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The Dynamics of Reservation Wages: Preliminary Evidence from the GSOEP

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Summary

This paper presents preliminary results from an empirical analysis of the individual and macroeconomic determinants of reservation wages, using data from the German Socio-Economic Panel. The longitudinal aspect of the dataset provides an interesting perspective on the dynamics of reservation wages and their correlations with accepted wage offers for workers who make the transition from unemployment to employment. The findings have important policy implications as well, since they shed some light on the disincentive effects of the German tax and transfer system for the labor supply and employment decisions of unemployed workers at different points of the skill/offer wage distribution.

1. Introduction

The reservation wage is an important concept for modeling certain key aspects of labor market dynamics. In particular, the theory of optimal job search typically implies the reservation wage property in the context of structural models of job search behavior. The reservation wage is also a concept that has relevance for modeling labor supply decisions, through its influence on transitions from nonemployment to employment.

In this paper, I provide an empirical analysis of the determinants of reservation wages using individual data from the German Socio Economic Panel (GSOEP). One of the questions included in the survey explicitly asks unemployed workers about their reservation wage. In addition, the GSOEP is particularly well suited to the analysis of reservation wages since it includes a rich set of individual- and household-specific characteristics. In this paper, I also exploit another strength of the GSOEP, which is the availability of detailed retrospective information on employment and income histories for individual workers. Further, the availability of consecutive reservation wage observations and of accepted wages that can be compared with stated reservation wages in previous years enables an indirect test of whether the reservation wage data bear a sensible relationship to actual economic behavior. Previous studies of reservation wages have been based on far less comprehensive information and have generally been limited to either making indirect inferences about reservation wages (e.g., Kiefer and Neumann 1979; Blau 1991) or using one or two years of data with little retrospective information about employment or income histories (e.g., Lancaster and Chesher 1983; Jones 1988; Hui 1991; Franz 1982).

The results in this paper are of analytical interest but have considerable policy relevance as well. In the final part of the paper, I use the reservation wage data to shed some light on a major problem — the high rate of nonemployment among low-skilled workers. In particular, the reservation wage data suggest that there exist labor supply rigidities at the low end of the skill/wage distribution. In tandem with the results of an earlier paper (Prasad 2000), I argue that the results indicate the need for comprehensive reforms to influence both labor demand and labor supply at the low end of the skill/wage distribution in order to solve the German unemployment problem (see Freeman and Schettkat 2000 for a contrary view).

2. Theoretical Framework

In this section, I discuss the main elements of a simple theoretical framework that is relevant for the analysis of reservation wages. To conserve space, I do not present the details of the formal model (which is in an extended version of the paper available upon request) but only discuss the implications that are relevant for the empirical work.

Standard models of job search imply that the reservation wage is a function of the offer wage distribution, the arrival rate of job offers, and search costs. Search costs could, of course, be determined by individual-specific factors as well as institutional factors such as the features of the unemployment compensation (UC) system.[1] The availability of detailed individual- and household-specific information is, thus, crucial for analyzing the determinants of reservation wages. For instance, conditional on other characteristics, an agent with alternative sources of income and/or other employed family members would tend to have lower search costs (in terms of forgone consumption). Further, agents in households with higher levels of wealth might have better access to financial instruments to insure against labor income risk and would tend to have higher reservation wages.

* Research Department, IMF; eprasad@imf.org. This paper was prepared for the GSOEP Conference in Berlin, July 4-6, 2000. An expanded version of this paper, which contains more detail about the theoretical framework and the empirical analysis, is available upon request. I have benefited from the comments of participants at the GSOEP conference and a seminar at the European Department of the IMF. The views expressed in this paper are those of the author and do not necessarily reflect those of the IMF.

[1] The UC system in Germany has two components — unemployment insurance and unemployment assistance. For the purposes of the analysis in this paper, I do not draw a distinction between these components.

Macroeconomic determinants are likely to play a role as well in determining reservation wages. Aggregate demand conditions could influence both the overall offer wage distribution and the arrival rate of job offers and, therefore, affect reservation wages. The predicted sign of this relationship in reduced-form estimates is, however, unclear. For instance, a higher local unemployment rate could drive down reservation wages as job offers become scarcer. On the other hand, since it presumably implies a lower real wage (if real wages are procyclical) and a lower probability of employment for workers with low levels of human capital, a drop in job search intensity could result from such workers' intertemporal optimization decisions and workers at the margin could drop out of the labor force altogether. This could drive up the *observed* distribution of reservation wages.

Another potential determinant of the reservation wage is unemployment duration. As discussed in more detail below, one would expect the reservation wage to decline over time on account of wealth effects and human capital depreciation. However, a problem that complicates estimation with the unemployment duration variable is that the reservation wage and the duration of unemployment could be endogenously determined. Optimal search theory, under the assumption of a stationary reservation wage, predicts a *positive* correlation between these variables. That is, workers with higher reservation wages tend to have longer unemployment spells. To test this particular prediction, and to obviate the problem of endogeneity, I use a reduced-form instrumental variables estimation approach suggested by Jones (1988).

Table 1

Summary Statistics

	Mean	Std. dev.
Log reservation wage (net monthly earnings)	7.33	0.54
Unemployment duration (months)	17.30	23.43
Education dummies:		
General schooling	0.38	0.48
Apprenticeship	0.36	0.48
Vocational training	0.18	0.39
University degree	0.08	0.27
Age	36.38	9.42
Age squared	1412.18	75.74
Male	0.37	0.48
Married	0.68	0.47
Household head	0.42	0.49
Kids	0.59	0.49
Home ownership	0.30	0.46
Other employed person in household	0.65	0.48
Log net household income	7.87	0.56
UI benefits/assistance (dummy)	0.43	0.25

Number of observations:

1987:	441	1992:	331	1996:	270
1988:	408	1993:	309	1997:	311
1989:	356	1994:	333	Total:	2759

Notes: Nominal variables are deflated by the CPI (1991Q4 = 100) for West Germany. Data are taken from the Public Use Version of the GSOEP.

3. Data

This section contains a brief description of the data used in the empirical analysis. The dataset is the public use version of the GSOEP. I restrict my analysis to residents of Western Germany between the ages of 25 and 55 who, at the time of the survey, were unemployed and reported that they were looking for a full-time job.

The survey question that is intended to elicit the reservation wage is: "How much would the net pay have to be for you to consider accepting a job that was offered to you now?" The possible responses are a figure for "DM per month" or "Don't know, it depends." Note that the reservation wage concept here is net monthly earnings. The reservation wage question was included in the survey in the years 1987–89, 1992–94 and 1996–97. Summary statistics for the main variables used in the analysis are shown in Table 1. All nominal variables are deflated by the CPI (1992Q4 = 100) for Western Germany. Observations with left-censored unemployment spells were excluded from the analysis. It should also be noted that the unemployment duration variable reflects an ongoing rather than completed spell of unemployment as of the date of the interview.

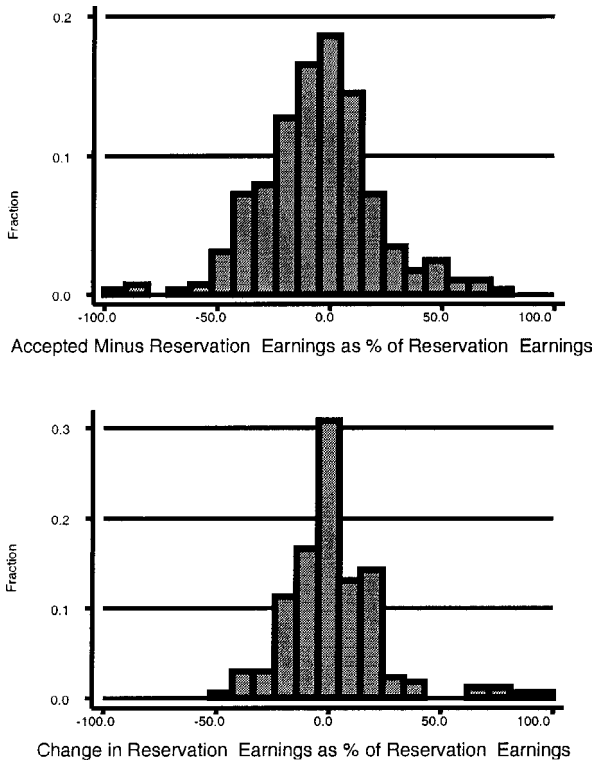
One interesting issue is whether the reported reservation wage data bear any relationship to actual economic behavior. For instance, are accepted wage offers correlated with stated reservation wages in a reasonable manner? A particular strength of the GSOEP is that, unlike previous datasets that have been used to analyze reservation wages, the panel aspect of this dataset provides a means for answering this question. For workers who report full-time earnings in the year after a reservation wage observation, I compute the differential between accepted (time $t+1$) and reservation wages (time t). Figure 1 (top panel) plots this differential as a percent of the reservation wage. Comfortingly, a majority of the observations are clustered around zero, with more mass in the left tail of the distribution. Of course, a negative differential can be rationalized on the grounds of a declining reservation wage over time for a given individual.

To examine whether reservation wages change over time, I examine those individuals for whom the dataset contains two consecutive observations on the reservation wage. This change, expressed as a percent of the first reservation wage observation, is shown in Figure 1 (lower

panel). Whether reservation wages would be expected to increase or decrease over time is, of course, not entirely clear. Wealth effects and the cost of depreciating human capital could drive down the reservation wage over time. On the other hand, the reservation wage might well increase over time simply as a result of increases in overall wage (offer) levels. Further, increasing knowledge over time about the true offer wage distribution could result in changes in the reservation wage. Nevertheless, one would not expect to see substantial changes in reservation wages from year to year for a given individual. Indeed, although there are a few observations with large changes, most of the mass of the distribution is around zero. Overall, I interpret this figure as indicating that the reservation wage data in the GSOEP are reliable and have the potential to provide a reasonable picture of the determinants of reservation wages.

Figure 1

Checking the Validity of Reservation Wage Data



Source: Author's calculations.

4. Main Results

I first examine the determinants of reservation wages using a reduced-form specification that relates each individual's reservation wage to individual-specific and macroeconomic variables. For this part of the analysis, the data are treated as a repeated set of cross-sections.

OLS estimates of the baseline specification are presented in the first column of Table 2. Reservation wages for workers with a university degree are more than 30 percent higher than for workers with only general schooling, controlling for other characteristics. Reservation wages for workers with an apprenticeship or vocational training, however, are similar to those of workers with general schooling. The reservation wage declines until about age 53 and then rises with age, consistent with the notion that older workers have higher reservation wage thresholds as they approach retirement. As expected, married workers and those with children tend to have lower reservation wages. Somewhat surprisingly, the status of household head exerts a positive effect on reservation wages.

Individuals with higher personal and household income are more likely to be able to afford to wait and search for jobs with higher wages and would, therefore, be expected to have higher reservation wages. Indeed, variables that proxy alternative sources of income, including total net household income and a dummy for receipt of unemployment compensation, are positively correlated with reservation wages.

The aggregate (Western German) unemployment rate is positively correlated with the reservation wage while the regional unemployment rate, conditional on the aggregate rate of unemployment, is negatively correlated with the reservation wage.[2] Entering unemployment rates in the specification implies a particular, and possibly restrictive, assumption about the effects of the overall macroeconomic environment on reservation wages. A simple alternative is to replace unemployment rates with time dummies. Although the estimated time effects do not have an economic interpretation, they should, in principle, soak up all the time-specific variation in reservation wages that are common to all individuals in a given time period. Column 2 of Table 2 reports the estimated specification with the time dummies (which were jointly significant at the 5 percent level). In this more general specification, the coefficients on the individual-specific variables remain very similar to those in column 1.

Table 2 (column 3) also reports results for the subsample of workers who, in the month of the interview, report that they are registered with the unemployment office and are also actively engaged in job search. Most of the main results are preserved for this sub-sample, although the coefficients on the age variables and unemployment rates are no longer significant.

[2] In general equilibrium, reservation wages and unemployment would tend to be positively correlated. The reduced-form specification used here can be motivated in a partial equilibrium framework in which an individual worker takes unemployment rates as given.

Table 2

Determinants of Reservation Wages

	Dependent Variable — Log Reservation Wage			
	(1)	(2)	(3)	(4)
Apprenticeship	–0,025 (0.018)	–0.032 (0.018)	0.022 (0.023)	0.022 (0.022)
Vocational Training	0.024 (0.022)	0.021 (0.022)	0.078* (0.027)	0.078* (0.027)
University Degree	0.299* (0.031)	0.291* (0.031)	0.327* (0.041)	0.326* (0.040)
Age	–0.025* (0.008)	–0.023* (0.008)	0.007 (0.009)	0.010 (0.009)
Age ^2/100	0.023* (0.010)	0.020* (0.010)	–0,010 (0.011)	–0,014 (0.011)
Male	0.499* (0.019)	0.502* (0.020)	0.340* (0.022)	0.334* (0.022)
Married	–0.090* (0.022)	–0.085* (0.022)	–0,033 (0.024)	–0,026 (0.024)
Household Head	0.132* (0.020)	0.119* (0.020)	0.168* (0.025)	0.172* (0.025)
Kids	–0.061* (0.020)	–0.065* (0.020)	0.004 (0.024)	0.000 (0.023)
Home Ownership	–0.020 (0.019)	–0,018 (0.018)	–0,015 (0.025)	–0,007 (0.025)
Other Emp. Person(s) in Household	–0.177* (0.022)	–0.155* (0.022)	–0.174* (0.024)	–0.157* (0.024)
Log Net Household Income	0.155* (0.019)	0.141* (0.019)	0.172* (0.022)	0.156* (0.022)
UI Benefits/Assistance	0.075* (0.020)	0.085* (0.020)	0.055* (0.020)	0.096* (0.022)
Unemployment Rate	0.017* (0.007)	— —	0.008 (0.009)	— —
Regional Unemployment Rate	–0.009* (0.003)	— —	–0,001 (0.004)	— —
Year Dummies	—	Yes	—	Yes
Adjusted Rsquared Nobs.	0.429 2759	0.440 2759	0,398 1093	0,425 1093

Notes: Excluded education dummy is General Schooling. The regressions in columns 3 and 4 are limited to the sub-sample of labor force participants who are registered as unemployed and are engaged in job search in the month of the interview. Standard errors are reported in parentheses. An asterisk indicates statistical significance at the 5 percent level.

As discussed earlier, the duration of unemployment spell is likely to be correlated with the reservation wage. To examine the empirical relationship between these variables, I first estimate reduced-form OLS regressions for unemployment duration with the reservation wage as a dependent variable. These estimates are presented in the first two columns of Table 3. Interestingly, the conditional correlation between these variables appears to be significantly negative. At an intuitive level, this seems reasonable, as one might expect the reservation wage to decline over time for the reasons cited earlier.

As noted by Jones (1988), however, the reservation wage and unemployment duration are endogenously determined. One way to obviate this problem is to instrument

Table 3

Determinants of Unemployment Duration

	Dependent Variable — Log Unemployment Duration (months)			
	OLS	OLS	IV	IV
Log Reservation Wage	–0.694* (0.148)	–0.687* (0.153)	1.816* (0.868)	2.207* (0.917)
Apprenticeship	–0.451* (0.115)	–0.438* (0.117)	–0.564* (0.141)	–0.537* (0.146)
Vocational Training	–0.241 (0.137)	–0.264 (0.139)	–0.500* (0.184)	–0.518* (0.187)
University Degree	–0.256 (0.214)	–0.280 (0.217)	–1.328* (0.442)	–1.461* (0.452)
Age	–0.028 (0.044)	–0.018 (0.045)	–0.056 (0.052)	–0.066 (0.056)
Age ^2/100	0.001 (0.052)	0.001 (0.053)	0.001 (0.063)	0.001 (0.067)
Male	0.347* (0.115)	0.355* (0.118)	–0.710 (0.383)	–0.876* (0.408)
Citizen	–0.199 (0.106)	–0.141 (0.107)	–0,091 (0.130)	–0.079 (0.132)
Unemployment Rate	–0.053 (0.052)	— —	–0.082 (0.062)	— —
Regional Unemployment Rate	0.091* (0.021)	— —	0.084* (0.025)	— —
Year Dummies	—	Yes	—	Yes
Adjusted Rsquared Nobs.	0.116 750	0.092 750	— 750	— 750

Notes: Standard errors are reported in parentheses. An asterisk indicates statistical significance at the 5 percent level.

for the reservation wage using variables that, except through their effects on search costs and, hence, on the reservation wage, are unlikely to have *further* effects on unemployment duration. Jones (1988) uses unemployment insurance benefits as an instrument. Since the GSOEP is a richer dataset than the one used by Jones, I have a number of potential instruments available. Following some preliminary analysis for instrument relevance, I chose a small set of instruments that worked best — dummies for marital status, presence of kids, and receipt of unemployment compensation.

The results from IV regressions are presented in the third column of Table 3. Consistent with the predictions of search-theoretic models, the coefficient on the log reservation wage turns positive and significant. Again, using time dummies rather than aggregate and regional unemployment rates makes little difference to the results (column 4). The results were quite similar across alternative choices of instrument sets. However, it should be noted that the positive coefficient found here is predicted by optimal search theory under the assumption of a stationary reservation wage. The evidence in the previous section suggested that the stationarity assumption is not necessarily borne out in the data. Hence, the interpretation of the positive effect of reservation wages on unemployment duration as being consistent with optimal search theory is tentative; it deserves further scrutiny in future work.

5. The Relationship between Skill Levels and Reservation Wages

In this section, I examine further the relationship between imputed skill levels and reservation wages. This analysis can be interpreted as providing some indirect evidence on labor supply, based on reservation wage data, at different points of the skill/wage distribution. This is of particular relevance for shedding light on potential

determinants of rigidities in labor supply at the low end of the skill/wage distribution that could have implications for understanding the German unemployment problem.

The approach I adopt can be broken down into the following steps: (i) estimate annual selection-corrected Mincerian wage equations for full-time employed workers; (ii) based on those estimates, generate a predicted offer wage for each unemployed worker conditional on observed characteristics; and (iii) construct the differential between reservation and (predicted) offer wages for each worker who reports a reservation wage.

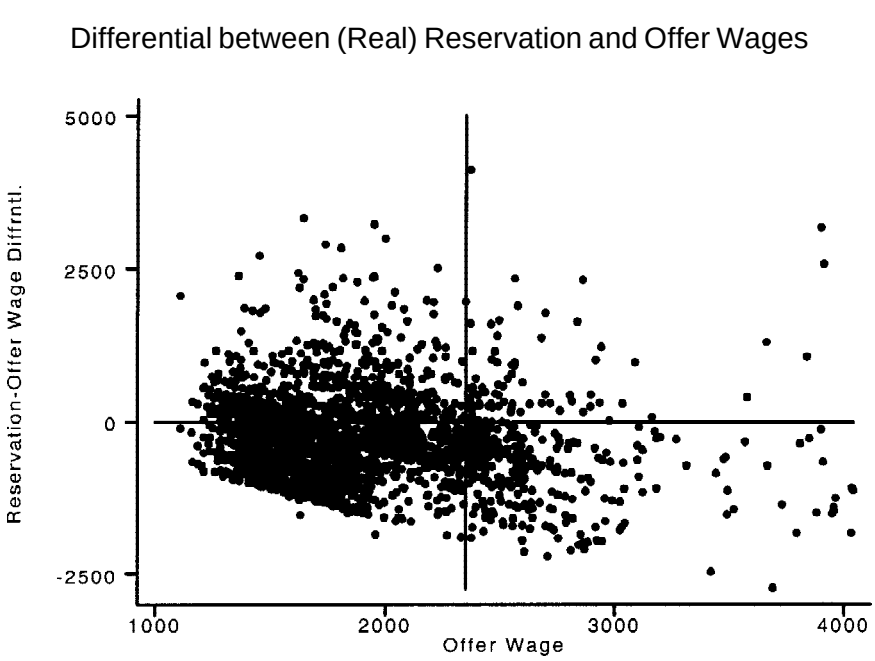
Net monthly earnings are used as the dependent variable in the regression for the first step. Since the observed wage distribution could be a biased measure of the offer wage distribution, an issue of particular importance for this analysis, I used an expanded sample including non-employed workers to estimate and correct for selectivity bias using Heckman's (1979) two-step procedure. It should also be kept in mind that observed worker characteristics explain only about 30-40 percent of the cross-sectional variation in wages.

In Figure 2, I plot the reservation-offer wage differential against the offer wage, which may be considered a comprehensive measure of skill. The interesting observation from this figure is that there is a clear negative relationship between the reservation-offer wage differential and skill level. For a majority of skilled workers — those whose offer wages lie to the right of the median wage (the vertical line in the figure) — the differential between reservation and offer wages is in fact negative. For these workers, the value of employment is apparently high enough that they are willing to accept employment even slightly below their market offer wage. This could be because of the much greater value of skilled workers' human capital investments and the associated higher absolute amount of depreciation of that capital as unemployment duration increases. By contrast, 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.

In earlier work (Prasad 2000), I have argued that the inability of the German wage structure to adjust to the rising relative demand for skilled labor has led to substitution of both capital and skilled labor for unskilled labor and, consequently, rising unemployment rates for unskilled workers. A possible concern with that analysis is that the offer wage distribution could in fact be truncated from below on account of high reservation wages. Thus, the apparent rigidity of the wage structure might be reflective not of institutional constraints imposed by the wage bargaining system but of rigidities in labor supply caused by other factors such as the UC system.

The cluster of observations below the zero line for labor force participants below the median wage and even close to the left tail of the skill distribution suggests that

Figure 2



Source: Author's calculations.

this issue is not of great empirical relevance. There appear to be enough low-skill workers willing to work at wages below their conditional offer wages if jobs were available. Thus, labor demand is apparently one of the problems inhibiting better employment outcomes for low-skill workers. Nevertheless, the large number of observations above the zero line suggests that labor supply is also a problem and that measures to influence labor demand alone would have a relatively small effect since a large number of unskilled workers are not willing to work at the going wage.

Regression results (not reported here) confirmed the existence of a strong negative relationship between the reservation-offer wage differential and education level. This differential initially declines with age but then turns around at about 47 years of age. The differential is positively related to household net income and, more importantly, to the availability of unemployment compensation. This latter result suggests that the UC system appears to play a role in driving up the reservation wages of many low-skill workers and in limiting their incentives to accept job offers at their respective conditional offer wages.

6. Conclusions

This paper has provided an empirical analysis of the determinants of reservation wages among unemployed workers in Western Germany. An interesting, although tentative, conclusion is that there appear to be significant labor supply rigidities at the low end of the skill/wage distribution, attributable in part to the unemployment compensation system (and perhaps also to other factors such as high effective marginal tax rates at low levels of income). A key policy conclusion that emerges from this and my previous work is that comprehensive reforms to influence both labor demand (by allowing for more flexibility in the dispersion of wages) and labor supply (by changing the disincentives for seeking employment) at the low end of the skill/wage distribution could be crucial for solving the structural problem of high nonemployment rates for low-skill workers in Western Germany.

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