration of unem-ployment the chances of getting a wage offer which exceeds the person's reservation wage becomes less probable. Especially for longer unemploy-ment duration, there are very few ratio observations which fall even short of the correction line. Of course, this is due to the non-decreasing reserva-tion wages with unemployment duration, while potential offered wages decrease. Moreover, with an R^2 of 26% the unemployment duration can explain a large part of the variation in the ratio data. To analyse this result in more detail, the OLS estimation results of the ratio are presented in Table 4.

Table 4 — Estimation Results for the OLS-Estimation[a] of the Ratio of
Reservation Wages to Offered Wages

Variable	Coefficient
Male	–0.119[***]
	(0.026)
Age	–0.021[***]
	(0.007)
Age^2	0.0003[***]
	(0.0001)
Married	–0.109[***]
	(0.025)
Number of children	0.0064
	(0.009)
West German	–0.082[***]
	(0.022)
East German	–0.127[***]
	(0.048)
Foreigner	--
Non-skilled person	0.022
	(0.125)
Semi-skilled person	–0.019
	(0.079)
Skilled person	0.065
	(0.093)
Highly-skilled person	--
Regional unemployment rate	0.005
	(0.005)
Skill-specific unemployment rate	–0.004
	(0.006)
Unemployment duration	0.019[***]
	(0.002)
Constant	1.427[***]
	(0.174)
$\overline{R}^2{}_{adj}$	0.324
F-Statistics[b]	21.44[***]
Observations[c]	895

[a]Heteroscedasticity-consistent standard errors by White (1980) are given in parenthesis; the model also includes annual dummies; [b]F-test of overall significance; [c]as described in Section 3.2 for both data-sets only observations with less than or equal to 48 months of unemployment are used; [***], [**] and [*] denote coefficients that are statistically significantly different from zero at the 1, 5, and 10 per cent level; -- labels the reference value for dummy variables.

Source: GSOEP (1999); own calculations.

The results of the OLS estimation show that the positive effect of the unemployment duration on the ratio of reservation to offered wages in the scatter graph in Figure 2 is not only due to correlation caused by further multicollinear variables. Indeed, each month of unemployment increases the ratio by 0.02. Thus, one year of unemployment leads to an increase in the ratio of 0.22. Even if the ratio is corrected by a 13% potential bias in the reservation wage data-set, after the ninth month of unemployment the reservation wages exceed the potential offered wages in mean (Figure 2). This is a dramatic result, especially because in 2000, 37% of all registered unemployed persons in Germany had an unemployment duration of more than 12 months (BA 2001: 19). Moreover, the unemployment duration is the most important influence factor on the ratio of reservation to offered wages: the partial R^2 is 0.14,[27] which is 43% of all the explained variation in the model.

All remaining estimates are less important, they together, except for the constant term of the regression, have a partial R^2 of 0.11, which is even less than the single influence of the unemployment duration. The estimates of the remaining explanatory variables are as follows: males overestimate their wage chances less often than females. This may be due to the financial security of women when they are married and their husbands are in work. Moreover, age has a u-shape in its influence on the ratio. Until an age of 37 years, the ratio decreases. Afterwards, the ratio increases. Thus, very young and very old workers overestimate their ratio more than middle-age workers. But this effect is very small: the difference in the ratio between an 37-year-old unemployed person and an 20-year-old unemployed person is only 8%. The same difference for a 37-year-old and a 50-year-old person is 5%. Thus, the high unemployment rate of older persons in Germany[28] seems not to be caused by extraordinary reservation wages. This group seems to be able to set their reservation wages nearly as realistically (or unrealistically) as the other unemployed.

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[27] The partial R^2 is calculated as $\dfrac{t^2}{t^2 + N - k}$ with t as t statistic of the single coefficient, N as number of observations, and k as number of estimated coefficients in the model (see Behr 1999: 186).

[28] The unemployment rate for persons over 50 years old was 20.5% in September 2000, while the corresponding unemployment rate for the whole labour force was 11.8% (database: sozialversicherungspflichtig Beschäftigte nach der Beschäftigtenstatistik, see BA 2001: 19).

The dummies for West Germans, East Germans, and foreigners show that foreigners in particular overestimate their potential wages. This, of course, can be explained by the lower offered wages for foreigners, which was found in the estimation for the offered wages (Table 3).

It is interesting that the skill dummies have no significant influence on the ratio of reservation to offered wages, especially since Prasad (2001) finds a negative correlation from reservation minus offered wages to offered wages.[29] He interprets this result as follows: "... for a large fraction of low-skill workers, reservation wages appear significantly higher than offer wages, and this relationship is stronger at lower skill levels." (Prasad 2001: 49).

For the ratio data-set used in this study, the observation of Prasad can be confirmed (see Figure 3): persons with a low potential offered wage have a higher than average ratio of reservation to offered wages. Thus, these persons, who are normally low-skilled, overestimate their potential offered wages to a high extent.

But how can this striking fact be explained? Table 5 presents the means of the ratios of reservation to offered wages differentiated by skills. It is obvious that for skilled and highly skilled persons only very few observations are in the sample. Thus, the data for these groups are unstable and a possible interpretation of the means of the ratios should be drawn carefully. Nevertheless, there seems to be a negative decline in the ratios with higher skill levels. Especially for the first two skill groups, 93% of all observations, this difference is obvious and significant.[30]

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[29] He does no estimation to explain the difference in reservation to offered wages, he only plots the difference against the offered wages (analogous to Figure 3) and interprets the scatter plot. He assumes that low (high) offered wages are correlated with low (high) skills, which seems realistic.

[30] The means differ significantly between the first two skill groups: the F statistic is 6.394, which corresponds to a probability of 0.012. The same is the case for the means of the first and the remaining three skill groups: the F statistic is 6.125, which corresponds to a probability of 0.014.

Figure 3 — The Ratio of Reservation to Offered Wages against Offered
Wages

Ratio of Reservation
to Offered Wages

Potential Offered
Wages
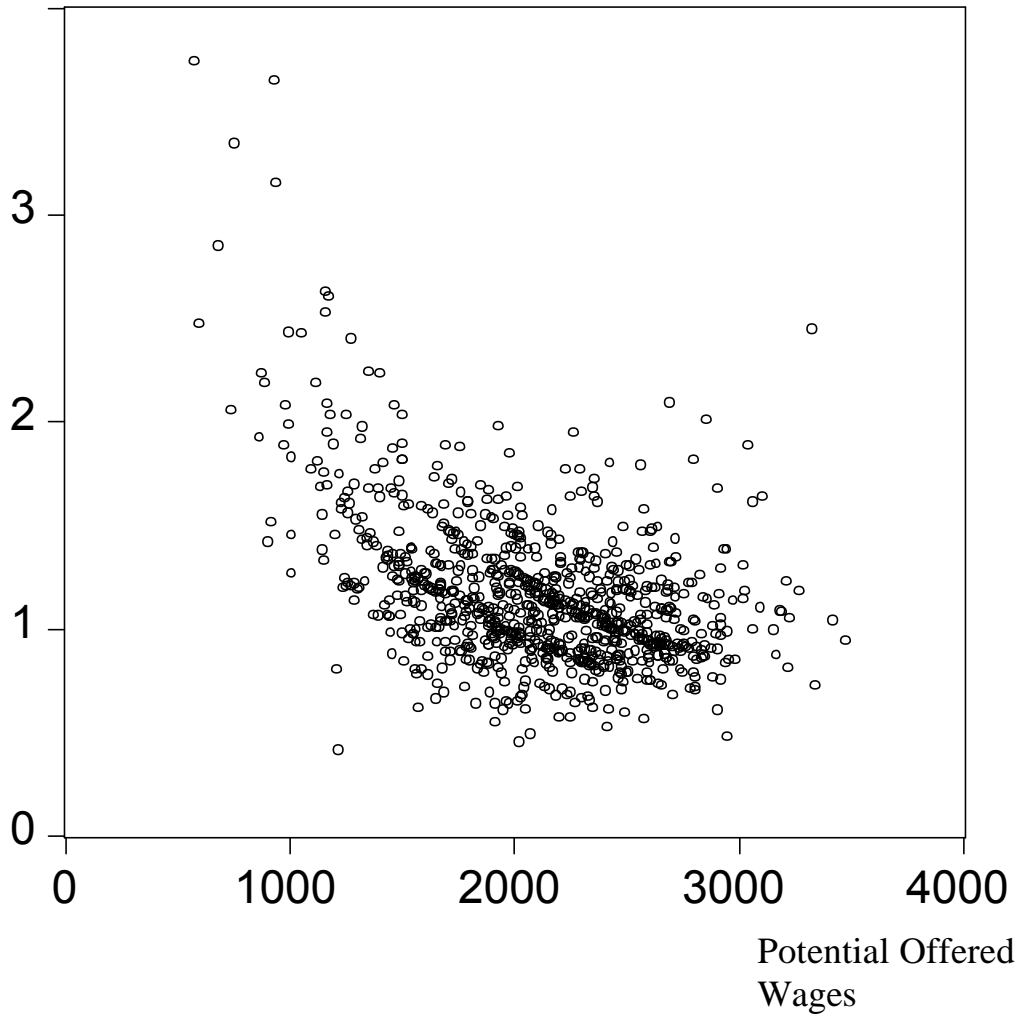
Source: GSOEP (1999); own calculations.

Table 5 — Ratios of Reservation to Offered Wages Differentiated by
                Skills

Skills	Ratio: Mean (Standard Deviation)	Number of Observations
Non-Skilled Person	1.20 (0.41)	364
Semi-Skilled Person	1.13 (0.33)	469
Skilled Person	1.22 (0.38)	34
Highly-Skilled Person	1.08 (0.37)	28
Semi- to Highly-Skilled Person	1.14 (0.34)	531

Source: GSOEP (1999); own calculations.

As this difference in the skills (especially for the first skill group) is not captured in the OLS estimation in Table 4, it seems to be caused by further (negative) influences, e.g. unemployment duration which is correlated with the skill dummies. Thus, it is not the formal skill level which causes the relatively high ratio of reservation to offered wages for the lowest skill group, but the further characteristics of the non-skilled persons.

To summarize, the results show that unemployment duration is the main determinant of the reservation wage/offered wage ratio: persons who have a longer unemployment duration overestimate their chances on the labour market in Germany to a large extent. No other determinant has such a high impact on the ratio of reservation to offered wages.

5. Summary and Policy Implications

The aim of this paper has been to analyse the ratio of reservation to offered wages and by this to test whether unemployed persons in Germany

overestimate their potential offered wages. To analyse this, first wages after unemployment are generated as potential offered wages to unemployed persons. The influence factors on these wages are then estimated to predict offered wages to unemployed persons, who are observed with reservation wage information in the GSOEP. Then, the ratio of reservation to offered wages is calculated and analysed for unemployed persons, whereby special focus is placed on the unemployment duration. The data-set allows an analysis of the ratio of reservation to offered wages for the time span from 1987 to 1998. The sample includes 895 observations.

The results of the study indicate that in contrast to reservation wages the offered wages decline considerably with duration of unemployment. This is the main reason for increasing ratios of reservation to offered wages with duration of unemployment. For example, after the ninth month of unemployment, the reservation wages exceed the offered wages in mean, even if the reservation wage information of the GSOEP are corrected by a potentially upward bias. And the ratio of reservation to offered wages increases by 0.22 for every additional year of unemployment. Thus, for long-term unemployed persons, who are well represented in the pool of German unemployed persons, the chance of getting an offered wage which exceeds the person's own reservation wage is extremely slight due to non-declining reservation and declining offered wages. For example for more than one and a half years of unemployment only 11.9% (21.4%) of observations have lower reservation wages (corrected) than potential offered wages.

Thus, a high share of persistent unemployment in Germany seems to be due to high and non-declining reservation wages of unemployed persons even after a long period of unemployment. Especially long-term unemployed persons overestimate their chances on the labour market. As the decrease in the ratio of reservation to offered wages with unemployment duration is extremely high, the main aspect in the labour market policy should be to place unemployed persons very quickly, even if the offered wage falls below the unemployed person's wage demand. The reason for this is that the chance for the unemployed person to receive a wage offer which exceeds the reservation wage will decrease considerably with each additional month of unemployment. After a longer duration of unemployment, these persons have only the chance of staying unemployed or accepting extreme wage losses.

6. Appendix

Table 6 — Description of Data

Variable	Description
Reservation wage	Minimum monthly net income in 1995 prices[a] to take an offered position (only unemployed persons)
Offered Wage	Monthly net income in 1995 prices[a] in new job after unemployment (first interview after unemployment spell; employment spell has to follow directly an unemployment spell)
Male	Dummy for being male
Age	Age in years
Age^2	Age squared
Married	Dummy for being married
Children	Number of children under 16 in the household
West German	Person from Western Germany
East German	Person from Eastern Germany
Foreigner	Foreigner and immigrants
Non-skilled person	No schooling or basic schooling (Haupt-, Realschule) and no vocational training
Semi-skilled person	Basic vocational training (Lehre, Ausbildung) and no basic schooling; university entrance certificate (Abitur, Fachhochschulreife) and no vocational training; basic schooling (Haupt-, Realschule) and vocational training
Skilled person	University entrance certificate (Abitur, Fachhochschulreife) and vocational training
Highly-skilled person	University degree or equivalent (Universität, Fachhochschule, etc.)
Regional unemployment rate	Aggregate unemployment rate by region (Bundesland) from StaBu (various issues); regional classification from GSOEP
Unemployment duration	Actual number of months an individual is registered as unemployed at the employment office (for reservation wage data), respectively number of months an individual was registered as unemployed at the employment office before getting a new job (for offered wage data)
Skill-specific unemployment rate	Within-group unemployment rate matched by formal education for individuals with no vocational training (ohne Berufsausbildung), vocational training (Lehre, Berufsfachschule), advanced vocational training (Fachschule), university of applied sciences (Fachhochschule), and university degree (Universität). Data taken from Reinberg (1999: 444)
No unemployment benefits	Persons who received no unemployment assistance and no unemployment insurance
Unemployment assistance	Persons who received unemployment assistance (Arbeitslosenhilfe)
Unemployment insurance	Persons who received unemployment insurance (Arbeitslosengeld)
Household income	Household income except accepted wage divided by number of persons in the household (children weighted with 0.5)

[a] Consumer prices from Sachverständigenrat (2000: table 10*).

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