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The Impact of Income Taxation on the Ratio between Reservation and Market Wages and the Incentives for Labour Supply

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The Impact of Income Taxation on the Ratio between Reservation and Market Wages and the Incentives for Labour Supply*

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Abstract

This paper extends previous research about the determinants of reservation wages by analysing the effect of progressive income taxation on the ratio between reservation and net market wages. Based on micro data for Germany (SOEP) we show that joint income taxation in Germany which discriminates by marital status, has a strong and highly significant impact on the reservation/market wage ratio. Relative to single filers, this leads to strong negative labour supply incentives for secondary earners and to positive incentives for first earners in married couples.

Keywords: Reservation/Market Wage Ratio, Income Taxation, Labour Supply, Microsimulation

JEL Classification: J22, H24, H31

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IMPRESSUM

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1 Introduction

According to the theory of labour supply, individuals decide to start working when the net wage they expect to receive on the labour market exceeds their reservation wage. Several recent studies have empirically analysed the determinants of reservation wages, e.g. Christensen (2001) and Prasad (2003) for Germany or Hogan (2004) for the UK.[1] These studies mainly focus on the effect of individual characteristics - such as education, length of unemployment, or previous wages - on the reservation wage.

The aim of this paper is to extend this literature by analysing the effect of income taxation on the reservation wage relative to the expected net market wage, namely the reservation/market wage ratio. More precisely, we show how the tax system, through its impact on the reservation/market wage ratio, creates incentives or disincentives to supply work. We conduct the analysis for Germany as the specific characteristics of the German tax and transfer system, such as joint taxation with income splitting, are well known to have strong disincentives on the labour supply behaviour of secondary earners. In Germany, couples can file a joint tax claim, and the system benefits principally one-earner couples and two-earner couples where the difference between partners' earnings is high. Steiner and Wrohlich (2004) discuss in detail positive and negative working incentives for first and secondary earners in married couples induced by joint taxation in Germany. They find that the employment rate of secondary earners in Germany would markedly increase when moving from joint taxation to individual taxation.

The contribution of this paper is twofold: First, we analyse the interaction between income taxation and labour supply incentives. This point is of particular interest in light

[1] Moreover the concept of reservation wage is central in the job search theory, for an updated literature survey, see Eckstein and van den Berg (2005). For an analysis and structural estimation of the reservation wage function, see Hui (1991)

of the political debate in Germany about the relative low labour market participation rates of secondary earners, in particular of married women. Second, this paper is interesting for methodological reasons. In contrast to the previous literature on reservation wages we apply microsimulation to derive the expected net market wage of the non working individuals which is compared with their survey-based reservation wage information. Using microsimulation we are able to derive the hypothetical individual share of the household net income of the first and the secondary earner. Moreover, this procedure allows us to circumvent selectivity and time-consistency problems. Additionally, we deal explicitly with the non-randomness of missing information about the reservation wage.

Our results highlight the strong effect of the German tax system on labour supply caused by joint taxation. Controlling for individual and household specific characteristics we find that the reservation/market wage ratio is relative low for primary earners and single tax filers. In contrast, secondary earners are faced with relatively high marginal tax rates such that their reservation wage is likely to exceed their net market wage. Hence, our results provide an empirical explanation for the low labour market participation rate of secondary earners which is consistent with the economic theory of labour supply.

2 Data, Reservation Wage, and Expected Net Market Wage

2.1 Data Description

Our study is based on the Socio-Economic-Panel (SOEP) which is a representative sample of over 12,000 households living in Germany with detailed information about socio-economic variables on a yearly basis.[2] In the empirical analysis we focus on non working individuals aged between 20 and 65 years. Excluded are individuals that define themselves as voluntarily

[2]For a detailed description of the data set, see Haisken De-New and Frick (2003).

non working as they do not intend to take up work in the future.[3] Moreover, we exclude the few households where both spouses are not working and one spouse intends to work part-time as we cannot meaningfully interpret the reservation wage of these spouses. To have sufficient observations for the empirical analysis we pool information for the fiscal years 2001-2003.[4] This period is a relatively homogenous period, as during that time the tax and benefit system in Germany was hardly affected by fiscal reforms and the economic situation was fairly stable. In total, the empirical analysis is based on information of 2,425 women and 986 men. Table 1 provides some descriptive statistics of the sample used.

Insert Table 1 about here

2.2 Reservation Wage

The reservation wage of unemployed individuals who intend to engage in paid work in the future is collected in the SOEP according to the following question: "*How high would your net income or salary have to be for you to take up a position offered to you?*". Individuals either do not respond to this question or give a numeric answer in Euros per month. Unfortunately, the reservation wage question is not straightforward to answer for the interviewee and even harder to interpret for the researcher. This is due to the fact that the net household income is subject to numerous transfers and to income taxation. Since transfers and income taxation are assessed on the household level, the individual net reservation wage is a theoretical concept which depends on assumptions about the household context. Therefore, a clear definition of the reservation wage is necessary, where we understand the reservation wage in the following way:

[3] Non-working individuals are asked the following question: "Do you intend to engage in paid employment (again) in the future?". If this question is answered with "Definitely not", individuals are excluded from the analysis as they are voluntarily not working.

[4] As we are interested in the impact of the tax and transfer system, we make use of the retrospective yearly information for the years 2001-2003 which are collected in the SOEP waves 2002-2004.

First of all, when reporting their reservation wage, individuals assume that their income is *not* on top of means tested transfers. Moreover, the net reported income does not include any child related benefits. As an example, a single mother with two children who reveals a reservation wage of 1,500 Euros per month, is aware that i) on the top of her reservation wage she receives child support for her children which is not withdrawn and ii) the 1,500 Euros are not on top of her out-of-work benefits since these are means tested. For couple households, interpretation is even more complex. We assume that spouses condition their reservation wage on the behavior of their partner and especially their labour market income. That is, the revealed reservation wage of a secondary earner is on top of the first earner's income. In a couple household where none of the spouses is working, we assume that reservation wage is *not* on top of means-tested transfers. Thus, we treat these couple households in the same way as single households. As an example we take a stylized household with 2 children where the husband is working full-time and the net household income amounts to 3,000 Euro. The reservation wage of the spouse amounting to 1,500 Euros implies that when she starts working, net household income increases to 4,500 Euro. In contrast in the same stylized household where both spouses are not working, her reservation wage of 1,500 Euro implies that this income is *not* on the top of the means tested transfer income. In both examples child benefits are not included in the reservation wage. The reservation wage question does not include any information about the assumed working hours; hence it is not possible to disentangle working hours and hourly wages. Therefore, we make use of the reported desired hours for the unemployed: "*Are you interested in full-time or part-time employment, or would both suit you?*". For part-time work we assign 19.5 and for full-time work 38.5 hours per week. When the respondent is indifferent between both working choices, we assume according to the empirical evidence part-time work for women and full-

time work for men. Based on this information about desired working hours we can derive the reservation wage per hour.

2.3 Expected Net Market Wage

To derive the corresponding expected net market wage of the currently unemployed who intend to start working in the future we make use of microsimulation. This stands in contrast to the previous literature which uses previous or future wages to proxy expected market wages. However, microsimulation is crucial for our research question as it enables us to condition the financial incentives and working decision of the unemployed on the behaviour of the spouse. Thus, we can derive the individual share of the net household income that corresponds to the revealed reservation wage. Furthermore, we avoid potential selectivity problems and time inconsistencies related to the use of retrospective or future information.

We employ the microsimulation model STSM which models all relevant components of the German tax and transfer system.[5]

As we are interested in the expected net market wage of currently unemployed individuals, it is necessary to estimate their expected gross hourly wages that is, the person specific distribution of offered wages W_{it}. As we do not observe W_{it} we follow Hogan (2004) and estimate $\hat{W}_{it}$, a measure of the mean of the distribution of offered wages. We apply a selection corrected wage estimation following Heckman (1974) and interpret the predicted hourly wages of the currently unemployed individuals as the mean of the distribution of offered wages.[6] The wage estimation is performed separately for East and West Germany

[5] A detailed description of the microsimulation STSM model can be found in Steiner, Haan, and Wrohlich (2005).

[6] In contrast to Hogan (2004) we estimate the wage distribution on basis of all employed not only the newly employed, yet we include tenure within a firm to capture the firm specific wage premium.

and by gender using pooled data from 1995-2003.[7]

Given the estimated gross hourly wage for the currently unemployed and their revealed desired hours, full-time or part-time, we simulate their hypothetical net household income. This net household income is again divided by the desired working hours to obtain the net household income per hour which is the net hourly market wage. For couple households we derive the hypothetical net market wage for each spouse conditioning on the working behaviour of the parter. That is, we assume that the working behaviour of the partner is given and remains constant when the spouse starts to work. For no-earner couples, the hypothetical net hourly income equals the whole net household income as the partner is not working. For couples, where the partner is working, the hypothetical individual share is conditioned on the spouses' income. This is simply derived based on the difference between the new hypothetical joint household income when both spouses are working and the observed income where only one spouse is employed. This is the relevant information to be compared with the reservation wage since the revealed reservation of the spouses is on the top of the partner earnings.[8]

3 Empirical Analysis

The key question of this paper is to empirically analyse whether and how income taxation ceteris paribus affects the reservation/market wage ratio. According to the theory of labour supply the relation between offered market wages and reservation wages determines individual's labour supply behaviour. It is only optimal to participate on the labour market if the offered market wage exceeds the reservation wage. The relationship between the reservation

[7]Estimation results are available on request from the authors.

[8]In the empirical analysis we exclude households when one spouse's reservation/market wage ratio is above 300% and the corresponding number of observations at the other end of the distribution.

and the net market wage is defined as the ratio of the reservation wage over the net market wage expressed in percent. A ratio over 100% indicates that the reservation wage is higher than the net market wage, thus suggesting that the individual has no or lower incentives to take up a job compared to someone who has a ratio lower than 100%.

As labour market behaviour varies greatly between men and women, and the sample of nonworking men and women is very different, we present separate estimates for the two groups. Non-working women tend to be be younger, better educated, are more likely to live in the western part of Germany and to have children than the non working men (Table 1). The key explanatory variable for our analysis is the marital status conditioned on the working behaviour of the spouse. As discussed by Steiner and Wrohlich (2004), married couples in Germany file taxes jointly. Relative to single filers, this leads to low marginal tax rates of first earners and to high marginal tax rates of secondary earners.[9]

Insert Table 2 about here

Table 2 shows the sample means of the dependent variables. Men and women are further divided to distinguish according to household composition and spouse's working behaviour. The third column provides a first suggestion about the impact of the tax system on work incentives. The reservation/market wage ratio is relatively low for first earners in couple households and slightly higher in single households. In contrast, it exceeds 100% for second earners which implies that reservation wages are higher than net market wages. This pattern is similar for both men and women, despite their different reservation wage profiles. The last column in the table shows the relative change in income taxation (RCT) when moving from the non working to the working status, which is a rough measure of fiscal disincentives to

[9]In Germany, cohabiting couples which are not married are not jointly taxed but assessed as single filers.

engage in paid work.[10] Clearly secondary earners are the most penalised group because of the joint income taxation. The relative change in income taxation is about twice as high as for non married individuals and more than three times compared to first earners. For women this difference is even more drastic. Thus, this variation points at high disincentives for secondary earners to supply labour induced by income taxation. In the following empirical analysis we will explore and discuss the impact of relative changes in income taxation on the reservation/market wage ratio.

Item Non-Response for the Reservation Wage: As mentioned by previous studies (see, e.g., Christensen (2001) or Prasad (2003)) there exists a severe problem of missing information about reservation wages. A large share of the non working individuals who intend to start to work in the future do not provide a numeric answer for their reservation wage.[11] As the item non-response might be not at random we explicitly model the selection process by applying a selection corrected estimation for the restricted sample with reservation wage observations as suggested by Heckman (1974). Drawing on the literature on panel attrition and item non-response in household surveys, e.g. Uhlendorff (2006), we use the variable "change of interviewer" beside household-specific variables as exclusion restrictions. As a robustness check we present in addition to the selection corrected estimates, results derived from standard OLS estimations.

The effect of the Reservation/Market Wage Ratio Table 3 reports the results of the OLS (I) and selection corrected regression (II) on the reservation/market wage ratio. As mentioned above, we run separate estimations for men and women.

[10]The relative change in taxation is calculated as the change in income taxation of a household when the non working partner starts to work, relative to his or her change in gross earnings.

[11]The item non-response rate is 53% among women and 33% among men.

Insert Table 3 about here

Our empirical findings clearly underline the strong effect of income taxation through discrimination between single filers, and first and secondary earners in joint filer households on the reservation/market wage ratio and thus on working incentives. In general, we find very similar results for the selection corrected specification and the OLS estimation. This is supported by a Wald test that does not reject independence between the error terms in the selection equation and in the estimation of the wage ratio. In all specifications, most individual variables do not affect the ratio significantly. This is not surprising as in general, those variables affect both the reservation and net market wages in a similar way. However, we find significant and strong effects of the marital status and the working behaviour of the spouse. Overall, married individuals have a lower ratio between reservation and net market wages than single individuals. This suggest that in general married couples benefit from joint taxation and have higher incentives for labour supply. We find that relative to single filers the ratio is about 9% lower for men and nearly 30% lower for women. Yet, this effect depends on the working behaviour of the spouse. Secondary earners have a significantly higher ratio between their reservation and their market wage than first earners as well as compared to single filers (this is the combined effect of being married and being secondary earner). The secondary earner effect is in particular strong for married women. Relative to a first earner women, the ratio increases by over 50%, for men the same effect is close to 30%. Our findings imply a strong work disincentive for secondary earners while there are positive incentives for first earners. As explained above the lower the reservation/market wage ratio the higher the work incentives. As we control for other individual characteristics we suggest that differences between first and secondary earners as well as the difference to single filers is strongly related to the different taxation of the three groups due to joint

income taxation in Germany.

4 Conclusions

It was the purpose of this paper to extend previous empirical literature on reservation wages by analysing the effect of income taxation on the reservation/market wage ratio. Based on micro data for Germany (SOEP) we show that income taxation which discriminates by marital status, has a strong and highly significant impact on that wage ratio. Relative to single filers, this leads to strong negative labour supply incentives for secondary earners and positive incentives for first earners. Our results lead to the conclusion that the low labour market participation of secondary earners, mainly married women, can be related to joint income taxation in Germany. Given the strong disincentives for secondary earners we suggest that moving towards individual taxation in Germany would increases labour market participation of secondary earners.

Tables

Table 1: Descriptive Statistics

	Men		Women	
	Mean	St Deviation	Mean	St Deviation
Average Age (years)	43.29	10.11	33.66	18.02
Living in the East	0.52	0.50	0.30	0.46
Disabled[(a)]	0.04	0.32	0.02	0.15
Foreign	0.12	0.50	0.11	0.31
Education				
9 years*	0.37	0.48	0.30	0.46
10 years**	0.35	0.48	0.41	0.49
12 to 13 years***	0.10	0.30	0.17	0.38
Other school diploma****	0.11	0.31	0.09	0.28
Further qualification				
Apprenticeship	0.57	0.50	0.48	0.50
Polytechnic	0.17	0.38	0.25	0.43
University	0.14	0.34	0.13	0.34
Family status				
Married	0.56	0.50	0.71	0.45
Married with working partner	0.26	0.44	0.61	0.49
With preschool-age child	0.16	0.37	0.42	0.49
Average number of children	0.89	1.17	1.45	1.10
Labour market				
Long-term unemployed	0.21	0.41	0.16	0.37
Receiving unemployment benefit[(b)]	0.81	0.39	0.33	0.47
With preference for part-time employment			0.59	0.49
Regional labour market[(c)]				
Average local unemployment rate	0.10	0.04	0.08	0.05
Average local vacancy rate (FT)	0.60	0.38	0.67	0.39
Average local vacancy rate (PT)	0.16	0.11	0.15	0.09
Sample size	986		2425	

Notes: All numbers are in shares.
**Hauptschulabschluss* ***Realschulabschluss* ****Abitur* or *Fachhochschulreife* *****Anderer Abschluss*. Omitted category: No school diploma (*Kein Abschluss*).
[(a)] Disability indicates a percentage of disability of 50% or higher. [(b)] Unemployment benefit includes unemployment insurance (*Arbeitlosengeld*) and unemployment assistance (*Arbeitlosenhilfe*). The first is determined on the base of the earnings on the last job, the second has a longer duration and is means-tested.

Table 2: Dependent variables and relative changes in taxation by marital status

	Reservation wage per hour	**Expected hourly net wage**	**Reservation wage over exp. net wage** (%)	**RCT**
Men				
Entire sample	7.88	10.04	90.33	0.15
Not married	7.12	9.02	88.15	0.14
Married, whose Spouse is not working	8.78	11.57	79.28	0.06
Married, whose Spouse is working	8.28	10.00	109.30	0.26
Women				
Entire sample	7.18	10.68	91.46	0.20
Not married	7.44	11.00	84.45	0.08
Married, whose Spouse is not working	6.51	13.50	53.66	0.03
Married, whose Spouse is working	7.16	10.08	106.08	0.29

Notes: RCT measures the relative change in income taxation when moving from the non-working to the working status.

Table 3: Estimation Results: Reservation/Market Wage Ratio

	Women		Men	
	(**I**)	(**II**)	(**I**)	(**II**)
Age	-0.461	-0.342	-2.395*	-2.361*
	(1.19)	(1.17)	(1.12)	(1.1)
Age^2	0.003	0.001	0.027*	0.027*
	(0.01)	(0.01)	(0.01)	(0.01)
Low Secondary School	5.102	5.134	14.234	14.186
	(6.3)	(6.24)	(7.66)	(7.51)
Intermediate Secondary School	10.662	10.64	13.879	13.813
	(6.47)	(6.42)	(8.11)	(7.95)
High School	29.881***	29.779***	6.52	6.464
	(8.31)	(8.24)	(9.47)	(9.3)
Other Secondary School	8.395	8.499	4.255	4.269
	(8.35)	(8.27)	(9.19)	(9.04)
Apprenticeship	-14.230***	-14.308***	-8.67	-8.676
	(4.27)	(4.22)	(4.53)	(4.45)
Technical College	-12.463*	-12.546*	1.739	1.734
	(4.92)	(4.88)	(5.61)	(5.51)
University	-1.674	-1.652	14.938*	14.923*
	(6.29)	(6.23)	(6.84)	(6.73)
Married	-28.221***	-28.115***	-9.263**	-9.154**
	(3.48)	(3.45)	(3.4)	(3.35)
Married*Working Spouse	54.239***	54.233***	29.744***	29.706***
	(4.16)	(4.11)	(5.24)	(5.16)
Pre-school-age Kid	1.63	1.884	-1.131	-1.039
	(4.57)	(4.53)	(4.92)	(4.84)
Long-term Unemployed	1.694	1.671	7.293	7.297
	(3.91)	(3.87)	(4.69)	(4.61)
Receiving Unemployment Benefit	12.686**	12.604**	-4.371	-4.347
	(4.27)	(4.23)	(4.67)	(4.59)
Part-time	-2.715	-2.579		
	(4.2)	(4.16)		
Disability	-12.718	-12.815	-0.323	-0.374
	(9.01)	(8.93)	(7.89)	(7.75)
Foreign	5.799	5.906	9.132	9.132
	(6.64)	(6.56)	(6.68)	(6.57)
Constant	83.104***	84.224***	117.263***	117.790***
	(25.01)	(24.89)	(23.81)	(23.47)
	Selection Equation			
Age				-0.017***
				(0.00)
Number of Kids		-0.149***		-0.077*
		(0.02)		(0.04)
East		0.417***		0.351***
		(0.06)		(0.08)
Change of Interviewer		-0.200*		0.067
		(0.09)		(0.14)
Constant		0.044		1.074***
		(0.05)		(0.21)
Mill's ratio		-3.946		-2.737
		(4.158)		(2.328)
Wald test[(b)]		0.343		0.224

Notes: Column (I) yield the OLS results; results Column (II) account for potential non-random attrition. Robust standard errors in parenthesis.
***/**/* indicate significance at the 1%/5%/10% level. Time dummies and regional specific variables such as regional unemployment and vacancy rates for full- and part-time work have been included.
[(a)] Omitted category is "No school diploma".
[(b)] Wald test of independence between the selection equation and the second stage equation. P-values reported.

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