BGPE Discussion Paper

No. 106

Labor supply after normal retirement age in Germany – A fourth pillar of retirement income?

Martina Eschelbach

October 2011

ISSN 1863-5733

Editor: Prof. Regina T. Riphahn, Ph.D.
Friedrich-Alexander-University Erlangen-Nuremberg

B G P E Discussion Paper Series

Labor supply after normal retirement age in Germany – A fourth pillar of retirement income?

Martina Eschelbach

October 5, 2011

Many European countries are currently transferring their pay-as-you-go public pension system to a three-pillar-system of public, occupational, and private pensions. In Germany, economists expect a pension gap for future retiree cohorts as public pensions will decrease and private old age provision is low. In this paper we ask, whether this pension gap might lead to the rise of a fourth pillar of retirement income: labor earnings. Using data from the German Socio-economic Panel, we find that retirees with low nonlabor income are more likely to work after normal retirement age. The negative relationship between nonlabor income and the participation probability is robust across educational and employment groups and particularly strong for retirees with low income. We conclude that labor market earnings constitute a pillar of retirement income already today.

JEL Codes: J22, J26

Key words: old age labor supply, work after normal retirement age, fourth pillar of retirement income

Correspondence to:

Martina Eschelbach
Economics Department
Univ. of Erlangen-Nuremberg
Lange Gasse 20
D-90403 Nuremberg
Germany
Email: martina.eschelbach@wiso.uni-erlangen.de

Helpful comments of Regina T. Riphahn, Boris Hirsch, and Christoph Wunder on earlier versions of this paper are gratefully acknowledged.

1 Introduction

This paper concentrates on a group of workers that is often neglected in employment statistics and economic analyses: those above normal retirement age. We investigate the labor supply of German retirees who passed the normal retirement age of 65 and yet participate in the labor market. In Germany, reaching age 65 generally entitles to a public old age pension - the most important source of retirement income - without deductions.[1] Socio-cultural norms suggest leaving the labor market and enjoying the remaining years in retirement even before this age. Despite these conventions, around five percent of men and two percent of women aged 65 and above participate in the labor market. Between 1996 and 2008 their absoloute number almost doubled from around 350,000 to 600,000 with larger birth cohorts reaching retirement age.[2] These figures show that working beyond the normal retirement age in Germany is a persistent phenomenon which grows in importance as society ages.

In this paper, we ask whether labor supply after normal retirement age complies with classical economic theory and is affected by pecuniary incentives. Special interest is given to the role of nonlabor income such as pension income. For countries such as Germany, that are about to reform their pay-as-you-go public pension system into a three pillar system of public, private, and occupational pensions, this question is of particular interest.[3] The analysis shows to what extent we might expect the emergence of a fourth pillar of retirement income in the form of labor earnings due to potential pension gap. The German pension reform process started in 2001. It aims at reducing public pension payments for future retiree cohorts on the one hand and promoting occupational and privately funded pensions on the other hand.[4] According to OECD estimates, the full implementation of the reform process will lead to a ten

[1] Starting in 2012, normal retirement age will, however, gradually rise to age 67 by 2030.
[2] Own calculations based on the Mikrozensus.
[3] Occupational pensions are jointly funded by employers and employees.
[4] The relevant reforms are the *Altersvermögensgesetz* passed in 2001 and the *Rentenversicherungs-nachhaltigkeitsgesetz* passed in 2004. For more information on the German public pension system and important reforms see Börsch-Supan and Wilke (2006).

percent reduction in net replacement rates of public pensions (OECD 2009a).[5] Problems arise as occupational and private pensions are not mandatory and low income groups in particular might not provide sufficiently for their old age (Börsch-Supan et al. 2007, Queisser et al. 2007, Corneo et al. 2009). Furthermore, because of distortions in the stock market caused by the financial crisis, payments from private pension funds might turn out smaller than expected. Some of the future retirees will therefore be confronted with lower retirement income compared to today's retired cohorts. Therefore it is worth investigating whether retirees are likely to compensate reduced pension incomes by a fourth pillar of retirement income: labor market earnings.

Many other European countries are currently planning or implementing similar reforms of their public pension systems (Queisser et al. 2007). So the analysis of labor supply after normal retirement age is of particular interest not only for Germany. Yet, so far, empirical evidence on this subject exclusively comes from the U.S.. In the U.S., net replacement rates of public old age security are far below OECD average (OECD 2009a) and individuals are encouraged to provide privately for retirement. At the same time labor force participation after normal retirement age is with around 15 percent between 2002 and 2009 rather high (OECD 2010a). Schmidt and Sevak (2008) analyze the labor supply of U.S. individuals aged 70 or older.[6] They estimate a classical labor supply function with data from the Health and Retirement Study and find that labor supply in this group is responsive to wage rates and taxation and is negatively affected by private pension receipt. Lahey et al. (2006) and Maestas (2010) analyze the decision to reenter the labor market after an age related withdrawal (unretirement). Lahey et al. (2006) find that the decision to reenter the labor market is not

[5] This figure is based on a comparison of pension entitlements for a worker entering the labor market in 2006 in two different scenarios: the reform had not taken place and the reform had fully phased in (OECD 2009a). For a more detailed analysis of the development of public pension entitlements of future retiree cohorts see also TNS Infratest Sozialforschung (2007).

[6] Their analysis is restricted to individuals aged 70 or older because of complications connected to the U.S. Social Security Earnings Test for younger age groups.

influenced by the retirees' financial situation but by the availability of health insurance. Maestas (2010) finds that the unretirement propensity is not affected by failures in financial planning or financial shocks. It rises, however, among those without an employer pension.

We contribute to the literature by analyzing the relationship between pension income and other sources of nonlabor income on the one hand and labor supply on the other hand for Germans who passed the normal retirement age of 65 and receive an old age pension.[7] To our knowledge, this is the first economic study on labor supply after normal retirement age outside the U.S.. Using data from the German Socio-Economic Panel (GSOEP) for the period 2002 to 2009, we find that retirees with small pension benefits have a particularly high probability to participate in the labor force after age 65 and that the association between pension income and labor force participation is stronger for low income groups.[8] The results suggest that the labor supply decision of retirees in Germany is significantly motivated by financial considerations. This not only indicates the existence of a fourth pillar of retirement income in Germany already today but gives reason to expect a rising importance of this pillar when public pensions decline for future cohorts.

The structure of this paper is as follows. Because very little empirical evidence on the subject can be found in the literature, section 2 provides descriptive statistics on labor supply after age 65 in Germany and other European countries. This section also explains the institutional background for working retirees in Germany. In sections 3 to 9, we continue with a regression analysis in order test several hypotheses concerning the relationship between German retirees' nonlabor income and labor supply using the GSOEP. Section 10 concludes.

[7] Henceforth, we will refer to this group as retirees, independent of their actual work status.
[8] The question of whether these relationships can be interpreted as causal will be addressed in section 5.

2 Labor force participation above age 65 in Europe and Germany

a. Europe

Figure 1 shows labor force participation rates among individuals aged 65 or older in 25 European countries as of 2009. Labor force participation is defined as working at least one hour a week. In the lead are Iceland and Norway with rates of 35 percent and 17 percent, respectively.[9] The lowest participation rate can be found in France with only 1.5 percent. When interpreting these results, we must take into account that normal retirement age differs between countries. Considering only countries, where - as in Germany - normal retirement age is 65, Portugal, Sweden, and Switzerland have the highest participation rates.[10] With a participation rate of four percent, Germany is in the lower midrange.

b. Germany

In Germany, normal retirement age is 65. Starting in 2012, it will be raised gradually to reach age 67 in 2030. *Normal* in the German context means that at this retirement age, full retirement benefits from the public pension system - the most important source of retirement income in Germany - are provided.[11] Leaving the labor market is not mandatory as there are no legal impediments to working after age 65. However, an obstacle to continued employment can be that many collective bargaining agreements and work contracts contain a clause that the employment relationship ends when the employee turns 65. German pension legislation does not know an earnings test for retirees aged 65 or older. Thus pension entitlement is not lost as a consequence of too much additional income.[12]

[9] The figures for Iceland are exceptionally high in 2009. Between 2000 and 2008, the participation rate was only around 19 percent. The strong increase in 2009 might be a result of the financial crisis in 2008.

[10] Portugal and Iceland are the only two European countries where effective retirement age exceeds normal retirement age (OECD 2009b).

[11] It is, however, possible to postpone the receipt of public pension beyond age 65 in order to increase future payments. This postponement option and its relevance for our analysis will be discussed in more detail in section 9.

[12] Exceptions are retirees that receive civil service pensions and retirees that get income support. Retirees that receive income support lose entitlement when their labor earnings raise their total income above the subsistence minimum. The percentage of Germans aged 65 or older that receive income support is, however, very low. Own calculations based on the Mikrozensus show that between 2002 and 2008 the percentage was around 1.7 percent.

The following descriptive statistics on labor supply after age 65 in Germany are based on two nationally representative datasets: the Mikrozensus is a cross section of one percent of German households provided by the German Federal Bureau of Statistics. The German Socio-economic Panel (GSOEP) is a longitudinal household survey.[13] Both datasets offer advantages for our descriptive analysis: the Mikrozensus comprises a large number of observations and there are no missing values. The GSOEP follows individuals over time and offers detailed information on the respondents' incomes and financial situation. We start with descriptive statistics based on the Mikrozensus.

Figure 2 shows the annual participation rates of individuals aged 65 and above between 1991 and 2008 separately for men and women. Around five percent of men and two percent of women of that age group are still in the labor force. There is a slight positive trend for both sexes which for men became more pronounced in 2008. When dividing the two groups into West and East German households (see Figure 3), we see that the participation rates are considerably lower in East Germany.[14] Comparisons between German and foreign citizens (see Figure 4) show that participation was consistently higher among foreign citizens, however with a negative trend since 2000. In 2008, participation rates were higher for German citizens for the first time, equally for men and women.

Table 1 offers descriptive statistics on the character of labor supply after age 65 in 2008, comprising working hours, occupation, employment status, and industry. The same statistics are also given for the age group 55 to 64. The comparison of the two age groups reveals important differences in the structure of activities before and after normal retirement age. First, work after age 65 is characterized by low weekly working hours. The median is only 17

[13] For more information on this dataset see Haisken-DeNew et al. (2005).
[14] A more detailed analysis shows that between 2000 and 2008 the participation rates were systematically higher in all the West German states compared to the East German states, except for Saarland. These figures, of course, also reflect worse labor markets in East Germany. The participation rates rose in all states between 1991 and 2008, except for Bavaria.

hours whereas in age group 50 to 64 it is still 40 hours. Second, the share of self-employed workers among working individuals aged 65 or older reaches almost 60 percent and is considerably higher than at younger ages. In contrast, the share of public servants is extremely small reflecting strict regulations for employment after age 65 in the public sector. Third, elementary occupations are almost twice as frequent after age 65 than before.[15] At the same time, also the share of high skill groups such as legislators, senior officials, managers, and professionals is higher among individuals aged 65 or older than in the younger age group. This suggests a very heterogeneous composition of working individuals above age 65.

Table 2 shows the distribution of nominal gross monthly labor income of working individuals above age 65. This table is based on data from the GSOEP (years 2002-2009) because this information is not available in the Mikrozensus. Around 40 percent of working individuals above age 65 report gross monthly labor earnings of below 500€.[16] This result together with the finding of low weekly working hours suggests that a large share of retirees' labor supply consists of marginal employment.

The longitudinal character of the GSOEP also allows us to analyze labor supply behavior over time. In the period between 2002 and 2009, 20 percent of those working retirees, who could also be observed before age 65, simply continued to work after age 65. The other 80 percent interrupted their careers at least once before or after age 65. The latter pattern can indicate a reversal of a former retirement decision (unretirement), but might also reflect that some retirees hold temporary jobs and do not work regularly.[17]

[15] According to the ISCO 88 classification, elementary occupations are defined as simple and routine tasks that require skills at the first ISCO skill level (e.g. cleaning, selling goods in streets or door to door, or collecting garbage).

[16] When excluding self-employed retirees, the share of working retirees that earn less than 500€ a month even rises to 57 percent.

[17] The latter interpretation is corroborated by the survey's income calendars where respondents are asked about their labor earnings of every month in the past year. Two percent of the retirees who reported not to work in the reporting month had labor earnings in another month of the respective year.

3 Theory and hypotheses

In the economic literature, the analysis of individual labor supply is commonly based on the life-cycle model derived from the Hicksian model of consumer demand. In this labor supply model, an individual attempts to maximize life-time utility drawn from the consumption of goods and leisure by choosing the optimal level of life-time labor supply.[18] Assuming that the individual's utility function is inter-temporally separable, life-time utility, *U*, can be written as the sum of discounted utilities obtained in every period *t*,

$$U = \sum_{t=1}^{T}(1+s)^{-t}\, U(C_t, L_t, E_t, e_t), \qquad (1)$$

where *s* is the time preference rate, *C* and *L* are the amounts of goods and leisure consumed, and *E* and *e* are the individuals' observed and unobserved characteristics that shape their preferences. A forward-looking individual maximizes *U* by choosing the optimal amount of labor supply in every period, satisfying the life-time budget constraint

$$\Omega = \sum_{t=1}^{T}(1+r)^{-t}(B_t + w_t h_t - C_t). \qquad (2)$$

Here *w* represents the hourly wage rate in period *t*, *h* the hours worked, *B* is nonlabor income, and *r* the time constant interest rate. The first order conditions of this maximization problem can be obtained by a Lagrangian approach. Optimal labor suppyly is a function of all past, present, and future values of market wage rates and nonlabor income. In particular, the participation probability in a given period *t* rises with falling life-time nonlabor income. Below, we test whether this prediction holds for German retirees.

4 Data and sample

In order to test whether labor supply after normal retirement age complies with economic theory and is affected by life-time nonlabor income, we run a regression analysis using data from the 2002 to 2009 waves of the GSOEP. The GSOEP is best suited for the regression analysis because it does not only contain the labor force status of respondents but also holds

[18] For a more detailed description of this model see e.g. Pencavel (1986) or Blundell and MaCurdy (1999).

information on their financial situation. Furthermore, a variety of socio-economic background variables and information on respondents' past working life derived from the panel structure of the data allow one to control for unobserved heterogeneity.

Our sample consists of repeated annual observations of individuals aged 65 or above who receive an old age pension. We will refer to them as retirees, independent of their work status. We exclude retirees that receive a civil servant pension as for this group an upper earnings limit applies. After these restrictions, we can use 29,697 annual observations of 6,027 different retirees which are evenly distributed across survey years.[19]

5 Empirical specification and variables

The following linear probability model is applied to the sample of German retirees:

$$lfp_{it} = \alpha + \eta_1 pension\_income_{it} + \eta_2 nonpension\_income_{it} + \eta_3 assets_{it} + \theta' X + \varepsilon_{it} \quad (3)$$

lfp is an indicator variable describing a retiree's labor force participation, *pension income*, *nonpension income,* and *assets* are variables describing a retiree's life-time nonlabor income, *X* is a matrix that contains control variables for unobserved heterogeneity among retirees, α is a constant η_1, η_2, and η_3 are coefficients, θ is a vector of coefficients, and ε is an error term.

The dependent variable *lfp* assumes the value one if retiree *i* is working in year *t* and is zero otherwise. We consider a retiree as working in a given year if, both, positive working hours and labor earnings are stated for the month of the interview.

In order to test for the association between life-time nonlabor income and labor supply, the variables *pension income, nonpension income*, and *assets* are generated. We use them as proxy variables for life-time nonlabor income. They are generated at the household level and

[19] 108 observations of 74 retirees with missing values in continuous variables were dropped beforehand.

deflated.[20] The variable *pension income* is the sum of monthly public, private, and occupational pension payments of a retiree's household (including survivor benefits).[21] The variable *nonpension income* is the net monthly income of a retiree's household minus the sum of monthly pension income of the retiree's household minus the retiree's own monthly labor earnings. It comprises for example interest payments or labor earnings of other household members. The variable *assets* is the self-assessed value of assets of the retiree's household. Households are asked about their assets in 2002 and 2006. We fill the missing values in the years 2003-2005 and 2007-2009 by assuming a constant linear trend.

If retirees' labor supply rises with falling life-time nonlabor income, the coefficients of *pension income*, *nonpension income*, and *assets* will be negative. The three variables describe the retirees' nonlabor income in period t. Furthermore, *pension income* also depicts the effect of future nonlabor income as it is received on a regular basis in every future period (Ruhm 1990). We therefore expect the negative coefficient of *pension income* to be larger than that of the other two income variables.

OLS estimates for η_1, η_2, and η_3 will only yield the true causal effect of nonlabor income on labor supply if nonlabor income is exogenous. When estimating the effect of nonlabor income on labor supply in a life-cycle model, an important endogeneity problem occurs (Smith 1980): individuals who enjoy work are more likely to participate in a given period. These individuals are also more likely to have worked in former periods, so they have higher pensions, assets, and interest payments based on former labor earnings. This can cause a

[20] By generating the variables at the household level, we assume that household members have equal access to the household's financial resources. When splitting a household's nonlabor income in a retiree's own nonlabor income and the income of other household members, we find that a retiree's labor supply is both affected by own nonlabor income and income of other household members. Separating household nonlabor income by recipient, however, considerably decreases estimation efficiency. Thus, we opt for using income measures at household level.

[21] For the calculation of this variable, we do not use the retiree's current public pension income but the highest public pension income that was observed for the retiree between 2002 and 2009. This approach is necessary because of a postponement option in the German public pension system. This problem will be addressed in more detail in section 9.

spurious positive correlation between the nonlabor income variables and current labor force participation as the coefficients of the nonlabor income variables are biased upwards.

In the literature on labor supply, the endogeneity problem of nonlabor income is usually solved by the use of exogenous income shocks and instruments, such as lottery wins, heritages, stock market gains or unexpected changes in social security legislation (e.g. Krueger and Pischke 1992, Eakin et al. 1994, Joulfaian and Wilhelm 1994, Coronado and Perozek 2003, Henley 2004, and Brown et al. 2010).[22]

Unfortunately, we do not have suitable instruments available. Our strategy is to include a large set of variables in order to control for the retiree's taste for work. The matrix X in equation 3 contains socio-economic background variables, such as education, age, sex, origin, marital status, health status (self-assessed), homeownership and the working status of the partner.[23] Moreover, the extent of social commitment is included as we expect retirees who volunteer for unpaid jobs to have a positive attitude towards work in general. Furthermore, we take advantage of the fact that retirees are at the end of their "regular careers". Thus we can use variables describing the retirees' working lives before age 65 as proxies for the retirees' general attitude towards work. We incorporate work experience, last observed gross hourly wage rate,[24] last employment status, and last job satisfaction before age 65. Finally, we include length of pension payment as retirees with a low taste for work are likely to draw early on pension income to be independent of labor earnings.

[22] Given that taste for work is a time constant retiree-specific characteristic, it would be tempting to use fixed effects regression techniques for estimating the effects of nonlabor income. In a life-cycle framework, however, this approach is inappropriate. The decisive factor in explaining labor force participation is life-time nonlabor income, which is constant. Changes in nonlabor income from one period to another, which would be used as regressor in a fixed effects model, should have no influence on the labor supply decision (e.g. Pencavel 1986 or Blundell and McCurdy 1999).

[23] The idea is that partners are similar in taste for work due to assortative mating (Blau and Riphahn 1999).

[24] Last wage rates before age 65 can also be interpreted as proxies for current wages, which are missing in our analysis. According to the life-cycle model of labor supply, higher current wage rates (compared to wage rates in other periods) raise the probability to work in the given period. Because information on current wages is only available for those retirees working after age 65, that is 3.5 percent of the sample, we follow Maestas (2010) and omit possible wage rate effects in our discussion.

The consistency of the coefficients η_1, η_2, and, η_3 depends on the quality of our control variables. But as we would expect a positive bias because of unobserved heterogeneity with respect to taste for work, we will interpret the coefficients as an upper bound of the true causal effects.

6 Descriptive statistics on the GSOEP sample

In our sample around 5 percent of male and 2.4 percent of female retirees are working in any given year. These participation rates are comparable to those in the Mikrozensus presented in section 2.

Table 3 presents descriptive statistics for the explanatory variables, separated by working status and sex. Contrary to our hypothesis, working retirees are in general financially better off than non-working retirees. Working retirees have higher pension income (except for working women), nonpension income, and assets. These correlation patterns might be driven by retirees' taste for work.

The following descriptive statistics provide supportive evidence for our hypothesis that financial considerations play a role in the participation decision of working retirees: in 2002 and 2007, GSOEP households were asked about the necessary amount of money to make ends meet. For observations from 2002 and 2007, we compare these figures with the amount of money the household of a given retiree has available except for the labor earnings of the retiree. More precisely, for a given retiree, we compare the necessary amount of money of his household with the net monthly income of his household reduced by his own monthly net labor earnings. According to this comparison, 12 percent of the retirees live in households that, not considering the respective retiree's labor earnings, are in need of additional income. Among working retirees, this share reaches 30 percent and is thus considerably higher (figures not included in tables).

7 Estimation results

Table 4 shows the results of a linear regression of equation 3 for the pooled sample as well as separately for men and women.[25] All variables shown in Table 3 are included as explanatory variables. Year indicators are added to capture time effects, but as the results reveal no systematic time trend, their coefficients are not presented for brevity. The nonlabor income variables are used in logs. Taking into account the panel structure of the data the standard errors are clustered by retiree.

The results for the pooled sample in column 1 of Table 4 largely confirm the hypotheses derived from economic theory: a one percent increase in the household's pension income, which implies an increase of 20€ per month at the sample mean, is correlated with a 0.012 percentage points rise in a retiree's probability to work. A one percent rise in the household's nonpension income, which implies an increase of 5€ per month at the sample mean, is associated with a 0.001 percentage points higher probability to work. The coefficient of pension income is larger than that of nonpension income because the coefficient of the former variable also depicts the negative effect of future pension income. Assets seem to have no effect on labor supply.

When assessing the magnitude of the association, we must consider that the sample mean of the dependent variable *lfp* is only 3.5 percent. This means, e.g., that for an average retiree a ten percent rise in pension income is correlated with a 3.5 percent increase in the probability to work.[26]

[25] In addition, we estimated equation 3 by a probit and a logit model, as well as a complementary log-log model. The complementary log-log model is typically used when the positive outcome is rare. The qualitative results for the effects of the nonlabor income variables were almost identical to those of the linear model presented in Table 4. As linear models are more convenient when testing for group differences, we chose the linear probability model as our baseline model.

[26] This figure is largely comparable to wealth elasticities found in the literature for older workers in general (e.g. Krueger and Pischke 1992).

The correlations between a retiree's labor force participation and the socio-economic taste variables are in most cases as expected and statistically significant: the probability to work falls with rising age and declining health. Retirees living in East Germany have a lower participation rate than retirees living in West Germany. Holding a university degree is significantly correlated with a higher propensity to work. As for the control variables derived from retirees' past careers, retirees with high former gross wages are more likely to work after age 65. Furthermore, we find a significant positive coefficient of experience in part time employment. Participating in the labor market after the normal retirement age might often be preceded by partial retirement. This corroborates empirical findings that for some retirees, working after age 65 is part of a more fluent transition to retirement (Maestas 2010). There is a significant negative correlation between years since first pension payment and labor supply. One additional year with pension payments reduces the probability to work by 0.2 percentage points. This indicates an adjustment process to the retirement status or the fact that individuals with low preferences for work retire earlier and at the same time have a lower probability to work after retirement. As for the employment status before age 65, the former self-employed by far have the highest probability of labor supply after retirement age. This is not surprising as in section 2, we have seen that most of the working retirees are also self-employed. As expected, a high work satisfaction in the last job before age 65 is correlated with a higher probability to work after age 65. Having a working partner significantly raises own participation probability by 7 percentage points.

Comparing the results for men and women in columns two and three of Table 4, the negative coefficient of pension income is larger for men. Their labor supply seems to be more responsive to nonlabor income.[27] In contrast, empirical studies on the labor supply of prime

[27] The coefficient of the asset variables is significantly negative for women and - contradicting our hypothesis - significantly positive for men. This variable, is however not very reliable. Respondents are asked about it only in 2002 and 2006 and missing values were imputed (c.f. section 5). Furthermore, there is no information on retirees' debt.

age individuals usually find stronger reactions for women (Boal and Ransom 1997). An explanation for this is that in many households, men are main earners whereas women are only second earners who only work when the income of the main earner is insufficient. This role allocation can also explain why after normal retirement age, men are more responsive than women: if labor earnings become necessary to make ends meet, it will rather be the former main earner who enters the labor market than the former second earner.

8 Heterogeneities among employment groups and educational groups

In section 2 we have seen that the composition of working retirees differs distinctively from that of younger age groups in the labor market. Work after retirement age can be characterized by a higher percentage of both high skilled and unskilled workers as well as an overrepresentation of self-employed. This composition and the differences compared to workers before age 65 might indicate that not all groups of working retirees are driven by the same motivation. In this section, we compare the relationship between nonlabor income and labor force participation for the following subgroups: (i) retirees with university degree vs. retirees without university degree (where retirees with university degree should be more likely to work in high skilled positions and retirees without university degree should be more likely to work in unskilled positions when working after age 65) and (ii) formerly self-employed vs. not formerly self-employed (where formerly self-employed should be more likely to be self-employed when working after age 65 than not formerly self-employed).[28]

Comparing retirees with and without tertiary education, we suspect the relationship between nonlabor income and labor supply to be weaker for retirees with tertiary education. Highly educated retirees are more likely to perform interesting and pleasurable tasks that

[28] Participation rates are substantially different across groups: in the group of formerly self-employed around 22 percent of retirees are working, whereas in the group of formerly not self-employed this share is only around 3 percent. For retirees with university degree, the participation rate is around 8 percent, whereas for retirees without university degree it is around 3 percent.

involve more intellectual activities and deliver more intrinsic satisfaction. We suppose that this group may be guided by non-monetary rewards from working and that their labor supply is less responsive to pecuniary incentives.

By comparing the formerly self-employed and the formerly not self-employed two strands of reasoning could be applied. On the one hand, one might expect the labor supply of formerly self-employed to be more responsive to nonlabor income. Financial planning over life-time is more difficult for this group as their labor income is more volatile. Miscalculations of expected retirement income might be more frequent so one might expect financial considerations to play a more important part in the labor supply decision of this group. On the other hand, one might also expect the effects of the financial variables to be weaker for the formerly self-employed: numerous empirical studies suggest that self-employed are substantially driven by non-pecuniary incentives and less by financial considerations (e.g. Hamilton 2000, Benz and Frey 2008).

Table 5 shows selected results of two different estimations: we completely interacted the specification in equation 3 by an indicator variable for *University degree* (columns one and two) and last employment status before age 65 *Self-employed* (columns three and four). For brevity, only the results for the nonlabor income variables and their interaction terms are presented. For both comparisons, the coefficients of the interaction terms are imprecisely estimated and neither systematically positive nor systematically negative. Our results suggest no significant differences in the relationship between nonlabor income and labor force participation across groups.

9 Robustness checks

We perform two robustness checks. In the first, we address a spurious correlation problem between pension income and labor force participation which arises from a postponement option in the German public pension system: in Germany it is possible to postpone receipt of

all or parts of one's public old age pension beyond age 65 in order to increase future pension payments.[29] The mechanism is independent of whether the retiree chooses to work during the delay or not. Nevertheless, retirees that make use of this option are more likely to work: they can further increase their future pensions continuing to contribute to the retirement insurance. In addition, they have to meet the budget constraint of the given period without pension income. A negative correlation between the currently observed pension income and the probability to work appears as retirees who postpone benefits have lower or no public pension income in the given period and a higher probability to work. For these retirees, the causality between labor force participation and pension income is reversed: the decision to work (and postpone) negatively affects their current level of pension income.

In the GSOEP, there is no direct information on whether retirees postpone benefits. Nevertheless, we have taken into account the postponement option when specifying the variable *pension income*: it does not contain the retiree's current public pension income, which could be affected by the current participation status, but instead it holds the maximum of the retiree's public pension income over time (c.f. footnote 17). In this robustness check, we exclude retirees whom we suspect to postpone benefits from the public pension system. More precisely, departing from our initial sample of retirees that receive *any* old age pension, we entirely drop retirees who did not receive a *public* old age pension or whose *public* pension payments rose by more than a third from one year to another between 2002 and 2009.[30] 215 retirees with 1,988 observations are excluded. As expected, the participation rate in the excluded group is with 15 percent considerably higher than in the full sample. In contrast, the probability to work in the sample with full public pension income is only 1.8

[29] The postponement increases a retiree's future pension payments through a more favorable adjustment factor and a smaller tax burden. The smaller tax burden was, however, only relevant before the retirement income law came into effect in 2005. For a detailed description on how to calculate pension entitlements see Börsch-Supan and Wilke (2006).

[30] When only part of the public pension is postponed, retirees receive at least one third of their regular pension payments.

percent. Thus, we lose almost half of the working retirees. The regression results of the financial variables for the restricted sample are given in column one of Table 6. Comparing these results with those of the full sample in Table 4, column one, we find that the coefficients of the income variables are similar. The negative correlation between pension income and labor force participation therefore has not been driven by retirees that delay the receipt of public pension and work in order to increase future pension income.

In a second robustness test, we check whether the effects of nonlabor income differ for retirees with a taxable nonlabor income below and above the tax exemption limit. This test is necessary because the negative correlation between the variables representing nonlabor income and the participation probability might not only reflect income effects but also disincentives from the tax system. While the participation decision should hinge on the current marginal net wage rate, for most of the retirees we can only observe gross wage rates before age 65. By omitting the marginal net wage rate, an additional negative correlation between nonlabor income and the participation probability might appear: retirees with high nonlabor income face higher marginal tax rates and lower marginal net wages and are therefore less inclined to work. The reverse relationship holds for retirees with low nonlabor income. If we omit the current marginal net wage rates in our analysis, the coefficients of *pension income* and *nonpension income* might be downward biased because they also depict the effect of the current marginal net wage rates.

To examine whether the effects of the income variables are affected by this kind of bias, we split the sample and compare the effects for retirees with a taxable nonlabor income below and above the German tax exemption limit of around 7800€. If the negative correlation between nonlabor income and the participation proabability is indeed driven by the omitted current net wage and tax rates, we would expect the correlations to be stronger in the sample of retirees with a taxable income above the tax exemption limit.

For the approximation of a retiree's monthly taxable nonlabor income, we considered that in Germany, old age pensions are only partly taxed and that the taxation of pension income was changed in 2005. Monthly taxable nonlabor income was calculated as the difference between net monthly income of a retiree's household on the one hand and the sum of monthly pension payments of the retiree's household and the retiree's own monthly labor earnings on the other hand. We then added a certain percentage of the household's monthly gross old age pension income depending on the year the observation was gathered and the retirees' age at first pension receipt.[31] Finally, we divided this amount by the number of household members.

In around 60 percent of the cases, the retiree's taxable income exceeds the tax exemption limit. The participation rate in the group above the exemption limit is slightly lower (3.4 percent) than in the group below the limit (3.7 percent).

Columns two and three of Table 6 provide estimation results for the two subgroups. Contrary to our expectations, the effects of the nonlabor variables are considerably stronger for retirees with a taxable income below the tax exemption limit. For those above the limit, the effects are not even significant. We conclude that the negative effects of the variables representing nonlabor income have not been driven by higher tax rates. Furthermore, the results suggest that financial incentives play a more important role in the labor supply decision of low income groups.[32]

10 Summary and Conclusion

We test the hypothesis that German retirees' labor supply is motivated by financial considerations and affected by nonlabor income using data from the German Socio-Economic

[31] Before 2005 the share of old age pension that was taxed depended on the retirees' age at first pension receipt. In 2005 deferred taxation of public old age pensions was introduced (*Alterseinkünftegesetz*): the share of public old age pension that was taxed was raised to 50 percent, independently of the retiree's age at first pension receipt. Furthermore, the share increases by 2 percentage points for new retirees every year until full taxation will be reached in 2040. The taxation of other sorts of old age pension continues to depend on the age at first pension receipt even after 2005.

[32] In this robustness check we divided the sample on the basis of the retirees' taxable income. We obtained comparable results when we divided the sample on the basis of the retirees' entire nonlabor income.

Panel (2002-2009). We model labor supply at the extensive margin using a linear probability model where pension income, nonpension income, and assets are the main explanatory variables. In order to control for taste for work and other sources of unobserved heterogeneity, a large set of variables is included which not only comprises the usual socio-economic control variables but also information on retirees' past career.

We find a highly significant negative relationship between nonlabor income and retirees' probability to work. The correlation is considerably stronger for men. A one percent increase in regular pension income, which depicts the effect of both current and future nonlabor income, is associated with a 0.01 percentage points higher probability to work for men. For women, this figure amounts to 0.006 percentage points. A one percent increase in current nonlabor income other than pension income is correlated with a 0.001 percentage points higher participation probability for men and women alike. These results are comparable to those of earlier studies on old age labor supply (e.g. Krueger and Pischke 1992). Comparing different subgroups, we find that the relationship between nonlabor income and labor supply does not depend on retirees' educational level or employment status before age 65. Furthermore, the relationship is only present for low income groups. We can infer that financial considerations play a significant part in the labor supply decision of retirees today. For some of them, labor earnings constitute a source of retirement income.

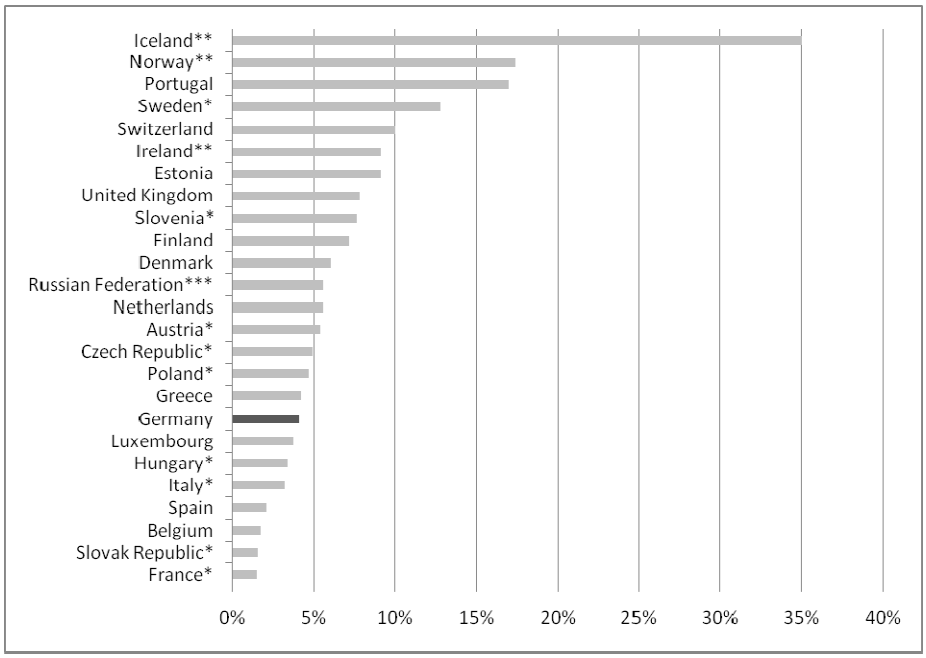
Our results are interesting against the background of the recent German pension reform process that aims at transferring the pay-as-you-go public pension system to a three-pillar-system of public, occupational, and private pensions. This transformation might inadvertently lead to the rise of a further pillar of retirement income: labor supply. We have shown that there is a strong negative relationship between pension income and the probability to work after retirement age. At the same time, the OECD estimates that the current German reform process in the public pension system will lead to a ten percent fall in public pension income

for future retired cohorts (OECD 2009a). According to our results, this would increase an average retirees' participation rate by around 4 percent, assuming, of course, retirees' behavior and additional pension and nonpension incomes remain unchanged.

A rise in retirees' participation rates becomes even more likely when we consider a further result of our analysis: the relationship between pension income and labor supply is particularly strong for low income groups. At the same time, other studies have shown that the level of additional private and occupational pension schemes is particularly low for this group (Börsch-Supan et al. 2007, Queisser et al. 2007, Corneo et al. 2009). Therefore a future rise in participation rates among retirees appears likely.

We conclude, however, on a positive note. We find that monetary incentives are also relevant for the labor supply of retirees with tertiary education. Higher participation also in the group of highly educated retirees should relieve the shortage of skilled workers in Germany (OECD 2010b) and other aging societies. Given rising life expectancy and better health conditions (BMFSFJ 2006), the group of working retirees can make a valuable contribution to the German workforce in the future.

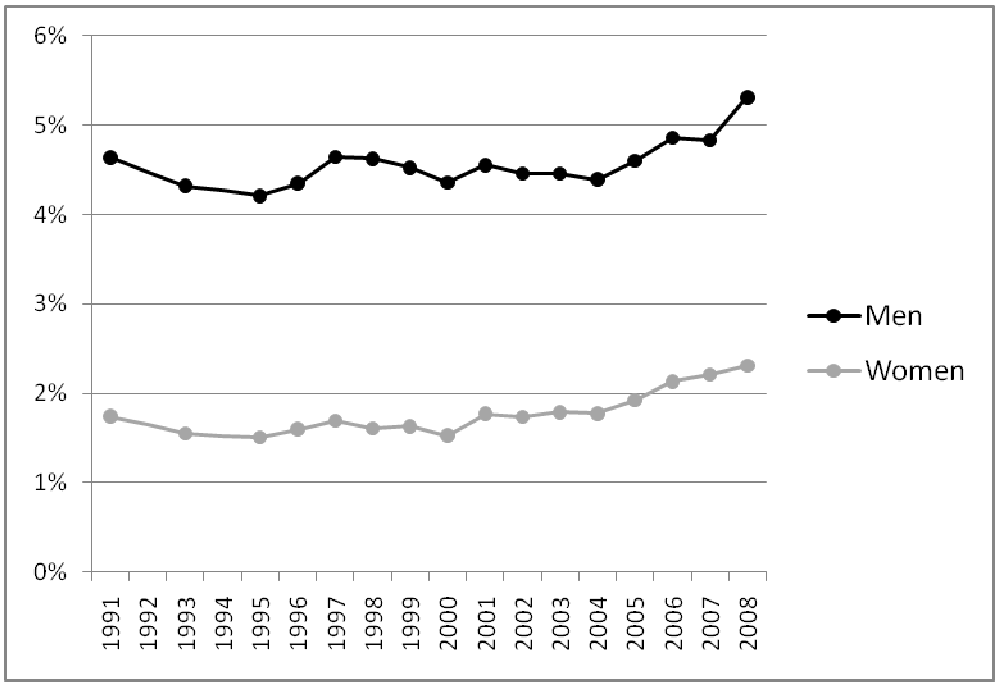
Figure 1: Labor force participation rate in age group 65 and above in 25 European countries 2009



Source: OECD (2010a).

Notes: Labor force participation is defined as working at least one hour a week. * and ** indicate normal retirement age below or above 65, respectively. *** indicate figures from 2008.

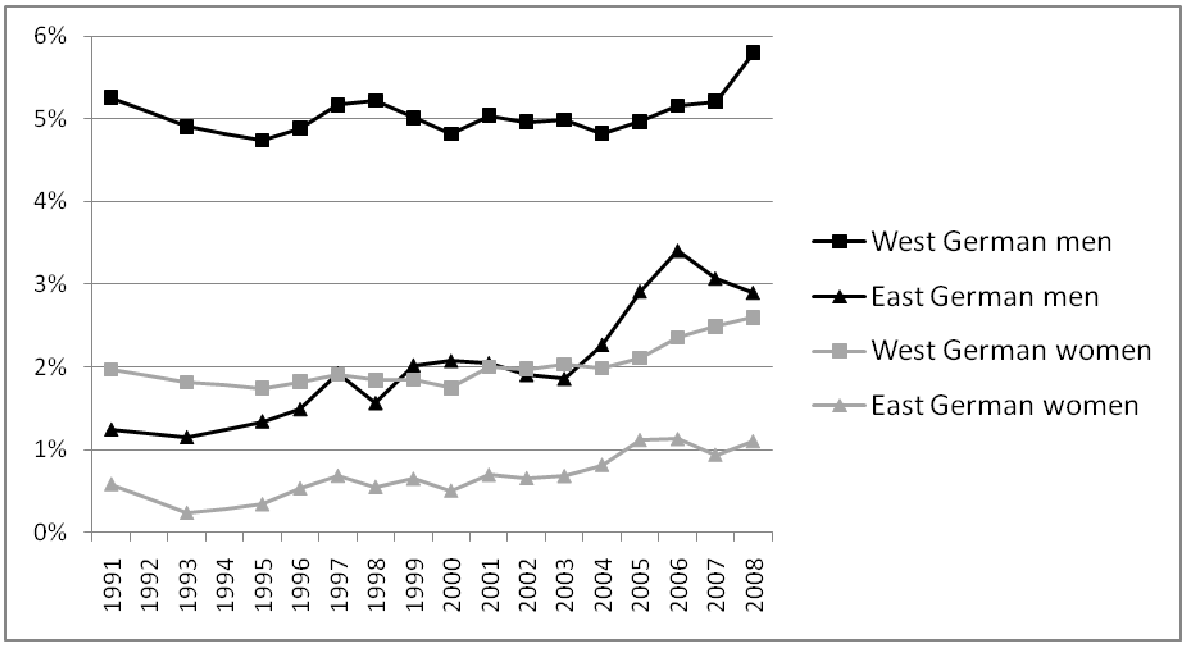
Figure 2: Labor force participation rate in age group 65 and above in Germany, by gender



Source: Own calculations based on the Mikrozensus (years 1991, 1993, and 1995-2008), unweighted data.

Note: Labor force participation is defined as working at least one hour a week.

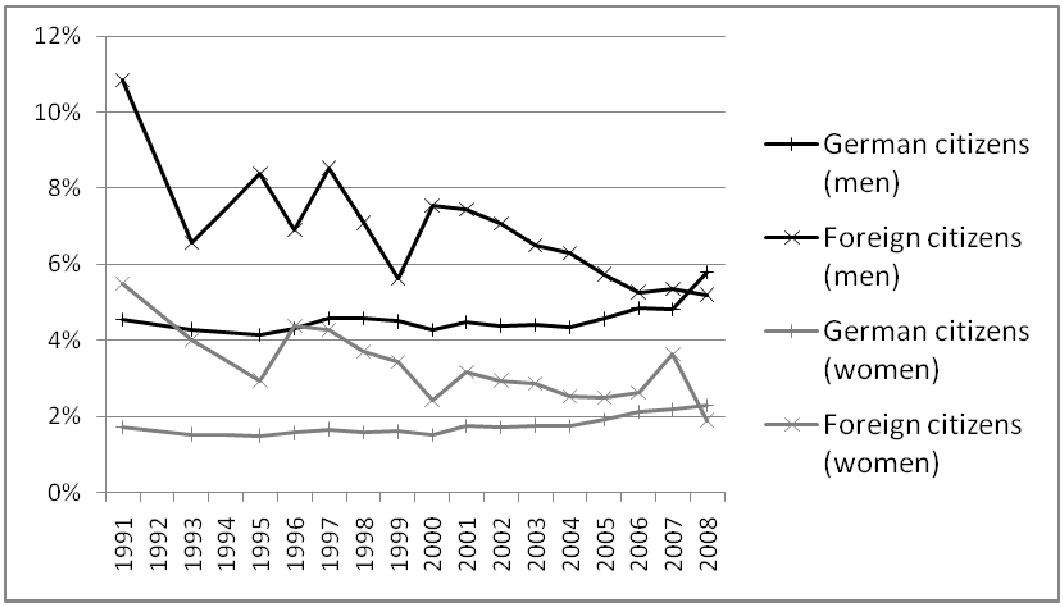
Figure 3: Labor force participation rate in age group 65 and above in Germany, by gender and region



Source: Own calculations based on the Mikrozensus (years 1991, 1993, and 1995-2008), unweighted data.

Note: Labor force participation is defined as working at least one hour a week.

Figure 4: Labor force participation rates in age group 65 and above in Germany, by gender and origin



Source: Own calculations based on the Mikrozensus (years 1991, 1993, and 1995-2008), unweighted data.

Note: Labor force participation is defined as working at least one hour a week.

Table 1: Descriptive statistics on characteristics of old age labor supply in Germany in 2008

	age group 65 and above	age group 55-64
Mean hours worked per week	24.16	36.00
Median hours worked per week	17.00	40.00
Employment status (percent distribution)		
white/ blue collar	38.98	74.00
self-employed	59.99	18.10
public servant	1.03	7.90
Occupation (percent distribution)		
Legislators, senior officials, and managers	14.00	7.56
Professionals	17.65	17.44
Technicians and associate professionals	12.60	20.25
Clerks	8.39	11.94
Service workers and shop and market sales workers	8.88	10.14
Skilled agricultural and fishery workers	5.07	2.38
Craft and related trades workers	9.12	12.31
Plant and machine operators and assemblers	6.02	7.41
Elementary occupations	18.29	10.53
Armed forces	0.00	0.05
Industry (percent distribution)		
Agriculture, forestry and fishing	3.08	3.08
Manufacturing	27.43	21.36
Wholesale, retail, hospitality, catering and transporting	21.45	26.36
Miscellaneous services	48.04	43.51

Source: Own calculations based on the Mikrozensus 2008.

Table 2: Distribution of gross nominal monthly labor income of working individuals in age group 65 and above (years 2002-2009)

Labor income	*N*	*Percent*
0 € - 500 €	941	40.32
501 € - 1,000 €	278	11.91
1,001 € - 1,500 €	192	8.23
1,501 € - 2,000 €	132	5.66
2,001 € - 2,500 €	131	5.61
2,501 € - 3,000 €	101	4.33
3,001 € - 3,500 €	90	3.86
3,501 € - 4,000 €	72	3.08
4,001 € - 4,500 €	65	2.78
4,501 € - 5,000 €	35	1.50
more than 5,000 €	297	12.72
Total	2,334	100

Source: Own calculations based on the GSOEP (waves 2002-2009).

Table 3: Descriptive statistics on the GSOEP sample by sex and working status

	Working		Not working		Working		Not working	
Variable	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*
Household real pension income (€)	2366.58	2365.70	2185.20	1284.81	1685.64	1339.55	1848.98	1196.68
Household real nonpension income (€)	1102.18	1800.80	575.81	1538.40	773.40	1295.32	541.10	1385.02
Household real value of assets in 1000€	171.25	511.78	71.17	345.83	67.17	172.74	51.16	237.35
Homeowner	0.74		0.58		0.59		0.50	
Number of household members	2.16	0.80	1.98	0.60	1.72	0.62	1.70	0.70
66 ≤ age ≤ 69	0.69		0.38		0.79		0.35	
70 ≤ age ≤ 74	0.23		0.34		0.16		0.30	
75 ≤ age ≤ 80	0.04		0.14		0.03		0.14	
age > 80	0.04		0.14		0.01		0.20	
Living in East Germany	0.18		0.30		0.12		0.29	
No German citizenship	0.04		0.05		0.05		0.03	
Marital status								
Married	0.86		0.81		0.57		0.52	
Widowed	0.05		0.13		0.27		0.35	
Divorced	0.08		0.05		0.15		0.08	
Single/ Missing	0.02		0.02		0.02		0.04	
Bad health status	0.13		0.32		0.20		0.38	
Education								
No secondary education/ Missing	0.06		0.09		0.06		0.08	
Middle secondary education	0.44		0.68		0.79		0.81	
Higher secondary education	0.02		0.03		0.03		0.03	
University degree	0.48		0.20		0.12		0.08	
Gross hourly real wage rate before age 65								
< 25th percentile	0.05		0.07		0.04		0.04	
> 25th and < 50th percentile	0.10		0.06		0.09		0.04	
> 50th and < 75th percentile	0.16		0.11		0.21		0.05	
> 75th percentile	0.68		0.20		0.67		0.13	
Not available	0.00		0.57		0.00		0.75	
Experience								
Experience full time (years)	40.64	7.28	38.49	7.02	20.61	16.03	20.86	14.90
Experience part time (years)	2.89	4.44	0.62	2.32	12.79	11.90	5.36	9.06
Experience unemployment (years)	0.57	1.62	0.78	1.86	0.58	1.62	0.63	1.95
Years since first pension payment	4.16	4.28	7.35	5.02	3.99	3.46	7.59	5.33
Last employment status before age 65								
Blue collar	0.16		0.21		0.26		0.11	
White collar	0.10		0.09		0.31		0.14	
High skilled white collar	0.16		0.09		0.02		0.02	
Farmer	0.00		0.01		0.00		0.00	
Self employed	0.26		0.04		0.20		0.02	
Not available	0.32		0.56		0.20		0.70	

Table 3 continued

	Men				Women			
	Working		Not working		Working		Not working	
Variable	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*
Satisfaction with last job before age 65								
Very low	0.10		0.14		0.15		0.09	
Low	0.13		0.10		0.19		0.07	
High	0.21		0.10		0.24		0.06	
Very high	0.24		0.09		0.23		0.06	
Not available	0.32		0.57		0.18		0.71	
Frequency of voluntary work								
Never	0.40		0.46		0.47		0.50	
Rarely	0.08		0.06		0.06		0.04	
Every month	0.06		0.05		0.06		0.04	
Every week	0.11		0.06		0.08		0.04	
Missing	0.35		0.37		0.33		0.38	
Working partner	0.36		0.09		0.26		0.05	
Number of observations:	665 (4.97%)		12,705 (95.0%)		386 (2.4%)		15,941 (97.6%)	
Number of retirees:	2,751				3,276			

Source: Own calculations based on the GSOEP (waves 2002-2009).

Note: The gross wage indicators refer to the quartiles of the sex-specific deflated wage distributions in the sample. The quartiles are 14€, 21€, and 30€ for women and 19€, 30€ and 46€ for men.

Table 4: Regression results from linear probability models with dependent variable *labor force participation (0/1)* for the pooled, male, and female sample, respectively

Variables	Pooled	Men	Women
Log (Household real pension income)	-0.0118***	-0.0168**	-0.0064*
	(0.0037)	(0.0080)	(0.0034)
Log (Household real nonpension income)	-0.0010***	-0.0013***	-0.0009***
	(0.0003)	(0.0005)	(0.0003)
Log (Household real value of assets)/1000	0.0002	0.0009**	-0.0005*
	(0.0002)	(0.0004)	(0.0003)
Homeowner	0.0027	0.0099	-0.0009
	(0.0038)	(0.0061)	(0.0045)
66 ≤ age ≤ 69	Ref.	Ref.	Ref.
70 ≤ age ≤ 74	-0.0180***	-0.0267***	-0.0157***
	(0.0035)	(0.0061)	(0.0037)
75 ≤ age ≤ 80	-0.0248***	-0.0428***	-0.0163***
	(0.0043)	(0.0087)	(0.0037)
age > 80	-0.0124***	-0.0203**	-0.0100***
	(0.0048)	(0.0101)	(0.0037)
East German household	-0.0092**	-0.0114	-0.0034
	(0.0042)	(0.0075)	(0.0041)
No German citizenship	-0.0096	-0.0079	-0.0099
	(0.0124)	(0.0171)	(0.0177)
Male	0.0054		
	(0.0042)		
Number of household members	0.0038	0.0075	0.0013
	(0.0036)	(0.0067)	(0.0033)
No secondary education/ Missing	0.0046	0.0184	-0.0078
	(0.0103)	(0.0172)	(0.0094)
Middle secondary education	Ref.	Ref.	Ref.
Higher secondary education	-0.0118	-0.0127	-0.0064
	(0.0072)	(0.0125)	(0.0090)
University degree	0.0374***	0.0515***	0.0051
	(0.0076)	(0.0109)	(0.0075)
Married	Ref.	Ref.	Ref.
Widowed	0.0075	0.0003	0.0091*
	(0.0049)	(0.0098)	(0.0050)

Table 4 continued

Divorced	0.0153*	0.0132	0.0175*
	(0.0086)	(0.0159)	(0.0100)
Single/ Missing	-0.0026	0.0141	-0.001
	(0.0069)	(0.0140)	(0.0069)
Bad health status	-0.0073***	-0.0111**	-0.0034
	(0.0026)	(0.0047)	(0.0029)
Gross hourly wage rate before age 65			
< 25th percentile	Ref.	Ref.	Ref.
> 25th and < 50th percentile	0.0362**	0.0237	0.0359**
	(0.0151)	(0.0222)	(0.0171)
> 50th and < 75th percentile	0.0510***	0.0144	0.0882***
	(0.0150)	(0.0202)	(0.0219)
> 75th percentile	0.0773***	0.0528**	0.0894***
	(0.0142)	(0.0214)	(0.0172)
Not available	-0.0831***	-0.1187***	-0.0400***
	(0.0125)	(0.0211)	(0.0133)
Experience full time	0.0003*	0.0018***	0
	(0.0002)	(0.0005)	(0.0002)
Experience part time	0.0019***	0.0132***	0.0010***
	(0.0003)	(0.0029)	(0.0003)
Experience unemployment	-0.0001	0.0003	-0.0009
	(0.0008)	(0.0015)	(0.0008)
Years since first pension payment	-0.0023***	-0.0025***	-0.0021***
	(0.0004)	(0.0008)	(0.0004)
Last employment status before 65			
Blue collar	Ref.	Ref.	Ref.
White collar	-0.0163*	-0.012	-0.0217
	(0.0094)	(0.0126)	(0.0142)
High skilled white collar	-0.013	-0.0071	-0.0223
	(0.0141)	(0.0168)	(0.0199)

Table 4 continued

Farmer	-0.0059	-0.0373	0.0117
	(0.0170)	(0.0314)	(0.0140)
Self employed	0.1336***	0.1430***	0.1093***
	(0.0230)	(0.0315)	(0.0303)
Not available	0.0582***	0.1114***	0.0187
	(0.0117)	(0.0241)	(0.0129)
Satisfaction with last job before age 65			
Very low	Ref.	Ref.	Ref.
Low	0.003	0.0048	-0.0013
	(0.0105)	(0.0141)	(0.0149)
High	0.0291***	0.0216	0.0303*
	(0.0112)	(0.0146)	(0.0169)
Very high	0.0389***	0.0486***	0.0255
	(0.0122)	(0.0176)	(0.0156)
Not available	0.0339***	0.0069	0.0299***
	(0.0090)	(0.0182)	(0.0095)
Working partner	0.0780***	0.0755***	0.0713***
	(0.0112)	(0.0149)	(0.0159)
Frequency of voluntary work			
Never	Ref.	Ref.	Ref.
Rarely	-0.0017	-0.0067	0.002
	(0.0065)	(0.0099)	(0.0081)
Every month	-0.0051	-0.0135	0.0031
	(0.0069)	(0.0101)	(0.0087)
Every week	0.0042	0.0008	0.0044
	(0.0088)	(0.0128)	(0.0102)
Missing	-0.0384***	-0.0580***	-0.0285***
	(0.0070)	(0.0125)	(0.0076)
Number of observations:	29,697	13,370	16,327
Number of retirees:	6,027	2,751	3,276
Adjusted R^2:	0.16	0.20	0.13

Source: Own calculations based on the GSOEP (waves 2002-2009).

Note: The table presents estimated coefficients and robust standard errors in parentheses. ***, **, and * indicate statistical significance at the 1, 5, and 10 percent level. The models include year fixed effects.

Table 5: Regression results for men from a linear probability model with dependent variable *labor force participation (0/1)*, allowing for differences across subgroups

	University degree vs. no university degree		Self-employed vs. not self-employed before age 65	
Variable	Main Effects	Interaction effects for *university degree*	Main effects	Interaction effects for s*elf-employed before age 65*
Log (Household real pension income)	-0.0214**	0.0269	-0.0133*	-0.0097
	(0.0090)	(0.0254)	(0.0073)	(0.0495)
Log (Household real nonpension income)	-0.0009**	-0.0023	-0.0006	-0.0045
	(0.0005)	(0.0016)	(0.0004)	(0.0039)
Log (Household real value of assets)/1000	0.0010**	-0.0004	0.0005	0.0044
	(0.0004)	(0.0013)	(0.0004)	(0.0033)
Number of observations:	13,370		13,370	
Number of retirees:	2,751		2,751	
Adjusted R^2:	0.23		0.24	

Source: Own calculations based on the GSOEP (waves 2002-2009).

Note: The table presents estimated coefficients and robust standard errors in parentheses. ***, **, and * indicate statistical significance at the 1, 5, and 10 percent level. The models include all explanatory variables used in the baseline specification in Table 3 as well as interaction terms between all these explanatory variables and the indicator variable for the respective subgroup.

Table 6: Regression results from a linear probability model with dependent variable *labor force participation (0/1)* for different subgroups

Variables	Full public pensions	Taxable income below tax exemption limit	Taxable income above tax exemption limit
Log (Household real pension income)	-0.0131***	-0.0241**	-0.0024
	(0.0038)	(0.0097)	(0.0033)
Log (Household real nonpension income)	-0.0008***	-0.0010**	-0.0004
	(0.0003)	(0.0005)	(0.0004)
Log (Household real value of assets)/1000	0.0001	0.0005	0.0001
	(0.0002)	(0.0004)	(0.0003)
Number of observations:	27,709	11,514	18,183
Number of retirees:	6,208		
Adjusted R^2:	0.14	0.17	0.16

Source: Own calculations based on the GSOEP (waves 2002-2009).

Note: The table presents estimated coefficients and robust standard errors in parentheses. ***, **, and * indicate statistical significance at the 1, 5, and 10 percent level. The models include the same explanatory variables as the baseline specification in Table 3.

Literature

Benz, M. and B. Frey (2008), 'The value of doing what you like: Evidence from the self-employed in 23 countries', *Journal of Economic Behavior and Organization 68 (3-4)*, 445-455.

Blau, D. and R. Riphahn (1999), 'Labor Force Transitions of Older Married Couples in Germany', *Labour Economics 6 (2)*, 229-251.

Blundell, R. and T. MaCurdy (1999), 'Labor Supply: A Review of Alternative Approaches', in: O. Ashenfelter and R. Layard (eds.), *Handbook of Labor Economics Vol. 3*, Elsevier, Amsterdam, pp. 1559-1695.

Boal W. and M. Ransom (1997), 'Monopsony in the labor market', *Journal of Economic Literature 35 (1)*, 86-112.

Börsch-Supan, A. and C. Wilke (2006), 'The German Public Pension System: How it will Become an NDC System Look-Alike', in: R. Holzmann and E. Palmer (eds.), *Pension Reform: Issues and prospects for non-financial defined contribution (NDC) schemes*, World Bank, Washington DC, pp. 573-610.

Börsch-Supan, A., A. Reil-Held, and D. Schunk (2007), 'The Savings Behavior of German Households: First experiences with state promoted private pensions', *MEA Working Paper Nr. 136-2007*, Mannheim Research Institute for the Economics of Aging, Mannheim.

Brown, J., C. Coile, and S. Weisbenner (2010), 'The Effect of Inheritance Receipt on Retirement', *The Review of Economics and Statistics 92 (2)*, 425-434.

Bundesministerium für Familie, Senioren, Frauen und Jugend (2006), *5. Bericht zur Lage der älteren Generation in der Bundesrepublik Deutschland*, Druck Vogt GmbH, Berlin.

Corneo, G., M. Keese, and C. Schröder (2009), 'The Riester Scheme and Private Savings: An empirical analysis based on the German SOEP', *Schmollers Jahrbuch 129 (2)*, 321-322.

Coronado, J. and M. Perozek (2003), 'Wealth Effects and the Consumption of Leisure: Retirement Decisions During the Stock Market Boom in the 1990s', *Board of Governors of the Federal Reserve System, Finance and Economics Discussion Series*, 2003-2020.

Eakin, D., D. Joulfaian, and H. Rosen (1994), 'The Carnegie Conjecture: Some Empirical Evidence', *The Quarterly Journal of Economics 108 (2)*, 413-435.

Haisken-DeNew, J. and J. Frick (2005), *Desktop Companion to the German Socio-Economic Panel (SOEP)*, DIW, Berlin.

Hamilton, B. (2000), 'Does Entrepreneurship Pay? An Empirical Analysis of Returns to Self-Employment', *Journal of Political Economy 108 (3)*, 604-632.

Henley, A. (2004), 'House Price Shocks, Windfall Gains and Hours of Work: British Evidence', *Oxford Bulletin of Economics and Statistics 66 (4)*, 439-456.

Krueger, A. and J. Pischke (1992), 'The Effect of Social Security on Labor Supply: A Cohort Analysis of the Notch Generation', *Journal of Labor Economics 10 (4)*, 412-437.

Joulfaian, D. and M. Wilhelm (1994), 'Inheritance and labor supply', *The Journal of Human Resources 29 (4)*, 1205-1234.

Lahey, K., D. Kim, and M. Newman (2006), 'Full retirement? An examination of factors that influence the decision to return to work', *Financial Services Review 15 (1)*, 1-19.

Maestas, N. (2010), 'Back to Work: Expectations and Realizations of Work after Retirement', *Journal of Human Resources 45 (3)*, 718-748.

OECD (2009a), *Pensions at a Glance 2009: Retirement-Income Systems in OECD Countries*, OECD, Paris.

OECD (2009b), *Society at a Glance 2009: OECD Social Indicators*, OECD, Paris.

OECD (2010a), OECD.Stat Extracts, Accessed [11 Aug 2010], URL: http://stats.oecd.org/Index.aspx?DatasetCode=LFS_SEXAGE_I_R.

OECD (2010b), *Policy Brief: Economic Survey of Germany*, OECD, Paris.

Pencavel, J. (1986), 'Labor supply of men: a survey', in: O. Ashenfelter and R. Layard (eds.), *Handbook of Labor Economics Vol. 1*, Elsevier, Amsterdam, pp. 3-102.

Queisser, M., E. Whitehouse, and P. Whiteford (2007), 'The public–private pension mix in OECD countries', *Industrial Relations Journal 38 (6)*, 542-568.

Ruhm, C. (1990), 'Bridge Jobs and Partial Retirement', *Journal of Labor Economics 8 (4)*, 482-501.

Schmidt, L. and P. Sevak (2009), 'Taxes, Wages, and the Labor Supply of Older Americans', *Research on Aging 31 (2)*, 207-232.

Smith, J. (1980), 'Assets and Labor Supply', in: J. Smith (ed.), *Female Labor Supply: Theory and Estimation*, Princeton University Press, New York, pp. 166-205.

TNS Infratest Sozialforschung (2007), *Altersvorsorge in Deutschland (AVID) 2005: Alterseinkommen und Biografie*, Deutsche Rentenversicherung und Bundesministerium für Arbeit und Soziales, Berlin.