Do Catholic women with non-smoking husbands earn less in a second job?

–

Assorted topics in empirical labor economics

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List of Acronyms

2SLS	Two-stage Least Squares
3SLS	Three-stage Least Squares
AFQT	Armed Forces Qualifying Test
ALMP	Active Labor Market Policies
BHPS	British Household Panel Survey
CMLE	Conditional Maximum Likelihood Estimator
CPS	Current Population Survey
DIW	Deutsches Institut für Wirtschaftsforschung
FE	Fixed Effects Model
GLS	Generalized Least Squares
GMM	Generalized Methods of Moments
GSOEP	German Socio-Economic Panel Study
ILO	International Labour Organisation
IV	Instrumental Variable
ISSP	International Social Survey Program
LM	Lagrange Multiplier
ML	Maximum Likelihood
Negbin	Negative Binomial Regression Model
NLSY	National Longitudinal Survey Youth Cohort
NORC	National organization for research
OECD	Organisation for Economic Co-Operation and Development
OLS	Ordinary Least Squares
PR	Pooled Regression
PSID	Panel Study of Income Dynamics
RE	Random Effects Model
SIPP	Survey of Income and Program Participation
WVS	World Value Surveys
ZUMA	Zentrum für Umfragen, Methoden und Analysen

1. Introduction

Empirical research on labor supply has always been one of the core topics in labor economics and, according to Pencavel (1999), who also gives a good overview of the historical development of this research, "… has become the most active area of all labor economics research".[1] In the last 20 years, the rapid increase in the literature of applied work then surely is caused and eased by the enhanced availability of cross-sectional and longitudinal micro datasets and in particular the progress in computing technology, leading to decreased costs (both in terms of hardware but mainly in terms of computing time) of applying multivariate statistical techniques to these data which then again stimulated the development of even more sophisticated statistical estimation methods.

Now, this thesis is in line with tradition insofar that it presents essays on applied labor supply topics, using a variety of micro datasets and running a rather large number of regressions. At first glance, however, the questions addressed here both seem not to be part of mainstream labor economics and furthermore seem not to have much in common: Following an introducing chapter on some of the econometric methods used in the studies, the second chapter explores the impact of religion on both individuals' economic attitudes and outcomes. The subsequent chapter examines differences in labor market behavior and outcomes between smokers and non-smokers. Thereafter, there is a chapter analyzing the determinants of moonlighting, i.e. secondary jobholding, in a comparative context. Besides the comparison of moonlighting in Germany and the UK, that chapter further presents an evaluation of a policy measure in Germany. In particular, the consequences of imposing social security payments on the so-called 'marginal employment' on secondary jobholding are studied.

Clearly, the respective issues of the three essays – religious behavior, health behavior and atypical employment – belong to rather disjointed areas. However, it is also clear that labor supply has many dimensions so that there are common aspects for all three topics. First, from a methodological point of view, the questions addressed all are analyzed with the set of econometric tools which labor economists typically apply to the data. In particular, most of the studies presented are based on longitudinal data, so that it is possible to apply panel estimators. This allows to account for the so-called individual heterogeneity and thus allows

[1] Pencavel (1999), p. 3.

to avoid possible biases in results when using cross-sectional data only.

Furthermore, referring to the more conceptual aspects there is also common ground. Some of the following analyses address gender related issues within questions of labor supply. Therefore, where relevant, either separate analyses for men and women (Chapter 4 on smoking behavior and Chapter 5 on secondary jobholding) or analyses of the impact of males on female labor supply are carried out (Chapter 3 on religion, section 2 and section 3). Besides that, some of the following analyses explore similar questions and therefore use similar dependent variables. In particular, Chapter 3, section 3 and Chapter 5, section 2 examine reduced form labor participation equations; Mincer-type earnings functions are estimated in Chapter 3, section 4 and Chapter 4, section 3.

Finally, another common aspect is that the topics addressed by and large are underresearched. This means that the analyses presented add to the literature in several ways, mainly by either exploring 'old questions' with 'new data' or, in the case of the studies of the earnings equations by applying a rather unfamiliar, though 'better' technique.

The thesis is organized as follows: Subsequently, Chapter 2 will briefly present the estimation techniques applied in those analyses that are based on panel data. Besides a short discussion of the estimators most often used in applied work, the random-effects model and the fixed-effects model, the Hausman-Taylor instrumental variable estimator is outlined. Although this estimator seems to be not well known, its application provides an alternative to the most severe shortcoming of the standard models, i.e. the 'all-or-nothing' assumption on whether individual-specific effects are assumed to be correlated with the regressors or not. In particular, the estimator suggests that there are subsets of time-invariant and time-varying regressors that both are correlated and uncorrelated with the individual-specific effects.

Chapter 3 presents analyses that might be placed within the fields of the 'Economics of Religion'. While this branch of research is a rather young scientific field, a growing number of contributions show that the economic approach is able to both explain individuals' religious behavior and, more of importance here, to use religious attitudes and behavior as a predictor of economic attitudes and behavior. Therefore, the analyses concentrate on both these latter aspects. First, using data from a cross-national survey (ISSP), it is examined in a rather explorative manner, whether denominational affiliation or religious belief affect

individuals' attitudes towards female labor supply, specified by individuals' attitudes towards mothers' employment and attitudes towards the traditional 'male-breadwinner' gender-role model (Chapter 3, section 2). Consequently, some further analysis is carried out in the same study using the male subsample of the data to examine whether the attitudes of husbands affect the employment participation of wives (still Chapter 3, section 2).

While the prior analysis is based on cross-sectional (though cross-national) data, the following section additionally uses panel data from the GSOEP. The study draws from both sociological and economic theories to explore in more detail the relationship between denonimational affiliation, religious belief and religious participation and the labor supply of married women in Germany (Chapter 3, section 3). The basic rationale here is that stricter or more hierarchical religions quite likely affect individuals' behavior in favor of the traditional gender role model and thus affecting female labor supply negatively. Prior evidence for that hypothesis exists for mainly the US. However, as the 'religious markets' in the US and Germany vary rather strongly, the analysis will explore whether the *a priori* reasoning will hold also for a more secular country like Germany.

All three indicators on religious behavior are also used in the subsequent section which presents an analysis of the impact of religion on the earnings of East and West German male workers (Chapter 3, section 4). Findings from the literature suggest for ambiguous effects of individuals' religion. Focusing on Christian religions, there is on the one hand evidence that religious believers may be averse to the lifetime accumulation of material wealth. On the other hand, the same behavior may, in the spirit of Max Weber's 'Protestant Work Ethic', be taken to be pleasing in the sight of God.

The latter section investigates whether membership to certain groups is associated with wage differentials. A similar approach is taken to examine whether there is a wage penalty for smokers (Chapter 4, section 3), a result that usually is found for the Northern-American labor markets. Among the theoretical reasons that are offered, prior studies argue that smokers may be individuals with higher time preference rates. Therefore, smokers might be less likely to invest in human capital which would consequently result in lower earnings. First, the analysis here examines whether there are earnings differentials for German smokers. Furthermore, (crude) tests for the theoretical reasoning is also provided.

However, before examining smokers' and non-smokers' labor market outcomes measured in earnings or wages, there is an analysis that addresses whether smokers may differ in another aspect of labor market behavior, namely absenteeism (Chapter 4, section 2). Again a

higher time preference rate may lead individuals to both smoke and show higher absence from work rates. The focus is again on the behavior and the outcomes of German workers. Therefore, GSOEP data are used in both sections which furthermore explore whether there are differences between males and females.

Chapter 5 then presents studies on secondary jobholding. First, a comparative analysis is carried out in section 5.2 that examines differences in the determinants of multiple jobholding. The countries studied are Germany and the UK, which belong to quite different regimes in terms of labor market regulations. One particular labor market restriction, hours-constraints, is one of the two more promiment arguments as to why workers should want to provide labor in more than one job. Given a more flexible labor market, like the British, it may therefore be argued that individuals do not face the need of holding a second job. However, besides this primary explanation there are further theoretical arguments which suggest that workers may not be hours-constrained to moonlight. For example, jobs may be complementary or one job may provide financial stability while the other offers non-monetary benefits. Both motives, the 'hours-constraints' motive and the 'heterogeneous-jobs' motive are examined with longitudinal data drawn from the BHPS and the GSOEP.

Finally, the subsequent section is devoted to the analysis of a change in the institutional framework in Germany and its consequences for secondary jobholding. That is, the 1999 reform of imposing social security payments on 'marginal employment' is evaluated.

The final chapter, Chapter 6, briefly summarizes the results from the empirical analyses again and presents some concluding remarks.

2. Panel estimation methods

2.1 Introduction and notation

In this chapter, techniques for panel or longitudinal data are briefly discussed.[1] As some of the following essays use the same estimation techniques, this section gives a short and general introduction one can later on refer to. Therefore, detailed repetitions of the methods can be avoided. However, only the techniques used more than once will be presented. Estimation methods that are applied only once will be illustrated in the particular section which allows for an undisturbed reading of the studies. Furthermore, extensions of the techniques that are necessary due to, for example, a different data structure will also be given only when needed.

The structure of this chapter is as follows: Subsequently, a short background to panel data is given and notation is established that is used in the presentation of the models. Thereafter, based on extensions to the pooled OLS estimator, the two most frequently used panel estimators for continuous dependent variables, the *random effects* estimator and the *fixed effects* estimator, are outlined. Followingly, the *Hausman-Taylor instrumental variable (IV)* estimator is presented which can be considered to be an estimator in between the fixed and random effects approach. The presentation of the estimators is followed by the outline of two statistical tests that can be used to decide on which estimator is the appropriate one to base the findings upon. In particular, both the Breusch-Pagan test tests for random effects and the Hausman test are presented, the latter being useful for the choice of either the random effects model, the fixed effects model or the Hausman-Taylor IV estimator. The chapter closes with the presentation of a model for panel data with binary dependent variables, the *fixed effects logit* estimator.

Panel data are repeated observations on the same set of cross-section units. While these methods can be employed for larger entities like, for instance, firms or regions, the units in the analyses here are all individuals. Typical sources of panel data are household surveys like e.g. the Panel Study of Income Dynamics (PSID) for the United States, the British Household Panel Survey (BHPS) or the German Socio-Economic Panel Study (GSOEP).[2] Persons who

[1] More details on panel data models and methods are provided by econometrics textbooks like Baltagi (2001), Greene (2003), Johnston and DiNardo (1997) or Verbeek (2000). The presentation of the models here draws heavily from these textbooks.

[2] For more information on the PSID see http://www.isr.umich.edu/src/psid/, information on the BHPS is given at

participate in one of these panel studies are re-interviewed on a yearly basis.[3] Therefore, the structure of panel data typically is that the number of cross-section units (N) is large and the number of time periods (T) over which individuals are observed is rather small. The use of time-series methods, i.e. when $n = 1$ and T is large, may hence be somewhat problematic. However, the techniques developed to address these short and wide data sets focus on cross-sectional variation, or heterogeneity.

The follow-up approach that is employed in the design of longitudinal data is the base for the fundamental advantage of panel data techniques. Using estimation methods for panel data, it is possible to control for the so-called unobservable individual heterogeneity.[4] The general idea behind this is that there are individual-specific characteristics that, on the one hand, are difficult or even impossible to observe or measure. On the other hand, it is assumed that those characteristics vary across individuals but are constant over time. One of the more typical examples for such an unobservable characteristic is the intelligence or the abilities of individuals. It is rather plausible that intelligence/abilities meets both underlying assumptions: It varies across individuals and it presumably is (more or less) constant over time. If intelligence/abilities or any other unobservable individual-specific characteristic is not taken into account in regression equations, results from, for example, OLS might be biased. In this latter case, the problem that emerges is simply one of missing or omitted regressors.

The panel estimators that are presented here, however, do control for unobservable individual heterogeneity. First, some notation is established:

y_{it} = the value of the dependent (continuous) variable[5] for cross-section individual i at time t where $i = 1, \ldots, n$ and $t = 1, \ldots, T$

X_{it}^{j} = the value of the jth explanatory variable for individual i at time t. There are K explanatory variables indexed by $j = 1, \ldots, K$.

The discussion of the models here is restricted to the case of *balanced* panels. That is, there is

http://www.iser.essex.ac.uk/bhps/index.php. The GSOEP is hosted by the GSOEP-group at the German Institute for Economic Research in Berlin (DIW), see http://www.diw.de/english/sop/index.html (all links October 2003).

[3] This refers to the ideal case. Survey non-response and the so-called panel attrition represent methodological challenges that are object of a large literature not further discussed here.

[4] The possibility to control for unobservable individual heterogeneity presumably is the most important benefit in the use of panel data. Baltagi (2001, 6-9) lists some more advantages as well as limitations.

[5] Regarding limited dependent variables, the presence of individual-specific effects in panel data complicates matters significantly. See section 2.8 in this chapter for an outline of the *fixed effects logit model* that can be used when the dependent variable is binary.

the same number of observations for each individual. The total number of observations thus is $n \cdot T$. Typically, the data are organized by decision units. Therefore,

$$\mathbf{y}_i = \begin{bmatrix} y_{i1} \\ y_{i2} \\ \vdots \\ y_{iT} \end{bmatrix} \qquad \mathbf{X}_i = \begin{bmatrix} X_{i1}^1 & X_{i1}^2 & \cdots & X_{i1}^K \\ X_{i2}^1 & X_{i2}^2 & \cdots & X_{i2}^K \\ \vdots & \vdots & \ddots & \vdots \\ X_{iT}^1 & X_{iT}^2 & \cdots & X_{iT}^K \end{bmatrix} \qquad \mathbf{e}_i = \begin{bmatrix} e_{i1} \\ e_{i2} \\ \vdots \\ e_{iT} \end{bmatrix} \tag{2.1}$$

where e_{it} is the error term for individual i at time t. Usually, the data are arranged to form

$$\mathbf{y} = \begin{bmatrix} y_1 \\ y_2 \\ \vdots \\ y_n \end{bmatrix} \qquad \mathbf{X} = \begin{bmatrix} \mathbf{X}_1 \\ \mathbf{X}_2 \\ \vdots \\ \mathbf{X}_n \end{bmatrix} \qquad \mathbf{e} = \begin{bmatrix} \mathbf{e}_1 \\ \mathbf{e}_2 \\ \vdots \\ \mathbf{e}_n \end{bmatrix} \tag{2.2}$$

where $\mathbf{y}$ is $nT \times 1$, $\mathbf{X}$ is $nT \times k$, and $\mathbf{e}$ is $nT \times 1$. The standard linear model can then be written as

$$\mathbf{y} = \mathbf{X}ß + \mathbf{e} \tag{2.3}$$

where $ß' = [b_1, b_2, \cdots, b_k]$.

All models that are presented subsequently are variants of the model given by (2.3). The differences between the models are mainly due to different assumptions about the error term $\mathbf{e}$.

2.2 The pooled OLS estimator

The simplest case of using longitudinal data arises from ignoring the panel structure of the data. Once the data are organized as given by equation (2.1) the model can be written as

$$y = \mathbf{X}ß + \mathbf{e}. \tag{2.4}$$

The simplicity of this model comes from the assumption about the error term: It is assumed that $e_{it} \sim iid(0, s^2)$. That is, for a given $\mathbf{X}$, there is no serial correlation between observations and, furthermore, errors are not heteroskedastic. Put differently, one assumes that an individual's observations over time are observations from different individuals. Such approach might be reasonable, for example, in cases when the size of cross-sectional samples is too small. However, ignoring the panel structure of the data by assuming that the error

terms are *iid* leads to results that are not appropriate in many cases. Still, as the assumptions about the disturbance meet those of the classic linear regression model, efficient estimation can be achieved using OLS. Let PR be an index corresponding to the pooled regression estimation, the least squares estimator can be derived just as in simple multiple linear regression models using cross-sectional data:

$$\hat{\boldsymbol{ß}}_{PR} = (\mathbf{X}'\mathbf{X})^{-1}\mathbf{X}'\mathbf{y} \tag{2.5}$$

The variance of the estimator is

$$Var(\hat{\boldsymbol{ß}}_{PR}) = s_e^{\,2}(\mathbf{X}'\mathbf{X})^{-1} \tag{2.6}$$

and $s_e^{\,2}$ can be estimated by

$$s_e^2 = \frac{1}{nT-K}\mathbf{e}'\mathbf{e} \tag{2.7}$$

where $\mathbf{e} = \mathbf{y} - \mathbf{X}\hat{\boldsymbol{ß}}_{PR}$.

However, in the presence of unobservable individual heterogeneity, the pooled OLS estimator quite likely will be biased. The following example will briefly illustrate the consequences. Consider the 'true' underlying model

$$\mathbf{y} = \mathbf{X}_1\boldsymbol{ß}_1 + \mathbf{X}_2\boldsymbol{ß}_2 + \mathbf{e} \tag{2.8}$$

Now, let $\mathbf{X}_2$ be unobservable. Therefore, the model is estimated taking into account $\mathbf{X}_1$ only. The familiar estimator for $\boldsymbol{ß}_1$ is:

$$\hat{\boldsymbol{ß}}_1 = (\mathbf{X}_1'\mathbf{X}_1)^{-1}\mathbf{X}_1'\mathbf{y} \tag{2.9}$$

The expected value of the estimator is given by:

$$E(\hat{\boldsymbol{ß}}_1) = E[\boldsymbol{ß}_1 + (\mathbf{X}_1'\mathbf{X}_1)^{-1}\mathbf{X}_1'\mathbf{X}_2\boldsymbol{ß}_2 + (\mathbf{X}_1'\mathbf{X}_1)^{-1}\mathbf{X}_1'\mathbf{e}] \tag{2.10}$$

However, assuming that $E(e_i|\mathbf{X}_1) = 0$ and given that $\boldsymbol{ß}_2 \neq 0$, which will presumably be the case, $\mathbf{X}_1'\mathbf{X}_2 \neq 0$:

$$E(\hat{\boldsymbol{ß}}_1) = \boldsymbol{ß}_1 + (\mathbf{X}_1'\mathbf{X}_1)^{-1}\mathbf{X}_1'\mathbf{X}_2\boldsymbol{ß}_2 \neq \boldsymbol{ß}_1 \tag{2.11}$$

The OLS estimator for $\boldsymbol{ß}_1$ will consequently be biased, although the direction of the bias *a priori* is not clear and has to rely on theoretical reasoning.

Nevertheless, and despite its potential biases, pooled OLS estimation is often used as starting point in applied analyses. Typically, its results are compared to results from models that are better suited for the analysis of panel data. The three models considered here are the random effects estimator, the fixed effects estimator as well as the Hausman-Taylor IV estimator. These are presented next. First, however, extensions to the simple model have to be introduced.

2.3 Extensions to the pooled OLS estimator

The following model is considered:

$$y_{it} = \mathbf{X}'_{it}\beta + e_{it} \tag{2.12}$$

where the structure of the error term is as follows:

$$e_{it} = \alpha_i + \eta_{it}. \tag{2.13}$$

That is, the disturbance term is decomposed in two parts: The second part, η_{it}, corresponds to the common stochastic error term in, for example, classical linear regression models. There are two explicit assumptions: First, η_{it} is assumed to be uncorrelated with $\mathbf{X}_{it}$ and it is furthermore assumed to vary unsystematically across individuals and time. In particular:

$$\begin{aligned} E(\eta_{it} \mid \mathbf{X}) &= 0 \\ E(\eta_{it}, \eta_{js} \mid \mathbf{X}) &= 0 \end{aligned} \tag{2.14}$$

for all $t \neq s$ or $i \neq j$.

The first part of the decomposed error term, α_i, is the so-called individual-specific effect. In contrast to the remaining disturbance the common assumption is that α_i varies across individuals but is constant over time. The crucial assumption that distinguishes the *fixed effects model* from the *random effects model* is whether α_i may or may not be correlated with the set of explanatory variables, $\mathbf{X}_{it}$:

- *random effects model*: α_i is uncorrelated with $\mathbf{X}_{it}$;
- *fixed effects model*: α_i is correlated with $\mathbf{X}_{it}$.

That is, in the fixed effects model, the a_i are assumed to be *n* unknown parameters that are to be estimated, while in the random effects case, the a_i are treated as drawings from a distribution with mean m and variance s_a^2 which are independent from the explanatory variables in $\mathbf{X}_{it}$. As will be shown later in this chapter, the Hausman-Taylor instrumental variable estimator provides an alternative to this 'all or nothing' approach regarding the correlation between the $\mathbf{X}_{it}$ and the a_i.

2.4 No correlation between individiual effects and covariates: The random effects model

Consider the following model:

$$y_{it} = \mathbf{X}'_{it}\beta + e_{it} \tag{2.15}$$

where $e_{it} = a_i + h_{it}$.

It is useful to be more explicit about the two parts of the error term (repeating and extending (2.14)):

$$\begin{aligned}
&E[h_{it} \mid \mathbf{X}] = E[a_i \mid \mathbf{X}] = 0, \\
&E[h_{it}^2 \mid \mathbf{X}] = s_h^2, \\
&E[a_i^2 \mid \mathbf{X}] = s_a^2, \\
&E[h_{it} a_i \mid \mathbf{X}] = 0 \text{ for all } i, t, \text{ and } j, \\
&E[h_{it} h_{js} \mid \mathbf{X}] = 0 \text{ if } t \neq s \text{ or } i \neq j, \\
&E[a_i a_j \mid \mathbf{X}] = 0 \text{ if } i \neq j.
\end{aligned} \tag{2.16}$$

Formulating the model in *T* observations for each unit *i*, it follows that, conditional on $\mathbf{X}$,

$$\begin{aligned}
E(e_{it}, e_{is}) &= E[(a_i + h_{it})(a_i + h_{is})] \\
&= E(a_i^2) + E(a_i, h_{is}) + E(h_{it}, a_i) + E(h_{it}, h_{is})
\end{aligned}$$

$$= \begin{cases} s_a^2 + s_h^2 & \text{for } t = s, \\ s_a^2 & \text{for } t \neq s, \\ 0 & \text{for all } t \text{ and } s \text{ if } i \neq j. \end{cases}$$

The error covariance of the disturbance term of each individual cross-section unit i is:

$$E[e_i e_i'] = s_h^2 \mathbf{I}_T + s_a^2 \mathbf{i}_T \mathbf{i}_T' = \begin{bmatrix} s_a^2 + s_h^2 & s_a^2 & \cdots & s_a^2 \\ s_a^2 & s_a^2 + s_h^2 & \cdots & s_a^2 \\ \vdots & \vdots & \ddots & \vdots \\ s_a^2 & s_a^2 & \cdots & s_a^2 + s_h^2 \end{bmatrix} \tag{2.17}$$

where $\mathbf{i}_T$ is a $T \times 1$ column vector of ones. Let $\mathbf{S} = E[e_i e_i' \mid \mathbf{X}]$ be the $T \times T$ matrix given in (2.17), the disturbance covariance matrix for the full nT observations then is

$$\mathbf{O} = \mathbf{I}_n \otimes \mathbf{S} = E[\mathbf{e}\mathbf{e}'] = \begin{bmatrix} \mathbf{S} & 0 & \cdots & 0 \\ 0 & \mathbf{S} & \cdots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \cdots & \mathbf{S} \end{bmatrix}. \tag{2.18}$$

For application of either the generalized least squares estimator (GLS) or feasible GLS, one needs to know the inverse of Ω, and, in particular, $\mathbf{O}^{-1/2} = \mathbf{I}_n \otimes \mathbf{S}^{-1/2}$. The block diagonality of $\mathbf{O}$ facilitates finding the inverse. One can focus on finding $\mathbf{S}^{-1/2}$, which is

$$\mathbf{S}^{-1/2} = \frac{1}{s_h}\left[\mathbf{I}_T - \left(\frac{1-q}{\mathbf{T}} \mathbf{i}_T \mathbf{i}_T'\right)\right],$$

where

$$q = \sqrt{\frac{s_h^2}{T s_a^2 + s_h^2}}. \tag{2.19}$$

Transforming $\mathbf{y}_i$ and $\mathbf{X}_i$ for GLS yields

$$\mathbf{O}^{-1/2}\mathbf{y}_i = \frac{1}{s_h}\begin{bmatrix} y_{i1} - q\bar{y}_{i\cdot} \\ y_{i2} - q\bar{y}_{i\cdot} \\ \vdots \\ y_{iT} - q\bar{y}_{i\cdot} \end{bmatrix} \tag{2.20}$$

and likewise for the rows of $\mathbf{X}_i$, where the ith term $\bar{y}_{i\cdot}$ is

$$\bar{y}_{i\cdot} = \frac{1}{T}\sum_{t=1}^{T} y_{it}$$

and $\overline{\mathbf{X}}_{i.}$ is defined similarly.

If the variance components s_h^2 and s_a^2 are known, GLS estimation can be applied without difficulty. However, this typically is not the case and estimates of the unknown variances are needed. Consistent estimators can be derived as the appropriately modified sum of squared errors from two different estimators, the so-called *between estimator* and the *within estimator*, which therefore will be presented briefly.

2.4.1 The between estimator

This estimator is quite intuitive insofar as one performs OLS on a 'collapsed' data set where all data are converted into individual specific averages $\overline{y}_{i.}$ and $\overline{\mathbf{X}}_{i.}$. The resulting *between estimator* is given by

$$\hat{ß}_B = (\mathbf{X}'\mathbf{P}_D\mathbf{X})^{-1}\mathbf{X}'\mathbf{P}_D\mathbf{y} \tag{2.21}$$

where $\mathbf{P}_D = \mathbf{D}(\mathbf{D}'\mathbf{D})^{-1}\mathbf{D}'$ and $\mathbf{D} = \mathbf{I}_n \otimes \mathbf{i}_T$, i.e. a $nT \times n$ matrix of n dummy variables corresponding to each cross-section unit, that is, each individual. Note that if OLS on the pooled sample is consistent, the between estimator $\hat{ß}_B$ is also consistent, though not efficient.

2.4.2 The within estimator

This estimator uses information that is not taken into account by the between estimator and is called within estimator as it uses only the variation *within* each cross-section unit. The data is premultiplied by a matrix $\mathbf{M}_D$, where $\mathbf{M}_D = \mathbf{I}_{nT} - \mathbf{D}(\mathbf{D}'\mathbf{D})^{-1}\mathbf{D}'$ and OLS is computed on the transformed data. The following estimator, the *within estimator*, then is

$$\begin{aligned}\hat{ß}_W &= \left[(\mathbf{M}_D\mathbf{X})'(\mathbf{M}_D\mathbf{X})\right]^{-1}(\mathbf{M}_D\mathbf{X})'(\mathbf{M}_D\mathbf{y}) \\ &= (\mathbf{X}'\mathbf{M}_D\mathbf{X})^{-1}\mathbf{X}'\mathbf{M}_D\mathbf{y}\end{aligned} \tag{2.22}$$

If the assumptions underlying the random effects model are correct, the within estimator $\hat{ß}_W$ is, alike the between estimator, consistent, but not efficient.

The unknown variance components s_h^2 and s_a^2 can now be computed as follows:

$$s_h^2 = \frac{1}{nT - nk - n}\hat{\mathbf{u}}_w'\hat{\mathbf{u}}_w$$

$$s_B^2 = \frac{\hat{\mathbf{u}}_B'\hat{\mathbf{u}}_B}{n-k}$$

$$s_a^2 = s_B^2 - \frac{s_h^2}{T}$$

where $\hat{\mathbf{u}}_w$ are the residuals from the within regression and $\hat{\mathbf{u}}_B$ are the residuals from the between regression. s_h^2 and s_a^2 can then be used to compute q as given by (2.19). After that, OLS can be performed on the transformed variables $\tilde{y}$ and $\tilde{\mathbf{X}}$ where

$$\tilde{y}_{it} = y_{it} - \bar{y}_{i\cdot} + \hat{q}\bar{y}_{i\cdot} \tag{2.23}$$

$$\tilde{\mathbf{X}}_{it} = \mathbf{X}_{it} - \overline{\mathbf{X}}_{i\cdot} + \hat{q}\overline{\mathbf{X}}_{i\cdot}. \tag{2.24}$$

Note that the random effects estimator reduces to the pooled OLS estimator when there is no uncorrelated individual-specific component of variance, i.e. $s_a^2 = 0$ and therefore $q = 1$.

2.5 Correlation between individiual effects and covariates: The fixed effects model

The within estimator that was needed in the random effects model to compute the unknown variance component s_h^2 is of importance again as it is one possible estimator for the fixed effects model. In contrast to the random effects case, the crucial assumption in the **f**ixed effects model is that $\text{cov}(\mathbf{X}_{it}, a_i) \neq 0$. The model must therefore be estimated *conditionally* on the presence of the fixed effects. Rewriting the model in (2.12) gives

$$y_{it} = \mathbf{X}_{it}'\boldsymbol{ß} + a_i + h_{it} \tag{2.25}$$

where the a_i are unknown parameters to be estimated.[6]

[6] Note that while the remaining parameters can be estimated consistently, there is no consistent estimation for a_i (Johnston and DiNardo, 1997).

The regression that is to be run is

$$\mathbf{y} = \mathbf{X}ß + \mathbf{D}a + ? \tag{2.26}$$

where, as above, $\mathbf{D}$ is the matrix that collects n dummy variables corresponding to each individual. Premultiplying the data by $\mathbf{M}_D$, the resulting *within estimator* is (repeating (2.22))

$$\hat{ß}_W = (\mathbf{X}'\mathbf{M}_D\mathbf{X})^{-1}\mathbf{X}'\mathbf{M}_D\mathbf{y}.$$

The particular advantage of the fixed effects model is the removal of the individual-specific heterogeneity which can be shown by an 'deviations-from-means' approach. Consider

$$\bar{y}_{i\cdot} = \bar{\mathbf{X}}_{i\cdot}'ß + \bar{a}_i + \bar{h}_{i\cdot}. \tag{2.27}$$

As the mean of the individual fixed effect a_i for individual i is a_i, Eqs. (2.25) and (2.27) can be differenced. This yields

$$y_{it} - \bar{y}_{i\cdot} = (\mathbf{X}_{it} - \bar{\mathbf{X}}_{i\cdot})'ß + (h_{it} - \bar{h}_{i\cdot}). \tag{2.28}$$

While unobservable heterogeneity is accounted for, there is a potential drawback insofar that the within estimator uses only the variation *within* an individual's set of observations. This might be problematic when there are time-invariant explaining variables, which is rather often the case in micro-econometric analyses. Consider, for example, an individual's time spent in education or vocational training. Once completed, this measure will not vary much over time, if at all. It therefore is associated with a_i and cannot be used in the regression. However, as will be shown below, the Hausman-Taylor IV estimator provides an opportunity to handle this potential problem.

The covariance matrix of the within estimator is

$$\text{var}(\hat{ß}_W) = s_h^2(\mathbf{X}'\mathbf{M}_D\mathbf{X})^{-1} \tag{2.29}$$

and can be estimated by computing

$$\hat{s}_h^2 = \frac{\mathbf{u}_w'\mathbf{u}_w}{nT - n - k}. \tag{2.30}$$

To sum up: The two estimators presented, the *random effects* estimator and the *fixed effects* estimator, both are models to handle the specific structure of longitudinal or panel data. That is, unobservable individual heterogeneity is taken into account by both models. The

distinction between the two models is whether the individual-specific time-invariant effects are correlated with the regressors or not. Furthermore, given that the random effects model is valid, the fixed effects estimator still produces consistent estimates of the identifiable parameters. As it often might be unlikely to believe that the individual-specific effects are uncorrelated with the relevant covariates, it is appealing to prefer the fixed effects estimator over the random effects estimator.

However, it has to be noted that there are also perils relying on the fixed effects model only. First, as pointed out, time-invariant variables cannot be used. This might be a limitation to a range of micro-econometric topics of interest like, for example, analyses on the returns of education. Furthermore, measurement error in $\mathbf{X}$ and endogenous changes in $\mathbf{X}$ might lead to biased results also with the fixed effects estimator.[7]

As a consequence, neither random effects nor fixed effects estimation might be appropriate and other, more sophisticated models, like IV estimation or GMM should be applied. Therefore, in addition to both random effects and fixed effects model which are standard in applied work and which are also used in some of the following studies, one of these more advanced methods, the Hausman-Taylor IV estimator presented followingly is also used.

2.6 Endogenous effects: The Hausman-Taylor instrumental variable (IV) estimator

As outlined, the crucial difference between the random effects model and the fixed effects model is based on assumptions about the correlation between the individual-specific effects and the set of regressors. There are two major shortcomings: First, the user is left to make an 'all or nothing' decision based on whether she assumes that there is correlation or not. Second, in cases where it is more reasonable to assume that the individual effects are related to the regressors, estimation of time-invariant explanatory variables is not possible. To overcome these shortcomings, Hausman and Taylor (1981) introduced a model where some of the explanatory variables are related to the a_i, while others are not. In particular, they

[7] For more details and consequences see Johnston and DiNardo (1997, pp. 399).

consider a model of the form:

$$y_{it} = \mathbf{X}_{it}\beta + \mathbf{Z}_i\gamma + \alpha_i + \varepsilon_{it} \tag{2.31}$$

where the $\mathbf{Z}_i$ are time-invariant covariates. In this formulation, all individual effects that are denoted as $\mathbf{Z}_i$ are observed. As in the panel models above, unobservable individual effects are contained in the person-specific random term, α_i. Hausman and Taylor suggested to split $\mathbf{X}$ and $\mathbf{Z}$ into two sets of variables: $\mathbf{X} = [\mathbf{X}_1;\mathbf{X}_2]$ and $\mathbf{Z} = [\mathbf{Z}_1;\mathbf{Z}_2]$. $\mathbf{X}_1$ is $n \times k_1$, $\mathbf{X}_2$ is $n \times k_2$, $\mathbf{Z}_1$ is $n \times g_1$, $\mathbf{Z}_2$ is $n \times g_2$ and $n = NT$.

The model then is

$$y_{it} = \mathbf{X}_{1it}\beta_1 + \mathbf{X}_{2it}\beta_2 + \mathbf{Z}_{1i}\gamma_1 + \mathbf{Z}_{2i}\gamma_2 + \alpha_i + \varepsilon_{it} \tag{2.32}$$

The distinguishing feature of this model is found in the assumptions on the correlation between the individual-specific effect, α_i, and the sets of time-varying and time-invariant regressors. In particular, four sets of *observed* variables are defined in this model:

$\mathbf{X}_{1it}$ is k_1 variables that are time-varying and uncorrelated with α_i,

$\mathbf{Z}_{1i}$ is g_1 variables that are time-invariant and uncorrelated with α_i,

$\mathbf{X}_{2it}$ is k_2 variables that are time-varying and correlated with α_i,

$\mathbf{Z}_{2i}$ is g_2 variables that are time-invariant and correlated with α_i.

There are the following assumptions about the random terms in the model:

$$\begin{aligned}
&E[\alpha_i] = E[\alpha_i \mid \mathbf{X}_{1it}, \mathbf{Z}_{1i}] = 0; \text{ however : } E[\alpha_i \mid \mathbf{X}_{2it}, \mathbf{Z}_{2i}] \neq 0, \\
&Var[\alpha_i \mid \mathbf{X}_{1it}, \mathbf{Z}_{1i}, \mathbf{X}_{2it}, \mathbf{Z}_{2i}] = \sigma_\alpha^2, \\
&Cov[\varepsilon_{it}, \alpha_i \mid \mathbf{X}_{1it}, \mathbf{Z}_{1i}, \mathbf{X}_{2it}, \mathbf{Z}_{2i}] = 0, \\
&Var[\varepsilon_{it} + \alpha_i \mid \mathbf{X}_{1it}, \mathbf{Z}_{1i}, \mathbf{X}_{2it}, \mathbf{Z}_{2i}] = \sigma^2 = \sigma_\varepsilon^2 + \sigma_\alpha^2, \\
&Corr[\varepsilon_{it} + \alpha_i, \varepsilon_{is} + \alpha_i \mid \mathbf{X}_{1it}, \mathbf{Z}_{1i}, \mathbf{X}_{2it}, \mathbf{Z}_{2i}] = \rho = \sigma_\alpha^2 / \sigma_\varepsilon^2 + \sigma_\alpha^2.
\end{aligned} \tag{2.33}$$

Under these assumptions, the fixed effects estimator will still result in consistent estimates for $\beta = (\beta_1', \beta_2')'$. However, the within transformation used in the fixed effects model will also sweep away both the individual effects, α_i, and, more vital here, the time-invariant covariates, $\mathbf{Z}_i$. Therefore, estimates of γ cannot be calculated using the fixed effects

estimator. Furthermore, it may not be efficient because $\mathbf{X}_{1it}$ is needlessly instrumented.

Hausman and Taylor propose an instrumental variable approach where the following variables are used as instruments: $\mathbf{X}_{1it}, \mathbf{Z}_{1i}$ and $\mathbf{X}_{2it} - \overline{\mathbf{X}}_{2i\cdot}, \overline{\mathbf{X}}_{1i\cdot}$. That is, the exogenous variables, i.e. the variables that are uncorrelated with m_i, serve as their own instruments. The time-varying endogenous variables, $\mathbf{X}_{2it}$, are instrumented by the deviation from individual means ($\mathbf{X}_{2it} - \overline{\mathbf{X}}_{2i\cdot}$), the time-invariant endogenous variables, $\mathbf{Z}_{2i}$, are instrumented by the individual average of $\mathbf{X}_{1it}$ ($\overline{\mathbf{X}}_{1i\cdot}$).

Given the minor role in the current empirical literature, the estimator seems not to be well known. Therefore, the strategy of the estimation is outlined in some more detail here. First, the familiar within transformation is applied to the data. The model (2.31) therefore reduces to

$$\tilde{y}_{it} = \tilde{\mathbf{X}}_{1it}\beta_1 + \tilde{\mathbf{X}}_{2it}\beta_2 + \tilde{n}_{it} \tag{2.34}$$

where $\tilde{y}_{it} = y_{it} - \bar{y}_{i\cdot}$ and $\bar{y}_{i\cdot} = \frac{1}{n}\sum_{t=1}^{T} y_{it}$; an analogous transformation is applied to $\mathbf{X}_{it}$ and n_{it}.

The resulting within estimators, $\hat{\beta}_{1w}$ and $\hat{\beta}_{2w}$, are consistent, but may not be efficient. Furthermore, note again that since $\tilde{\mathbf{Z}}_i = \mathbf{Z}_i - \overline{\mathbf{Z}}_{i\cdot} = 0$ and $\tilde{m}_i = m_i - \overline{m}_{i\cdot} = 0$, both $\mathbf{Z}_i$ and m_i are removed from the model. The **?** therefore are not estimable.

Next, the within residuals are obtained from the within estimator:

$$\tilde{d}_{it} = \tilde{y}_{it} - \tilde{\mathbf{X}}_{1it}\beta_{1w} - \tilde{\mathbf{X}}_{2it}\beta_{2w} \tag{2.35}$$

It is then possible to estimate the variance of the idiosyncratic error component, s_n^2, as

$$\hat{s}_n^2 = \frac{RSS}{N-n} \tag{2.36}$$

where *N* is the total number of observations and *RSS* is the residual sum of squares from the within regression.

To access intermediate, consistent estimates $?_1$ and $?_2$, the group means of the residuals, $\tilde{d}_{it}$, are then used as the dependent variable in an instrumental variable regression on $\mathbf{Z}_1$ and $\mathbf{Z}_2$,

where $\mathbf{Z}_1$ and $\mathbf{X}_1$ are the instruments. These estimates, $\hat{\gamma}_{1IV}$ and $\hat{\gamma}_{2IV}$, are needed to obtain an estimate of the variance of the random effect, σ_m^2. Define

$$s^2 = \frac{1}{N}\sum_{i=1}^{n}\sum_{t=1}^{T_i}\left(\frac{1}{T_i}\sum_{t=1}^{T_i}\hat{e}_i\right)^2 \tag{2.37}$$

with $\hat{e}_{it} = (y_{it} - \mathbf{X}_{1it}\hat{\boldsymbol{\beta}}_{1w} - \mathbf{X}_{2it}\hat{\boldsymbol{\beta}}_{2w} - \mathbf{Z}_{1it}\hat{g}_{1IV} - \mathbf{Z}_{2it}\hat{g}_{2IV})$.

In the case of balanced panels, Hausman and Taylor show that

$$\text{plim}_{n\to\infty} s^2 = T\sigma_m^2 + \sigma_n^2. \tag{2.38}$$

Given that the panel is unbalanced, it follows that

$$\text{plim}_{n\to\infty} s^2 = \overline{T}\sigma_m^2 + \sigma_n^2. \tag{2.39}$$

where $\overline{T} = \dfrac{n}{\sum_{i=1}^{n} 1/T_i}$.

From this estimator and the estimator of σ_n^2 in (2.36), it is possible to deduce

$$\hat{\sigma}_m^2 = \frac{(s^2 - \hat{\sigma}_n^2)}{\overline{T}}. \tag{2.40}$$

In order to run feasible GLS, a weight is needed. Therefore, define

$$\hat{q}_i = 1 - \sqrt{\left(\frac{\hat{\sigma}_n^2}{\hat{\sigma}_n^2 + T_i\hat{\sigma}_m^2}\right)}. \tag{2.41}$$

The next and final step is to perform the standard random effects GLS transformation on each of the variables. As the full set of the variables in the model can be written as $\mathbf{w}'_{it} = (\mathbf{X}'_{1it}, \mathbf{X}'_{2it}, \mathbf{Z}'_{1i}, \mathbf{Z}'_{2i})$, the transformed variables for GLS are

$$\mathbf{w}^{*'}_{it} = \mathbf{w}'_{it} - \hat{q}_i\overline{\mathbf{w}}_{i\cdot} \text{ and } y^*_{it} = y_{it} - \hat{q}_i\overline{y}_{i\cdot}. \tag{2.42}$$

Consider then a $nT \times (k_1 + k_2 + g_1 + k_1)$ matrix $\mathbf{V}$, where the rows consist of the instrumental variables $\mathbf{v}'_{it} = [(\mathbf{X}_{1it} - \overline{\mathbf{X}}_{1i\cdot})', (\mathbf{X}_{2it} - \overline{\mathbf{X}}_{2i\cdot})', \mathbf{Z}'_{1i}, \overline{\mathbf{X}}_{1i\cdot}]$. The instrumental variable estimator then is

$$(ß', ?')'_{IV} = [(\mathbf{W}^{*\prime}\mathbf{V})(\mathbf{V}'\mathbf{V})^{-1}(\mathbf{V}'\mathbf{W}^{*})]^{-1}(\mathbf{W}^{*\prime}\mathbf{V})(\mathbf{V}'\mathbf{V})^{-1}\mathbf{V}'\mathbf{y}^{*})] \quad (2.43)$$

This Hausman-Taylor instrumental variable estimator is consistent and efficient. Furthermore, a strong advantage of this approach is that no external instruments have to be used. While the subsequently proposed estimators of Amemiya and MaCurdy (1986) and Breusch, Mizon and Schmidt (1989) try to improve upon the efficieny of the HT-IV estimator, only this latter is used here as the underlying exogeneity assumptions are weaker.[8]

2.7 Two statistical tests for panel models

The preceding sections presented four estimators that can be applied to panel data. Clearly, the pooled OLS estimator is presented mainly because of its ease of use and because of its benchmark character in the empirical literature. However, as it does not account for unobservable individual heterogeneity, the more relevant models are the random effects and the fixed effects model, which are the two most prevalent estimators that are applied to longitudinal micro-data. Furthermore, improving on some of the shortcomings of these two models, the Hausman-Taylor instrumental variable estimator might also be applied.

However, this variety of methods leaves the question about which model to use. That question is answered in the next two subsections that present simple statistical tests. First, the Breusch-Pagan test for random effects is presented. This Lagrange-Multiplier test is a test on whether there are individual-specific effects. It can therefore be used to decide on whether to rely on the results from the pooled OLS estimator or, somewhat more likely when using panel data, whether random effects exist. Next, the Hausman test is shortly discussed. This test is a tool when having to decide on whether it is the fixed effects or the random effects model that is the more reliable one. Furthermore, although not presented here, the Hausman test can also be used for the decision on whether the HT-IV estimator is the more appropriate one to apply to the data.

[8] See Baltagi (2001) for a comparison of these three methods and the particular differences between the estimators.

2.7.1 The Breusch-Pagan test

This Lagrange-Multiplier test tests for the existence of individual heterogeneity, i.e. whether the pooled OLS is an appropriate model or not. It was developed by Breusch and Pagan (1980) and is based on the following statistical hypotheses:

$$H_0: \quad s_a^2 = 0,$$

$$H_1: \quad s_a^2 \neq 0.$$

Therefore, the null hypothesis, H_0, is the same as $Cor(e_{it}, e_{is}) = 0$ for $t \neq s$.

It is instructive to explore the following equation:

$$\sum_{i=1}^{n}\left[\sum_{t=1}^{T} e_{it}\right]^2 = \sum_{i=1}^{n}\sum_{t=1}^{T} e_{it}^2 + \sum_{i=1}^{n}\sum_{s\neq t} e_{is}e_{it} \; . \tag{2.44}$$

Assuming that the pooled OLS model is valid, the second term on the right hand side equals zero. The sum on the left hand side and the first term on the right hand side can easily be determined. Given that both terms are roughly equal, unobservable individual heterogeneity is not relevant.

The estimation of a pooled OLS regression is sufficient to compute the test-statistic. Let the estimated residuals e_{it} be an estimator for e_{it}, the test-statistic for the Breusch-Pagan test then is

$$LM_{BP} = \frac{nT}{2(T-1)}\left[\frac{\sum_{i=1}^{n}\left[\sum_{t=1}^{T} e_{it}\right]^2}{\sum_{i=1}^{n}\sum_{t=1}^{T} e_{it}^2} - 1\right]^2$$

$$= \frac{nT}{2(T-1)}\left[\frac{\sum_{i=1}^{n}(T\bar{e}_{i.})^2}{\sum_{i=1}^{n}\sum_{t=1}^{T} e_{it}^2} - 1\right]^2 \sim c_1^2 \tag{2.45}$$

Under the null hypothesis, LM_{BP} is distributed as chi-squared with one degree of freedom.

2.7.2 The Hausman test

As outlined, the salient distinction between the random effects model and fixed effects model is whether there is correlation between the a_i and the set of regressors. This distinction is sufficient to put up the Hausman test which is based on the following (verbal) hypotheses:

$H_0: a_i$ is uncorrelated with $\mathbf{X}$,

$H_1: a_i$ ist correlated with $\mathbf{X}$.

There now is a simple motivation for the development of an appropriate test-statistic:

- Under the null hypothesis, H_0, i.e. if the a_i are uncorrelated with the covariates $\mathbf{X}_{it}$, the random effects (GLS-)estimator ($\hat{\boldsymbol{\beta}}_{RE}$) is consistent and efficient; the fixed effects (within-)estimator ($\hat{\boldsymbol{\beta}}_{FE}$) is consistent, though not efficient.
- Under the alternative hypothesis, H_1, i.e. if the a_i are correlated with the explanatory variables $\mathbf{X}_{it}$, the fixed effects estimator is consistent and efficient but the random effects estimator is now inconsistent.

Therefore, under the null hypothesis, there should be no systematic differences between $\hat{\boldsymbol{\beta}}_{FE}$ und $\hat{\boldsymbol{\beta}}_{RE}$. The hypotheses can then be modified as follows:

$$H_0: \quad (\hat{\boldsymbol{\beta}}_{FE} - \hat{\boldsymbol{\beta}}_{RE}) = 0,$$

$$H_1: \quad (\hat{\boldsymbol{\beta}}_{FE} - \hat{\boldsymbol{\beta}}_{RE}) \neq 0.$$

The variance of both estimators is needed to compute the test-statistic. In general, the variance of the differences is:

$$Var(\hat{\boldsymbol{\beta}}_{FE} - \hat{\boldsymbol{\beta}}_{RE}) = Var(\hat{\boldsymbol{\beta}}_{FE}) + Var(\hat{\boldsymbol{\beta}}_{RE}) - Cov(\hat{\boldsymbol{\beta}}_{FE}, \hat{\boldsymbol{\beta}}_{RE}) - Cov(\hat{\boldsymbol{\beta}}_{FE}, \hat{\boldsymbol{\beta}}_{RE})'. \qquad (2.46)$$

The first two components on the right hand side are known from the estimations. The covariances, however, are unknown. Hausman (1978) showed that the covariance of an efficient estimator with its difference from an inefficient estimator is zero, which implies that

$$Cov[(\hat{\boldsymbol{\beta}}_{FE} - \hat{\boldsymbol{\beta}}_{RE}), \hat{\boldsymbol{\beta}}_{RE}] = Cov(\hat{\boldsymbol{\beta}}_{FE}, \hat{\boldsymbol{\beta}}_{RE}) - Var(\hat{\boldsymbol{\beta}}_{RE}) = 0. \qquad (2.47)$$

Therefore,

$$Cov(\hat{\boldsymbol{\beta}}_{FE}, \hat{\boldsymbol{\beta}}_{RE}) = Var(\hat{\boldsymbol{\beta}}_{RE}).$$

Using this result yields the required covariance matrix for the test:

$$Var(\hat{\beta}_{FE} - \hat{\beta}_{RE}) = Var(\hat{\beta}_{FE}) - Var(\hat{\beta}_{RE}) = \mathbf{S} . \quad (2.48)$$

$\mathbf{S}$ can be computed using the estimated covariance matrices from the within- and the GLS-estimation. The Hausman test-statistic then is:

$$HT = (\hat{\beta}_{FE} - \hat{\beta}_{RE})' \hat{\mathbf{S}}^{-1} (\hat{\beta}_{FE} - \hat{\beta}_{RE}) \sim c_K^2 . \quad (2.49)$$

Under the null hypothesis, *HT* is asymptotically distributed as chi-squared with *K* degrees of freedom.

2.8 A method for binary dependent variables: the fixed effects logit model

While all the above presented models for panel data deal with continuous dependent variables, the estimation of models for limited dependent variables complicates matters significantly. The reason is that correlations between different error terms typically complicate the likelihood functions of such models.

Similar to the cross-sectional case, panel models with limited dependent variables are formulated as follows:

$$y_{it}^* = \mathbf{X}_{it}' \beta + a_i + h_{it} \quad (2.50)$$

where y_{it}^* is a underlying latent variable representing, for example, tastes to work. However, such variables in general are not observable. In the case of a binary variable, one typically observes

$$y_{it} = \begin{cases} 1 & \text{if } y_{it}^* > 0 \\ 0 & \text{otherwise.} \end{cases}$$

Initially assuming that the error term h_{it} has a symmetric distribution function F(.) and is *iid* across individuals and time and independent of all $\mathbf{X}_{it}$, maximizing the resulting log-likelihood function suffers from the so-called 'incidental parameters problem' as the number

of parameters increases with the number of observations resulting in inconsistent estimators (Verbeek, 2000).[9]

An alternative strategy has been proposed by Chamberlain (1980) by using the conditional maximum likelihood. Accordingly, the likelihood function is considered conditional upon a set of statistics t_i that are 'minimal sufficient' for a_i. That is, conditional upon t_i, an individual's likelihood contribution does not depend upon a_i but still depends upon the other characteristics $ß$. Assuming that the dependent variable in question is a binary choice variable, the existence of a minimal sufficient statistic depends upon the functional form of F, i.e. the distribution of h_{it}. Let $f(y_{i1},\ldots,y_{iT},a_i,b)$ be the joint density function of $y_{i1},\ldots,y_{iT}$. The function hence depends upon a_i and $ß$. Given that there exists a sufficient statistic t_i, the joint density funtion no longer depends upon a_i: $f(y_{i1},\ldots,y_{iT}\mid t_i,a_i,ß) = f(y_{i1},\ldots,y_{iT}\mid t_i,ß)$. Based upon the latter term, the conditional maximum likelihood function can be maximized to get a consistent estimator of $ß$.

For nonlinear models, it has been shown that there exists no sufficient statistic for a_i for the probit model, i.e. there is no consistent estimator for a fixed effects probit model for fixed *T*. However, for the fixed effects logit model, i.e. assuming that the h_{it} are distributed independently logistic, $t_i = \bar{y}_i$ is such a minimal sufficient statistic for a_i. Consistent estimation is therefore possible by conditional maximum likelihood. In particular, the following probability model is considered:

$$P(y_{it}=1\mid \mathbf{X}_{it},a_i) = \frac{\exp(a_i + \mathbf{X}_{it}'ß)}{1+\exp(a_i + \mathbf{X}_{it}'ß)}. \tag{2.51}$$

As noted, this fixed effects model can be estimated by conditional maximum likelihood. Particularly, the probability of a sequence of outcomes (y_{i1}, …, y_{iT}), conditional to $\bar{y}_i = \sum_{t=1}^{T} y_{it}$

[9] This is, because the estimator relies on T_i increasing for the constant terms to be consistent. However, T_i is fixed and, furthermore, usually quite small. The estimators of the constant terms, a_i, therefore do not converge (Greene, 2003).

$$P(y_{it},\ldots,y_{iT} \mid \mathbf{X}_{it},\ldots,\mathbf{X}_{iT},\alpha_i,y_i) = \frac{\prod_{t=1}^{T}\exp(\mathbf{X}'_{it}\beta y_{it})}{\sum_{s\in S_i}\prod_{t=1}^{T}\exp(\mathbf{X}'_{it}\beta s_t)} \tag{2.52}$$

where S_i is the set of all possible combinations of y_i ones and $T - y_i$ zeros, is free of the incidental parameters, i.e. independent of α_i.

Similar to the perils of the fixed effects estimation in the case of continuous dependent variables, it should be noted that the fixed effects logit model also has its shortcomings. In particular, the conditional distribution of $y_{i1},\ldots,y_{iT}$ is degenerate if t_i (i.e. $\bar{y}_i$) = 0 or t_i = 1. Such individuals do not contribute to the conditional likelihood and should therefore be discarded from the estimation.[10] In other words, only those individuals that change status at least once are relevant for estimating β as their behavior would be captured by their individual effect α_i otherwise.

Like the standard random and fixed effects models, it is of relevance to test whether there is individual heterogeneity. If there would be no heterogeneity, the model could be estimated using the familiar logit estimator, i.e. by unconditional maximum likelihood. Testing for heterogeneity can again be done by a Hausman-specification test. The null hypothesis here is that there is homogeneity. That is

$$H_0: \quad \alpha_i = \alpha ,$$

$$H_1: \quad \alpha_i \neq \alpha .$$

Under the null hypothesis, H_0, both Chamberlain's conditional maximum likelihood estimator (CMLE) and the usual maximum likelihood (ML) estimator are consistent, but the CMLE is inefficient. Under the alternative hypothesis, H_1, the CMLE is consistent and efficient, but the unconditional ML estimator is inconsistent. The appropriate Hausman test can therefore be based on the following chi-squared statistic

$$H = (\hat{\beta}_{CML} - \hat{\beta}_{ML})'(Var[CML] - Var[ML])^{-1}(\hat{\beta}_{CML} - \hat{\beta}_{ML}) \sim \chi^2_K . \tag{2.53}$$

[10] In fact, this is often done automatically by appropriate statistical software packages like, in this case, STATA.

Under the null hypothesis, H is asymptotically distributed as chi-squared with K degrees of freedom. A large value will cast doubt on the null hypothesis, i.e. the existence of homogeneity.

3. Religion and economic outcomes

3.1 Introduction: The economists' view of religion

In this chapter, a variety of questions is analyzed that are associated with the field of the so-called 'Economics of Religion'. Several non-market situations have been addressed increasingly by economists in the last decades – sometimes entailing the accuse of the 'imperialism of economics'. However, individuals' religious behavior as subject of scientific research has long been neglected. Typically, this area of research is considered as rather esoteric by mainstream economists. This rather declining attitude is based on the perceivingly widespread assumption that faith in a superior order rests upon irrationality. According to this opinion, scientific research should be left to more traditional scholars like sociologists, psychologists if not theologians in the first place.

Nevertheless, Iannaccone (1998) shows in his extensive survey of work done in this field that the economic analysis of religion can offer valuable contributions when tackling to understand human behavior. Not only has previous research shown that religious behavior does not rest on 'primitive' thought, neurotic impulses and social conditioning (Iannaccone *et al.*, 1998) but that religious involvement furthermore influences a range of social and economic phenomena. Among the aspects explored, religious participation and its determinants is addressed more often. The seminal contribution here was made by Azzi and Ehrenberg (1975) who analyze church attendance in the US in a Becker-style allocation-of-time framework.[1]

While the origin of the 'Economics of Religion' might be attributed to the writings of Adam Smith, the study of Azzi and Ehrenberg has to be considered as the modern revival of economists' work on religion and individuals' religious behavior. However, the demand for religious products is only one of the strands of research that are subsumed to the 'Economics of Religion'. Besides religious participation, the economic analysis also covers the functioning of religious markets and religious bodies.[2] Overall, the basic message from this body of research is that 'home oeconomicus' and 'homo religiosus' are not mutually

[1] Among recent analyses are, e.g., Cameron (1999), Sawkins *et al*. (1997), Smith *et al*. (1998) or Heineck (2001).
[2] In particular, this strand addresses churches and other religious bodies and analyzes these institutions the way consultants analyzes firms and the potential to improve on efficiency or to stimulate growth. Still another strand is the so-called 'Religious Economics', a field of research that analyzes the structure of economies and economic policies from a religious perspective. There exists, for example, an established literature from the Islamic point of view on, amongst others, banking and accounting. For a general introduction to the 'Economics of Religion' see Iannaccone (1998) or, in Germany only, Schmidtchen (1999).

exclusive.

While a good deal of work has furthermore been done to explore Max Weber's famous hypothesis of the 'Protestant Work Ethic' (see, e.g., Blum and Dudley, 2001, Barro and McCleary, 2002 or Ekelund *et al*., 2002), the questions addressed in this chapter focus on the micro-level approach on the economic consequences of religion and religious behavior of individuals. Here, most of the research done so far examines more socio-economic or sociological issues like marital stability (Heaton and Pratt, 1990; Lehrer and Chiswick, 1993, Booth *et al*., 1995, Chinitz and Brown, 2001) or fertility (Lehrer, 1996).

Literature on economic outcomes, however, is scarce. Among the few analyses that exist, Berggren (1997) shows, using data for Sweden, that the higher the rate of Christians in a city, the lower the rate of non-payments of debts. Earnings and wage premiums respectively are found by Chiswick (1983) for American Jews, by Tomes (1985) for Canadian Jews and by Ewing (2000) for American Catholics. Steen (1996) concludes that both Jewish and Catholic men have significantly higher wages than men who are raised in other religious traditions. Lipford and Tollison (2002), using US state data on per capita income, apply simultaneous estimation techniques to examine the effects of religious participation on income and, vice versa, income on religious participation. Their findings support hypotheses that, on the one hand, religious participation reduces participants' incomes. High incomes, on the other hand, discourage religious participation.

Lehrer (1995) analyzes the labor supply of married women using US data. She draws from both economic and sociological theories to examine the impact of religion on women's decisions regarding the allocation of time between home and labor market. Her findings support the hypothesis that religion affects female time allocation decisions.

The following analyses add to the existing literature on the effects of religion on individuals' economic outcomes in several ways. First, two of the three following studies use survey data from Germany. As most of the existing literature explores North-American data, this opens the possibility of transnational and -continental comparisons. Such is of interest as there are huge differences in the structure of religious markets between, for example, the US and Germany. On the one hand, in the US, there is a variety of strongly competing religious bodies (Lindner, 2003). The German religious market, on the other hand, is dominated by the Roman Catholic Church and the Evangelical Church in Germany, i.e. mainline Protestants. Adherents of these two religious bodies together account for almost two thirds of the German population. Furthermore, and additional to the overall secular trends in the last decades, the

eastern and western parts of Germany have experienced different developments concerning the societal role of religion prior to the reunification in 1990. While there is evidence of a recovery of religiosity in most post-communist countries (Barro and McCleary, 2002), East Germany is exceptional insofar that the majority of the population neither has a denominational affiliation nor believes in God (Pollack and Pickel, 1999).

Besides the re-examinations of existing work with different data there furthermore are methodological advantages of some of the following studies. In contrast to the mostly cross-secional analyses done yet, longitudinal data are used as well so that panel analyses can be carried out. As pointed out in the chapter on econometric methods for panel data, results from cross-sectional analyses might be biased in the presence of unobservable individual heterogeneity. Therefore, applying panel estimators might help to remove such potential bias and to make statistical inferences more reliable.

Three studies are carried out followingly: The next section, 3.2, presents a cross-national study on the impact of religion on individuals' attitudes towards female or mothers' labor market participation and, using a sub-sample of employed married males, whether those attitudes affect wives' employment. This latter aspect is explored in more detail by additionally using panel data in section 3.3, presenting analyses on the impact of religion on the labor supply of married women in Germany. This is followed by the analysis of the relationship between religion and male earnings in Germany in section 3.4. Concluding remarks on the economic outcomes of religion are given in section 3.5.

3.2 Religion, attitudes towards mothers' labor participation and wives' employment

In the economic and sociological literature, there is considerable concern about the rise in women's participation in paid employment in the last decades. There exists extensive research both theoretically and empirically. However, there are only a few studies tackling the substantial variation in female employment across countries. This, among other reasons, is certainly due to the lack of comparable data in early years. In the last ten to twenty years, however, a few databases have been established and successfully implemented that ease inter-country analyses. It is since possible to examine factors that influence the labor participation decision of women controlling for differences in welfare state regimes across countries. These

regimes include, for example, institutional settings like family taxation, child allowances or the availability of state provided child care services.

Culture, however, as a constituting part of human nature has not been that prominent in economic analyses that examine female employment across countries. This might partially be attributed to the complexity of the term. It consists of explicit and implicit patterns of and for behavior. Traditional ideas, i.e. ideas that are historically derived and selected and especially their attached values are of particular importance. Culture may thus, on the one hand, be considered as products of action. On the other hand, it may also be considered as conditioning elements of further action (Kroeber and Kluckhohn, 1967). Consequently, culture plays an essential role in the formation of individuals' habits and attitudes on any imaginable aspect of life, also including factors that influence economic outcomes. Aspects like, for example, diligence or honesty shown by employees might be rewarded by employers. Still, while it is plausible to assume that individuals structure and organize daily life on behavioral norms and virtues, attitudes and norms differ across individuals depending on their particular cultural background.

There are several factors that influence this background. The country-specific historical experience is one of these factors as certainly also is the membership to a particular ethnic group. Furthermore, there always are interdependencies between these aspects and the religion that is dominant in the country, region, and/or ethnic group. Therefore, religious affiliation and religious belief quite likely influence individual attitudes and behavior. The references given in the introduction to this chapter show that there is empirical evidence that religion affects a variety of sociological and economic aspects.

However, pertaining to mothers' employment there are only a few studies that address the formation of attitudes at the basic individual level and the observable cross-country variation in patterns. This is somewhat surprising as the strong increase in female labor participation and its impact on family as an institution has attracted the attention of the public as well as of policy makers. Furthermore, while culture in general and institutional settings have been explored by some authors (Knudsen and Waerness, 2001; Antecol, 2003), religion as a potential factor has largely been ignored.

This section therefore adds to the existing research in multiple ways. First, three waves of a cross-national comparable dataset are used spanning time from 1991 to 1998. It is thus possible to get an insight in the recent development of attitudes towards working mothers. This, however, is not the focus of the section and hence remains somewhat crude. Yet, religion and its impact on attitude formation is explored in more detail. Furthermore, building

up on the analysis of attitudes, the data on males are used to examine the effect of religion on wives' employment participation. This latter has, as far as apparent, hitherto not been object of investigation.

3.2.1 Attitudes towards mothers' employment: previous findings and expectations

In many Western industrialized countries, women's participation in paid employment increased rapidly in the last decades. This phenomenon has attracted much attention in social sciences, particularly in economics and sociology. Analyses on both the macro- and the micro-level have been conducted exploring possible factors that led to this development. On the macro-level, three prominent hypotheses from the sociological literature are the *emancipation hypothesis*, the *U-hypothesis*, and the *constancy hypothesis* each offering a different explanation as to why female labor participation has grown and hence also suggesting different prospects of future development (for a detailed discussion see Rau and Wazienski, 1999).

However, more of interest here are studies on the micro-level that focus on the formation of attitudes towards female and particularly mothers' labor participation and analyses that use such attitudes as predictors of women's employment. Often, micro-level studies also link their analyses to the cross-country variation in female labor participation. Such comparative studies are regularly based on differences in welfare states and social policies. The cross-country variation in female employment can consequently be attributed to differences in, e.g., the taxation of the family or state-provided services of both child care and care of the elderly. Such policy dimensions, however, are subject to support of the society in general and therefore, in particular, are subject to individual behavior and attitudes towards gender roles and women working outside the home.

Now, as Knudsen and Waerness (1999) point out, there are only few theoretical underpinnings about cross-country differences in attitude formation. These, in general, focus on the differences in institutional patterns. However, they furthermore state that there are two general social processes that lead to different attitudes and behavior in Western industrialized countries. These are (1) the struggle toward gender equality and (2) the individualization process, both being consequences of the secularization process. On the one hand, there is a certain amount of studies in the spirit of Weber's 'Protestant Ethic' addressing secularization

or individualization and its relationship to economic well-being and prosperity. However, on the other hand, there surprisingly is only scarce literature that addresses the formation of basic attitudes at the level of the individual and the potential role religion might play within this process. Only recently has scholarly interest in such questions been rediscovered.

For instance, Knudsen and Waerness (1999) acknowledge that, where dominant, religions might influence both a nation's institutional settings like the design of the welfare state and the individuals' interpretations of it. However, while noting that Catholic nations might be expected to be less favorable towards female or mothers' employment, they do not include indicators of religion in their empirical analysis.

In another study, Knudsen and Waerness (2001) combine attitudinal indicators from the International Social Survey Program (ISSP) into a single index to examine attitudes towards gender roles and mothers' employment comparing the UK, Norway and Sweden. Here, they use frequency of religious participation as explanatory variable. They hypothesize that religiously devoted individuals are more negative towards modern gender roles than the not religiously engaged. Their findings show that a higher level of religious participation has a negative impact on liberal attitudes. While there are no statistical differences between the Swedish and the Norwegians they furthermore find that religiously active individuals in Britain are more in favor of modern gender roles and working mothers than the Norwegian counterparts.

Siaroff (1994) pursues a comparative analysis on the aggregate level and finds that Protestantism is a crucial factor explaining female work desirability. On the one hand, he attributes this result to the greater importance, Protestantism attaches to individual rights. On the other hand, traditional religions including foremost Catholicism usually have stricter views towards working mothers. Schmidt's (1993) analysis is along this line of arguments and his findings corroborate the Protestantism-Catholicism split. Gomilschak *et al.* (2000), using ISSP-data, also find that the higher the share of Protestants in nations the less likely is the accordance with the traditional 'male-breadwinner' model.

Sainsbury (1999), on the other hand, concludes that it is not the Protestantism-Catholicism split only that is responsible for the cross-country variation in the development of female labor participation. While she acknowledges that Protestantism and Catholicism may play a part on its own, she refers to the Norwegian and the US case to indicate that it rather is the political institutionalization of religious and traditional beliefs in the party system also of Protestant nations that maintains societal attitudes in favor of the traditional 'male breadwinner' regime.

Similar results are shown by Guiso *et al.* (2002) in their quite comprising study that analyzes the impact of religion on people's economic attitudes. Using data from the World Value Surveys (WVS) they, among a variety of economic aspects, also examine attitudes towards working women. They find that it is the religiously engaged who are less favorable with respect to female labor participation. However, this finding is not only attributed to more hierarchical denominations such as Catholicism or the Islam, but across most denominations, with Buddhism being somewhat exceptionally. Following their analysis, Protestantism is therefore not *the* religion in support of particularly liberal attitudes.

There are some lessons and implications from the findings of all above noted studies. First, despite the complexity of institutional differences across countries with its differences in incentives for women to participate in paid employment, religiosity, in general, seems to have an impact on the behavior of individuals also including economic attitudes and outcomes. This, second, seems to be more or less independent from the particular denomination people are affiliated with but is rather attributed to the intensity of involvement, i.e. the frequency of religious participation. Consequently, there is no reason to assume that this picture should not show in the following analyses.

However, none of the aforementioned studies shed light on intra-household or intra-family processes. According to New Home Economics (Becker, 1991), it can however be expected that both partners bargain over joint labor participation decisions, mostly implying that a husband's career has a negative effect on his wife's employment participation and outcomes. Empirical evidence in this area shows that the husband indeed matters. Bernardi (1999), using Italian data, conludes that a wife's participation in the labor market is negatively affected if the husband has comparative advantages in market work. Antecol (2003) presents a cross-country comparison based on the 1994 wave of the ISSP and ILO labor statistics. She analyzes the impact of male attitudes on the female decision to participate in the labor market and concludes that labor force participation rates of women are higher in countries where there are more liberal male attitudes towards working women.

However, these studies again ignore religion and individual religious behavior as a potential source of variation in attitudes. This section therefore combines elements of previous analyses and examines possible influences on both attitudes towards mothers' employment and actual labor market participation of wives.

To sum up: Due to missing theoretical underpinnings, no particular expectations can be

derived deductively. However, based on the existing results from the previous literature, religiosity is assumed to affect individual attitudes towards gender roles and towards working mothers negatively. This assumption holds across the variety of denominations that are present in the (predominantly Christian) countries examined here. In particular, taken that individuals are religiously active or engaged, there should be no substantial differences in attitudes between Catholics and Protestants. Moreover, male and in particular husbands' attitudes in favor of the traditional gender and family models are expected to affect the labor participation of wives negatively.

The choice of the countries examined is based on Esping-Andersen's follow-up on his classification on welfare state regimes (Esping-Andersen, 1996). Particularly, West-Germany and Italy, having more familialistic welfare regimes, are considered to follow the 'labor reduction route' so that Germans and Italians are expected to show more traditional attitudes. Britain and New Zealand are representing the 'neoliberal route' and having more individualistic regimes that are based on less generous and means tested welfare benefits. More liberal attitudes should show for these two countries.

East Germany is exceptional: Similar to other post-communist nations, it also was ideological reasoning prior to German reunification that lead to higher female labor participation rates. However, it might be argued that this was only state decreed behavior that was not reflecting true underlying individuals' attitudes. In fact, there is evidence that individuals in the Eastern European countries are as traditionalistic as in the Western industrialized countries. Gomilschak *et al.* (2000) show that agreement to the traditional role of women ranges from 60% to 73% of the respective population. East Germany is different: following Canadians, where only 17% are in favor of the traditional gender role of women, East Germans (20% agreement) are even more liberal than the British or the Scandinavian. However, Braun *et al.* (1994) argue that the prevalent more egalitarian gender-role attitudes might be undermined once the economic necessity is reduced. Nevertheless, it can be expected that East German individuals are more liberal than West Germans or Italians.

3.2.2 Data and econometric methods

The data used are drawn from the International Social Survey Program (ISSP).[3] This is a continuing, annual program of cross-national collaboration with a focus on social values and

[3] For more detailed information, see http://www.issp.org (URL: October 2003).

attitudes. Adding to the countries' regular surveys a module is administered each year to collect comparable data. It started with a bilateral cooperation between the German ZUMA und the US-American NORC in the beginning of the 1980's. It ever since has grown to 38 participating countries. Three modules from the 1990's are the source for the data used here. In particular, these are the two available modules on 'Religion' issued in 1991 and 1998 and the second module on 'Family and Gender Roles' issued in 1994.

The latter provides a rich data source on attitudes towards female and mothers' labor participation. It provides five questions of variables pertaining to family and six questions on sex roles. However, only two indicators drawn from this module are used. In particular, it is one question from the first set of variables on gender roles and one question from the variables on the impact of working mothers respectively: *Do you agree or disagree* with (1) *a man's job is to earn money; a woman's job is to look after the home and family* and (2) *all in all, family life suffers when the woman has a full-time job*. Answers to both questions are to be given on a five-point scale ranging from '*strongly disagree*' to '*strongly agree*'.

There are mainly two reasons why only these questions are used in the analyses. First, as is obvious from the above cited studies, the 1994 module has been widely explored by both sociologists and economists. Second, and more important, there are almost the same questions in the 'Religion' modules in 1991 and 1998. It is thus possible to explore an admittedly rather crude and descriptive time trend in individual attitudes towards mothers' employment across sexes, countries and religions. However, the ISSP is not a panel study, i.e. a survey that consists of repeated observations on the same set of cross-section units. Therefore, panel estimators that control for unobservable individual heterogeneity cannot be applied. Furthermore, as the cross-sectional samples used are not extensive, pseudo-panel estimation as outlined by Baltagi (2001) cannot be used either. The advantage of using three waves of the ISSP therefore basically is the increase of the sample size, making statistical inference more reliable.

Two necessary comments have to be made: First, whereas the family question is identical in all three waves, there is a little change in wording in the gender role question. Instead of '*man*' and '*woman*', that is used only in 1994, '*husband*' and '*wife*' are used in 1991 and 1998: *Do you agree or disagree …* A *husband's job is to earn money; a wife's job is to look after the home and family*. Secondly, attention should also be paid to the differences in the modules: It might be that the response behavior to the questions on attitudes is not independent from the general focus of all other questions. Therefore, a possible bias in answers cannot be ruled out *a priori*.

The Likert-scale answers on the two indicators on gender roles and family are used both as dependent and independent variables in the analyses here. To ease estimation and interpretation of the results, binary indicators are generated from the original data that equal one if the individual agrees or strongly agrees with the respective issue and zero else. A similar approach is followed in the analysis of wives' employment: It would in general be possible to differentiate the amount of labor supplied in, say, full-time, part-time and not being employed. This would allow to use models for categorical or nominal outcomes. However, because of sample size restrictions, the original data are used to generate a binary outcome variable, 'employed-not employed', and appropriate estimators are applied.

The underlying hypothesis in this analysis is that religion and, in particular, religious involvement plays an important role in the formation of attitudes. It is further assumed that religion affects wives' employment. Therefore, a range of variables covering religious affiliation and participation is included. Detailed information on denominational affiliation is given in all three waves of the ISSP used. However, due to the focus on Western industrialized countries, the bulk of denominations included is of Christian nature. These denominations are in particular: Roman Catholic, Lutheran, Baptist, Methodist, Presbyterian, Anglican, Protestant and other Christian affiliation. Further non-Christian religions included are Muslim and a variable capturing all other denominations as well as a variable for individuals who are not affiliated with a religion or denomination.[4] Being aware that there are differences between Protestant groups across the countries examined here, affiliation to one of these churches or groups is stacked together in one indicator to ease clarity of the models estimated in order to track the possible Protestant-Catholicism split.[5]

As argued, denominational affiliation is only one possible factor influencing individual attitudes. It rather is religiosity, i.e. the intensity of religious belief and the level of religious involvement that might play another, if the not the dominant part determining attitudes and behavior. Therefore, indicators of the frequency of religious participation are included in the analyses as well. As Iannaccone (1998) points out, religious participation might be used as a measure for the individual's so-called 'religious human capital', i.e. the stock of knowledge and familiarity with one's own religion, its rituals and doctrines. While this idea might be considered as extention to the familiar 'human capital theory', the level of religious

[4] Due to sample size restrictions, observations on the following Christian and Non-Christian denominations have been excluded from the analyses: Congregational, Orthodox, Free Presbyterian; Hindu, Sikh, Buddhist, and Jewish.

[5] Further analyses that include separate indicators for the Protestant denominations noted did not yield in findings that differ substantially from those shown in this section and are thus not presented.

participation is used here as proxy for the religiosity of individuals.[6]

It might plausibly be expected that a high level of participation in religious services is accompanied by familiarity with church doctrines. As shown by previous research, this quite likely affects attitudes towards female or mothers' employment in case the particular church upholds the traditional family role model. Therefore, four dummy-variables are used that are generated from the original data and capture whether the individual attends religious services '*once a week or more*', '*once a month or more*', '*less frequently*' and '*never*', the latter being the omitted reference category.

Moreover, there is a variety of socio-economic characteristics that are also included in the multivariate regressions as control-variables. These are in particular: two age-dummies (individuals older than 50 years being the reference group), a male-dummy, affiliation to lower social class, a binary indicator for married and other than married, dummies on part-time and full-time occupation, another indicator on occupation in public services, a dummy indicating whether the individual has a higher education, two dummy variables representing left or right wing political attitudes (liberal being the reference group), an indicator on household-size and another dummy capturing whether the individual's residence is in a rural area. The final sample used consists of 11,570 individuals aged 20 to 64 years.[7] At first glance this age restriction might seem to be rather arbitrarily when examining attitudes towards mothers' employment. However, it makes sense in the ensuing analysis of married men and the impact of religion on wives' employment.

As noted above, the dependent variables are binary. Therefore, probit estimation is an appropriate method to apply. However, instead of presenting coefficients resulting from the probit model, discrete changes in the predicted probabilities are shown. Similar to marginal effects, discrete changes capture the effects of single covariates on the dependent variable.[8] They are calculated as follows (Long, 1997):

[6] In general, attention has to be paid when applying this concept empirically as frequency of participation and religious human capital are endogenous: Frequent religious participation adds to the stock of religious capital and in turn increases participation as the level of satisfaction that arises from the consumption of religious products like church attendance or reading religious scripts increases the higher an individual's religious human capital. However, this potential endogeneity is no problem here as there is no indicator for religious human capital, like, for example, a question on the importance of religious belief.

[7] Experiments with different age restrictions like the common labor supply related span from age 25 to 55 did not result in substantially different findings from the estimations.

[8] The advantage of using discrete changes rather than the popular marginal effects is that interpretation of changes in the predicted probabilities is more straightforward given discrete changes in x_k. Furthermore, marginal effects are inappropriate for binary independent variables. For a detailed discussion, see Long (1997, pp. 71).

Let Pr(y=1 | **x**, x_k) be the probability of an event, i.e. the agreement to gender roles or mothers' labor participation, given a set of explaining characteristics, **x**, and noting the value of x_k. Pr(y=1 | **x**, x_k + d) then is the probability with x_k increased by d, with all other variables unchanged. The discrete change in the probability for a change of d in x_k then equals

$$\frac{\Delta \Pr(y=1|\mathbf{x})}{\Delta x_k} = \Pr(y=1|\mathbf{x}, x_k + d) - \Pr(y=1|\mathbf{x}, x_k). \quad (3.1)$$

For dummy variables, discrete changes are the change as x_k goes from 0 to 1, holding all other variables at their mean:

$$\frac{\Delta \Pr(y=1|\bar{\mathbf{x}})}{\Delta x_k} = \Pr(y=1|\bar{\mathbf{x}}, x_k = 1) - \Pr(y=1|\bar{\mathbf{x}}, x_k = 0). \quad (3.2)$$

3.2.3 Empirical results

3.2.3.1 Attitudes towards gender roles and female full-time employment

First, note that the results from the control variables meet prior expectations so that they need not be discussed.[9] As noted above, the three waves drawn from the ISSP allow to crudely picture the trend of attitudes towards gender roles and mothers' employment in the 1990's. Figure 3.1 to Figure 3.4 show the cumulated shares of agreement and strong agreement towards both questions over the time period examined here. While Figure 3.1 and Figure 3.2 show the time trend separately for women and men across the five countries, Figure 3.3 and Figure 3.4 depict agreement to the gender role model subject to denominational affiliation and frequency of religious participation.

A distinctive feature of these descriptive results is that, when looking at the four figures, one has to be cautious interpreting the findings. This is because response behavior seems to be dependent on the focus of the respective module. In particular, responses in 1994 to some extent cause a non-monotonic development between 1991 and 1998. Unless one is willing to believe that there have been real up and down changes in attitudes interpretation demands care.[10]

[9] Corroborating existing evidence it is found that, on average, it is the higher educated young woman living in small urban households and in favor of left wing political positions who disagrees with the traditional 'male breadwinner model'. Full estimation results are shown in the Appendix.

[10] It is, however, interesting to notice that except for the attitudes on the 'male-breadwinner' gender role, the 1994 questioning presumably led to stricter views on female labor participation. Therefore, evidence from the literature might even be slightly 'biased'.

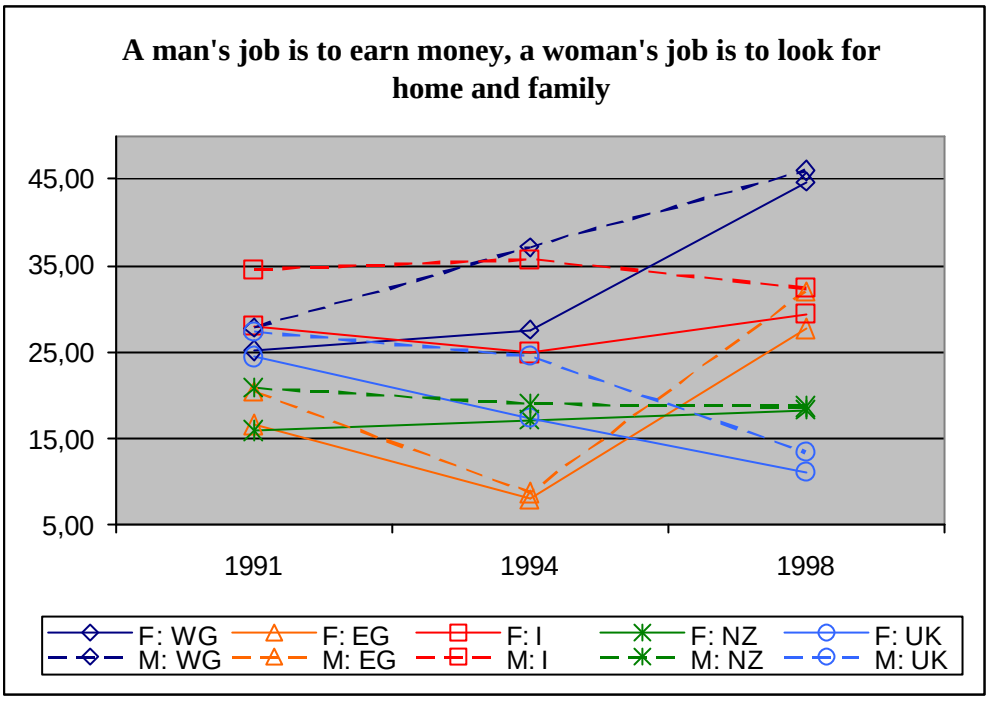

Figure 3.1: Attitudes towards the traditional gender role model, by country and gender
Source: ISSP, own calculations; cumulative shares of agreement and strong agreement, weighted.

Figure 3.1 and Figure 3.2 show that, as expected, males are more in favor of the traditional allocation of labor between spouses or partners than females. While this is observable across all countries examined, there are large differences between the countries. Not surprisingly, the two proponents of Esping-Andersen's (1996) labor-reduction route, West Germany and Italy, are the most restrictive nations regarding the traditional gender role (Figure 3.1) and, even more clearly, pertaining to mothers' employment (Figure 3.2). While agreement of Italians to the 'male breadwinner model' is rather stable over the time period (between 30-35%), individuals in West Germany even show an increase in favor of the traditional role model (Figure 3.1). Agreement increases from about 30% in 1991 to 45% in 1998. A similar picture can be seen for the attitude towards working mothers. Clearly, Italy is the most traditional country in the sample of countries here: Only about 30-35% of the population do not think that the family suffers when the woman/mother works full-time (Figure 3.2). Note, however, that there is a small decrease from 1991 to 1998, having a peak in 1994.

As could be expected, liberal attitudes are found for the UK and New Zealand. Agreement in New Zealand is quite stable towards both attitudinal issues: About 17% are in favor of male's responsibility to financially take care of the family and only about 30% think that the family suffers when the mother works full-time (again having a peak in 1994 at about 40%).

Attitudes in Britain have even become more liberal between 1991 and 1998. While agreement to the 'male-breadwinner' model is at 25% in 1991, it decreases to less than 15% in 1998 (Figure 3.1). Mothers' full-time employment, however, is seen sceptical by about 30% of the British in 1991 with only a slight decrease to 25% in 1998 (Figure 3.2).

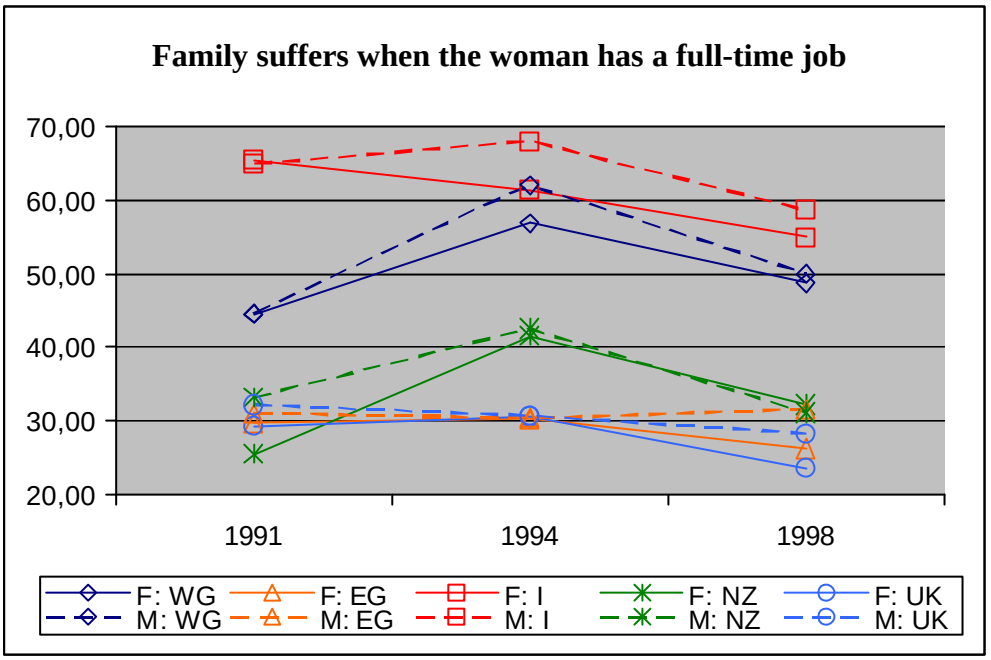

Figure 3.2: Attitudes towards mothers' full-time emplo yment, by country and gender

Source: ISSP, own calculations; cumulative shares of agreement and strong agreement, weighted.

Unsurpringly, East Germany is different. Attitudes towards mothers' emplyoment are as liberal as the British and the New Zealand case which might, somewhat speculative though, be due to the extensive full-time child care institutions that were supplied by the state prior to German reunification. However, the model on the traditional allocation of labor has regained popularity: While about 20% support the 'male-breadwinner' model in 1991, there is a considerable increase to about 30% of agreement in 1998 (Figure 3.1). To some extent, this might hint towards the hypothesis of Braun *et al*. (1994) that trad itit ional gender-role attitudes might regain importance once economic hardship has eased up.

Regarding religious affiliation and participation, the descriptive findings shown in the figures (Figure 3.3 and Figure 3.4) are mainly as expected. First, as in the figures shown above, mothers' full-time employment is less accepted. While agreement towards the traditional male-female allocation of labor ranges from 15% to at maximum 45%, full-time working

mothers are refused by 25% up to even 65% of the interviewed individuals.

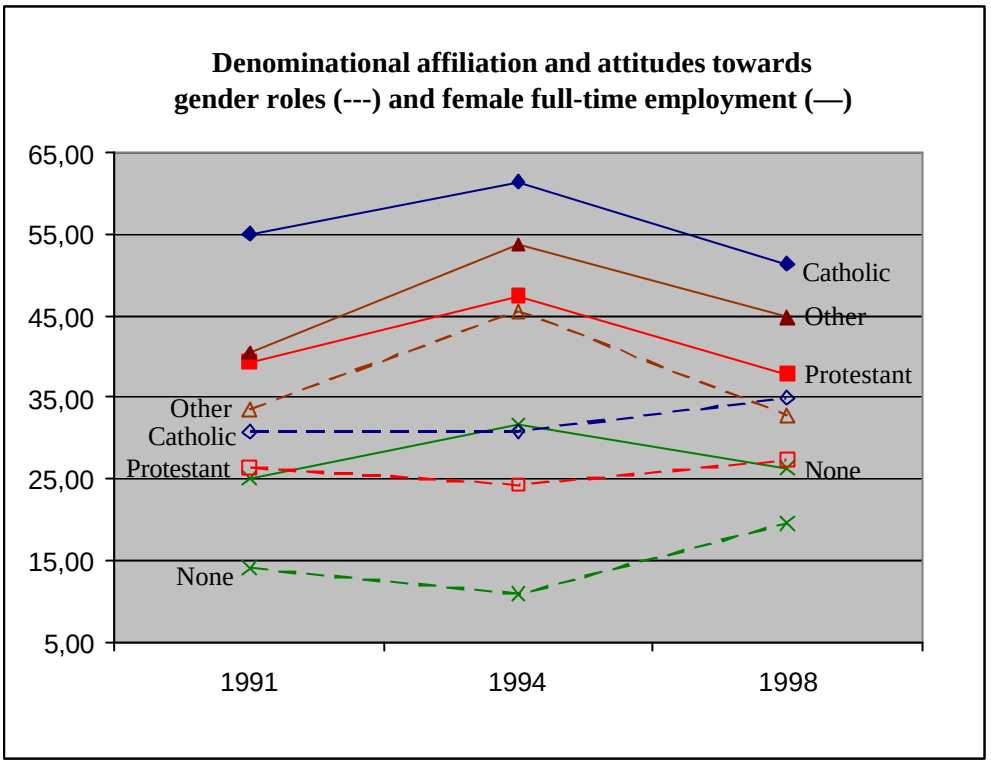

Figure 3.3: Denominational affiliation and attitudes towards the traditional gender role model and mothers' full-time employment

Source: ISSP, own calculations; cumulative shares of (strong) agreement to the 'male-breadwinner' gender role model and that the family suffers when women/wives work full-time, weighted.

Pertaining to denominational affiliation, belonging to the Roman Catholic Church or any other religious group than those listed is attributed with more conservative attitudes (Figure 3.3). Again, having peaks in 1994, disagreement with full-time employed mothers among Caholics is rather stable at about 55-50% from 1991 to 1998. Subsequently, some 45% of members of other religious groups in 1998 agree that families suffer when mothers work full-time. They are followed by Protestants with 40% of agreement. As might be expected, the least conservative are individiuals with no denominational affiliation: Only some 25% believe that mothers' full-time employment is harmful for the family.

Mainly the same picture shows for attitudes towards the 'male-breadwinner' gender role (Figure 3.3): While the level of agreement is somewhat lower then the attitude on mother' employment, it is again membership to the Roman Catholic Church or any other religious group that is in favor for the traditional allocation of labor. Here, the latter are the least liberal,

followed by Catholics and Protestants where agreement is only slightly lower. The range across denominations is from about 25% (Protestants) to almost 35% (others).[11]

More clearly distanced, only some 15% in 1991 to about 18% in 1998 of individuals without religious affiliation agree towards the traditional male-female of labor.

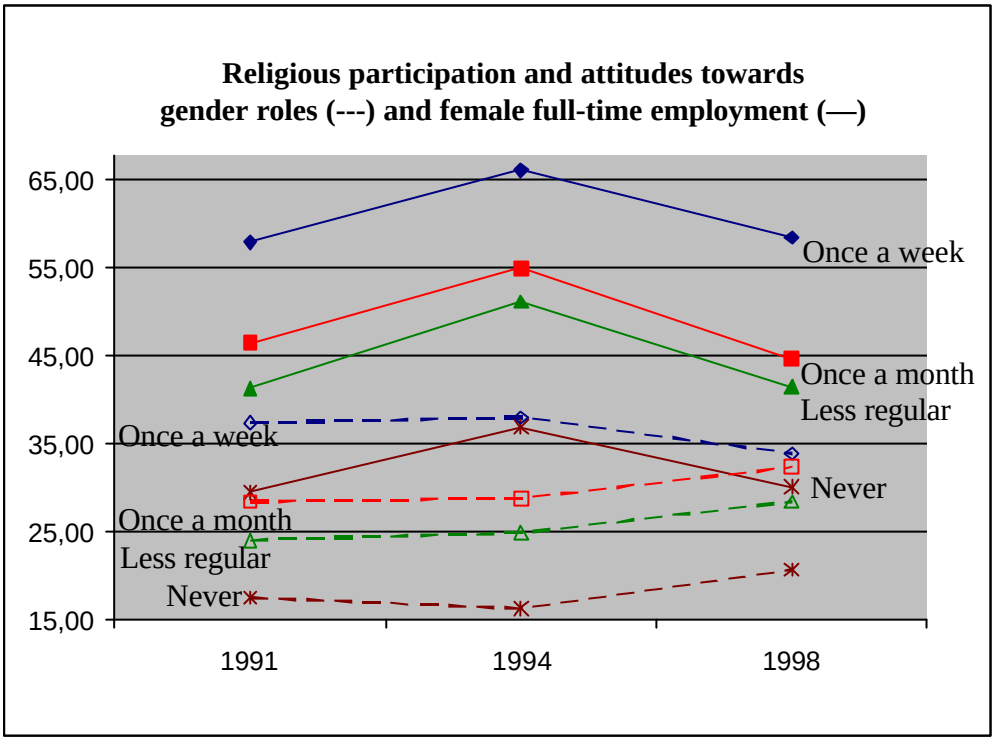

Figure 3.4: Religious participation and attitudes towards the traditional gender role model and mothers' full-time employment

Source: ISSP, own calculations; cumulative shares of (strong) agreement to the 'male-breadwinner' gender role model and that the family suffers when women/wives work full-time, weighted.

Figure 3.4 shows the differences for both attitudes in question across different levels of religious participation. Interestingly, the quasi-cardinal order in the frequency of church attendance finds its equivalents in the ordinally scaled agreement towards both attitudes on gender role and mothers'employment. In particular, indiviudals who attend church once a week or more mainly think that families suffer when mothers work full-time. Agreement here is at more than 55%. While the level of agreement is lower (about 35%), it is again the most religiously active who support the 'male-breadwinner' gender role model. Subsequently, individuals who attend church once a month ore less regular follow in agreement towards

[11] Again, some peculiar peaks are found for 1994, but are not discussed further.

both indicators. Clearly again, individuals who never participate in religious activities are the most liberal: About 30-35% only agree with the idea of a suffering family when mothers work full-time and only 15% to about 20% are in favor for the traditional allocation of labor between men and women.

However, these findings are preliminary as they might be caused by factors that are not accounted for in these simple graphics. Therefore, probit regressions are run where the range of socio-economic control variables outlined above are included. Table 3.1 and Table 3.2 show the discrete changes in the predicted probabilities of agreement to either the traditional male-female allocation of labor or the notion of the suffering family.

In Table 3.1, results from regressions are shown that use variables interacting denominational affiliation and religious participation with additional country-controls, while results from the interaction of attendance and nationality are shown in Table 3.2.[12] Besides, further control variables on denominational affiliation are included in the estimations. These latter regressors are either included in the regressions (model specifiation 2) or not (model specification 1).

Meeting prior expectations, Table 3.1 shows that, compared to Catholics who do not attend church regularly, it is regular religious participation among Catholics, Muslims and members of other denominational affiliations that lead to higher predicted probabilities in the agreement on the 'male-breadwinner' model. While the discrete changes in the predicted probabilities for Catholics are rather small, ranging from 0.02 to almost 0.04, there are larger discrete changes for Muslims (about 0.4).

Moreover, individuals who consider themselves not to be affiliated with a specific church or religious group, but regularly participate in religious activities are also more traditional regarding the allocation of labor between men and women. While church attending Protestants are not found to be statistically different from the reference group, this latter finding supports the hypothesis that it rather might be religious participation than denominational affiliation that affects underlying attitudes. However, findings that again point

[12] Regressions were estimated that include attendance, denominational affiliation and citizenship separately. While the results are not, the findings are in line with expectations, i.e. the higher the frequency of religious participation, the higher is the discrete change in the predicted probability of the particular outcome. Similar results are found for individuals which are denominationally affiliated. Individuals from nations other than West Germany are more liberal than their counterparts except for the case of Italians who are more likely to think that the family suffers when the woman is working full-time.

to differences in attitudes across religious bodies show for those individuals who do not attend church regularly: Protestants and persons without denominational affiliation are more liberal than Catholics. Predicted probabilities for Protestants decrease by 0.2 to 0.3 and by 0.1 to about 0.15 for individuals without religion.

Table 3.1: Denominational affiliation, religious participation and attitudes towards gender role and female full-time employment; including control variables

	Man's job: earn money; woman's job: home and family		Family suffers when woman/wife has a full-time job	
	(1)	(2)	(1)	(2)
Catholic and regular attendance	0.0393***	0.0230*	0.1003***	0.0353**
	(0.0136)	(0.0137)	(0.0163)	(0.0169)
Protestant and regular attendance	-0.0033	0.0083	-0.0199	0.0661***
	(0.0185)	(0.0196)	(0.0225)	(0.0242)
Muslim and regular attendance	0.4343***	0.4424***	0.1932	0.3059**
	(0.1673)	(0.1663)	(0.1637)	(0.1431)
Other denomination and regular attendance	0.1926***	0.1953***	0.1092**	0.1499***
	(0.0492)	(0.0502)	(0.0507)	(0.0512)
No denomination and regular attendance	0.1851**	0.1908**	0.0810	0.2012**
	(0.0815)	(0.0824)	(0.0805)	(0.0783)
Catholic and no regular attendance		*(omitted reference category)*		
Protestant and no regular attendance	-0.0318***	-0.0252**	-0.0666***	-0.0045
	(0.0104)	(0.0111)	(0.0130)	(0.0143)
Muslim and no regular attendance	0.0634	0.0744	-0.1467	-0.0665
	(0.1457)	(0.1498)	(0.1415)	(0.1619)
Other denomination, no regular attendance	0.0211	0.0238	-0.0218	0.0126
	(0.0313)	(0.0320)	(0.0367)	(0.0382)
No denomination and no regular attendance	-0.1478***	-0.1164***	-0.1900***	-0.0888***
	(0.0092)	(0.0106)	(0.0124)	(0.0145)
Nationality: West German		*(omitted reference category)*		
Nationality: East German	—	-0.1177***	—	-0.1848***
		(0.0101)		(0.0138)
Nationality: Italian	—	-0.0400***	—	0.0803***
		(0.0125)		(0.0175)
Nationality: New Zealander	—	-0.1000***	—	-0.1618***
		(0.0114)		(0.0155)
Nationality: British	—	-0.0445***	—	-0.1707***
		(0.0122)		(0.0144)
Chi^2	1,466.61	1,589.89	1,216.56	1,565.65
Log likelihood	-5,676.14	-5,614.50	-7,271.47	-7,096.92

Notes: Discrete changes following probit regressions. Standard errors in parentheses. N = 11,570 observations. * significant at 10%; ** significant at 5%; *** significant at 1%

Source: ISSP, 1991, 1994 and 1998. Own calculations.

Similar results are found regarding the attitudes towards full-time working women (columns 3 and 4). Again, Catholics and individuals with other religious affiliation who regularly participate in religious activities are more likely to think that the family suffers when women

work full-time. Individuals without denominational affiliation and Protestants who do not attend church regularly are also less likely to agree on this particular attitude.

However, the results for Protestants are not robust when additionally controlling for nationality (Table 3.1, last column). While regular attendance now affects the predicted probability, Protestants who do not participate in religious acitivities are not different to their Catholic counterparts. Furthermore, and likewise interestingly, the discrete changes for Muslims and individuals without denominational affiliation are found statistically signficant pointing to less liberal attitudes. Regarding nationality itself, the results corroborate the descriptive findings shown above. That is, West German individuals are the least liberal among the countries analyzed here regarding agreement on the 'male-breadwinner' gender role model and only surpassed by Italians who are even more restrictive in the attitudes towards full-time working women.

Controlling for interaction between nationality and regular religious participation, Table 3.2 first shows that denominational affiliation is associated with rather traditional attitudes towards both gender roles and female full-time employment (columns 2 and 4).

Furthermore, West Germans who attend church are more in support of traditional gender roles compared to their counterparts from the reference group, i.e. West Germans who do not attend church regularly. Regardless of the frequency of church attendance, East Germans are less restrictive. In particular, predicted probabilities decrease by about 0.6 to 0.7 for church attending East Germans and by about 0.13 to 0.15 for those who do not go to church. While the discrete changes are lower, British and New Zealanders who do not attend church are likewise liberal.

Again corroborating the descriptive findings shown above, full-time employment of women is disagreed with by West Germans who regularly attend church and Italians regardless on whether they are attending church or not. The predicted probabilities increase by 0.09 to almost 0.13 for West Germans and by about 0.10 to 0.18 for Italians. Less traditional attitudes are found for British, also regardless of the frequency of religious participation, as well as East Germans and New Zealand citizens who do not attend church regularly.

Table 3.2: Nationality, religious involvement and attitudes towards gender role and female full-time employment; including control variables

	Man: job; woman: family		Family suffers	
	(1)	(2)	(1)	(2)
West German and regular attendance	0.0759***	0.0468**	0.1268***	0.0951***
	(0.0204)	(0.0201)	(0.0236)	(0.0245)
East German and regular attendance	-0.0583**	-0.0722***	-0.0226	-0.0458
	(0.0293)	(0.0273)	(0.0424)	(0.0416)
Italian and regular attendance	0.0224	-0.0061	0.1838***	0.1448***
	(0.0166)	(0.0174)	(0.0202)	(0.0229)
New Zealander and regular attendance	0.0484**	0.0281	-0.0141	-0.0353
	(0.0245)	(0.0235)	(0.0275)	(0.0273)
British and regular attendance	0.0381	0.0185	-0.0651**	-0.0862***
	(0.0258)	(0.0249)	(0.0280)	(0.0276)
West German and no regular attendance		*(omitted reference category)*		
East German and no regular attendance	-0.1547***	-0.1334***	-0.1864***	-0.1479***
	(0.0091)	(0.0102)	(0.0141)	(0.0155)
Italian and no regular attendance	0.0025	-0.0215	0.1395***	0.1081***
	(0.0155)	(0.0161)	(0.0194)	(0.0213)
New Zealander and no regular attendance	-0.1210***	-0.1179***	-0.1354***	-0.1301***
	(0.0108)	(0.0109)	(0.0159)	(0.0161)
British and no regular attendance	-0.0470***	-0.0339**	-0.1371***	-0.1202***
	(0.0127)	(0.0133)	(0.0155)	(0.0161)
Denomination: Catholic	—	0.0887***	—	0.1130***
		(0.0138)		(0.0156)
Denomination: Muslim	—	0.3655***	—	0.2158**
		(0.1168)		(0.1084)
Denomination: Protestant	—	0.0758***	—	0.1017***
		(0.0113)		(0.0126)
Denomination: Other denomination	—	0.1629***	—	0.1367***
		(0.0311)		(0.0309)
Denomination: No denomination		*(omitted reference category)*		
Chi^2	1,495.67	1,579.20	1,431.45	1,519.39
Log likelihood	-5,661.61	-5,619.85	-7,164.02	-7,120.05

Notes: Discrete changes following probit regressions. Standard errors in parentheses. N = 11,570 observations. * significant at 10%; ** significant at 5%; *** significant at 1%

Source: ISSP, 1991, 1994 and 1998. Own calculations.

To sum up, evidence is found that denominational affiliation as well as religious participation and nationality affect attitudes towards gender roles and female full-time employment. Meeting prior expectations, West Germany and Italy are the most traditional countries among the nations in the sample here. This finding furthermore holds when controlling for the level of religious participation. While the results for denominational affiliation itself also hint towards more traditional attitudes, there is some evidence that only those individuals who regularly attend church are less liberal in their attitudes.

3.2.3.2 Husbands attitudes and wives' employment

Before discussing the findings from the probit regressions, descriptive results are presented in the following two tables, showing the shares of women in paid employment (Table 3.3) and, conditional on the subsample of married males, the shares of wives in paid employment (Table 3.4).

Table 3.3: Religious participation, denominational affiliation and female employment

	Women in paid employment (respective shares)				
	West Germany	East Germany	Italy	New Zealand	United Kingdom
Mean	50.0	60.4	40.1	66.3	61.5
Denomination:					
Roman Catholic	48.9	59.4	39.6	70.6	61.4
Protestant	49.0	52.3	—	64.7	60.6
Other	(39.7)	(50.0)	(44.1)	56.9	(61.1)
None	66.4	65.4	(50.9)	70.5	62.7
Church attendance:					
Once a week	32.1	(57.9)	35.1	59.1	52.7
Once a month	46.3	(44.4)	35.2	71.3	68.2
Less regularly	51.5	64.9	46.0	68.5	60.8
Never	57.7	59.1	47.9	64.9	60.3
N	707	626	440	810	597

Notes: ( ) Cell includes less than 30 observations.
Source: ISSP, 1991, 1994 and 1998. Own calculations.

Table 3.3 shows several aspects. First, there is considerable variation in labor participation rates across countries in line with Esping-Andersen's welfare state regimes: While only 40% of Italian women participate in paid employment, almost two thirds of women from New Zealand offer labor outside the home. Regarding denominational affiliation, female labor participation by and large does not differ much from the respective overall country-shares. However, with the exception of British women, women who are not affiliated with a church or religious group are more often employed.

Even more clearly, labor participation differs across women depending on their level of religious participation. For West Germany and Italy, there is even an ascending order of female employment with descending church attendance. Furthermore, only 32% of West

German women who attend church at least once a week are in paid employment which is a difference from the average female labor participation of about 36%. While differences for the neoliberal proponents, New Zealand and the UK, are not that large and furthermore neither clearly de- or increasing, women who attend church once a week or more are less often in paid employment.

Table 3.4: Religious participation and denominational affiliation of males and wives' employment

	Wives in paid employment (respective shares)				
	West Germany	East Germany	Italy	New Zealand	United Kingdom
Mean	44.7	66.2	44.9	68.4	64.8
Denomination:					
Roman Catholic	43.1	(61.9)	43.8	69.0	61.8
Protestant	48.2	54.8	—	64.4	58.6
Other	(28.6)	(41.7)	(49.5)	76.6	(53.9)
None	47.7	70.4	(58.1)	71.5	72.3
Church attendance:					
Once a week	32.2	(75.0)	39.2	62.1	(53.1)
Once a month	38.3	(54.2)	35.9	(64.9)	(72.2)
Less regularly	48.5	63.0	49.1	68.8	61.7
Never	45.1	67.8	53.1	70.7	67.3
N	417	468	306	489	357

Notes: ( ) Cell includes less than 30 observations.
Source: ISSP, 1991, 1994 and 1998. Own calculations.

Pertaining to the possible effect of religiosity of husbands on the labor participation of their wives, Table 3.4 corroborates the findings from Table 3.3. By and large, given that men are not member of a church or a religious group, wives are more often employed than average. While this is also true for wives of Protestant men in West Germany and wives of men of other religious affiliation in New Zealand, Protestants' wives in East Germany and the UK are less often in paid employment. A picture similar to the above also shows for church attendance rates of males and wives labor participation. Again, for West Germany, the relationship is reversely related: the more often the husband attands church the less often is the wive offering labor. The relationships in all other countries analyzed are more ambiguous. However, labor participation of wives whose men are never attending church is again higher

than the average female employment rate across all nations.

Again, as further variables are not controlled for in these descriptive findings, the results presented may reflect influences other than those indicated. Therefore, probit regressions are run and discrete changes in the predicted probabilities are calculated. Results from these operations are shown in Table 3.5. As can be seen, once controlling for a range of socie-demographic and –economic variables, the relationship between male denominational affiliation and its effect on wives' employment is not overwhelming. Compared to wives of men without religious affiliation, all discrete changes hint towards a lower labor participation of women whose husbands are denominationally affiliated. However, all but the Protestants' coefficients are not statistically significant.

Table 3.5: Husbands' attitudes, religious involvement and labor participation of wives

	Wife is participating in paid employment			
	(1)	(2)	(3)	(4)
"A man's job is …"	-0.1715***	—	—	—
	(0.0196)			
"Family suffers …"	—	-0.1683***	—	—
		(0.0177)		
"A man's job is …" * regular church attendance	—	—	-0.1833***	—
			(0.0318)	
"Family suffers …" * regular church attendance	—	—	—	-0.1511***
				(0.0278)
Denomination: Catholic	-0.0388	-0.0368	-0.0319	-0.0283
	(0.0285)	(0.0285)	(0.0286)	(0.0287)
Denomination: Muslim	-0.1929	-0.2164	-0.2267	-0.2295
	(0.1662)	(0.1633)	(0.1607)	(0.1598)
Denomination: Protestant	-0.0508**	-0.0561**	-0.0623***	-0.0581**
	(0.0231)	(0.0231)	(0.0230)	(0.0230)
Denomination: Other denomination	-0.0281	-0.0386	-0.0284	-0.0282
	(0.0562)	(0.0563)	(0.0561)	(0.0561)
Nationality: East German	0.1826***	0.1816***	0.2013***	0.2036***
	(0.0270)	(0.0270)	(0.0263)	(0.0262)
Nationality: Italian	0.0155	0.0292	0.0183	0.0249
	(0.0303)	(0.0302)	(0.0302)	(0.0301)
Nationality: New Zealander	0.2149***	0.2136***	0.2350***	0.2319***
	(0.0267)	(0.0267)	(0.0258)	(0.0259)
Nationality: British	0.1655***	0.1513***	0.1758***	0.1735***
	(0.0277)	(0.0282)	(0.0272)	(0.0273)
Chi^2	677.81	689.84	634.50	631.38
Log likelihood	-2,262.74	-2,256.73	-2,284.40	-2,285.96

Notes: Discrete changes following probit regressions. Standard errors in parentheses. N = 3,806 observations.
* significant at 10%; ** significant at 5%; *** significant at 1%

Source: ISSP, 1991, 1994 and 1998. Own calculations.

Regarding nationality, evidence is found that supports both prior expectations as well as results from descriptive findings: wives from East Germany, New Zealand and the UK are

more likely employed than their West German counterparts. Italian wives do not statistically differ from the reference group.

Unsurprisingly, there is further evidence that wives are less likely in paid employment given that the husband has traditional attitudes towards female labor participation. This holds also when controlling for male religious participation. However, the differences in the discrete changes are not large and, furthermore, not consistent. On the one hand, the predicted probabilities of wives' employment further decrease when the male's attitude on the 'male-breadwinner' gender role model is interacted with regular church attendance (Table 3.5, column 1 and 3). The predicted probabilities change from –0.17 to –0.18. Column 2 and 4 then show that, on the other hand, predicted probabilities in wives' employment slightly increase from almost –0.17 to –0.15 for men who think that the family suffers when the woman works full-time and who regularly attend church.

3.3. The effect of religion on the labor supply of married women in Germany

Apart from the sociological interest in female labor participation outlined above, female labor supply and particularly the labor supply of married women is object of frequent analysis in the labor economics literature. This is not too surprising given the strong increase in female participation in paid employment in the last 30 to 40 years. Consequently, as mentioned before, researchers spent remarkable efforts to examine the underlying reasons for this development. Questions of interest mainly are institutional patterns and their effect on the incentives of individuals to offer labor. In the context of female labor supply, patterns of relevance, for example, are a) the taxation of families and b) child care support provided by either public or private institutions.

As pointed out, neither culture in general nor religion in particular is on the top of the agenda of economists. It should therefore not surprise that there is only scare literature on the potential influence of religion on labor supply of individuals themselves or individuals within households. In fact, to the best knowledge, there is only one study by Lehrer (1995) that addresses the impact of religion on the labor supply of married women using US data. She draws from both economic and sociological theories to examine the impact of religion on women's decisions regarding the allocation of time between home and market. The

subsequent analysis follows a similar approach using German data. In combination with the analysis of the preceding section, it adds to the understanding of the effects of religious attitudes on female labor supply. Furthermore, given the differences between the religious markets in Germany and, above all, the US, this study opens the possibility of transatlantic comparisons. On the one hand, the US situation is identified by a broad range of denominations which are also acting in a competitive way. On the contrary, the German religious market is dominated by two large Christian churches: The adherents of the Roman Catholic Church and the Evangelical Church in Germany together account for almost two thirds of the German population. As about a fourth of Germans are not denominationally affiliated, other denominations and religious groups play a minor or even negligible role. Furthermore, as is shown in the preceding section, religion plays different societal roles in the eastern and western parts of Germany.

In general, the cross-sectional analysis performed here replicates results found for the US, thus supporting the hypothesis that religion affects female time allocation decisions. Furthermore, and extending previous research, the findings from the longitudinal analysis carried out reinforces preceding results: There is evidence that the labor participation decision of married women is affected by their husbands' religious belief. This, to some extent, may be interpreted in line with the 'male-chauvinist' model (Killingsworth, 1983), i.e. that the male usually decides on his supply of labor independently from the female. The female then treats the male income as property income when deciding about how much labor to supply. Furthermore, the results support bargaining models that consider joint household decisions to be dominated by male attitudes and behavior due to, for example, asymmetric bargaining power between spouses (Ott, 1992).

The remainder of this section is organized as follows. Theoretical considerations and testable hypotheses are presented subsequently; the data and methods used are discussed in subsection 3.3.2, followed by the empirical results in subsection 3.3.3.

3.3.1. Theoretical considerations

Based on both sociological and economic theories, there are mainly two mechanisms through which religion might affect women's decisions whether to supply labor or not. Sociological literature suggests that attitudes toward gender roles and the appropriate division of labor

differ across religious groups. Attitudes then are supposed to range from most egalitarian to rather strict positions,[13] individuals with no religion on the one side and, relevant for the US, so-called 'exclusivist Protestants' on the other side of the spectrum. Lehrer (1995), for example, finds that almost 25% of exclusivist Protestants strongly agree that it falls into the man's responsibility to earn the main living while the woman takes care of the home and family. In contrast, only about 8% of persons without religion share this view. Exclusivist Protestants also tend to disapprove stronger that mothers work full time when their youngest child is under age 5.

The findings from the preceding section show that differences in attitudes across denominations might also be of concern for Germany. Furthermore, while not controlling for religious affiliation, Albrecht *et al.* (2000) show that 48% of West German men expect their wives to stay home, even if the children are in school age, compared to only 22% of Italian men or to even only 12% of British men.

Taking into account that the employment behavior of married women might differ due to different family backgrounds, information on the husband's religion and belief has to be included in the analysis as well. If spouses have the same religious affiliation, women's labor participation then only depends on the religious group's position in the 'egalitarian-strict-continuum'. However, if spouses do not share the same faith and instead belong to religious groups with strong different attitudes toward gender roles marital conflicts may arise. The mechanism that resolves these conflicts is the so-called 'bargaining effect' (Lehrer, 1995).[14] This effect suggests for either less or more female labor supply, depending on whether the husband belongs to a more liberal religion or not. That is, if the wife's faith is placed on the egalitarian end of the spectrum, her husband however belonging to a less tolerant religion, one would then expect the woman to supply less labor compared to the case where the husband shares his wife's liberal attitude toward female labor participation.

Analogously, a higher labor supply should be expected among women who belong to a strict religious group but have a husband who does not. This is because strict religious groups often have clear membership criteria and sometimes even proscriptions against 'outer-

[13] Strictness in this respect is a phenomenon that has to be seen in comparison to more liberal or egalitarian religious groups, i.e. something to be found rather between than within denominations (Olson and Perl, 2001). It implies the obedience to rules not only affecting the issue of labor participation but furthermore aspects like dietary (e.g. no drinking or smoking) or questions of morality (e.g. the acceptance of divorce and cohabitation).

[14] The name of the effect goes back to its origin in the framework of game-theoretic bargaining models. For models regarding household decisions see Ott (1992).

marriages'. An outer-faith marital union might then be seen as indicator that the wife overcomes less tolerant attitudes and doctrines by their religion, hence including the disaffirmation of women who engage in paid employment.

It can furthermore be argued that it is not simply denominational affiliation itself that influences individual behavior but that it rather is a person's intensity of religious belief that affects various aspects of human behavior.[15] That is, even if someone is a church member, but otherwise does not care about religious belief, this individual will ceteris paribus not show a much different labor behavior than an individual without religion. Such is easily conceivable in cases when membership to a church or religious group is simply inherited from the parents or because of the regional predominance of a particular denomination.

Both the individual's belief and the denominational household composition are also relevant for the second line of explaining the impact of religion on the labor supply of married women. Economic literature suggests that it is religious inter-marriage that affects female incentives to invest in various forms of human capital. Both Becker *et al*. (1977) and Lehrer (1996) find that marital differences in religious beliefs are associated with smaller family size. This supports the argument that inter-faith couples recognize the relative instability of their unions and that subsequently partners have lower incentives to invest in spouse-specific capital, primarily children.

Put differently, women in such unions recognize the supposedly less stable union they have. Therefore, they face incentives to invest more in labor related human capital such as vocational training and other labor market experience that becomes useful in the case of a divorce. Hence, due to this 'marital-stability-effect' (Lehrer, 1996), a higher level of labor supply would be expected for women whose husbands do not belong to the same church or religious group compared to women in inner-faith marriages.

3.3.2. Data and econometric methods

The structure of religious bodies in Germany is quite different to, for example, the US case: First, almost two thirds of the population are adherents of the Roman Catholic Church (32,3%) or the Evangelical Church in Germany (31,9%), which is the institutional form

[15] Recall the findings from the preceding section that are in line with this hypothesis: Individuals without denominational affiliation who regularly attend church are more in favor of traditional attitudes than their counterparts who do not attend church (Table 3.1).

chosen by a community of 24 Lutheran, Reformed and United regional churches. Besides these two Christian churches, there is a variety of other denominations and religious bodies. Muslims account for almost 4% of the population. Other Christian denominations range from Orthodox churches to other Protestant groups like Baptists or Methodists to denominations that are rather exclusivist-like. However, as the adherents of all other Christian bodies sum up to about 2,5% of the German population, they play a minor role. Furthermore, about 29% of the population is not affiliated with a church or religious group.[16] Second, concerning the regional distribution of denominations, there is in general a historically grown Protestant-North Catholic-South divide in the former western federal states. More important, the eastern part of Germany is different inasmuch as 70% of its population does not belong to a church because of East Germany's former communist history.

The data used are drawn from the German Socio-Economic Panel (GSOEP), a wide-ranging representative longitudinal study of private households (SOEP Group, 2001). It provides information on all household members, consisting of Germans living in the old and new German states, foreigners and recent immigrants to Germany. The Panel was started in 1984. In 2000, there were more than 12,000 households, and more than 20,000 persons sampled.

Information on religious behavior and attitudes is available in different ways and waves. As outlined above, different religious groups are considered to show varying 'denominational strictness' (Iannaccone, 1992).[17] Therefore, information on denominational affiliation is initially included. This was asked for in 1990 and 1997 and has shown to be rather stable except for Protestants, i.e. adherents of the Evangelical Church in Germany, where membership decreased about 13% (Heineck, 2001).

'Faith intensity', i.e. the question on the importance of belief/faith in one's life, was asked for in 1994, 1998 and 1999.[18] Answers to this question were to be given on a scale ranging from 1 *'very important'* to 4 *'not important'*. The strength of belief is assumed to be a stronger indicator of labor related behavior than mere denominational affiliation. The 1998 information on the intensity of faith is thus matched to individual data from 1997 for a cross-

[16] All numbers noted are drawn from a scientific online information service on religion in Germany, see www.remid.de (mainly in German).

[17] Iannaccone´s interest (1992) is on the examination of the impact of 'sect-like' religious groups and sects in comparison to church-like groups. Nevertheless, it might be suggested that even in a rather secular country like Germany, expectations, for example, to attend services may be higher among Roman Catholics and Muslims compared to Protestants.

[18] Cameron (1999), in his analysis of the frequency of religious participation in the UK, adapts the Azzi-Ehrenberg allocation-of-time framework by including 'strength of faith' as 'God Appreciation Capital'. Here, 'strength of faith' and 'religious belief' are used interchangeably for the implied religious conviction.

sectional analysis, willing to accept this potential source of, presumably only small, bias.

Furthermore, information on church attendance is available from 1990, 1992 and continuously from 1994 to 2001. The frequency of participation mainly is given on a scale ranging from 1 *'at least once a week'* to 4 *'never'*. In 1995 and 1998, however, answers were extended to a fifth category *'daily'*. Answers to this item have been recoded to fit the *'at least once a week'* category. Note again that using participation information may raise potential endogeneity problems with the intensity of faith: Among other religious 'inputs', a high level of church attendance contributes to form the so-called 'religious human capital' (Iannaccone, 1998), i.e. a stock of religious knowledge and the familiarity with church ritual and doctrines etc. This type of human capital in turn increases the level of attendance because the satisfaction an individual receives from participation will increase with increasing religious capital. Church attendance and strength of belief will thus be determined simultaneously and might lead to biased estimations if included both as exogenous variable. Therefore, the indicators are used in separate equation specifications.

A first impression is given by some descriptive data in Table 3.6, already grasping some of the theoretical implications. That is, there is preliminary evidence that married women who belong to presumably stricter religious groups are less often employed than their respective counterparts. Women, for example, who belong to other religious groups – under it mainly Muslims[19] – are prevailingly not employed (about 72%). They are followed by women who are members of other Christian churches or groups, i.e. Baptists, Methodists and others (almost 59%). On the contrary, women without religion are much more often full-time employed than those with denominational affiliation. A similar structure is found for women who rather attach importance to religion in their lives. 64% of those women, who say that belief is very important, are not employed, compared to only about 43% of those women to whom religion is of no importance. Furthermore, only some 12% of the believers work full-time, whereas almost 40% of the non-religious women have a full-time job.

A likewise picture shows for religious participation: 33% of women, who never attend church, hold full-time positions, whereas only about 13% of women attending church at least once a week are full-time employed. While the findings for part-time occupation are less clear cut, it is again for non-employed women. Here, about 60% are regularly participating in religious activities while some 45% are never attending church.

[19] Although Muslims are not identifiable in the 1997 sub-sample, they were so in 1990 and then accounted for 95% of those individuals stating to belong to any other religious church or group.

With regard to both the 'bargaining-effect' and the 'marital-stability-effect' outlined above, only some of the theoretical implications are testable directly in this analysis due to sample size limitations. Couples, in which spouses do not share the same denominational affiliation, sum up to about 20 percent in the sample. Allocating these cases into separate dummy variables indicating the husbands' respective religion to test for either more or less labor participation of the wives would make estimation questionable due to the subsequent too small number of cases.

Table 3.6: Employment status by denominational affiliation, strength of belief and frequency of church attendance; Married women in Germany

	Employment status in 1997 (row %)		
	Full-time	Part-time	Not employed
Denominational affiliation			
Catholic	18.7	29.1	52.2
Protestant	19.7	31.4	48.9
Other Christian	18.2	(23.1)	58.7
Other religious group	(11.4)	(16.7)	71.9
No denomination	44.0	16.4	39.6
Importance of religion/belief			
Very important	12.4	23.6	64.0
Important	21.0	27.8	51.2
Less important	22.8	30.9	46.3
Not important at all	39.3	18.2	42.5
Frequency of church attendance			
At least once a week	12.7	28.1	59.2
At least once a month	15.2	21.1	63.7
Infrequently	19.1	33.2	47.7
Never	33.0	22.1	44.9
Total	23.4	26.7	49.9

Notes: ( ) sample includes less than 30 cases.
Source: GSOEP, 1997 and 1998; own calculations, weighted.

That is, testing for both 'bargaining-effect' and 'stability-effect', this analysis has to rely on the information about inner-faith unions and can thus only indirectly derive implications of outer-marriages regarding the labor market outcomes of women. The cross-sectional analysis then is based on a sample of 1,763 observations of married women aged 25 to 55 years old.

This age is chosen to focus on women who have completed their formal education but are still young enough to rule out substantial outflows from the labor force into early or regular retirement. There are two samples used for the panel analyses: The first sample uses 1,245 person-year observations and is based on data from the three waves that supply information about the strength of religious belief (1994, 1998 and 1999). The second sample uses data from 1992 and 1994 to 2001 summing up to 8,773 person-year observations to explore the effect of church attendance on labor supply.[20]

3.3.2.1 Cross-sectional analysis

A familiar way to examine labor participation would be to model the binary choice decision whether or not to supply labor. This could then be estimated by, for example, the probit model. Here, information is used that is available on the extent of labor supplied by married women. This is done because religious attitudes, given a pro-labor decision, may furthermore influence the question on how many hours should be supplied. This might, for example, be of relevance when children are to be cared for. Thus, a multinomial logit model is applied to the cross-sectional data as the decision whether or not and if yes, whether to supply labor either as full- or part-time occupation can appropriately be estimated by this model.

Let y be the employment status of individual i, it can be observed as

$$y_i = \begin{cases} 1 = \\ 2 = \text{if the individual is} \\ 3 = \end{cases} \begin{cases} \text{employed full time} \\ \text{employed part time} \\ \text{not employed .} \end{cases}$$

The estimable probability model then is (Long 1997):

$$\Pr(y_i = m \,|\, \mathbf{x}_i) = \frac{\exp(\mathbf{x}_i \boldsymbol{ß}_m)}{\sum_{j=1}^{J} \exp(\mathbf{x}_i \boldsymbol{ß}_j)} \tag{3.3}$$

where $\boldsymbol{ß}_1 = 0$, $m = 1, 2, 3, j = 1, ..., m$.

$\mathbf{x}_i$ is the vector of explanatory variables that are assumed to affect women's decision on labor participation. It hence also includes the variables that are related to denominational affiliation, strength of belief or church attendance. Similar to the binary model used out in the preceding

[20] Note that data from 1990 are not used in this analysis. This is because indicators for self-reported health status and registered disability status, which are assumend to be important control variables, are not available.

section, the magnitudes of the effects in the model can be assessed by measuring the discrete change in probabilities when x_k changes from the starting value x_S to the ending value x_E:

$$\frac{\Delta Pr(y = m \mid \mathbf{x})}{\Delta x_k} = Pr(y = m \mid \mathbf{x}, x_k = x_E) - Pr(y = m \mid \mathbf{x}, x_k = x_S), \tag{3.4}$$

where $\Pr(y = m \mid \mathbf{x}, x_k)$ is the probability that $y = m$ given $\mathbf{x}$, noting the specific value for x_k.

This approach, however, is limited in two ways. First, the amount of change in the probability depends on the amount of change in x_k, the starting value of x_k and the values of all other variables. Consequently, at different levels of these variables, the changes will be different. Second, the dynamics among the dependent outcomes are not indicated by measures of discrete change. This latter can be addressed using the odds formulation of the multinomial logit model. The odds of outcome *m* versus outcome *n* given **x** are indicated by

$$\Omega_{m|n}(\mathbf{x}) = \exp(\mathbf{x}ß_{m|n}) \tag{3.5}$$

and equal

$$\Omega_{m|n}(\mathbf{x}_i) = \frac{\Pr(y_i = m \mid \mathbf{x}_i)}{\Pr(y_i = n \mid \mathbf{x}_i)} = \frac{\frac{\exp(\mathbf{x}_i ß_m)}{\sum_{j=1}^{J} \exp(\mathbf{x}_i ß_j)}}{\frac{\exp(\mathbf{x}_i ß_n)}{\sum_{j=1}^{J} \exp(\mathbf{x}_i ß_j)}} = \frac{\exp(\mathbf{x}_i ß_m)}{\exp(\mathbf{x}_i ß_n)}. \tag{3.6}$$

Expanding $\exp(\mathbf{x}ß_{m|n})$ and changing x_k by d leads to

$$\Omega_{m|n}(\mathbf{x}, x_k + d) = e^{b_{0,m|n}} e^{b_{1,m|n} x_1} \cdots e^{b_{k,m|n} x_k} e^{b_{k,m|n} x_d} \cdots e^{b_{K,m|n} x_K} \tag{3.7}$$

The effect of x_k can then be measured by the ratio of the odds before and after the change in x_k:

$$\frac{\Omega_{m|n}(\mathbf{x}, x_k + d)}{\Omega_{m|n}(\mathbf{x}, x_k)} = e^{b_{k,m|n} x_d} \tag{3.8}$$

Therefore, the change in the odds for a change in x_k does not depend on the level of x_k or on the level of any other variable.

However, the calculation of changes in the odds results in a large number of coefficients that makes it difficult to see patterns in the results. Therefore, to ease the understanding of the

findings, a graphical tool is employed and enhanced odds ratio plots of the results are presented (Long, 1997). These plots then include both the discrete change in the base probabilities and the factor changes in the odds.

3.3.2.2 Panel analysis

Exploring the longitudinal structure of the data offers the possibility to account for unobservable individual-specific heterogeneity. As outlined in Chapter 2 (equations 2.8 to 2.11), results from the cross-sectional analysis might be biased in the presence of unobservable characteristics. Among other unobservable influences it can, for example, be assumed that tastes towards work vary across the women examined here. Such tastes, however, are difficult to measure. It may then be possible that the variables used to capture the effects of religion reflect these propensities to paid employment instead of the effects of denominational affiliation or strength of belief. The major advantage of the panel estimation methods employed is that they account for individual-specific characteristics that are not observable. Put simply, as shown in detail above, these techniques allow for the inclusion of as many individual specific effects in the regression as there are individuals in the sample.[21] It is then possible to estimate each individual specific coefficient. This results in a large set of coefficients indicating each individual's specific effect that is constant over time. It is best imagined as the particular individual's effect shifting the overall regression constant. Interpretation would therefore turn out to be cumbersome when N is large. However, interpretation is unnecessary in most of the cases. In general, the panel estimators used 'differentiate out' individual-specific heterogeneity while still accounting for it. Therefore, the bias that can possibly exist in cross-sectional estimations is removed.

As the number of hours supplied as labor is inherently ordered, either ordered probit or logit models or, at least, models for multinomial outcomes would be the appropriate econometric techniques to apply also to the longitudinal data. Furthermore, as it is plausible to assume that the individual-specific effect is correlated with the set of regressors, the fixed-effect estimator should be preferred. However, at present there is a ready formulation of the ordered model for the random effects case only[22] but not for the fixed effects case. The employment information therefore is collapsed into the employed/not employed dichotomy and the fixed effects logit model as outlined in the chapter on methodology is applied. The following underlying latent model is considered (see also Greene, 2003):

[21] For technical details, see Chapter 2 and the literature referred to there.
[22] See Butler and Moffitt (1982). For an application on church attendance rates see Heineck (2001).

$$y_{it}^{*} = \alpha_i + \mathbf{x}_{it}'\beta + \nu_{it}, \qquad i = 1, \ldots, N, \; t = 1, \ldots, T \tag{3.9}$$

where y_{it}^{*} is the continuous but unobserved taste to work of individual i in period t, $\mathbf{x}_{it}$ is a vector of explanatory variables and α_i is the constant over time fixed effect that accounts for the intrinsic differences in tastes to work and unobserved explanatory variables. ν_{it} is the stochastic error term that is assumed to be *iid*.

However, y_{it}^{*} is unobservable. Instead, one observes

$$y_{it} = \begin{cases} 1 \text{ if } y_{it}^{*} > 0 \\ 0 \text{ else}. \end{cases} \tag{3.10}$$

Assuming that ν_{it} is distributed independently logistic, it follows that

$$\mathrm{P}(y_{it} = 1 \mid x_{it}, \alpha_i) = \frac{\exp(\alpha_i + \mathbf{x}_{it}'\beta)}{1 + \exp(\alpha_i + \mathbf{x}_{it}'\beta)}. \tag{3.11}$$

As shown in Chapter 2, this fixed effects model can then be estimated by conditional maximum likelihood (Chamberlain, 1980).

Explanatory variables used in the cross-sectional analysis

Both denominational affiliation and strength of religious belief of both partners are expected to affect the employment decision of married women. Furthermore, similar to religious belief itself, frequency of church attendance is used as proxy for religious human capital. Therefore, three model specifications are estimated: First, in specification 1 (M1), the denominational composition of the partnership is used to test for both the 'bargaining effect' and the 'marital stability effect'. Therefore, dummy variables are employed that represent the different religious affiliations and furthermore show whether both partners belong to the respective religious group. The reference category is the homogamous Catholic union where the traditional inner-household allocation of labor is assumed to play an important role.

Depending on the other groups' strictness, different effects are expected for homogamous partnerships. Traditional attitudes toward female labor participation should also show for Muslims, a negative effect on labor participation is therefore expected. Other Christian groups are not distinguished in particular. It is hence impossible to differ between, for example, Orthodox affiliation and other maybe more exclusivist-like affiliations. No prior statements

can thus be made. As for Protestant partnerships, one might be tempted to connect expectations to the famous Protestant Ethic of Max Weber. However, and despite its popularity, empirical evidence in the literature is far from clear cut (Iannaccone, 1998). Therefore, the positive effect that would usually be anticipated is restricted here: At least, no negative effects should show. In turn, results for partners that both have no religious affiliation are expected to have a positive effect.

As the sample size does not allow to control for the particular affiliation of the husband, expectations on partnerships where wife and husband have different religions are more difficult to grasp. One exception might be unions of Muslim women with men of any other affiliation. As pointed out above, overcoming proscriptions against 'outer-marriages' and hence overcoming negative attitudes towards women in paid employment should be accompanied with positive effects on female labor participation.

Model specification 2 (M2) employs the indicator on religious belief. This is because it is assumed that in a more secular country like Germany it is not denominational affiliation itself that affects tastes to work. It rather is the individual's religious conviction that plays an important role in its life. That is, assuming that the religious dogma taught in the respective church or group is rooted in the person's everyday life, effects on individual behavior are expected to be observable. Therefore, dummy variables that interact affiliation with belief and non-belief are used. Two mainline results should be observed. First, as above, there might be different effects due to differences of the groups' strictness. Furthermore, non-believers are assumed to have a higher propensity to work compared to believers.

The findings for church attendance in Model specification 3 (M3) should not substantially differ from that of specification 2, as the frequency of religious participation can be used as proxy for revealed preferences and is henceforth included in the analysis to test for robustness of the expected results.

A variety of control variables are used in both cross-sectional and panel analyses. To economize on space, both expectations on results and findings from the estimations are not discussed in further detail. In particular, common labor related variables included are: age, age squared, duration of education as proxy for accumulated human capital, and non-labor income. Furthermore, the number of both small children up to age 6 and children between age 7 and 16 are included.[23] Health is controlled for by using self reported health status and a

[23] Lehrer (1995) examines the effect of religion on female labor participation dividing the sample in three stages

dummy capturing whether the individual is registered disabled. Furthermore, dummies for municipal size are included to control for possible social ties, also including religious attitudes toward female labor participation. In addition, another dummy variable is included controlling whether the individual is a West-German or East-German citizen. This is done, because labor markets in both parts of Germany still are quite different. As shown in the preceding section, female labor participation in East Germany in general and full-time employment in particular is higher compared to West Germany, despite East Germany's structural problems and its high unemployment.[24]

Explanatory variables used in the longitudinal analysis

The control variables just illustrated for the cross-sectional analyses are also employed in the panel estimations. Denominational affiliation is omitted in the longitudinal analyses. This is done for two reasons. First, it is asked for in the GSOEP in 1990 and 1997 only. Employing the fixed effects estimator on data from two waves might result in undesirable findings. As the estimator then is based on the intrapersonal change over time, using two points in time would measure the effects of this change. This, however, is not the intention here.

Information on the strength of religious belief is available for three waves; data on the frequency of church attendance are drawn from eight waves. Therefore, two sets of models are estimated: The first part of the equations analyzes the effects of religious belief on female labor participation. Therefore, dummy variables indicating the importance of religion in both the wife's and the husband's lives are used. Several model specifications are applied. First, estimations that separately include the wife's belief (M1) and the husband's belief respectively (M2) are run. The belief variables of both wife and husband are included in M3.

Collapsing the information on religious belief, interaction-terms are generated to further analyze the effects of the partners composition regarding to religious belief. Controlling for the wife's faith, variables are used that simultaneously account for the husband's religious belief (M4). Somewhat more crude is the second set of variables which indicate whether both partners have a (strong) religious belief, whether it only is the wife to whom religion is of

in the life cycle: period 1, when no children yet are in the household, period 2, in which small children are present in the household and the youngest is under age 6 and period 3, when all the children have left the household. This separation is based on the assumption that some religions emphasize the domestic role for women especially in connection to the presence of children and young children particularly. With no children present in the household, religious composition of unions should result in a relatively weak influence on the wife's labor supply. However, effects emerge or get stronger when young children arrive. In this analysis, though, limitations of sample size impede a further exploration of this additional theoretical strand.

[24] Further experiments with control variables for a possible North-South or Protestant-Catholic divide mainly did not yield other than trivial results and thus are not presented.

importance or whether it is the husband (M5). In both case, the reference categoy is the couple where both partners do not think that religious belief is important.

Analogously, several equations are estimated assessing the effect of religious participation on the wife's labor supply. A first part includes dummy variables that indicate the frequency of male and female church attendance. Again, effects of male and female participation are calculated separately (M1 and M2) and together (M3). A second part of equations collapses the data into variables that simultaneously represent the wife's and the husband's attendance rates. Again, specification M4 is somewhat more detailed than specification M5.

3.3.3. Empirical results

First, note that the results for the control variables from both the cross-sectional and the panel analyses are all well behaving and will hence not be discussed. Full results from the multinomial logit models are shown in the Appendix. The findings for the effects in the cross-sectional analysis are presented graphically, using an enhanced odds-ratio plot (Long, 1997). In the case of the multinomial logit model estimated, this allows for the presentation of two aspects of interest: First, the dynamics among the dependent outcomes can be shown by plotting the factor changes in the odds ratios. That is, the effect of a covariate on the possible outcomes of the dependent variable is visualized by the horizontal distance between letters representing the different outcomes. If a regressor increases the odds of, for example, outcome A over outcome B, then A is plotted to the right of B and vice versa. A dotted line is included if the variable does not differentiate the outcomes, i.e. if the coefficient is not statistically significant.

However, a substantive impact of a variable would be small if, for example, the odds would increase by a factor of 10 but if the current odds would be 1 in 10,000. Therefore, second, the baseline probabilities have to be taken into account as well. Therefore, the discrete change in the probabilities of the outcomes is represented by the size of the letters that depict the particular outcome. That is, the heights of the letters are made proportional to the square root of the discrete change in the odds.[25] However, it has to be kept in mind that the discrete change depends on the values of the data at hand.

[25] The square root is used since letters are approximately square, and thus the area of the letters is proportional to the magnitude of the discrete change.

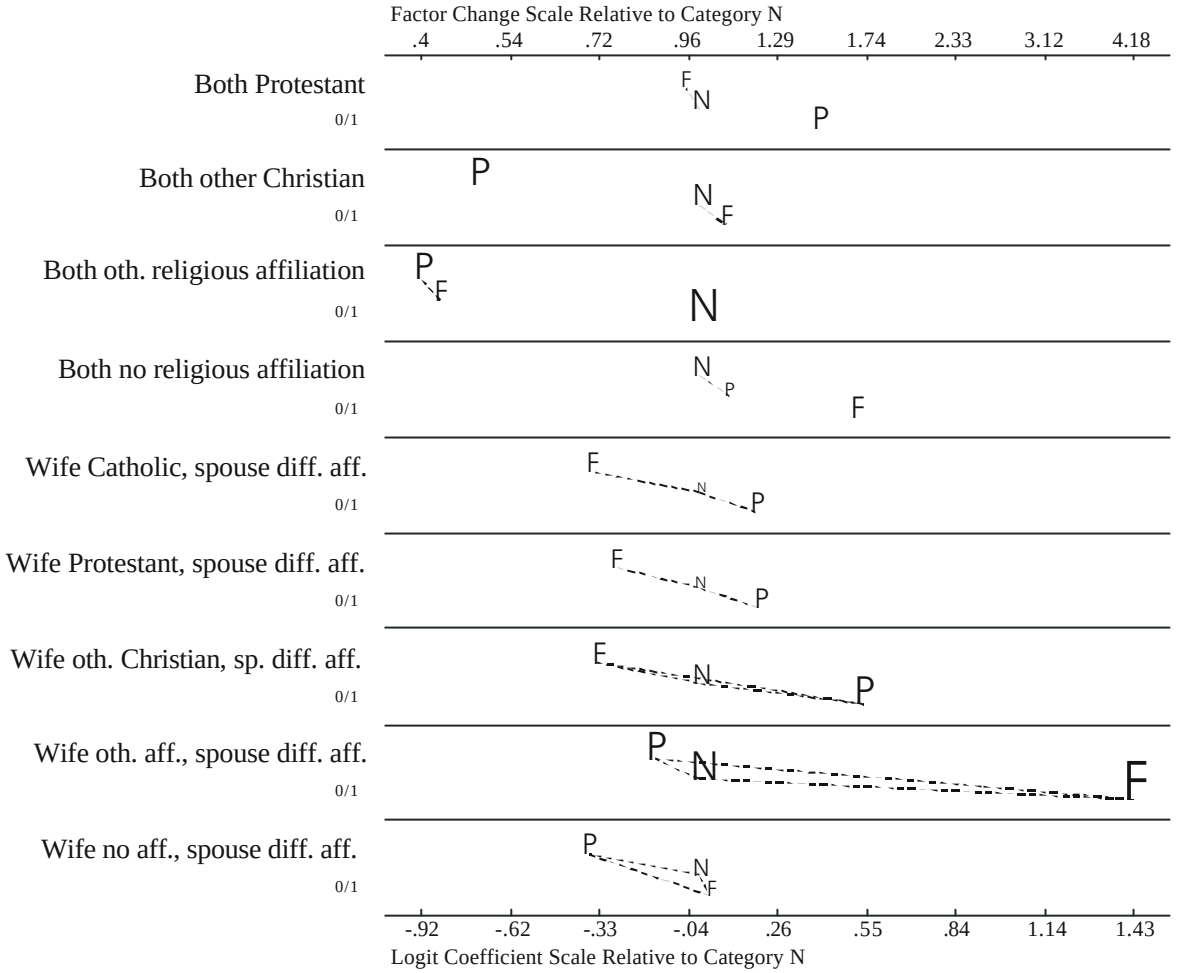

Figure 3.5: Enhanced odds ratio plot of the effect of homogenous unions and intermarriages
Source: GSOEP, 1997 and 1998; own calculations.

Figure 3.5 shows the effect of homogenous unions and intermarriages on female labor supply. In particular, the outcomes analyzed are full-time employment (F), part-time employment (P), and being not employed (N). The omitted reference group is the homogamous Catholic union. Consider first the cases where partners have the same affiliation. The odds of having a part-time job relative to either being employed full-time or even being not employed increase by a factor of about 1.5 if both spouses are Protestant.[26] When both partners have any other Christian affiliation a reverse finding exists. That is, the odds of being in part-time occupation decrease by a factor of about 0.5 relative to the other outcomes. For other Christian women there is also a decrease in the predicted probability of part-time employment of -0.15.[27] In both cases, i.e. being Protestant or other Christian, the odds of N over F, however, are not

[26] Factor changes in the odds are printed at the top of the figure. The values on this scale equal to the exponential of the values of the logit coefficients that are plotted at the bottom scale.
[27] To further economize on space, results for the changes in predicted probabilities are not shown.

influenced.

Being a woman in unions in which both partners are not affiliated with any religion increases the odds of having a full-time job relative to both being not employed or working part-time with a factor change of 1.7. Another result that supports prior expectations is the finding for women who have any other religious affiliation, i.e. who are Muslim, and whose spouses are also Muslim. The odds of both full- and part-time employment over being not employed clearly decrease by a factor of about 0.4.

Furthermore, the probability of being not employed increases more than the probability of part-time employment and particularly full-time employment, with all other variables held at their means: The predicted probability increases by 0.22. However, one has to remember that this change depends on the given set of variables and might therefore be different for any other set of data. A similar result is found for Muslim women whose husbands have a different religious affiliation. The probability of working full-time increases by 0.33 and is thus in line with expectations. Women in such 'outer-marriages' counteract against cultural customs and habits that also include traditional attitudes towards female labor participation. However, the odds of all three outcomes are not differentiated statistically.

The somewhat vague expectations on the other 'outer-marriages' show through also in the findings. No particular outcome is found to be differentiated statistically for both women without religious affiliation and other Christian women whose spouses belong to other religious groups. The odds of having a part-time occupation relative to full-time employment, however, increase for both Catholic and Protestant women whose partners have a different affiliation.

As argued above, denominational affiliation may only be a weak indicator of the possible influence of religion in a person's life. In order to tackle the different attitudes towards female labor participation across religious groups, model specification M2 uses variables that interact religious affiliation with the strength of belief. The estimation therefore includes believers and non-believers. Analogously to specification M1, the group of Catholic women who have a very strong or strong belief is the omitted reference category. Note furthermore that there are too few observations on 'no affiliation and believer' in the sample. A corresponding indicator could hence not be used in the estimation.

Comparing M1 and M2, there are some similarities in the findings: Compared to their

Catholic counterparts, female Protestant believers are more likely to be part-time employed relative to full-time employment or not being employed (Figure 3.6).[28] The odds increase by a factor change of about 1.7. On the other hand, the odds of being employed over not being employed decrease for Muslim women with strong belief by a factor change of about 0.4 to 0.5. Again, there is no differentiation between full-time and part-time occupation for Muslim women and there is also an increase by 0.19 in the probability of being not employed. Different to the above findings, being a believing woman with other Christian affiliation does not influence the odds of any outcome over the other.

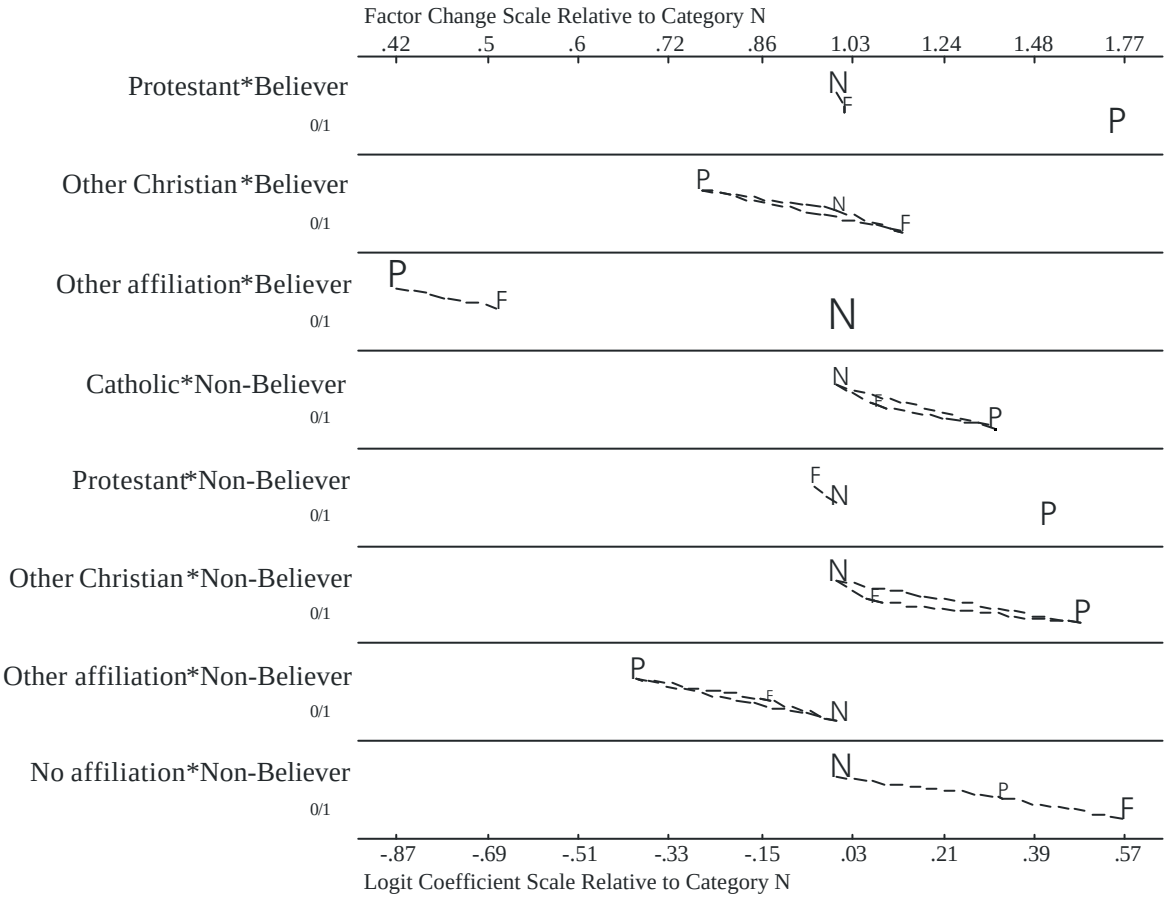

Figure 3.6: Enhanced odds ratio plot of the effect of denominational affiliation and religious belief
Source: GSOEP, 1997 and 1998; own calculations.

Regarding women without religious belief, the differentiation between the employment outcomes and the base category N is more distinct at first glance. The odds of having a part-time job relative to being not employed seem to increase for all but Muslim women by factor changes of 1.4 to 1.5. These effects, however, are statistically significant only for Catholic

[28] Note that due to the different scales in Figure 3.5 to Figure 3.7 the distances only appear to be greater.

and Protestant women who do not believe. There is furthermore no significant effect for Muslim women and other Christian women. However, women who have no affiliation and do not attach importance to religion in their life are much more likely to work full-time relative to not working at all. The factor increases by 1.8.

Figure 3.7 plots the results for specification M3 including indicators for the frequency of religious participation that again is interacted with denominational affiliation. Churchgoers and non-churchgoers are referred to the omitted category: the churchgoing Catholic woman. As religious participation might be interpreted as revealed preferences, it is not too surprising that the findings are not much different compared to those of specification M2.

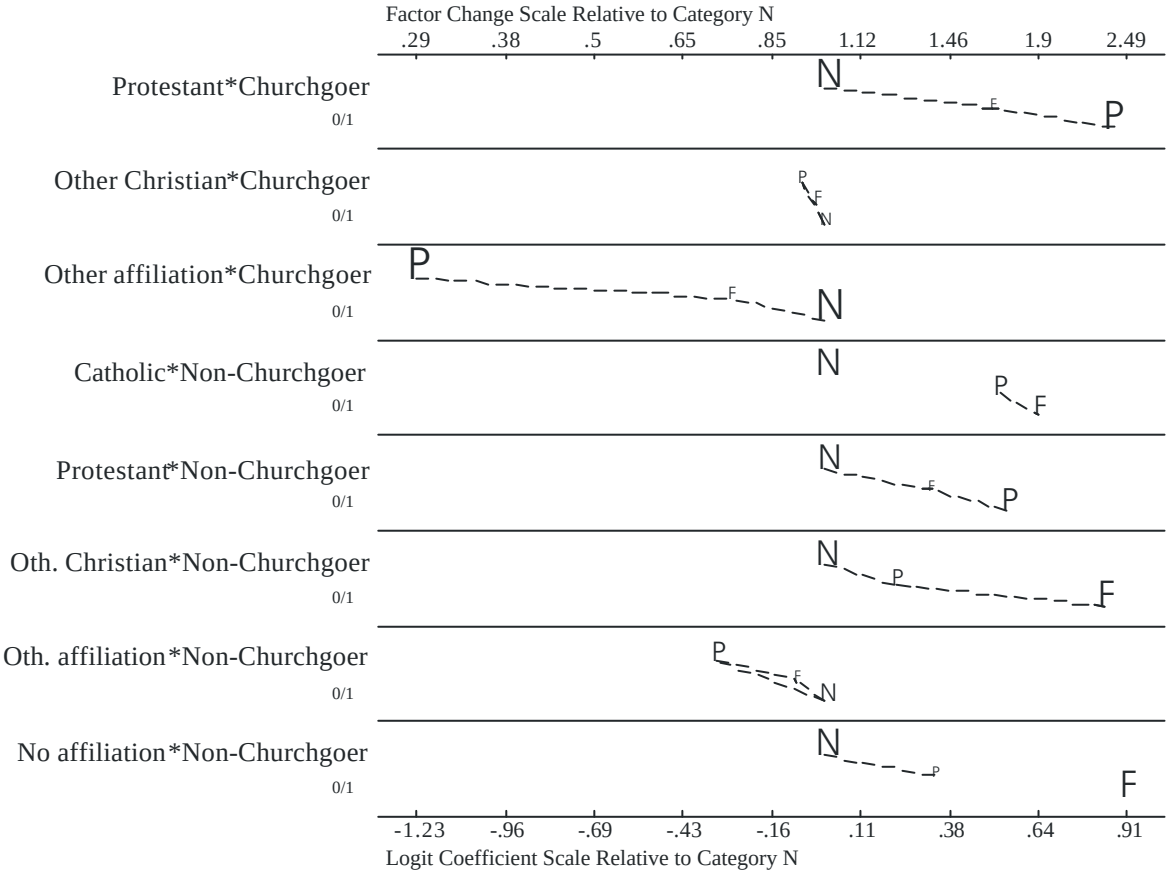

Figure 3.7: Enhanced odds ratio plot of the effect of church attendance and non-attendance
Source: GSOEP, 1997 and 1998; own calculations.

Again, the odds of having a part-time occupation relative to not working are increasing for Protestant women who regularly attend church by a factor change of 2.4. Furthermore, there is an increase in predicted probability of part-time employment by 0.16 and a decrease of being not employed by -0.17. No statistical differentiation between the three outcomes is found for

other Christian women who regularly attend church and, holding all other variables at their mean, the discrete changes in the predicted probabilities are rather small. In accordance with the above findings, the odds of having a part-time job relative to being not employed decreases for Muslim women who are frequently participating in religious activities. While the odds decrease by a factor change of 0.3 there is also a decrease in predicted probability of part-time occupation by -0.2. On the other hand, the probability of being out of labor force increases by 0.18. However, unlike the results from M1 and M2, full-time employment is neither differentiated from being not employed nor part-time employment.

Referring to women who are not regularly attending church, the patterns shown in Figure 3.6 are reinforced. First, like above, the outcomes are not statistically differentiated for Muslim women. However, the odds of having a part-time job relative to N increase for Protestant women by a factor change of 1.7. Furthermore, and in contrast to the statistically insignificant effect in M2, the odds of being full-time employed relative to not working are clearly increasing for other Christian females and women without religious affiliation. The factor changes here are 2.3 and 2.5 respectively. The odds of being employed either full- or part-time relative to not being employed increase also for Catholic women who do not go to church by factor changes of 1.9 and 1.7 respectively.

Summing up, there is at least some evidence for possible effects of religion on female labor supply decisions. However, the results from the cross-sectional analyses just presented might be biased as unobservable individual heterogeneity that differs across individuals but does not vary over time is not controlled for. In contrast, the following results from the longitudinal estimations account for these individual specific effects.

Examining the results from the panel analyses in Table 3.7 and Table 3.8 one has to keep in mind that only those observations could be used for the fixed effects estimation where there is variation in the data over time. That is, information on women who were either employed or not employed in all of the waves used is dropped out of the conditional likelihood function. This also explains the substantial decrease in the number of observations. The models that analyze the effects of religious belief on labor participation use 1,245 observations out of 7,543 observations that are available for the three waves used. Analyzing the effect of religious participation on the labor decision of women, there are 8,773 observations out of 21,578 observations from eight waves.

Table 3.7: Strength of religious belief and employment participation, fixed effects logit estimation including control variables

	M1	M2	M3
W: Faith is very important	-0.3361	—	-0.0533
	(0.5191)		(0.5468)
W: Faith is important	-0.0452	—	0.0185
	(0.3727)		(0.3853)
W: Faith is less important	0.1353	—	0.1396
	(0.2825)		(0.2875)
W: Faith is not important	*(omitted reference category)*		
H: Faith is very important	—	-1.1696**	-1.1324*
		(0.5620)	(0.5875)
H: Faith is important	—	-0.3141	-0.3042
		(0.3512)	(0.3620)
H: Faith is less important	—	0.0494	0.0409
		(0.2435)	(0.2481)
H: Faith is not important	*(omitted reference category)*		
Log likelihood	-305.47	-303.27	-303.04
Chi^2	283.47	287.87	288.34

	M4	M5
W: F. is very important*H: F. is (very) important	-0.8535	—
	(0.5941)	
W: F. is very important*H: F. is less/not important	0.8502	—
	(0.9715)	
W: F. is important*H: F. is (very) important	-0.3445	—
	(0.4533)	
W: F. is important*H: F. is less/not important	0.0375	—
	(0.4017)	
W: F. is less important*H: F. is (very) important	-0.0997	—
	(0.4713)	
W: F. is less important*H: F. is less/not important	0.1231	—
	(0.2866)	
W: F. is less/not important*H: F. is (very) important	-1.0497	—
	(1.0942)	
W: F. is less/not important*H: F. is less/not important	*(omitted reference category)*	
W: F. is (very) important*H: F. is (very) important	—	-0.5491
		(0.3658)
W: F. is (very) important*H: F. is less/not important	—	-0.0757
		(0.3032)
W: F. is less/not important* H: F. is (very) important	—	-0.3172
		(0.3831)
W: F. is less/not important*H: F. is less/not important	*(omitted reference category)*	
Log likelihood	-303.32	-304.85
Chi^2	287.78	284.70

Notes: Standard errors in parentheses.
Statistical significance levels: * significant at 10%; ** significant at 5%; *** significant at 1%

Source: GSOEP, 1994, 1998 and 1999. Own calculations.

Table 3.7 shows the findings for the effects of religious belief on female labor participation;

Table 3.8 presents the results for the effects of church attendance. Furthermore, the husband's strength of belief and his frequency of religious participation as well as the interaction-terms are included to indirectly test for the 'bargaining effect' and the 'marital-stability' effect.

Compared to the results obtained from the cross-sectional analysis the findings for the longitudinal estimations tell a somewhat different story.[29] In Table 3.7, the influence of the women's belief seems to be eliminated: Although the coefficients for strong believing and believing women are mainly negative, the effects are not statistically different from zero. However, this might be explained by the fact that women's faith is more stable over time. There may hence be too little variation in the data that would be needed to get substantial results from the fixed effects estimator. Furthermore, using 1,245 observations for three waves, it is obvious that the sample size is far from extensive.

Regarding the effect of the husbands' belief there is evidence in support of prior expectations. In particular, in both model specification 2 and specification 3, the presence of a husband with a strong belief affects the wife's employment decision significantly negative. It furthermore makes no big difference whether the indicators on male belief are used separately or together with the female's indicators. The logit changes by about -1.17 and -1.13 respectively which corresponds to a decrease in the odds ratios by a factor of about 0.3. However, when including the belief dummies for both men and women, the statistical significance level decreases from 5% to 10%. Furthermore, negative coefficients are found for husbands to whom faith is important. These coefficients are not statistically significant though.

Examining the results from the interaction-terms in the lower half of Table 3.7 the picture again slightly changes a little. Independently from the wife's strength of faith, all interaction-variables that represent a (strong) religious belief of the husband show the expected negative sign. However, none of those coefficients is statistcally different from zero. Still, it should be noted that in the case of both partners having a strong religious belief, the *z*-values are somewhat 'close' to statistical significance (-1.44 in specification M4 and -1.50 in M5). Given a larger sample size, findings might then turn non-trivial.

[29] Again, the coefficients for the control variables all behave as one would expect and are not discussed, but are given in the Appendix.

Table 3.8: Church attendance and employment participation, fixed effects logit estimation including control variables

	M1	M2	M3
W: attends church at least once a week	-0.4115**	—	-0.3613*
	(0.1794)		(0.1963)
W: attends church once a month	-0.0650	—	-0.1021
	(0.1377)		(0.1493)
W: attends church less regular	0.0836	—	0.0404
	(0.0939)		(0.1006)
W: never attends church	*(omitted reference category)*		
H: attends church once a week	—	-0.3270*	-0.1674
		(0.1964)	(0.2146)
H: attends church once a month	—	0.0558	0.1208
		(0.1511)	(0.1641)
H: attends church less regular	—	0.1436	0.1343
		(0.0959)	(0.1027)
H: never attends church	*(omitted reference category)*		
Log likelihood	-2,674.07	-2,674.39	-2,671.98
Chi^2	1,196.82	1,196.18	1,201.00

	M4	M5
W: once a week*H: once a week/month	-0.3691*	—
	(0.2070)	
W: once a week*H: less often/never	-0.5923**	—
	(0.2924)	
W: once a month*H: once a week/month	-0.1266	—
	(0.1737)	
W: once a month*H: less often/never	0.0063	—
	(0.1726)	
W: less often*H: once a week/month	0.0205	—
	(0.2124)	
W: less often*H: less often/never	0.0930	—
	(0.0969)	
W: never*H: once a week/month	0.0597	—
	(0.3142)	
W: never*H: less often/never	*(omitted reference category)*	
W: once a week/month*H: once a week/month	—	-0.2525*
		(0.1469)
W: once a week/month*H: less often/never	—	-0.1692
		(0.1468)
W: less often/never*H: once a week/month	—	-0.0138
		(0.1846)
W: less often/never*H: less often/never	*(omitted reference category)*	
Log likelihood	-2,673.41	-2,676.48
Chi^2	1,198.15	1,192.00

Notes: Standard errors in parentheses.
Statistical significance levels: * significant at 10%; ** significant at 5%; *** significant at 1%

Source: GSOEP, 1992, 1994, 1998 to 2001. Own calculations.

Including the frequency of religious participation as a proxy for religious belief, the results

corroborate the above findings (Table 3.8). First, when using the indicators of church attendance separately in the regressions, the findings show that frequent attendance of both wife and husband affects the likelihood of the wife's employment participation negatively (M1 and M2).

As the husband's effect is weak, it is not surprising that his level of church attendance does not affect the wife's decision on labor participation anymore when using the indicators together in one regression equation.

The result for the wife, however, is quite robust: While the statistical significance decreases from 10%-level to the 5%-level, the finding still indicates that wives who attend church at least once a week are less likely to be in paid employment. The logit changes about -0.4 each corresponding to an odds ratio decrease by a factor of about 0.6. While monthly participation in religious activities does not affect women's labor participation statistically, the coefficients have negative signs, as would be expected.

Furthermore, the findings for the interaction-terms also point towards a negative influence of a high level of religious participation on the likelihood of wives' employment. Again, women who attend church once a week or once a month are less likely to be employed compared to couples which do not participate in religious activities. This result is rather independent from the level of the husband's church attendance. The exception is found for specification M5, where the result for a female who regularly attends church but whose husband does not is not statistically significant: As expected, the sign is negative, the *z*-value, however, is only -1.15. Nevertheless, it may altogether be argued that regular church attendance by married women embeds attitudes towards female labor participation that affect their decision on labor supply negatively.

3.4. The impact of religion on male earnings in Germany

As shown in the preceding two sections, religion quite likely influences underlying economic attitudes towards female labor supply as well as the labor participation of women itself. As could be seen further, it is men and adherents to more hierarchical religious groups who are, on average, more traditional pertaining to the inner-household allocation of labor. As male

labor participation is more homogenous than female employment, the focus in this chapter is on men's earnings rather than women's. The general idea behind this is the assumption that male attitudes and mechanisms towards female participation in paid employment might well result in differences in labor market behavior and therefore also in differences in earnings. However, it is *a priori* not possible to predict whether religiously involved individuals have higher or lower earnings than others.

It might be that men with a strong religious belief are even more in favor of the 'male-breadwinner' gender role model than the average male. Those males might therefore be more likely to take on the responsibility to financially care for the family. This might subsequently be associated with higher efforts on the labor market which, *ceteris paribus*, may then result in differences in earnings for religiously active males.

Furthermore, education might also be a channel through which religion might affect individuals' earnings. Schools that are run by churches might differ in, for example, the set of ethical or moral norms and values that might transmit in differences in individuals' behavior also on the labor market. On the other hand, it might as well be argued that individuals who uphold religious, and in particular Christian traditions, do not emphasize the accumulation of material wealth. Lower earnings might therefore be observable.

However, despite the range of possible theoretical explanations that are further presented in the next subsection, there is only little research on the relationship between religion and individuals' earnings or religion and aggregate income.

This section adds threefold to the existing literature. First, data from Germany are used for the first time, allowing for transatlantic comparisons, as previous research examines datasets from the US or Canada only. Second, and more importantly, the longitudinal structure of the German Socio-Economic Panel (GSOEP) is again used. This allows to apply panel estimation techniques that account for individual heterogenity, something that has hitherto not been accounted for in the existing literature. Third, it is not alone denominational affiliation or church membership and its impact, that is analyzed in this section. Adding to previous work, two more indicators of individuals' religious behavior are included for the first time in analyses of the effects of religion on earnings. These proxies are the individuals' strength of religious belief as well as the individuals' church attendance rate.

Following these introductory remarks, subsection 3.4.1 discusses some theorectical arguments for the link between religion or religious commitment and individuals´ earnings and

introduces shortly the findings from previous studies. Subsection 3.4.2 presents very briefly the data and the estimation techniques used followed by the results in subsection 3.4.3. Concluding remarks are given in subsection 3.4.4.

3.4.1. Theoretical background and previous findings

As is well known in the economic literature, family background can influence individuals´ socio- economic outcomes substantially. The relationship between family background and, for example, educational attainment of children is just one issue that is addressed more often (see e.g. Painter and Levine, 2000; Plug and Vijverberg, 2001; Keane and Wolpin, 2001 or Maurin, 2002).

Religious tradition and the religious upbringing of children might be seen as one important aspect of family background that affects individual behaviour. As indicated above, there are several studies that find evidence for an effect of religion on e.g. marital stability or criminal activity.[30] Lipford and Tollison (2002) argue that it is hence suggesting that religious teachings might also affect individuals´ attitudes and behavior regarding the acquisition of material wealth. Referring to the emphasis of Christian faith on 'treasures in heaven' as opposed to 'treasures on earth',[31] they pick up an argument by Azzi and Ehrenberg (1975), arguing that there might be a trade-off between the present and the so-called 'afterlife' consumption. They consequently hypothesize that religious participants place lower valuation on market earnings because of their differing preference sets. Therefore, males who are religiously active may earn less compared to those males who are not religiously involved.

Religious upbringing and religious commitment might have an effect on earnings through another possible mechanism. Values and virtues like honesty, discipline or diligence that are possibly transmitted through the religious upbringing of the individual either by parents or by schools run by churches might be rewarded by an employer. It is, however, plausible to assume that this signalling effect is more important on labor markets if religious markets are comparable to the US structure, i.e. having a wide range of churches and denominations that

[30] Family background is of course only one aspect affecting the behavior of individuals. School environment may also play an important role. Mocan *et al*. (2002), for example, examine the impact of Catholic schools on deviance among teens. They, however, do not find empirical support that Catholic schooling leads to a lower incidence of risky or deviant behavior.

[31] There are several passages in the Bible that point to the inverse relationship between material wealth and redemption. A presumably well known passage is the example that it might be easier for a camel to go through the eye of a needle than for a rich man to enter into the kingdom of God. See Marc, 10, 23-25 or Luke, 18, 24-25 or Matthew, 19, 23-24.

compete for both members and financial support.

On the other hand, recall that European religious markets, and the German religious market in particular, are quite different to the US structure. In contrast to the US, the German religious market is a highly concentrated one. In 1997, membership to the Roman Catholic Church and the Protestant Church amount for over 90% of denominationally affiliated men, who are examined here.[32] A signalling effect that may be based only on the membership to a particular church or denomination is therefore expected to play no significant role in the German situation.

This might, however, be different if denominational affiliation is associated with the embedding of religious doctrines and attitudes in an individual´s life. Regarding the predominance of Christian faith in Germany, the above noted hypothesis is relevant again: It might be expected that strong believers are less inclined towards the acquisition and accumulation of material wealth. Therefore, the earnings of strong believers should, *ceteris paribus*, be lower compared to individuals who attach no importance to faith in their lives. Regarding Protestants, this argument might be seen in contrast to Max Weber´s thesis of greater wealth and prosperity due to the Protestant Work Ethic. However, as pointed out, there is a number of studies challenging or even refuting the popular thesis empirically.[33]

There is only scarce literature on the relationship between religion and income or earnings. Most of the relevant studies use cross-sectional US or Northern American data. As the structure of the religious bodies is rather heterogenous, it is not surprising that findings are somewhat ambiguous.

Using US state level data, Heath *et al.* (1995) examine the impact of religion on per capita income. They argue that the prevalence of more strict churches or denominations might, on the one hand, discourage the settlement and development of specific industries in 'unprogressive' areas. It, however, might on the other hand also discourage individual behavior that inhibits economic progress, such as criminal activities, and furthermore encourage and uphold values and virtues such as honesty and discipline that might improve economic performance. Regressing per capita state income against the shares of population groups that are denominationally attached, they find that Jewish membership is positively correlated with per capita income. In contrast, Catholicism and the so-called fundamentalist

[32] Furthermore, apart from additional donations, there is no competition for the financing of the churches in Germany. Being a member of an established church, a church tax is directly deducted from earnings.
[33] See Iannaccone (1998, 1474-75).

Protestantism are negatively correlated with state per capita income.

Lipford and Tollison (2002), also using US state per capita income, estimate simultaneous-equation regressions to analyze the effect of religious participation on income and the impact of income on religious participation. They find that membership in religious bodies is negatively correlated with per capita income, reflecting the effect of religion on preferences and net earnings potential. Furthermore, they find evidence that income deters religious participation by inducing a substitution between market-earnings and religious activities.

There is furthermore some research on the relationship between religion and individuals' earnings or wages, most of which has been done in the beginning and the middle of the 1980s. Chiswick (1983) presumably was the first explicitly using the human capital framework in his study of Jewish men, finding that Jews have both higher earnings and a higher rate of return to schooling. Higher earnings for Jews are also reported by Meng and I (1984) and Tomes (1983, 1984 and 1985), whereas there is no unambiguous evidence for an earnings differential for Catholics or Protestants.

Similar results are found by Steen (1996) and Ewing (2000) who both use data from the National Longitudinal Survey Youth Cohort (NLSY). Whereas both find higher earnings for Catholics, Ewing (2000) is the only author not finding wage premiums for Jews. He, however and unlike the others, does not restrict his analysis to men.

Given the different structure of the religious market in Germany, the findings of the existing literature do not directly carry over in prior expectations here. First, and in contrast to previous results, denominational affiliation itself is not expected to be associated with higher earnings. It might even be argued, that retaining to a religious affiliation in times of the continuing secularization and individualization indicates that aspects other than material well being are of more importance. Therefore, lower earnings of religiously affiliated men might as well be observed. This arguing should also apply to the indicators of an males' religious involvement given by the importance that is attached to religious belief and by the frequency of religious participation. That is, given that the male has a strong religious belief or given that he attends church regularly and often, lower earnings could be expected.

3.4.2. Data and econometric methodology

The data used are again drawn from the German Socio-Economic Panel (GSOEP). As the variables that are related to religious affiliation and religious participation are outlined in section 3.3.2, another detailed discussion of the sample and the derived indicators is omitted.
A first impression of the data at hand is given by the descriptive findings in Table 3.9 and Table 3.10. The first table shows that strong belief is no widespread phenomenon among the German men examined. Only about 6% of men in the western federal states state that faith or religion is very important to them.[34] Even aggregating the two categories 'faith is very important' and 'faith is important', its share amounts to less than a third of the respondents. Among married men, there are sligthly more strong believers than among single men. Men, however, who are 35 to 45 years of age are less believing than their younger and older counterparts.

Table 3.9: Structure of denominational affiliation and importance of faith among German men

	West-Germany			East-Germany		
Denominational affiliation in 1997	Non-married	Married	All	Non-married	Married	All
Catholic	34.9	39.4	37.7	(10.1)	(5.6)	7.2
Protestant	30.8	30.3	30.5	(9.8)	16.8	14.3
Other Christian	(1.0)	2.8	2.1	–	(2.3)	(1.5)
Other Faith	(1.9)	6.8	5.0	–	–	–
No Denomination	31.4	20.7	24.7	80.1	75.3	77.0

	West-Germany		East-Germany	
Religious belief is …	very important	important or very important	very important	important or very important
All	6.4	31.0	2.6	9.7
Aged .. to .. years				
25 – 35	7.7	28.4	(1.9)	(6.7)
35 – 45	4.8	29.1	(3.1)	9.5
45 – 55	7.0	36.3	(2.6)	15.0
Married	7.1	33.2	3.6	12.7
Non-married	5.0	26.5	(0.3)	(2.9)

Notes: ( ) Cell includes less than 30 cases.
Source: GSOEP, different waves. Own calculations, weighted.

Looking at east German men, it is obvious that both parts of Germany have experienced a fundamentally different development in the decades before reunification also regarding religion. Whereas about 25% of men in the western federal states are not denominationally

[34] Recall that the original question is '*How important is faith/religion for your well-being and your satisfaction?*'. The answer are given on a four-point-ordinal scale from '*very important*' to '*not important at all*'.

affiliated, there are only 23% East German men, who are member of a Christian Church. It is easily conceivable that the predominance of men who are not denominationally affiliated can be attributed to the formerly atheistic public life. An analogous picture also shows in the lower part of Table 3.9, regarding the importance of faith. Only 2.6% of East German men in the sample think that religion or faith is very important and adding those who attach some importance to faith the share amounts to less than 10%.[35] Again, married men are slightly more likely to have a religious belief.

Table 3.10: Completed years of education and monthly gross earnings by religious involvement

	West-Germany				East-Germany			
	Years of education	*t*-value	Log of monthly gross earnings	*t*-value	Years of education	*t*-value	Log of monthly gross earnings	*t*-value
Religious affiliation								
Catholic	11.1***	4.19	8.36***	3.46	11.6***	2.28	7.46**	2.00
Protestant	12.0***	-6.34	8.43**	-2.47	12.5	-0.68	7.59	1.33
Other Christian	10.5***	3.75	8.31**	2.26	—	—	—	—
Other Faith	9.7***	8.22	8.22***	5.95	—	—	—	—
No affiliation	12.2***	-5.96	8.54***	-7.29	12.4	-0.50	7.67	-2.23
Importance of faith								
Very important	11.0***	4.29	8.37***	5.78	11.9	1.51	8.05*	1.67
Important	11.4***	2.76	8.49	0.09	12.2	1.47	8.15	0.15
Less important	11.7**	-2.07	8.51**	-2.41	12.5	0.57	8.15	-0.16
Not important at all	12.0***	-3.53	8.51	-1.13	12.6*	-1.89	8.15	-0.53
Attendance rates								
Once a week	11.4***	3.92	8.36***	7.33	12.6*	-1.68	7.95	-1.33
Once a month	11.4***	3.91	8.42	1.12	12.7*	-1.83	7.96	-1.60
Less regular	11.6	0.51	8.45***	-5.70	12.5**	-2.43	7.96***	-3.33
Never	11.7***	-5.16	8.43	0.43	12.3***	3.61	7.90***	4.16

Notes: two-sided *t*-tests, H_0:particular mean=respective average mean
* Significant at the 10%-level; ** the 5%-level; *** the 1%-level.

Source: GSOEP. Own calculations.

Plotting both earnings and years spent in education against either denominational affiliation, importance of faith or frequency of church attendance (Table 3.10), there is, for both East and

[35] Using a different survey, Pollack (1994) finds that the majority of East Germans do not belief in God or deny the existence of a higher order.

West Germans, some first evidence in support for the hypothesis that the religiously involved are less educated and earn less than non-believers. In particular, having no denominational affiliation is associated with more time spent in education and higher earnings for West German men. Compared to men of any other Christian faith, males withouth religion have 1.7 years more of formal education and even 2.5 years compared to males of any other religious affiliation. In East Germany, however, only Catholics show to have less education and lower earnings.

West German men who are religious believers or attend church regularly have less education and earn less too. While strong believers on average have one year less of education than men do not care about faith, the difference decreases to 0.3 years for churchgoers compared to non-churchgoers. The relationship is even weaker in East Germany: Men who do not attach importance to faith in their lives spend slightly more time in education and the earnings of strong believers are lower by 0.1 points in the logarithm of monthly gross earnings.

However, looking at religious participation, that first picture is different: Although the difference is rather small, it is those men who regularly attend church who are better educated. Furthermore, men who never attend church earn slightly less than all other men.

As argued above, individuals' religious involvment quite likely is a stronger indicator or predictor of individual behavior than mere denominational affiliation. To control for possible interactions between religious belief, religious participation and membership in a religious group or church, the 1998 information on the intensity of belief is matched to individual data from 1997 for a first cross-sectional analysis, accepting the potential source of a presumably only small bias. Recall that church attendance and strength of religious belief are simultaneously determined. Therefore, to again avoid potential endogeneity problems that may consequently rise if included both as exogenous variable, both indicators are used separately in the analyses.

To further avoid problems that might be related to education or early retirement, the sample drawn from the data is restricted to male employees aged 25-55. The earnings regressions that are run separately for East and West German men include standard human capital variables and related background characteristics. These are in particular: length and type of education, experience and experience squared, a dummy capturing whether overtime work is done or not, a part-time dummy, a 'blue-collar' and a public servant dummy, three firm-size bands, regional dummies for the western federal states that equals unity if the

individual lives in the northern or the middle-western. Furthermore, dummies for nine occupations and eleven branches are included.

Model specification and robustness is controlled for by estimating a series of different earnings equations, using a variety of subsamples. First, as indicated, cross-sectional regressions are run using a dataset with matched information from 1997 and 1998 to be able to control for denominational affiliation, frequency of religious participation and strength of religious belief. That dataset comprises 2,012 observations.

Longitudinal regressions are estimated using three panel-datasets. First, the change in denominational affiliation and its effect on earnings can be captured using data from 1990 and 1997, with 2,524 person-year-observations. The effect of religious belief on earnings is examined with data from the years 1994, 1998 and 1999 and covers 4,077 person-year-observations. The subsample comprises nine waves from 1990, 1992 and 1994 to 1999 and 2001 to analyze the impact of church attendance on earnings. 24,522 person-year observations are available in this unbalanced panel.[36]

The dependent variable used in all regressions is monthly gross earnings. As Anger and Schwarze (2002) point out, monthly labor income might overstate the remuneration of workers whose weekly hours of work exceed 40. Using hourly wages, that can be generated by dividing earnings by working hours, might however understate the earnings of those who work long hours. Thus, to prevent differences in working hours from distorting the estimates, working time is used as a control variable.

Starting from a Mincer-type standard earnings-regression function, the cross-sectional relationship between earnings and religion is specified by

$$\ln W_i = X_i' b_1 + R_i' b_2 + e_i \tag{3.12}$$

where W_i represents monthly gross earnings for individual i, X_i is a vector of exogenous standard human capital variables with its associated parameters b_1. R_i is the vector of binary indicators capturing the individual's religious belief, her denominational affiliation or her religious participation. Rather than including the indicators themselves, variables are used that

[36] Using the unbalanced data in the latter case is due to the attrition of the panel over 1990 to 2001. Balancing the data reduces the sample size to 212 West German and 148 East German men. Furthermore, running the regressions using the balanced data, the very implausible results suggest for selectivity problems in response behavior. From the technical point of view, note that there are some modifications in the computation of the estimators and their components when using the unbalanced panel rather than the balanced dataset. For details see Greene (2000) pp. 567 for the fixed effects model and pp. 577 for the random effects case.

interact denominational affiliation with religious belief or religious participation respectively.

In the semi-logarithmic specification, the coefficient, b_2, can then approximately be interpreted as the percental earnings gains or losses of the particular denominational affiliation or strength of belief. The variable e_i is the common disturbance term that is assumed to be *iid*.

Furthermore, to control for unobservable individual heterogeneity that might lead to biased cross-sectional estimates, the longitudinal structure of the GSOEP is used and panel estimators are applied. The earnings function of individual i at time t can be formulated as

$$\ln W_{it} = X_{it}'b_1 + R_{it}'b_2 + g_i + e_{it}, \qquad i=1, \ldots, N;\ t=1, \ldots, T, \tag{3.13}$$

where notation follows equation (3.12). g_i denotes the unobservable factor that varies across individuals but is constant over time, hence called the "individual fixed effect". The error term is represented by e_{it} and is assumed to be uncorrelated with the regressors, X_{it} and R_{it}, and the individual time-invariant factor g_i.

As discussed in Chapter 2, such model can be estimated by the fixed-effects or the random-effects estimator which differ in the assumption on whether g_i is correlated with the vector of regressors (fixed-effects) or not (random-effects). Furthermore, assuming that a subset of the regressors is correlated with the individual-specific effect while the remaining subset of covariates is not correlated, the model can also be estimated using the Hausman-Taylor instrumental variable estimator. Note also that there is one peculiarity regarding the fixed-effects estimator: When using only two waves, as is the case here examining the effects of denominational affiliation on earnings, it is the change in the covariates and the dependent variable that enters the estimation.

In particular, OLS estimation is performed on data that are transformed as

$$\Delta \ln W = \Delta X'b_1 + \Delta R b_2 + \Delta e \tag{3.14}$$

where Δ is the difference operator. It thus is not the denominational affiliation itself that affects earnings but exit from or entry into a religious group or church.[37] The individual fixed-

[37] In the GSOEP, there is a decreasing number of members between 1990 and 1997 both for the Roman Catholic Church (-3.6%) and the Protestant Church (-12.9%), whereas other Christian denominations and other religious groups increase in membership. Note, however, that official statistics report a decrease in membership of about 3% for Roman Catholics, while the Protestant Church loses about 7% of its members (Federal Statistical Office

effect, however, is still accounted for as the time-invariant individual specific effect, g_i, is differenced out of the equation.

3.4.3. Empirical results

First, note that the results of both the cross-sectional estimation and the pooled OLS estimation that are presented in the following might serve as a means of comparison to previous findings in the literature. However, as will be shown below, one important result is that unobservable individual heterogenity has to be accounted for when analyzing the effects of religion or faith on individuals´ earnings.

The results from cross-sectional estimations (Table 3.11 and Table 3.12) corroborate the descriptive findings and furthermore show evidence of two aspects.[38] One the one hand – not surprisingly though – the results from the separate East-West regressions confirm that due to the different historical development religion exert different effects in the two parts of Germany. Whereas for the West German sample denominational affiliation accounts for some of the variation in the data, membership in a church does not affect earnings in East Germany.

However, and in contrast to most of prior findings for the US, membership in a religious group or church correlates negatively with the earnings of West German men. That is, initially including only denominational affiliation in the regressions (Table 3.11, upper part), being a Catholic or a Protestant is accompanied with an earnings penalty of about 6%, compared to their undenominational counterparts. Having any other faith, i.e. mainly being a Muslim, even seems to lead to an earnings loss of almost 8%. A second model specification in the middle of Table 3.11 then includes the 'strength of faith' indicators as regressors and it shows that strong believers suffer a wage penalty of about 7% in West Germany and even more than 15% in East Germany. While the earnings of East German men are unaffected by religious participation, a high level of church attendance is associated with an earnings loss of almost 6% for West German men (Table 3.11, lower part).

of Germany, 1993 and 1999).

[38] To economize upon space, only the covariates relevant to the hypotheses are discussed. The control variables that are included in all regressions, however, behave as expected. For full details see the Appendix.

Table 3.11: Denominational affiliation, religious belief, religious participation and earnings; cross-sectional regressions including control variables

	West Germany	East Germany
Denomination: Catholic	-0.0623***	-0.0001
	(0.0195)	(0.0557)
Denomination: Protestant	-0.0656***	-0.0077
	(0.0198)	(0.0294)
Denomination: Other Christian	-0.0446	—
	(0.0351)	
Denomination: Other religious affiliation	-0.0783**	—
	(0.0321)	
R^2	0.5867	0.4869
F	43.15	11.84
Religious belief is very important	-0.0651**	-0.1538**
	(0.0278)	(0.0669)
Religious belief is important	-0.0204	0.0116
	(0.0199)	(0.0394)
Religious belief is less important	-0.0233	-0.0051
	(0.0178)	(0.0239)
R^2	0.5842	0.4922
F	43.68	11.79
Religious participation: At least once a week	-0.0589**	-0.0639
	(0.0243)	(0.0604)
Religious participation: At least once a month	-0.0065	-0.0293
	(0.0238)	(0.0654)
Religious participation: Less regular	-0.0151	0.0375
	(0.0152)	(0.0296)
R^2	0.5844	0.4901
F	43.71	11.69

Notes: Standard errors in parentheses.
*** Coefficient statistically significant at the 1%-level, ** at the 5%-level, * at the 10%-level.

Source: GSOEP, 1997 and 1998. Own calculations.

Table 3.12 presents results of regressions that include interaction-terms on denominational affiliation and either the strength of religious belief or the frequency of church attendance. In contrast to the above finding, religious belief now does not seem to affect earnings of East German men anymore. The findings for West German men indicate that denominational affiliation statistically dominates the effects. That is, irrespective of the intensity of religious belief or the level of religious participation, Catholic and Protestant as well as Muslim males earn less than men without denominational affiliation who do not have a religious belief or who never attend church. The coefficients in general hint towards earnings losses of about 6-7%, although Muslims without religious belief as well as Protestants or again Muslims who participate in religious activities seem to earn about 11% less than the respective counterpart. However, it has to be kept in mind that these findings all come from cross-sectional estimations. Individual heterogeneity is thus not accounted for.

Table 3.12: Denominational affiliation, religious belief and religious participation interacted; cross-sectional regressions including control variables

	West Germany	East Germany
Catholic and religious belief	-0.0721***	-0.0625
	(0.0235)	(0.0703)
Catholic and no religious belief	-0.0663***	0.1007
	(0.0220)	(0.0880)
Protestant and religious belief	-0.0592**	-0.0062
	(0.0294)	(0.0475)
Protestant and no religious belief	-0.0767***	-0.0078
	(0.0216)	(0.0345)
Other Christian and religious belief	-0.0562	—
	(0.0403)	
Other Christian and no religious belief	-0.0391	—
	(0.0561)	
Other religion and religious belief	-0.0769**	—
	(0.0353)	
Other religion and no religious belief	-0.1129**	—
	(0.0494)	
No religion and religious belief	-0.0792	0.0206
	(0.0526)	(0.0721)
R^2	0.5877	0.4891
F	38.93	11.08
Catholic and religious participation	-0.0611**	-0.0480
	(0.0258)	(0.0740)
Catholic and no religious participation	-0.0650***	0.0562
	(0.0207)	(0.0818)
Protestant and religious participation	-0.1157**	-0.0205
	(0.0478)	(0.0657)
Protestant and no religious participation	-0.0628***	-0.0062
	(0.0201)	(0.0316)
Other Christian and religious participation	-0.0317	—
	(0.0500)	
Other Christian and no religious participation	-0.0556	—
	(0.0434)	
Other religion and religious participation	-0.1063***	—
	(0.0411)	
Other religion and no participation	-0.0636*	—
	(0.0372)	
No religion and religious participation	-0.1722	-0.1380
	(0.1135)	(0.1488)
R^2	0.5879	0.4887
F	38.96	11.07

Notes: Standard errors in parentheses.
*** Coefficient statistically significant at the 1%-level, ** at the 5%-level, * at the 10%-level.
Source: GSOEP, 1997 and 1998. Own calculations.

The relevant findings from the panel regressions are shown in Table 3.13 through Table 3.15. Although results from the pooled OLS estimator do no account for unobservable individual effects, they are included for means of comparison. The effects of denominational affiliation

on earnings (Table 3.13) again indicate earnings losses of about 6% to 7% in the pooled regression and of about 5% in the random effects model for Protestant and Catholic males in West Germany only. The earnings of other Christian men as well as of those without religious affiliation are not affected. Furthermore, while the random effects model accounts for individual-specific effects, the Hausman-test statistics reject the latter in favor of both the fixed effects model (c^2-value of 160.76) and in particular the Hausman-Taylor model (c^2-value of 19.76). While both these models suggest for earnings losses of about 4% for Catholics and Protestants, the coefficients do not statistically differ from zero.[39] Again, other Christian and Muslim males have earnings that do not differ from the earnings of males witout religion.

Table 3.13: Denominational affiliation and earnings; longitudinal regressions including control variables

	PR	RE	FE	HT-IV
West Germany				
Catholic	-0.0617***	-0.0531***	-0.0427	-0.0409
	(0.0173)	(0.0185)	(0.0340)	(0.0261)
Protestant	-0.0701***	-0.0577***	-0.0191	-0.0194
	(0.0174)	(0.0189)	(0.0355)	(0.0273)
Other Christian	-0.0379	-0.0304	-0.0078	-0.0019
	(0.0299)	(0.0319)	(0.0529)	(0.0409)
Other religious affiliation	-0.0241	-0.0169	0.0153	0.0127
	(0.0285)	(0.0310)	(0.0570)	(0.0439)
Chi^2	174.16			
Hausman			160.76	19.76
East Germany				
Catholic	-0.0217	-0.0199	0.0292	0.0093
	(0.0422)	(0.0456)	(0.1206)	(0.0894)
Protestant	-0.0031	-0.0043	0.0010	-0.0096
	(0.0222)	(0.0235)	(0.0483)	(0.0363)
Chi^2	19.59			
Hausman			67.05	11.16

Notes: Standard errors in parentheses.
*** Coefficient statistically significant at the 1%-level, ** at the 5%-level, * at the 10%-level.
Source: GSOEP, 1990 and 1997. Own calculations.

Using the strength of faith as indicator for possible effects of religion on individual behavior the results from the pooled OLS are in line with the first cross-sectional regressions above.

[39] Note again that the fixed effects model is based on data from two waves only and therefore quite likely captures the effects of either exit from or entry into a religious group. Furthermore, note that the fixed-effects estimator might then also be susceptible to problems of endogenous selection. See Johnston and DiNardo (1997, 402) for a nice illustration of such a problem.

Table 3.14 shows that strong believers in West Germany earn about 5% less than their non-believing counterparts. Men in East Germany seem to have an earnings loss of about 10%. However, the LM-tests clearly reject the absence of unobservable effects (c^2-value of 1,025.86 for the West German sample and 447.56 for the East German part). While the random effects estimation also suggests for earnings penalties of about 5% to 8% for believers and strong believers in East Germany,[40] the Hausman-test statistics point towards the relevance of the Hausman-Taylor model for West German males (c^2-value of 9.40) and the fixed effects model for East German males (c^2-value of 4.12).

Table 3.14: Religious belief and earnings; longitudinal regressions including control variables

	PR	RE	FE	HT-IV
West Germany				
Religious belief is very important	-0.0469***	-0.0282	-0.0106	-0.0089
	(0.0182)	(0.0177)	(0.0205)	(0.0169)
Religious belief is important	0.0023	-0.0089	-0.0108	-0.0109
	(0.0129)	(0.0122)	(0.0139)	(0.0115)
Religious belief is less important	-0.0048	-0.0068	-0.0064	-0.0066
	(0.0118)	(0.0104)	(0.0112)	(0.0093)
LM-Chi^2	1,025.86			
Hausman			374.05	9.40
East Germany				
Religious belief is very important	-0.1010**	-0.0786*	-0.0656	-0.0682
	(0.0437)	(0.0471)	(0.0617)	(0.0502)
Religious belief is important	-0.0340	-0.0451*	-0.0495	-0.0522*
	(0.0277)	(0.0270)	(0.0329)	(0.0267)
Religious belief is less important	-0.0022	0.0094	0.0134	0.0152
	(0.0166)	(0.0144)	(0.0162)	(0.0131)
LM-Chi^2	447.56			
Hausman			50.41	4.12

Notes: Standard errors in parentheses.
*** Coefficient statistically significant at the 1%-level, ** at the 5%-level, * at the 10%-level.
Source: GSOEP, 1994, 1998 and 1999. Own calculations.

Neither of these models, however, suggest for earnings losses that are associated with religious belief. Although the findings indicate for earnings differences of about 5% to 7% less in the eastern federal states and less than 1% less in the western federal states, none of the relevant coefficients is statistically signifcant. Note, however, that the East German sample is not extensive (n=388) and that for East German believers, the t-statistic is 1.51 and thus

[40] The results presented are based on the balanced panel. Using the unbalanced data yields no substantial differences in the findings except for the random effects model that implies an earnings loss of about 3% for strong believers in West Germany.

'close' to statistical significance.

The findings shown in Table 3.15 are based on the largest sample covering nine waves between 1990 and 2001 and using religious participation as indicator for individual attitudes and behavior.[41] The results from the pooled regressions are slightly different from the cross-sectional estimations. First, while the findings above do not show an effect for East German males, the results imply an earnings loss of 4% for males who attend church at least once a week. Furthermore, and in contrast to the prior findings, men who participate in religious activities from time to time seem to earn about 1.5% more than those who never attend church. A similar pattern shows for West German men: While a high level of church attendance is accompanied with an earnings loss of 1.6%, less frequent participation is associated with an earnings benefit of nearly 2%.

However, but rather unsurprisingly though, the hypothesis of the absence of unobservable individual heterogeneity is again clearly rejected for both samples (c^2-value of 4,007.50 for the East German part and 7,925.08 for the West German part). The subsequently estimated random effects model implies no effects of religion on the earnings of East German males, although the coefficients associated to regular church attendance still point towards earnings losses. For West German males, the random effects model suggest for a reversed U-curved effect of religious participation on earnings: The result for a high level of church attendance rate is not statistically different from zero and therefore is not different from the earnings of males who never go to church. However, irregular and regular but unfrequent participation seems to result in earnings gains of about 1%.

Following the pattern of the results for the impact of religious belief above, results from Hausman-tests reject the assumption that unobservable individual effects and regressors are not correlated. Morever, the c^2-values of further Hausman-tests that test the fixed effects model against the HT-IV estimation suggest for the relevance of the latter model for West German males (c^2-value of 248.61) and the fixed effects model for East German men (c^2-value of 5.77).

[41] Note again that the data are unbalanced. As mentioned above, using the balanced dataset results in quite implausible findings for East German men. In particular, PR results indicate an earnings gain for strong believers of 5% and FE and HT-IV imply a premium of 13% and even 15%. However, tests suggest for the relevance of the RE model that is associated to higher earnings of about 10% for males to whom faith is very important. As these findings are based on 148 male observations only, further investigation should be carried out to analyze whether there is selectivity in survey participation.

Table 3.15: Religious participation and earnings; bngitudinal regressions including control variables

	PR	RE	FE	HT-IV
West Germany				
Religious participation: once a week	-0.0162**	-0.0016	-0.0032	-0.0012
	(0.0072)	(0.0076)	(0.0085)	(0.0077)
Religious participation: once a month	0.0044	0.0124**	0.0070	0.0091
	(0.0071)	(0.0062)	(0.0066)	(0.0060)
Religious participation: less regular	0.0193***	0.0119***	0.0032	0.0050
	(0.0046)	(0.0040)	(0.0043)	(0.0039)
LM-Chi^2	7,925.08			
Hausman		1,911.58	248.61	
East Germany				
Religious participation: once a week	-0.0409**	-0.0242	0.0329	0.0338
	(0.0187)	(0.0259)	(0.0390)	(0.0345)
Religious participation: once a month	-0.0247	-0.0132	0.0126	0.0142
	(0.0199)	(0.0205)	(0.0250)	(0.0221)
Religious participation: less regular	0.0158*	0.0112	0.0156	0.0164*
	(0.0089)	(0.0094)	(0.0111)	(0.0098)
LM-Chi^2	4,007.50			
Hausman		429.93	5.77	

Notes: Standard errors in parentheses.
*** Coefficient statistically significant at the 1%-level, ** at the 5%-level, * at the 10%-level.

Source: GSOEP, 1990, 1992, 1994 to 2001. Own calculations.

Followingly, earnings of West German males are unaffected by religious participation: Neither is any of the coefficients statistically significant nor would these suggest for effects that are much different from zero. For East German men, both fixed effects model and Hausman-Taylor estimation would suggest for earnings gains of about 1.5% for less frequent religious participation and some 3% for weekly churchgoers. However, while the HT-IV suggests for weak statistical significance for irregular religious participants, the coefficients from the relevant fixed effects model do not statistically differ from zero. That is, the earnings of East German males are also unaffected by religious participation.

Summing up briefly, the results presented stress the need to control for unobservable individual heterogeneity: On the one hand, the findings from cross-sectional estimations or pooled OLS regressions suggest for negative effects of religious affiliation and religious belief or participation on male earnings in West Germany and partially also in East Germany. On the other hand, once individual-specific effects are controlled for, these results vanish: Neither do denominational affiliation nor a strong faith or a frequent church attendance affect male earnings in both West and East Germany.

As the theoretical background outlined suggests for either higher or lower earnings of religiously involved individuals, establishing testable hypotheses is difficult. Furthermore, the analyses presented suggest for only a weak if not neglectable effect of religion on male earnings in Germany. Nevertheless, alternative regressions were run to carry out (rather crude) tests. In particular, interaction-terms between religious belief and completed years of education or potential work experience and interaction-terms between regular church attendance and education or experience are included in the estimations.

The idea behind this is that religiously involved males may, on the one hand, be expected to invest less in human capital because of the irrelevance of material wealth which might then result in lower returns to either schooling or experience. On the other hand, in line with the Protestant Work Ethic, religiously active individuals might as well invest relatively more in human capital than individuals without religious belief. This would then suggest for higher earnings.

Table 3.16: Alternative specifications testing for hypotheses (1); longitudinal regressions including control variables

	West Germany			East Germany		
	RE	FE	HT-IV	RE	FE	HT-IV
Believer	0.0438	0.1074**	0.1120***	-0.1461	-0.1425	-0.1202
	(0.0379)	(0.0434)	(0.0360)	(0.1481)	(0.1789)	(0.1455)
Belief*Education	-0.0043	-0.0099***	-0.0103***	0.0072	0.0065	0.0044
	(0.0032)	(0.0037)	(0.0031)	(0.0117)	(0.0140)	(0.0113)
Believer	0.1094**	0.1130*	0.1070**	-0.0729	-0.0100	-0.0739
	(0.0553)	(0.0596)	(0.0493)	(0.1390)	(0.1499)	(0.1195)
Belief*Experience	-0.0138***	-0.0136**	-0.0130***	-0.0021	-0.0076	-0.0021
	(0.0051)	(0.0054)	(0.0045)	(0.0133)	(0.0148)	(0.0118)
Belief*Experience^2	0.0003***	0.0003***	0.0003***	0.0001	0.0002	0.0001
	(0.0001)	(0.0001)	(0.0001)	(0.0003)	(0.0003)	(0.0003)
Churchgoer	-0.0268	0.0191	-0.0030	-0.0181	-0.1307	-0.1385
	(0.0223)	(0.0245)	(0.0222)	(0.0862)	(0.1127)	(0.0993)
Churchgoer*Education	0.0024	-0.0015	0.0005	-0.0003	0.0104	0.0111
	(0.0019)	(0.0021)	(0.0019)	(0.0066)	(0.0087)	(0.0076)
Churchgoer	0.0405	0.0195	0.0251	0.0476	0.0208	0.0215
	(0.0257)	(0.0274)	(0.0250)	(0.0785)	(0.0858)	(0.0758)
Churchgoer*Experience	-0.0042*	-0.0022	-0.0027	-0.0083	-0.0037	-0.0034
	(0.0024)	(0.0026)	(0.0024)	(0.0078)	(0.0085)	(0.0075)
Churchgoer*Experience^2	0.0001*	0.0001	0.0001	0.0002	0.0001	0.0001
	(0.0001)	(0.0001)	(0.0001)	(0.0002)	(0.0002)	(0.0002)

Notes: Standard errors in parentheses.
*** Coefficient statistically significant at the 1%-level, ** at the 5%-level, * at the 10%-level.
Source: GSOEP. Own calculations.

Table 3.16 shows the relevant findings from these alternative regressions.[42] Again, the

[42] Results from PR estimations are omitted as statistical tests suggests for either one of the three panel estimators.

earnings of East German males are unaffected in all additional specifications. However, the results shown in the upper part suggest for lower returns to schooling for West German males who have a (strong) religious belief. The findings from the second specification further point towards lower returns to work experience for West German believers. Taken together, those two findings might therefore weakly support the hypothesis that religiously involved men in West Germany are less inclined towards the accumulation of material wealth. However, with a difference of up to 1.5%-points in the return to either schooling or experience, the economic impact is rather small. Furthermore, the evidence from a second set of alternative specifications using church attendance in the interaction-terms again implies no effects of religious behavior on both the returns to schooling and experience.

Table 3.17: Alternative specifications testing for hypotheses (2); longitudinal regressions including control variables

	West Germany			East Germany		
	RE	FE	HT-IV	RE	FE	HT-IV
Belief*Income important	-0.0072	-0.0044	-0.0043	-0.0704***	-0.0860***	-0.0903***
	(0.0085)	(0.0094)	(0.0078)	(0.0249)	(0.0307)	(0.0249)
Belief*Income unimportant	0.0175	0.0151	0.0162	-0.0971	-0.0787	-0.0851
	(0.0609)	(0.0606)	(0.0503)	(0.0981)	(0.1048)	(0.0853)
No Belief*Income unimp.	-0.0430*	-0.0218	-0.0232	0.0162	0.0114	0.0123
	(0.0230)	(0.0237)	(0.0196)	(0.0412)	(0.0418)	(0.0341)
Belief*Success important	-0.0083	-0.0085	-0.0083	-0.0492**	-0.0562**	-0.0601***
	(0.0087)	(0.0096)	(0.0079)	(0.0242)	(0.0286)	(0.0232)
Belief* Success unimp.	-0.0398	-0.0378	-0.0317	0.0658	0.0745	0.0704
	(0.0339)	(0.0357)	(0.0295)	(0.0782)	(0.0808)	(0.0658)
No Belief* Success unimp.	-0.0318***	-0.0295**	-0.0291***	-0.0031	-0.0017	-0.0025
	(0.0122)	(0.0129)	(0.0107)	(0.0210)	(0.0224)	(0.0182)
Belief*Family important	-0.0086	-0.0073	-0.0072	-0.0562**	-0.0609**	-0.0651***
	(0.0085)	(0.0095)	(0.0079)	(0.0244)	(0.0301)	(0.0245)
Belief*Family unimp.	0.0554	0.0419	0.0350	—	—	—
	(0.1211)	(0.1232)	(0.1018)			
No Belief*Family unimp.	-0.0877***	-0.0949***	-0.0953***	-0.0505	-0.0459	-0.0476
	(0.0266)	(0.0278)	(0.0230)	(0.0540)	(0.0586)	(0.0477)

Notes: Standard errors in parentheses.
*** Coefficient statistically significant at the 1%-level, ** at the 5%-level, * at the 10%-level.
Source: GSOEP. Own calculations.

Further specifications are estimated that include interaction-terms between religious belief and whether the individual thinks that family or income or occupational success are important. Indicators for those latter items are available in the GSOEP for 1994, 1998 and 1999 Again, *a priori* expectations are ambiguous: Religiously involved males may, for example, believe that income is of no importance because of an underlying dissafirmation of material wealth. They may, on the other hand, follow the spirit of the Protestant Work Ethic

and believe that income is important.

The results from the regressions presented in Table 3.17 do not suggest for any relevance of religion for the earnings of West German males. Furthermore, the earnings of East German males who are believers and state that either family or income or occupational success is important seem to be affected negatively. The earnings penalties are at about 5% to 8% which therefore reinforces the tendencies shown above in Table 3.14. The statistical effect in the additional regressions quite likely shows as observations on 'belief' and 'strong belief' are pooled.

While the finding for believers who are in favor of the family is consistent with prior expectations, the results for believers who are in favor of income or success, however, are both surprising and, to some extent, unsatisfactory. This is because it might have been expected that those individuals should show higher earnings, if at all significant. It therefore may be concluded that religious belief itself still affects male earnings in East Germany negatively.

3.5. Religion and economic outcomes: concluding remarks

This chapter presented analyses on the relationship between religion and economic outcomes. Adding to previous research, the three studies offer several novelties. First, except for the first study, German data are used. As most of the relevant literature explores Northern American data, this allows for transnational comparisons. Such is of interest as the structures of religious markets and religious bodies in Germany and, above all, the US are quite different. Furthermore, the studies also provide results that are based on longitudinal data. The use of appropriate panel estimation techniques is an advantage to prior findings which were mainly based on cross-sectional data as that approach in general does not account for unobservable individual heterogeneity.

The analysis in the first section provides a cross-national examination of the impact of religion on the attitudes towards female labor participation. Furthermore, some first evidence on whether husbands' attitudes and religiosity influence wives' employment participation is

presented as well. Using data from three waves of the ISSP from the 1990's, the cross-country variation in attitudes corroborates previous research and shows that males are less favorable towards female labor participation and female full-time employment. While this finding holds across all the countries analyzed, there are (large) differences between the countries. Among the nations included in the analysis, West Germany and Italy are the most traditional in attitudes towards gender roles and female full-time emplyoment. Furthermore, with regard to religious involvement, results show that both denominational affiliation and religious participation influence attitudes. In particular, Catholics and Muslims tend to be more traditional in gender roles and less liberal towards female full-time employment. Moreover, this also holds for individuals who are not denominationally affiliated but attend church regularly.

Results for indicators on denominational affiliation combined with religious participation are also in line with expectations. That is, support is found for the hypothesis that it is a high level of church attendance that affects individual behavior. However, the picture is somewhat more heterogeneous when controlling for nationality in combination with religious participation. Here, the country-specific background to some extent counteracts the effects that typically are observable for higher levels of religious activities.

Somewhat less conclusive results are found for the possible effect of husbands' religiosity on wives' employment. On the one hand, as could be expected, more traditional attitudes of husbands are negatively correlated with wives' labor participation. On the other hand, neither denominational affiliation nor regular church attendance of males seems to have a negative effect. The exception is found for Protestants husbands whose wives are less likely to be in paid employment. While this might be somewhat surprising considering that Protestants typically are expected to be in favor of more liberal attitudes, it has to be noted again, that the indicator captures a variety of Protestant churches which quite likely are not quite homogenous. Furthermore, due to the given data structure, the findings rely on a cross-sectional and thus on a somewhat preliminary analysis.

Using longitudinal data from the German Socio-Economic Panel, the second section therefore presents a more detailed examination of the possible effect religion might have on the labor supply of married women. Sociological and economic theory suggests that, on the one hand, membership to strict churches or religious groups might affect women's participation in paid employment negatively. Marital composition, on the other hand, might add to or counteract these effects. Having an inner-faith marriage, i.e. both partners having the same

denominational affiliation, should influence female labor supply negatively only when the spouses belong to a strict religious group. Depending on the attitudes of either wife or husband, inter-faith marriages, however, might both positively and negatively affect the labor supply decision of women.

Using cross-sectional as well as longitudinal econometric techniques, there is weak and indirect empirical evidence of the hypotheses suggested. First, marital composition influences female labor participation insofar that among homogeneous unions, Christian women other than Catholic and Protestant are less likely to be part-time employed. Furthermore, Muslim women are even less probable to be employed at all. Inter-faith marriages in general do not affect the labor supply of women. Second, arguing that it is not denominational affiliation alone that influences behavior, both the strength of religious belief and the frequency of religious participation along with denominational affiliation are included in the analyses. Results suggest that the labor participation decision is affected by both strong religious belief and regular participation. These latter findings from cross-sectional analyses are also supported by the results from the panel estimations that control for unobservable individual heterogeneity. It is found that women who attend church regular and often are less likely employed. Furthermore, while women's strength of religious belief does not affect female labor supply, it is the presence of a husband with a strong religious belief that influences female labor participation negatively.

In the last section of this chapter, GSOEP data are again used to analyze whether religion influences male earnings. Separate earnings regressions are run for East and West German men due to the quite different religious traditions in the last decades before reunification. As a result, the findings differ in various ways. First, cross-sectional estimations suggest that denominational affiliation is negatively correlated with earnings only in West Germany: Both Catholics and Protestants earn about 6% less than men who are not denominationally affiliated, men of any other faith receive monthly gross earnings that are about 8% lower. Using interaction-term between denominational affiliation and either religious belief or religious participation, the results are corroborated with the earnings losses being slightly larger.

Up to this point, the results confirm prior results from the literature inasmuch cross-sectional estimations suggest for an effect of religion on individuals´ earnings. Findings from OLS estimation might, however, be biased if there are individual specific effects that cannot be observed. Therefore, using the longitudinal structure of the GSOEP, panel estimators are

applied that control for unobservable individual heterogeneity. The results stress the need to do this: The negative effects mainly vanish. While random-effects regressions still point to a negative effect of denominational affiliation on earnings for West German males and also to a negative effect of religious belief in East Germany, it is mainly the fixed effects specification or the Hausman-Taylor model that is relevant. Results from these models imply that male earnings in West Germany are not effected by religious affiliation, belief or participation. However, there is some evidence that religious belief affects earnings of East German males negatively.

Crude empirical tests did not reveal further insights other than the weak evidence for strong believers in West Germany to be less inclined to invest in human capital. Moreover, East German believers earn less even if they are in favor of income or occupational success.

Two mainline results arise from the analyses: First, from a technical point of view, it is important to account for unobservable individual effects when analyzing the effects of religion. Second, religious affiliation as well as religious belief and participation to some extent influence labor related issues also in a supposedly secularized country like Germany.

4. Smoking behavior and economic outcomes

4.1 Introduction: Some remarks on health, smoking and economics

In the preceding chapter, evidence is presented on the relationship between issues of religion or religious behavior and economic outcomes. As pointed out, there is only limited empirical research in this area yet. In contrast, far more attention is typically attracted by topics that are related to health and its effects on economic behavior or outcomes. There are analyses both on the individual and the aggregate, public health level. The latter is a major policy concern as health expenditures in Western industrialized countries, with only a few exceptions, have constantly increased in the last 30 to 40 years (Figure 4.1).[1]

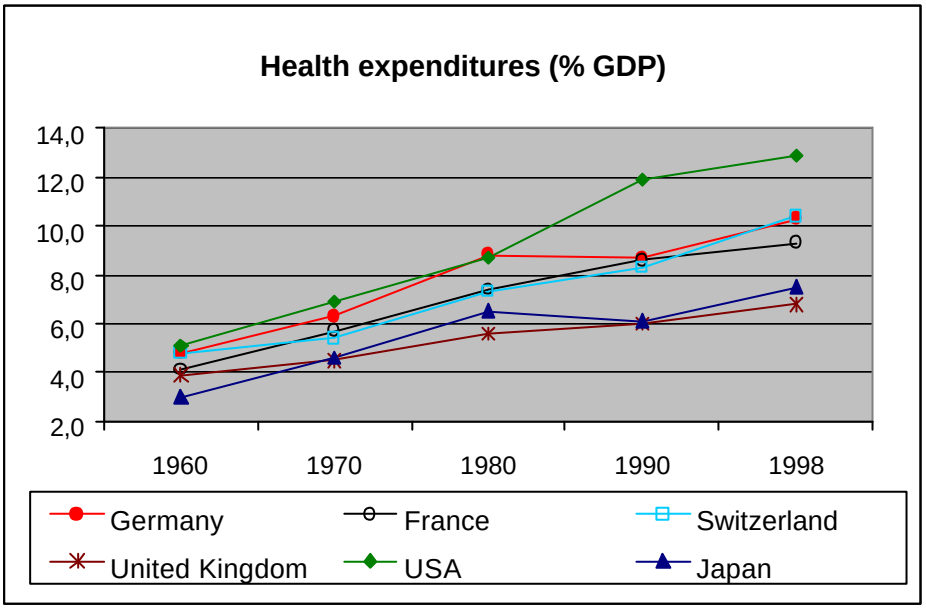

Figure 4.1: Health expenditures (% GDP) in selected OECD countries
Source: OECD Health Data, 2001.

However, while the determinants for this development are of ongoing socio-political interest, this chapter will concentrate on the micro-level and focus on one particular aspect of individual health behavior, tobacco consumption, and its relationship to economic outcomes. There are several reasons why this is done. For example, subject to the genetical condition, an individual's health by and large is determined by her behavior. A balanced diet, regular non-

[1] To ease legibility, only a few OECD countries are shown. However, increasing health expenditures is a phenonemon found in almost all of the OECD countries.

excessive physical training and a moderate use of stimulants are prerequisites for a good health condition both mentally and physically. Furthermore, essential for the following analysis, a good health forms the basis of a good performance in the labor market. Productivity losses that might occur due to bad health can clearly influence individuals' labor outcomes. In the empirical labor economics literature, indicators on self-rated health are regularly used as explanatory variable in, for example, earnings regressions or labor participation equations. Furthermore, chronic conditions or disability as well as the effects of accidents on labor related outcomes are also addressed by a vast literature.

The focus here is on tobacco use as an indicator of individuals' health behavior. The crucial point is that people decide on whether to smoke or not, although they quite likely know about the adverse health effects that are attributed to smoking: While there also is a variety of (expected) subjective benefits of smoking like stimulation, stress or tension reduction, positive social effects and weight control (Rohsenow *et al*., 2002), it is nowadays a well known fact that smoking causes heart disease, stroke, different forms of cancer and other serious diseases. Subsequently, smoking reduces the life expectancy and is found to be the largest single cause of premature death in developed countries (Peto *et al*., 1994). Projections by the WHO (1997) support this finding and, by 2020, also expect smoking to be responsible for more deaths than any other single disease.

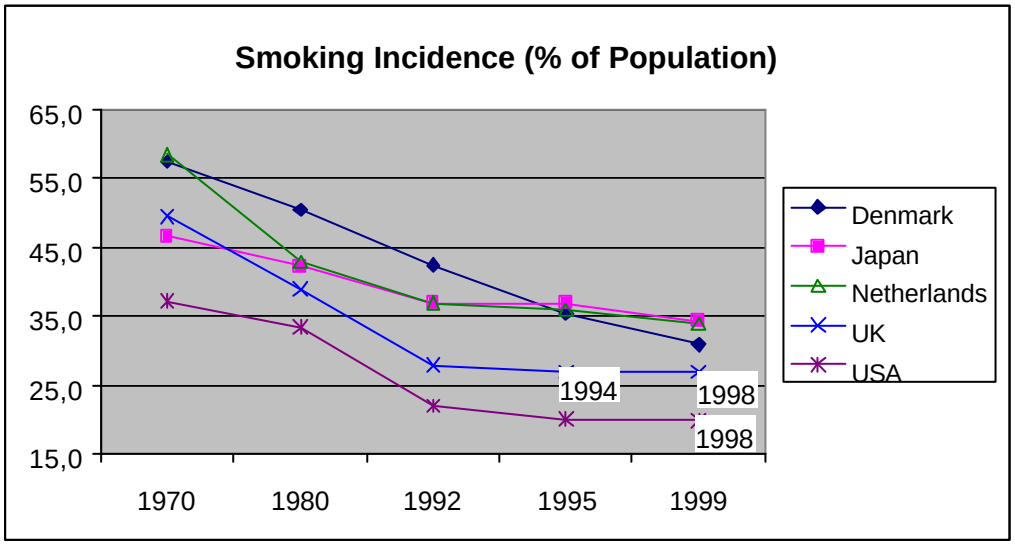

Figure 4.2: Smoking prevalence (% of population) in selected OECD countries
Source: OECD Health Data, 2001.

However, and despite the more or less ubiquitous knowledge of tobacco use and its negative

consequences on individuals´ health, smoking is still a prevalent phenomenon in Western industrialized countries. While there is variation across countries, Figure 4.2 shows for a small sample of OECD countries that after declining smoking rates in the 1970's and 1980's, the incidence of tobacco consumption has pivoted to a somewhat stable level in the 1990's.[2]

For Germany, smoking rates were also stable at about 26% to 28% in the 1990's (Federal Statistical Office, 2001a and 2001b). While further analysis on the determinants of both starting and quitting smoking might be worthwile, it is not of primar relevance here. It rather are consequences observable on the labor market that will be studied.[3] In contrast to the German case, substance use, i.e. the use of illicit drugs, alcohol and tobacco has been addressed by a variety of analyses mainly using US data. Among the different socio-economic outcomes examined, labor related issues that are analysed e.g. are labor supply, absenteeism and wages. As will be pointed out by the brief discussions of the existing literature in the respective sections, smokers differ from non-smokers in both labor market behavior and outcomes.

The two following studies add to analyses that have been done for the US and other Western industrialized countries. In Section 4.2, an analysis of the relationship between smoking behavior and absence from work using GSOEP data for Germany is presented. Subsequently, labor earnings in Germany are examined for smokers and non-smokers in Section 4.3 to account for possible wage differentials that are typically found in the literature. Some concluding remarks are given in Section 4.4.

4.2 Smoking and absence from work

Smoking behavior is associated with a range of effects that are deleterious to individuals' health. Therefore, smokers' productivity might well be limited once these health impairments emerge due to increasing sickness incidence. On the one hand, it might well be argued that major negative health effects of tobacco consumption will first appear in a later stage of life. On the other hand, there is evidence that smoking is associated with poor physical fitness

[2] Again, only few OECD countries are shown to ease clarity. Data availability over the period shown has been the selection criterion.

[3] For Germany, there is evidence that the decision to start smoking tends to be influenced by a complex intergenerational transmission (Bantle and Haisken-DeNew, 2002). That is, youths living in households where one parent or even both parents smoke are more likely to smoke themselves compared to youths from non-smoker households.

already among young smokers (Conway and Cronan, 1992).

Besides that, the last 10 to 20 years have seen developments to ban smoking from the workplace in order to protect non-smokers from passive smoking. Therefore, given that smoking is not allowed at the workplace, smokers are more likely to have breaks from working in order to smoke. Welte *et al.* (2000) analyze the overall economic costs attributable to smoking for Germany. They find productivity losses due to work-loss days and early retirement that sum up to about 16.4 billion DM (about 8.4 billion €) for 1993. Their work corroborates other findings on the relationship between tobacco consumption and aggregate social costs. It should, however, be noted that there are also researchers refuting the argument that smokers lay a financial burden on society. Among others, Manning *et al.* (1989) argue that although smokers may contribute to higher medical and insurance costs while living, society might also gain from tobacco taxes paid by smokers plus the savings that their early deaths brings to public pension plans and other kinds of old-age care. In a follow-up study, Manning *et al.* (1991) then show that calculation of the external costs of smoking is rather sensitive to the underlying discount rate. Without discounting, smokers appear to save non-smokers money as smoking reduces the period of aged dependency and hence reduces pension payments. However, at a real discount rate of about 5%, smoking has net lifetime external costs of (1991) $1,000 per smoker.

The purpose of the analysis in this subsection does not attempt to add to this ongoing discussion on whether or not smokers are a burden to society or whether it is them who subsidize non-smokers. However, the empirical literature shows that smokers are more likely to be absent from the workplace than non-smokers. Besides the short- and long-term medical effects associated with smoking, there is no substantial theoretical body explaining the link between smoking and absence from work. Fuchs (1982) and subsequent authors (e.g., Becker and Murphy, 1988; Evans and Montgomery, 1994) suggest that smokers are individuals with higher time preferences, i.e. they are assumed to value the negative health effects that might emerge in the future less than benefits from current tobacco consumption.

This study now adds to previous evidence insofar that data from a representative longitudinal survey from Germany are used. This allows to account for unobservable heterogeneity which has hitherto not been done. Furthermore, while previous studies mainly employed methods for binary variables to model absence incidence or OLS when analyzing the number of days smokers and non-smokers were absent, the analysis here is based on models for count data. Such model take into account the specific characteristics of absenteeism as the dependent variable when measured in days.

4.2.1 Evidence from the literature

There is a rather large literature on abseentism covering a wide range of aspects. For instance, several authors conclude in the seemingly empirical regularity that sickness absence is negatively correlated with the unemployment rate (see, e.g., Thalmeier, 1999 or Askildsen *et al.*, 2002). Barmby *et al.* (2002) present a comparison of sickness absence across a range of countries that differ in institutional settings like sickpay regulation or family policy. As absence from work in general is higher among female workers, gender differences have attracted attention already in early work for the US (Paringer, 1983). Recently, Mastekaasa and Olsen (1998) as well as Bridges and Mumford (2001) conducted further research on absenteeism from a gender point of view.

There are further studies that analyze the relationship between absence and, for example, the type of working contract or firm size. For example, and without going into details, Winkelmann (1996) analyzes whether worker abenteeism is different for full-time and part-time workers. In another study, Winkelmann (1999) examines the effects of wages and firm size on worker absenteeism. Barmby *et al.* (2001) address the number of contracted work days and its impact on individuals' absence behavior. While these studies focus on different aspects of absenteeism they all use count data models for estimation, which are also applied in this analysis.

Furthermore, there already is some literature on the effect of smoking on absenteeism. First, there are a few early studies from the medical, psychological or occupational health literature. For example, while her primar interest is on the relative weight of respondents and its impact on absence from the workplace, Parkes (1987) finds that smoking increases reported absence episodes significantly. However, similar to other studies of that time and approach, the sample she uses is on student nurses only and it therefore is far from representative.[4]

Large scale micro-datasets have been used as well. Ault *et al.* (1991) draw data from the 1968 Panel Study of Income Dynamics (PSID). They run Tobit-regressions and also employ decomposition techniques to determine whether there is absenteeism that is attributable to smoking behavior of workers. Their results suggest that smoking itself has no statistical significant effect an absence from work when other job or individual-specific characteristics are taken into account. They argue that smokers do not miss work because they smoke. Smoking behavior might rather be used as signal of other worker characteristics that are more

[4] See Parkes (1987) for more references from that period on studies that mainly are workplace-studies.

likely to affect absenteeism. In particular, they suggest that it is alcohol consumption that might have a stronger effect an workers' absence behavior. However, they conclude that in cases where employers have only limited information available on their employees' characteristics, smoking behavior might be used to provide some insight into potential absenteeism.

In his study on the relationship between smoking and absenteeism, Leigh (1995) uses data from the 1986 wave of the PSID. He also applies Tobit regressions which furthermore are corrected for possible sample selection biases. Besides, he investigates the effects of smoking for men and women separately. His findings indicate that tobacco consumption moderately increases absenteeism among men. Female absences are raised by a slight to nil amount.

Data from the 1989/90 Australian National Health Survey are used by Bush and Wooden (1995). They estimate logit-models of absence incidence separately for males and females. While they also control for alcohol consumption and obesity, smoking is a strong predictor for the likelihood of absence from work. In particular, their findings suggest that among men, the probability of smokers of being absent is 66% greater than that for men who never smoked. While the difference is smaller for women (23% greater), it is still highly statistically significant. Furthermore, and in contrast to the results of Ault *et al.* (1991), differences in observable individual characteristics of smokers compared to non-smokers cannot contribute much to the explanation of why there is such a high abseentism among smokers. While they do not find substantial results for a possible effect of the quantity of tobacco consumption on absence incidence, they suggest that it is important to distinguish ex-smokers from other non-smokers, with absence rates of ex-smokers being much higher than those of other non-smokers. Including indicators on ex-smoking in their regressions they find that smoking cessation might increase attendance to work compared to current smokers.

Adding to this study, Wooden and Bush (1995) argue in their analysis on the relationship between smoking cessation and absence from work that controlling for ex-smokers is particularly important because smoking cessation itself might be caused by illness to which smoking has contributed. Therefore, ex-smokers might have more serious health problems than current smokers.

Summing up the literature on absenteeism in general and in particular that part which examines smoking and its relationship to absence from work, implications for the empirical analysis here come up. First of all, the underlying hypothesis to be tested is that smokers are more absent from work than non-smokers. Regarding the findings from the cited studies that employ models for count data, various employment related indicators should be included as

well. In particular, controls for part-time employment as well as fixed-term occupation, firm size and others should be included in the regressions. Furthermore, as men and women differ in smoking patterns, gender separated analyses should be undertaken. Regarding smoking behavior itself, estimations should further include indicators on whether the individual is an ex-smoker or whether she has never consumed tobacco products. While the amount of cigarette use of current smokers does not show to be good predictor for absence incidence in the study of Bush and Wooden (1995), there is no particular reason why this information should be disregarded. The problem of sample selection might be mitigated when using panel data, so that unobservable individual heterogeneity can be taken into account. In addition, models for count data should be applied as these excplicitely consider the specific nature of absenteeism measured in days. As will be outlined in the following subsection on data and the econometric methods used, most of the aspects mentioned will be considered in the following analysis.

4.2.2 Data and econometric methodology: count data models

This study focuses on the relationship between tobacco use and absence from work for Germany using GSOEP data. While this survey in general offers a wide range of socio-demographic and socio-economic variables, substance use is not a major topic in the questionnaire. For example, as alcohol consumption may be a major factor driving individual behavior also on the labor market, indicators on the frequency of drinking behavior and the quantity consumed would be helpful. Unfortunately, no such indicators exist in the GSOEP.

However, there are a few variables on smoking. In particular, questions covering the tobacco consumption of individuals are available for three waves: 1998, 1999 and 2001. The 1998 question distinguishes both the kinds of tobacco (*cigarettes, cigars or a pipe*) and the number of cigarettes or related tobacco products consumed. The 1999 question, however, is different. It covers possible answers ranging from '*Yes*' to '*No, but I used to smoke*' or '*No*'. Additional to this latter distinction, the 2001 question again asks for the quantity of tobacco products consumed, although without differing between the particular types of products.

Table 4.1 presents the structure of smoking behavior in the sample used. While the official statistics show smoking rates of less than 30%, the smoking incidence here is higher probably due to the restriction on blue collar and white collar workers aged 25 to 55 years. The share of men smoking is higher than the share of women who smoke. The upper age class (46 to 55

years old) shows a lower rate of smoking for both women and men than the age classes beneath. As the negative health consequences of tobacco consumption mainly appear in the later stages of life, it might be that these consequences, once emerged, lead to quitting from smoking. Education and smoking is inversely related. A higher level of schooling is accompanied by a lower rate of smoking. This might, for example, be due to the more disseminated knowledge of the detrimental health effects of smoking or due to a lower rate of time preference among the better educated. The latter hypothesis might also cause the lower rate of smokers among white collar workers compared to blue collar worker.

Table 4.1: Incidence of smoking in the sample of German workers

	Smoking (respective shares)		
	Women	Men	All
All	33.8	42.7	39.0
Age:			
25 to 35 years	36.3	43.2	41.1
36 to 45 years	36.3	44.8	40.8
46 to 55 years	28.5	39.2	34.3
Schooling:			
Basic schooling	41.5	50.9	47.7
Intermediate schooling	35.1	38.5	36.8
Secondary schooling	23.9	27.2	26.0
Employment status:			
Blue collar worker	39.6	50.4	47.8
White collar worker	31.9	33.0	32.4

Source: GSOEP, 1998-2001. Own calculations, unweighted.

Information on absenteeism is included annually in the GSOEP. There are two questions regarding to absence from work that are conditional to employment and cover whether the individual has been absent in the period prior to the interview. That is, the data available are retrospective and thus associated with the typical caveat of errors due to shortcomings in memories. However, as the question refers to the period prior to the interview, this kind of error should not pose much of a problem. The questions are in particular: '*Were you sick from work for more than six weeks at one time last year?*' and '*How many days were you not able to work in* [year prior to the interview] *because of illness? Please state all the days, not just*

those for which you had an official note from your doctor.' While it might be possible that sickness absences lasting longer than six weeks are also caused by tobacco consumption only the last question is used because of the responses that are given in total days, i.e. as counts.

The sample is restricted to blue collar and white collar workers aged 25 to 55 years to exclude possible biases due to the worker still being in formal education or, more of a problem here, already are in early or regular retirement. A total of 8,365 observations for two waves, 1998 and 1999, is then available where information on absenteeism from 1999 and 2000 is matched to the preceding waves. While it would be desirable to use the third wave for which indicators for smoking behavior are available, the 2002 data that would be needed to access the absence variable for 2001 is not published at the time of the analysis.

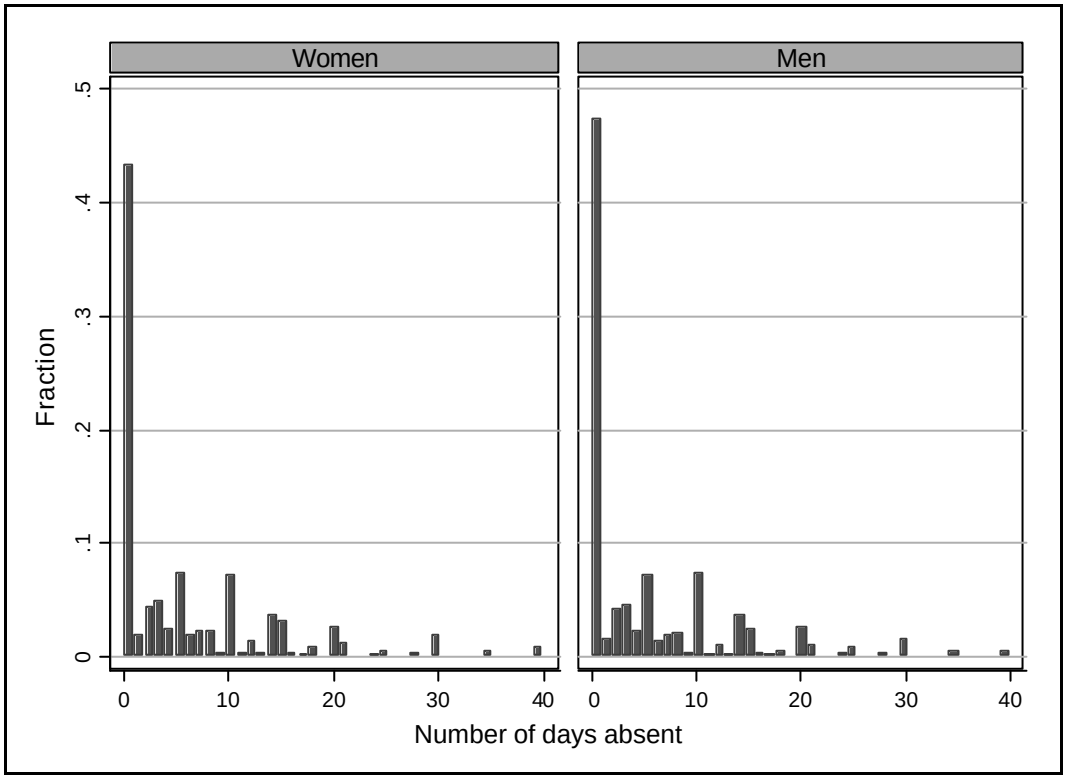

Figure 4.3: Distribution of absenteeism across male and female workers
Source: GSOEP, 1998 – 2000.

Figure 4.3 illustrates that the distribution of days of absence is more or less similar for men and women. While more than 40% of female workers and close to 50% of male workers report to have not been absent, the bigger part of reported absence from work ranges between 1 and 10 absent days with peaks at five and ten days. Only a minor part of workers is absent for longer than ten days. Note that there are peaks at multiples of 5. This might hint towards

either a possible measurement error in the retrospective report of days absent from work or, as likely, that sickness certificates are issued on a weekly basis and therefore are conditioned on multiples of 5.

However, similar to findings of other studies (see, for example, Barmby *et al*., 1991), the fraction of women reporting absence is higher also for the German case. Therefore, multivariate analyses should be carried out that are separated across gender. Furthermore, the regression equations should also include a variety of gender-specific indicators. Above all, the family situation is essentially important for women. In particular, the presence of children in pre-school age might have a major impact (Bridges and Mumford, 2001).

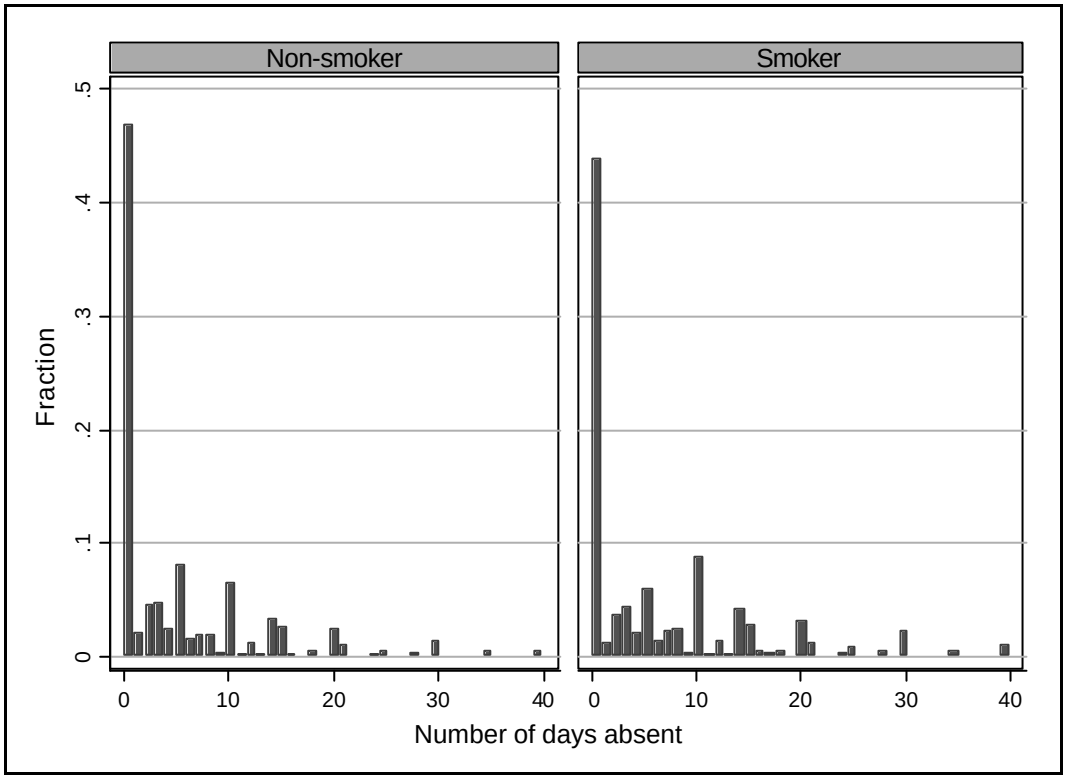

Figure 4.4: Distribution of absenteeism across non-smoking and smoking workers
Source: GSOEP, 1998 – 2000.

A plot of the distribution of absence from work for non-smokers and smokers hints at both a higher incidence of absenteeism and longer spells of absence from work for smokers (Figure 4.4). First, less smokers report to have not been absent and they, second, also have longer periods of absence as the distribution of days is slightly skewed to the right with somewhat stronger peaks.

Table 4.2: Absenteeism among smoking and non-smoking German workers

	Absence incidence		
	Non-smoker	Smoker	*t*-test
All	52.3	56.0	-3.62
Men	50.8	53.1	-1.74
Women	54.1	61.3	-4.41
Full-time	53.0	56.1	-2.85
Part-time	49.0	55.1	-2.19
Blue collar	50.1	56.4	-4.02
White collar	52.4	54.5	-1.46
Public servant	62.5	64.4	-0.48
	Number of absent days (Std. Dev.)		
	Non-smoker	Smoker	*t*-test
All	5.7 (8.9)	6.7 (10.0)	-5.55
Men	5.3 (8.9)	6.5 (10.0)	-4.45
Women	6.0 (9.0)	7.2 (10.1)	-3.89
Full-time	5.7 (9.1)	6.8 (10.0)	-5.06
Part-time	5.3 (8.3)	6.2 (9.8)	-1.86
Blue collar	6.5 (10.2)	7.8 (11.4)	-3.99
White collar	5.2 (8.1)	5.5 (8.4)	-1.56
Civil servant	5.8 (8.8)	6.4 (7.6)	-0.85

Notes: t-test statistic is for H_0: means are equal.

Source: GSOEP, 1998-2000.

This illustrative impression is corroborated by further descriptive statistics on both incidence of absenteeism and the number of days absent from work. Table 4.2 indicates that there are differences both in absence incidence and also in the number of absent days between smokers and non-smokers by personal and labor related characteristics. For example, while 54% of non-smoking women report to have been absent from work, 61% of women who smoke have missed. The *t*-test statistic of 4.41 clearly rejects the hypothesis of equal absence incidence for the two groups. A similar picture shows for blue collar workers where the *t*-test statistic of 4.02 also indicates towards differences between smokers and non-smokers. Furthermore, smoking is associated with a higher number of absent days reported across gender and by blue collar workers. It might, however, be argued whether the difference of about 1 day per annum

is economically large, though.

As information is given on the number of days that an individual has been absent from work, the econometric modelling of the relationship between smoking and absenteeism employs count data models. These models take into account several characteristics of the variable in question. First, measured in days, the indicator is discrete. Furthermore, there is a lower bound to absenteeism. That is, individuals' absence is only observable once it occurs. Otherwise, the number of absence days equal zero.[5] A further aspect of absenteeism is that a large part of workers does report to have not been absent. Therefore, there might be concern of the so-called overdispersion, a distributional aspect that will be discussed subsequently.

Count data models now are well suited for the analysis of absence. In fact, as pointed out above, some of the literature that employs count data models also addresses absenteeism (above all, see the studies of Winkelmann). The idea is that absences might be thought of as results from a sequence of Bernoulli trials. That is, in a given period, there are n trials , where n is the number of working days in this period. On any of these n days, a worker is absent from work with probability p and she is at work with probability $1 - p$. Therefore, the total number of days of absence Y is the sum of the n Bernoulli variables X_n

$$Y = \sum_{n=1}^{N} X_n \tag{4.1}$$

The resulting number of days of absence tends to a Poisson distribution with expected value λ as n tends to infinity under the assumption that the trials are independent and the the probability $p = \lambda / n$ is constant. Parametrization is introduced by letting

$$E(Y_{it} \mid x_{it}) = \lambda_{it} = \exp(x'_{it}\beta) \tag{4.2}$$

where β is a vector of coefficients conformable to the $(k \times 1)$-vector of covariates, x_{it}.

The probability model then is

$$P(\lambda_{it}) = \frac{\exp(-\exp(x'_{it}\beta))\exp(x'_{it}\beta)^{y_{it}}}{y_{it}!} \tag{4.3}$$

[5] It is not of relevance in this analysis whether working time that exceeds the number of contracted working hours may be interpreted as 'negatve absenteeism'. Typically, such phenomena are addressed by the literature on unpaid overtime.

While the Poisson model is the standard benchmark model for count data variables, the required assumptions of independence and constant probability quite likely are not met in the application to absenteeism. First, the postulated independence of the process that generates absent days would require that the probability of an absence in t does not depend on whether or not the worker was absent in the preceding period, $t - 1$. However, evidence is found for both duration dependence (Barmby *et al.*, 1991) and state dependence (Barmby *et al.*, 1995). That is, absence spells do not occur randomly over time. Second, unobservable individual heterogeneity invalidates the basic Poisson model insofar that all factors that are relevant for establishing the expected number of days of absence cannot be controlled for.

When both these assumptions, independence and constant probability, are violated, the data are likely to display overdispersion. This is a situation where, in contrast to the Poisson model, where the (positive) l is equal to the mean and the variance, the conditional mean exceeds the conditional variance of the number of absent days. Furthermore, excess zeros also lead to overdispersion (Winkelmann, 2000).

As shown by the distributions of the counts of absent days in Figure 3.3 and Figure 3.4 and the descriptive statistics in Table 3.2, and further assuming that the required assumptions for the Poisson model are not met, overdispersion is quite likely a matter of concern. Therefore, a more general model that allows for this phenomenon, the negative binomial model (negbin), which provides a potentially more efficient estimator, is used. In particular, the probability model is

$$P(l_{it} \mid x_{it}) = \frac{\Gamma(a + y_{it})}{\Gamma(a)\Gamma(y_{it} + 1)} \left(\frac{a}{\exp(x_{it}' b) + a} \right)^{a} \left(\frac{\exp(x_{it}' b)}{\exp(x_{it}' b) + a} \right)^{y_{it}} \tag{4.4}$$

where a is an additional parameter. This model can arise if the Bernoulli process is characterized by occurrence dependence (Cameron and Trivedi, 1986). However, these specifications assume that observations for individuals consecutive over time are independent.

The panel structure of the data now allows to account for additional unobservable heterogeneity

$$E(Y_{it} \mid x_{it}) = \exp(x_{it}' b + u_i) \tag{4.5}$$

A random effects estimator for the negative binomial model that can be applied to panel data has been introduced by Hausman *et al.* (1984). They start from the Poisson model and assume that the individual specific effect, $\exp(u_i)$, is gamma distributed with $E(u_i) = 1$ and $Var(u_i) = 1/a$. Further assuming that $a_i/(1 + a_i)$ is distributed as *beta*(a;b), a_i can be integrated out

and the resulting joint probability function for individual i can be written as

$$P(y_{i1}, y_{i2}, \ldots, y_{iT}) = \frac{\Gamma(a+b)\Gamma(a+\sum_t \exp(x_{it}'b))\Gamma(b+\sum_t y_{it})}{\Gamma(a)\Gamma(b)\Gamma(a+b+\sum_t \exp(x_{it}'b)+\sum_t y_{it})} \times \prod_t \frac{\Gamma(\exp(x_{it}'b + y_{it})}{\Gamma(\exp(x_{it}'b))y_{it}!} \quad (4.6)$$

Assuming that there are no random effects, $a = b = 0$. A standard Wald test or a likelihood ratio test can be employed to test for this restriction.

The dependent variable used here is the annual number of days of absence from work. The lower limit is 0 and the theoretical upper limit is 365 or the maximum number of workdays. In the final sample, about 45% of the workers report to have not been absent, the largest number of absent days is 199. The average number of days of absence is 6.1 with standard deviation 9.4 (Table 4.2).

Besides the smoking related variables, a variety of socio-demographic and employment related covariates are included to control for effects that are assumed or known to affect absenteeism. In particular, two age class dummies are included, using young individuals, i.e. those aged between 25 to 35 years, as reference group. To control for possible cohort effects, these age class dummies are interacted with smoking indicators and additional regressions are run. Other socio-demographic variables included are a dummy on whether the individual is married, another one indicating whether children up to the age of 16 are living in the household, one dummy on whether she is from East Germany and another one on whether she is of Non-German origin. There are furthermore health-related regressors: a dummy capturing whether the individual is registered disabled, one denoting the (officially registered) degree of disability and two dummy variables on self-rated health: very good and good or fair. That is, a self-rated health status less than fair is the reference category. The labor related covariates are: years of education, potential experience, also squared, the period of current employment, dummies on whether the job is a temporary job or a part-time job. Furthermore, indicators are included on whether she undergoes vocational training, whether she is satisfied with her job, whether she works overtime and whether she is a blue collar worker or a public servant, white collar workers being the reference group. Gross monthly earnings and hours worked per week are given in natural logarithm. Categories on firm sizes larger than 20 employees are also included. Furthermore, eight occupational dummies and twelve branch dummies are used.

Due to the different questions on smoking in 1998 and 1999, cross-sectional regressions

are estimated for both years separately. There are 4,307 male and female observations available for 1998 and 4,058 observations for 1999. The longitudinal regressions are then run using 8,365 person-year observations, 3,849 for women and 4,876 for men.

4.2.3 Empirical results

The results from the cross-sectional regressions are presented first. While these models do not account for individual-specific effects they may be used for comparison to the evidence from the literature. To economize on space, results from the control variables are not discussed in full detail.[6] In general, it is the better educated individual with a very good, good or fair self-rated health who is satisfied with the job, who is less often absent. Part-time occupation is also associated with less absence from work for men. In contrast, individuals working in firms with more than 20 employees tend to be more often absent than workers in small firms. A higher absence rate is also found for male blue collar workers and for females with increases in monthly earnings.

Smoking related findings are shown in the following tables. Table 4.3 presents results for 1998 for which the data allow to control for the amount of cigarettes consumed. Table 4.4 then shows findings for 1999 for which the survey allows to distinguish non-smokers, smokers and ex-smokers.

Table 4.3 shows that, for 1998, the findings from the estimation of the negative binomial regressions confirm the descriptive statistics shown above for male smokers only. That is, compared to non-smoking males, the expected number of absent days is higher for men who smoke.[7] Interestingly, the multivariate count data regressions do not corroborate the descriptive, and hence preliminary results for women: Smoking does not account for higher absence rates among female workers. While this contradicts prior evidence, one has to remember that the regression does not account for unobservable individual heterogeneity.

[6] See Appendix for full regression results.
[7] Note that coefficients shown do not represent marginal effects and are therefore not necessarily comparable across the models estimated for 1998 and 1999.

Table 4.3: Amount of cigarette consumption and absence from work

	M1		M2	
	Women	Men	Women	Men
Smoker	0.1478	0.1536*	—	—
	(0.0967)	(0.0862)		
No. of cig. daily: up to 10	—	—	0.1581	0.0144
			(0.1765)	(0.1827)
No. of cig. daily: 10 to 20	—	—	0.1355	0.2397*
			(0.1409)	(0.1283)
No. of cig. daily: 20 to 30	—	—	0.1781	0.1603
			(0.1472)	(0.1157)
No. of cig. daily: more than 30	—	—	0.0634	0.0877
			(0.3086)	(0.1717)
Observations	1,802	2,505	1,802	2,505
Log likelihood	-4,755.72	-6,064.07	-4,755.61	-6,063.35
Chi^2 (DF)	84.24 (47)	144.38 (47)	84.47 (50)	145.82 (50)
Prob > Chi^2	0.0007	0.0000	0.0017	0.0000

Notes: Standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Source: GSOEP, 1998.

Furthermore, the level of tobacco consumption does also play no substantial role in the explanation of absence from work. While all coefficients are positive and are thus indicating towards higher absence rates for smokers, no statistical significance is again found for women. This holds true also for male workers except for those who smoke between 10 and 20 cigarettes a day. Such workers have higher absence rates. However, there is only weak statistical significance at the 10%-level and, as for women, the finding is based on an estimator that does not allow to control for unobservable individual-specific effects.

Examining whether having smoked in the past influences current absenteeism does not result in possibly expected findings. As pointed out above, it can be argued that the decision to quit smoking might be caused by the deleterious health effects of tobacco consumption which might then result in higher absenteeism. However, with the data at hand, it is not possible to identify the duration of the time since the cessation from smoking. That is, it cannot be controlled for either recent quits from smoking possibly caused by a worsening health condition or quits that happened long ago so that health may have improved in the meantime. Results thus have to be taken rather carefully.

Table 4.4: Smoking, ex-smoking and absence from work

	M1		M2	
	Women	Men	Women	Men
Smoker	0.0689	0.0562	—	—
	(0.1044)	(0.0953)		
Ex-smoker	-0.0424	0.0276	—	—
	(0.1312)	(0.1115)		
Smoker (age 25 to 35)	—	—	0.0812	0.1814
			(0.1738)	(0.1430)
Smoker (age 36 to 45)	—	—	0.1046	-0.2105
			(0.2462)	(0.2061)
Smoker (age 46 to 55)	—	—	-0.0187	-0.6093*
			(0.3827)	(0.3147)
Non-smoker (age 36 to 45)	—	—	0.0346	-0.2570
			(0.2444)	(0.2086)
Non-smoker (age 46 to 55)	—	—	-0.0188	-0.4664
			(0.3692)	(0.3275)
Ex-smoker (age 25 to 35)	—	—	-0.1740	0.2402
			(0.2417)	(0.1973)
Ex-smoker (age 36 to 45)	—	—	-0.2565	0.0463
			(0.2082)	(0.1816)
Ex-smoker (age 46 to 55)	—	—	0.2965	-0.2588
			(0.2359)	(0.2072)
Observations	1,687	2,371	1,687	2,371
Log likelihood	-4,430.46	-6,019.66	-4,428.30	-6,017.89
Chi^2 (DF)	84.12 (48)	110.74 (48)	88.43 (52)	114.27 (52)
Prob > Chi^2	0.0010	0.0000	0.0012	0.0000

Notes: Standard errors in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%

Source: GSOEP, 1999.

The findings from the cross-sectional regressions using the 1999 data indicate that neither current nor past smoking influences absence from work (Table 4.4). This result holds across gender and both for using the indicators on smoking and ex-smoking itself (M1, column 1 and column 2) and also using variables that interact smoking, ex-smoking and age cohorts (M2, column 3 and column 4). Furthermore, the only coefficient statistically different from zero hints towards less absence for male smokers aged 46 to 55 years compared to young male non-smokers. However, although shown in the Appendix only, it is more likely that it is the age effect which dominates this finding.

Note again that the findings just presented are results from estimations of the negative binomial regression model. While it is not shown nor further discussed, LR-tests that test this model against the (nested within) Poisson model call for the negative binomial regression model. However, unobservable individiual heterogeneity is accounted for only in the panel

specification of the model, employed here as a random effects negative binomial regression model. Still, in order to have a benchmark for the panel estimations, pooled regressions are run that again ignore the covariance structure of the longitudinal data.

Table 4.5: Smoking and absence from work; pooled negbin-model including control-variables

	M1		M2	
	Women	Men	Women	Men
Smoker	0.1360**	0.0978*	—	—
	(0.0685)	(0.0595)		
Smoker (age 25 to 35)	—	—	0.2186*	0.1546*
			(0.1134)	(0.0909)
Smoker (age 36 to 45)	—	—	0.2665	-0.0446
			(0.1623)	(0.1392)
Smoker (age 46 to 55)	—	—	0.2550	-0.3669
			(0.2625)	(0.2232)
Non-smoker (age 36 to 45)	—	—	0.1249	-0.0924
			(0.1575)	(0.1303)
Non-smoker (age 46 to 55)	—	—	0.2560	-0.4401**
			(0.2450)	(0.2189)
Observations	3,489	4,876	3,489	4,876
Log likelihood	-9,199.85	-12,099.81	-9,199.09	-12,099.46
Chi^2 (DF)	141.54 (48)	228.78 (48)	143.05 (50)	229.49 (50)
Prob > Chi^2	0.0000	0.0000	0.0000	0.0000

Notes: Standard errors in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%

Source: GSOEP, 1998 – 2000.

In contrast to the findings for the 1999 data and only partially in accordance with the 1998 data, Table 4.5 then shows that smoking is associated with higher absence rates for both men and women (column 1 and column 2). Again using interaction variables, it is found that both young female and male smokers are more likely to have more absent days than their non-smoking counterparts (column 3 and column 4). Note, however, that there is no consistent pattern as the coefficients for smokers older than 35 years are negative, though not statistically significant. Elderly non-smoking males have lower absence rates than their younger counterparts.

Table 4.6 presents the estimation results from the random effects negative binomial regression model, i.e. controlling for unobservable individiual heterogeneity. Again, smoking results in higher absence rates for female workers; male absenteeism, however, seems to be not affected by smoking (column 1 and column 2).

Table 4.6: Smoking and absence from work; negbin-model accounting for random effects

	M1		M2	
	Women	Men	Women	Men
Smoker	0.1287***	0.0132	—	—
	(0.0468)	(0.0399)		
Smoker (age 25 to 35)	—	—	0.1092	0.0061
			(0.0753)	(0.0605)
Smoker (age 36 to 45)	—	—	0.4533***	-0.1113
			(0.1108)	(0.0934)
Smoker (age 46 to 55)	—	—	0.4523**	-0.3046*
			(0.1763)	(0.1554)
Non-smoker (age 36 to 45)	—	—	0.2474**	-0.1275
			(0.1053)	(0.0902)
Non-smoker (age 46 to 55)	—	—	0.4243**	-0.3270**
			(0.1666)	(0.1480)
Observations	3,489	4,876	3,489	4,876
Number of individuals	2,197	2,910	2,197	2,910
Log likelihood	-9,111.50	-12,044.41	-9,110.33	-12,044.40
Chi^2 (DF)	317.86 (48)	349.76 (48)	320.89 (50)	349.74 (50)
Prob > Chi^2	0.0000	0.0000	0.0000	0.0000

Notes: Standard errors in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%

Source: GSOEP, 1998 – 2000.

Using the smoking-age interaction terms, column 3 and column 4 of Table 4.6 show that female smokers older than 35 years have more absent days than young non-smoking women. However, as higher absence rates are also found for elder non-smoking women it might quite likely be the age effect that comes through here. A similar conclusion has to be drawn for males where both elderly smoking and non-smoking workers have lower absence rates than young non-smoking workers. However, interestingly, LR-tests suppose that the random effects specification is not superior to the pooled negative binomial model. It might hence be concluded that it is in particular both female and male young smokers who are more likely to be absent from work compared to their non-smoking counterparts.

4.3 Smoking and earnings[8]

The evidence from the preceding section shows some evidence that smokers are more absent than non-smokers. However, as pointed out, it cannot be said whether smokers are more

[8] I am grateful to session participants at the 15th Annual EALE Conference, Seville, 2003, and in particular Prof. Jan C. van Ours, who gave valuable comments on this study.

frequently exposed to illnesses that are caused by tobacco consumption or whether smokers are individuals with higher time preferences that are less willing to invest in human capital and hence select in jobs with flatter earnings profiles. This section now will add to the analysis ot the preceding section and examine whether smokers differ from non-smokers not only in absence behavior but whether differences show also in earnings. As there are differences in smoking behavior between men and women, the analysis will employ estimations separate for men and women.

Whereas there is only scarce work that examines the impact of smoking only on earnings or wages, the majority of the relevant literature examines the effects of smoking in combination to or additional to another health indicator. Since these studies are closely related to the analysis here, they will be introduced briefly.

Most of the relevant literature concentrates on the effect of alcohol use on wages (Berger and Leigh, 1988; Zarkin *et al*., 1998; MacDonald and Shields, 2001; Tekin, 2002). Results tell that there are both linear and U-shaped relationships between alcohol consumption and wages. That is, there are wage premiums for moderate drinkers in comparison to both heavy drinkers and non-drinkers.[9] There is furthermore a small literature that addresses the impact of the use of illicit drugs on labor supply and wages (Gill and Michaels, 1992; Kaestner, 1991, 1994a, 1994b) or the influence of smoking and being overweight on earnings (Berger and Leigh, 1989). Besides these, there are a few studies that include both tobacco and alcohol use in their analyses (Auld, 2002; Lee, 1999; Lye and Hirschberg, 2001; Van Ours, 2002). Results from the latter support the positive effect of moderate alcohol use but discover wage penalties for smokers. As pointed out, and to the best knowledge, smoking alone and its effect on wages has been of interest only for Levine *et al*. (1997), also yielding lower wages for smokers.

As most of the existing literature explores data for either North-America, Australia and, only recently, the Netherlands, examining the German case for the first time adds to the possibility of international comparisons. Furthermore, the panel structure of the data is used. This is advantageous to cross-sectional analyses as unobservable individual heterogeneity can be controlled for. That is, if unobservable individual factors exist that are correlated both with smoking and labor market outcomes, using cross-sectional data might quite likely lead to biased estimates.

This section is structured as follows: next, subsection 4.3.1 provides a theoretical

[9] These results are consistent with the findings of the medical literature that there is a U-shaped relationship between alcohol consumption and cardiovascular disease (see e.g. Marmot and Brunner (1991); for more references see Tekin (2002) or Lye and Hirschberg (2001)).

background and reviews shortly the results of previous research. Section 4.3.2 shortly presents both the data and the econometric methods used. Results are discussed in section 4.3.3 and are followed by concluding remarks in section 4.3.4.

4.3.1 Background and previous findings

Applying the 'rational addiction theory' (Becker and Murphy, 1988) to smoking tells that the consumption of tobacco products can be seen as a result of an individual's rational decision-making process, taking into account both present and future benefits as well as costs of smoking (Becker *et al.*, 1994; Chaloupka, 1991). This view has not been without contradiction in the literature as some authors find evidence for bounded rationality in the case of smoking (Laux, 2000; Gruber, 2000).

However, from the theoretical point of view, the idea that smokers are individuals with high time preference rates is one of the possible links between smoking and earnings. If smokers are individuals who strongly discount their future lifetime utility, they are less likely to invest in productivity enhancing human capital which might then result in lower wages. A higher time preference of smokers might therefore affect both time spent in formal education investments in on-the-job training. Empirical evidence supporting the argument that smokers hence have lower educational attainment than non-smokers is found by Evans and Montgomery (1994) and implicitly though by Bantle and Haisken-DeNew (2002).

A second theoretical argument is a potential lower productivity of smokers. A decline in productivity may occur, as shown above, because of increased absenteeism of smokers that might then affect earnings negatively. Lower earnings might also result from smokers' lower physical fitness that might confine workers' abilities which might then result in a reduced productivity. Discrimination against smokers might be another reason for earnings differentials (Levine *et al.*, 1997). Public policies to promote knowledge about the deleterious effects of smoking behavior have lead to developments in the protection of non-smokers from passive smoking by either restricting smoking in public buildings to designated areas or even banning it completely. Many private employers have followed these trends and implemented their own smoking policies that might lead to a discrimination of smokers and result in lower wages. It is, however, doubtful whether the discrimination-hypothesis is applicable to the case here because smokers in Germany are not yet as exposed to discrimination as they are, for

example, in the US.[10]

Levine *et al*. (1997) provide another potential explanation: They argue that smokers may be attracted to jobs that provide health insurance. They would thus be willing to accept lower wages in compensation. However, this argument too is not useful for the German case due to the differences in the social insurance systems between Germany and, for example, the US. In Germany, health insurance is compulsory for mainly all employees who are not self-employed. Workers therefore do not face the choice to get jobs that are or are not providing health insurance benefits.

Empirical results of previous research on substance use and its effect on earnings or wages support the theoretical implications insofar as there in general is a negative impact of smoking on wages. Levine *et al.* (1997) apply different methodologies to data drawn from the National Longitudinal Survey of Youth. Besides typical semi-logarithmic earnings regressions that include a full range of personal and family background characteristics, they attempt to control for unobservable heterogeneity by comparing siblings. As they use data from 1984 and 1991, they furthermore account for individual-specific effects by regressing on differenced data. Put differently, they apply the within estimator. However, their focus is on the wage changes between continuous smokers and those workers who quit smoking. Nevertheless, they find that smokers earn 4-8% less than non-smokers. Berger and Leigh (1989) analyze the relationship between earnings, smoking and being overweight. They discuss the possibility of simultaneity bias which might be controlled for by using instrumental variable estimators. While not reported in their study, they conclude that earnings does not have an influence on either the probability of smoking or being overweight. Therefore, they suggest that the earnings regressions they estimate are free of problems of endogeneity. Pertaining to the possible impact of smoking and being overweight itself, they do not find any statistically significant effects of either of these two factors on current earnings. They, however, attribute these findings to the structure of the cross-sectional data they use.

Auld (2002), Lye and Hirschberg (2001) and Van Ours (2002) analyze the simultaneous effects of both smoking and drinking on wages and, in general, find similar results. In particular, Auld (2002) applies both the familiar maximum likelihood estimator and the full information maximum simulated likelihood (FIMSL) estimator, the latter accounting for endogeneity of substance use. His results suggest a positive effect of moderate alcohol use on wages compared to heavy drinking or abstention. Smoking is accompanied with a wage loss

[10] Levine *et al*. allege that over time „... mild public intolerance of smoking has developed into fairly widespread hostility" (Levine *et al*., 1997, p. 493).

of 8% and, after controlling for simultaneity and endogenous selection, with wage losses of 22%. Lye and Hirschberg (2001), also correcting for endogenous selection, do not present direct effects of smoking on wages but find support for the U-shaped relationship of alcohol use for non-smokers but not for smokers. Van Ours (2002), using a dataset from the Netherlands, finds no significant effects of either alcohol or tobacco use on wages of females. Males, however, who drink earn about 10% more than men who do not drink. This positive effect, though, is canceled out by the negative wage effect for male smokers of also about 10%.[11]

Most of the studies just outlined use cross-sectional data. The exception is the study of Levine *et al*. (1997) who partially use panel data. While being related to the study here in a broader sense, Tekin (2002) uses longitudinal data and applies panel estimators to examine the effect of alcohol consumption on employment and wages of Russian workers. He estimates models with and without controlling for unobservable heterogeneity. Without individual-specific effects, his results are comparable to those mentioned above. That is, compared to either heavy drinking or abstention, there is an earnings gain for moderate drinking. However, once he controls for unobservable heterogeneity, these effects either diminish or even vanish. As drinking behavior and smoking behavior are closely related, the important conclusion from his study for the following analysis is that unobservable individual heterogeneity has to be appropriately controlled for when estimating the relationship between substance use and labor market outcomes.

4.3.2 Data and econometric methodology

The data used again are drawn from the German Socio-Economic Panel (GSOEP). The sample is restricted to blue collar and white collar employees aged 25 to 55 years. As in the preceding chapter, the dependent variable used in all regressions is monthly gross earnings, controlling for weekly working hours to prevent differences in working hours from distorting the estimates (Anger and Schwarze, 2003). The Mincer-type earnings regression are run separately for men and women and include standard human capital variables and related background characteristics. These are in particular: length of education, potential work experience (also squared), the firm-specific period of employment, a dummy capturing

[11] Using the rather poetical title “A pint a day raises a man´s pay; but smoking blows that gain away”, he makes the reader aware of his results already in advance.

whether overtime work is done or not, a part-time dummy, a blue-collar worker dummy, three firm-size bands, one regional dummy that equals unity if the individual lives in one of the East German federal states, dummies for nine occupations, and dummies for eleven branches.[12]

One approach to examine the impact of smoking on earnings would be to estimate (selectivity corrected) earnings regressions separately for smokers and non-smokers. The wage differential between smokers and non-smokers could then be analyzed by wage decomposition techniques that account for differences in coefficients and personal characteristics (for related analyses see e.g. Berger and Leigh, 1988; Lye and Hirschberg, 2001). Such approach is useful in order to examine possible differences between the characteristics of smokers and non-smokers. The analysis here, however, uses a variety of indicators of smoking behavior that are included in the regression equations. As outlined above, information of tobacco consumption is available in the GSOEP for three years at the time of this analysis: 1998, 1999 and 2001. In contrast to the preceding study of smoking and absenteeism, the present section uses all three waves as the data need not be matched with preceding or subsequent waves.

Due to the differences in questions on smoking behavior, three subsamples are available allowing to use several indicators of smoking. First, the largest sample consists of 8,367 observations from all three waves. This balanced panel includes a smoker-dummy. A two-wave sample of 1998 and 2001 data additionally uses indicators of the amount of tobacco consumed, resulting in a quasi-continuous variable. To further test for specification robustness, a set of four dummy-variables is generated that covers whether the individual smokes up to 10 or 11 to 20 or 21 to 30 or 31 and more cigarettes or other tobacco products per day. The third sample available is based on data from 1999 and 2001 and includes a dummy on whether the individual has smoked in the past, i.e. whether the worker is an ex-smoker.

A first insight in the relationship between smoking and earnings is given by Table 4.7. It indicates that women who smoke earn slightly more than women who do not smoke. However, results of *t*-tests show that statistical differences between smokers and non-smokers in earnings appear only for men. That is, male smokers earn significantly less compared to the average male non-smoker. These preliminary findings suggest that male workers suffer a wage differential of about 10% because of smoking.

[12] For details see the Appendix.

Table 4.7: Characteristics of smokers and non-smokers

	Mean monthly gross earnings (in €)		
	Non-smoker	Smoker	*t*-test
Women	1,666.61	1,673.32	-0.22
Men	2,753.74	2,487.50	8.07
	Means		*t*-test
Years spent in formal education	12.31	11.47	15.57
Number of days absent from work	7.33	9.56	-5.35
	Shares		*t*-test
Blue collar employment	0.37	0.52	-14.47
Self-rated health is very good	0.10	0.08	2.67
Self-rated health is worse than fair	0.07	0.09	-1.89

Notes: H_0: Means are equal.

Source: GSOEP, own calculations.

As for the theoretical arguments, i.e. discrimination against smokers, a higher time preference rate, a higher level of days absent from work as well as a lower productivity might cause wage or earnings differentials between smokers and non-smokers. While discrimination is difficult to tackle directly, Table 4.7 shows that in the sample used here smokers spent less time in formal education and are more likely to hold a blue collar job, which both might hint towards a higher rate of time preference. While productivity cannot be measured directly here, the descriptive findings for self-reported health, either excellent of worse than fair, as well the number of days absent from work in the year preceding the interview show that smokers are both more likely to report a bad self-rated health and to have a higher absence rate (Table 4.7).

While most of the existing literature explores cross-sectional data, the following analysis mainly employs panel estimators that account for unobservable individual heterogeneity. However, the pooled OLS estimator will be applied as a benchmark model.

The Mincer-type earnings function of individual *i* at time *t* is specified by

$$\ln W_{it} = X'_{it} b_1 + S'_{it} b_2 + g_i + e_{it}, \qquad i=1, \ldots, N; \; t=1, \ldots, T, \tag{4.7}$$

where W_{it} represents monthly gross earnings for individual i at time t, X_{it} is a vector of exogenous standard human capital variables with its associated parameters b_1, S_{it} is a vector capturing smoking behavior and g_i denotes the factor that captures the unobservable

individual heterogeneity. It varies across individuals but is constant over time. The idiosyncratic error term is represented by e_{it}. It is assumed not to be correlated across individuals, i.e. $E(e_{it}, e_{jt}) = 0$ for all $i \neq j$, and is furthermore assumed to be uncorrelated with the regressors, X_{it} and S_{it}, and the individual time-invariant factor g_i. Depending on the underlying assumptions about correlation or non-correlation of g_i, the equation can be estimated by the fixed-effects model or the random-effects model. Furthermore, assuming that only some of the regressors are correlated with g_i, the Hausman-Taylor IV estimator can be applied. For the latter model, it is assumed that the individual-specific effects are correlated with the years spent in education, the potential work experience, smoking behavior, East German origin, blue collar worker employment and being married. These covariates then are treated as endogenous.

Using the panel estimators allows to account for the unobservable individual heterogeneity, g_i. This is of relevance as a cross-sectional approach might be affected by a selectivity bias if unobservable factors exist that influence both smoking and earnings. The coefficient, b_2, would then be biased. If, for example, individuals with a high time preference rate base their tobacco consumption decision on the current satisfaction without considering the future deleterious health effects, they may also be more likely to invest less in human capital. Smokers may thus select in jobs with flatter age-earnings profiles.

As another example, the cross-sectional estimate of b_2 will also be biased, if, as Levine *et al.* (1997) put it, "… people with poor judgement are likely to choose to smoke, and no measure of judgement is included in the regression …".[13] In this case, the negative earnings effect of having a poor judgement will be reflected in the smoking indicator and hence results in estimates of b_2 that are biased downward. In cross-sectional applications, possible remedies for this spurious correlation between S_i and the error term is to either include a rich set of personal characteristics, as possible including measures that are correlated with relevant unobservables. Levine *et al.* (1997), for example, use the Armed Forces Qualifying Test (AFQT) as such a measure.[14] Another approach is the instrumental variable (IV) method which might also be applied in the panel framework. This latter might be particularly helpful if assuming that the unobservable individual heterogeneity varies over time.

Note that while the Hausman-Taylor estimator is also an instrumental variable estimator

[13] Levine *et al.* (1997), p. 496.
[14] Unfortunately, "aptitude test scores" similar to the AFQT are not available in the GSOEP.

there are fundamental differences in the underlying assumptions. The IV-estimators assume that a subset of the explanatory variables in the model are correlated with the idiosyncratic error e_{it}. In contrast, recalling the presentation of Chapter 2, the Hausman-Taylor estimator assumes that a subset of the explanatory variables are correlated with the individual-level random-effects, g_i, but that none of the explanatory variables are correlated with the idiosyncratic error e_{it}.

To test for specification robustness, S_i takes on several forms: Once, it is the binary indicator capturing whether the individual is a smoker or a non-smoker. Furthermore, to account for possible age cohort effects, variables interacting age and smoking are used instead of the simple smoker-dummy. Another specification includes the continuous measure of tobacco consumption and still another uses the vector of variables reflecting the discrete measure of tobacco consumed. In the semi-logarithmic specification, the coefficient, b_2, can approximately be interpreted as the percental earnings gains or losses of a smoker.[15]

4.3.3 Empirical results

Turning first to the IV approach, and reviewing shortly the outcomes of the related literature, one, in general, finds rather conspicuous results. In his study on the impact of alcohol and tobacco use, Auld (2002), for example, finds that once endogeneity is corrected for, smoking is associated with a wage penalty of 24%.[16] In another analysis of the effect of both smoking and drinking on wages, Van Ours (2002) applies 2SLS and 3SLS estimates among other methods. While he does not find significant wage effects for females, alcohol use results in, according to his own opinion, implausibly high coefficients. He, thus, concludes that "… it is difficult to find good instrumental variables".[17] As another example, Zarkin *et al.* (1998) simply do not report their results from 2SLS estimations as their instruments perform very poorly.

These previous conclusions find support in the analyses here. Using both cross-sectional and longitudinal data, experiments with both 2SLS and 3SLS estimates in the cross-sectional framework as well as with the two-stage least squares within, i.e. fixed effects, estimator for

[15] For dummy variables, the percentage change in the dependent variable is given by $e^b - 1$.
[16] Note that in an earlier version of his paper, Auld (1998, pp. 22) concludes that cross-sectional data „… appears to be of limited use in unravelling the income/substance use puzzle" and that panel data „… may be able to shed more light on the puzzle by controlling for both endogeneity and unobservable heterogeneity to a greater extent than approaches possible in cross-sections."
[17] Van Ours (2002), p. 11.

the panel data all result in implausible results for the returns to smoking. To illustrate, depending on whether it is the cross-section or the panel that is used, results range from +33% to -160% (sic!) for female smokers and +18% to +97% for male smokers However, as the first stage regressions mostly perform rather poorly, reliability of the results can strongly be doubted. They thus are not presented.[18]

Turning to more plausible results, note first that the findings for the control variables are not discussed in detail since they behave as expected.[19] Regarding the indicators of the amount of tobacco consumed, i.e. exploring data from 1998 and 2001, the findings from the pooled OLS estimations only partially support the results found in the relevant literature. The estimation results presented in Table 4.8 show that women's earnings by and large are not affected by smoking behavior.

Both the smoker dummy variable as well as the quasi-metric measure of tobacco consumption are not statistically significant, no matter which estimator is used. Including dummy variables for the number of cigarettes smoked per day, results from the pooled OLS suggest that women who smoke more than 30 cigarettes suffer an earnings loss of about 12%. While the coefficients from the panel estimators also suggest for earnings differentials of about 10-15%, they are not statistically significant. Note, however, that the corresponding *t*-values range from 1.40 to 1.56, i.e. the covariates are somewhat 'close' to statistical significance.

Regarding male smokers, the results from the pooled estimations are more alike the findings from the literature. While the estimates shown in Table 4.8 suggest for earnings losses for smokers, the size of the differential is somewhat smaller for German males compared to the results from previous research (see e.g. Levine *et al.*, 1997; Auld, 2002; Van Ours, 2002). That is, male smokers seem to suffer an earnings penalty of almost 2.5% compared to their non-smoking counterparts.

[18] The instruments used are similar indicators that can be found in previous studies. In the cross-sectional application, these variables are 'strong religious belief' and 'being married' in the 2SLS estimation; these two as well as 'age', 'non-labor income', 'number of children up to 3 years of age', 'higher education' and 'foreign nationality' are added to the 3SLS identifying estimation. In the longitudinal framework, 'strong religious belief' could not be used as this indicator is not available for the 2001 data.

[19] Note, however, that returns to schooling are higher when estimated by the HT-IV estimator compared to the results from either the random effects or the fixed effects model. That finding is noteworthy as the development of the HT-IV estimator was induced by the shortcomings in the estimation of this explanatory variable resulting in estimates of returns to schooling which Hausman and Taylor (1981) suggested were too low.

Table 4.8: Tobacco consumption and earnings, panel regressions including control variables

Female	Pooled OLS	RE	FE	HT-IV
Smoker	0.0020	-0.0007	-0.0158	-0.0085
	(0.0147)	(0.0164)	(0.0281)	(0.0255)
Chi^2-LM-Test	570.93			
Hausman-Test			345.96	99.42
Tobacco	-0.0007	-0.0008	-0.0019	-0.0015
	(0.0008)	(0.0009)	(0.0017)	(0.0015)
Chi^2-LM-Test	571.83			
Hausman-Test			345.04	99.77
Up to 10 cig. per day	0.0246	0.0126	-0.0125	-0.0065
	(0.0207)	(0.0210)	(0.0309)	(0.0282)
11 to 20 cig. per day	-0.0110	-0.0108	-0.0321	-0.0223
	(0.0184)	(0.0200)	(0.0336)	(0.0305)
21 to 30 cig. per day	0.0420	0.0168	-0.0719	-0.0574
	(0.0506)	(0.0500)	(0.0701)	(0.0640)
31 and more cig. per day	-0.1226*	-0.1069	-0.1479	-0.1257
	(0.0673)	(0.0686)	(0.1000)	(0.0899)
Chi^2-LM-Test	566.79			
Hausman-Test			353.68	100.01
Male	Pooled OLS	RE	FE	HT-IV
Smoker	-0.0246***	-0.0210**	-0.0054	-0.0067
	(0.0093)	(0.0100)	(0.0152)	(0.0140)
Chi^2-LM-Test	292.10			
Hausman-Test			244.34	85.70
Tobacco	-0.0009**	-0.0009**	-0.0005	-0.0005
	(0.0004)	(0.0004)	(0.0007)	(0.0006)
Chi^2-LM-Test	292.03			
Hausman-Test			245.19	85.29
Up to 10 cig. per day	-0.0446***	-0.0267*	0.0022	-0.0011
	(0.0157)	(0.0149)	(0.0190)	(0.0175)
11 to 20 cig. per day	-0.0106	-0.0088	0.0011	-0.0007
	(0.0113)	(0.0118)	(0.0174)	(0.0160)
21 to 30 cig. per day	-0.0230	-0.0339**	-0.0285	-0.0248
	(0.0171)	(0.0166)	(0.0230)	(0.0211)
31 and more cig. per day	-0.0771***	-0.0506*	-0.0180	-0.0131
	(0.0278)	(0.0270)	(0.0360)	(0.0331)
Chi^2-LM-Test	289.98			
Hausman-Test			247.96	84.64

Notes: Standard errors in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%

Source: GSOEP, 1998 and 2001. Own calculations.

If the metric measure of tobacco consumed is included in the regression instead of the binary indicator or the age-smoker interactions, the finding for smokers shrinks to an earnings loss of about 0,1%. This appears to be a huge drop, but one has to remember that this coefficient indicates the penalty for any additional unit consumed, i.e. any "marginal cigarette" smoked. Using the dummy-variables of the number of cigarettes smoked per day, results show that

male smokers seem to earn about 4.5% less when smoking up to 10 cigarettes daily and even seem to suffer an earnings loss of about 8% when smoking more than 30 cigarettes daily.

So far, findings are in accordance with the literature. However, turning to the panel estimations, the picture changes. While the results from the random effects model are similar to the pooled OLS estimates in both size and statistical significance level, the Hausman tests applied suggest that it is the fixed effects model and, even more so, the HT-IV model which have the superior fit. As a result, smoking behavior does not affect male earnings. While most of the coefficients show a negative sign, pointing towards earnings losses for smokers, none of the estimates is statistically signicant.

Furthermore, these findings are supported by the results of the estimations using data from 1999 and 2001, i.e. including indicators for having smoked in the past (Table 4.9). Again, current smoking does not influence female earnings. While the estimates even suggest for earnings gains from smoking, the coefficients are not statistically significant. This furthermore holds when using age-smoking interacted variables except for the case of female workers aged 46 to 55 years. Here, findings from the HT-IV estimation suggest that smokers earn about 11% more than non-smokers. This result is somewhat puzzling as the age category does not account for variation in the data when entered by itself.

Results for having smoked in the past might at first glance also contradict prior expectations. As pointed out above, it might be argued that the decision to quit smoking may be caused by a worsening health condition and might therefore also be associated with a decrease in productivity and result in lower earnings. However, ex-smoking here is associated with higher earnings of about 4% to 7% when applying the preferable panel estimators. Controlling for age cohorts, the estimates suggest that it is particularly young female smokers who earn about 9% to 10 % more than their non-smoking counterparts. As it is rather unlikely that negative health from smoking occurr in that stage of life already, productivity restrictions are as unlikely to emerge. Theoretical expectations of a possible correlation between quitting smoking and lower earnings might therefore still be valid. However, there have to be other factors associated with ex-smoking that affect earnings positively.

Table 4.9: Smoking, ex-smoking and earnings, panel regressions including control variables

Female	Pooled OLS	RE	FE	HT-IV
Smoker	0.0158	0.0239	0.0270	0.0359
	(0.0153)	(0.0177)	(0.0330)	(0.0314)
Ex-smoker	0.0134	0.0352*	0.0689**	0.0712**
	(0.0187)	(0.0201)	(0.0314)	(0.0300)
Chi^2-LM-Test	299.88			
Hausman-Test			389.03	107.28
Smoker (age 25 to 35)	-0.0105	0.0140	0.0300	0.0542
	(0.0291)	(0.0308)	(0.0460)	(0.0444)
Smoker (age 36 to 45)	-0.0359	0.0005	0.0420	0.0512
	(0.0363)	(0.0347)	(0.0471)	(0.0454)
Smoker (age 46 to 55)	0.0027	0.0594	0.0746	0.1079*
	(0.0528)	(0.0477)	(0.0617)	(0.0590)
Ex-smoker (age 25 to 35)	0.0064	0.0519	0.0922**	0.1038**
	(0.0381)	(0.0361)	(0.0468)	(0.0451)
Ex-smoker (age 36 to 45)	0.0031	0.0161	0.0469	0.0448
	(0.0280)	(0.0285)	(0.0404)	(0.0389)
Ex-smoker (age 46 to 55)	0.0329	0.0425	0.0706	0.0720
	(0.0337)	(0.0362)	(0.0546)	(0.0526)
Non-smoker (age 36 to 45)	-0.0321	-0.0012	0.0248	0.0309
	(0.0356)	(0.0331)	(0.0408)	(0.0391)
Non-smoker (age 46 to 55)	-0.0688	-0.0148	0.0244	0.0461
	(0.0522)	(0.0458)	(0.0550)	(0.0523)
Chi^2-LM-Test	298.71			
Hausman-Test			388.62	93.81
Male	Pooled OLS	RE	FE	HT-IV
Smoker	-0.0187*	-0.0135	-0.0032	0.0024
	(0.0104)	(0.0117)	(0.0196)	(0.0183)
Ex-smoker	0.0108	0.0052	-0.0048	0.0028
	(0.0120)	(0.0121)	(0.0172)	(0.0162)
Chi^2-LM-Test	709.08			
Hausman-Test			301.40	81.51
Smoker (age 25 to 35)	0.0008	0.0078	0.0226	0.0222
	(0.0167)	(0.0171)	(0.0253)	(0.0227)
Smoker (age 36 to 45)	0.0090	0.0011	-0.0001	0.0075
	(0.0220)	(0.0194)	(0.0270)	(0.0240)
Smoker (age 46 to 55)	0.0311	0.0191	0.0001	0.0212
	(0.0334)	(0.0265)	(0.0329)	(0.0290)
Ex-smoker (age 25 to 35)	0.0032	0.0172	0.0275	0.0295
	(0.0220)	(0.0195)	(0.0246)	(0.0221)
Ex-smoker (age 36 to 45)	0.0169	-0.0007	-0.0236	-0.0162
	(0.0188)	(0.0179)	(0.0238)	(0.0213)
Ex-smoker (age 46 to 55)	-0.0004	-0.0039	-0.0234	-0.0150
	(0.0223)	(0.0216)	(0.0285)	(0.0254)
Non-smoker (age 36 to 45)	0.0220	0.0195	0.0141	0.0177
	(0.0225)	(0.0189)	(0.0225)	(0.0201)
Non-smoker (age 46 to 55)	0.0897**	0.0586**	0.0242	0.0341
	(0.0349)	(0.0281)	(0.0339)	(0.0301)
Chi^2-LM-Test	706.43			
Hausman-Test			307.05	53.38

Notes: Standard errors in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%

Source: GSOEP, 1999 and 2001. Own calculations.

Still another picture shows for male workers (Table 4.9). In contrast to females, ex-smokers do not differ in earnings from non-smokers. Furthermore, while the coefficient from the pooled OLS estimations suggests a 2% earnings loss for smokers, this differential vanishes once panel estimators are applied. Controlling for age groups, elder non-smokers also seem to earn about 9% more than their younger counterparts. However, this finding first decreases to an earnings gain of about 6% applying the random effects model and eventually is abolished running the fixed effects model and the HT-IV model.

Looking at the results from the estimations using the three-wave-panel, the findings are as follows. Table 4.10 shows that there is again no statistical significant result for women. Even though the fixed effects and the HT-IV estimator show a tendency towards an earnings loss of about 1.5%, the corresponding *t*-values are far off from any reasonable significance level. This further holds when using the age-smoking interaction variables. While the Hausman tests once more call for using the estimators which allow for correlation between the unobservable individual-spedific effect and all or a subset of the covariates, none of the resulting coefficients is statistically different from zero. That is, following from these analyses, it might well be concluded that smoking behavior does not affect female earnings.

Looking at the findings for male workers in the lower half of Table 4.10, the results obtained from the preceding estimations are reinforced. First, using the binary indicator, the pooled OLS equations suggest an earnings penalty of about 2% for smokers. However, controlling for individual heterogeneity, the effects turn statistically insignificant in the random effects model and furthermore show a (statistically insignificant) positive sign for the fixed effects model and for the HT-IV estimation.

Furthermore, including interaction-terms accounting for age and smoking status, the earnings penalty for smokers does not show anymore even for the pooled OLS estimator. There is, however, a positive effect for elder non-smokers suggesting that those workers earn about 7% more than their young non-smokers. Again, this effect diminishes when estimating the random effects model and eventually turns to be not statistically different from zero applying the fixed effects estimator or the superior HT-IV model (Hausman-Chi^2-value of 79.31).

Table 4.10: Smoking and earnings; panel regressions including standard control variables

	Model 1				Model 2			
Female	PR	RE	FE	HT-IV	PR	RE	FE	HT-IV
Smoker	0.0066	0.0021	-0.0175	-0.0141				
	—	—	—	—	—	—	—	—
	(0.0118)	(0.0139)	(0.0190)	(0.0186)				
Smoker (age 25 to 35)					-0.0098	-0.0020	-0.0086	0.0024
	—	—	—	—				
					(0.0213)	(0.0219)	(0.0259)	(0.0256)
Smoker (age 36 to 45)	—	—	—	—	-0.0411	-0.0228	-0.0306	-0.0236
					(0.0275)	(0.0257)	(0.0298)	(0.0293)
Smoker (age 46 to 55)	—	—	—	—	-0.0086	0.0393	0.0047	0.0269
					(0.0423)	(0.0369)	(0.0417)	(0.0409)
Non-smoker (age 25 to 35)			(omitted reference category)				(omitted reference category)	
Non-smoker (age 36 to 45)	—	—	—	—	-0.0296	-0.0070	0.0015	0.0060
					(0.0262)	(0.0230)	(0.0246)	(0.0241)
Non-smoker (age 46 to 55)	—	—	—	—	-0.0664	-0.0053	0.0078	0.0274
					(0.0407)	(0.0333)	(0.0349)	(0.0341)
Chi^2-LM-Test	961.14				958.57			
Hausman-Test (DF)		510.93 (36)	131.03 (36)			498.56 (38)	118.72 (38)	
	Model 1				Model 2			
Male	PR	RE	FE	HT-IV	PR	RE	FE	HT-IV
Smoker	-0.0210***	-0.0102	0.0055	0.0051				
	—	—	—	—	—	—	—	—
	(0.0074)	(0.0082)	(0.0105)	(0.0100)				
Smoker (age 25 to 35)						0.0081		0.0187
	—	—	—	—	0.0015		0.0198	
					(0.0119)	(0.0115)	(0.0134)	(0.0124)
Smoker (age 36 to 45)	—	—	—	—	-0.0120	-0.0126	-0.0109	-0.0021
					(0.0167)	(0.0138)	(0.0157)	(0.0144)
Smoker (age 46 to 55)	—	—	—	—	0.0020	0.0061	-0.0049	0.0151
					(0.0271)	(0.0199)	(0.0215)	(0.0197)
Non-smoker (age 25 to 35)			(omitted reference category)				(omitted reference category)	
Non-smoker (age 36 to 45)	—	—	—	—	0.0056	0.0073	-0.0018	0.0067
					(0.0160)	(0.0123)	(0.0131)	(0.0121)
Non-smoker (age 46 to 55)	—	—	—	—	0.0666**	0.0362*	-0.0010	0.0175
					(0.0261)	(0.0194)	(0.0209)	(0.0191)
Chi^2-LM-Test	2,152.62				2,145.19			
Hausman-Test (DF)		574.57 (37)	121.72 (37)			532.88 (38)	79.31 (39)	

Notes: Standard errors in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%

Source: GSOEP, 1998, 1999, and 2001. Own calculations.

There is another aspect worth to mention. Looking at the results from both the fixed effects and the HT-IV estimations, the coefficients suggest an earnings gain of about 2% for male smokers aged 25 to 35 years. While both coefficients are not statistically significant, the respective *t*-statistics are 1.47 and 1.51, i.e. 'close' to statistical significance. Considering that the sample size is not extensive (n=1,642), the tests are not very powerful. Assuming that the effects would be statistically significant, such finding would suggest for a higher time preference rate of smokers. This is because young smokers might be imagined to select in jobs with flatter age-earnings profiles. Consequently, young non-smokers would be more likely to still invest in human capital in that stage of life and therefore show to earn less like their smoking counterparts. However, as the sample by general standards is of reasonable size, it has to be concluded that male workers, alike female workers, do not suffer in earnings from smoking behavior. These results again underline the importance of controlling for unobservable individual heterogeneity.

So far, the estimations analyzed whether there are earnings differentials due to tobacco consumption. Despite the empirical evidence that smoking does not affect earnings of German workers, attempts to test for the theoretical implications outlined above are undertaken that follow the approach of Levine *et al*. (1997). That is, additional regressions are run that includcde indicators to crudely test for both a possible lower productivity and a higher time preference rate of smokers. In particular, the hypothesis of a reduced productivity is tested by including an indicator on whether the worker is registered disabled and hence is likely to have a work limitation. Furthermore, another indicator denoting whether the worker's self-reported health is worse than fair is used. The rationale behind using these two variables is that a worker's poor health might reflect in the smoking indicators possibly leading to wage or earnings penalties. However, given that the above results do not suggest for earnings differentials it is not too surprising that the relevant coefficients shown in the upper half of Table 4.11 do not alter the findings. That is, having excluded the health-related variables from the regressions above does not impose a bias on the effect of smoking behavior on earnings.

Furthermore, a lower productivity of smokers might be reflected in a higher rate of days absent from work. Whereas the descriptive statistics shown above indicate that smokers are longer absent from work than non-smokers, the results from the regressions that use the retrospective number of absent days as explanatory variable neither suggest for an effect of absenteeism itself nor does the inclusion of that regressor affect the coefficient of workers' smoking behavior (mid of Table 4.11).

Table 4.11: Alternative model specifications testing hypotheses; panel regressions including control variables

	Females			Males		
	RE	FE	HT-IV	RE	FE	HT-IV
Smoker	0.0023	-0.0175	-0.0158	-0.0102	0.0056	-0.0158
	(0.0139)	(0.0191)	(0.0186)	(0.0082)	(0.0105)	(0.0186)
Registered disabled	0.0269	0.0009	0.0151	0.0109	0.0126	0.0151
	(0.0286)	(0.0365)	(0.0357)	(0.0189)	(0.0230)	(0.0357)
Smoker	0.0018	-0.0175	-0.0160	-0.0102	0.0057	0.0049
	(0.0139)	(0.0191)	(0.0186)	(0.0082)	(0.0105)	(0.0100)
Self-rated health is worse	0.0096	-0.0027	-0.0001	0.0148	0.0125	0.0132
than fair	(0.0155)	(0.0160)	(0.0156)	(0.0105)	(0.0108)	(0.0104)
Smoker	0.0016	-0.0175	-0.0160	-0.0104	0.0051	0.0043
	(0.0139)	(0.0191)	(0.0186)	(0.0082)	(0.0105)	(0.0101)
Number of absent days	0.0003	-0.0001	0.0001	-0.0002	-0.0001	-0.0002
	(0.0002)	(0.0002)	(0.0002)	(0.0001)	(0.0001)	(0.0001)
Smoker	-0.0998	-0.0458	-0.0520	0.1070**	0.0901	0.0804
	(0.0912)	(0.1117)	(0.1093)	(0.0485)	(0.0550)	(0.0528)
Work experience*Smoker	0.0062	0.0025	0.0035	-0.0109**	-0.0082	-0.0077
	(0.0087)	(0.0107)	(0.0105)	(0.0047)	(0.0054)	(0.0051)
Work experience (squared)	-0.0001	-0.0001	-0.0001	0.0002**	0.0002	0.0002
*Smoker	(0.0002)	(0.0002)	(0.0002)	(0.0001)	(0.0001)	(0.0001)

Notes: Models include all background characteristics as outlined in the text. While results from pooled OLS are not presented, note that they do not differe from the findings from the preceding regressions.
Standard errors in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%

Source: GSOEP, 1998, 1999 and 2001. Own calculations.

Finally, to test for the individual's time preference, an interaction term between the potential work experience and smoking status is included in the earnings equations. Given that smokers would be individuals with a higher time preference rate they should be less likely to invest in on-the-job training. Returns to work experience should therefore be lower. While the findings for female smokers do not support this hypothesis, the results for male workers to some extent are consistent with the idea of a higher rate of time preference for smokers. While the coefficient from the random effects model is the only one being statistically significant, the signs of the coefficients from both the fixed effects model and the HT-IV estimation are also negative and the *t*-statistics of 1.53 and 1.50 only closely miss the minimum statistical significance level. While this evidence admittedly is rather weak, one might see at least a tendency for support of this potential explanation.

4.4 Smoking, absenteeism and earnings: concluding remarks

The two preceding sections presented analyses on the relationship between smoking behavior and economic outcomes. In particular, it is examined whether smoking affects absence from

work and whether there is an impact on earnings. There are several novelties arising from the analyses that add to the existing evidence from the literature. First, data for Germany are used. As most of prior studies are based on Northern American data, the results here allow for international and transcontinental comparisons. Furthermore, as prior studies have mainly used cross-sectional data, exploring longitudinal data allows for the use of methodologies that are able to address problems which could not appropriately be tackled in earlier analyses.

In the first section, absence from work is studied which is a regularly addressed topic in the empirical literature. However, while there is a variety of aspects that are typically thought to be influential in the determination of absence from work, tobacco consumption as an indicator of individuals' health behavior is rarely examined. First, corroborating evidence from the literature, descriptive findings show that also in the German case smokers are both more often and longer absent from work than non-smokers. This particularly holds for women and blue collar workers. However, the difference of about one more absent day per year might be considered to be not very large economically.

Furthermore, multivariate analyses are employed. In particular, count data models are applied. These models account for the specific nature of the non-negative, discrete measure which is exposed to exzess-zeros and overdispersion. Controlling for a wide range of socio-demographic and employment related background characteristics, the findings from both cross-sectional and panel estimations suggest that smoking is only a weak predictor for absenteeism. While indicators for the amount of cigarettes consumed as well as for ex-smoking turn out to be of no relevance in the regressions, both female and male smokers aged 25 to 35 years have higher absence rates than their non-smoking counterparts. However, it may be somewhat farfetched to conclude from this result only that smokers are individuals with higher time preferences, which is one of the theoretical links between substance use and economic outcomes.

In the following section, the relationship between smoking behavior and earnings is examined. The results found only partially confirms previous research. In general, similar to findings for the Netherlands (Van Ours, 2002), women's earnings are not affected by smoking. Further, in consistence with other studies that mainly are based on cross-sectional data, earnings differentials are found for males when using estimators that do not account for unobservable individual heterogeneity. In particular, smoking seems to be associated with an earnings penalty of about 2% for male workers. First, compared to results from the literature, this differential is small. Furthermore, as the findings are based on the pooled OLS estimator, the result may be spurious as unobservable individual-specific effects might lead to a

downward bias in the smoking coefficients. Thus, panel regressions are performed that account for heterogeneity. In particular, the familiar random and fixed effects models are estimated. As these models are relying heavily on assumptions about whether there is or is not correlation between the individual-specific effects and the set of explanatory variables, the Hausman-Taylor estimator is applied. This instrumental variable estimator allows for partial correlation of a subset of both time-variant and time-invariant endogenous regressors with the individual-specific effect, while the remaining subset of covariates is assumed not to be correlated with it. Results from this estimator are both consistent and efficient and, furthermore, time-invariant regressors like schooling indicators can still be accounted for.

While the results from the random effects model still suggest for similar findings as those from the pooled OLS estimation, Hausman test-statistics suggest that both the fixed effects model and the HT-IV model are the models with the superior fit. According to these models, the prior negative effect of smoking on earnings vanishes. Coefficients do statistically not differ from zero and, moreover, have positive signs. Using the balanced panel that is based an three waves, the *t*-test statistics even get close to the 10%-level for smokers aged 25 to 35 years old. On a somewhat speculative ground, it may be argued that these young male smokers are individuals with a higher rate of time preference. While the hypothesis suggests that smokers select in jobs with flatter age-earnings profiles, the tendency towards higher earnings for young smokers seen in the data is not inconsistent with the argument. It is that young smokers subsequently might not invest in human capital as much as their non-smoking counterparts. They hence are likely to have occupational experience that non-smokers are only about to establish.

Tests for a higher time preference rate of smokers as well as for another theoretical implication, that is whether smokers are workers with lower productivity, are also provided. Using indicators for an individual's disability status, her self-rated health and the number of days absent from work as additional regressors in the estimations, the latter is not supported. However, concerning the time preference of smokers, one again finds at least weak support for this hypothesis. Suggesting that smokers are less likely to invest in on-the-job training assuming that they strongly discount future events, interaction terms between smoking status and work experience is additionally included. Results show at least a tendency towards lower returns to work experience which is consistent with prior expectations.

5. Atypical employment in Germany and the UK: The case of moonlighters

5.1 Introduction: Some remarks on atypical employment

The two preceding chapters have presented analyses on topics that might be considered to be somewhat off the labor economist's mainstream interest. The focus of this chapter's analysis now is on secondary jobholding, the so-called moonlighting.[1] While this might at first glance be a more typical issue, the supply of labor in more than one job has not been on the top of labor economists' agendas for long either. Although there is an established literature, it is far from extensive and only recently has there been an increasing interest in multiple jobholding along with the ever increasing literature on atypical employment. While this latter term in general covers all phenomena that refer to non-permanent, non-full-time employment, the majority of the relevant literature concentrates on (female) part-time employment, fixed-term employment, and temporary work via temping agencies.

Table 5.1: Atypical employment in the EU

	Part-time employment (% of total employment)			Fixed term employment (% of total employment)			
	1990	1995	2001	1985 [b)]	1990	1995	2001
France	12.0	15.8	16.4	4.7	10.4	12.4	14.9
Germany	14.1 [a)]	16.3	20.3	10.0	10.2	10.5	12.4
Netherlands	32.0	37.5	42.4	7.5	7.6	11.2	14.3
Spain	4.8	7.4	8.1	15.6	30.3	34.9	31.7
UK	20.1	24.3	24.9	7.0	5.2	7.3	6.8

Notes: [a)] Data from 1991; [b)] Drawn from Dolado *et al*. (2001).
Source: European Commission (2002), Dolado *et al*. (2001)

Table 5.1 shows that there has been an increase in both part-time employment and fixed-term employment in the European Union over the last 10 to 20 years.[2] These developments have consequently attracted much interest among researchers as well as among policy-makers.

[1] Here, 'moonlighting' does not refer to any kind of illicit employment that sometimes is paraphrased by that term too.
[2] Only a few countries from the EU are selected to illustrate the general trend. Information for the remaining countries are given in the respective sources.

Therefore, there is a vast literature covering a wide range of issues that are related with either form of employment. For instance, De Grip *et al*. (1997), examine the development of atypical employment in the EU for the period between 1985 and 1995 with a focus on occupational characteristics of workers. Bardasi and Francesconi (2003) analyze for the UK whether both part-time and temporary employment affects individual wellbeing, measured by indicators of mental health, general health status, life satisfaction and job satisfaction. The German case has been analyzed, e.g., by Schäfer (2000) and Klös and Schäfer (2000). The consequences of temporary employment in terms of wage differentials have been examined by Hagen (2001) for Germany and Booth *et al*. (2002a) for the UK who also analyze whether this type of employment serves as stepping stone to permanent work (Booth *et al*., 2002b). Dolado *et al*. (2001) attempt to draw lessons for other countries from the development of fixed term employment in Spain between the mid-1980s and the late 1990s. Dekker and Kaiser (2000) examine for Germany, the Netherlands and the UK, whether it is useful to distinguish between atypical or flexible employment patterns when analyzing non-standard employment.

Multiple jobholding, on the other hand, has gone unnoticed by and large. This is somewhat surprising as that form of labor supply is as closely related to changes in labor market institutions and regulations as are both part-time and fixed term employment. The following analyses therefore add to the literature in several ways. First, the analysis in the following section, 5.2, examines moonlighting patterns for two countries that are representatives of different labor market regimes, Germany and the UK. While the UK labor market can be considered liberal, the German labor market regime is a rather restrictive one and is attributed by a large body of regulations. As constraints in the main job are the most prominent argument of the theoretical background of secondary jobholding, the comparison between Germany and the UK can help to explore underlying determinants other than labor market constraints. Furthermore, as in the preceding chapters, panel data are used, allowing to control for unobservable heterogeneity.

The past few years have undergone a continuing strive towards deregulated labor markets in continental Europe, the declared aim being the enhancement of labor flexibility and mobility which is assumed to foster the reduction of mass unemployment. Again, there is a strong scientific interest in the causes and, above all, the consequences of labor market instruments. Consequently, there also is a growing body of literature evaluating the pros und cons of labor

market policies and instruments. However, besides deregulative attempts, there have also been reregulations in Germany following a political change in the government in 1998. Due to the need of coping with the financing of the social security systems in a demographically changing society, social security payments for the so-called 'marginal employment' have been introduced in 1999. Section 5.3 will present a brief case-study that evaluates its consequences for workers' moonlighting behavior. The final section concludes.

5.2 Moonlighting in Germany and the UK

As outlined, it is rather surprising that there is non-extensive research on multiple jobholding. Even more so as it is a quite widespread phenomenon in most of the Western industrialized countries. For the US and Canada, there are a few studies issued by official labor statistics institutions that present mainly descriptive evidence for trends in moonlighting over time. Stinson (1997), for example, shows for the US that multiple jobholding increased from 5.2% of all employed persons in 1970 to over 6% in the 1990's, mainly being induced by the growth of moonlighting women from 2.2% to about 6%. In Canada, moonlighting prevalence has also grown from 2% of all workers at the end of the 1970's up to about 5% in 1997 (Sussman, 1998). Again, women outnumber men (6%, compared with 5% for men).

As will be shown in more detail followingly, secondary jobholding in Germany has decreased from about 9% in the mid-1980s (Schwarze and Helberger, 1987; Schwarze, 1991) to a rather stable rate of about 6-7% of all employed persons in the first half of the 1990s (Schupp *et al.*, 1997; Schwarze, 1997; Schwarze and Heineck, 1999). Bell *et al.* (1997) find moonlighting rates of about 10% for the UK for 1991 to 1994 which is updated by the findings of Böheim and Taylor (2003) who report moonlighting rates of 8-10% for the period between 1991 and 1998. Similar to the Northern American labor markets, the prevalence of moonlighting in the UK is higher for women than for men. In Germany, however, the picture is reversed: Male moonlighting is higher than female secondary jobholding.

The analyses here add to the literature insofar as a cross-country comparison has not been carried out yet. The study furthermore explores the determinants of moonlighting behavior for males and females separately which has been of interest for a only a few studies yet (e.g., Schwarze, 1991; Averett, 2001). First, a short survey of the relevant background literature is given.

5.2.1 Background and findings from the literature on moonlighting

When asking workers why they supply labor in more than one job, answers show that financial concerns are the main motivation to moonlight. Among possible reasons, the *'need to meet regular household expenses'* is the most important one, with about 30-35% of moonlighters citing that reason (Stinson, 1990; Cohen, 1994, Sussman, 1998; Averett, 2001). Consequently, the primary explanation for secondary jobholding used to be the notion of a fixed amount of hours an individual is allowed to work on her main or first job. If that number of hours is below the one, the individual would like to work, labor supply constraints exist. As will be shown in more analytical detail below, there might then be an incentive to adjust the difference between desired and realized hours of work by offering labor in a second job.

However, there are also other possible reasons for moonlighting. While 10-15% of moonlighters want to *'gain experience to build up a business'*, more than 15% simply *'enjoy the work on the second job'* (Stinson, 1990; Cohen, 1994, Sussman, 1998; Averett, 2001). These findings hint towards additional motives for moonlighting other than hours-constraints. There consequently are a few studies that extend the initial theoretical background by ideas that might be subsumed under the so-called 'heterogeneous-jobs' motive. In general, this refers to jobs that are not perfect substitutes. Typical examples are the university professor who uses her expertise in consulting or the musician who cannot make a living from her performances only and thus holds a regular job to keep up to her expenses.

These simple examples point to possible differences between a constrained and a non-constrained moonlighter: In the first case with hours-constraints, the main job typically is the higher paying one. As the earnings' capacity in this job is limited, workers will accept lower wages in a second job. Lower paying second jobs may also be the case for the 'heterogeneous-jobs' moonlighter: Consider the musician who might accept low earnings as long as she is allowed to play her music no matter whether she is hours-constrained on her first job or not. On the other hand, pertaining to the second example, the university professor's consulting fee may break down to a rather high wage. Here, it might be the relative security of his academic occupation preventing that the professor engages in full-time consulting only. Furthermore, the academic position and its accompanying reputation might be the basis for consulting deals.

There are some more explanations that are in accordance with the 'heterogeneous-jobs' motive. For example, women who have young children may hold two part-time jobs that suit their time-allocation needs of arranging child care better than one full-time occupation.

Furthermore, as indicated above, workers who expect to change jobs or start their own business at some future point of time might be moonlighting to acquire or improve certain skills that are needed in the forthcoming occupation. Furthermore, job insecurity might be another possible reason to moonlight although there are arguments that also suggest for a negative effect on participation in secondary jobholding.

Along these lines, multiple jobholding might be both a short and long run phenomenon. Hours-constrained workers might moonlight for one or even more shorter periods in their lifetime to overcome times of economic hardship. Typical examples are the need of paying off debts or to accumulate savings for a bigger purchase. While these financial straints in general might be expected to be of short run duration, secondary jobholding might also be a continuous phenomenon if there is a need to meet regular household expenses.

The existing research on multiple jobholding covers a wide range of both theoretical and empirical topics. The seminal study is by Shishko and Rostker (1976), who were the first to combine theoretical reasoning with empirical analyses. While they acknowledge that there may be reasons for moonlighting other than hours constraints on the main job, the empirical part of their analysis is based on that rationale only. Whereas following analyses of that early period also focus on the 'hours-constraints' case (for example, O'Connell, 1979), more recent research also addresses other motives and different issues of interest. For instance, Schwarze (1991) in his comprehensive study on secondary jobholding in Germany in the mid-1980's extends the theoretical background that is based on traditional neoclassical approach by explicitely incorporating a 'job-quality' factor in the model which then has to be considered as a 'discrete choice' model. This factor is qualified to capture the heterogeneous character of both the main and the second job as it might include aspects like, e.g., working conditons and job or income security. The findings from the empirical analyses that are based on cross-sectional data from the GSOEP from 1985/86 reinforce the importance of the extended model. He analyzes both the traditional model by applying the Tobit-estimator and the extended random utility model by estimating the moonlighting participation decision using logit-models. He concludes that the findings from the latter approach fit the data better than the model that is based on the assumption of underlying hours constraints only.

The link between labor supplied in the first and the second job is analyzed by Smith Conway and Kimmel (1998) for US males. They use data from the SIPP and employ a disequilibrium model to estimate differences between those who have a second job and those who do not. They show that male labor supply is far more elastic than usually assumed, once

moonlighting is acknowledged in labor supply behaviour. Furthermore, they too find evidence in support of both the 'hours-constraints' and the 'heterogenous-jobs' motive.

Also for the US, gender differences in moonlighting behaviour and moonlighting wages have been explored by Averett (2001). While she does not find substantive differences in the factors leading men and women to moonlight she concludes that the observed wage differential between male and female moonlighter cannot be explained by differences in individual characteristics. She furthermore examines non-reporting of income among multiple jobholders and recommends to use care when interpretating data on secondary jobholding in general, and financial data of moonlighters in particular.

The dynamics of dual jobholding have been the focus of Böheim and Taylor (2003) for the UK as well as of Paxson and Sicherman (1996) for the US, who also model the decision to take second jobs and/or change main jobs as a stochastic dynamic process. The duration of moonlighting is addressed by Marshall (2002) and Kimmel and Smith Conway (2001). Again, the main results are consistent with the presence of multiple motives for dual jobholding, with the 'hours-constraints' motive being the most common. The family context of unmarried moonlighting individuals has been analyzed by Allen (1998), while a household production model including multiple jobholding behavior is outlined by Highfill *et al*. (1995). The household context is also modeled by Krishnan (1990) who explores the husband's decision to moonlight together with the wife's decision to work using a double self-selection model.

In accordance with the 'heterogenous-jobs' motive, Bell *et al*. (1997) examine for the UK, whether secondary jobholding is used as a 'hedge' against unemployment. They analyze the possible link between job security and multiple jobholding. They argue that a second job might be hold if workers believe that their main job has a high risk of termination.They, however, find only weak evidence in support for their hypothesis.

Sofar, with the studies on the dynamics and the duration of moonlighting being somewhat exceptional, the literature is mainly based on analyses of cross-sectional data. Therefore, one of the novelties here is the use of panel data. This allows to employ panel estimators that mainly have not been used before.[3] That is, unobservable individual heterogeneity is controlled for that might lead to biased results in the case of cross-sectional estimates.

Furthermore, as all of the preceding studies are based on single-country data, the second

[3] As far as apparent, the exception is the study of Böheim and Taylor (2003). While their focus is on the dynamics of multiple jobholding, they also estimate moonlighting participation using a random-effects probit model.

novelty is the transnational comparison of the German and the British case. This is of even more relevance as the German labor market has to be considered highly regulated and thereby imposing even more restrictions on workers. Liberal regimes such as the British, on the other hand, might offer a wide range of options a worker might adjust to in order to achieve maximum utility.

Evidence for existing differences in labor market regimes is provided by the OECD (OECD, 1999). Table 5.2 shows for Germany and the UK that measuring the overall strictness of employment protection legislation on a scale from 0 to 6, the UK has an overall score of 0.9 whereas Germany's score is 2.6.

Table 5.2: Summary indicators of the strictness of employment protection legislation

	Regular employment		Temporary employment		Collective dismissals	Overall EPL strictness					
						Version 1[a]				Version 2[b]	
	Late 1980s	Late 1990s	Late 1980s	Late 1990s	Late 1990s	Late 1980s		Late 1990s		Late 1990s	
Germany	2.7	2.8	3.8	2.3	3.1	3.2	(14)	2.5	(18)	2.6	(20)
UK	0.8	0.8	0.3	0.3	2.9	0.5	(2)	0.5	(2)	0.9	(2)

Notes: Figures in brackets show country rankings that increase with the strictness of employment protection.
[a)] Average of indicators for regular contracts and temporary contracts.
[b)] Weighted average of indicators for regular contracts, temporary contracts and collective dismissals.
Source: OECD, 1999.

While employment protection in Germany in terms of the overall strictness score has become less strict from the late 1980s to the late 1990s, the position in terms of ranking, however, worsened. Among the 26 OECD countries analyzed, Germany ranks at either position 18 or 20, with only the Southern European countries having even stricter employment protection legislation. The UK, on the other hand, ranks at position 2, i.e. has the most liberal labor market regime following the US which mainly has no labor market restrictions except for regulations regarding collective dissmals.

Concerning the impact of labor market restrictions on secondary jobholding, it might be argued that without or with only a few regulations specifically on working time, workers may have less incentives to moonlight. This is because it might then be expected that they will be able to realize the desired amount of time. However, such arguing is clearly based on the 'hours-constraints' motive which has shown to be too simple to capture individual moonlighting behavior. The empirical analysis might therefore allow to explore whether

differences in the labor market regimes are associated with differences in the determinants of participation in secondary jobholding.

5.2.2 The theory of multiple jobholding

As noted, the standard theoretical framework that is usually employed in the analysis of moonlighting is based on the assumption of an hours-constrained worker. The seminal contribution is the study of Shishko and Rostker (1976), who explore moonlighting both theoretically and empirically. Extending the standard labor supply model, they argue that a worker who cannot spend as much time in her main job as she wants to in order to achieve the utility maximizing hours of work, may have an incentive to supply labor in a second job. They derive a set of testable implications from comparative statics that are also adapted by Smith Conway and Kimmel (1998) as well as Böheim and Taylor (2003) and are therefore not repeated here. However, the decision of a constrained/non-constrained moonlighter can easily be illustrated with adaptions of the standard labor-leisure diagram.[4]

Consider Figure 5.1, where Y is non-labor income and w_1 and w_2 are the wages paid in first and second job respectively. T denotes total time available, H_1 is the fixed hours of work in the first job, and h_2 is the time spent in a second job. The worker is assumed to maximise her utility which is determined by consumption and leisure. She would like to work T-L* hours on her first job in order to reach utility level I*, but cannot work more than H_1 hours. The decision to supply labor in a second job then depends on the moonlighting wage offered.

The second-job reservation wage is determined by the utility level (I_1) given at the intersection of the first-job wage line and the allowable hours H_1. If the wage offered exceeds the reservation wage, the constrained worker will take a second job that makes her better off. In the diagram, the moonlighting wage, w_2, is higher than the reservation wage. Therefore, the worker supplies h_2 hours of work in a second job and thus reaches a utility level, I_2, that is closer to the maximum utility level of the unconstrained case.

[4] The diagrams mainly follow Averett (2001).

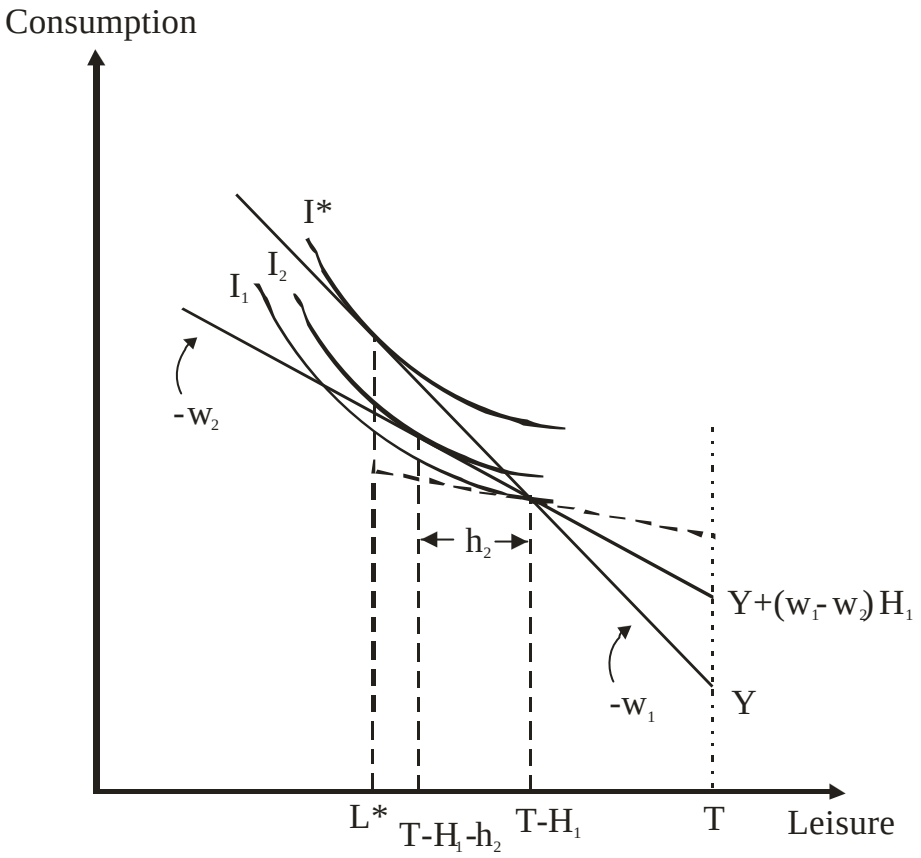

Figure 5.1: Utility maximizing hours-constrained double jobholder

The decision of the non-constrained moonlighter can be depicted only for the case of a higher paying second job, like, for example, the professor who is engaged in consulting. Figure 5.2 shows that situation. The individual that is non-constrained in her main job can work any amount of hours (h_1) that falls in the given standard working time span T-H_1. Work in a second job might nevertheless be supplied, if the wage paid at least upholds the individual's utility level (I). That wage, however, has to be higher than the one paid in the first job.

Assuming that hours of work on the second job (h_2) is a choice variable, it can be argued that the individual facing this situation would aim at working more hours in her moonlighting job. However, due to the possible heterogeneous character of the two jobs, there quite likely are other reasons that drive the worker to supply labor in both occupations.

As is furthermore easily conceivable, it is not possible to picture in the static framework the decision of a non-constrained double jobholder whose wage rate on the second job is lower than that on the main job. In this case, it should be expected that the individual would work more hours on her higher paying first job. Again, there might be different reasons as to why the individual holds two jobs.

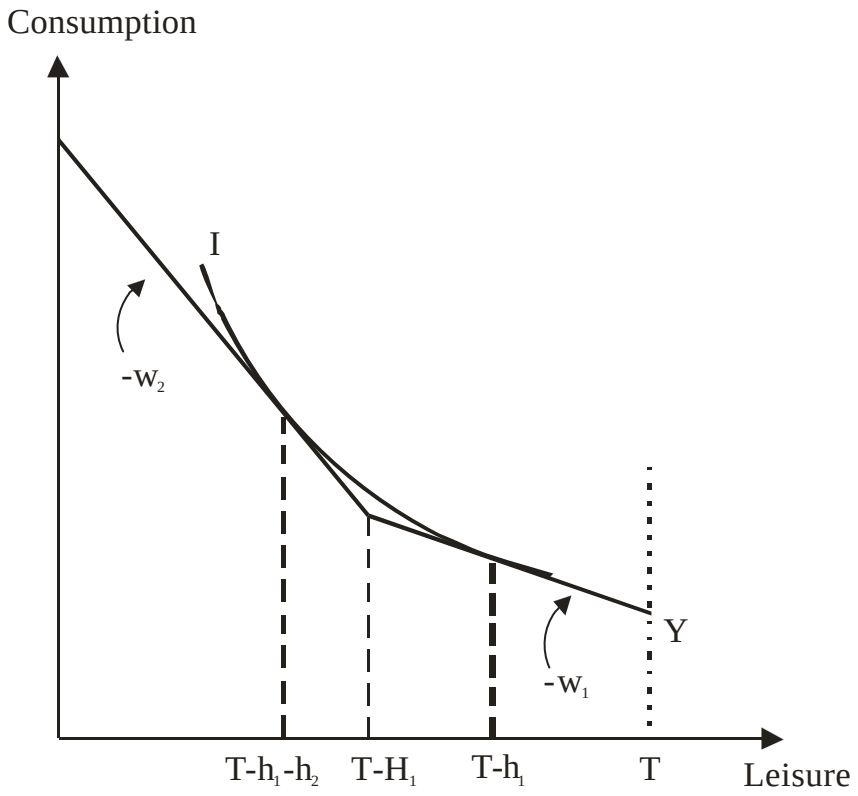

Figure 5.2: Utility maximizing non hours-constrained double jobholder

Schwarze (1991) provides an extension of the standard moonlighting model and includes a 'job-quality' factor in the utility function of the (representative) worker. Consider

$$U = U(n_l, y, q) \tag{5.1}$$

where n_l is the share of time spent by leisure, y is income and q is an indicator for 'job quality'. It includes both a set of working conditions and aspects like income security and social security benefits that are attributed to the job. Assuming a well behaved utility curve, utility is maximized subject to the total time available,

$$1 = n_l + n_1 + n_2 \tag{5.2}$$

where n_i, i=1,2, refers to the time spent in job 1 or 2. The budget constraint is given by

$$y = (1-t)w_1 n_1 T + w_1 n_2 T + Y \tag{5.3}$$

where t is the tax rate, w_i, i=1,2, is the wage in job i, T is the total time available and Y is non-labor income.

The factor that extends the traditional theoretical approach is 'job quality', which is given by

$$q = a_1 n_1 + a_1 n_2 + btn_1 + Q \tag{5.4}$$

where a_i, i=1,2, are factors that indicate the level of satisfaction that is associated with the

particular job. Again, t is the tax rate and b can be interpreted as a parameter representing whether the individual acknowledges the usefulness of taxation and payments to social security systems; Q indicates social security features that are independent from the worker's employment.

Schwarze (1991) also applies comparative statics and develops testable hypotheses. First, his findings for the impact of partial changes in both wages and non-labor income are in line with the usual 'hours-constraints' approach.

$$\begin{aligned} \frac{\partial n_2}{\partial w_2} &<> 0 \\ \frac{\partial n_2}{\partial w_1} &< 0 \\ \frac{\partial n_2}{\partial Y} &< 0 \end{aligned} \tag{5.5}$$

While there is a negative effect of an increase in either the wage in the main job or in non-labor income, the effect of a change in the second job wage is ambiguous in sign because of income and substitution effects.

Without going into detail, the partial analysis furthermore suggests that an increase in the tax rate has an ambiguous effect on moonlighting, depending on the individual's 'taxation-acceptance', b. Negative effects on secondary jobholding are derived for both an increase in the individual's willingness to accept taxation and an increase in social security that is not connected to employment.

As interesting are the possible effects of 'job quality' on workers' moonlighting behavior. While it would be desirable to have a clear cut theoretical proposition, Schwarze (1991) shows that the quality of both first and second job are affiliated with ambiguous signs regarding the effect on multiple jobholding.

$$\begin{aligned} \frac{\partial n_2}{\partial a_2} &<> 0 \\ \frac{\partial n_2}{\partial a_1} &<> 0 \end{aligned} \tag{5.6}$$

Whether improving working conditions imply an increase in the supply of labor in a second job depends on whether the subsequently increasing job quality results in a higher marginal utility of leisure. If so, moonlighting will decrease. However, it may as well be that worsening working conditions on the main job enhance the need to regenerate in the spare time. Analogously, given that working conditions improve, leisure might then not be needed that much to recover from stress. Consequently, secondary jobholding may increase.

5.2.3 Data and econometric methods

The data used are drawn from the GSOEP for Germany and the British Household Panel Survey (BHPS) for the UK. Similar to the GSOEP, the BHPS is a nationally representative study providing detailed information on individual and household related characteristics on an annual basis. While the GSOEP started in 1984, the BHPS was implemented in 1991 (Taylor *et al.*, 2001). Both surveys provide a sufficient range of questions concerning secondary jobholding. In the BHPS, these are in particular: (1) *Has a second paid job?* (2) *Number of hours worked per month in second job?* (3) *Gross earnings from second jobs last month?* (4) *Occupation in second job?* Similar items are available in the GSOEP: (1) *Has no second paid job?* (2) *Days a month engaged in second job?* (3) *Average hours on these days?* While information on gross earnings from a second job are available in each wave of the BHPS, the GSOEP started to collect that information in 1997 only: (4) *Gross earnings from second jobs at this time?* Information on occupational classification of the moonlighting job, on the other hand, is regularly available.

Unlike, for example, the special supplement of the 1991 CPS on moonlighting, there is no question in either one of the surveys as to why the worker holds a second job. Such would make it rather easy to differ between a constrained and an unconstrained moonlighter. However, there is a variety of indicators that may help to identify whether it is because of hours constraints or because of other reasons, a worker might take a second job.

Above all, both surveys provide questions on the individual's preferences over hours worked. While the BHPS directly asks for preferences ("*Thinking about the hours you work, assuming that you would be paid the same amount per hour, would you prefer to (1) work fewer hours (2) work more hours (3) continue same hours?"*), the GSOEP asks for the desired number of hours ("*If you could choose the extent of your hours at work, taking into account that your earnings would change correspondingly: How many hours per week would you like*

to work?"). Comparing the number of desired hours with the number of hours usually worked per week, it is possible to generate appropriate indicators.

While there might be the usual caveats regarding subjective indicators, analyses show that the reported dissatisfaction with hours work reflects actual restrictions on their choice of hours (Bryan, 2002). There is also evidence that subjective reports on constraints predict adjustments in working hours by, for example, a change of job (Böheim and Taylor, 2001). If hours constraints exist and if a job-change cannot, for whatever reason, be achieved in the short run, workers might then adjust their desired hours of work by moonlighting.

In both surveys, there are further questions on attitudes and expectations towards current and future employment that can be used to capture 'job quality'. To start with, information on job related satisfaction is used. The questions from the BHPS used cover the individual's satisfaction with (1) *job security* (2) *total pay* (3) *work itself*. Among further job related questions, there is also one question about the satisfaction with the number of hours worked. However, that question is not used, because there is no comparable question in the GSOEP. Furthermore, the stated preferences identifying workers' hours constraints quite likely cover (dis)satisfaction with working hours.

There are further differences in the related indicators drawn from the GSOEP. The variable on dissatisfaction with job security is generated from the original variable *"Are you concerned about your job security"* where *"very concerned"* is used to indicate the worker's dissatisfaction with job security. Next, there is no comparable question regarding a worker's satisfaction with the pay she receives. Therefore, a dummy variable generated from the indicator of satisfaction with household-income is employed. This should be kept in mind when interpreting the results.[5] Note also, that the scales of possible answers are different: In the BHPS, answers are given on a seven-point-scale from 1 *'not satisfied at all'* to 7 *'completely satisfied'*. These are collapsed into a binary variable denoting whether the individual is not satisfied (answers 1 to 3 on the scale) or satisfied (answers 4 to 7 on the scale). The GSOEP-scale on the other hand allows for eleven possible answers with 0 meaning *'totally unhappy'* up to 10 *'totally happy'*. Here, answers 0 to 3 are taken to indicate the worker's dissatisfaction with income.

A priori expectations towards the effects of dissatisfaction with job security are ambiguous

[5] While there is a comparable 'satisfaction with household-income' variable in the BHPS, it is not used because it is available from 1996 only.

and are thus in line with the theoretical arguments regarding job quality. First, it might be argued that secondary jobholding serves as a 'hedge' against unemployment (Bell *et al.*, 1997). However, it may also be possible that workers make even more efforts to perform well in their first job and are therefore less inclined to moonlight. Furthermore, as Schwarze (1991, p. 228) points out, it may furthermore as well be that less favorable labor market conditions that lead to concerns about job security in the first place may inhibit to supply a second job.

Another indicator for (low) job quality is the (dis)satisfaction with work itself. However, in contrast to job security, it might well be expected that a worker who is dissatisfied with her first job may be more likely to hold a second job. This is because if work itself is not satisfying, but provides, for example, pecuniary stability, an individual might moonlight if the second job provides amenities other than monetary benefits.[6]

Dissatisfaction with total pay or income might otherwise hint towards a limited earnings' capacity that may move workers to take a second job. This is, because given the utility maximizing behavior of workers, it is quite plausible to assume that dissatisfaction with total pay is given only for cases with earnings that are 'too low'.

Both BHPS and GSOEP provide some more questions on expectations on current and future work which might be used as indicators of job quality. Starting in 1996, workers in the UK are asked whether they think that in 12 months following the interview they (1) *get a better job with [their] current employer?* (2) *take up any work related training?* (3) *start a new job with a new employer?* (4) *start up [their] own business (a new business)?* (5) *give up paid work?*[7]

Similar questions are available from the GSOEP:[8] *"Is it likely that you will…"* (1) *be promoted in the company you currently work for*, (2) *gain further qualifications or education through courses*, (3) *give up your current occupation and start a completely new one*, (4) *will voluntarily become self-employed or become a freelancer* and (5) *give up your employment completely or for a period of time?* It, however, has to be noted that in contrast to the BHPS,

[6] In the middle or long run, it should, however, be expected that the individual will change to a new job that provides both monetary and other benefits.

[7] Note that there is a change in the questionnaire from 1998 onwards. In 1996 and 1997, the original question is '*How likely do think it is that you will…*'. Possible answers are '*very likely*', '*likely*', '*unlikely*' and '*very unlikely*'. Here, the first two outcomes are collapsed into a binary indicator to compare with the 'yes-no' dichotomy of the items from 1998 to 2000.

[8] Note that the corresponding questions were issued irregularly over time. In particular, the questions regarding promotion, starting a new job or quitting from paid employment are given in 1985, 1987, 1989, 1991-1994, 1996, 1998, 1999 and 2001. In addition, the item covering the intention to become self-employed, is asked along the noted waves from 1991 onwards, the question about work related training was added in 1994.

which refers to the next 12 months, the GSOEP questions refer to the next 2 years following the interview.

The first two items may carefully be considered to represent a better job quality on the first job. Remember that *a priori* expectations towards moonlighting behavior are ambiguous though. In contrast, items 3 and 4 may be understood as indicators of a lower job quality. In accordance with the 'heterogeneous-jobs' motive, it might therefore be expected that workers who are likely to either start a new job/occupation or become self-employed may hold a second job in order to gain experience or improve skills in the new or even different occupation. While there is no clear theoretical proposition for a relationship between the expectation to give up paid employment and moonlighting, it can be assumed that this also captures second jobs. Therefore, a negative correlation should be observable.

Information about gross hourly wages received in either the first or second job can be derived from the data that is given on monthly earnings and the usual number of hours worked per week. However, there are some limitations with those variables. First, as noted above, the particular sample size strongly reduces when using the GSOEP data. Out of 17 waves that are available in general, only the latest 5 waves include the needed information on second job monthly earnings. Next, affecting both the German and the British sample, there possibly exists a problem with sample selection. It would theoretically be needed to examine the effect of the (reservation) wage received in a second job for all workers. However, data on those wages are observable for moonlighters only. Using OLS and predicting second job wages for the whole sample might ignore that participation in moonlighting is not random, and hence self-selected.

Heckman (1979), addressing the comparable problem of observing wages only for employed persons, proposed a practical solution which treats the selection problem as an omitted variable problem. The correction mechanism he initially proposed is known as the two-step Heckman-correction method and has thereafter become standard in the labor supply literature. This technique basically would have to be applied here as well. However, despite its popularity, the method is not exempt from criticism. Heckman (1979) himself already warns against the use of the procedure with inadequately specified selection models. Manski (1989) argues that the procedure lacks robustness and is sensitive to identification and Puhani (2000) recommends a "case by case" use of the Heckman selectivity correction and furthermore shows that if collinearity problems prevail, subsample OLS is the most robust among the simple–to–calculate estimators.

Following Puhani (2000), checks for collinearity problems have been done by calculating R^2 of the regression of the selection parameter, the so-called inverse Mills ratio, on the regressors of the main (second job wage) equation.[9] The corresponding R^2-values range between 0.8355 and 0.9464 for Germany and between 0.8638 and 0.9896 for the UK which clearly suggests for collinearity. Due to these findings and the aforementioned considerations the regressions are estimated without sample selectivity correction. Note that this approach is not an unusual decision (see, for instance, Montenegro, 2001 or Newell and Reilly, 2001).

There is another potential problem with using wages and hours on the first job, which arises from the possible endogeneity of the participation decision in both the first and second job (Smith Conway and Kimmel, 1998). If jobs are heterogenous, the worker simultaneously decides upon both forms of employment. Wages from and hours worked on the first job then are not strictly exogenous as is assumed by the traditional 'hours constraints' theory. While this argument suggests to omit using both indicators as regressors, it is plausible to assume that both motives are relevant. Therefore, the covariates are used but there has to be careful interpretation of the results.

Non-labor income is another important theoretical parameter. However, there is a potential drawback for that indicator for the German data. Before 1995, no information regarding separate types of labor and non-labor income, like social assistance or other transfer benefits is available in the GSOEP. Therefore, a variable 'non-labor income' is generated by subtracting a worker's earnings as well as the spouse's labor earnings from the overall net household-income. While second job earnings are subtracted from that indicator where possible, this variable still will quite likely include earnings from moonlighting before 1997. Therefore, the results should again be interpreted rather carefully.

Besides the factors discussed, there is a variety of other explanatory and control variables used in the reduced form partipation equations. Only those that are more plausibly affecting the decision to take a second job will be presented shortly.

[9] The second job wage equations have been estimated using the cross-sectional data. The covariates used for both the German and the British sample are 'male', 'age', 'years of education', 'part-time employment', 'temporary employment'. A 'West German' dummy variable is additionally used for the German sample. The Heckman-selection instruments are 'wants to work more hours', 'number of dependent children' and 'works in a company with less than 10 (UK) or 20 (D) employees'.

Working overtime and get overtime hours paid[10] points to hours and earnings adjustments that might have a negative effect on moonlighting if the 'hours-constraints' motive prevails. There can be no prior expectations regarding part-time jobs because such occupation might be voluntary or involuntary. If part-time jobs are accompanied with moonlighting, this might on the one hand hint towards an insufficient hours capacity on the first job. It might, on the other hand, support the 'heterogeneous-jobs' motive as working part-time on a stable and secure job might allow to take a second job that has, for example, other non-monetary amenities. Furthermore, holding two part-time job might simply be a means of workers' labor flexibility. Temporary employment might as well be an indicator for job quality again with ambiguous expectations towards the effect on moonlighting behavior. Given that the fixed-term contract is used for a probationary period with prospects for a permanent follow-up employment, a worker may have an incentive make strong efforts within that period to signal high productivity. Holding a second job may then be less likely. However, having a temporary job may also be a demand-side induced outcome of lower productivity. Therefore, secondary jobholding may be used as means of adapting to the possibly low labor market position of the worker. There is a variety of further control variables that are included in the estimations but are not discussed in detail to economize upon space.[11]

Due to the infrequent availability of important indicators, there are different subsamples that are used for the estimations of the reduced form moonlighting participation equations. The largest sample drawn from the BHPS covers all eleven waves available, i.e. data from 1991 to 2001. The unbalanced panel consists of 24,319 male and 26,289 female person-year-observations. The German sample, also an unbalanced panel, basically could include data from 1985 to 2001, hence covering 17 waves. However, data on second job earnings are available from 1997 onwards only. Furthermore, indicators on job quality were issued irregularly. The corresponding samples therefore are based on (merely) 22,181 male and

[10] For the GSOEP, there are further variables indicating whether the worker is compensated for overtime work by leisure or by both leisure and payments. In addition, for a limited range of waves, there is information on whether compensation by leisure is offered day- or hours-wise. While these indicators might provide further insights, there are not used because there are no comparable data from the BHPS.

[11] The following socio-economic characteristics are included: 'age' and 'age squared', dummies on the 'highest qualificational/educational level achieved', 'years spent in education', 'person is married', 'spouse is employed', 'number of dependent children' and two dummies indicating whether the 'dependent children are of age 0 to 4 years' or '5 to 15 years'. Regional dummies are included for both the British and the German sample. Job-related covariates are: 'public/governmental employer', 'duration of employment', three 'firm-size dummies', twelve 'branch dummies' and ten 'occupational dummies'. To account for possible adjustements to desired working hours by a change of job, there is a further dummy variable indicating whether the individual has changed to the current job only recently, i.e. has 'job tenure less than one year'. See the Appendix for descriptive statistics of the samples used.

18,263 female observations. Furtermore, all German and British samples are restricted to blue- and white-collar workers aged 17 to 60 years old who are full- or part-time employed on their first job.

As for the estimation techniques, methods for both cross-sectional and longitudinal date are applied. On the pooled cross-sectional level, the logit estimator is applied. To account for the samples being pooled over individuals and time, the estimator is adjusted for individual-clustered groups. Furthermore, the panel structure of the data is used. Unobservable individual heterogeneity that might bias results from cross-sectional analyses is hence controlled for.

In particular, the following structural model is considered:

$$y_{it}^{*} = \alpha_i + \mathbf{x}_{it}'\beta + \nu_{it}, \qquad i = 1, \ldots, N, \; t = 1, \ldots, T \tag{5.7}$$

where y_{it}^{*} corresponds to the latent propensity of individual i at time t to supply labor in a second job. α_i is the individual specific effect that differs across individuals but is constant over time. It accounts for intrinsic differences in tastes towards moonlighting and in other unobserved explanatory variables. x_{it} is the vector of covariates affecting y_{it}^{*}. It also includes the factors that refer to both 'hours constraints' and the 'heterogenous jobs' motive. ν_{it} is the stochastic error term that is assumed to be *IID*. As y_{it}^{*} is a latent variable, it is not observable. Instead, what one observes is

$$y_{it} = \begin{cases} 1 & \text{if } y_{it}^{*} > 0 \\ 0 & \text{otherwise.} \end{cases} \tag{5.8}$$

Assuming an underlying logistic distribution for ν_{it}, the probability model that follows is

$$Prob(y_{it} = 1 \mid \mathbf{x}_{it}) = \frac{\exp(\alpha_i + \mathbf{x}_{it}'\beta)}{1 + \exp(\alpha_i + \mathbf{x}_{it}'\beta)}. \tag{5.9}$$

As outlined in the Chapter 2, this model can be estimated using the fixed effects logit estimator. Note again that the *conditional maximum likelihood* is free of the fixed effects parameters, α_i (Greene, 2000). This is because a contribution to the likelihood arises from those groups of observations that are not always zero or one. Therefore, if the worker does not moonlight at all or is always moonlighting over the time period in question, her information does not enter the likelihood function. This, however, typically entails a huge drop in the number of cases that are used for estimation. However, the advantage of the model is that,

unlike the random effects model, the a_i are allowed to correlate with the vector of covariates in the fixed effects model.

The equations have also been estimated using the random effects specification of the estimator. However, corresponding Hausman-tests have been calculated that all suggest for the fixed effects model to be the relevant one. The results from the random effects therefore are not presented to ease clarity of the results that are presented followingly.

5.2.4 Empirical results

To give some first impressions about the structure of secondary jobholding in both Germany and the UK, descriptive findings will be presented before estimation results will be discussed.

Figure 5.3 shows that moonlighting is a persistent phenomenon in both countries. There, however, is quite some variation over time and between males and females. In Germany, it decreased from about 8-10% in the mid 1980s to about 7% in 2001, showing a peak around the German reunification in 1990 and, after an downswing in the subsequent years, increased again in the mid-1990s.

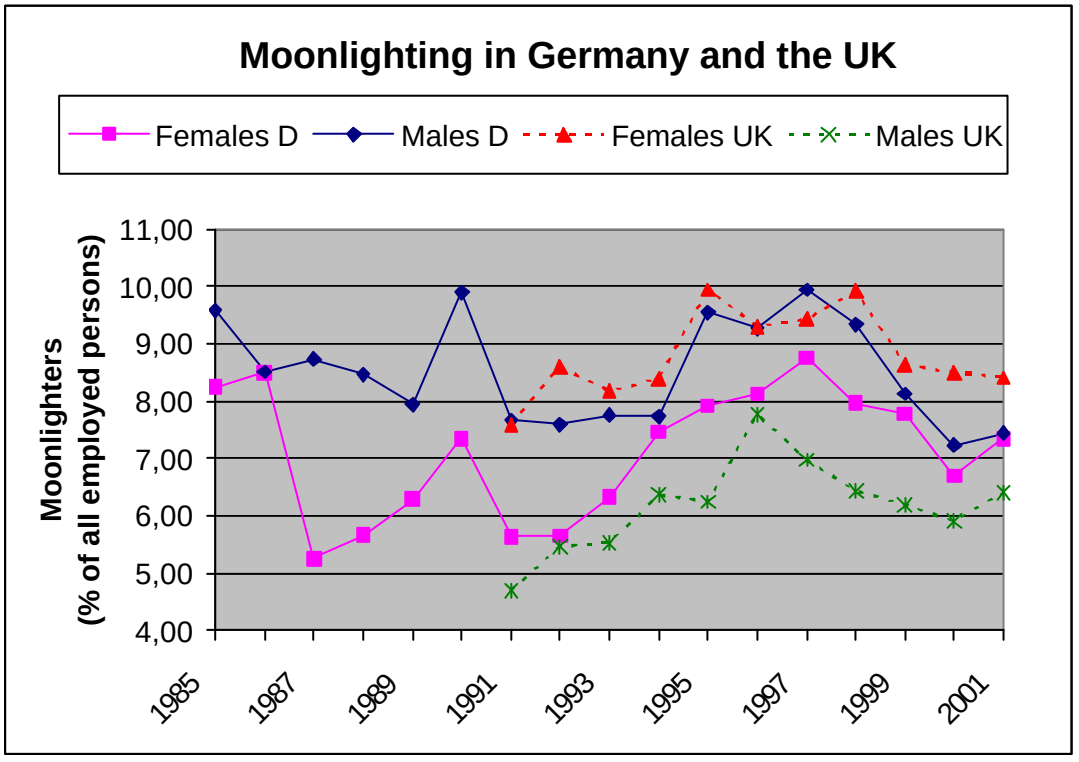

Figure 5.3: Moonlighting in Germany and the UK (% of all employed persons)

From 1999, social security contributions have been levied on the so-called 'marginal employment'. As this type of part-time employment quite often had been supplied as a second job (Schwarze and Heineck, 1999; see also the analysis in the subsequent section), moonlighting has decreased in 2000 before slightly recovering in 2001. In the UK, secondary jobholding has also seen an upwards movement from about 6% in 1991, has remained on a high level between 1995 and 1999 before decreasing to a share of about 7% in 2001.

There are further differences in moonlighting participation by gender. Corroborating prior results, British women hold a second job more often than British men. The difference in participation rates, however, is rather stable over time. In contrast, females in Germany mainly moonlight less often then German males, with one exception found for 1986, when 8.5% of both male and female workers held a second job. Furthermore, unlike the British case, participation rates do not follow the same patterns over time. Following 1986, there is a rather huge gap in participation by gender which diminishes close to nil in 1994 because of the increase in female moonlighting. In 2001, both the male and the female secondary jobholding rate is again approximately the same.

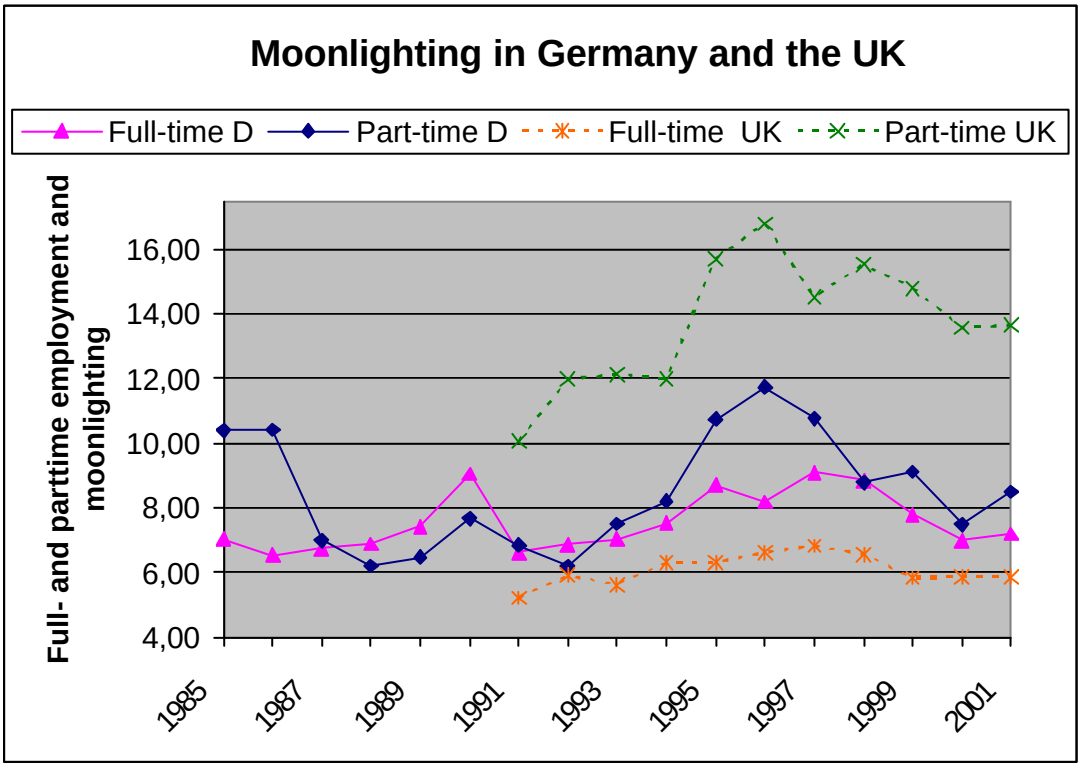

Figure 5.4: Moonlighting in Germany and the UK (by full- and part-time employment)

Figure 5.4 shows that the variation in participation rates over time mainly is due to the changes in secondary jobholding by part-time employees. Interestingly, there is a strong increase in moonlighting by part-time workers in both Germany and the UK from the beginnings of the 1990s until 1996, reaching a level of almost 12% moonlighters in Germany and close to 17% in the UK. Thereafter, secondary jobholding by part-time workers decreases again in both countries. While German workers drop back to the level of 1994, participation in secondary jobholding remains on a rather high level for part-time workers in the UK.

While there are also moonlighters among full-time workers, there are rather minor changes in participation over time. The exception are German full-time workers in 1990 when secondary jobholding shows a peak, possibly as a consequence of the German reunification. Furthermore, as part-time employment is the domain of women, it is not surprising that differences in participation rates between full- and part-time employees mainly follow the trends by gender shown above.

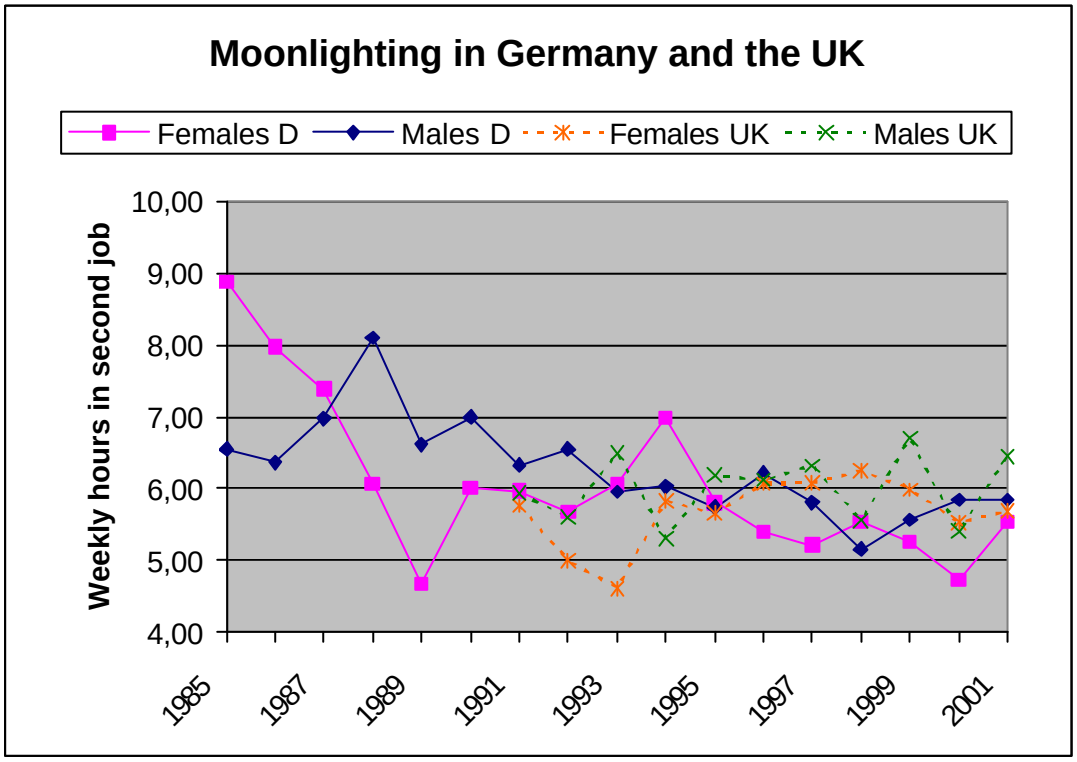

Figure 5.5: Weekly second job hours in Germany and the UK

The numbers of weekly hours worked in a second job are shown in Figure 5.5. In the 1990s, both German and British workers engaged in a second job supplied between 5 and hours 7 per

week in that job. The diagram furthermore shows that the amount of hours supplied by British moonlighters oscillates between these upper and lower bounds without following a distinct pattern. German secondary labor supply has decreased strongly at the end of the 1980s before recovering in the beginnings of the 1990s, but turned downwards again in recent years.[12]

While the diagrams shown sofar allow for first insights in the structure of secondary jobholding in both countries, Tables 5.3 and Table 5.4 explore some of the prior expectations outlined above also in an illustrative approach. Table 5.3 shows the distribution of preferences over hours worked, the respective moonlighting rate in the samples of German and British workers as well as as the ratio of wages earned in the first and second job.

The most striking feature shown is the difference in the distribution of preferences which clearly reflects differences in the labor market regimes. Almost 60% of workers on the liberal British labor market are satisified with the number of hours they work, thereby indicating that they achieved their optimal level of labor supply. While it at first glance may be speculative to attribute that finding to the liberal framework of the British labor market only, it may become more suggestive when looking at the figures found for the strongly regulated German labor market.

In particular, it is only about 27% of German workers who do not want to change their labor supply. However, it is interesting to note that more than half of all employed persons want to work less. Rather than being restricted upwards, which is the major argument of the traditional moonlighting theory, these workers suffer from downwards constraints. In accordance with upwards restrictions it can furthermore be seen that almost 8% of the British workers and even about 17% of German workers would like to supply more hours of work.

More differences appear regarding the participation in moonlighting and the ratios of wages in both jobs. First, although unsurprisingly, the moonlighting rate is above average among workers who want to work more hours. However, while the difference in moonlighting prevalence is of 1.8 percentage points for German workers compared to the average moonlighting prevalence, there is a difference of more than 4 percentage points for British

[12] While it is not shown in detail, note that the decrease of the number of hours supplied by German moonlighters to a fairly constant level in the 1990s is accompanied with an inversion of secondary jobholding supplied either occasionally or regularly. In 1985, about 52% of second job were supplied occasionally, 35% were jobs held regularly (the difference in total percentage from 100% stems from the third categorie observed: '*work in family business*'). Thereafter, occasional moonlighting decreased whereas regular moonlighting increased. In 1993, the shares of both types of secondary jobholding were about the same. The drift apart continued so that in 2001, 50% of second jobs were held regularly while about 39% were supplied occasionally.

employees. Next, it is found that German workers who are satisfied with their working hours – and hence may be considered to have achieved their optimum number of hours worked – hold a second job less often than average. British workers, on the other hand, do not moonlight more often given that they are satisfied with their working hours. Furthermore, while British employees who want to work less hours also moonlight less than average, their German counterparts hold a second job slightly above average.[13]

Table 5.3: Moonlighting and wage ratios by preferences over hours worked

Would like to work…	Germany		United Kingdom	
more hours	16.9		7.9	
the same hours	26.7		59.0	
less hours	56.4		33.1	
Would like to work…	Moonlighting	Wage ratio	Moonlighting	Wage ratio
more hours	8.8	1.08	12.5	0.90
the same hours	5.3	1.09	8.5	0.95
less hours	7.2	0.99	6.3	0.82
All	7.0	1.03	8.1	0.91

Notes: Wage ratio is defined as (net wage in first job/gross wage in second job).

Source: BHPS, GSOEP. Own calculations.

Regarding the wages earned in both jobs, German workers who would prefer to supply fewer hours, receive wages in the second job that are higher than those in the first job. This is in accordance with the theoretical proposition for unconstrained moonlighters as shown in Figure 5.2. For British workers, second job wages are higher than first job wages irrespectively of what their preferences over working hours are. However, workers who would like to work fewer hours have second job wages that are relatively higher than those of moonlighters who either would prefer to work more hours or who are satisfied with their labor supply.

Given that moonlighting wages are higher than those on the main job, one may suggest that there are incentives for expanding the labor supply in the second job if not completely

[13] Note that incidence rates shown in Table 5.3 are averages over the time periods in the respective sample. Analogously to the diagrams, there has been some up and down over time particularly for workers who state to be restricted upwards. The moonlighting behavior of workers who either are satisfied with their number of hours worked or who want to work less is fairly stable over the periods observed.

switching to that job in the first place. Table 5.4 now presents further descriptive findings that are related with such expectations. The prospect of a better job is attributed with moonlighting behavior that is not far from average in both Germany and the UK. Work related training, however, is accompanied with slightly higher than average secondary jobholding in Britain and even making a difference of 2.5 percentage points for German workers.

Table 5.4: Job related expectations and moonlighting incidence in Germany and the UK

Person expects to …	Germany	United Kingdom
get a better job (UK); be promoted (D)	8.0	7.2
get work related training / gain further qualification	9.5	8.5
start a new job / new occupation	10.3	10.4
start own business / become self-employed	21.3	18.9
give up paid work / employment	7.1	6.0
Overall moonlighting rate	7.0	8.1

Source: BHPS, GSOEP. Own calculations.

The most striking result, however, is the moonlighting incidence among workers who either expect to start a new job or who expect to start to become self-employed. In both Germany and the UK, more than 10% of employees who are about to start a new occupation hold a second job and even about one in five forthcoming self-employed workers are moonlighting. Although preliminary, these two findings clearly support the 'heterogenous-jobs' motive.

A last descriptive look is taken at the distributions of classifications of first and second jobs held by moonlighters. Table 5.5 summarizes the similarity or difference between both jobs. The diagonal captures 'perfect matches', i.e. cases for which the occupational classification of first and second job is the same. It is obvious that there is little correspondence between the category of the main job and that of the second job. As the occupations are grouped according to classification schemes, it would in general be possible that workers supply a first and a second job that corresponds to the same group. However, most of them supply labor in a job that is completely different according to the classification schemes which again might (carefully) be interpreted in support of the 'heterogenous jobs' motive. While it might be rewarding to inspect in more detail the relationship between the types of jobs held by workers this issue is not the focus here and is therefore not examined further.

Table 5.5: Occupational stratification of moonlighters in first and second job (row %)

	Germany								
Occ.	1	2	3	4	5	6	7	8	9
1	**6.06**	33.84	29.80	4.55	5.05	0.51	5.05	3.54	11.62
2	2.42	**51.32**	25.05	5.27	6.26	0.77	1.76	1.21	5.93
3	1.14	13.33	**30.41**	13.09	16.50	0.73	4.07	3.82	16.91
4	1.26	10.36	16.25	**20.31**	20.31	1.54	2.66	5.60	21.71
5	0.42	6.29	15.93	8.39	**32.91**	0.63	2.73	6.29	26.42
6	—	—	7.89	1.32	17.11	**19.74**	3.95	6.58	43.42
7	0.56	4.84	9.19	2.82	7.34	2.02	**34.11**	6.69	32.42
8	1.78	4.07	8.14	1.53	14.50	4.83	14.25	**7.63**	43.26
9	1.62	3.24	11.89	3.51	11.35	2.70	9.46	3.24	**52.97**
	United Kingdom								
Occ.	1	2	3	4	5	6	7	8	9
1	**18.41**	16.11	19.95	7.16	5.88	21.48	4.09	1.79	5.12
2	6.06	**47.16**	27.27	3.41	1.70	9.85	2.27	0.57	1.70
3	2.46	8.95	**52.13**	7.61	5.15	11.41	6.71	1.57	4.03
4	4.33	5.23	11.36	**17.49**	3.14	29.30	17.94	1.64	9.57
5	2.64	1.06	7.12	1.32	**44.06**	17.41	6.07	6.60	13.72
6	2.19	2.03	7.82	9.70	3.76	**46.48**	8.92	2.66	16.43
7	4.89	4.23	7.82	10.75	5.21	32.90	**16.29**	2.28	15.64
8	1.57	0.94	12.58	3.46	9.75	37.74	7.55	**10.38**	16.04
9	3.90	1.46	4.88	3.17	8.29	27.32	5.37	2.68	**42.93**

Notes: First job in rows, second job in columns. Note that because of the different classification schemes (see below), the distributions cannot be directly compared. Further recoding would be needed first.
D: *N*=5,608; Occupational coding follows the *International Standard Classification of Occupations* (ISCO-88)
UK: *N*=4,088; Occupational coding follows the *Standard Occupational Classification* (SOC)

Source: GSOEP and BHPS, 1991-2000.

Subsequently, the results from applying both the pooled logit estimator and the (conditional) fixed effects estimator are presented.[14] Note that the estimations from the pooled data are clustered on individuals. However, these results are based on an estimator that does not control for unobservable individual heterogeneity. Still, they are used as benchmark comparable to both prior results from previous research that has mainly been conducted with cross-sectional data and the findings from the following panel estimations.

[14] Again, note that random effects logit models have been estimated. However, the results from these estimations are not shown as Hausman-test statistics reject the assumption of individual specific-effects that are uncorrelated with the regressors.

All models are estimated separately for men and women. Furthermore, the regressions include information on the individual's working hours preferences and whether the worker is dissatisfied with job security, pay/household income or the job itself. Due to limited availability of important indicators as outlined above, the following tables first show the results from estimations that include (predicted) wages from a second job as regressors. Thereafter, estimations are presented that do not include information on second job wages, but use indicators for further job related expectations. To keep the presentation coherent, Table 5.6 and Table 5.7 show the respective findings for male workers, while Table 5.8 and Table 5.9 present the results for female employees. Finally, note that only the more important indicators are discussed.[15]

As is expected, Table 5.6 shows that the desire to work more hours is a strong predictor for moonlighting behavior of male workers in both Germany and the UK. For the latter case, controlling for unobservable heterogeneity even is attributed with an increase in the change in the logit and a change in statistical significance from the 10%-level to the 1%-level.

As suggested by the descriptive findings, there are differences between German and British workers who want to work less hours. Although the results from the fixed effects model is not statistically significant, there is a tendency towards the 10%-level for British males with a *z*-value of 1.61. Furthermore, the coefficient is negative and thus in accordance with theory. German males are different insofar that the desire to work fewer hours is correlated with a higher likelihood of holding a second job. This might come along with the descriptive finding of higher wages achieved in the second job (Table 5.3).

Whereas the *a priori* expectations suggest for an ambiguous effect, job security does not play a role in the decision of males to moonlight. While there is no effect at all for British workers, the result from the pooled logit model for German workers at first suggests for a negative impact. However, this finding vanishes when using the fixed effects estimator to control for individual-specific effects. A similar outcome is found for dissatisfaction with pay or

[15] There is a range of further control variables that is included in the regressions. To summarize, there is evidence that the length of education as well as the type of qualification achieved does not affect moonlighting participation in both Germany and the UK. Furthermore, there is weak evidence from the pooled cross-sectional regressions that agricultural workers are more likely to have a second job in both countries. Being a female technician, professional or clerk also affects moonlighting positively. On the other hand, German males who are occupied as professional, metal or constructional worker, and British men who are clerks or provide personal services are less likely to supply labor in more than one job.

household income. While there first seems to be a weak positive effect for both British and German men, the coefficients decrease when applying the panel estimator and they are not statistically significant.

Table 5.6: Participation in moonlighting, panel regressions for males in Germany and the UK, including additional control variables

	D		UK	
	Pooled Logit	FE Logit	Pooled Logit	FE Logit
Would like to work more hours	0.5144***	0.5341***	0.2291*	0.4317***
	(0.0981)	(0.1720)	(0.1201)	(0.1577)
… work less hours	0.2735***	0.3652***	0.0067	-0.1710
	(0.0817)	(0.1399)	(0.0779)	(0.1065)
Is dissatisfied with job security	-0.2926***	0.1165	0.0298	0.0515
	(0.1001)	(0.1832)	(0.0797)	(0.1030)
… with pay/household-income	0.2304**	0.0119	0.1450*	0.1105
	(0.1033)	(0.1936)	(0.0742)	(0.1016)
… with job itself	-0.0356	0.0911	0.1191	0.2203*
	(0.1320)	(0.2207)	(0.0848)	(0.1171)
Log of gross hourly wage in second job^{+}	0.1229	0.4554	-0.4797*	-0.2323
	(0.2996)	(0.3982)	(0.2872)	(0.3666)
Log of net hourly wage in first job	0.0409	-0.3600	-0.3263**	-1.1362***
	(0.1184)	(0.2470)	(0.1509)	(0.2038)
Log of non-labor income	0.0036	-0.0476*	0.0212	-0.0329
	(0.0121)	(0.0257)	(0.0285)	(0.0380)
Weekly working hours	0.0039	0.0005	-0.0117**	-0.0327***
	(0.0049)	(0.0102)	(0.0058)	(0.0072)
Works overtime	0.1218*	-0.0361	0.1069	0.2954**
	(0.0693)	(0.1214)	(0.1065)	(0.1480)
Overtime work is paid	0.0916	0.1024	-0.1625	-0.4019**
	(0.0805)	(0.1394)	(0.1149)	(0.1613)
Part-time employment	0.9305***	1.1461***	0.3790*	-0.0770
	(0.1810)	(0.4050)	(0.2168)	(0.3046)
Temporary employment	0.2958***	0.4557**	0.0824	-0.4417**
	(0.1103)	(0.2115)	(0.1397)	(0.2032)
Has recently changed job	-0.0243	-0.2845*	0.0636	0.0192
	(0.0860)	(0.1469)	(0.0722)	(0.1042)
Job tenure	-0.0096*	-0.0096	0.0103	0.0187
	(0.0057)	(0.0218)	(0.0083)	(0.0134)
Public/Governmental employer	0.2975**	-0.0003	-0.0878	0.2798
	(0.1278)	(0.2880)	(0.1424)	(0.2081)
Spouse is employed	0.1877*	0.0051	-0.0403	-0.2040
	(0.1024)	(0.2058)	(0.0970)	(0.1308)
N / Groups	22,181	2,323 / 620	24,319	3,915 / 605
Chi^2	345.33	53.70	309.16	115.95
Log likelihood	-5,853.83	-832.53	-5,973.34	-1408.18

Notes: $^{+}$ predicted wage.

Source: BHPS, GSOEP. Own calculations.

There is mixed evidence for possible effects of wages. The (predicted) second job wage does not influence the moonlighting decision of German male workers. For British males, the pooled estimation results suggest for a negative impact of second job wages on moonlighting participation, therefore indicating that the income effect would dominate the substitution

effect. However, controlling for unobservable heterogeneity returns a coefficient that is not statistically significant anymore, although there still is a negative sign. In line with the theoretical implications, increasing first job wages, on the other hand, are a strong disincentive for British workers to supply labor in a second job. German males are not affected, although the negative coefficient from the fixed effects estimation shows a *z*-value of about 1.45, which may carefully be taken as a tendency in support of *a priori* expectations. Findings for non-labor income are in line with theory for German males only, where fixed effects estimation suggests for a (weak) negative impact on secondary jobholding. The negative coefficient that is found for British male workers, however, is not statistically significant.

Table 5.6 furthermore shows that an increase in weekly working hours does not affect the moonlighting participation of German workers. However, there is a negative effect for British men. Given that the number of working hours also is a downwards limit, the recreational aspect of leisure time may be more important although wages in second jobs tend to be higher than first job wages (recall the wage ratios shown in Table 5.3). On the other hand, and somewhat surprisingly, the fixed effects regression suggests that working overtime influences the moonlighting decision positively for British male workers. However, given that overtime work is paid, the likelihood of secondary jobholding decreases. This again is not too surprising, as these workers are able to adjust a possibly given hours standard in their first job by working overtime with the same employer. As it is plausible to assume that overtime hours are compensated with wages that are relatively higher than the first-job wage, they do not face the need to moonlight. Moonlighting participation of German men, on the other hand, is not affected by overtime work.[16]

Both temporary and part-time employment are good predictors for secondary jobholding among German males. The results from both the pooled and the fixed effects regression return coefficients that are strongly statistically significant. While the estimation of the pooled data for British workers also suggest that part-time employment affects the moonlighting decision positively, accounting for individual heterogeneity abolishes that effect. Furthermore, the findings from the fixed effects regression imply that British males, who have a fixed term

[16] As outlined above (Footnote 82), there are GSOEP-variables indicating whether overtime work is compensated hours-wise or even day-wise. However, experiments with these indicators, which are not available in the BHPS, did not return in non-trivial results.

contract, are less likely to hold a second job. Although the different labor market regimes in Germany and the UK strongly affect both part-time and temporary employment regulations, it cannot, however, be said whether these differences cause the differences in the effects.

Although a change of job may be a possible adjustment to job constraints, the relevant indicator does not suggest for effects on secondary jobholding. The exception is found for the fixed effects model for German male workers for whom a recent job change weakly affects moonlighting negatively. This, however, is a rather plausible finding, given that a job change should increase a worker's utility.

While job tenure does not have an impact on the participation in double jobholding, having a public employer seems to suggest for a positive impact on moonlighting for German workers first. However, the effect is again cleared away by the panel estimator. A similar result is found for whether there is an employed spouse: The pooled logit regression first implies that male German workers are more likely to participate in secondary jobholding; the effect is abolished once unobservable heterogeneity is accounted for.

Table 5.7 presents the results from the regressions that do not include information on second job wages. However, the data allow to include additional indicators that are related to workers' expectations regarding current and future employment. These indicators might be thought as further proxies for job quality and therefore being theoretically linked to secondary jobholding.

First, regarding the variables that are included in both regressions, there are not many differing findings which supports the robustness of the specified model. While the effects of preferences towards working more or less hours are basically the same for German males, the effect for British workers shown above vanishes once the additional job quality proxies are included. Furthermore, the positive effect of part-time employment and temporary employment found from the fixed effects regressions for German males become statistically insignificant. Having a public employer now seems to have a positive impact on secondary jobholding for British males. However, applying the fixed effects estimator, this effect vanishes.

Table 5.7: Job related expectations and participation in moonlighting, panel regressions for males in Germany and the UK, including additional control variables

	D		UK	
	Pooled Logit	FE Logit	Pooled Logit	FE Logit
Would like to work more hours	0.5342***	0.6684**	0.0983	0.2410
	(0.1223)	(0.2960)	(0.1505)	(0.2656)
… work less hours	0.2841***	0.4330*	-0.0620	-0.1180
	(0.1058)	(0.2296)	(0.0946)	(0.1686)
Is dissatisfied with job security	-0.3159**	-0.1516	-0.0662	0.1017
	(0.1251)	(0.2923)	(0.0975)	(0.1708)
… with household-income/pay	0.0993	-0.2000	0.1326	-0.2084
	(0.1328)	(0.3351)	(0.0922)	(0.1646)
… with job itself	0.1887	0.4411	0.0655	0.4208**
	(0.1528)	(0.3572)	(0.1035)	(0.1922)
Expects to be promoted/get a better job	0.1196	0.2773	-0.3172***	-0.3461*
	(0.1060)	(0.2500)	(0.1043)	(0.1875)
… get job related training/courses	0.0684	0.1115	0.2042**	-0.0789
	(0.0868)	(0.2099)	(0.0889)	(0.1522)
… start a new job	0.3088**	0.1821	0.1015	0.4226**
	(0.1384)	(0.3356)	(0.0995)	(0.1805)
… become self-employed/start up own business	1.0250***	-0.0977	0.9435***	0.3106
	(0.1665)	(0.3426)	(0.1442)	(0.2667)
… quit from paid employment	-0.0307	-0.9328*	-0.6724*	0.0065
	(0.2112)	(0.5208)	(0.3573)	(0.6943)
Log of net wage in first job	0.0626	-0.4353	-0.2542*	-1.2022***
	(0.1310)	(0.4460)	(0.1445)	(0.3255)
Log of non-labor income	0.0092	-0.0221	0.0081	-0.0091
	(0.0145)	(0.0382)	(0.0322)	(0.0628)
Weekly working hours	-0.0016	0.0041	-0.0143**	-0.0433***
	(0.0057)	(0.0192)	(0.0063)	(0.0115)
Works overtime	0.1876**	0.1340	0.0254	0.2149
	(0.0836)	(0.1954)	(0.1276)	(0.2426)
Overtime work is paid	0.1340	-0.2191	-0.0251	-0.4550*
	(0.0956)	(0.2135)	(0.1359)	(0.2628)
Part-time employment	0.7782***	0.6649	0.6239***	-0.7048
	(0.2159)	(0.6653)	(0.2393)	(0.4610)
Temporary employment	0.2868**	0.5348	0.0945	-0.6402**
	(0.1363)	(0.3560)	(0.1676)	(0.3197)
Has recently changed job	-0.1301	-0.3447	0.0855	-0.0433
	(0.1113)	(0.2502)	(0.0901)	(0.1612)
Job tenure	-0.0089	-0.0258	0.0112	-0.0089
	(0.0064)	(0.0357)	(0.0096)	(0.0211)
Public/Governmental employer	0.2613*	0.6418	0.4685***	0.4091
	(0.1476)	(0.5537)	(0.1336)	(0.4064)
Spouse is employed	0.2334**	0.0178	-0.0633	-0.2033
	(0.1158)	(0.3352)	(0.1115)	(0.2184)
N / Groups	12,773	856 / 315	13,569	1,492 / 375
Chi^2	358.18	37.30	232.75	100.90
Log likelihood	-3,401.69	-291.32	-3,429.80	-499.73

Source: BHPS, GSOEP. Own calculations.

Only a few of the variables additionally included result in statistically significant coefficients. However, these few effects are in line with theoretical expectations. Expecting to get a better job with the current employer decreases the likelihood of moonlighting for British males. For this group, the prospect of job related training furthermore seems to have a negative impact

which would contradict prior arguments. Again, unobservable heterogeneity causes spurios correlation in the pooled estimation so that the result from the fixed effects estimation suggests for no effect. Starting up a new job in the near future affects secondary jobholding positively. While statistical signifcance for German worker is found for the pooled data only, the initially insignificant coefficient shown for British males turns statistically significant in the fixed effects estimation.[17] The prospect of becoming self-employed is associated with a higher likelihood for moonlighting in both countries when estimating the pooled logit model. Although these effects vanish in the fixed effects model, it might still be suggested that second job may be used to achieve or improve skills that are needed in the forthcoming new occupation.

Being about to quit from paid employment is attributed with weak evidence of a lower likelihood of holding a second job for German males. The likewise negative effect returned from the pooled model for British workers vanishes in the panel estimation.

Pertaining to the results for female employees in Germany and the UK, Table 5.8 presents the findings from regressions that include (predicted) second job wages. Table 5.9 then shows the results from the models that explore the effects of the job related expectations just discussed for male workers.

First, note that there are not many differences between the results found for men and those found for women. Furthermore, the differing findings between Germany and the UK mainly are the same for women. The wage earned in the second job, for instance, does not play a role in the moonlighting participation decision (Table 5.8). Wages in the first job lowers the likelihood of holding a second job mainly for British women and to some extent also for German women. However, while there is no effect using the pooled model, the coefficient from the fixed effects estimation is statistically significant at the 10%-level only. The findings for the impact of non-labor income are similar: While there are rather strong negative effects on secondary jobholding for British females, the likewise negative effect that is returned from the pooled model for German women is cleared away when controlling for individual-specific effects. Note, however, that the negative sign pertains and that there is a *z*-value of 1.63.

[17] However, the fixed effects model performs poorly (Prob > Chi^2 = 0.2383).

Table 5.8: Participation in moonlighting, panel regressions for females in Germany and the UK, including additional control variables

	D		UK	
	Pooled Logit	FE Logit	Pooled Logit	FE Logit
Would like to work more hours	0.3856***	0.2887	0.0033	-0.1688
	(0.1123)	(0.2028)	(0.0942)	(0.1135)
… work less hours	0.2050**	0.5134***	-0.2059***	-0.0753
	(0.0938)	(0.1726)	(0.0732)	(0.0967)
Is dissatisfied with job security	-0.0921	0.1001	0.0819	0.2080**
	(0.1091)	(0.2145)	(0.0690)	(0.0906)
… with pay/household-income	0.1474	-0.0469	0.1702***	0.2401***
	(0.1136)	(0.2047)	(0.0626)	(0.0843)
… with job itself	-0.1168	-0.5622**	-0.0709	0.0448
	(0.1381)	(0.2504)	(0.0810)	(0.1028)
Log of net wage in first job	0.1079	-0.4641*	-0.3237***	-0.9214***
	(0.1221)	(0.2411)	(0.1017)	(0.1360)
Log of gross wage in second job (predicted)	-0.0495	-0.4046	-0.0285	-0.0427
	(0.3028)	(0.4616)	(0.2082)	(0.2536)
Log of non-labor income	-0.0368***	-0.0485	-0.0618**	-0.0859***
	(0.0142)	(0.0297)	(0.0252)	(0.0330)
Weekly working hours	-0.0052	-0.0223**	-0.0216***	-0.0369***
	(0.0052)	(0.0106)	(0.0056)	(0.0070)
Works overtime	0.3686***	0.3656**	0.1267	0.1555
	(0.0807)	(0.1423)	(0.0998)	(0.1243)
Overtime work is paid	0.1574	-0.1028	-0.0596	-0.2669*
	(0.1172)	(0.1989)	(0.1167)	(0.1434)
Part-time employment	0.2952***	0.3536	0.4910***	0.5336***
	(0.1093)	(0.2285)	(0.1316)	(0.1597)
Temporary employment	0.3570***	0.7628***	0.0375	0.1735
	(0.1161)	(0.2421)	(0.0975)	(0.1383)
Has recently changed job	-0.0794	-0.1178	0.0134	0.0505
	(0.0935)	(0.1570)	(0.0676)	(0.0861)
Job tenure	-0.0043	0.0059	-0.0166*	-0.0363***
	(0.0082)	(0.0238)	(0.0094)	(0.0136)
Public/Governmental employer	-0.1409	0.2092	0.1095	0.2073
	(0.1153)	(0.2598)	(0.0989)	(0.1294)
Spouse is employed	-0.1498	-0.0482	-0.1377	-0.1172
	(0.1567)	(0.3485)	(0.0861)	(0.1263)
N / Groups	18,262	1,687/466	26,289	5,935 / 846
Chi^2	228.99	66.24	510.58	248.31
Log likelihood	-4,239.30	-590.48	-7,442.67	-2,128.84

Source: BHPS, GSOEP. Own calculations.

Similar to the findings for men, there a discrepancies between German and British women for the effects of the preferences over hours worked. First, German females who want to work fewer hours are more likely to moonlight. As for their male counterparts, this effect may result because of higher second job wages. British women who are in favor for less hours, on the other hand, seem to be likely to hold a second job. However, this effect is based on the pooled regression, and turns statistically insignificant using the panel estimator.

A likewise findings exists for German women who are upwards hours-constrained: the result from the pooled logit model strongly suggests for a positive impact on secondary

jobholding, the fixed effects estimator, however, returns no statistically significant effect. Furthermore, there is an interesting and also somewhat puzzling finding for British women. While there seems to be no effect in the pooled estimation, there is a tendency towards a negative effect in the panel model (Table 5.8). Anticipating the following results from the subsequent estimation, this coefficient even turns statistically significant (Table 5.9). This implies that British females who want to work more hours are less likely to moonlight. While this might surprise at first glance, it may well be that these women are able to adjust to working more hours in other ways as by taking a second job.[18]

Regarding job related aspects that may hint towards job quality, the dissatisfaction with job security and, even stronger, the dissatisfaction with the current pay affects moonlighting participation of British women positively. While there are no likewise effects for German females, the result from the fixed effects estimation for this group suggests that being dissatisfied with the job itself decreases the likelihood of holding a second job. According to the theoretical notions it may well be that the recreational aspect of leisure time is relatively more valuable, given that the main job is tiring or physically demanding and hence causing that the worker is dissatisfied.

Similar to the findings for men, an increase in weekly working hours seems to affect in particular British female moonlighting participation negatively. Analogously, working overtime is a predictor for the secondary jobholding of German women. Compared to the findings for male's, this effect is even stronger. However, as there is no impact of paid overtime on moonlighting for German women, it can only be speculated whether the additional hours worked are compensated by leisure which then may be used to supply another job. British women, on the other hand, are less likely to moonlighting given that overtime hours worked are paid.

Not quite surprisingly, part-time employment is a good predictor for female moonlighting in both countries. However, while it should be noted that the coefficient from the fixed effects estimation for German women is statistically insignificant (*z*-value of 1.54), it may furthermore be that there are different reasons driving such an effect. On the quite liberal British labor market, women on the one hand may voluntarily supply labor in two jobs that better suit their needs of flexible working time, for example, when taking care of children. While that argument may also hold for Germany, it may as well be assumed that part-time

[18] As Böheim and Taylor (2001) show, such adjustment quite likely might be the change to another job.

occupation is of involuntary nature on the strongly regulated German labor market. Therefore, female part-timers may face the need to adjust their working hours in case they want to work more hours.

Temporary employment affects the moonlighting participation decision for German women only which again reflects the across-countries finding for men. While a recent change of jobs does not affect moonlighting participation, the result for job tenure suggests that the longer British women are working for the same employer, the less likely they have a second job. While it furthermore may be expected that an employed spouse may be an disincentive for the secondary jobholding of women, no statistically significant effect is found. Based on the result from the fixed effects estimation, having a public employer is attributed with a tendency towards affecting female moonlighting in the UK positively (*z*-value of 1.60).

The findings from Table 5.9 indicate that also for women, the model is quite robust when including the additional variables which indicate the worker's job related expectations. First, the findings for preferences over hours worked and its effect on moonlighting are as indicated above for both British and German women. The positive effect of dissatisfaction with job security found for British women, however, is cleared away. Corroborating the results of Bell *et al*. (1997), it might therefore well be concluded that moonlighting does not serve as hedge against unemployment. Another difference is also found for German females who are dissatisfied with the job itself. While the initial results from the fixed effects estimation suggest for a lower propensity to hold a second job, the coefficient is not statistically significant anymore in this model specification.

The results for both first job wages and non-labor income remain the same as in the former model. A high level of weekly working hours, however, returns no effects from the panel estimations, although the coefficients still are negative. While mainly all other regressors, i.e. (paid) overtime work, part-time or fixed term employment, change of jobs and an employed spouse, imply the same effects as before, the statistically significant coefficient found for the job tenure of British women returns not to be significant anymore. There therefore is no 'loyality effect' in the sense that job duration would affect moonlighting behavior negatively. Furthermore, the tendency towards a positive effect on secondary jobholding of having a public employer is reinforced: Results from the fixed effects logit model suggest that British females working with a public or governmental employer are more likely to hold a second job.

Table 5.9: Job related expectations and participation in moonlighting, panel regressions for females in Germany and the UK, including additional control variables

	D		UK	
	Pooled Logit	FE Logit	Pooled Logit	FE Logit
Would like to work more hours	0.3663***	0.3368	-0.0058	-0.3069*
	(0.1373)	(0.3375)	(0.1171)	(0.1858)
… work less hours	0.2207*	0.4880*	-0.3078***	0.0158
	(0.1176)	(0.2701)	(0.0920)	(0.1520)
Is dissatisfied with job security	-0.2224	0.0857	-0.0284	-0.0231
	(0.1394)	(0.3210)	(0.0898)	(0.1513)
… with household-income/pay	-0.0258	-0.2351	0.1155	0.3794***
	(0.1441)	(0.3492)	(0.0803)	(0.1414)
… with job itself	0.1909	-0.1348	-0.1931*	-0.0953
	(0.1668)	(0.3713)	(0.1040)	(0.1678)
Expects to be promoted/get better job	-0.0222	0.7465**	-0.0094	0.0766
	(0.1426)	(0.3423)	(0.0916)	(0.1559)
… get job related training/courses	0.0887	0.0145	0.1272*	-0.1253
	(0.1014)	(0.2327)	(0.0742)	(0.1279)
… start a new job	0.1096	-0.0391	0.2930***	0.4242***
	(0.1622)	(0.3781)	(0.0857)	(0.1438)
… become self-employed/start up own business	1.2987***	0.6187	0.8136***	0.9125***
	(0.1859)	(0.4491)	(0.1605)	(0.3373)
… quit from paid employment	-0.4423**	-0.3304	-0.5065**	-0.2075
	(0.2037)	(0.4541)	(0.2058)	(0.3416)
Log of net wage in first job	0.1261	-0.5423	-0.2363**	-0.7513***
	(0.1415)	(0.3966)	(0.1164)	(0.2267)
Log of non-labor income	-0.0310**	-0.0602	-0.0695**	-0.1748***
	(0.0158)	(0.0499)	(0.0282)	(0.0598)
Weekly working hours	-0.0096	-0.0189	-0.0220***	-0.0069
	(0.0060)	(0.0179)	(0.0066)	(0.0123)
Works overtime	0.5263***	0.5595**	0.1358	0.0690
	(0.0991)	(0.2317)	(0.1203)	(0.2127)
Overtime work is paid	0.2143	-0.4159	0.0166	-0.2438
	(0.1355)	(0.3031)	(0.1362)	(0.2316)
Part-time employment	0.2230*	0.5379	0.4342***	1.0034***
	(0.1255)	(0.3641)	(0.1509)	(0.2619)
Temporary employment	0.3591**	0.7546**	0.0725	0.2521
	(0.1419)	(0.3829)	(0.1228)	(0.2378)
Has recently changed job	-0.1014	0.0859	0.0660	0.0897
	(0.1178)	(0.2634)	(0.0828)	(0.1399)
Job tenure	-0.0060	0.0374	-0.0056	-0.0336
	(0.0087)	(0.0361)	(0.0106)	(0.0241)
Public/Governmental employer	-0.0531	0.1919	0.0975	0.5670**
	(0.1364)	(0.3982)	(0.1145)	(0.2409)
Spouse is employed	-0.1807	0.2774	-0.0007	-0.0497
	(0.1735)	(0.5278)	(0.1009)	(0.2438)
N / Groups	10,535	676/257	14,718	2,141 / 517
Chi^2	239.79	47.81	406.43	150.43
Log likelihood	-2,506.19	-219.92	-4,104.96	-723.32

Source: BHPS, GSOEP. Own calculations.

Including the additional regressors that indicate job related expectations, the findings suggest for similar effects as those for men. For instance, the prospect of either starting a new job or of becoming self-employed is associated with a higher likelihood of moonlighting for British females. The changes in the logit even increase from 0.3 to 0.4 and from 0.8 to 0.9 when

controlling for individual-specific effects. For German women, the likewise effect found from the pooled logit model vanishes using the panel estimator.

Such effects can also be seen for the expectation of putting down paid employment: While the pooled model suggests for a negative effect on secondary jobholding for females from both countries, the fixed effects estimation returns coefficients that still are negative but statistically insignficant. There is a somewhat mixed evidence for the impact of the prospect of either expecting to get job related courses or the prospect of getting a better job with the current employer. While prior expectations may suggest for a negative relationship between both aspects and secondary jobholding, the regressions mainly imply for no effects at all. Furthermore, both unexpected and puzzling, fixed effects estimation for German women results in a logit increase of about 0.75, i.e. a rather strong positive effect on moonlighting participation.

Summing up briefly, there is evidence of both similarities and discrepancies in the determinants of secondary jobholding in Germany and the UK. For instance, the factors that may be derived from the traditional moonlighting theory basically behave the same. That is, first job wages and non-labor income affect secondary jobholding negatively in both countries and also across gender. While these effects are in accordance with the 'hours constraints' motive of multiple jobholding, there is also a variety of effects that support the 'heterogenous jobs' motive. Above all, the prospect of changing to a new job or of starting up an own business in the near future is associated with a higher propensity to moonlight. One possible and quite plausible reason can be that skills needed for the new job are achieved or improved on the second job. It may furthermore as well be that the new job will be gradually established from a moonlighting job held prior to the switch in employment.

5.3 Imposing social security payments on 'marginal employment' and its impact on moonlighters in Germany

The focus of the previous section has been on the determinants of multiple jobholding. Althought the two countries compared are rather different in terms of labor market regimes, the analysis has shown that the underlying factors that drive the decision to offer labor in more than one job are not too different. However, it is well known that labor market

institutions play an important role in the determination of both the structure and the development of different types of employment also including secondary jobholding.

Besides that, there is an increasing literature that addresses the consequences of active labor market policies (ALMP) and attempts to evaluate the quality of such means. Research on ALMP typically addresses issues such as, for instance, public employment services, labor market training or subsidized employment. The analysis in this section, however, will examine the introduction of compulsory social security contributions that were levied on the so-called 'marginal employment' in Germany and its consequences on secondary jobholding. Obviously, this policy measure does not belong to the core of ALMP. Still, as it was a distinct change in the institutional framework, it may therefore be considered as a kind of 'natural experiment' out of which valuable insights may be derived from in regard of the design of policy instruments.

5.3.1 Background

As outlined in the introduction to this chapter, there has been a general change in the structure of employment towards new forms of atypical employment like, e.g., part-time employment, temporary work or, a German peculiarity, 'marginal employment'. The literature suggests that structural changes in both the demand of labor and in the supply of labor are driving forces for that development.

On the demand side, employers are increasingly interested in full utilization of available capacities. Therefore, more flexible types of employment grow more important. Furthermore, there may also be a desire to be able to quickly react to short term market fluctuations. Fixed term contracts may, for example, be a possible way of adjusting a firm's labor force without bearing the risk of having high dismissal costs in case of negative developments.

On the supply side, individuals have, on the one hand, simply reacted to the changes in labor demand. On the other hand, there have also been changes in the structure of individuals' preferences towards both the amount of time supplied as paid employment as well as towards the 'timing' over the life cycle. That is, compared to the traditional permanent, full-time employment, individuals' labor histories nowadays are more heterogenous inasmuch as there are more changes of jobs which may or may not deviate from the standard type of employment. Furthermore, in Germany, the age of entry in the labor market increases and the age of exit from it decreases.

These trends, together with the ongoing demographical change towards an on average older society, raise increasing worries for German policy makers. This is because social security systems in Germany mainly rest upon the traditional standard type full-time employment. In general, payments to the social security systems are a fixed percentage from gross earnings to be paid half by the employer and half by the employee. Furthermore, payments are compulsory for basically all workers in the private as well as the public sector given that workers' earnings do not exceed an upper earnings level (the so-called '*Beitragsbemessungs-grenze*' or '*Jahresentgeltgrenze*').[19]

Entitlements to benefits from the social security systems then mainly depend on workers' past contributions. However, there are also redistributional aspects. Health insurance, for instance, is free for family members given that there is one employed and hence health insured person. The typical example is the family with a male bread-winner whose (not employed) wife and children are free from compulsory health insurance payments. Therefore, the system gives little incentives for particularly male workers to deviate from the standard type of employment.

While male workers therefore in general are entitled to sufficient old age benefits, the situation has been different for women and particularly married women. While women in general are more prone to supply part-time labor, the group of married women in Germany has had barely no incentive to supply regular part-time employment as they would have suffered from a restrictively high marginal tax rate of up to even 100%, which they take over from their husbands (Schwarze, 1998). Therefore, there rather have been strong incentives to supply labor as so-called 'marginal employment'. Prior to the reform that is examined here, a worker was marginally employed given that her monthly earnings did not exceed 630 DM[20] or given that a total of up to 15 working hours per week were supplied by the worker. Prior to the reform that went into effect on April, 1st 1999, a worker was free from the otherwise compulsory social security payments given that she was subject to these standards.[21]

[19] In 2002, the upper level was at 3.375 € gross monthly earnings pertaining to health insurance. Pension insurance payments were levied on all workers who did not earn more than 4.500 € (West) or 3.750 € (East) per month. These latter thresholds were raised to 5.100 € (West) and 4.250 € per month in 2003, thereby extending the tax base (http://www.bma.bund.de). Furthermore, while health insurance is not compulsory beyond the stated level of earnings, the limits for pension insurance refer to the maximum level of payments only.

[20] The limit was adjusted to 325 € when the Euro was introduced as official currency in 2002.

[21] Besides the standards mentioned, a worker is also considered to be marginally employed if two or more 'mini-jobs' are supplied or given that the job is of short-term nature. While the latter has not been affected by the changes of the reform, social security payments were compulsory in the first case also prior to the reform (Rudolph, 1999).

The drawback of that kind of employment was that workers mainly did not gain own entitlements to social security benefits, in particular old age pension benefits. Therefore, one of the goals of the reform was to enable particularly married women to build up their own entitlements in order to make them less dependent on their spouse's incomes.

Furthermore, there were increasing tendencies that employers opted to convert regular full-time or part-time jobs into marginal jobs in order to evade the employer's share of the social security payments (Rudolph, 1998). While this, generally speaking, may be considered to be a normal optimizing behavior, the financing of the social security systems would increasingly have suffered from such trends. Consequently, the reform also aimed at slowing down if not limiting the extension of that type of employment.

However, except for the compulsory social security payments, the reform had different effects on workers who only held one 'mini-job' or on workers who supplied marginal employment as a second job.

- Given that the worker offers one 'mini-job' only, earnings from marginal employment are exempt from taxation if there are no further incomes. Labor costs for employers by and large are the same as duty payments are replaced by social security payments.
- Given that the 'mini-job' is a second job, the tax burden increases as there is no possibility to evade payment of both earnings taxes and social security payments. Therefore, labor costs for employers increase and net earnings of workers decrease.

Table 5.10 sums up the general institutional framework of marginal employment and the incentives for both labor supply and labor demand prior to and after the reform.
As the reform induced both incentives and disencentives to supply marginal employment, the total employment effects could not be assessed ex ante. Reactions to that policy instrument were to be expected both on the labor demand side and the labor supply side. This is, because on the one hand, social security payments are part of total labor costs that employers have to bear. Such might be followed by a decrease in the demand of that kind of employment.

On the other hand, both workers' wages and conditions to entitlements to future benefits from the social security systems are affected. Due to the substitution- and income effect of wage changes, labor supply reactions *a priori* typically are ambiguous. Furthermore, while

marginally employed workers are to pay 12% of earnings to the old age insurance funds, this will not add to sufficient future benefits if the worker does not pay the difference between that 'flat' rate and the regular rate (about 19% of earnings). However, as that payment is not compulsory, it is not very surprising that a cross-sectional analysis that was carried out shortly after the reform finds that only about 2.5% of all workers who then were marginally employed used that option (Apel *et al.*, 1999).

Table 5.10: Institutional framework of marginal employment prior to and after the reform

	Prior to the reform	After the reform
Marginal employment	• no social security payments • lump sum wage tax (20%, to be paid by the employer) + strong incentive for married women and students to offer that type of labor	• 'flat' social security payments (12% old age insurance; 10% health insurance) • exempt from taxation, given there are no further incomes ± still an incentive for married women, but less so for students to offer that type of labor
Secondary jobholding	• no social security payments • lump sum wage tax (20%, to be paid by the employer) + incentive to offer that type of labor as second job	• social security payments (fixed percentage from all earnings) • lump sum wage tax (20%, to be paid by the employer) - disincentive to supply that type of labor as second job as net earnings decrease - disencentive to demand that type of labor as second job as labor costs increase

As outlined, there are differences in the effects between the group of workers with one 'mini-job' only and those who are moonlighting. As there is a small literature that addresses the consequences mainly for the first group (e.g., Heineck and Schwarze, 2001 or Heineck,

2002), the focus of the following analysis is on the reaction of workers holding the 'mini-job' as a second job. In general, there are several options, a moonlighter could have chosen. These are:

- forego the additional income and quit from moonlighting;
- maintain the second job accepting the decreasing net earnings;
- expand secondary jobholding to sustain the prior earnings level;
- switch to illicit, and thus illegal work (given the employer's willingness to do so);
- expand working hours in the main job (either by a higher number or regular working hours or by paid overtime).

However, as shown by the analysis in the preceding section, moonlighting incidence is higher among workers who would like to work more hours. And as possible hours constraints in the first job are one of the theoretical arguments for secondary jobholding, it is questionable whether the last option is feasible. Consequently, holding a second job indicates that workers are not satisfied with either the working hours or the working conditions of the first job. It therefore may not be expected that quitting from secondary jobholding would be the most likely option.

5.3.2 Data and methods

The study in this section uses data that again are drawn from the GSOEP. As shown in the preceding section, the GSOEP is an appropriate data-source when addressing multiple jobholding. The focus here lies on the examination of the dynamics of secondary jobholding and its relationship to the reform of 'marginal employment'. Therefore, the samples for the following multivariate analyses are restricted to male and female workers who were moonlighting in 1998.

The attempt to evaluate the reform of the 'marginal employment' faces a methodological problem that is also encountered when examining ALMP (see, e.g., Heckman *et al*., 1999, or Schmidt, 2000). Typically, such policy instruments are not designed as controlled experiments. It therefore is difficult to isolate the 'pure' impact of the labor market policy. The problem is that individuals' (re)actions to policy measures are observable only in a

insufficient way compared to the ideal, but impossible case of observing the individual's outcome in reaction to the ALMP in comparison to the individual's outcome given that she would not be subject to the policy measure.

Therefore, the relevant point is to find a sensible and feasible (pseudo-)contrafactual situation. As the reform was implemented in 1999, there will be an analysis of the changes in secondary jobholding between 1998 and 2000 that will be compared to changes in moonlighting between 1994 and 1996. The latter period of time is chosen as reference as there have not been any changes in the institutional conditions. To some extent, it will then be possible to put down the differences in the changes to the workers' reactions to the reform.

However, it should be noted that this approach is limited compared to controlled experiments: First, due to data size limitations, it is not possible to examine and compare the same group of workers and their behavior. Furthermore, there were differences in the cyclical and hence national economic situation between the two periods of time.

Besides comparisons of descriptive findings, multivariate methods are applied. Recall that there is a range of possible options a worker might chose as reaction to the changes induced by the reform. While it would be relevant to include each option into the analysis, sample size restrictions allow to model the following alternatives only. Given that worker *i* was moonlighting in 1998, her options in 2000 are modelled as:

$$y_{i,2000} = \begin{cases} 1 = \\ 2 = \text{if the worker is} \\ 3 = \end{cases} \begin{cases} \text{employed and moonlighting} \\ \text{employed, but not moonlighting} \\ \text{not employed .} \end{cases}$$

One appropriate model to apply is the multinomial logit model (Long 1997):

$$\Pr(y_{i,2000} = m \mid \mathrm{x}_i, \mathrm{y}_{i,1998} = 1) = \frac{\exp(\mathrm{x}_i' ß_m)}{\sum_{j=1}^{J} \exp(\mathrm{x}_i' ß_j)} \qquad (5.10)$$

where $ß_1 = 0$, m = 1, 2, 3, j = 1, ..., m.

While it would be possible to use the odds-ratio formulation of the model and then depict the results by the odds ratio plot (see Chapter 3.3), marginal effects are calculated in this analysis. This is because there is a wider range of possible factors affecting the decision to hold a second job so that the graphical illustration would turn out be excessive.

The marginal effects can be calculated for continuous variables as

$$\frac{\partial \Pr(y = m \mid \mathrm{x})}{\partial x_k} = \Pr(y = m \mid \mathrm{x}) \left[b_{km} - \sum_{j=1}^{J} b_{kj} \Pr(y = j \mid \mathrm{x}) \right]. \qquad (5.11)$$

For dummy variables changes in the predicted probabilities are computed as discrete change

$$\frac{\Delta \Pr(y = m \mid \mathrm{x})}{\Delta x_k} = \Pr(y = m \mid \mathrm{x}, x_k = 1) - \Pr(y = m \mid \mathrm{x}, x_k = 0). \qquad (5.12)$$

The coefficients resulting from these computations can be interpreted as a change in the predicted probability of outcome *m* for a (unit or discrete) change in the covariate x_k, holding all other variables at their mean.

5.3.3 Empirical results

Before presenting the results from the multivariate analyses, there will be a brief discussion of some descriptive findings that reflect the changes in secondary jobholding between 1998 and 2000 which is compared to the 'natural dynamics' that has taken place in the reference period between 1994 and 1996.

Table 5.11: Dynamics of multiple jobholding, all employed persons

	1996		
1994	Employed and moonlighting	Employed, but not moonlighting	Not employed
Employed and Moonlighting	53.8	39.7	(6.5)
Employed, but not moonlighting	3.1	84.8	12.1
	2000		
1998	Employed and moonlighting	Employed, but not moonlighting	Not employed
Employed and Moonlighting	44.5	48.0	(7.5)
Employed, but not moonlighting	2.6	86.3	11.1

Source: GSOEP. Own calculations.

Following the reform, there has been a remarkable downswing in multiple jobholding: The moonlighting rate decreased from 8.3% in 1998 to 6.0% in 2000 which projects to about

770 000 workers (Heineck and Schwarze, 2001).[22] While this may seem to be an outstanding trend downwards, Table 5.11 shows that secondary jobholding in general is a rather dynamic type of employment.[23]

Regarding the reference period, only about half of the workers were moonlighting in 1994, while about 40% did not have a second job in 1996. Besides, there has been a small inflow into moonlighting: some 3% of workers picked up a second job between these two points of time.

Introducing compulsory social security payments seems to have had a substantial negative impact on secondary jobholding. Compared to the reference period, there is a difference of about 9 percentage points indicating that fewer workers maintained moonlighting from 1998 to 2000: only some 45% of prior moonlighters still held on to their second job.

Furthermore, the inflow to moonlighting also decreased slightly to 2.6% which is 0.5 percentage points lower in comparison to the inflow between 1994 and 1996.

Table 5.12: Dynamics of multiple jobholding, married women

	1996		
1994	Employed and moonlighting	Employed, but not moonlighting	Not employed
Employed and Moonlighting	55.8	39.8	(4.4)
Employed, but not moonlighting	2.4	82.9	14.7
	2000		
1998	Employed and moonlighting	Employed, but not moonlighting	Not employed
Employed and Moonlighting	32.0	56.7	(11.3)
Employed, but not moonlighting	2.4	84.9	12.7

Source: GSOEP. Own calculations.

Addressing one of the bigger groups of moonlighters, Table 5.12 shows that the downturn in secondary jobholding is mainly caused by the behavior of women and, in particular, married women. While the changes in the reference period are quite similar to the changes shown for

[22] Note that the descriptive findings indicated above show a decrease of 8.7% to 6.9%. The differences in numbers may be attributed to the fact, that Heineck and Schwarze (2001) used preliminary data for 2000.
[23] This is even more visible in comparison to full-time or part-time employment. Heineck and Schwarze (2001), for example, find that in both periods in question, more than 85% of full-time workers and about 62% of part-time workers maintain their type of employoment.

all employed persons, there has been a strong decrease in moonlighting by this group between 1998 and 2000. Compared to the reference period, there is a difference of more than 20 percentage points: While more than 55% of married women continued to moonlight between 1994 and 1996, only 32% of married women were willing to do so after the implementation of the reform.[24]

However, as indicated by the stylized facts in the preceding section, there has also been a normalization in secondary jobholding behavior inasmuch as the moonlighting rate slightly increased again from 2000 to 2001. In terms of employment transitions between these two years, Table 5.13 shows that the dynamics have returned to and even exceed the 'natural' transition rates as shown for the reference period of 1994 to 1996. In particular, some 58% of either all workers and almost 56% of married women who held a second job in 2000 were still moonlighting in 2001.

Table 5.13: Dynamics of multiple jobholding (2000-2001), all employed persons

All persons	2001		
2000	Employed and moonlighting	Employed, but not moonlighting	Not employed
Employed and Moonlighting	58.1	36.7	5.2
Employed, but not moonlighting	2.8	89.6	7.5
Not employed	0.8	10.8	88.4
Married women	**2001**		
2000	Employed and moonlighting	Employed, but not moonlighting	Not employed
Employed and Moonlighting	55.7	35.5	(8.8)
Employed, but not moonlighting	2.3	87.8	9.9
Not employed	(0.3)	8.6	91.1

Source: GSOEP. Own calculations.

While Table 5.13 shows that secondary jobholding in Germany recovered from the shock of the 1999 reform, the following results illustrate which determinants may have prompted workers to either maintain their second jobs or quit from moonlighting.

[24] Analyzing all women results in mainly the same findings: only some 34% of 1998 moonlighters are holding a second job in 2000 while 54% quit from moonlighting.

Table 5.14 shows that only a few of the covariates contribute to the variation in the data. First, neither the wage earned in the first job nor in the second job affect the decision to quit from or to maintain secondary jobholding. This also holds for the level of the partner's earnings and the level of non-labor income in 1998. However, and although the change in the predicted probabilitly is rather small (-0.0155), the marginal effect found for the change in non-labor income between 1998 and 2000 suggests that an increasing non-labor income between these two years affects moonlighting participation negatively.

A tendency towards a reverse result is found for the share of second job earnings in the 1998 household-income: Although the effect is not statistically significent (*z*-value of 1.5),[25] a higher share of second job earnings may have affected the worker's decision to maintain moonlighting in 2000. Another predictor for the worker's reaction to the reform is the indicator on whether second jobs were held regular. Given that moonlighting was done only occassionally in 1998, the likelihood of still holding a second job in 2000 decreases. However, this finding is not surprising as the reference individual is the moonlighter working in a family business.

Furthermore, the type of employer is also relevant: While moonlighting in firms does not affect the participation or, better, the continuation decision, moonlighting in private households leads to a positive change of 0.16 in the predicted probability of secondary jobholding in 2000. A similar finding exists for the type of occupation in the second job. While working as clerk or in manufacturing does not have an impact on moonlighting in 2000, having a service second job in 1998 affects the maintenance of moonlighting positively.[26] The predicted probability changes by about 0.3.

Being a white-collar worker in 1998 does not affect the moonlighting decision after the reform. However, compared to blue-collar workers, civil servants are more likely to continue their second job in 2000. While part-time employment seems to affect moonlighting negatively, the marginal effect is not statistically significant (*z*-value of 1.2). On the other hand, having a fixed-term contract in 1998 has a positive effect on the continuation of secondary jobholding in 2000; the predicted probability changes by 0.2.

[25] Note that the sample size (N=322) is not quite extensive.
[26] Sample size restrictions prohibit the use of more occupational dummies.

Table 5.14: Moonlighting status of 1998 moonlighters in 2000, marginal effects of the multinomial logit model

	Employed and moonlighting	Employed, but not moonlighting	Not employed
Log of net wage in first job	0.1065	-0.1010	-0.0054
	(0.1089)	(0.1082)	(0.0155)
Log of gross wage in second job	0.0327	-0.0322	-0.0004
	(0.0479)	(0.0477)	(0.0074)
(Non-labor income)/100	0.0047	-0.0040	-0.0006
	(0.0064)	(0.0064)	(0.0009)
(Difference in non-labor income 1998 to 2000)/100	-0.0155**	0.0138**	0.0016*
	(0.0069)	(0.0067)	(0.0009)
(Spouse's earnings)/100	0.0017	-0.0014	-0.0002
	(0.0029)	(0.0029)	(0.0005)
Share of transfer benefits in hh-income	0.0061	-0.0059	-0.0002
	(0.0095)	(0.0095)	(0.0017)
Share of second job earnings in hh-income	0.0066	-0.0064	-0.0002
	(0.0044)	(0.0044)	(0.0008)
Second job is supplied occasionally	-0.2745*	0.2882*	-0.0136
	(0.1587)	(0.1590)	(0.0181)
Second job is supplied regularly	-0.0773	0.1110	-0.0337
	(0.1578)	(0.1585)	(0.0344)
Second job supplied in a firm	-0.0592	0.0582	0.0010
	(0.0717)	(0.0715)	(0.0114)
Second job supplied in private household	0.1629*	-0.1663*	0.0034
	(0.0907)	(0.0889)	(0.0183)
Second job occupation: Clerks	0.0130	-0.0025	-0.0105
	(0.1327)	(0.1325)	(0.0125)
Second job occupation: Services	0.2192**	-0.2528***	0.0335
	(0.1008)	(0.0920)	(0.0458)
Second job occupation: Manufacturing	-0.1286	0.1191	0.0095
	(0.1431)	(0.1440)	(0.0336)
Desire to work more hours	0.2553***	-0.2613***	0.0060
	(0.0935)	(0.0912)	(0.0247)
Desire to work fewer hours	0.1705*	-0.1899**	0.0194
	(0.0950)	(0.0948)	(0.0166)
First job is part-time employment	-0.1354	0.1166	0.0188
	(0.1122)	(0.1130)	(0.0295)
First job is temporary employment	0.1919*	-0.2107**	0.0188
	(0.1036)	(0.0974)	(0.0395)
White-collar worker	0.0549	-0.0456	-0.0092
	(0.0826)	(0.0824)	(0.0141)
Civil servant	0.2222*	-0.2153*	-0.0068
	(0.1199)	(0.1186)	(0.0162)
Works overtime	0.0384	-0.0173	-0.0211
	(0.0692)	(0.0688)	(0.0167)
Overtime is paid	-0.0548	0.0578	-0.0030
	(0.0899)	(0.0898)	(0.0128)
Overtime compensation by leisure in days	0.0141	-0.0261	0.0120
	(0.0719)	(0.0717)	(0.0132)

Notes: N=322; LR Chi^2-value=93.07; Prob > Chi^2 = 0.0065; Log likelihood = -221.39; Pseudo R^2 = 0.1737
Further socio-demographic control variables included are: Age and age squared, a male dummy, a married woman dummy, the number of children aged up to 4 years or aged 5 to 15 years, a West German dummy and the number of years spent in education. Note that all these coefficients returned trivial results so that they need not be presented here.

Source: GSOEP, 1998 and 2000. Own calculations.

Neither working overtime itself nor overtime compensation by additional payments or leisure has a statistically significant effect on moonlighting participation in 2000. Finally, an interesting result is found for the preferences over hours worked. First, it is not surprising that the desire to work more hours is associated with an increase in the predicted probability of continued moonlighting after the reform. On the other hand, it is rather puzzling that a similar effect arises for the 1998 moonlighters who want to work fewer hours. However, as shown in the preceding section, it is quite likely that there are also reasons other than hours restrictions on the first job to pick up a second job.

As the downturn in secondary jobholding was mainly caused by the decrease in female moonlighting participation, further multivariate regressions are carried out. While it would be interesting and relevant to analyze the group of married women, such approach results in a sample size that is far too small (N=59) to get reliable statistical findings. Therefore, the following analysis uses data on all women who were moonlighting in 1998 (N=115). Furthermore, as there are too few observations in the 'not employed' category, the limited sample size only allows to apply the familiar logit model. Table 5.15 presents both the coefficients and the marginal effects from that estimation.

Due to sample size limitations, the model estimated performs rather poorly (Prob > Chi^2 = 0.0943). Again, only a few of the regressors explain variation in the data. First, the wage in the second job as well as non-labor income in 1998 and the difference in non-labor income prior to and after the reform does not affect women's moonlighting decision in 2000 (although the latter shows the expected negative sign). While this also applies to the earnings of the husband, the female's net wage in the first job tends to affect secondary jobholding positively; a z-value of 1.55 indicates that with a larger sample, statistical significance may show.

Furthermore, occasional moonlighting in 1998 is associated with a rather strong decrease in the predicted probability (-0.53) of secondary jobholding in 2000. However, while that finding repeats and reinforces the result shown for all workers, female employees who were regularly moonlighting prior to the reform are as well less likely to hold a second job two years after. The predicted probability decreases by even 0.54.

On the other hand, as above, moonlighting in private households and moonlighting as service worker leads to continuing secondary employment also after the reform.

Table 5.15: Moonlighting participation of 1998 female moonlighters in 2000

	Coefficient	Marginal effect
Log of net wage in first job	1.0526	0.2600
	(0.6739)	(0.1669)
Log of gross wage in second job	0.2100	0.0518
	(0.3762)	(0.0929)
(Non-labor income)/100	0.0465	0.0115
	(0.0346)	(0.0085)
(Difference in non-labor income 1998 to 2000)/100	-0.0231	-0.0057
	(0.0406)	(0.0100)
(Spouse's earnings)/100	0.0131	0.0032
	(0.0151)	(0.0037)
Share of second job earnings in hh-income	0.0171	0.0042
	(0.0293)	(0.0072)
Second job is supplied occasionally	-2.7184**	-0.5298***
	(01.360)	(0.1824)
Second job is supplied regularly	-2.4544*	-0.5436**
	(01.280)	(0.2168)
Second job supplied in a firm	-0.3361	-0.0828
	(0.5579)	(0.1367)
Second job supplied in private household	1.6202**	0.3734**
	(0.7916)	(0.1503)
Second job occupation: Clerks	0.7238	0.1789
	(0.7087)	(0.1708)
Second job occupation: Services	1.7903**	0.4085***
	(0.7215)	(0.1340)
Second job occupation: Manufacturing	0.6378	0.1578
	(1.5772)	(0.3786)
Civil servant	0.9289	0.2260
	(1.3131)	(0.2959)
First job is temporary employment	0.1007	0.0249
	(0.9857)	(0.2453)
Works overtime	0.0658	0.0162
	(0.5345)	(0.1318)
Overtime is paid	-0.6024	-0.1438
	(0.6684)	(0.1513)
Overtime compensation by leisure in days	-0.3592	-0.0886
	(0.5458)	(0.1343)
Desire to work more hours	1.3385*	0.3220**
	(0.7401)	(0.1637)
Desire to work fewer hours	0.9275	0.2241
	(0.7242)	(0.1681)
Constant	-4.7081	—
	(4.7033)	
Notes: N=115; LR Chi^2-value=33.48; Prob > Chi^2 = 0.0943; Log likelihood = -62.44; Pseudo R^2 = 0.2114		
Further socio-demographic control variables included are: Age and age squared, the number of years spent in education and a dummy indicating whether dependent children are living in the household. Note that again all these coefficients returned trivial results so that they are not be presented here.		
Source: GSOEP, 1998 and 2000. Own calculations.		

In contrast to the finding for all workers, neither temporary employment nor being a female civil servant does affect the moonlighting participation decision in 2000. Regarding the desire to work either more or less hours, it is now found that only those female moonlighters who want to work more hours are more likely to still hold a second job after the reform.

5.4 Concluding remarks

This chapter presents analyses on an underresearched issue of labor supply, secondary jobholding. While there is an established, though small literature on the so-called moonlighting, the studies here provide some novelties.

Following a brief analytical outline of the two most prominent theoretical arguments of moonlighting, the 'hours-constraints' motive and the 'heterogeneous-jobs' motive, the first section presents a cross-national comparison, something which has hitherto not been carried out. This is of even more relevance as the countries in question, Germany and the UK, are proponents of rather different labor market regimes. The analysis furthermore uses longitudinal data so that panel estimators can be applied which only very recently has been done once before (Böheim and Taylor, 2003). In contrast to prior analyses that are based on cross-sectional data, it is then possible to control for unobservable individual heterogeneity.

Thereafter, the second section briefly evaluates the consequences of imposing social security payments on the so-called 'marginal employment' in Germany. As this type of part-time employment is often supplied as second job, the reform that was implemented in 1999 was followed by a strong decrease in moonlighting participation. However, simply recognizing such a decline would quite likely lead to wrong conclusions. The analysis therefore uses an approach that is also applied in the evaluation of active labor market policies. In particular, the development of secondary jobholding prior to and after the reform is referred to a (pseudo-)contrafactual situation so that the analysis disentangles 'natural' dynamics in moonlighting from the effects that were induced by the reform. Furthermore, multivariate analyses examine the determinants that affect the decision to maintain secondary jobholding after the reform.

The results from the comparative analysis that is carried out in the first section show evidence in support of the two most important theoretical rationales. That is, workers who suffer from hours-constraints on their first job are more likely to moonlight in order to narrow the gap between the individual optimum and the hours they are allowed to work. This is a quite plausible finding for the German labor market which, according to analyses of the OECD, is one of the most restrictive regimes. However, this result might be somewhat surprising in case of the British labor market which can be considered to be of one the most liberal and hence presumably more flexible regimes. In fact, descriptive findings suggest that, in contrast to German workers, the main part of British workers achieve a satisfactory solution regarding

the number of working hours.

While hours-constraints may nevertheless occur on flexible labor markets too, this argument is only one of the theoretical reasons as to why workers should offer a second job. Consequently, the analyses also provide evidence for the so-called 'heterogeneous-jobs' motive. That is, workers need not be hours-constrained but, for instance, may hold their main job for the sake of pecuniary stability and security and take a second job that provides other then monetary benefits. A further explanation is that workers strive to acquire skills or get experience in occupations other than the current job. Evidence for this phenomenon is found for both German and British men and women, who either desire or expect to get a new job or start their own business. However, it has to be noted that the reason for the desire to change is not clear-cut: It might either be constraints in working time and hence a limited earnings' capacity of individuals or, supporting the heterogeneity of jobs, it might be other benefits that come along with the new job.

Summing up, it is interesting to note that there rather are more similarities than discrepancies in the determinants of secondary jobholding in Germany and the UK. That is, the distinct differences in labor market regimes do not transmit into individual labor supply behavior that differs much with respect to secondary jobholding.

However, the second section of this chapter shows, that changes in the institutional framework may have a strong impact on labor supply and, in particular, secondary jobholding. In a (quasi) 'natural experiment' setting, the 1999 reform of imposing social security payments on 'marginal employment' in Germany and its consequences for secondary jobholding are examined. *A priori*, it however could not be said whether labor supply decreases given that net earnings from second jobs are lower due to the compulsory social security payments. Workers may as well try to compensate this loss by supplying even more moonlighting hours. However, the extent of labor supply is not of further interest here.

Focusing on participation itself, the analyses of transitions out of and into secondary jobholding prior to and after the reform, i.e. 1998 and 2000, show that the reform caused a stronger decline in moonlighting participation compared to the 'natural dynamics' of the reference period, 1994 to 1996. However, further findings for the subsequent year show that reactions to the reform may be considered as a kind of exogeneous shock which has been overcome quickly: Between 2000 and 2001, transitions out of and into moonlighting normalized and got back to a level comparable to the reference period.

Examining the determinants that may have caused 1998 moonlighters to maintain their second jobs after the reform, it is found that not many of the indicators available have explanatory power. On the one hand, an increasing non-labor income between 1998 and 2000 affects continued moonlighting participation negatively. A similar result is found for occasional secondary jobholding which also had a negative impact.

On the other hand, one of the primary factors thought of driving secondary jobholding, the desire to work more hours, has a positive effect which is further also found for moonlighting jobs in service or given that the employer was a private household. Here, workers are more likely to still hold a second job in 2000.

6. Summary and conclusion

This thesis basically is a collection of three essays on topics in the fields of empirical labor supply research. Following a short outline of some of the econometric methods used in the applied analyses, the first essay presents studies on the impact of religion and individuals' behavior on labor participation and earnings. Both participation and earnings are also addressed by the second essay that examines possible differences between workers who smoke and those who do not smoke. Finally, the third essay analyzes patterns of secondary jobholding in Germany and the UK, thus comparing two different labor market regimes. Furthermore, this last essay includes a brief evaluation of imposing compulsory social security payments on 'marginal employment' in Germany and its consequences for moonlighting workers.

At first glance, there seems to be not much of common ground. Indeed, all questions addressed do not belong to the mainstream canon of labor economics. Above all, this applies to the first essay on the effects, religious behavior and attitudes may have on individuals' labor market outcomes. In general, economists are hesitative regarding the appartently irrational belief in a superior order. However, the growing research on the 'Economics of Religion' shows that the economic approach to religious behavior is relevant and achieves useful results. The analyses carried out add to previous research. There are three smaller studies that offer several novelties. In contrast to the bulk of the corresponding literature that is generally based on cross-sectional Northern American data, it is mainly German data that are used. This allows for transnational comparisons which, however, are not the focus. Still, such research might be of future interest as the structures of religious markets and religious bodies in Germany and, above all, the US are quite different. Another asset is the use of longitudinal data that allows to apply more appropriate panel estimation techniques.

Furthermore, there are different questions of interest that are addressed in the chapter. First, a comparative context is chosen to analyze the impact of religion on individuals' attitudes towards female labor participation, given by attitudes towards the more traditional gender role model of the inner-household allocation of labor and by attitudes towards full-time employment of mothers. Furthermore, husbands' attitudes and their religiosity are used to predict employment participation of wives'. Three cross-sections drawn from the ISSP covering West Germany, East Germany, Italy, New Zealand and the UK are used. The

empirical findings support *a priori*, maybe unsurprising expectations insofar that males, adherents to more hierarchical religions, like Roman Catholicism, and religiously active persons are associated with less favorable attitudes towards female or mothers' labor participation. This being a general finding for all countries examined, there are differences between the countries. For example, West Germany and Italy are the least liberal with regard to female employment. While that finding may have been expected for Italy, given that more than 90% of the population are Roman Catholics, it is interesting to note such a result for West Germans.

Furthermore, the same data are used to analyze possible effects of husbands' religiosity on wives' employment. Unsurprisingly, it is found that husbands with traditional attitudes affect their wives' labor participation negatively. However, neither denominational affiliation nor regular church attendance of males seems to have a similar effect. As this may be lead back to the use of cross-sectional data, the subsequent section presents a more detailed analysis of the possible effects religion might have on the labor supply of married women. In particular, panel data from the GSOEP are used and panel estimations are carried out in addition to cross-sectional analyses.

The following study examines hypotheses derived from both sociological and economic theory. As above, these suggest that membership to strict religious groups may have a negative effect on women's employment participation. Again, the household context also plays an important role insofar that marital composition might either add to or counteract this effect. Inner-faith marriages should influence female labor supply negatively only when both spouses are member of a strict religious group. The *a priori* effects of inter-faith marriages, however, are ambiguous depending on the attitudes of either wife or husband and on the bargaining power of the spouses.

The empirical evidence found suggest for only weak and indirect support of the hypotheses suggested. First, there are no clear-cut patterns of the effects of denominational affiliation on female labor supply. This, however, is not surprising given that membership to a church may be a rather weak indicator for religious attitudes and beliefs. Therefore, both the religious belief and religious participation along with denominational affiliation are included in the analyses. Results from both cross-sectional and panel estimations suggest that female labor participation is affected by strong religious belief as well as regular participation. Furthermore, husbands with a strong religious belief also seem to affect female labor participation negatively.

The last section of this chapter presents a study on the relationship between male religious behavior and their earnings. The GSOEP provides information for both East German and West German men, which is of high interest, as there have been fundamentally different religious traditions in the decades before reunification. Consequently, it is not surprising that the results differ in various ways. First, there seems to be no association between religious attitudes or religious behavior and earnings of East German workers. West German workers, on the other hand, who are denominationally affiliated seem to bear an earnings penalty of 6-8%. However, these findings arise from cross-sectional estimations.

Using panel data, and applying the standard panel estimation techniques, i.e. random effects and fixed effects estimators, the negative effects mainly vanish. Furthermore, the Hausman-Taylor IV estimator is applied as well. This estimator overcomes the potential drawback of assuming either correlation between the individual-specific effects and the set of covariates or not. Findings from the fixed effects model and the Hausman-Taylor IV model imply that male earnings in West Germany are not affected by religious affiliation, belief or participation. However, there is some evidence for earnings penalties for believers and strong believers in East Germany.

The second essay includes two studies on the relationship between tobacco consumption and, on the one hand, absenteeism, i.e. absence from the work place and earnings on the other hand. The corresponding literature suggests some few theoretical ideas as to why smokers may be more absent or may earn less than non-smokers, the latter being an empirical regularity for the Northern American regions. In particular, it may be argued that smokers are individuals with higher time preference rates. Another hypothesis suggests that smokers may be less productive due to the deleterious health effects from tobacco consumption. The analyses presented are in line with the prior essay insofar that they provide evidence for Germany using longitudinal data. Again, existing research has mainly used cross-sectional data for the US or Canada. However, smoking may quite likely be assumed to be correlated with unobservable individual effects which strongly calls for the application of panel estimators that account for heterogeneity.

The first study corroborates existing evidence and shows that, also in the German case, smokers seem to be both more often and longer absent from work than non-smokers. On the other hand, the difference of about one more absent day per year may be considered to be not large economically. Furthermore, count data models are applied that account for the specific characteristic when measuring absence as counts. The findings from both cross-sectional and

panel estimations suggest that smoking behavior is a weak predictor for absence from the workplace. The results imply that only young female and male smokers have higher absence rates than their non-smoking counterparts.

The analysis on smoking and absenteeism has more of an explorative character than the subsequent study which addresses the relationship between smoking behavior and earnings. Here, (crude) tests for theoretical implications are provided as well. In particular, it is tested whether smokers may be individuals with a higher time preference rate or whether smokers are workers with lower productivity. First, however, results from earnings regressions only partially confirm previous research. Women's earnings in Germany are not affected by tobacco consumption. On the other hand, there seem to be earnings differentials for males. Compared to prior results, the differential of about 2%, however, is rather small. Furthermore, this finding is based on the pooled OLS estimator and is hence not accounting for unobservable individual-specific effects. Therefore, as in the preceding chapter, panel regressions are performed. Again, the random effects model, the fixed effects model and the Hausman-Taylor IV estimator are employed.

Rather unsurprisingly, the (negative) findings from the random effects model are rejected in favor of both the fixed effects model and the HT-IV model. According to these models, the prior negative effect of smoking on earnings vanishes. While the coefficients are not statistically significant, they furthermore show positive signs. Using a three-waves balanced panel, the *t*-test statistics for young male smokers indicate that coefficients are 'almost statistically significant'. On a somewhat speculative ground, it may be argued that young male smokers are individuals with a higher rate of time preference. This is because young males who smoke may not invest in human capital as much as their non-smoking counterparts given a higher time preference rate. They thus may be likely to have occupational experience that non-smokers are only about to establish which results in a tendency of higher earnings.

Furthermore, crude tests have been employed to examine further hypotheses. While a lower productivity of smokers cannot be supported, additional regressions suggest, though weakly, that smokers have lower returns to work experience. This is in line with higher time preference rates assuming that smokers are less likely to invest in on-the-job training.

The third and final essay analyzes secondary jobholding. Alike the other two topics, moonlighting is also a rather neglected issue. Recently, however, has there been an increase in literature because of the likewise increasing interest in atypical employment, like part-time or fixed term employment. The essay consists of a study of the underlying patterns of secondary

jobholding and of another study that addresses the impact of a policy measure on that type of employment.

First, the theory of multiple jobholding is briefly discussed. There are two more prominent theoretical arguments: The primary explanation is given by the case of workers who have a limited earnings' capacity because of a fixed number of hours they are allowed to work in their first job. The second motive to hold a second job arises from possible heterogeneous character of jobs so that, for example, one job might be the prerequisite for the other. Both motives, the 'hours-constraints' motive and the 'heterogeneous-jobs' motive are addressed in the analysis of the first section of the chapter. Examining Germany and the UK, the study follows a comparative approach, something which has hitherto not been done. Furthermore, the countries chosen represent two quite different labor market regimes making the analysis even more interesting as well as relevant. Again, as in the two preceding chapters, longitudinal data are used and panel estimators are applied.

The results from the multivariate analyses show that there rather are more similarities than discrepancies in the determinants of secondary jobholding in Germany and the UK. There is evidence in support of both theoretical rationales. That is, in both countries there is a group of workers who are hours-constrained on their first job and thus have an incentive to moonlight given that their individual optimum hours worked is not achieved by the hours restricitions. However, descriptive findings suggest that the bulk of British workers are satisfied with the number of hours they work and thus may be considered to have achieved the individual optimum. In contrast, German workers are mainly dissatisfied with their working hours but are restricted downwards. These differences do not come surprising given that Germany is one of the most restrictive regimes, according to the OECD.

Furthermore, the analyses also provide evidence for the heterogeneous character of jobs. In both countries, for example, indicators on the prospect of starting a new occupation or of becoming self-employed are good predictors for secondary jobholding. This might be explained by workers holding a second job in order to acquire or to improve in skills other than those demanded in the current job.

Despite the evidence that the differences in labor market regimes do not to result in large differences in moonlighting behavior in Germany and the UK, the subsequent and hence last section shows, that secondary jobholding may still be affected by changes in the institutional framework.

In particular, the analysis concentrates on a quasi 'natural experiment': In 1999, a reform

went into effect that imposed compulsory social security payments on 'marginal employment' in Germany. However, prior to the reform, moonlighting jobs quite often categorized as marginal employment given the typically small number of hours that is supplied and the corresponding low earnings that are obtained. The reform was accompanied by both decreases in the moonlighting net wages and increases in labor costs due to employer's share of social security payments. Still, *a priori*, it could not be said whether labor supply would decrease because of the income- and substitution-effects of a wage change. Descriptive findings nevertheless show that the reform was followed by a strong decrease in moonlighting participation.

However, it may be misleading to simply acknowledge a decline. Therefore, a reference period that was not burdened by institutional changes is used as (pseudo-)contrafactual situation in order to disentangle the 'natural dynamics' of secondary jobholding from the effects that were induced by the reform. Compared to these 'natural' transitions, findings still suggest for a strong negative impact of the reform. It should, however, also be noted that workers overcame that exogeneous shock quite quickly insofar that in the subsequent year, the transitions out of and into secondary jobholding in general got back to the 'natural' level. Finally, multivariate analyses are used to explore the determinants that affected 1998 moonlighters in their decision to maintain secondary jobholding after the reform. However, the results are rather unsatisfactory insofar that only a few of the indicators available have explanatory power. On the one hand, occasional secondary jobholding in 1998 and an increasing non-labor income between 1998 and 2000 affects continued moonlighting participation negatively. On the other hand, although not too surprising, the desire to work more hours has a positive effect on keeping up the moonlighting job. A more interesting finding is found for secondary jobs in service or given that the employer was a private household. Here, workers also are more likely to still hold a second job in 2000.

Despite the fact that the topics analyzed do belong to rather different branches of research, one methodological mainline result arises from the analyses carried out: the need to account for unobservable individual heterogeneity. Most of prior research on which the studies here are based use cross-sectional data. However, as has been shown by the analyses that explore longitudinal data, prior results are mainly not supported by the findings in this thesis. On the other hand, as the GSOEP is the primary data source used, it would in general be correct to assume that the theoretical arguments simply do not hold for the German case. However, it is more plausible to assume that taking into account individual-specific effects cause the

reversal of results.

The material collected in this thesis does not attempt to answer each question from the fields examined. It rather has to be seen as a small contribution to the existing literature and as a first step towards future research that will likewise show that seemingly off-mainstream research may contribute to enhance economists' understanding of the underlying patterns of individuals' behavior in general and particularly individuals' labor supply decisions.

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— Appendix —

Note that the numbering of the tables in the Appendix corresponds to the numbering of the tables in the chapters. Therefore, the gaps in numbering are by intention. Furthermore, there are tables that correspond to Figures shown in the text. Eventually, there are also tables in the text that either are collapsed to economize upon space or split in two or more parts due to the comprised presentation of only the relevant variables in the text.

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Table D-3.1: Religion and attitudes towards gender role and female full-time employment; descriptive statistics

Variable	Mean	Std. Dev.
A man's job: earn money, a woman's job: home and family	0.2425	(0.4286)
Family suffers when the woman has a full-time job	0.4223	(0.4939)
Catholic and regular attendance	0.1363	(0.3432)
Muslim and regular attendance	0.0008	(0.0293)
Protestant and regular attendance	0.0521	(0.2222)
Other denomination and regular attendance	0.0094	(0.0966)
No denomination and regular attendance	0.0034	(0.0586)
Catholic and no regular attendance	0.1757	(0.3806)
Muslim and no regular attendance	0.0008	(0.0293)
Protestant and no regular attendance	0.2488	(0.4323)
Other denomination, no regular attendance	0.0165	(0.1274)
No denomination and no regular attendance	0.2677	(0.4428)
West German and regular attendance	0.0508	(0.2196)
East German and regular attendance	0.0124	(0.1108)
Italian and regular attendance	0.0816	(0.2738)
New Zealander and regular attendance	0.0364	(0.1874)
British and regular attendance	0.0298	(0.1700)
West German and no regular attendance	0.1988	(0.3991)
East German and no regular attendance	0.1591	(0.3658)
Italian and no regular attendance	0.0859	(0.2802)
New Zealander and no regular attendance	0.1505	(0.3576)
British and no regular attendance	0.1223	(0.3277)
Denomination: Catholic	0.3133	(0.4638)
Denomination: Muslim	0.0018	(0.0425)
Denomination: Protestant	0.3036	(0.4598)
Denomination: Other denomination	0.0271	(0.1624)
Denomination: No denomination	0.3375	(0.4729)
Nationality: West German	0.2595	(0.4384)
Nationality: East German	0.2104	(0.4076)
Nationality: Italian	0.1691	(0.3748)
Nationality: New Zealander	0.1904	(0.3927)
Nationality: British	0.1703	(0.3759)
Male	0.4792	(0.4995)
Age: 20 to 35 years old	0.3474	(0.4761)
Age: 36 to 50 years old	0.3592	(0.4798)
Age: 51 to 64 years old	0.2932	(0.4552)
Married	0.6878	(0.4634)
Is not employed	0.3331	(0.4713)
Has full-time employment	0.5391	(0.4984)
Has part-time employment	0.1250	(0.3308)
Public servant	0.1700	(0.3757)
Has higher education	0.3955	(0.4889)
Number of persons in household	3.0909	(1.3886)
Lives in rural area	0.2094	(0.4069)
Lower social class	0.2035	(0.4026)
Has left-wing political attitude	0.3157	(0.4648)
Has right-wing political attitude	0.2256	(0.4180)
Year of observation: 1991	0.3688	(0.4825)
Year of observation: 1994	0.3873	(0.4871)
Year of observation: 1998	0.2437	(0.4293)

Notes: *N*=11,570 observations.

Source: ISSP, 1991, 1994 and 1998.

Table A-3.1: Denominational affiliation, religious participation and attitudes towards gender role and female full-time employment; including control variables

	Man's job: earn money; woman's: home and family		Family suffers when woman/ wife has a full-time job	
Catholic and regular attendance	0.0393***	0.0230*	0.1003***	0.0353**
	(0.0136)	(0.0137)	(0.0163)	(0.0169)
Muslim and regular attendance	0.4343***	0.4424***	0.1932	0.3059**
	(0.1673)	(0.1663)	(0.1637)	(0.1431)
Protestant and regular attendance	-0.0033	0.0083	-0.0199	0.0661***
	(0.0185)	(0.0196)	(0.0225)	(0.0242)
Other denomination and regular attendance	0.1926***	0.1953***	0.1092**	0.1499***
	(0.0492)	(0.0502)	(0.0507)	(0.0512)
No denomination and regular attendance	0.1851**	0.1908**	0.0810	0.2012**
	(0.0815)	(0.0824)	(0.0805)	(0.0783)
Muslim and no regular attendance	0.0634	0.0744	-0.1467	-0.0665
	(0.1457)	(0.1498)	(0.1415)	(0.1619)
Protestant and no regular attendance	-0.0318***	-0.0252**	-0.0666***	-0.0045
	(0.0104)	(0.0111)	(0.0130)	(0.0143)
Other denomination, no regular attendance	0.0211	0.0238	-0.0218	0.0126
	(0.0313)	(0.0320)	(0.0367)	(0.0382)
No denomination and no regular attendance	-0.1478***	-0.1164***	-0.1900***	-0.0888***
	(0.0092)	(0.0106)	(0.0124)	(0.0145)
Nationality: East German	—	-0.1177***	—	-0.1848***
		(0.0101)		(0.0138)
Nationality: Italian	—	-0.0400***	—	0.0803***
		(0.0125)		(0.0175)
Nationality: New Zealander	—	-0.1000***	—	-0.1618***
		(0.0114)		(0.0155)
Nationality: British	—	-0.0445***	—	-0.1707***
		(0.0122)		(0.0144)
Male	0.1015***	0.0964***	0.0858***	0.0747***
	(0.0088)	(0.0089)	(0.0104)	(0.0106)
Age: 20 to 35 years old	-0.1436***	-0.1550***	-0.1417***	-0.1586***
	(0.0094)	(0.0094)	(0.0126)	(0.0128)
Age: 36 to 50 years old	-0.0949***	-0.1033***	-0.0778***	-0.0888***
	(0.0094)	(0.0094)	(0.0125)	(0.0127)
Family status: married	0.0091	0.0091	0.0300***	0.0375***
	(0.0097)	(0.0097)	(0.0115)	(0.0116)
Has full-time employment	-0.0940***	-0.0934***	-0.0761***	-0.0780***
	(0.0098)	(0.0099)	(0.0118)	(0.0120)
Has part-time employment	-0.0721***	-0.0681***	-0.0404***	-0.0289*
	(0.0112)	(0.0114)	(0.0157)	(0.0160)
Public servant	-0.0372***	-0.0386***	-0.0208	-0.0300**
	(0.0111)	(0.0110)	(0.0135)	(0.0136)
Has higher education	-0.1385***	-0.1276***	-0.1288***	-0.1103***
	(0.0081)	(0.0085)	(0.0102)	(0.0108)
Number of persons in household	0.0049	0.0086**	0.0190***	0.0213***
	(0.0033)	(0.0035)	(0.0040)	(0.0042)
Lives in rural area	-0.0069	0.0219**	-0.0086	0.0109
	(0.0097)	(0.0107)	(0.0118)	(0.0127)
Lower social class	0.0148	0.0375***	-0.0476***	-0.0204
	(0.0106)	(0.0116)	(0.0125)	(0.0134)
Has left-wing political attitude	-0.0445***	-0.0552***	-0.0553***	-0.0501***
	(0.0092)	(0.0094)	(0.0112)	(0.0118)
Has right-wing political attitude	0.0214**	0.0139	0.0176	0.0286**
	(0.0103)	(0.0103)	(0.0124)	(0.0127)
Year of observation: 1994	-0.0189**	-0.0317***	0.0821***	0.0658***
	(0.0091)	(0.0091)	(0.0110)	(0.0112)
Year of observation: 1998	0.0047	0.0186*	-0.0495***	-0.0278**
	(0.0108)	(0.0110)	(0.0128)	(0.0132)
Chi^2	1,466.61	1,589.89	1,216.56	1,565.65
Log likelihood	-5,676.14	-5,614.50	-7,271.47	-7,096.92

Notes: Discrete changes following probit regressions. Standard errors in parentheses. N = 11,570.
* significant at 10%; ** significant at 5%; *** significant at 1%

Source: ISSP, 1991, 1994 and 1998. Own calculations.

Table A-3.2: Nationality, religious involvement and attitudes towards gender role and female full-time employment; including control variables

	Man's job: earn money; woman's: home and family		Family suffers when woman/ wife has a full-time job	
West German and regular attendance	0.0759***	0.0468**	0.1268***	0.0951***
	(0.0204)	(0.0201)	(0.0236)	(0.0245)
East German and regular attendance	-0.0583**	-0.0722***	-0.0226	-0.0458
	(0.0293)	(0.0273)	(0.0424)	(0.0416)
Italian and regular attendance	0.0224	-0.0061	0.1838***	0.1448***
	(0.0166)	(0.0174)	(0.0202)	(0.0229)
New Zealander and regular attendance	0.0484**	0.0281	-0.0141	-0.0353
	(0.0245)	(0.0235)	(0.0275)	(0.0273)
British and regular attendance	0.0381	0.0185	-0.0651**	-0.0862***
	(0.0258)	(0.0249)	(0.0280)	(0.0276)
East German and no regular attendance	-0.1547***	-0.1334***	-0.1864***	-0.1479***
	(0.0091)	(0.0102)	(0.0141)	(0.0155)
Italian and no regular attendance	0.0025	-0.0215	0.1395***	0.1081***
	(0.0155)	(0.0161)	(0.0194)	(0.0213)
New Zealander and no regular attendance	-0.1210***	-0.1179***	-0.1354***	-0.1301***
	(0.0108)	(0.0109)	(0.0159)	(0.0161)
British and no regular attendance	-0.0470***	-0.0339**	-0.1371***	-0.1202***
	(0.0127)	(0.0133)	(0.0155)	(0.0161)
Denomination: Catholic	—	0.0887***	—	0.1130***
		(0.0138)		(0.0156)
Denomination: Muslim	—	0.3655***	—	0.2158**
		(0.1168)		(0.1084)
Denomination: Protestant	—	0.0758***	—	0.1017***
		(0.0113)		(0.0126)
Denomination: Other denomination	—	0.1629***	—	0.1367***
		(0.0311)		(0.0309)
Male	0.0915***	0.0967***	0.0702***	0.0774***
	(0.0088)	(0.0089)	(0.0105)	(0.0106)
Age: 20 to 35 years old	-0.1557***	-0.1505***	-0.1603***	-0.1519***
	(0.0093)	(0.0094)	(0.0127)	(0.0128)
Age: 36 to 50 years old	-0.1054***	-0.1005***	-0.0906***	-0.0832***
	(0.0094)	(0.0094)	(0.0126)	(0.0127)
Family status: married	0.0109	0.0103	0.0365***	0.0365***
	(0.0097)	(0.0097)	(0.0116)	(0.0116)
Has full-time employment	-0.0932***	-0.0935***	-0.0750***	-0.0752***
	(0.0099)	(0.0099)	(0.0119)	(0.0119)
Has part-time employment	-0.0687***	-0.0680***	-0.0264*	-0.0268*
	(0.0114)	(0.0114)	(0.0160)	(0.0160)
Public servant	-0.0366***	-0.0370***	-0.0284**	-0.0289**
	(0.0111)	(0.0111)	(0.0136)	(0.0136)
Has higher education	-0.1362***	-0.1329***	-0.1195***	-0.1148***
	(0.0084)	(0.0085)	(0.0107)	(0.0107)
Numer of persons in household	0.0086**	0.0072**	0.0210***	0.0197***
	(0.0034)	(0.0034)	(0.0042)	(0.0042)
Lives in rural area	0.0236**	0.0220**	0.0083	0.0054
	(0.0107)	(0.0107)	(0.0126)	(0.0126)
Lower social class	0.0421***	0.0420***	-0.0174	-0.0174
	(0.0118)	(0.0118)	(0.0135)	(0.0135)
Has left-wing political attitude	-0.0572***	-0.0565***	-0.0466***	-0.0462***
	(0.0093)	(0.0093)	(0.0117)	(0.0118)
Has right-wing political attitude	0.0152	0.0122	0.0333***	0.0267**
	(0.0104)	(0.0103)	(0.0127)	(0.0128)
Year of observation: 1994	-0.0278***	-0.0306***	0.0717***	0.0698***
	(0.0091)	(0.0091)	(0.0112)	(0.0112)
Year of observation: 1998	0.0100	0.0199*	-0.0465***	-0.0314**
	(0.0108)	(0.0111)	(0.0130)	(0.0132)
Chi^2	1,495.67	1,579.20	1,431.45	1,519.39
Log likelihood	-5,661.61	-5,619.85	-7,164.02	-7,120.05

Notes: Discrete changes following probit regressions. Standard errors in parentheses. N = 11,570.
* significant at 10%; ** significant at 5%; *** significant at 1%

Source: ISSP, 1991, 1994 and 1998. Own calculations.

Table A-3.5: Husbands' attitudes, religious involvement and labor participation of wives

	Wife is participating in paid employment			
	(1)	(2)	(3)	(4)
"A man's job is …"	-0.1715***	—	—	—
	(0.0196)			
"Family suffers …"	—	-0.1683***	—	—
		(0.0177)		
"A man's job is …" * regular church attendance	—	—	-0.1833***	—
			(0.0318)	
"Family suffers …" * regular church attendance	—	—	—	-0.1511***
				(0.0278)
Denomination: Catholic	-0.0388	-0.0368	-0.0319	-0.0283
	(0.0285)	(0.0285)	(0.0286)	(0.0287)
Denomination: Muslim	-0.1929	-0.2164	-0.2267	-0.2295
	(0.1662)	(0.1633)	(0.1607)	(0.1598)
Denomination: Protestant	-0.0508**	-0.0561**	-0.0623***	-0.0581**
	(0.0231)	(0.0231)	(0.0230)	(0.0230)
Denomination: Other denomination	-0.0281	-0.0386	-0.0284	-0.0282
	(0.0562)	(0.0563)	(0.0561)	(0.0561)
Nationality: East German	0.1826***	0.1816***	0.2013***	0.2036***
	(0.0270)	(0.0270)	(0.0263)	(0.0262)
Nationality: Italian	0.0155	0.0292	0.0183	0.0249
	(0.0303)	(0.0302)	(0.0302)	(0.0301)
Nationality: New Zealander	0.2149***	0.2136***	0.2350***	0.2319***
	(0.0267)	(0.0267)	(0.0258)	(0.0259)
Nationality: British	0.1655***	0.1513***	0.1758***	0.1735***
	(0.0277)	(0.0282)	(0.0272)	(0.0273)
Age: 20 to 35 years old	0.0468*	0.0515**	0.0605**	0.0621***
	(0.0241)	(0.0240)	(0.0238)	(0.0238)
Age: 36 to 50 years old	0.1255***	0.1310***	0.1350***	0.1367***
	(0.0212)	(0.0211)	(0.0210)	(0.0210)
Has higher education	0.0478**	0.0526***	0.0675***	0.0715***
	(0.0195)	(0.0194)	(0.0192)	(0.0191)
Has full-time employment	0.3435***	0.3572***	0.3506***	0.3512***
	(0.0219)	(0.0217)	(0.0217)	(0.0217)
Has part-time employment	0.2846***	0.2859***	0.2855***	0.2838***
	(0.0294)	(0.0292)	(0.0293)	(0.0294)
Public servant	-0.0071	-0.0094	-0.0002	0.0025
	(0.0236)	(0.0237)	(0.0235)	(0.0235)
Numer of persons in household	-0.0464***	-0.0448***	-0.0461***	-0.0454***
	(0.0080)	(0.0080)	(0.0080)	(0.0080)
Lives in rural area	0.0005	-0.0003	-0.0047	-0.0060
	(0.0219)	(0.0219)	(0.0219)	(0.0219)
Lower social class	-0.0102	-0.0233	-0.0111	-0.0141
	(0.0240)	(0.0241)	(0.0240)	(0.0240)
Has left-wing political attitude	0.0514**	0.0516**	0.0574***	0.0577***
	(0.0210)	(0.0210)	(0.0209)	(0.0209)
Has right-wing political attitude	0.0545**	0.0549**	0.0560**	0.0587***
	(0.0220)	(0.0219)	(0.0219)	(0.0218)
Year of observation: 1994	-0.0445**	-0.0310	-0.0383**	-0.0359*
	(0.0196)	(0.0196)	(0.0195)	(0.0195)
Year of observation: 1998	0.0010	-0.0065	-0.0031	-0.0003
	(0.0240)	(0.0240)	(0.0239)	(0.0239)
Chi^2	677.81	689.84	634.50	631.38
Log likelihood	-2,262.74	-2,256.73	-2,284.40	-2,285.96

Notes: Standard errors in parentheses. N = 3,806.
* significant at 10%; ** significant at 5%; *** significant at 1%

Source: ISSP, 1991, 1994 and 1998. Own calculations.

Table D-3.2: Religion and the labor supply of married women; descriptive statistics

Variable	Mean	Std. Dev.
Dependent variables:		
Cross-section: 1=not employed, 2=part-time employed, 3=full-time employed	2.0833	(0.8391)
Longitudinal: 0=not employed, 1=in paid employment	0.6715	(0.4696)
Explanatory variables:		
Cross-sectional sample (n= 1,763)		
Model specification 1:		
Both spouses Catholic (*reference category*)	0.2473	(0.4315)
Both spouses Protestant	0.1815	(0.3855)
Both spouses other Christian	0.0380	(0.1912)
Both spouses other religious affiliation (mainly Muslim)	0.0850	(0.2790)
Both spouses no religious affiliation	0.1979	(0.3985)
Wife Catholic, spouse different affiliation	0.0748	(0.2632)
Wife Protestant, spouse different affiliation	0.1134	(0.3172)
Wife other Christian, spouse different affiliation	0.0136	(0.1159)
Wife other religious affiliation, spouse different affiliation	0.0045	(0.0672)
Wife no religious affiliation, spouse different affiliation	0.0272	(0.1627)
Model specification 2:		
Catholic woman and (strong) religious belief (*reference category*)	0.1843	(0.3878)
Protestant woman and (strong) religious belief	0.1344	(0.3412)
Other Christian woman and (strong) religious belief	0.0385	(0.1926)
Woman with other religious affiliation and (strong) religious belief	0.0692	(0.2538)
Woman with no religious affiliation and (strong) religious belief	0.0147	(0.1205)
Catholic woman and no religious belief	0.1389	(0.3460)
Protestant woman and no religious belief	0.1656	(0.3718)
Other Christian woman and no religious belief	0.0107	(0.1032)
Woman with other religious affiliation and no religious belief	0.0215	(0.1452)
Woman with no religious affiliation and no religious belief	0.2217	(0.4155)
Model specification 3:		
Catholic woman who regularly attends church (*reference category*)	0.1287	(0.3350)
Protestant woman who regularly attends church	0.0516	(0.2213)
Other Christian woman who regularly attends church	0.0260	(0.1594)
Woman with other religious affiliation who regularly attends church	0.0340	(0.1813)
Woman with no religious affiliation who regularly attends church	0.0034	(0.0582)
Catholic woman who does not attends church	0.1945	(0.3959)
Protestant woman who regularly attends church	0.2484	(0.4322)
Other Christian woman who regularly attends church	0.0232	(0.1507)
Woman with other religious affiliation who regularly attends church	0.0567	(0.2313)
Woman with no religious affiliation who regularly attends church	0.2331	(0.4229)
Longitudinal sample I (n=7,543)		
Wife: Faith is very important	0.1150	(0.3191)
Wife: Faith is important	0.2811	(0.4496)
Wife: Faith is less important	0.3680	(0.4822)
Wife: Faith is not important	0.2357	(0.4244)
Husband: Faith is very important	0.0876	(0.2827)
Husband: Faith is important	0.2300	(0.4208)
Husband: Faith is less important	0.3847	(0.4865)
Husband: Faith is not important	0.2976	(0.4572)
Longitudinal sample II (n=17,657)		
Wife: attends church once a week	0.1001	(0.3001)
Wife: attends church once a month	0.1042	(0.3055)
Wife: attends church less regular	0.3150	(0.4645)
Wife: never attends church (*reference category*)	0.4806	(0.4996)
Husband: attends church once a week	0.0914	(0.2882)
Husband: attends church once a month	0.0825	(0.2752)
Husband: attends church less regular	0.2872	(0.4524)
Husband: never attends church (*reference category*)	0.5387	(0.4985)
Other control variables (n=17,657)		
Age	39.7268	(8.3529)
Age (squared)	1647.99	(676.1186)

(Table D-3.2 continued)		
Number of children aged 0 to 6 years	0.3686	(0.6596)
Number of children aged 7 to 16 years	0.6836	(0.8799)
Years of education	11.5990	(2.3362)
Non-labor income	3537.079	(1919.619)
Self reported health is fair or worse	0.4483	(0.4973)
Registered disabled	0.0492	(0.2164)
Resident of West Germany	0.6792	(0.4667)
Municipal size: 2,000 or less (*reference category*)	0.1214	(0.3266)
Municipal size: 2,000 to 5,000	0.1145	(0.3184)
Municipal size: 5,000 to 20,000	0.2315	(0.4218)
Municipal size: 20,000 to 50,000	0.1760	(0.3808)
Municipal size: 50,000 to 100,000	0.0853	(0.2794)
Municipal size: 100,000 to 500,000	0.1592	(0.3659)
Municipal size: 500,000 or more	0.1118	(0.3151)
Year of observation	95.9609	(2.2017)

Source: GSOEP.

Table F-3.5 (corresponding to Figure 3.5): Multinomial logit model (M1), comparison group: not employed

M1	Coefficients (ß)		Odds ratios (exp(ß))	
	Full-time	Part-time	Full-time	Part-time
Both spouses Protestant	-0.0441	0.3984**	0.9568	1.4896**
	(0.2187)	(0.1810)	(0.2093)	(0.2696)
Both spouses other Christian	0.0921	-0.7283*	1.0965	0.4827*
	(0.3618)	(0.3809)	(0.3968)	(0.1839)
Both spouses other religious affiliation	-0.8503***	-0.9162***	0.4273***	0.4000***
	(0.3185)	(0.2706)	(0.1361)	(0.1083)
Both spouses no religious affiliation	0.5175**	0.1014	1.6778**	1.1068
	(0.2306)	(0.2280)	(0.3870)	(0.2525)
W: Catholic, spouse different affiliation	-0.3524	0.1859	0.7029	1.2043
	(0.3048)	(0.2341)	(0.2143)	(0.2820)
W: Protestant, spouse different affiliation	-0.2751	0.2033	0.7595	1.2255
	(0.2539)	(0.2074)	(0.1929)	(0.2542)
W: other Christian, spouse different affiliation	-0.3339	0.5415	0.7161	1.7186
	(0.6486)	(0.5114)	(0.4645)	(0.8790)
W: other affiliation, spouse diff. affiliation	1.4314	-0.1451	4.1846	0.8649
	(0.9401)	(1.2609)	(3.9342)	(1.0906)
W: no affiliation, spouse different affiliation	0.0357	-0.3627	1.0364	0.6957
	(0.4159)	(0.4258)	(0.4311)	(0.2963)
Age	0.3265***	0.2701***	1.3861***	1.3102***
	(0.0956)	(0.0866)	(0.1326)	(0.1135)
Age (squared)	-0.0045***	-0.0034***	0.9955***	0.9966***
	(0.0011)	(0.0010)	(0.0012)	(0.0011)
Years of education	0.2483***	0.1108***	1.2819***	1.1172***
	(0.0368)	(0.0321)	(0.0473)	(0.0359)
Non-labor income	-0.0005***	-0.0001***	0.9995***	0.9999**
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
No. of children aged 0 to 6 years	-2.3966***	-0.8657	0.0910***	0.4208***
	(0.2221)	(0.1320)	(0.0202)	(0.0556)
No. of children aged 7 to 16 years	-0.8104***	-0.1048	0.4446***	0.9004
	(0.1012)	(0.0757)	(0.0450)	(0.0682)
Self reported health is fair or worse	-0.1890	-0.1729	0.8277	0.8412
	(0.1497)	(0.1337)	(0.1239)	(0.1125)
Registered disabled	-1.2944***	-0.6406**	0.2740***	0.5270**
	(0.3391)	(0.2721)	(0.0929)	(0.1434)
Municipal size: 2,000 to 5,000	0.2491	0.4859	1.2829	1.6256
	(0.3159)	(0.3038)	(0.4054)	(0.4940)
Municipal size: 5,000 to 20,000	0.1119	0.3098	1.1184	1.3632
	(0.2767)	(0.2687)	(0.3096)	(0.3664)
Municipal size: 20,000 to 50,000	-0.2443	0.1144	0.7833	1.1213
	(0.2884)	(0.2820)	(0.2260)	(0.3163)
Municipal size: 50,000 to 100,000	0.0667	0.4153	1.0691	1.5149
	(0.3376)	(0.3175)	(0.3610)	(0.4810)
Municipal size: 100,000 to 500,000	-0.0113	0.5121*	0.9887	1.6689*
	(0.2967)	(0.2862)	(0.2934)	(0.4778)
Municipal size: 500,000 or more	0.1578	0.3218	1.1710	1.3797
	(0.3230)	(0.3149)	(0.3784)	(0.4346)
Resident of West Germany	-0.2790	0.4310**	0.7565	1.5389**
	(0.2028)	(0.2092)	(0.1535)	(0.3219)
Constant	-5.2557***	-6.4520***	—	—
	(1.9581)	(1.7629)		
Log likelihood		-1,532.63		
Chi^2		775.38		
Prob > Chi^2		0.0000		

Notes: Standard errors in parentheses. N = 1,763 observations.
Statistical significance levels: * significant at 10%; ** significant at 5%; *** significant at 1%

Source: GSOEP, 1997 and 1998. Own calculations.

Table F-3.6 (corresponding to Figure 3.6): Multinomial logit model (M2), comparison group: not employed

M2	Coefficients (ß)		Odds ratios (exp(ß))	
	Full-time	Part-time	Full-time	Part-time
Protestant*Believer	0.0169	0.5506***	1.0170	1.7343***
	(0.2487)	(0.2106)	(0.2530)	(0.3654)
Other Christian*Believer	0.1316	-0.2686	1.1407	0.7644
	(0.3745)	(0.3496)	(0.4272)	(0.2673)
Oth. Affiliation *Believer	-0.6661*	-0.8721***	0.5137*	0.4181***
	(0.3479)	(0.3068)	(0.1787)	(0.1283)
Catholic*Non-Believer	0.0796	0.3126	1.0829	1.3670
	(0.2469)	(0.2029)	(0.2675)	(0.2775)
Protestant*Non-Believer	-0.0483	0.4142**	0.9528	1.5132**
	(0.2392)	(0.1965)	(0.2280)	(0.2975)
Other Christian*Non-Believer	0.0744	0.4820	1.0772	1.6195
	(0.6592)	(0.5864)	(0.7102)	(0.9498)
Other affiliation*Non-Believer	-0.1355	-0.3986	0.8732	0.6713
	(0.5249)	(0.4809)	(0.4584)	(0.3228)
No affiliation*Non-Believer	0.5733**	0.3310	1.7742**	1.3924
	(0.2400)	(0.2291)	(0.4259)	(0.3191)
Age	0.3319***	0.2666***	1.3937***	1.3056***
	(0.0953)	(0.0864)	(0.1329)	(0.1129)
Age (squared)	-0.0045***	-0.0033***	0.9954***	0.9966***
	(0.0011)	(0.0010)	(0.0012)	(0.0010)
Years of education	0.2416***	0.1101***	1.2733***	1.1164***
	(0.0363)	(0.0318)	(0.0463)	(0.0355)
Non-labor income	-0.0005***	-0.0001**	0.9995***	0.9999**
	(0.0001)	(0.0001)	(0.0000)	(0.0000)
No. of children aged 0 to 6 years	-2.3852***	-0.8530***	0.0921***	0.4261***
	(0.2215)	(0.1317)	(0.0204)	(0.0561)
No. of children aged 7 to 16 years	-0.7909***	-0.0939	0.4534***	0.9103
	(0.1006)	(0.0756)	(0.0457)	(0.0689)
Self reported health is fair or worse	-0.1990	-0.1647	0.8195	0.8481
	(0.1487)	(0.1335)	(0.1219)	(0.1132)
Registered disabled	-1.2812***	-0.6684**	0.2777***	0.5125**
	(0.3384)	(0.2724)	(0.0940)	(0.1396)
Municipal size: 2,000 to 5,000	0.2475	0.4947	1.2809	1.6401
	(0.3160)	(0.3039)	(0.4048)	(0.4986)
Municipal size: 5,000 to 20,000	0.0666	0.2886	1.0689	1.3346
	(0.2767)	(0.2692)	(0.2958)	(0.3594)
Municipal size: 20,000 to 50,000	-0.2756	0.0583	0.7591	1.0600
	(0.2901)	(0.2832)	(0.2203)	(0.3003)
Municipal size: 50,000 to 100,000	0.0062	0.3547	1.0062	1.4258
	(0.3372)	(0.3173)	(0.3394)	(0.4524)
Municipal size: 100,000 to 500,000	-0.0271	0.4655	0.9732	1.5929
	(0.2966)	(0.2866)	(0.2887)	(0.4567)
Municipal size: 500,000 or more	0.1611	0.2538	1.1749	1.2890
	(0.3231)	(0.3159)	(0.3797)	(0.4072)
Resident of West Germany	-0.2912	0.4860**	0.7473	1.6259**
	(0.2065)	(0.2104)	(0.1544)	(0.3421)
Constant	-5.4430***	-6.6122***	—	—
	(1.9483)	(1.7611)		
Log likelihood		-1,540.72		
Chi^2		759.21		
Prob > Chi^2		0.0000		

Notes: Standard errors in parentheses. *N* = 1,763 observations.
Statistical significance levels: * significant at 10%; ** significant at 5%; *** significant at 1%
Source: GSOEP, 1997 and 1998. Own calculations.

Table F-3.7 (corresponding to Figure 3.7): Multinomial logit model (M3), comparison group: not employed

M3	Coefficients (ß)		Odds ratios (exp(ß))	
	Full-time	Part-time	Full-time	Part-time
Protestant*Churchgoer	0.5058	0.8689***	1.6584	2.3845***
	(0.3892)	(0.3122)	(0.6455)	(0.7446)
Other Christian*Churchgoer	-0.0303	-0.0701	0.9702	0.9323
	(0.5206)	(0.3986)	(0.5051)	(0.3717)
Other affiliation*Churchgoer	-0.2791	-1.2280**	0.7564	0.2929**
	(0.4764)	(0.4777)	(0.3604)	(0.1399)
Catholic*Non-Churchgoer	0.6433**	0.5256**	1.9028**	1.6916**
	(0.2559)	(0.2078)	(0.4871)	(0.3516)
Protestant *Non-Churchgoer	0.3167	0.5515***	1.3727	1.7360***
	(0.2451)	(0.1997)	(0.3365)	(0.3468)
Other Christian *Non-Churchgoer	0.8431*	0.2164	2.3236*	1.2416
	(0.4545)	(0.4618)	(1.0561)	(0.5734)
Other affiliation *Non-Churchgoer	-0.0830	-0.3247	0.9203	0.7227
	(0.3849)	(0.3256)	(0.3543)	(0.2354)
No affiliation*Non-Churchgoer	0.9116***	0.3328	2.4885***	1.3950
	(0.2668)	(0.2441)	(0.6640)	(0.3405)
Age	0.3179***	0.2579***	1.3744***	1.2942***
	(0.0956)	(0.0866)	(0.1314)	(0.1122)
Age (squared)	-0.0043***	-0.0032***	0.9956***	0.9967***
	(0.0011)	(0.0010)	(0.0012)	(0.0011)
Years of education	0.2470***	0.1161***	1.2802***	1.1232***
	(0.0365)	(0.0318)	(0.0468)	(0.0358)
Non-labor income	-0.0005***	-0.0001**	0.9995***	0.9999**
	(0.0001)	(0.0001)	(0.0001)	(0.0000)
No. of children aged 0 to 6 years	-2.4232***	-0.8853***	0.0886***	0.4126***
	(0.2226)	(0.1325)	(0.0197)	(0.0547)
No. of children aged 7 to 16 years	-0.7611***	-0.0777	0.4671***	0.9252
	(0.1017)	(0.0765)	(0.0475)	(0.0709)
Self reported health is fair or worse	-0.2086	-0.1883	0.8117	0.8283
	(0.1493)	(0.1339)	(0.1212)	(0.1109)
Registered disabled	-1.3006***	-0.6819**	0.2724***	0.5056**
	(0.3382)	(0.2727)	(0.0921)	(0.1379)
Municipal size: 2,000 to 5,000	0.2401	0.5190*	1.2714	1.6804*
	(0.3167)	(0.3033)	(0.4027)	(0.5098)
Municipal size: 5,000 to 20,000	0.0484	0.2987	1.0496	1.3481
	(0.2774)	(0.2685)	(0.2912)	(0.3620)
Municipal size: 20,000 to 50,000	-0.3103	0.0880	0.7332	1.0920
	(0.2906)	(0.2825)	(0.2131)	(0.3086)
Municipal size: 50,000 to 100,000	-0.0127	0.3684	0.9874	1.4455
	(0.3378)	(0.3171)	(0.3335)	(0.4584)
Municipal size: 100,000 to 500,000	-0.0353	0.4887*	0.9653	1.6302*
	(0.2969)	(0.2863)	(0.2867)	(0.4668)
Municipal size: 500,000 or more	0.1165	0.2902	1.1236	1.3367
	(0.3236)	(0.3148)	(0.3636)	(0.4208)
Resident of West Germany	-0.2868	0.4214**	0.7506	1.5241**
	(0.2078)	(0.2119)	(0.1561)	(0.3231)
Constant	-5.6012***	-6.5891	—	—
	(1.9536)	(1.7645)		
Log likelihood			-1,535.26	
Chi^2			770.12	
Prob > Chi^2			0.0000	

Notes: Standard errors in parentheses. N = 1,763 observations.
Statistical significance levels: * significant at 10%; ** significant at 5%; *** significant at 1%
Source: GSOEP, 1997 and 1998. Own calculations.

Table A-3.7-I: Strength of religious belief and employment participation, fixed effects logit estimation including control variables

	M1	M2	M3
W: Faith is very important	-0.3361	—	-0.0533
	(0.5191)		(0.5468)
W: Faith is important	-0.0452	—	0.0185
	(0.3727)		(0.3853)
W: Faith is less important	0.1353	—	0.1396
	(0.2825)		(0.2875)
H: Faith is very important	—	-1.1696**	-1.1324*
		(0.5620)	(0.5875)
H: Faith is important	—	-0.3141	-0.3042
		(0.3512)	(0.3620)
H: Faith is less important	—	0.0494	0.0409
		(0.2435)	(0.2481)
Age	1.2967***	1.2831***	1.2820***
	(0.2121)	(0.2132)	(0.2131)
Age (squared)	-0.0123***	-0.0121***	-0.0121***
	(0.0025)	(0.0025)	(0.0025)
Number of children aged 0 to 6	-0.5130	-0.5159	-0.5163
	(0.3784)	(0.3825)	(0.3825)
Number of children aged 7 to 16	-0.3406	-0.3246	-0.3201
	(0.2492)	(0.2501)	(0.2504)
Years of education	5.2635***	5.0187***	5.0183***
	(1.7609)	(1.8099)	(1.8195)
Non-labor income	-0.0011***	-0.0011***	-0.0011***
	(0.0001)	(0.0001)	(0.0001)
Self reported health is fair or worse	0.0288	0.0709	0.0621
	(0.1924)	(0.1926)	(0.1935)
Registered disabled	-1.1179*	-1.1697**	-1.1451**
	(0.5761)	(0.5781)	(0.5793)
Resident of West Germany	1.1391*	1.1870*	1.1894*
	(0.6589)	(0.6526)	(0.6625)
Municipal size: 2,000 or less	0.0082	-0.0659	-0.0358
	(0.5332)	(0.5249)	(0.5308)
Municipal size: 2,000 to 5,000	-0.6830	-0.7029	-0.6830
	(0.6745)	(0.6618)	(0.6654)
Municipal size: 5,000 to 20,000	-0.3911	-0.3315	-0.3009
	(0.8251)	(0.8201)	(0.8240)
Municipal size: 20,000 to 50,000	-0.7687	-0.8717	-0.8074
	(1.0483)	(1.0283)	(1.0390)
Municipal size: 50,000 to 100,000	-0.0586	0.1132	0.1063
	(0.7027)	(0.6969)	(0.7044)
Municipal size: 100,000 to 500,000	0.8933	0.9799	0.9730
	(0.8633)	(0.8641)	(0.8660)
Log likelihood	-305.47	-303.27	-303.04
Chi^2	283.47	287.87	288.34

Notes: Standard errors in parentheses; Number of observations/individuals: 1,245/489
Statistical significance levels: * significant at 10%; ** significant at 5%; *** significant at 1%

Source: GSOEP, 1994, 1998 to 1999. Own calculations.

Table A-3.7-II: Strength of religious belief and employment participation, fixed effects logit estimation including control variables

	M4	M5
W: F. is very important*H: F. is (very) important	-0.8535	—
	(0.5941)	
W: F. is very important*H: F. is less/not important	0.8502	—
	(0.9715)	
W: F. is important*H: F. is (very) important	-0.3445	—
	(0.4533)	
W: F. is important*H: F. is less/not important	0.0375	—
	(0.4017)	
W: F. is less important*H: F. is (very) important	-0.0997	—
	(0.4713)	
W: F. is less important*H: F. is less/not important	0.1231	—
	(0.2866)	
W: F. is less/not important*H: F. is (very) important	-1.0497	—
	(1.0942)	
W: F. is (very) important*H: F. is (very) important	—	-0.5491
		(0.3658)
W: F. is (very) important*H: F. is less/not important	—	-0.0757
		(0.3032)
W: F. is less/not important* H: F. is (very) important	—	-0.3172
		(0.3831)
Age	1.3307***	1.2956***
	(0.2150)	(0.2124)
Age (squared)	-0.0127***	-0.0123***
	(0.0025)	(0.0025)
Number of children aged 0 to 6	-0.4717	-0.5076
	(0.3802)	(0.3808)
Number of children aged 7 to 16	-0.3141	-0.3423
	(0.2497)	(0.2508)
Years of education	4.8772***	5.0333***
	(1.6832)	(1.8010)
Non-labor income	-0.0011***	-0.0011***
	(0.0001)	(0.0001)
Self reported health is fair or worse	0.0481	0.0645
	(0.1931)	(0.1921)
Registered disabled	-1.1744**	-1.1930**
	(0.5796)	(0.5761)
Resident of West Germany	1.0906*	1.1410*
	(0.6623)	(0.6565)
Municipal size: 2,000 or less	0.0366	0.0101
	(0.5372)	(0.5354)
Municipal size: 2,000 to 5,000	-0.6995	-0.7055
	(0.6769)	(0.6703)
Municipal size: 5,000 to 20,000	-0.3725	-0.3652
	(0.8335)	(0.8201)
Municipal size: 20,000 to 50,000	-1.0039	-0.8512
	(1.0374)	(1.0283)
Municipal size: 50,000 to 100,000	0.0018	0.0518
	(0.7166)	(0.6963)
Municipal size: 100,000 to 500,000	0.9825	0.9406
	(0.8975)	(0.8666)
Log likelihood	-303.32	-304.85
Chi^2	287.78	284.70

Notes: Standard errors in parentheses; Number of observations/individuals: 1,245/489
Statistical significance levels: * significant at 10%; ** significant at 5%; *** significant at 1%

Source: GSOEP, 1994, 1998 to 1999. Own calculations.

Table A-3.8-I: Church attendance and employment participation, fixed effects logit estimation including control variables

	M1	M2	M3
W: attends church at least once a week	-0.4115**	—	-0.3613*
	(0.1794)		(0.1963)
W: attends church once a month	-0.0650	—	-0.1021
	(0.1377)		(0.1493)
W: attends church less regular	0.0836	—	0.0404
	(0.0939)		(0.1006)
H: attends church once a week	—	-0.3270*	-0.1674
		(0.1964)	(0.2146)
H: attends church once a month	—	0.0558	0.1208
		(0.1511)	(0.1641)
H: attends church less regular	—	0.1436	0.1343
		(0.0959)	(0.1027)
Age	0.9239***	0.9184***	0.9201***
	(0.0834)	(0.0833)	(0.0833)
Age (squared)	-0.0082***	-0.0081***	-0.0082***
	(0.0010)	(0.0010)	(0.0010)
Number of children aged 0 to 6	-0.9666***	-0.9653***	-0.9714***
	(0.1340)	(0.1339)	(0.1338)
Number of children aged 7 to 16	-0.4014***	-0.4050***	-0.4051***
	(0.0909)	(0.0908)	(0.0909)
Years of education	0.0258	0.0269	0.0266
	(0.0572)	(0.0571)	(0.0572)
Non-labor income	-0.0007***	-0.0007***	-0.0007***
	(0.0000)	(0.0000)	(0.0000)
Self reported health is fair or worse	0.0120	0.0167	0.0150
	(0.0733)	(0.0733)	(0.0734)
Registered disabled	-1.3709***	-1.3818***	-1.3798***
	(0.2316)	(0.2319)	(0.2319)
Resident of West Germany	0.6521**	0.6392*	0.6416*
	(0.3274)	(0.3277)	(0.3277)
Municipal size: 2,000 or less	0.5126**	0.5077**	0.5157**
	(0.2409)	(0.2402)	(0.2408)
Municipal size: 2,000 to 5,000	0.2873	0.2883	0.2909
	(0.2462)	(0.2455)	(0.2461)
Municipal size: 5,000 to 20,000	0.5278*	0.5322*	0.5330*
	(0.2824)	(0.2821)	(0.2823)
Municipal size: 20,000 to 50,000	-0.0714	-0.0839	-0.0783
	(0.3991)	(0.3997)	(0.3998)
Municipal size: 50,000 to 100,000	-0.2025	-0.1948	-0.2026
	(0.3022)	(0.3017)	(0.3022)
Municipal size: 100,000 to 500,000	0.1848	0.1982	0.1832
	(0.3929)	(0.3928)	(0.3931)
Log likelihood	-2,674.07	-2,674.39	-2,671.98
Chi^2	1,196.82	1,196.18	1,201.00

Notes: Standard errors in parentheses; Number of observations/individuals: 8,773/1,801
Statistical significance levels: * significant at 10%; ** significant at 5%; *** significant at 1%

Source: GSOEP, 1992, 1994 to 2001. Own calculations.

Table A-3.8-II: Church attendance and employment participation, fixed effects logit estimation including control variables

	M4	M5
W: once a week*H: once a week/month	-0.3691*	—
	(0.2070)	
W: once a week*H: less often/never	-0.5923**	—
	(0.2924)	
W: once a month*H: once a week/month	-0.1266	—
	(0.1737)	
W: once a month*H: less often/never	0.0063	—
	(0.1726)	
W: less often*H: once a week/month	0.0205	—
	(0.2124)	
W: less often*H: less often/never	0.0930	—
	(0.0969)	
W: never*H: once a week/month	0.0597	—
	(0.3142)	
W: once a week/month*H: once a week/month	—	-0.2525*
		(0.1469)
W: once a week/month*H: less often/never	—	-0.1692
		(0.1468)
W: less often/never*H: once a week/month	—	-0.0138
		(0.1846)
Age	0.9214***	0.9262***
	(0.0834)	(0.0834)
Age (squared)	-0.0082***	-0.0082***
	(0.0010)	(0.0010)
Number of children aged 0 to 6	-0.9648***	-0.9580***
	(0.1342)	(0.1342)
Number of children aged 7 to 16	-0.4002***	-0.3987***
	(0.0911)	(0.0909)
Years of education	0.0251	0.0232
	(0.0573)	(0.0572)
Non-labor income	-0.0007***	-0.0007***
	(0.0000)	(0.0000)
Self reported health is fair or worse	0.0121	0.0161
	(0.0734)	(0.0733)
Registered disabled	-1.3737***	-1.3682***
	(0.2319)	(0.2316)
Resident of West Germany	0.6478**	0.6510**
	(0.3274)	(0.3270)
Municipal size: 2,000 or less	0.5103**	0.5143**
	(0.2408)	(0.2404)
Municipal size: 2,000 to 5,000	0.2860	0.2910
	(0.2461)	(0.2456)
Municipal size: 5,000 to 20,000	0.5295*	0.5349*
	(0.2823)	(0.2822)
Municipal size: 20,000 to 50,000	-0.0764	-0.0734
	(0.3991)	(0.3990)
Municipal size: 50,000 to 100,000	-0.1988	-0.1870
	(0.3023)	(0.3020)
Municipal size: 100,000 to 500,000	0.1764	0.1943
	(0.3932)	(0.3928)
Log likelihood	-2,673.41	-2,676.48
Chi^2	1,198.15	1,192.00

Notes: Standard errors in parentheses; Number of observations/individuals: 8,773/1,801
Statistical significance levels: * significant at 10%; ** significant at 5%; *** significant at 1%

Source: GSOEP, 1992, 1994 to 2001. Own calculations.

Table D-3.3: Religion and male earnings; descriptive statistics

Variable	Mean	Std. Dev.
Log of monthly gross earnings	8.2799	(0.4806)
Denomination: Catholic*	0.2880	(0.4529)
Denomination: Protestant*	0.2563	(0.4366)
Denomination: Other Christian*	0.0388	(0.1932)
Denomination: Other religious affiliation*	0.0530	(0.2242)
Denomination: No religious affiliation*	0.3652	(0.4816)
Religious belief is very important**	0.0713	(0.2574)
Religious belief is important**	0.2283	(0.4198)
Religious belief is less important**	0.4010	(0.4901)
Religious belief is not important at all**	0.2992	(0.4579)
Religious participation: once a week	0.0775	(0.2674)
Religious participation: once a month	0.0796	(0.2707)
Religious participation: less regular	0.2896	(0.4535)
Religious participation: never	0.5531	(0.4971)
Age: 25 to 35 years old	0.3651	(0.4814)
Age: 36 to 45 years old	0.3397	(0.4736)
Age: 46 to 55 years old	0.2951	(0.4561)
Married	0.7333	(0.4422)
Non-German origin	0.1700	(0.3756)
East German citizen	0.2910	(0.4542)
West German region: North	0.1318	(0.3383)
West German region: Mid-West	0.3130	(0.4637)
West German region: South	0.2638	(0.4407)
Log of hours worked per week	3.7579	(0.2029)
Working overtime	0.5395	(0.4984)
Years of education	11.798	(2.5222)
Schooling: Basic schooling (*Hauptschule*)	0.3539	(0.4782)
Schooling: Intermediate schooling (*Realschule*)	0.3019	(0.4591)
Schooling: Secondary schooling (*Abitur*)	0.1500	(0.3571)
Schooling: No completed schooling	0.0395	(0.1949)
No vocational training	0.1511	(0.3582)
Vocational training	0.7660	(0.4233)
University degree	0.1474	(0.3545)
Blue-collar worker	0.5863	(0.4924)
In public service	0.1552	(0.3621)
Has part-time employment	0.0155	(0.1236)
Potential work experience	21.1095	(9.0315)
Potential work experience (squared)	527.177	(410.3449)
Firm size: < 20 employees	0.1913	(0.3933)
Firm size: 20 to 199 employees	0.2431	(0.4289)
Firm size: 200 to 1999 employees	0.2508	(0.4335)
Firm size: > 2000 employees	0.2400	(0.4271)
Occupation: Manager	0.0485	(0.2149)
Occupation: Academics	0.1126	(0.3161)
Occupation: Professionals	0.1313	(0.3378)
Occupation: Clerks	0.0657	(0.2478)
Occupation: Services	0.0291	(0.1683)
Occupation: Agriculture	0.0092	(0.0959)
Occupation: Crafts	0.3269	(0.4691)
Occupation: Manufacturing	0.1614	(0.3679)
Occupation: Elementary	0.0721	(0.2587)
Occupation: Other	0.0007	(0.0270)
Branch: Agriculture	0.0228	(0.1495)
Branch: Mining/Oil/Gas	0.0371	(0.1890)
Branch: Textiles	0.0111	(0.1051)
Branch: Wood/Paper	0.0269	(0.1619)
Branch: Chemicals/Plastics/Glas	0.0697	(0.2547)
Branch: Metal	0.2580	(0.4375)
Branch: Water/Energy	0.0184	(0.1345)

(Table D-3.3 continued)		
Branch: Construction	0.1371	(0.3439)
Branch: Trade/Retail	0.0878	(0.2831)
Branch: Transport	0.0687	(0.2530)
Branch: Banking/Insurance	0.0279	(0.1649)
Branch: Other services	0.1329	(0.3395)
Year of observation: 1990	0.0873	(0.2824)
Year of observation: 1992	0.1099	(0.3127)
Year of observation: 1994	0.1073	(0.3095)
Year of observation: 1995	0.1112	(0.3144)
Year of observation: 1996	0.1072	(0.3094)
Year of observation: 1997	0.1043	(0.3057)
Year of observation: 1998	0.1081	(0.3105)
Year of observation: 1999	0.1092	(0.3120)
Year of observation: 2001	0.1550	(0.3619)

Notes: N=24,522; *: N=2,524; **: N= 4,077.
Source: GSOEP.

Table A-3.11/12-I: Religion and earnings; cross-sectional regressions, West German men

	Table A3.11-I			Table A3.12-I	
	(1)	(2)	(3)	(4)	(5)
Denomination: Catholic	-0.0623***	—	—	—	—
	(0.0195)				
Denomination: Protestant	-0.0656***	—	—	—	—
	(0.0198)				
Denomination: Other Christian	-0.0446	—	—	—	—
	(0.0351)				
Denomination: Oth. Rel. affiliation	-0.0783**	—	—	—	—
	(0.0321)				
Religious belief is very important	—	-0.0651**	—	—	—
		(0.0278)			
Religious belief is important	—	-0.0204	—	—	—
		(0.0199)			
Religious belief is less important	—	-0.0233	—	—	—
		(0.0178)			
Rel. participation: Once a week	—	—	-0.0589**	—	—
			(0.0243)		
Rel. participation: Once a month	—	—	-0.0065	—	—
			(0.0238)		
Rel. participation: Less regular	—	—	-0.0151	—	—
			(0.0152)		
Catholic, religious belief	—	—	—	-0.0721***	
				(0.0235)	
Catholic, no religious belief	—	—	—	-0.0663***	
				(0.0220)	
Protestant, religious belief	—	—	—	-0.0592**	
				(0.0294)	
Protestant, no religious belief	—	—	—	-0.0767***	
				(0.0216)	
Other Christian, religious belief	—	—	—	-0.0562	
				(0.0403)	
Other Christian, no rel. belief	—	—	—	-0.0391	
				(0.0561)	
Other religion, religious belief	—	—	—	-0.0769**	
				(0.0353)	
Other religion, no rel. belief	—	—	—	-0.1129**	
				(0.0494)	
No religion, religious belief	—	—	—	-0.0792	
				(0.0526)	
Catholic, religious participation	—	—	—	—	-0.0611**
					(0.0258)
Catholic, no rel. participation	—	—	—	—	-0.0650***
					(0.0207)
Protestant, rel. participation	—	—	—	—	-0.1157**
					(0.0478)
Protestant, no rel participation	—	—	—	—	-0.0628***
					(0.0201)
Oth. Christian, rel. participation	—	—	—	—	-0.0317
					(0.0500)
Oth. Christian, no rel. participation	—	—	—	—	-0.0556
					(0.0434)
Other religion, rel. participation	—	—	—	—	-0.1063***
					(0.0411)
Other religion, no rel. participation	—	—	—	—	-0.0636*
					(0.0372)
No religion, rel. participation	—	—	—	—	-0.1722
					(0.1135)
Age: 36 to 45 years old	-0.0403	-0.0399	-0.0407	-0.0393	-0.0398
	(0.0277)	(0.0276)	(0.0276)	(0.0277)	(0.0277)

(Table A-3.11/12-I continued)

Age: 46 to 55 years old	-0.0238	-0.0273	-0.0298	-0.0237	-0.0192
	(0.0484)	(0.0484)	(0.0484)	(0.0485)	(0.0486)
Married	0.0559***	0.0537***	0.0544***	0.0544***	0.0562***
	(0.0163)	(0.0162)	(0.0163)	(0.0163)	(0.0163)
Years of education	0.0187**	0.0195**	0.0199**	0.0186**	0.0189**
	(0.0078)	(0.0078)	(0.0079)	(0.0078)	(0.0078)
Vocational training	0.0033	0.0038	0.0042	0.0032	0.0032
	(0.0211)	(0.0211)	(0.0211)	(0.0212)	(0.0212)
University degree	0.1321***	0.1349***	0.1331***	0.1362***	0.1347***
	(0.0401)	(0.0402)	(0.0403)	(0.0402)	(0.0403)
Schooling: Basic schooling	0.0435**	0.0422**	0.0394**	0.0450**	0.0438**
	(0.0197)	(0.0197)	(0.0197)	(0.0197)	(0.0197)
Schooling: Intermediate schooling	0.1027***	0.1065***	0.1080***	0.1048***	0.1038***
	(0.0231)	(0.0231)	(0.0230)	(0.0232)	(0.0232)
Schooling: Secondary schooling	0.0813**	0.0783**	0.0800**	0.0799**	0.0791**
	(0.0353)	(0.0355)	(0.0355)	(0.0354)	(0.0354)
Blue-collar worker	-0.1501***	-0.1458***	-0.1474***	-0.1511***	-0.1504***
	(0.0240)	(0.0240)	(0.0240)	(0.0240)	(0.0240)
In public service	-0.0404	-0.0443	-0.0447	-0.0425	-0.0400
	(0.0272)	(0.0272)	(0.0272)	(0.0272)	(0.0273)
Has part-time employment	-0.5983***	-0.6093***	-0.6118***	-0.5990***	-0.5986***
	(0.0622)	(0.0624)	(0.0624)	(0.0624)	(0.0623)
Potential work experience	0.0407***	0.0410***	0.0418***	0.0404***	0.0409***
	(0.0058)	(0.0058)	(0.0058)	(0.0058)	(0.0058)
Potential work experience (sqd.)	-0.0007***	-0.0007***	-0.0007***	-0.0007***	-0.0007***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Log of hours worked per week	0.3580***	0.3545***	0.3518***	0.3586***	0.3602***
	(0.0398)	(0.0400)	(0.0401)	(0.0399)	(0.0399)
Working overtime	0.0637***	0.0653***	0.0653***	0.0625***	0.0625***
	(0.0144)	(0.0145)	(0.0145)	(0.0145)	(0.0145)
Firm size: < 20 employees	-0.1979***	-0.2013***	-0.1989***	-0.1979***	-0.1989***
	(0.0222)	(0.0222)	(0.0222)	(0.0222)	(0.0222)
Firm size: 20 to 199 employees	-0.1119***	-0.1129***	-0.1123***	-0.1128***	-0.1132***
	(0.0186)	(0.0186)	(0.0186)	(0.0186)	(0.0186)
Firm size: 200 to 1999 employees	-0.0620***	-0.0595***	-0.0590***	-0.0620***	-0.0621***
	(0.0183)	(0.0182)	(0.0183)	(0.0183)	(0.0183)
West German region: North	-0.0240	-0.0133	-0.0160	-0.0228	-0.0272
	(0.0202)	(0.0196)	(0.0198)	(0.0203)	(0.0203)
West German region: Mid-West	-0.0028	-0.0030	-0.0039	-0.0019	-0.0051
	(0.0147)	(0.0147)	(0.0148)	(0.0148)	(0.0148)
Non-German origin	0.0288	0.0312	0.0253	0.0306	0.0299
	(0.0234)	(0.0209)	(0.0205)	(0.0237)	(0.0237)
Constant	6.4041***	6.3674***	6.3589***	6.4151***	6.3970***
	(0.1877)	(0.1876)	(0.1878)	(0.1883)	(0.1878)
12 Branch / 9 Occupational dummies	Yes	Yes	Yes	Yes	Yes
F-/Chi^2-value	43.15	43.68	43.71	38.93	38.96
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000
R^2	0.5867	0.5842	0.5844	0.5877	0.5879

Notes: Standard errors in parentheses; *N*= 1,445
Statistical significance levels: * significant at 10%; ** significant at 5%; *** significant at 1%

Source: GSOEP, 1997 and 1998. Own calculations.

Table A-3.11/12-II: Religion and earnings; cross-sectional regressions, East German men

	Table A3.11-II			Table A3.12-II	
	(1)	(2)	(3)	(4)	(5)
Denomination: Catholic	-0.0001	—	—	—	—
	(0.0557)				
Denomination: Protestant	-0.0077	—	—	—	—
	(0.0294)				
Religious belief is very important	—	-0.1538**	—	—	—
		(0.0669)			
Religious belief is important	—	0.0116	—	—	—
		(0.0394)			
Religious belief is less important	—	-0.0051	—	—	—
		(0.0239)			
Rel. participation: Once a week	—	—	-0.0639	—	—
			(0.0604)		
Rel. participation: Once a month	—	—	-0.0293	—	—
			(0.0654)		
Rel. participation: Less regular	—	—	0.0375	—	—
			(0.0296)		
Catholic and religious belief	—	—	—	-0.0625	—
				(0.0703)	
Catholic and no religious belief	—	—	—	0.1007	—
				(0.0880)	
Protestant and religious belief	—	—	—	-0.0062	—
				(0.0475)	
Protestant and no religious belief	—	—	—	-0.0078	—
				(0.0345)	
No religion and religious belief	—	—	—	0.0206	—
				(0.0721)	
Catholic and religious participation	—	—	—	—	-0.0480
					(0.0740)
Catholic and no rel. participation	—	—	—	—	0.0562
					(0.0818)
Protestant and religious participation	—	—	—	—	-0.0205
					(0.0657)
Protestant and no rel. participation	—	—	—	—	-0.0062
					(0.0316)
No religion and rel. participation	—	—	—	—	-0.1380
					(0.1488)
Age: 36 to 45 years old	-0.0515	-0.0489	-0.0519	-0.0523	-0.0542
	(0.0496)	(0.0495)	(0.0495)	(0.0499)	(0.0499)
Age: 46 to 55 years old	0.0105	0.0147	0.0121	0.0095	0.0104
	(0.0783)	(0.0779)	(0.0781)	(0.0784)	(0.0784)
Married	0.0532**	0.0551**	0.0548**	0.0555**	0.0566**
	(0.0269)	(0.0267)	(0.0270)	(0.0270)	(0.0271)
Years of education	0.1017***	0.0996***	0.0991***	0.0961***	0.1015***
	(0.0319)	(0.0317)	(0.0318)	(0.0322)	(0.0320)
Vocational training	-0.0850*	-0.0891*	-0.0876*	-0.0832*	-0.0870*
	(0.0497)	(0.0496)	(0.0499)	(0.0499)	(0.0499)
University degree	-0.1965*	-0.1921*	-0.1905*	-0.1768	-0.1971*
	(0.1136)	(0.1124)	(0.1125)	(0.1145)	(0.1138)
Schooling: Basic schooling	0.2996**	0.3049**	0.3041**	0.2868**	0.3031**
	(0.1293)	(0.1290)	(0.1290)	(0.1297)	(0.1295)
Schooling: Intermediate schooling	0.2057*	0.2124*	0.2115*	0.2008*	0.2088*
	(0.1119)	(0.1115)	(0.1116)	(0.1121)	(0.1121)
Schooling: Secondary schooling	-0.0973	-0.0893	-0.0844	-0.0869	-0.0954
	(0.1305)	(0.1297)	(0.1301)	(0.1308)	(0.1310)
Blue-collar worker	-0.0758*	-0.0756*	-0.0760*	-0.0778*	-0.0756*
	(0.0448)	(0.0449)	(0.0448)	(0.0449)	(0.0449)
In public service	-0.0561	-0.0589	-0.0607	-0.0601	-0.0588
	(0.0411)	(0.0409)	(0.0411)	(0.0412)	(0.0412)

(Table A-3.11/12-II continued)					
Has part-time employment	-0.9250***	-0.9336***	-0.9574***	-0.9251***	-0.9284***
	(0.1879)	(0.1872)	(0.1889)	(0.1881)	(0.1881)
Potential work experience	0.0132	0.0130	0.0134	0.0133	0.0134
	(0.0104)	(0.0103)	(0.0103)	(0.0104)	(0.0104)
Potential work experience (squared)	-0.0004*	-0.0004*	-0.0004*	-0.0004*	-0.0004*
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Log of hours worked per week	0.0474	0.0457	0.0472	0.0423	0.0449
	(0.0552)	(0.0550)	(0.0551)	(0.0554)	(0.0553)
Working overtime	0.0508**	0.0515**	0.0522**	0.0503**	0.0491**
	(0.0232)	(0.0231)	(0.0231)	(0.0232)	(0.0233)
Firm size: < 20 employees	-0.3147***	-0.3090***	-0.3169***	-0.3139***	-0.3158***
	(0.0363)	(0.0361)	(0.0361)	(0.0364)	(0.0364)
Firm size: 20 to 199 employees	-0.1546***	-0.1520***	-0.1564***	-0.1558***	-0.1560***
	(0.0327)	(0.0325)	(0.0327)	(0.0328)	(0.0328)
Firm size: 200 to 1999 employees	-0.0285	-0.0226	-0.0286	-0.0263	-0.0281
	(0.0382)	(0.0382)	(0.0382)	(0.0383)	(0.0383)
Non-German origin	-0.6622**	-0.6667***	-0.6542**	-0.6587**	-0.6620**
	(0.2578)	(0.2568)	(0.2573)	(0.2580)	(0.2581)
Constant	6.6859***	6.7069***	6.7154***	6.7762***	6.7030***
	(0.4688)	(0.4683)	(0.4678)	(0.4740)	(0.4697)
12 Branch / 9 Occupational dummies	Yes	Yes	Yes	Yes	Yes
F-/Chi^2-value	11.84	11.79	11.69	11.08	11.07
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000
R^2	0.4869	0.4922	0.4901	0.4891	0.4887

Notes: Standard errors in parentheses; *N*= 567
Statistical significance levels: * significant at 10%; ** significant at 5%; *** significant at 1%

Source: GSOEP, 1997 and 1998. Own calculations.

Table A-3.13-I: Denominational affiliation and earnings; West German men

	PR	RE	FE	HT-IV
Denomination: Catholic	-0.0617***	-0.0531***	-0.0427	-0.0409
	(0.0173)	(0.0185)	(0.0340)	(0.0261)
Denomination: Protestant	-0.0701***	-0.0577***	-0.0191	-0.0194
	(0.0174)	(0.0189)	(0.0355)	(0.0273)
Denomination: Other Christian	-0.0379	-0.0304	-0.0078	-0.0019
	(0.0299)	(0.0319)	(0.0529)	(0.0409)
Denomination: Other religious affiliation	-0.0241	-0.0169	0.0153	0.0127
	(0.0285)	(0.0310)	(0.0570)	(0.0439)
Age: 36 to 45 years old	-0.0151	-0.0032	0.0018	-0.0011
	(0.0230)	(0.0182)	(0.0190)	(0.0148)
Age: 46 to 55 years old	0.0255	0.0201	0.0140	0.0108
	(0.0369)	(0.0290)	(0.0304)	(0.0237)
Married	0.0469***	0.0386***	0.0228	0.0224
	(0.0143)	(0.0142)	(0.0196)	(0.0151)
Vocational training	0.0485***	0.0594***	-0.1364	0.0271
	(0.0159)	(0.0193)	(0.1638)	(0.0611)
University degree	0.1801***	0.2176***	0.1550	0.1849***
	(0.0267)	(0.0305)	(0.1502)	(0.0591)
Schooling: Intermediate schooling	0.0489***	0.0712***	—	0.1365***
	(0.0171)	(0.0209)		(0.0475)
Schooling: Secondary schooling	0.1464***	0.1713***	—	0.4576***
	(0.0255)	(0.0307)		(0.1432)
Blue-collar worker	-0.1319***	-0.0975***	0.0368	0.0251
	(0.0208)	(0.0202)	(0.0300)	(0.0227)
In public service	-0.0436**	-0.0542**	-0.0820**	-0.0754***
	(0.0217)	(0.0219)	(0.0318)	(0.0226)
Has part-time employment	-0.3322***	-0.2988***	-0.2597***	-0.2866***
	(0.0564)	(0.0498)	(0.0576)	(0.0435)
Potential work experience	0.0374***	0.0362***	-0.0202	0.0396***
	(0.0048)	(0.0041)	(0.0352)	(0.0041)
Potential work experience (squared)	-0.0007***	-0.0007***	-0.0007***	-0.0007***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Log of hours worked per week	0.4109***	0.3691***	0.2789***	0.3130***
	(0.0370)	(0.0348)	(0.0437)	(0.0323)
Working overtime	0.0572***	0.0476***	0.0393***	0.0374***
	(0.0123)	(0.0110)	(0.0130)	(0.0098)
Firm size: < 20 employees	-0.1827***	-0.1745***	-0.1412***	-0.1513***
	(0.0191)	(0.0194)	(0.0284)	(0.0202)
Firm size: 20 to 199 employees	-0.0963***	-0.0900***	-0.0707***	-0.0753***
	(0.0152)	(0.0154)	(0.0223)	(0.0160)
Firm size: 200 to 1999 employees	-0.0713***	-0.0494***	-0.0127	-0.0179
	(0.0144)	(0.0142)	(0.0192)	(0.0140)
West German region: North	-0.0296*	-0.0308	-0.1512*	-0.0674*
	(0.0166)	(0.0201)	(0.0839)	(0.0359)
West German region: Mid-West	0.0008	-0.0078	-0.2276***	-0.0630**
	(0.0124)	(0.0152)	(0.0718)	(0.0276)
Non-German origin	-0.0431**	-0.0527**	—	-0.2760**
	(0.0184)	(0.0223)		(0.1207)
Year of observation: 1997	0.2426***	0.2430***	0.6548***	0.2371***
	(0.0124)	(0.0106)	(0.2440)	(0.0157)
Constant	6.3452***	6.4615***	8.0673***	6.6143***
	(0.1496)	(0.1405)	(0.7548)	(0.1647)
12 Branch / 9 Occupational dummies	Yes	Yes	Yes	Yes
F-/Chi2-value	65.12	3,228.30	50.12	3,784.36
Prob > F	0.0000	0.0000	0.0000	0.0000

Notes: Standard errors in parentheses; Number of observations/individuals: 1,642/821
Statistical significance levels: * significant at 10%; ** significant at 5%; *** significant at 1%

Source: GSOEP, 1990 and 1997. Own calculations.

Table A-3.13-II: Denominational affiliation and earnings; East German men

	PR	RE	FE	HT-IV
Denomination: Catholic	-0.0217	-0.0199	0.0292	0.0093
	(0.0422)	(0.0456)	(0.1206)	(0.0894)
Denomination: Protestant	-0.0031	-0.0043	0.0010	-0.0096
	(0.0222)	(0.0235)	(0.0483)	(0.0363)
Age: 36 to 45 years old	-0.0182	-0.0308	-0.0649*	-0.0687**
	(0.0356)	(0.0332)	(0.0384)	(0.0296)
Age: 46 to 55 years old	-0.0084	-0.0311	-0.0957	-0.0908*
	(0.0575)	(0.0536)	(0.0617)	(0.0479)
Married	0.0563**	0.0542**	0.0612	0.0390
	(0.0230)	(0.0246)	(0.0535)	(0.0410)
Vocational training	-0.0514	-0.0498	0.0332	-0.0309
	(0.0412)	(0.0452)	(0.1858)	(0.0731)
University degree	0.1010**	0.1221**	0.0675	0.1150
	(0.0456)	(0.0489)	(0.2238)	(0.0805)
Schooling: Intermediate schooling	0.0898***	0.0927***	—	0.1603***
	(0.0260)	(0.0287)		(0.0576)
Schooling: Secondary schooling	0.1555***	0.1660***	—	0.3658***
	(0.0448)	(0.0487)		(0.1304)
Blue-collar worker	-0.0799***	-0.0770***	-0.0450	-0.0561**
	(0.0271)	(0.0265)	(0.0355)	(0.0273)
In public service	0.0367	0.0315	-0.0011	0.0156
	(0.0288)	(0.0282)	(0.0374)	(0.0269)
Has part-time employment	-0.3138*	-0.2959*	-0.2106	-0.2566
	(0.1780)	(0.1716)	(0.2135)	(0.1580)
Potential work experience	0.0168**	0.0226***	-0.0052	0.0404***
	(0.0076)	(0.0073)	(0.0780)	(0.0074)
Potential work experience (squared)	-0.0003**	-0.0004***	-0.0007***	-0.0007***
	(0.0002)	(0.0002)	(0.0002)	(0.0001)
Log of hours worked per week	0.1681***	0.1543***	0.1041	0.1190**
	(0.0511)	(0.0505)	(0.0686)	(0.0493)
Working overtime	0.0632***	0.0583***	0.0299	0.0429**
	(0.0180)	(0.0177)	(0.0238)	(0.0170)
Firm size: < 20 employees	-0.2087***	-0.1809***	-0.0583	-0.1049***
	(0.0306)	(0.0302)	(0.0419)	(0.0297)
Firm size: 20 to 199 employees	-0.0987***	-0.0839***	-0.0085	-0.0394
	(0.0258)	(0.0256)	(0.0356)	(0.0254)
Firm size: 200 to 1999 employees	-0.0594**	-0.0486*	0.0054	-0.0185
	(0.0252)	(0.0248)	(0.0339)	(0.0242)
Non-German origin	-0.2900	-0.2933	—	-0.0945
	(0.1790)	(0.2000)		(1.5904)
Year of observation: 1997	0.9911***	0.9854***	1.2710**	0.9558***
	(0.0226)	(0.0215)	(0.5371)	(0.0255)
Constant	6.4422***	6.4378***	7.3274***	6.3470***
	(0.2507)	(0.2462)	(1.4742)	(0.2528)
12 Branch / 9 Occupational dummies	Yes	Yes	Yes	Yes
F-/Chi2-value	96.03	5,093.96	126.05	7,966.52
Prob > F	0.0000	0.0000	0.0000	0.0000

Notes: Standard errors in parentheses; Number of observations/individuals: 882/441
Statistical significance levels: * significant at 10%; ** significant at 5%; *** significant at 1%

Source: GSOEP, 1990 and 1997. Own calculations.

Table A-3.14-I: Religious belief and earnings; West German men

	PR	RE	FE	HT-IV
Religious belief is very important	-0.0469***	-0.0282	-0.0106	-0.0089
	(0.0182)	(0.0177)	(0.0205)	(0.0169)
Religious belief is important	0.0023	-0.0089	-0.0108	-0.0109
	(0.0129)	(0.0122)	(0.0139)	(0.0115)
Religious belief is less important	-0.0048	-0.0068	-0.0064	-0.0066
	(0.0118)	(0.0104)	(0.0112)	(0.0093)
Age: 36 to 45 years old	-0.0144	-0.0158	-0.0173	-0.0177*
	(0.0170)	(0.0121)	(0.0121)	(0.0100)
Age: 46 to 55 years old	0.0085	-0.0029	-0.0137	-0.0131
	(0.0288)	(0.0202)	(0.0202)	(0.0167)
Married	0.0681***	0.0618***	0.0507***	0.0520***
	(0.0108)	(0.0120)	(0.0155)	(0.0128)
Vocational training	0.0449***	0.0640***	0.2783**	0.0544
	(0.0119)	(0.0174)	(0.1170)	(0.0507)
University degree	0.2101***	0.2858***	0.9448***	0.4469***
	(0.0194)	(0.0257)	(0.2029)	(0.0530)
Schooling: Intermediate schooling	0.0875***	0.0981***	0.0000	0.1049
	(0.0124)	(0.0188)	(0.0000)	(0.0787)
Schooling: Secondary schooling	0.1533***	0.1715***	0.0000	0.1155
	(0.0181)	(0.0262)	(0.0000)	(0.1645)
Blue-collar worker	-0.1656***	-0.1163***	-0.0537***	-0.0554***
	(0.0146)	(0.0138)	(0.0168)	(0.0138)
In public service	-0.0028	-0.0310*	-0.0311	-0.0312*
	(0.0171)	(0.0177)	(0.0227)	(0.0185)
Has part-time employment	-0.1532***	-0.0953***	-0.0748**	-0.0747***
	(0.0393)	(0.0296)	(0.0301)	(0.0249)
Potential work experience	0.0328***	0.0319***	0.1565***	0.0356***
	(0.0040)	(0.0036)	(0.0512)	(0.0048)
Potential work experience (squared)	-0.0006***	-0.0006***	-0.0006***	-0.0006***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Log of hours worked per week	0.3595***	0.2344***	0.1799***	0.1859***
	(0.0266)	(0.0219)	(0.0232)	(0.0191)
Working overtime	0.0520***	0.0381***	0.0278***	0.0284***
	(0.0094)	(0.0075)	(0.0078)	(0.0064)
Firm size: < 20 employees	-0.2027***	-0.1056***	0.0088	-0.0013
	(0.0150)	(0.0159)	(0.0201)	(0.0164)
Firm size: 20 to 199 employees	-0.1169***	-0.0593***	0.0009	-0.0031
	(0.0118)	(0.0125)	(0.0155)	(0.0127)
Firm size: 200 to 1999 employees	-0.0606***	-0.0144	0.0208	0.0177
	(0.0113)	(0.0113)	(0.0133)	(0.0109)
Non-German origin	-0.0078	-0.0244	0.0000	-0.1597
	(0.0128)	(0.0188)	(0.0000)	(0.1545)
West German region: North	-0.0271**	-0.0524***	-0.1222**	-0.1168***
	(0.0127)	(0.0185)	(0.0513)	(0.0371)
West German region: Mid-West	-0.0158*	-0.0260*	0.0013	-0.0220
	(0.0096)	(0.0142)	(0.0493)	(0.0327)
Year of observation: 1998	0.0985***	0.0988***	-0.3864*	0.0935***
	(0.0109)	(0.0075)	(0.2035)	(0.0151)
Year of observation: 1999	0.1107***	0.1107***	-0.4949*	0.1050***
	(0.0109)	(0.0079)	(0.2543)	(0.0184)
Constant	6.7256***	7.1301***	4.7658***	7.2382***
	(0.1113)	(0.0956)	(1.0517)	(0.1479)
12 Branch / 9 Occupational dummies	Yes	Yes	Yes	Yes
F-/Chi2-value	24.24	844.77	13.98	838.28
Prob > F	0.0000	0.0000	0.0000	0.0000

Notes: Standard errors in parentheses; Number of observations/individuals: 2,913/971
Statistical significance levels: * significant at 10%; ** significant at 5%; *** significant at 1%

Source: GSOEP, 1994, 1998 and 1999. Own calculations.

Table A-3.14-II: Religious belief and earnings; East German men

	PR	RE	FE	HT-IV
Religious belief is very important	-0.1010**	-0.0786*	-0.0656	-0.0682
	(0.0437)	(0.0471)	(0.0617)	(0.0502)
Religious belief is important	-0.0340	-0.0451*	-0.0495	-0.0522*
	(0.0277)	(0.0270)	(0.0329)	(0.0267)
Religious belief is less important	-0.0022	0.0094	0.0134	0.0152
	(0.0166)	(0.0144)	(0.0162)	(0.0131)
Age: 36 to 45 years old	-0.0014	-0.0121	-0.0026	-0.0063
	(0.0323)	(0.0222)	(0.0229)	(0.0186)
Age: 46 to 55 years old	0.0492	-0.0010	-0.0044	-0.0089
	(0.0521)	(0.0347)	(0.0353)	(0.0287)
Married	0.0830***	0.0570**	0.0344	0.0331
	(0.0213)	(0.0223)	(0.0280)	(0.0228)
Vocational training	-0.0375	-0.0731	0.0000	-0.0021
	(0.0367)	(0.0555)	(0.0000)	(0.8503)
University degree	0.1580***	0.1253**	-0.5027*	-0.0253
	(0.0418)	(0.0540)	(0.2609)	(0.0945)
Schooling: Intermediate schooling	0.0457*	0.0496	—	0.0500
	(0.0241)	(0.0364)		(0.6481)
Schooling: Secondary schooling	0.0217	0.1067*	—	0.3450
	(0.0416)	(0.0583)		(0.9319)
Blue-collar worker	-0.1285***	-0.1346***	-0.0959***	-0.1001***
	(0.0282)	(0.0271)	(0.0349)	(0.0283)
In public service	-0.0051	0.0062	0.0245	0.0255
	(0.0255)	(0.0244)	(0.0308)	(0.0250)
Has part-time employment	-0.2520***	-0.2008***	-0.1896***	-0.1910***
	(0.0818)	(0.0606)	(0.0631)	(0.0513)
Potential work experience	0.0057	0.0201***	-0.3034*	0.0168
	(0.0077)	(0.0066)	(0.1606)	(0.0292)
Potential work experience (squared)	-0.0002	-0.0005***	-0.0007***	-0.0007***
	(0.0002)	(0.0001)	(0.0002)	(0.0001)
Log of hours worked per week	0.0308	0.0414	0.0355	0.0386
	(0.0364)	(0.0279)	(0.0296)	(0.0241)
Working overtime	0.0524***	0.0237*	0.0142	0.0130
	(0.0160)	(0.0125)	(0.0132)	(0.0108)
Firm size: < 20 employees	-0.2837***	-0.1821***	-0.1108***	-0.1125***
	(0.0253)	(0.0247)	(0.0298)	(0.0242)
Firm size: 20 to 199 employees	-0.1445***	-0.0847***	-0.0469*	-0.0483**
	(0.0225)	(0.0212)	(0.0251)	(0.0204)
Firm size: 200 to 1999 employees	-0.0151	0.0176	0.0271	0.0273
	(0.0249)	(0.0232)	(0.0269)	(0.0219)
Non-German origin	-0.1398	-0.1011	—	-2.7965
	(0.1492)	(0.2305)	(0.0000)	(14.9630)
Year of observation: 1998	0.1637***	0.1583***	1.4870**	0.2135*
	(0.0190)	(0.0132)	(0.6381)	(0.1142)
Year of observation: 1999	0.1829***	0.1786***	1.8398**	0.2482*
	(0.0193)	(0.0142)	(0.7975)	(0.1426)
Constant	7.9366***	7.7475***	13.8544***	7.8046***
	(0.1679)	(0.1455)	(2.9858)	(1.2840)
12 Branch / 9 Occupational dummies	Yes	Yes	Yes	Yes
F-/Chi^2-value	24.24	844.77	13.98	838.28
Prob > F	0.0000	0.0000	0.0000	0.0000

Notes: Standard errors in parentheses; Number of observations/individuals: 1,164/388
Statistical significance levels: * significant at 10%; ** significant at 5%; *** significant at 1%

Source: GSOEP, 1994, 1998 and 1999. Own calculations.

Table A-3.15-I: Religious participation and earnings; West German men

	PR	RE	FE	HT-IV
Religious participation: once a week	-0.0162**	-0.0016	-0.0032	-0.0012
	(0.0072)	(0.0076)	(0.0085)	(0.0077)
Religious participation: once a month	0.0044	0.0124**	0.0070	0.0091
	(0.0071)	(0.0062)	(0.0066)	(0.0060)
Religious participation: less regular	0.0193***	0.0119***	0.0032	0.0050
	(0.0046)	(0.0040)	(0.0043)	(0.0039)
Age: 36 to 45 years old	-0.0247***	-0.0109*	-0.0105*	-0.0104*
	(0.0083)	(0.0060)	(0.0061)	(0.0055)
Age: 46 to 55 years old	0.0068	0.0012	-0.0078	-0.0039
	(0.0139)	(0.0099)	(0.0100)	(0.0091)
Married	0.0672***	0.0559***	0.0396***	0.0453***
	(0.0049)	(0.0056)	(0.0066)	(0.0060)
Vocational training	0.0493***	0.0507***	-0.0012	0.0376***
	(0.0054)	(0.0073)	(0.0111)	(0.0088)
University degree	0.2066***	0.2590***	0.1374***	0.2065***
	(0.0087)	(0.0115)	(0.0222)	(0.0153)
Schooling: Intermediate schooling	0.0322***	0.0185*	—	0.0614***
	(0.0057)	(0.0101)		(0.0205)
Schooling: Secondary schooling	0.1068***	0.1229***	—	0.3648***
	(0.0083)	(0.0138)		(0.0443)
Schooling: No completed schooling	-0.0005	-0.0350**	—	0.0273
	(0.0095)	(0.0178)		(0.0341)
Blue-collar worker	-0.1662***	-0.0964***	-0.0211***	-0.0353***
	(0.0068)	(0.0064)	(0.0074)	(0.0067)
In public service	-0.0150*	-0.0341***	-0.0385***	-0.0386***
	(0.0079)	(0.0079)	(0.0091)	(0.0079)
Has part-time employment	-0.4754***	-0.3302***	-0.2063***	-0.2598***
	(0.0167)	(0.0138)	(0.0151)	(0.0133)
Potential work experience	0.0355***	0.0368***	0.0201***	0.0403***
	(0.0016)	(0.0015)	(0.0040)	(0.0017)
Potential work experience (squared)	-0.0007***	-0.0006***	-0.0007***	-0.0007***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Log of hours worked per week	0.4522***	0.3269***	0.2577***	0.2768***
	(0.0115)	(0.0096)	(0.0102)	(0.0092)
Working overtime	0.0502***	0.0286***	0.0237***	0.0248***
	(0.0043)	(0.0034)	(0.0035)	(0.0031)
Firm size: < 20 employees	-0.1765***	-0.0858***	-0.0339***	-0.0548***
	(0.0064)	(0.0065)	(0.0074)	(0.0064)
Firm size: 20 to 199 employees	-0.0992***	-0.0364***	-0.0118**	-0.0215***
	(0.0059)	(0.0055)	(0.0059)	(0.0052)
Firm size: 200 to 1999 employees	-0.0466***	-0.0074	0.0015	-0.0026
	(0.0053)	(0.0049)	(0.0053)	(0.0047)
Non-German origin	-0.0160***	-0.0268***	—	-0.1399***
	(0.0056)	(0.0102)		(0.0421)
West German region: North	-0.0096*	-0.0070	-0.0788***	-0.0434***
	(0.0058)	(0.0099)	(0.0251)	(0.0145)
West German region: Mid-West	0.0084*	0.0255***	-0.0482**	-0.0067
	(0.0044)	(0.0078)	(0.0207)	(0.0114)
Constant	6.1030***	6.4303***	7.0440***	6.5519***
	(0.0474)	(0.0408)	(0.0748)	(0.0460)
12 Branch / 9 Occupational dummies	Yes	Yes	Yes	Yes
8 Year of observation dummies	Yes	Yes	Yes	Yes
F-/Chi^2-value	390.08	12,087.86	147.72	10,296.33
Prob > F	0.0000	0.0000	0.0000	0.0000

Notes: Standard errors in parentheses; Number of observations/individuals: 17,386/5,283
Statistical significance levels: * significant at 10%; ** significant at 5%; *** significant at 1%

Source: GSOEP. Own calculations.

Table A-3.15-II: Religious participation and earnings; East German men

	PR	RE	FE	HT-IV
Religious participation: once a week	-0.0409**	-0.0242	0.0329	0.0338
	(0.0187)	(0.0259)	(0.0390)	(0.0345)
Religious participation: once a month	-0.0247	-0.0132	0.0126	0.0142
	(0.0199)	(0.0205)	(0.0250)	(0.0221)
Religious participation: less regular	0.0158*	0.0112	0.0156	0.0164*
	(0.0089)	(0.0094)	(0.0111)	(0.0098)
Age: 36 to 45 years old	-0.0271*	-0.0195*	-0.0210*	-0.0209**
	(0.0140)	(0.0108)	(0.0111)	(0.0098)
Age: 46 to 55 years old	-0.0102	-0.0128	-0.0151	-0.0137
	(0.0230)	(0.0170)	(0.0173)	(0.0153)
Married	0.0419***	0.0292***	0.0170	0.0185
	(0.0082)	(0.0101)	(0.0136)	(0.0119)
Vocational training	0.0097	0.0418***	0.0477**	0.0625***
	(0.0135)	(0.0160)	(0.0238)	(0.0184)
University degree	0.1584***	0.1778***	0.0983***	0.1255***
	(0.0160)	(0.0194)	(0.0339)	(0.0234)
Schooling: Intermediate schooling	0.0563***	0.0883***	—	0.1563***
	(0.0094)	(0.0150)		(0.0522)
Schooling: Secondary schooling	0.0828***	0.1729***	—	0.4259***
	(0.0159)	(0.0232)		(0.0815)
Schooling: No completed schooling	-0.2140***	-0.2479***	—	-0.1741
	(0.0568)	(0.0819)		(0.2562)
Blue-collar worker	-0.1033***	-0.0650***	-0.0318***	-0.0333***
	(0.0107)	(0.0099)	(0.0112)	(0.0099)
In public service	0.0026	-0.0048	-0.0080	-0.0078
	(0.0110)	(0.0104)	(0.0116)	(0.0102)
Has part-time employment	-0.3186***	-0.2308***	-0.1777***	-0.1828***
	(0.0291)	(0.0232)	(0.0243)	(0.0214)
Potential work experience	0.0140***	0.0217***	0.0127	0.0294***
	(0.0027)	(0.0025)	(0.0110)	(0.0031)
Potential work experience (squared)	-0.0003***	-0.0004***	-0.0006***	-0.0006***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Log of hours worked per week	0.1803***	0.1195***	0.0919***	0.0944***
	(0.0170)	(0.0141)	(0.0148)	(0.0131)
Working overtime	0.0608***	0.0424***	0.0313***	0.0322***
	(0.0068)	(0.0056)	(0.0059)	(0.0052)
Firm size: < 20 employees	-0.2279***	-0.1291***	-0.0882***	-0.0922***
	(0.0105)	(0.0100)	(0.0110)	(0.0096)
Firm size: 20 to 199 employees	-0.1110***	-0.0565***	-0.0330***	-0.0352***
	(0.0097)	(0.0088)	(0.0095)	(0.0083)
Firm size: 200 to 1999 employees	-0.0393***	-0.0145*	-0.0016	-0.0025
	(0.0099)	(0.0088)	(0.0094)	(0.0083)
Non-German origin	-0.0820*	-0.0350	—	-0.0979
	(0.0434)	(0.0698)		(1.3690)
Constant	6.2163***	6.3030***	6.6923***	6.2241***
	(0.0739)	(0.0643)	(0.1962)	(0.0886)
12 Branch / 9 Occupational dummies	Yes	Yes	Yes	Yes
8 Year of observation dummies	Yes	Yes	Yes	Yes
F-/Chi^2-value	338.76	22,324.30	384.11	24,095.56
Prob > F	0.0000	0.0000	0.0000	0.0000

Notes: Standard errors in parentheses; Number of observations/individuals: 7,136/1,746
Statistical significance levels: * significant at 10%; ** significant at 5%; *** significant at 1%

Source: GSOEP. Own calculations.

Table D-4.1: Smoking and absenteeism, descriptive statistics

Variable	Mean	Std. Dev.
Number of absent days	5.9402	(9.3310)
Smoker	0.3894	(0.4876)
Smoker (age 25 to 35)	0.1569	(0.3637)
Smoker (age 36 to 45)	0.1490	(0.3561)
Smoker (age 46 to 55)	0.0834	(0.2765)
Non-smoker (age 25 to 35)	0.2186	(0.4133)
Non-smoker (age 36 to 45)	0.2179	(0.4128)
Non-smoker (age 46 to 55)	0.1739	(0.3790)
Ex-smoker (age 25 to 35)*	0.0510	(0.2200)
Ex-smoker (age 36 to 45)*	0.0783	(0.2687)
Ex-smoker (age 46 to 55)*	0.0630	(0.2431)
No. of cigarettes smoked daily: up to 10**	0.0619	(0.2411)
No. of cigarettes smoked daily: 10 to 20**	0.1260	(0.3319)
No. of cigarettes smoked daily: 20 to 30**	0.1444	(0.3515)
No. of cigarettes smoked daily: more than 30**	0.0471	(0.2119)
Aged 25 to 35 years	0.3756	(0.4843)
Aged 36 to 45 years	0.3670	(0.4820)
Aged 46 to 55 years	0.2573	(0.4372)
Male	0.5829	(0.4931)
Married	0.7008	(0.4578)
Non-German origin	0.1128	(0.3164)
East German citizen	0.2754	(0.4467)
Children up to age 16 in household	0.4841	(0.4997)
Self-rated health is very good	0.1010	(0.3013)
Self-rated health is good or fair	0.8222	(0.3823)
Self-rated health is worse than fair	0.0755	(0.2642)
No. of visits to a physician	1.7737	(2.8209)
Registered disabled	0.0443	(0.2058)
Level of disability	1.9397	(10.0280)
Blue-collar worker	0.4029	(0.4905)
White-collar worker	0.5258	(0.4993)
Public servant	0.0687	(0.2530)
Is satisfied with job	0.4723	(0.4992)
Undergoes vocational training	0.0356	(0.1853)
Log of monthly gross earnings	8.2217	(0.5227)
Log of hours worked per week	3.6455	(0.3339)
Works overtime	0.5463	(0.4978)
Temporary job	0.0693	(0.2540)
Full-time job	0.8433	(0.3634)
Part-time job	0.1566	(0.3634)
Period of employment	9.2444	(8.4106)
Years of education	12.1019	(2.5801)
Potential work experience	21.1663	(8.5234)
Potential work experience (squared)	520.6541	(383.7575)
Occupation: Management	0.0430	(0.2029)
Occupation: Professional	0.1408	(0.3478)
Occupation: Technician	0.2212	(0.4151)
Occupation: Clerk	0.1231	(0.3286)
Occupation: Service	0.0933	(0.2909)
Occupation: Agriculture	0.0068	(0.0822)
Occupation: Craft	0.1974	(0.3981)
Occupation: Plant operator	0.0985	(0.2980)
Occupation: Elementary	0.0705	(0.2560)

(Table D-4.1 continued)		
Branch: Agriculture	0.0133	(0.1149)
Branch: Mining/Oil/Gas	0.0259	(0.1589)
Branch: Textiles	0.0117	(0.1076)
Branch: Wood/Paper	0.0234	(0.1512)
Branch: Chemicals/Plastics/Glas	0.0563	(0.2305)
Branch: Metal	0.1661	(0.3722)
Branch:Water/Energy	0.0133	(0.1149)
Branch: Construction	0.0661	(0.2484)
Branch: Trade/Retail	0.1213	(0.3265)
Branch: Transport	0.0524	(0.2230)
Branch: Banking/Insurance	0.0398	(0.1955)
Branch: Other Services	0.2974	(0.4571)
Firm size: < 20 employees	0.2243	(0.4172)
Firm size: 20 to 199 employees	0.2967	(0.4568)
Firm size: 200 to 1999 employees	0.2429	(0.4288)
Firm size: >= 2000 employees	0.2307	(0.4213)
Year of observation: 1998	0.5148	(0.4998)
Year of observation: 1999	0.4851	(0.4998)
Notes: *N*=8,365; * *N*=4,058; ** *N*=4,307		
Source: GSOEP, 1998 and 1999.		

Table A-4.3: Amount of cigarette consumption and absence from work

	M1		M2	
	Women	Men	Women	Men
Smoker	0.1478	0.1536*	—	—
	(0.0967)	(0.0862)		
No. of cig. daily: up to 10	—	—	0.1581	0.0144
			(0.1765)	(0.1827)
No. of cig. daily: 10 to 20	—	—	0.1355	0.2397*
			(0.1409)	(0.1283)
No. of cig. daily: 20 to 30	—	—	0.1781	0.1603
			(0.1472)	(0.1157)
No. of cig. daily: more than 30	—	—	0.0634	0.0877
			(0.3086)	(0.1717)
Aged 36 to 45 years	0.1925	0.0447	0.1964	0.0507
	(0.1966)	(0.1706)	(0.1977)	(0.1705)
Aged 46 to 55 years	0.3620	-0.2984	0.3621	-0.3034
	(0.3329)	(0.3044)	(0.3332)	(0.3048)
Married	-0.0511	0.0323	-0.0543	0.0292
	(0.1034)	(0.1117)	(0.1040)	(0.1119)
Children up to the age of 16	0.0736	-0.0229	0.0722	-0.0247
	(0.1114)	(0.1006)	(0.1117)	(0.1007)
East-German citizen	0.1033	0.1171	0.1026	0.1113
	(0.1154)	(0.1157)	(0.1166)	(0.1162)
Non-German origin	0.3439**	0.2683*	0.3526**	0.2752**
	(0.1676)	(0.1397)	(0.1691)	(0.1402)
Registered disabled	0.3782	0.7064	0.3785	0.7186
	(0.5746)	(0.5114)	(0.5770)	(0.5125)
Level of disability	-0.0005	-0.0046	-0.0005	-0.0048
	(0.0113)	(0.0111)	(0.0114)	(0.0111)
Self-rated health is very good	-0.6939***	-0.9444***	-0.6987***	-0.9622***
	(0.2141)	(0.2003)	(0.2149)	(0.2012)
Self-rated health is good or fair	-0.3625**	-0.6214***	-0.3660**	-0.6312***
	(0.1613)	(0.1589)	(0.1620)	(0.1593)
Years of education	-0.0531*	-0.0582**	-0.0528*	-0.0585**
	(0.0290)	(0.0270)	(0.0290)	(0.0270)
Experience	-0.0419	-0.0149	-0.0418	-0.0172
	(0.0370)	(0.0356)	(0.0373)	(0.0356)
Experience (squared)	0.0004	0.0004	0.0004	0.0005
	(0.0008)	(0.0007)	(0.0008)	(0.0007)
Period of employment	-0.0049	-0.0062	-0.0049	-0.0061
	(0.0068)	(0.0065)	(0.0069)	(0.0065)
Temporary job	-0.1062	0.0326	-0.1069	0.0266
	(0.1815)	(0.1897)	(0.1817)	(0.1897)
Part-time job	0.1563	-0.7322**	0.1576	-0.7248**
	(0.1389)	(0.3588)	(0.1395)	(0.3605)
Satisfied with job	-0.1928**	-0.0717	-0.1934**	-0.0708
	(0.0923)	(0.0837)	(0.0923)	(0.0837)
Log of monthly gross earnings	0.5333***	0.1582	0.5337***	0.1655
	(0.1561)	(0.1715)	(0.1562)	(0.1712)
Log of hours worked per week	0.1234	-0.0301	0.1250	-0.0055
	(0.1901)	(0.2505)	(0.1909)	(0.2517)
Works overtime	-0.1253	0.0576	-0.1236	0.0614
	(0.0945)	(0.0892)	(0.0948)	(0.0892)
Blue-collar worker	-0.0629	0.5564***	-0.0596	0.5591***
	(0.1641)	(0.1474)	(0.1648)	(0.1473)
Public servant	-0.1300	0.3470*	-0.1290	0.3401*
	(0.2146)	(0.1896)	(0.2146)	(0.1895)
Undergoes vocational training	-0.0909	-0.2218	-0.0936	-0.2257
	(0.2418)	(0.2219)	(0.2423)	(0.2219)
Firm size: 20 to 200	0.1518	0.2345*	0.1521	0.2251*
	(0.1245)	(0.1209)	(0.1246)	(0.1218)

(Table A-4.3 continued)				
Firm size: 200 to 2000	0.2319*	0.3160**	0.2311*	0.3106**
	(0.1358)	(0.1357)	(0.1359)	(0.1358)
Firm size: more than 2000	0.3641**	0.4251***	0.3658**	0.4200***
	(0.1461)	(0.1393)	(0.1464)	(0.1397)
Constant	-1.2385	1.4249	-1.2438	1.3093
	(1.1321)	(1.5428)	(1.1332)	(1.5444)
Observations	1,802	2,505	1,802	2,505
Log likelihood	-4,755.72	-6,064.	-4,755.61	-6,063.35
Chi^2 (degree of freedom)	84.24 (47)	144.38 (47)	84.47 (50)	145.82 (50)
Prob > Chi^2	0.0007	0.0000	0.0017	0.0000
Notes: Standard errors in parentheses				
* significant at 10%; ** significant at 5%; *** significant at 1%				
Source: GSOEP, 1998.				

Table A-4.4: Smoking, ex-smoking and absence from work

	M1		M2	
	Women	Men	Women	Men
Smoker	0.0689	0.0562	—	—
	(0.1044)	(0.0953)		
Ex-smoker	-0.0424	0.0276	—	—
	(0.1312)	(0.1115)		
Smoker (age 25 to 35)	—	—	0.0812	0.1814
			(0.1738)	(0.1430)
Smoker (age 36 to 45)	—	—	0.1046	-0.2105
			(0.2462)	(0.2061)
Smoker (age 46 to 55)	—	—	-0.0187	-0.6093*
			(0.3827)	(0.3147)
Non-smoker (age 36 to 45)	—	—	0.0346	-0.2570
			(0.2444)	(0.2086)
Non-smoker (age 46 to 55)	—	—	-0.0188	-0.4664
			(0.3692)	(0.3275)
Ex-smoker (age 25 to 35)	—	—	-0.1740	0.2402
			(0.2417)	(0.1973)
Ex-smoker (age 36 to 45)	—	—	-0.2565	0.0463
			(0.2082)	(0.1816)
Ex-smoker (age 46 to 55)	—	—	0.2965	-0.2588
			(0.2359)	(0.2072)
Aged 36 to 45 years	0.0255	-0.3642**	—	—
	(0.2100)	(0.1644)		
Aged 46 to 55 years	0.0846	-0.7195**	—	—
	(0.3446)	(0.2902)		
Married	-0.0154	-0.0879	-0.0154	-0.0762
	(0.1052)	(0.1101)	(0.1064)	(0.1107)
Children up to age 16 in household	0.0189	0.0576	0.0108	0.0418
	(0.1156)	(0.0986)	(0.1154)	(0.0991)
East-German citizen	-0.1087	-0.0286	-0.1008	-0.0315
	(0.1109)	(0.1180)	(0.1111)	(0.1180)
Non-German origin	0.1490	0.1032	0.1508	0.0864
	(0.1693)	(0.1314)	(0.1693)	(0.1317)
Registered disabled	0.2771	0.1857	0.2981	0.2184
	(0.5478)	(0.4358)	(0.5482)	(0.4400)
Level of disability	0.0020	0.0087	0.0014	0.0080
	(0.0114)	(0.0091)	(0.0114)	(0.0092)
Self-rated health is very good	-0.8135***	-0.7726***	-0.8147***	-0.7501***
	(0.2244)	(0.2103)	(0.2239)	(0.2108)
Self-rated health is good or fair	-0.3310**	-0.5213***	-0.3341**	-0.5045***
	(0.1590)	(0.1627)	(0.1589)	(0.1629)
Years of education	-0.0629**	-0.0304	-0.0662**	-0.0332
	(0.0289)	(0.0259)	(0.0289)	(0.0259)
Experience	0.0073	0.0308	0.0069	0.0253
	(0.0366)	(0.0343)	(0.0369)	(0.0346)
Experience (squared)	-0.0005	-0.0001	-0.0004	-0.0000
	(0.0007)	(0.0007)	(0.0007)	(0.0007)
Period of employment	0.0034	-0.0017	0.0035	-0.0017
	(0.0068)	(0.0063)	(0.0068)	(0.0064)
Temporary job	-0.2614	-0.1662	-0.2715	-0.1744
	(0.1691)	(0.1726)	(0.1693)	(0.1726)
Part-time job	0.0333	-0.3704	0.0303	-0.3499
	(0.1426)	(0.3769)	(0.1432)	(0.3774)
Satisfied with job	-0.1195	-0.1766**	-0.1175	-0.1723**
	(0.0917)	(0.0829)	(0.0914)	(0.0828)
Log of monthly gross earnings	0.0754	-0.1585	0.0709	-0.1447
	(0.1552)	(0.1692)	(0.1557)	(0.1691)
Log of hours worked per week	0.2999	0.0086	0.3079	0.0130
	(0.1890)	(0.2540)	(0.1881)	(0.2534)

(Table A-4.4 continued)				
Works overtime	0.1286	-0.1372	0.1380	-0.1457*
	(0.0965)	(0.0868)	(0.0964)	(0.0869)
Blue collar worker	0.1395	0.1098	0.1425	0.1166
	(0.1566)	(0.1453)	(0.1566)	(0.1453)
Public servant	-0.1313	0.0241	-0.1224	0.0347
	(0.2192)	(0.1986)	(0.2187)	(0.1990)
Undergoes vocational training	-0.0865	-0.0643	-0.1185	-0.0583
	(0.2461)	(0.2386)	(0.2467)	(0.2393)
Firm size: 20 to 200	0.2141*	0.1762	0.2049	0.1760
	(0.1272)	(0.1205)	(0.1275)	(0.1206)
Firm size: 200 to 2000	0.4838***	0.3400**	0.4535***	0.3364**
	(0.1354)	(0.1373)	(0.1363)	(0.1375)
Firm size: more than 2000	0.5205***	0.3377**	0.4877***	0.3301**
	(0.1518)	(0.1404)	(0.1523)	(0.1409)
Constant	1.0030	3.7148**	1.0548	3.5562**
	(1.2728)	(1.5252)	(1.2792)	(1.5302)
8 Occupational / 12 Branch dummies	Yes	Yes	Yes	Yes
Observations	1,687	2,371	1,687	2,371
Log likelihood	-4,430.46	-6,019.66	-4,428.30	-6,017.89
Chi^2 (degree of freedom)	84.12 (48)	110.74 (48)	88.43 (52)	114.27 (52)
Prob > Chi^2	0.0010	0.0000	0.0012	0.0000

Notes: Standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Source: GSOEP, 1999.

Table A-4.5: Smoking and absence from work; pooled nbreg-model

	M1		M2	
	Women	Men	Women	Men
Smoker	0.1360**	0.0978*	—	—
	(0.0685)	(0.0595)		
Smoker (age 25 to 35)	—	—	0.2186*	0.1546*
			(0.1134)	(0.0909)
Smoker (age 36 to 45)	—	—	0.2665	-0.0446
			(0.1623)	(0.1392)
Smoker (age 46 to 55)	—	—	0.2550	-0.3669
			(0.2625)	(0.2232)
Non-smoker (age 36 to 45)	—	—	0.1249	-0.0924
			(0.1575)	(0.1303)
Non-smoker (age 46 to 55)	—	—	0.2560	-0.4401**
			(0.2450)	(0.2189)
Aged 36 to 45 years	0.0869	-0.1387	—	—
	(0.1416)	(0.1179)		
Aged 46 to 55 years	0.1863	-0.4670**	—	—
	(0.2366)	(0.2093)		
Married	-0.0256	-0.0275	-0.0187	-0.0292
	(0.0729)	(0.0779)	(0.0733)	(0.0780)
Children up to age 16 in household	0.0475	0.0070	0.0440	0.0047
	(0.0798)	(0.0700)	(0.0798)	(0.0700)
East-German citizen	-0.0188	0.0275	-0.0206	0.0272
	(0.0791)	(0.0817)	(0.0792)	(0.0817)
Non-German origin	0.2373**	0.1762*	0.2348**	0.1713*
	(0.1168)	(0.0954)	(0.1167)	(0.0956)
Registered disabled	0.3256	0.3396	0.3228	0.3394
	(0.3985)	(0.3266)	(0.3976)	(0.3266)
Level of disability	0.0009	0.0038	0.0010	0.0038
	(0.0081)	(0.0070)	(0.0081)	(0.0070)
Self-rated health is very good	-0.7405***	-0.8675***	-0.7314***	-0.8704***
	(0.1532)	(0.1436)	(0.1532)	(0.1436)
Self-rated health is good or fair	-0.3072***	-0.5673***	-0.3025***	-0.5677***
	(0.1129)	(0.1132)	(0.1128)	(0.1132)
Years of education	-0.0514**	-0.0410**	-0.0525***	-0.0411**
	(0.0202)	(0.0185)	(0.0202)	(0.0185)
Experience	-0.0148	0.0094	-0.0184	0.0095
	(0.0257)	(0.0244)	(0.0259)	(0.0246)
Experience (squared)	-0.0000	0.0001	0.0001	0.0001
	(0.0005)	(0.0005)	(0.0005)	(0.0005)
Period of employment	-0.0001	-0.0035	-0.0002	-0.0036
	(0.0047)	(0.0045)	(0.0047)	(0.0045)
Has temporary employment	-0.1547	-0.0616	-0.1562	-0.0614
	(0.1217)	(0.1260)	(0.1216)	(0.1259)
Has parttime employment	0.0981	-0.5473**	0.1015	-0.5427**
	(0.0978)	(0.2582)	(0.0979)	(0.2584)
Satisfied with job	-0.1480**	-0.1261**	-0.1447**	-0.1258**
	(0.0639)	(0.0584)	(0.0640)	(0.0584)
Log of monthly gross earnings	0.2786***	-0.0181	0.2883***	-0.0168
	(0.1080)	(0.1201)	(0.1083)	(0.1200)
Log of hours worked per week	0.2381*	0.0024	0.2320*	0.0077
	(0.1304)	(0.1765)	(0.1306)	(0.1769)
Works overtime	-0.0008	-0.0426	0.0019	-0.0445
	(0.0668)	(0.0619)	(0.0669)	(0.0620)
Blue collar worker	0.0452	0.3261***	0.0440	0.3269***
	(0.1118)	(0.1021)	(0.1118)	(0.1021)
Public servant	-0.1319	0.1989	-0.1293	0.1971
	(0.1529)	(0.1363)	(0.1526)	(0.1366)
Undergoes vocational training	-0.1351	-0.1221	-0.1341	-0.1186
	(0.1689)	(0.1599)	(0.1690)	(0.1600)

(Table A-4.5 continued)				
Firm size: 20 to 200	0.1701*	0.1857**	0.1640*	0.1821**
	(0.0878)	(0.0849)	(0.0879)	(0.0851)
Firm size: 200 to 2000	0.3377***	0.3111***	0.3281***	0.3085***
	(0.0949)	(0.0956)	(0.0954)	(0.0957)
Firm size: more than 2000	0.4277***	0.3666***	0.4216***	0.3651***
	(0.1032)	(0.0980)	(0.1033)	(0.0981)
Year of observation: 1998	0.0459	-0.0932*	0.0452	-0.0933*
	(0.0624)	(0.0562)	(0.0624)	(0.0562)
Constant	-0.1697	2.7014**	-0.2179	2.6468**
	(0.8452)	(1.0759)	(0.8445)	(1.0792)
8 Occupational / 12 Branch dummies	Yes	Yes	Yes	Yes
Observations	3,489	4,876	3,489	4,876
Log likelihood	-9,199.85	-12,099.81	-9,199.09	-12,099.46
Chi^2 (degree of freedom)	141.54 (48)	228.78 (48)	143.05 (50)	229.49 (50)
Prob > Chi^2	0.0000	0.0000	0.0000	0.0000

Notes: Standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Source: GSOEP, 1998 – 2000.

Table A-4.6: Smoking and absence from work; nbreg-model accounting for random effects

	M1		M2	
	Women	Men	Women	Men
Smoker	0.1287***	0.0132	—	—
	(0.0468)	(0.0399)		
Smoker (age 25 to 35)	—	—	0.1092	0.0061
			(0.0753)	(0.0605)
Smoker (age 36 to 45)	—	—	0.4533***	-0.1113
			(0.1108)	(0.0934)
Smoker (age 46 to 55)	—	—	0.4523**	-0.3046*
			(0.1763)	(0.1554)
Non-smoker (age 36 to 45)	—	—	0.2474**	-0.1275
			(0.1053)	(0.0902)
Non-smoker (age 46 to 55)	—	—	0.4243**	-0.3270**
			(0.1666)	(0.1480)
Aged 36 to 45 years	0.2832***	-0.1225	—	—
	(0.0963)	(0.0799)		
Aged 46 to 55 years	0.3982**	-0.3208**	—	—
	(0.1610)	(0.1426)		
Married	-0.0172	-0.0908*	-0.0192	-0.0911*
	(0.0513)	(0.0515)	(0.0513)	(0.0515)
Children up to age 16 in household	0.1038*	0.0643	0.1054*	0.0648
	(0.0546)	(0.0473)	(0.0545)	(0.0473)
East-German citizen	-0.1734***	-0.0778	-0.1726***	-0.0777
	(0.0544)	(0.0551)	(0.0544)	(0.0552)
Non-German origin	0.0267	0.0726	0.0314	0.0727
	(0.0804)	(0.0616)	(0.0804)	(0.0616)
Registered disabled	0.4163*	0.3866**	0.4204*	0.3866**
	(0.2296)	(0.1686)	(0.2290)	(0.1687)
Level of disability	-0.0041	-0.0011	-0.0040	-0.0011
	(0.0047)	(0.0034)	(0.0047)	(0.0034)
Self-rated health is very good	-0.6073***	-0.7772***	-0.6088***	-0.7773***
	(0.1066)	(0.0941)	(0.1066)	(0.0942)
Self-rated health is good or fair	-0.2869***	-0.4717***	-0.2921***	-0.4720***
	(0.0728)	(0.0674)	(0.0728)	(0.0675)
Years of education	-0.0474***	-0.0469***	-0.0477***	-0.0469***
	(0.0144)	(0.0128)	(0.0144)	(0.0128)
Experience	-0.0534***	-0.0067	-0.0533***	-0.0065
	(0.0182)	(0.0166)	(0.0182)	(0.0167)
Experience (squared)	0.0006	0.0002	0.0006	0.0002
	(0.0004)	(0.0003)	(0.0004)	(0.0003)
Period of employment	-0.0041	-0.0007	-0.0039	-0.0007
	(0.0033)	(0.0029)	(0.0033)	(0.0029)
Temporary job	-0.2121**	-0.1076	-0.2132**	-0.1071
	(0.0899)	(0.0848)	(0.0899)	(0.0849)
Part-time job	0.1655**	-0.3493*	0.1626**	-0.3491*
	(0.0710)	(0.1933)	(0.0710)	(0.1933)
Satisfied with job	-0.1216***	-0.1106***	-0.1192***	-0.1109***
	(0.0441)	(0.0399)	(0.0441)	(0.0399)
Log of monthly gross earnings	0.3735***	0.1382*	0.3752***	0.1388*
	(0.0752)	(0.0762)	(0.0753)	(0.0763)
Log of hours worked per week	0.2376**	-0.1538	0.2289**	-0.1537
	(0.0995)	(0.0999)	(0.0997)	(0.1000)
Works overtime	-0.0279	-0.0377	-0.0280	-0.0376
	(0.0468)	(0.0412)	(0.0468)	(0.0412)
Blue collar worker	-0.0177	0.2408***	-0.0197	0.2411***
	(0.0830)	(0.0741)	(0.0830)	(0.0742)
Public servant	0.0915	0.2439***	0.0887	0.2443***
	(0.0987)	(0.0876)	(0.0989)	(0.0876)
Undergoes vocational training	0.0126	-0.0849	0.0123	-0.0853
	(0.1130)	(0.1105)	(0.1130)	(0.1105)

(Table A-4.6 continued)				
Firm size: 20 to 200	0.1450**	0.1331**	0.1452**	0.1330**
	(0.0648)	(0.0604)	(0.0648)	(0.0604)
Firm size: 200 to 2000	0.4067***	0.3043***	0.4075***	0.3041***
	(0.0676)	(0.0654)	(0.0676)	(0.0654)
Firm size: more than 2000	0.3923***	0.3234***	0.3954***	0.3233***
	(0.0736)	(0.0680)	(0.0736)	(0.0681)
Year of observation: 1998	0.0006	-0.0864**	-0.0007	-0.0864**
	(0.0429)	(0.0383)	(0.0429)	(0.0383)
Constant	-3.6698***	-0.6539	-3.6386***	-0.6562
	(0.5790)	(0.6883)	(0.5795)	(0.6893)
8 Occupational / 12 Branch dummies	Yes	Yes	Yes	Yes
Observations	3,489	4,876	3,489	4,876
Number of individiuals	2,197	2,910	2,197	2,910
Log likelihood	-9,111.50	-12,044.41	-9,110.330	-12,044.40
Chi^2 (degree of freedom)	317.86 (48)	349.76 (48)	320.89 (50)	349.74 (50)
Prob > Chi^2	0.0000	0.0000	0.0000	0.0000

Notes: Standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Source: GSOEP, 1998 – 2000.

Table D-4.2: Smoking and earnings, descriptive statistics

Variable	Mean	Std. Dev.
Log of monthly gross earnings	8.2518	(0.5602)
Smoker	0.3904	(0.4878)
Smoker (age 25 to 35)	0.1398	(0.3468)
Smoker (age 36 to 45)	0.1664	(0.3725)
Smoker (age 46 to 55)	0.0841	(0.2776)
Non-smoker (age 25 to 35)	0.1991	(0.3993)
Non-smoker (age 36 to 45)	0.2422	(0.4284)
Non-smoker (age 46 to 55)	0.1681	(0.3740)
Ex-smoker (age 25 to 35)*	0.0494	(0.2168)
Ex-smoker (age 36 to 45)*	0.0885	(0.2841)
Ex-smoker (age 46 to 55)*	0.0674	(0.2507)
Tobacco, i.e. cig. smoked daily	6.7628	(10.373)
No. of cig. smoked daily: up to 10*	0.1077	(0.3100)
No. of cig. smoked daily: 10 to 20*	0.2007	(0.4006)
No. of cig. smoked daily: 20 to 30*	0.0543	(0.2266)
No. of cig. smoked daily: more than 30*	0.0202	(0.1408)
Male	0.5887	(0.4920)
Married	0.7128	(0.4524)
Aged 25 to 35 years	0.3389	(0.4733)
Aged 36 to 45 years	0.4087	(0.4916)
Aged 46 to 55 years	0.2523	(0.4343)
Non-German origin	0.1229	(0.3284)
East German citizen	0.2742	(0.4461)
Years of education	11.9505	(2.4651)
Blue-collar worker	0.4327	(0.4954)
White-collar worker	0.5672	(0.4954)
Log of hours worked per week	3.6401	(0.3549)
Works overtime	0.5533	(0.4971)
Has temporary employment	0.0393	(0.1943)
Has part-time employment	0.1410	(0.3480)
Period of employment	9.6522	(8.0332)
Potential work experience	21.5136	(7.9380)
Potential work experience (squared)	525.8411	(355.8965)
Has vocational training	0.7638	(0.4247)
Has university degree	0.1493	(0.3565)
Has no vocational training	0.1447	(0.3518)
Occupation: Management	0.0426	(0.2021)
Occupation: Professional	0.1113	(0.3146)
Occupation: Technician	0.2280	(0.4195)
Occupation: Clerk	0.1296	(0.3359)
Occupation: Service	0.0822	(0.2747)
Occupation: Agriculture	0.0065	(0.0808)
Occupation: Craft	0.2140	(0.4101)
Occupation: Plant operator	0.1119	(0.3153)
Occupation: Elementary	0.0705	(0.2560)
Branch: Agriculture	0.0123	(0.1102)
Branch: Mining/Oil/Gas	0.0302	(0.1712)
Branch: Textiles	0.0108	(0.1037)
Branch: Wood/Paper	0.0258	(0.1585)
Branch: Chemicals/Plastics/Glas	0.0644	(0.2455)
Branch: Metal	0.2044	(0.4033)
Branch:Water/Energy	0.0144	(0.1193)
Branch: Construction	0.0645	(0.2457)

(Table D-4.2 continued)		
Branch: Trade/Retail	0.1257	(0.3315)
Branch: Transport	0.0485	(0.2148)
Branch: Banking/Insurance	0.0439	(0.2050)
Branch: Other Services	0.2533	(0.4349)
Firm size: < 20 employees	0.2099	(0.4073)
Firm size: 20 to 199 employees	0.3038	(0.4599)
Firm size: 200 to 1999 employees	0.2557	(0.4363)
Firm size: >= 2000 employees	0.2244	(0.4172)
Year of observation: 1998	0.3333	(0.4714)
Year of observation: 1999	0.3333	(0.4714)
Year of observation: 2001	0.3333	(0.4714)
Notes: *N*=8,367; * *N*=5,578		
Source: GSOEP, 1998-2000.		

Table A-4.8-I: Tobacco consumption (binary indicator) and earnings, panel regressions

	Females				Males			
	PR	RE	FE	HT-IV	PR	RE	FE	HT-IV
Smoker	0.0020	-0.0007	-0.0158	-0.0085	-0.0246***	-0.0210**	-0.0054	-0.0067
	(0.0147)	(0.0164)	(0.0281)	(0.0255)	(0.0093)	(0.0100)	(0.0152)	(0.0140)
Age: 36 to 45 years old	-0.0189	-0.0055	-0.0047	-0.0135	0.0081	0.0014	-0.0131	-0.0044
	(0.0297)	(0.0251)	(0.0282)	(0.0253)	(0.0174)	(0.0133)	(0.0145)	(0.0128)
Age: 46 to 55 years old	-0.0285	0.0130	0.0113	0.0296	0.0509*	0.0295	-0.0145	0.0151
	(0.0479)	(0.0384)	(0.0414)	(0.0375)	(0.0303)	(0.0222)	(0.0240)	(0.0212)
Years of education	0.0344***	0.0403***	—	0.0972***	0.0290***	0.0388***	—	0.0945***
	(0.0044)	(0.0051)		(0.0147)	(0.0028)	(0.0032)		(0.0073)
Work experience	0.0162***	0.0184***	0.0085	0.0176**	0.0294***	0.0331***	0.0293***	0.0412***
	(0.0061)	(0.0061)	(0.0118)	(0.0078)	(0.0038)	(0.0037)	(0.0061)	(0.0045)
Work experience (squared)	-0.0003**	-0.0004***	-0.0004**	-0.0004**	-0.0006***	-0.0007***	-0.0009***	-0.0008***
	(0.0001)	(0.0001)	(0.0002)	(0.0002)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Job tenure	0.0065***	0.0064***	-0.0007	0.0063***	0.0043***	0.0043***	-0.0000	0.0039***
	(0.0010)	(0.0011)	(0.0021)	(0.0014)	(0.0007)	(0.0007)	(0.0013)	(0.0010)
Has temporary employment	-0.1006***	-0.0807***	-0.0703**	-0.0677**	-0.1329***	-0.0925***	-0.0550**	-0.0766***
	(0.0345)	(0.0305)	(0.0351)	(0.0301)	(0.0243)	(0.0203)	(0.0226)	(0.0196)
Has part-time employment	-0.0461***	-0.0653***	-0.0550**	-0.0502**	-0.5293***	-0.5886***	-0.5715***	-0.6033***
	(0.0176)	(0.0177)	(0.0247)	(0.0195)	(0.0477)	(0.0436)	(0.0526)	(0.0438)
Log of hours worked per week	0.9108***	0.8294***	0.6566***	0.7316***	0.3968***	0.2716***	0.1686***	0.2268***
	(0.0195)	(0.0193)	(0.0261)	(0.0219)	(0.0260)	(0.0225)	(0.0259)	(0.0225)
Works overtime	-0.0049	0.0013	0.0072	-0.0047	0.0555***	0.0427***	0.0234**	0.0313***
	(0.0146)	(0.0134)	(0.0159)	(0.0135)	(0.0096)	(0.0082)	(0.0093)	(0.0080)
Blue collar worker	-0.1558***	-0.1160***	-0.0120	-0.0273	-0.1417***	-0.1160***	-0.0116	-0.0267
	(0.0230)	(0.0229)	(0.0318)	(0.0284)	(0.0155)	(0.0150)	(0.0213)	(0.0187)
East German citizen	-0.1709***	-0.1613***	—	0.1983*	-0.2959***	-0.3106***	—	-0.6532***
	(0.0161)	(0.0201)		(0.1052)	(0.0112)	(0.0144)		(0.0840)
Non-German origin	0.0280	0.0333	—	0.2205***	0.0047	0.0008	—	-0.0298
	(0.0256)	(0.0321)		(0.0538)	(0.0142)	(0.0183)		(0.0350)
Married	-0.0303*	-0.0386**	-0.0208	-0.0308	0.0367***	0.0236**	-0.0165	-0.0063
	(0.0160)	(0.0181)	(0.0323)	(0.0293)	(0.0107)	(0.0115)	(0.0174)	(0.0159)
Constant	4.2529***	4.4541***	5.7704***	4.0015***	6.4282***	6.7058***	7.6084***	6.1610***
	(0.1162)	(0.1197)	(0.2098)	(0.2104)	(0.1121)	(0.1028)	(0.1352)	(0.1325)
F/Chi^2	165.17	4,511.25	29.41	2,916.62	122.55	3,150.63	21.83	1,918.17
Observations/Individuals	2,294 / 1,147				3,284 / 1,642			

Notes: All models also include control variables for occupation, branch of employment, firm size as well as time of observation.
Standard errors in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%

Source: GSOEP, own calculations.

Table A-4.8-II: Tobacco consumption (quasi-metric) and earnings, panel regressions

	Females				Males			
	PR	RE	FE	HT-IV	PR	RE	FE	HT-IV
Tobacco	-0.0007	-0.0008	-0.0019	-0.0015	-0.0009**	-0.0009**	-0.0005	-0.0005
	(0.0008)	(0.0009)	(0.0017)	(0.0015)	(0.0004)	(0.0004)	(0.0007)	(0.0006)
Age: 36 to 45 years old	-0.0182	-0.0049	-0.0039	-0.0125	0.0080	0.0013	-0.0129	-0.0043
	(0.0297)	(0.0251)	(0.0282)	(0.0253)	(0.0174)	(0.0133)	(0.0145)	(0.0128)
Age: 46 to 55 years old	-0.0275	0.0137	0.0123	0.0306	0.0506*	0.0300	-0.0135	0.0156
	(0.0478)	(0.0384)	(0.0414)	(0.0374)	(0.0304)	(0.0222)	(0.0240)	(0.0212)
Years of education	0.0339***	0.0399***	—	0.0967***	0.0291***	0.0388***	—	0.0942***
	(0.0044)	(0.0051)		(0.0147)	(0.0028)	(0.0032)		(0.0073)
Work experience	0.0166***	0.0186***	0.0080	0.0175**	0.0294***	0.0332***	0.0294***	0.0413***
	(0.0061)	(0.0061)	(0.0117)	(0.0078)	(0.0038)	(0.0037)	(0.0061)	(0.0045)
Work experience (squared)	-0.0003**	-0.0004***	-0.0004**	-0.0004**	-0.0006***	-0.0007***	-0.0009***	-0.0008***
	(0.0001)	(0.0001)	(0.0002)	(0.0002)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Job tenure	0.0065***	0.0064***	-0.0007	0.0063***	0.0043***	0.0043***	-0.0001	0.0039***
	(0.0010)	(0.0011)	(0.0021)	(0.0014)	(0.0007)	(0.0008)	(0.0013)	(0.0010)
Has temporary employment	-0.1007***	-0.0805***	-0.0693**	-0.0669**	-0.1332***	-0.0925***	-0.0546**	-0.0765***
	(0.0344)	(0.0305)	(0.0351)	(0.0301)	(0.0243)	(0.0203)	(0.0226)	(0.0196)
Has part-time employment	-0.0459***	-0.0653***	-0.0550**	-0.0501**	-0.5290***	-0.5879***	-0.5715***	-0.6030***
	(0.0175)	(0.0177)	(0.0247)	(0.0195)	(0.0477)	(0.0436)	(0.0526)	(0.0437)
Log of hours worked per week	0.9122***	0.8304***	0.6571***	0.7319***	0.3974***	0.2724***	0.1693***	0.2276***
	(0.0195)	(0.0193)	(0.0261)	(0.0219)	(0.0261)	(0.0226)	(0.0260)	(0.0225)
Works overtime	-0.0043	0.0017	0.0073	-0.0044	0.0555***	0.0424***	0.0234**	0.0312***
	(0.0146)	(0.0134)	(0.0159)	(0.0135)	(0.0096)	(0.0082)	(0.0093)	(0.0080)
Blue-collar worker	-0.1553***	-0.1159***	-0.0123	-0.0274	-0.1417***	-0.1160***	-0.0116	-0.0267
	(0.0229)	(0.0228)	(0.0318)	(0.0284)	(0.0155)	(0.0150)	(0.0212)	(0.0187)
East German citizen	-0.1726***	-0.1629***	—	0.2007*	-0.2969***	-0.3117***	—	-0.6538***
	(0.0161)	(0.0202)		(0.1054)	(0.0112)	(0.0145)		(0.0839)
Non-German origin	0.0271	0.0324	—	0.2210***	0.0043	0.0006	—	-0.0299
	(0.0256)	(0.0321)		(0.0540)	(0.0142)	(0.0183)		(0.0350)
Married	-0.0313*	-0.0392**	-0.0200	-0.0301	0.0366***	0.0234**	-0.0165	-0.0062
	(0.0160)	(0.0180)	(0.0323)	(0.0293)	(0.0107)	(0.0115)	(0.0174)	(0.0159)
Constant	4.2572***	4.4589***	5.7792***	4.0110***	6.4214***	6.7003***	7.6067***	6.1622***
	(0.1160)	(0.1195)	(0.2096)	(0.2099)	(0.1122)	(0.1027)	(0.1350)	(0.1324)
F/Chi^2	165.24	4,512.53	29.46	2,904.46	122.42	3,148.83	21.85	1,919.94

Notes: See above; Standard errors in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%

Source: GSOEP, own calculations.

Table A-4.8-III: Tobacco consumption (no. of cigarettes smoked) and earnings, panel regressions

	Females				Males			
	PR	RE	FE	HT-IV	PR	RE	FE	HT-IV
Up to 10 cig. per day	0.0246	0.0126	-0.0125	-0.0065	-0.0446***	-0.0267*	0.0022	-0.0011
	(0.0207)	(0.0210)	(0.0309)	(0.0282)	(0.0157)	(0.0149)	(0.0190)	(0.0175)
11 to 20 cig. per day	-0.0110	-0.0108	-0.0321	-0.0223	-0.0106	-0.0088	0.0011	-0.0007
	(0.0184)	(0.0200)	(0.0336)	(0.0305)	(0.0113)	(0.0118)	(0.0174)	(0.0160)
21 to 30 cig. per day	0.0420	0.0168	-0.0719	-0.0574	-0.0230	-0.0339**	-0.0285	-0.0248
	(0.0506)	(0.0500)	(0.0701)	(0.0640)	(0.0171)	(0.0166)	(0.0230)	(0.0211)
31 and more cig. per day	-0.1226*	-0.1069	-0.1479	-0.1257	-0.0771***	-0.0506*	-0.0180	-0.0131
	(0.0673)	(0.0686)	(0.1000)	(0.0899)	(0.0278)	(0.0270)	(0.0360)	(0.0331)
Age: 36 to 45 years old	-0.0188	-0.0054	-0.0035	-0.0118	0.0074	0.0008	-0.0132	-0.0044
	(0.0297)	(0.0252)	(0.0283)	(0.0253)	(0.0174)	(0.0133)	(0.0145)	(0.0128)
Age: 46 to 55 years old	-0.0289	0.0129	0.0125	0.0310	0.0506*	0.0293	-0.0133	0.0160
	(0.0478)	(0.0384)	(0.0415)	(0.0374)	(0.0303)	(0.0223)	(0.0241)	(0.0212)
Years of education	0.0345***	0.0403***	—	0.0968***	0.0292***	0.0389***	—	0.0941***
	(0.0044)	(0.0051)		(0.0148)	(0.0028)	(0.0032)		(0.0073)
Work experience	0.0166***	0.0187***	0.0075	0.0175**	0.0296***	0.0332***	0.0291***	0.0413***
	(0.0061)	(0.0061)	(0.0118)	(0.0078)	(0.0038)	(0.0037)	(0.0061)	(0.0045)
Work experience (squared)	-0.0003**	-0.0004***	-0.0004**	-0.0004**	-0.0006***	-0.0007***	-0.0009***	-0.0008***
	(0.0001)	(0.0001)	(0.0002)	(0.0002)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Job tenure	0.0067***	0.0065***	-0.0008	0.0063***	0.0044***	0.0043***	-0.0001	0.0039***
	(0.0010)	(0.0011)	(0.0021)	(0.0014)	(0.0007)	(0.0008)	(0.0013)	(0.0010)
Has temporary employment	-0.0999***	-0.0802***	-0.0685*	-0.0662**	-0.1338***	-0.0931***	-0.0549**	-0.0765***
	(0.0345)	(0.0305)	(0.0352)	(0.0302)	(0.0242)	(0.0203)	(0.0227)	(0.0196)
Has part-time employment	-0.0465***	-0.0657***	-0.0555**	-0.0503***	-0.5298***	-0.5878***	-0.5705***	-0.6020***
	(0.0176)	(0.0177)	(0.0247)	(0.0195)	(0.0477)	(0.0436)	(0.0527)	(0.0437)
Log of hours worked per week	0.9104***	0.8296***	0.6565***	0.7310***	0.3985***	0.2726***	0.1692***	0.2273***
	(0.0195)	(0.0194)	(0.0262)	(0.0219)	(0.0260)	(0.0226)	(0.0260)	(0.0225)
Works overtime	-0.0053	0.0016	0.0082	-0.0036	0.0554***	0.0426***	0.0234**	0.0313***
	(0.0146)	(0.0134)	(0.0160)	(0.0135)	(0.0096)	(0.0082)	(0.0093)	(0.0080)
Blue collar worker	-0.1594***	-0.1188***	-0.0128	-0.0280	-0.1429***	-0.1167***	-0.0129	-0.0276
	(0.0230)	(0.0229)	(0.0320)	(0.0285)	(0.0155)	(0.0150)	(0.0213)	(0.0187)
East German citizen	-0.1736***	-0.1638***	—	0.2026*	-0.2958***	-0.3114***	—	-0.6517***
	(0.0162)	(0.0202)		(0.1058)	(0.0112)	(0.0145)		(0.0839)
Non-German origin	0.0292	0.0337	—	0.2223***	0.0059	0.0014	—	-0.0294
	(0.0256)	(0.0321)		(0.0542)	(0.0142)	(0.0183)		(0.0350)
Married	-0.0309*	-0.0387**	-0.0190	-0.0289	0.0350***	0.0228**	-0.0163	-0.0061
	(0.0160)	(0.0181)	(0.0324)	(0.0293)	(0.0107)	(0.0115)	(0.0175)	(0.0159)
Constant	4.2518***	4.4531***	5.7889***	4.0110***	6.4196***	6.7008***	7.6089***	6.1630***
	(0.1161)	(0.1197)	(0.2101)	(0.2110)	(0.1122)	(0.1028)	(0.1354)	(0.1324)
F/Chi^2	153.74	4,519.55	27.19	2,892.98	114.16	3,158.88	20.19	1,923.13

Notes: See above; Standard errors in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%

Source: GSOEP, own calculations.

Table A-4.9-I: Smoking, ex-smoking and earnings, panel regressions

	Females				Males			
	PR	RE	FE	HT-IV	PR	RE	FE	HT-IV
Smoker	0.0158	0.0239	0.0270	0.0359	-0.0187*	-0.0135	-0.0032	0.0024
	(0.0153)	(0.0177)	(0.0330)	(0.0314)	(0.0104)	(0.0117)	(0.0196)	(0.0183)
Ex-smoker	0.0134	0.0352*	0.0689**	0.0712**	0.0108	0.0052	-0.0048	0.0028
	(0.0187)	(0.0201)	(0.0314)	(0.0300)	(0.0120)	(0.0121)	(0.0172)	(0.0162)
Age: 36 to 45 years old	-0.0279	-0.0126	0.0106	-0.0129	0.0160	0.0028	-0.0133	-0.0044
	(0.0301)	(0.0271)	(0.0319)	(0.0294)	(0.0175)	(0.0134)	(0.0151)	(0.0135)
Age: 46 to 55 years old	-0.0328	0.0013	0.0234	0.0195	0.0608**	0.0315	-0.0077	0.0179
	(0.0477)	(0.0405)	(0.0454)	(0.0421)	(0.0303)	(0.0223)	(0.0248)	(0.0221)
Years of education	0.0325***	0.0381***	—	0.0809***	0.0291***	0.0394***	—	0.0957***
	(0.0044)	(0.0052)		(0.0173)	(0.0027)	(0.0032)		(0.0075)
Work experience	0.0114*	0.0083	0.0018	-0.0069	0.0233***	0.0246***	0.0187***	0.0299***
	(0.0064)	(0.0067)	(0.0132)	(0.0100)	(0.0041)	(0.0040)	(0.0068)	(0.0054)
Work experience (squared)	-0.0002	-0.0002	-0.0000	0.0002	-0.0005***	-0.0005***	-0.0006***	-0.0006***
	(0.0001)	(0.0001)	(0.0002)	(0.0002)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Job tenure	0.0063***	0.0063***	-0.0021	0.0049***	0.0043***	0.0050***	0.0023	0.0049***
	(0.0010)	(0.0011)	(0.0022)	(0.0015)	(0.0007)	(0.0007)	(0.0014)	(0.0010)
Has temporary employment	-0.0511	0.0085	0.0109	0.0215	-0.1325***	-0.0886***	-0.0550**	-0.0739***
	(0.0348)	(0.0307)	(0.0346)	(0.0314)	(0.0247)	(0.0197)	(0.0219)	(0.0193)
Has part-time employment	-0.0501***	-0.0627***	-0.0206	-0.0251	-0.4284***	-0.4446***	-0.3918***	-0.4515***
	(0.0169)	(0.0173)	(0.0236)	(0.0202)	(0.0460)	(0.0442)	(0.0570)	(0.0467)
Log of hours worked per week	0.8783***	0.7533***	0.5152***	0.5873***	0.3904***	0.2935***	0.2113***	0.2640***
	(0.0189)	(0.0189)	(0.0250)	(0.0223)	(0.0262)	(0.0222)	(0.0256)	(0.0226)
Works overtime	0.0036	0.0138	0.0124	0.0050	0.0634***	0.0350***	0.0137	0.0226***
	(0.0142)	(0.0129)	(0.0149)	(0.0135)	(0.0095)	(0.0077)	(0.0086)	(0.0076)
Blue collar worker	-0.1591***	-0.1271***	-0.0361	-0.0547*	-0.1445***	-0.1194***	-0.0186	-0.0322*
	(0.0229)	(0.0230)	(0.0321)	(0.0297)	(0.0150)	(0.0141)	(0.0199)	(0.0178)
East German citizen	-0.1385***	-0.1177***	—	0.6300***	-0.2904***	-0.3076***	—	-0.7293***
	(0.0157)	(0.0201)		(0.1308)	(0.0111)	(0.0146)		(0.0899)
Non-German origin	0.0361	0.0443	—	0.3391***	0.0037	-0.0009	—	-0.0571
	(0.0257)	(0.0330)		(0.0671)	(0.0140)	(0.0184)		(0.0367)
Married	-0.0272*	-0.0404**	0.0079	-0.0200	0.0323***	0.0327***	0.0248	0.0356**
	(0.0158)	(0.0185)	(0.0359)	(0.0338)	(0.0106)	(0.0117)	(0.0186)	(0.0173)
Constant	4.4417***	4.8159***	6.0945***	4.7312***	6.5379***	6.7259***	7.5353***	6.1488***
	(0.1197)	(0.1260)	(0.2166)	(0.2478)	(0.1144)	(0.1042)	(0.1380)	(0.1409)
F/Chi^2	159.13	3,976.85	18.77	1,819.65	123.39	2,977.22	13.88	1,613.03

Notes: N=5,578; All models also include control variables for occupation, branch of employment, firm size as well as time of observation.
Standard errors in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%

Source: GSOEP, own calculations.

Table A-4.9-II: Smoking, ex-smoking (interaction-terms) and earnings, panel regressions

	Females				Males			
	PR	RE	FE	HT-IV	PR	RE	FE	HT-IV
Smoker (age 25 to 35)	-0.0105	0.0140	0.0300	0.0542	0.0008	0.0078	0.0226	0.0222
	(0.0291)	(0.0308)	(0.0460)	(0.0444)	(0.0167)	(0.0171)	(0.0253)	(0.0227)
Smoker (age 36 to 45)	-0.0359	0.0005	0.0420	0.0512	0.0090	0.0011	-0.0001	0.0075
	(0.0363)	(0.0347)	(0.0471)	(0.0454)	(0.0220)	(0.0194)	(0.0270)	(0.0240)
Smoker (age 46 to 55)	0.0027	0.0594	0.0746	0.1079*	0.0311	0.0191	0.0000	0.0212
	(0.0528)	(0.0477)	(0.0617)	(0.0590)	(0.0334)	(0.0265)	(0.0329)	(0.0290)
Ex-smoker (age 25 to 35)	0.0064	0.0519	0.0922**	0.1038**	0.0032	0.0172	0.0275	0.0295
	(0.0381)	(0.0361)	(0.0468)	(0.0451)	(0.0220)	(0.0195)	(0.0246)	(0.0221)
Ex-smoker (age 36 to 45)	0.0031	0.0161	0.0469	0.0448	0.0169	-0.0007	-0.0236	-0.0162
	(0.0280)	(0.0285)	(0.0404)	(0.0389)	(0.0188)	(0.0179)	(0.0238)	(0.0213)
Ex-smoker (age 46 to 55)	0.0329	0.0425	0.0706	0.0720	-0.0004	-0.0039	-0.0234	-0.0150
	(0.0337)	(0.0362)	(0.0546)	(0.0526)	(0.0223)	(0.0216)	(0.0285)	(0.0254)
Non-smoker (age 36 to 45)	-0.0321	-0.0012	0.0248	0.0309	0.0220	0.0195	0.0141	0.0177
	(0.0356)	(0.0331)	(0.0408)	(0.0391)	(0.0225)	(0.0189)	(0.0225)	(0.0201)
Non-smoker (age 46 to 55)	-0.0688	-0.0148	0.0244	0.0461	0.0897**	0.0586**	0.0242	0.0341
	(0.0522)	(0.0458)	(0.0550)	(0.0523)	(0.0349)	(0.0281)	(0.0339)	(0.0301)
Years of education	0.0326***	0.0381***	—	0.0995***	0.0291***	0.0393***	—	0.0909***
	(0.0044)	(0.0052)		(0.0194)	(0.0027)	(0.0032)		(0.0083)
Work experience	0.0115*	0.0079	0.0015	0.0093	0.0221***	0.0240***	0.0190***	0.0273***
	(0.0064)	(0.0068)	(0.0132)	(0.0116)	(0.0041)	(0.0041)	(0.0068)	(0.0058)
Work experience (squared)	-0.0002	-0.0001	-0.0000	0.0000	-0.0005***	-0.0005***	-0.0006***	-0.0006***
	(0.0001)	(0.0001)	(0.0002)	(0.0002)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Job tenure	0.0063***	0.0063***	-0.0021	0.0030*	0.0044***	0.0050***	0.0021	0.0052***
	(0.0010)	(0.0011)	(0.0022)	(0.0017)	(0.0007)	(0.0007)	(0.0014)	(0.0011)
Has temporary employment	-0.0532	0.0076	0.0111	0.0218	-0.1320***	-0.0885***	-0.0557**	-0.0695***
	(0.0349)	(0.0307)	(0.0347)	(0.0317)	(0.0247)	(0.0197)	(0.0219)	(0.0187)
Has part-time employment	-0.0504***	-0.0625***	-0.0203	-0.0302	-0.4246***	-0.4421***	-0.3896***	-0.4389***
	(0.0170)	(0.0173)	(0.0237)	(0.0206)	(0.0461)	(0.0442)	(0.0570)	(0.0460)
Log of hours worked per week	0.8791***	0.7541***	0.5154***	0.5788***	0.3911***	0.2938***	0.2126***	0.2565***
	(0.0189)	(0.0189)	(0.0251)	(0.0226)	(0.0262)	(0.0223)	(0.0257)	(0.0220)
Works overtime	0.0038	0.0140	0.0122	0.0056	0.0626***	0.0345***	0.0133	0.0201***
	(0.0142)	(0.0130)	(0.0149)	(0.0137)	(0.0095)	(0.0077)	(0.0086)	(0.0073)
Blue collar worker	-0.1590***	-0.1273***	-0.0372	-0.0536*	-0.1439***	-0.1197***	-0.0193	-0.0321*
	(0.0229)	(0.0230)	(0.0322)	(0.0300)	(0.0150)	(0.0141)	(0.0199)	(0.0172)
East German citizen	-0.1374***	-0.1175***	—	0.6839***	-0.2908***	-0.3076***	—	-0.7849***
	(0.0158)	(0.0202)		(0.1394)	(0.0111)	(0.0146)		(0.0974)
Non-German origin	0.0349	0.0423	—	0.3727***	0.0023	-0.0017	—	-0.0803*
	(0.0257)	(0.0330)		(0.0720)	(0.0140)	(0.0184)		(0.0414)
Married	-0.0265*	-0.0393**	0.0084	-0.0161	0.0328***	0.0324***	0.0235	0.0316*
	(0.0158)	(0.0185)	(0.0360)	(0.0342)	(0.0106)	(0.0117)	(0.0186)	(0.0165)
Constant	4.4457***	4.8182***	6.0906***	4.2352***	6.5409***	6.7221***	7.5159***	6.2888***
	(0.1201)	(0.1265)	(0.2182)	(0.3123)	(0.1145)	(0.1044)	(0.1384)	(0.1599)

(Table A-4.9-II continued)								
F/Chi^2	144.89	3,986.24	16.92	1,711.94	112.39	2,980.72	12.62	1,458.91
Notes: See above; Standard errors in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%								
Source: GSOEP, own calculations.								

Table A-4.10-I: Smoking and earnings; panel regressions (females)

	Model 1				Model 2			
	PR	RE	FE	HT-IV	PR	RE	FE	HT-IV
Smoker	0.0066	0.0021	-0.0175	-0.0141	—	—	—	—
	(0.0118)	(0.0139)	(0.0190)	(0.0186)				
Smoker (age 25 to 35)	—	—	—	—	-0.0098	-0.0020	-0.0086	0.0024
					(0.0213)	(0.0219)	(0.0259)	(0.0256)
Smoker (age 36 to 45)	—	—	—	—	-0.0411	-0.0228	-0.0306	-0.0236
					(0.0275)	(0.0257)	(0.0298)	(0.0293)
Smoker (age 46 to 55)	—	—	—	—	-0.0086	0.0393	0.0047	0.0269
					(0.0423)	(0.0369)	(0.0417)	(0.0409)
Non-smoker (age 36 to 45)	—	—	—	—	-0.0296	-0.0070	0.0015	0.0060
					(0.0262)	(0.0230)	(0.0246)	(0.0241)
Non-smoker (age 46 to 55)	—	—	—	—	-0.0664	-0.0053	0.0078	0.0274
					(0.0407)	(0.0333)	(0.0349)	(0.0341)
East German citizen	-0.1537***	-0.1236***	—	0.6111***	-0.1536***	-0.1238***	—	0.6768***
	(0.0129)	(0.0191)		(0.1142)	(0.0129)	(0.0191)		(0.1218)
Non-German origin	0.0171	0.0308	—	0.3192***	0.0157	0.0296	—	0.3487***
	(0.0207)	(0.0306)		(0.0622)	(0.0207)	(0.0306)		(0.0659)
Married	-0.0274**	-0.0437***	-0.0046	-0.0182	-0.0269**	-0.0430***	-0.0045	-0.0141
	(0.0129)	(0.0162)	(0.0254)	(0.0246)	(0.0129)	(0.0162)	(0.0254)	(0.0249)
Aged 25 to 35 years	-0.0285	-0.0117	-0.0068	-0.0170	—	—	—	—
	(0.0240)	(0.0208)	(0.0220)	(0.0212)				
Aged 36 to 45 years	-0.0420	0.0090	0.0084	0.0187	—	—	—	—
	(0.0390)	(0.0313)	(0.0320)	(0.0308)				
Years of education	0.0327***	0.0412***	—	0.0794***	0.0328***	0.0412***	—	0.0926***
	(0.0036)	(0.0048)		(0.0154)	(0.0036)	(0.0048)		(0.0171)
Experience	0.0146***	0.0156***	0.0108	0.0108	0.0147***	0.0154***	0.0110	0.0239***
	(0.0049)	(0.0055)	(0.0099)	(0.0073)	(0.0050)	(0.0055)	(0.0099)	(0.0086)
Experience (squared)	-0.0002**	-0.0003***	-0.0003**	-0.0002	-0.0002**	-0.0003***	-0.0003**	-0.0003**
	(0.0001)	(0.0001)	(0.0002)	(0.0002)	(0.0001)	(0.0001)	(0.0002)	(0.0002)
Period of employment	0.0066***	0.0061***	-0.0012	0.0037***	0.0065***	0.0061***	-0.0012	0.0026*
	(0.0008)	(0.0010)	(0.0016)	(0.0013)	(0.0008)	(0.0010)	(0.0016)	(0.0014)
Has temporary employment	-0.0646**	-0.0055	0.0085	0.0123	-0.0662**	-0.0067	0.0076	0.0118
	(0.0279)	(0.0239)	(0.0248)	(0.0237)	(0.0279)	(0.0239)	(0.0248)	(0.0239)
Has part-time employment	-0.0610***	-0.0908***	-0.0628***	-0.0626***	-0.0609***	-0.0907***	-0.0628***	-0.0654***
	(0.0140)	(0.0144)	(0.0172)	(0.0158)	(0.0140)	(0.0144)	(0.0172)	(0.0161)
Log of hours worked per week	0.8841***	0.7008***	0.5172***	0.5609***	0.8851***	0.7017***	0.5173***	0.5558***
	(0.0155)	(0.0155)	(0.0179)	(0.0170)	(0.0155)	(0.0155)	(0.0180)	(0.0171)
Works overtime	-0.0025	0.0152	0.0181*	0.0134	-0.0023	0.0153	0.0181*	0.0134

(Table A-4.10-I continued)

	(0.0117)	(0.0101)	(0.0105)	(0.0101)	(0.0117)	(0.0101)	(0.0105)	(0.0102)
Blue collar worker	-0.1601***	-0.1064***	-0.0272	-0.0409*	-0.1596***	-0.1069***	-0.0276	-0.0391*
	(0.0188)	(0.0190)	(0.0228)	(0.0219)	(0.0188)	(0.0190)	(0.0228)	(0.0221)
Firm size 1 to 20	-0.2710***	-0.2298***	-0.1106***	-0.1797***	-0.2713***	-0.2300***	-0.1113***	-0.1776***
	(0.0175)	(0.0196)	(0.0257)	(0.0224)	(0.0175)	(0.0196)	(0.0258)	(0.0227)
Firm size 20 to 200	-0.1094***	-0.0795***	-0.0142	-0.0582***	-0.1080***	-0.0785***	-0.0141	-0.0573***
	(0.0168)	(0.0182)	(0.0226)	(0.0203)	(0.0168)	(0.0182)	(0.0227)	(0.0205)
Firm size 200 to 2000	-0.0302*	-0.0027	0.0378*	0.0162	-0.0290*	-0.0017	0.0378*	0.0170
	(0.0166)	(0.0173)	(0.0205)	(0.0186)	(0.0166)	(0.0173)	(0.0205)	(0.0189)
Year of observation: 1999	0.0299**	0.0317***	0.0443***	0.0351***	0.0298**	0.0317***	0.0444***	0.0284***
	(0.0132)	(0.0085)	(0.0100)	(0.0080)	(0.0132)	(0.0085)	(0.0100)	(0.0088)
Year of observation: 2001	0.0738***	0.0840***	0.1238***	0.0947***	0.0733***	0.0839***	0.1238***	0.0760***
	(0.0134)	(0.0091)	(0.0193)	(0.0098)	(0.0134)	(0.0092)	(0.0193)	(0.0137)
Constant	4.3646***	4.8958***	6.1191***	4.7149***	4.3638***	4.8958***	6.1142***	4.3389***
	(0.0949)	(0.1056)	(0.1662)	(0.2098)	(0.0951)	(0.1058)	(0.1667)	(0.2626)
F/Chi^2	243.49	4,896.75	37.41	2,526.14	232.37	4,907.10	35.50	2,423.49

Notes: *N*/Individuals=3,441 / 1,147; All models also include control variables for occupation and branch of employment.
Standard errors in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%

Source: GSOEP, own calculations.

Table A-4.10-II: Smoking and earnings; panel regressions (males)

	Model 1				Model 2			
	OLS	FE	RE	HT-IV	OLS	FE	RE	HT-IV
Smoker	-0.0210***	0.0055	-0.0102	0.0051	—	—	—	—
	(0.0074)	(0.0105)	(0.0082)	(0.0100)				
Smoker (age 25 to 35)	—	—	—	—	0.0015	0.0198	0.0081	0.0187
					(0.0119)	(0.0134)	(0.0115)	(0.0124)
Smoker (age 36 to 45)	—	—	—	—	-0.0120	-0.0109	-0.0126	-0.0021
					(0.0167)	(0.0157)	(0.0138)	(0.0144)
Smoker (age 46 to 55)	—	—	—	—	0.0020	-0.0049	0.0061	0.0151
					(0.0271)	(0.0215)	(0.0199)	(0.0197)
Non-smoker (age 36 to 45)	—	—	—	—	0.0056	-0.0018	0.0073	0.0067
					(0.0160)	(0.0131)	(0.0123)	(0.0121)
Non-smoker (age 46 to 55)	—	—	—	—	0.0666**	-0.0010	0.0362*	0.0175
					(0.0261)	(0.0209)	(0.0194)	(0.0191)
Aged 25 to 35 years	-0.0048	-0.0147	-0.0055	-0.0067	—	—	—	—
	(0.0142)	(0.0110)	(0.0105)	(0.0102)				
Aged 36 to 45 years	0.0400	-0.0112	0.0192	0.0122	—	—	—	—
	(0.0249)	(0.0181)	(0.0173)	(0.0167)				
East German citizen	-0.2915***	—	-0.3155***	-0.7097***	-0.2913***	—	-0.3159***	-0.7375***
	(0.0090)		(0.0140)	(0.0802)	(0.0090)		(0.0140)	(0.0906)
Non-German origin	-0.0030	—	-0.0089	-0.0540	-0.0043	—	-0.0096	-0.0639
	(0.0114)		(0.0177)	(0.0350)	(0.0114)		(0.0177)	(0.0406)
Married	0.0332***	0.0026	0.0251**	0.0134	0.0334***	0.0024	0.0248**	0.0115
	(0.0086)	(0.0133)	(0.0100)	(0.0127)	(0.0086)	(0.0133)	(0.0100)	(0.0123)
Years of education	0.0297***	—	0.0441***	0.0956***	0.0297***	—	0.0440***	0.0940***
	(0.0023)		(0.0030)	(0.0065)	(0.0023)		(0.0030)	(0.0074)
Experience	0.0306***	0.0269***	0.0327***	0.0381***	0.0294***	0.0269***	0.0324***	0.0381***
	(0.0031)	(0.0050)	(0.0033)	(0.0040)	(0.0032)	(0.0050)	(0.0033)	(0.0043)
Experience (squared)	-0.0007***	-0.0008***	-0.0007***	-0.0008***	-0.0006***	-0.0008***	-0.0007***	-0.0008***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Period of employment	0.0044***	0.0006	0.0044***	0.0033***	0.0045***	0.0006	0.0044***	0.0031***
	(0.0005)	(0.0010)	(0.0007)	(0.0008)	(0.0005)	(0.0010)	(0.0007)	(0.0008)
Has temporary employment	-0.1390***	-0.0469***	-0.0721***	-0.0600***	-0.1391***	-0.0473***	-0.0725***	-0.0568***
	(0.0191)	(0.0148)	(0.0143)	(0.0138)	(0.0191)	(0.0148)	(0.0143)	(0.0134)
Has part-time employment	-0.4896***	-0.4576***	-0.5050***	-0.4948***	-0.4850***	-0.4581***	-0.5043***	-0.4872***
	(0.0379)	(0.0384)	(0.0345)	(0.0346)	(0.0379)	(0.0384)	(0.0345)	(0.0340)
Log of hours worked per week	0.3329***	0.1403***	0.1943***	0.1672***	0.3331***	0.1403***	0.1945***	0.1610***
	(0.0206)	(0.0168)	(0.0161)	(0.0157)	(0.0206)	(0.0168)	(0.0161)	(0.0153)
Works overtime	0.0602***	0.0214***	0.0339***	0.0259***	0.0595***	0.0213***	0.0337***	0.0245***

(Table A-4.10-II continued)

	(0.0078)	(0.0060)	(0.0058)	(0.0056)	(0.0078)	(0.0060)	(0.0058)	(0.0055)
Blue collar worker	-0.1458***	-0.0177	-0.0963***	-0.0269**	-0.1453***	-0.0181	-0.0967***	-0.0258**
	(0.0125)	(0.0141)	(0.0117)	(0.0131)	(0.0125)	(0.0141)	(0.0117)	(0.0128)
Firm size 1 to 20	-0.2159***	-0.0027	-0.1203***	-0.0547***	-0.2172***	-0.0034	-0.1211***	-0.0441***
	(0.0123)	(0.0167)	(0.0131)	(0.0142)	(0.0123)	(0.0167)	(0.0131)	(0.0142)
Firm size 20 to 200	-0.1406***	0.0124	-0.0727***	-0.0243**	-0.1411***	0.0120	-0.0729***	-0.0166
	(0.0101)	(0.0134)	(0.0107)	(0.0115)	(0.0101)	(0.0134)	(0.0107)	(0.0114)
Firm size 200 to 2000	-0.0629***	0.0165	-0.0254**	-0.0042	-0.0634***	0.0164	-0.0257**	0.0001
	(0.0102)	(0.0123)	(0.0103)	(0.0107)	(0.0102)	(0.0123)	(0.0103)	(0.0106)
Year of observation: 1999	0.0169*	0.0325***	0.0178***	0.0179***	0.0173**	0.0325***	0.0179***	0.0194***
	(0.0087)	(0.0056)	(0.0048)	(0.0045)	(0.0087)	(0.0056)	(0.0048)	(0.0047)
Year of observation: 2001	0.0717***	0.1222***	0.0758***	0.0784***	0.0723***	0.1223***	0.0760***	0.0829***
	(0.0088)	(0.0106)	(0.0053)	(0.0055)	(0.0088)	(0.0106)	(0.0053)	(0.0071)
Constant	6.6517***	7.7090***	6.9135***	6.4021***	6.6528***	7.7032***	6.9097***	6.4571***
	(0.0896)	(0.0974)	(0.0809)	(0.1116)	(0.0896)	(0.0974)	(0.0809)	(0.1334)
F/Chi^2	179.01	3,382.31	27.77	2,004.44	171.11	3,392.63	26.44	1,873.39

Notes: *N*/Individuals=4,926 / 1,642; All models also include control variables for occupation and branch of employment.
Standard errors in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%

Source: GSOEP, own calculations.

Table D-5.1: Moonlighting in Germany and the UK, descriptive statistics

	UK		Germany	
Variable	Mean	Std. Dev.	Mean	Std. Dev.
Has a second job	0.0814	(0.2735)	0.0730	(0.2602)
Would like to work more hours	0.0777	(0.2677)	0.1550	(0.3619)
Would like to work the same hours	0.5854	(0.4926)	0.2709	(0.4444)
Would like to work less hours	0.3301	(0.4702)	0.5740	(0.4944)
Is dissatisfied with job security	0.2593	(0.4382)	0.1465	(0.3536)
Is dissatisfied with pay	0.3573	(0.4792)	0.0978	(0.2971)
Is dissatisfied with work itself	0.1843	(0.3878)	0.0558	(0.2296)
Expects to be promoted/get a better job	0.1699	(0.3756)	0.1295	(0.3358)
Expects to get job related training/courses	0.4342	(0.4956)	0.3315	(0.4707)
Expects to start a new job	0.1770	(0.3817)	0.0709	(0.2566)
Expects to become self-employed/start up own business	0.0294	(0.1690)	0.0297	(0.1698)
Expects to give up paid employment	0.0240	(0.1531)	0.0437	(0.2045)
Log of gross hourly wage in second job (observed)	1.9624	(1.0051)	3.0196	(0.8720)
Log of gross hourly wage in second job^{+}	1.9878	(0.3592)	2.9700	(0.3044)
Log of net hourly wage in first job	1.5709	(0.4508)	2.6031	(0.5094)
Log of non-labor income	4.5987	(1.4888)	5.3188	(3.1355)
Weekly working hours	38.3189	(13.5631)	38.6080	(11.4540)
Works overtime	0.4746	(0.4993)	0.4826	(0.4997)
Overtime work is paid	0.2620	(0.4397)	0.1484	(0.3555)
Public/Governmental employer	0.1832	(0.3868)	0.2630	(0.4402)
Part-time employment	0.2055	(0.4041)	0.1540	(0.3610)
Temporary employment	0.0580	(0.2337)	0.1355	(0.3423)
Has recently changed job	0.2978	(0.4573)	0.1443	(0.3514)
Job tenure	4.8356	(5.8732)	8.8616	(9.0052)
Spouse is employed	0.6279	(0.4833)	0.4290	(0.4949)
Age	38.0833	(10.7304)	38.4608	(10.977)
Age squared	1565.481	(836.211)	1599.731	(860.289)
Male	0.4805	(0.4996)	0.5484	(0.4976)
Married	0.8035	(0.3973)	0.6189	(0.4856)
Number of dependent children	0.7465	(0.9966)	0.6192	(0.8978)
Has children in the age of up to 4 years	0.1519	(0.3589)	0.1132	(0.3169)
Has children in the age 5 to 15 years	0.3569	(0.4790)	0.3341	(0.4716)
Years of education	12.7531	(2.8186)	11.6673	(3.0277)
Education (UK/D): Degree	0.3577	(0.4793)	0.1504	(0.3575)
Education (UK): A-levels	0.1258	(0.3317)	—	
Education (UK): O-levels	0.3127	(0.4636)	—	
Education (D): Vocational training	—		0.6940	(0.4608)
Education (UK/D): No qualification	0.1477	(0.3548)	0.1352	(0.3419)
Occupation (UK/D): Manager	0.1318	(0.3383)	0.0329	(0.1785)
Occupation (UK/D): Professional	0.1021	(0.3028)	0.1206	(0.3256)
Occupation (UK/D): Technician	0.1075	(0.3097)	0.2079	(0.4058)
Occupation (UK/D): Clerk	0.1922	(0.3940)	0.1196	(0.3245)
Occupation (UK/D): Craft worker	0.1024	(0.3032)	0.0883	(0.2837)
Occupation (UK): Personal services	0.1054	(0.3070)	—	
Occupation (UK): Sales	0.0704	(0.2559)	—	
Occupation (D): Service-Sales worker	—		0.1059	(0.3077)
Occupation (UK/D): Machine operator	0.0930	(0.2905)	0.0883	(0.2837)
Occupation (UK/D): Other/Elementary	0.0743	(0.2623)	0.0764	(0.2657)
Occupation (D): Agricultural worker	—		0.0091	(0.0953)
Branch: Agriculture	0.0092	(0.0958)	0.0126	(0.1115)
Branch: Energy & Water supplies	0.0205	(0.1419)	0.0104	(0.1016)
Branch (UK): Minerals & Chemicals	0.0320	(0.1760)	—	
Branch (D): Minerals	—		0.0239	(0.1528)
Branch (D): Chemicals	—		0.0455	(0.2084)
Branch: Metal	0.0908	(0.2873)	0.1541	(0.3610)
Branch: Manufacturing	0.0890	(0.2848)	—	
Branch: Construction	0.0322	(0.1767)	0.0764	(0.2656)
Branch: Distribution, Trade & Retail	0.1757	(0.3806)	0.1276	(0.3337)

(Table D-5.1 continued)				
Branch: Transport & Communication	0.0578	(0.2334)	0.0493	(0.2165)
Branch: Banking, Finance & Insurance	0.1262	(0.3321)	0.0369	(0.1885)
Branch: Other	0.3340	(0.4716)	0.3147	(0.4644)
Branch (D): Textiles	—		0.0107	(0.1029)
Branch (D): Wood/Paper	—		0.0227	(0.1492)
Firm size (UK): 1 to 9 employees	0.1729	(0.3782)	—	
Firm size (UK): 10 to 24 employees	0.1571	(0.3639)	—	
Firm size (UK): 25 to 199 employees	0.3562	(0.4788)	—	
Firm size (UK): 200 to 999 employees	0.1936	(0.3951)	—	
Firm size (UK): more than 1000 employees	0.1003	(0.3004)	—	
Firm size (D): 1 to 19 employees	—		0.2455	(0.4304)
Firm size (D): 20 to 199 employees	—		0.2927	(0.4550)
Firm size (D): 200 to 1999 employees	—		0.2183	(0.4131)
Firm size (D): 2000 and more employees	—		0.2136	(0.4098)

Notes: Includes further controls for regions and year of observation.
Source: BHSP, GSOEP.

Table A-5.6: Participation in moonlighting, panel regressions for males in Germany and the UK, including additional control variables

	Germany		UK	
	Logit	FE Logit	Logit	FE Logit
Would like to work more hours	0.5144***	0.5341***	0.2291*	0.4317***
	(0.0981)	(0.1720)	(0.1201)	(0.1577)
… work less hours	0.2735***	0.3652***	0.0067	-0.1710
	(0.0817)	(0.1399)	(0.0779)	(0.1065)
Is dissatisfied with job security	-0.2926***	0.1165	0.0298	0.0515
	(0.1001)	(0.1832)	(0.0797)	(0.1030)
… with pay/household-income	0.2304**	0.0119	0.1450*	0.1105
	(0.1033)	(0.1936)	(0.0742)	(0.1016)
… with job itself	-0.0356	0.0911	0.1191	0.2203*
	(0.1320)	(0.2207)	(0.0848)	(0.1171)
Log of net hourly wage in first job	0.0409	-0.3600	-0.3263**	-1.1362***
	(0.1184)	(0.2470)	(0.1509)	(0.2038)
Log of gross hourly wage in second job (predicted)	0.1229	0.4554	-0.4797*	-0.2323
	(0.2996)	(0.3982)	(0.2872)	(0.3666)
Log of non-labor income	0.0036	-0.0476*	0.0212	-0.0329
	(0.0121)	(0.0257)	(0.0285)	(0.0380)
Weekly working hours	0.0039	0.0005	-0.0117**	-0.0327***
	(0.0049)	(0.0102)	(0.0058)	(0.0072)
Works overtime	0.1218*	-0.0361	0.1069	0.2954**
	(0.0693)	(0.1214)	(0.1065)	(0.1480)
Overtime work is paid	0.0916	0.1024	-0.1625	-0.4019**
	(0.0805)	(0.1394)	(0.1149)	(0.1613)
Part-time employment	0.9305***	1.1461***	0.3790*	-0.0770
	(0.1810)	(0.4050)	(0.2168)	(0.3046)
Temporary employment	0.2958***	0.4557**	0.0824	-0.4417**
	(0.1103)	(0.2115)	(0.1397)	(0.2032)
Has recently changed job	-0.0243	-0.2845*	0.0636	0.0192
	(0.0860)	(0.1469)	(0.0722)	(0.1042)
Job tenure	-0.0096*	-0.0096	0.0103	0.0187
	(0.0057)	(0.0218)	(0.0083)	(0.0134)
Public/Governmental employer	0.2975**	-0.0003	-0.0878	0.2798
	(0.1278)	(0.2880)	(0.1424)	(0.2081)
Spouse is employed	0.1877*	0.0051	-0.0403	-0.2040
	(0.1024)	(0.2058)	(0.0970)	(0.1308)
Age	0.0666**	-0.0326	0.0514	0.2528***
	(0.0313)	(0.1510)	(0.0338)	(0.0750)
Age squared	-0.0009**	-0.0006	-0.0008*	-0.0025***
	(0.0004)	(0.0019)	(0.0004)	(0.0009)
Married	0.0395	0.0084	-0.0677	0.3752**
	(0.1287)	(0.3052)	(0.1055)	(0.1676)
Number of children	0.0592	-0.2693	0.0983	0.0148
	(0.0768)	(0.1911)	(0.0688)	(0.1038)
Has children in age of up to 4 years	-0.1793	0.1440	0.0295	0.1500
	(0.1312)	(0.2802)	(0.1140)	(0.1577)
Has children in age of 5 to 15 years	-0.1395	0.0809	0.0038	0.1501
	(0.1361)	(0.2807)	(0.1237)	(0.1689)
Years of education	0.0333	—	0.0357	—
	(0.0247)		(0.0282)	
Constant	-4.9040***	—	-2.3565***	—
	(0.8255)		(0.7439)	
N / Groups	22,181	2,323 / 620	24,319	3,915 / 605
Chi^2	345.33	53.70	309.16	115.95
Log likelihood	-5,853.83	-832.53	-5,973.34	-1408.18

Notes: Includes further qualificational, occupational, branch, regional and year of observation controls.
Source: BHPS, GSOEP. Own calculations.

Table A-5.7: Job related expectations and participation in moonlighting, panel regressions for males in Germany and the UK, including additional control variables

	Germany		UK	
	Logit	FE Logit	Logit	FE Logit
Would like to work more hours	0.5342***	0.6684**	0.0983	0.2410
	(0.1223)	(0.2960)	(0.1505)	(0.2656)
… work less hours	0.2841***	0.4330*	-0.0620	-0.1180
	(0.1058)	(0.2296)	(0.0946)	(0.1686)
Is dissatisfied with job security	-0.3159**	-0.1516	-0.0662	0.1017
	(0.1251)	(0.2923)	(0.0975)	(0.1708)
… with household-income	0.0993	-0.2000	0.1326	-0.2084
	(0.1328)	(0.3351)	(0.0922)	(0.1646)
… with job itself	0.1887	0.4411	0.0655	0.4208**
	(0.1528)	(0.3572)	(0.1035)	(0.1922)
Expects to be promoted	0.1196	0.2773	-0.3172***	-0.3461*
	(0.1060)	(0.2500)	(0.1043)	(0.1875)
… get job related training/courses	0.0684	0.1115	0.2042**	-0.0789
	(0.0868)	(0.2099)	(0.0889)	(0.1522)
… start a new job	0.3088**	0.1821	0.1015	0.4226**
	(0.1384)	(0.3356)	(0.0995)	(0.1805)
… start up own business/become self-employed	1.0250***	-0.0977	0.9435***	0.3106
	(0.1665)	(0.3426)	(0.1442)	(0.2667)
… quit from paid employment	-0.0307	-0.9328*	-0.6724*	0.0065
	(0.2112)	(0.5208)	(0.3573)	(0.6943)
Log of net wage in first job	0.0626	-0.4353	-0.2542*	-1.2022***
	(0.1310)	(0.4460)	(0.1445)	(0.3255)
Log of non-labor income	0.0092	-0.0221	0.0081	-0.0091
	(0.0145)	(0.0382)	(0.0322)	(0.0628)
Weekly working hours	-0.0016	0.0041	-0.0143**	-0.0433***
	(0.0057)	(0.0192)	(0.0063)	(0.0115)
Works overtime	0.1876**	0.1340	0.0254	0.2149
	(0.0836)	(0.1954)	(0.1276)	(0.2426)
Overtime work is paid	0.1340	-0.2191	-0.0251	-0.4550*
	(0.0956)	(0.2135)	(0.1359)	(0.2628)
Part-time employment	0.7782***	0.6649	0.6239***	-0.7048
	(0.2159)	(0.6653)	(0.2393)	(0.4610)
Temporary employment	0.2868**	0.5348	0.0945	-0.6402**
	(0.1363)	(0.3560)	(0.1676)	(0.3197)
Has recently changed job	-0.1301	-0.3447	0.0855	-0.0433
	(0.1113)	(0.2502)	(0.0901)	(0.1612)
Job tenure	-0.0089	-0.0258	0.0112	-0.0089
	(0.0064)	(0.0357)	(0.0096)	(0.0211)
Public/Governmental employer	0.2613*	0.6418	0.4685***	0.4091
	(0.1476)	(0.5537)	(0.1336)	(0.4064)
Spouse is employed	0.2334**	0.0178	-0.0633	-0.2033
	(0.1158)	(0.3352)	(0.1115)	(0.2184)
Age	0.0754**	0.1372	0.0361	-0.0345
	(0.0353)	(0.2409)	(0.0370)	(0.1688)
Age squared	-0.0010**	-0.0020	-0.0006	-0.0006
	(0.0004)	(0.0030)	(0.0005)	(0.0022)
Married	0.0856	0.1248	-0.0984	0.0086
	(0.1490)	(0.4328)	(0.1189)	(0.2709)
Number of children	0.0927	-0.1976	0.0826	0.1983
	(0.0843)	(0.2768)	(0.0743)	(0.1883)
Has children in age of up to 4 years	-0.2204	0.0036	-0.0616	0.0598
	(0.1481)	(0.3815)	(0.1395)	(0.2684)
Has children in age of 5 to 15 years	-0.1597	0.4305	0.1389	0.3696
	(0.1500)	(0.4378)	(0.1419)	(0.2935)
Years of education	0.0407*	—	0.0125	—
	(0.0223)		(0.0200)	

(Table A-5.7 continued)				
Constant	-4.8245***	—	-2.5340***	—
	(0.7055)		(0.7251)	
N / Groups	12,773	856 / 315	13,569	1,492 / 375
Chi^2	358.18	37.30	232.75	100.90
Log likelihood	-3,401.69	-291.32	-3,429.80	-499.73

Notes: Includes further qualificational, occupational, branch, regional and year of observation controls.
Source: BHPS, GSOEP. Own calculations.

Table A-5.8: Participation in moonlighting, panel regressions for females in Germany and the UK, including additional control variables

	Germany Logit	UK FE Logit	Germany Logit	UK FE Logit
Wants to work more hours	0.3856***	0.2887	0.0033	-0.1688
	(0.1123)	(0.2028)	(0.0942)	(0.1135)
Wants to work less hours	0.2050**	0.5134***	-0.2059***	-0.0753
	(0.0938)	(0.1726)	(0.0732)	(0.0967)
Is dissatisfied with job security	-0.0921	0.1001	0.0819	0.2080**
	(0.1091)	(0.2145)	(0.0690)	(0.0906)
Is dissatisfied with houshold-income	0.1474	-0.0469	0.1702***	0.2401***
	(0.1136)	(0.2047)	(0.0626)	(0.0843)
Is dissatisfied with job itself	-0.1168	-0.5622**	-0.0709	0.0448
	(0.1381)	(0.2504)	(0.0810)	(0.1028)
Log of net wage in first job	0.1079	-0.4641*	-0.3237***	-0.9214***
	(0.1221)	(0.2411)	(0.1017)	(0.1360)
Log of gross wage in second job (predicted)	-0.0495	-0.4046	-0.0285	-0.0427
	(0.3028)	(0.4616)	(0.2082)	(0.2536)
Log of non-labor income	-0.0368***	-0.0485	-0.0618**	-0.0859***
	(0.0142)	(0.0297)	(0.0252)	(0.0330)
Weekly working hours	-0.0052	-0.0223**	-0.0216***	-0.0369***
	(0.0052)	(0.0106)	(0.0056)	(0.0070)
Works overtime	0.3686***	0.3656**	0.1267	0.1555
	(0.0807)	(0.1423)	(0.0998)	(0.1243)
Overtime work is paid	0.1574	-0.1028	-0.0596	-0.2669*
	(0.1172)	(0.1989)	(0.1167)	(0.1434)
Part-time employment	0.2952***	0.3536	0.4910***	0.5336***
	(0.1093)	(0.2285)	(0.1316)	(0.1597)
Temporary employment	0.3570***	0.7628***	0.0375	0.1735
	(0.1161)	(0.2421)	(0.0975)	(0.1383)
Has recently changed job	-0.0794	-0.1178	0.0134	0.0505
	(0.0935)	(0.1570)	(0.0676)	(0.0861)
Job tenure	-0.0043	0.0059	-0.0166*	-0.0363***
	(0.0082)	(0.0238)	(0.0094)	(0.0136)
Public/Governmental employer	-0.1409	0.2092	0.1095	0.2073
	(0.1153)	(0.2598)	(0.0989)	(0.1294)
Age	0.0018	0.2241	-0.1377	-0.1172
	(0.0340)	(0.1634)	(0.0861)	(0.1263)
Age squared	-0.0002	-0.0042**	0.0292	0.1426**
	(0.0004)	(0.0021)	(0.0285)	(0.0588)
Married	-0.2190	-0.0479	-0.0005	-0.0013*
	(0.1558)	(0.3913)	(0.0004)	(0.0007)
Spouse is employed	-0.1498	-0.0482	-0.1324	-0.0944
	(0.1567)	(0.3485)	(0.0888)	(0.1337)
Number of children	0.0301	-0.2368	-0.0690	-0.2487***
	(0.1001)	(0.2941)	(0.0609)	(0.0912)
Has children in age up to 4 years	-0.4225**	-0.3131	-0.5337***	-0.5886***
	(0.2143)	(0.4440)	(0.1086)	(0.1397)
Has children in age of 5 to 15 years	0.0456	0.3991	0.1053	0.0757
	(0.1771)	(0.4086)	(0.1122)	(0.1439)
Years of education	0.0336	—	0.0195	—
	(0.0274)		(0.0231)	
Constant	-3.1407***	—	-2.2867***	—
	(0.8892)		(0.6785)	
N / Groups	18,262	1,687/466	26,289	5,935 / 846
Chi^2	228.99	66.24	510.58	248.31
Log likelihood	-4,239.30	-590.48	-7,442.67	-2,128.84

Notes: Includes further qualificational, occupational, branch, regional and year of observation controls.
Source: BHPS, GSOEP. Own calculations.

Table A-5.9: Job related expectations and participation in moonlighting, panel regressions for females in Germany and the UK, including additional control variables

	Germany Logit	UK FELogit	Germany Logit	UK FELogit
Wants to work more hours	0.3663***	0.3368	-0.0058	-0.3069*
	(0.1373)	(0.3375)	(0.1171)	(0.1858)
… work less hours	0.2207*	0.4880*	-0.3078***	0.0158
	(0.1176)	(0.2701)	(0.0920)	(0.1520)
Is dissatisfied with job security	-0.2224	0.0857	-0.0284	-0.0231
	(0.1394)	(0.3210)	(0.0898)	(0.1513)
… with pay/household-income	-0.0258	-0.2351	0.1155	0.3794***
	(0.1441)	(0.3492)	(0.0803)	(0.1414)
… with job itself	0.1909	-0.1348	-0.1931*	-0.0953
	(0.1668)	(0.3713)	(0.1040)	(0.1678)
Expects to be promoted	-0.0222	0.7465**	-0.0094	0.0766
	(0.1426)	(0.3423)	(0.0916)	(0.1559)
… get job related training/courses	0.0887	0.0145	0.1272*	-0.1253
	(0.1014)	(0.2327)	(0.0742)	(0.1279)
… start a new job	0.1096	-0.0391	0.2930***	0.4242***
	(0.1622)	(0.3781)	(0.0857)	(0.1438)
… start up own business/become self-employed	1.2987***	0.6187	0.8136***	0.9125***
	(0.1859)	(0.4491)	(0.1605)	(0.3373)
… quit from paid employment	-0.4423**	-0.3304	-0.5065**	-0.2075
	(0.2037)	(0.4541)	(0.2058)	(0.3416)
Log of net wage in first job	0.1261	-0.5423	-0.2363**	-0.7513***
	(0.1415)	(0.3966)	(0.1164)	(0.2267)
Log of non-labor income	-0.0310**	-0.0602	-0.0695**	-0.1748***
	(0.0158)	(0.0499)	(0.0282)	(0.0598)
Weekly work hours	-0.0096	-0.0189	-0.0220***	-0.0069
	(0.0060)	(0.0179)	(0.0066)	(0.0123)
Works overtime	0.5263***	0.5595**	0.1358	0.0690
	(0.0991)	(0.2317)	(0.1203)	(0.2127)
Overtime work is paid	0.2143	-0.4159	0.0166	-0.2438
	(0.1355)	(0.3031)	(0.1362)	(0.2316)
Part-time employment	0.2230*	0.5379	0.4342***	1.0034***
	(0.1255)	(0.3641)	(0.1509)	(0.2619)
Temporary employment	0.3591**	0.7546**	0.0725	0.2521
	(0.1419)	(0.3829)	(0.1228)	(0.2378)
Has recently changed job	-0.1014	0.0859	0.0660	0.0897
	(0.1178)	(0.2634)	(0.0828)	(0.1399)
Job tenure	-0.0060	0.0374	-0.0056	-0.0336
	(0.0087)	(0.0361)	(0.0106)	(0.0241)
Public/Governmental employer	-0.0531	0.1919	0.0975	0.5670**
	(0.1364)	(0.3982)	(0.1145)	(0.2409)
Spouse is employed	-0.1807	0.2774	-0.0007	-0.0497
	(0.1735)	(0.5278)	(0.1009)	(0.2438)
Age	-0.0175	0.2716	-0.0176	0.0218
	(0.0383)	(0.2431)	(0.0343)	(0.1453)
Age squared	0.0001	-0.0051*	0.0002	-0.0015
	(0.0005)	(0.0030)	(0.0004)	(0.0018)
Married	-0.2280	-1.1516	-0.0087	-0.0163
	(0.1756)	(0.7025)	(0.1005)	(0.2550)
Number of children	0.0269	-0.2785	-0.0636	-0.0917
	(0.1198)	(0.4922)	(0.0698)	(0.1724)
Has children in age up to 4 years	-0.4043	0.3250	-0.4324***	-0.5854**
	(0.2475)	(0.7048)	(0.1308)	(0.2402)
Has children in age of 5 to 15 years	0.0671	0.6485	0.2410*	-0.0865
	(0.2082)	(0.6802)	(0.1314)	(0.2479)
Years of education	0.0213	—	0.0089	—
	(0.0238)		(0.0190)	

(Table A-5.9 continued)				
Constant	-2.8554***	—	-1.1622	—
	(0.7400)		(0.8265)	
Observations	10,535	676/257	14,718	2141/517
Chi^2	239.79	47.81	406.43	150.43
Log likelihood	-2,506.19	-219.92	-4,104.96	-723.32

Notes: Includes further qualificational, occupational, branch, regional and year of observation controls .
Source: BHPS, GSOEP. Own calculations.

Table D-5.2: Imposing social security contributions on marginal employment, descriptive statistics

Variable	Mean	Std. Dev.
Has second job in 2000	0.5279	(0.4999)
Job status in 2000: 1=employed, but not moonlighting; 2=employed and moonlighting; 3=not employed	1.5931	(0.5683)
Log of net wage in first job	4.1909	(0.4227)
Log of gross wage in second job	3.0463	(0.7873)
(Non-labor income)/100	4.0672	(6.6908)
(Difference in non-labor income 1998 to 2000)/100	1.1860	(6.8789)
Share of transfer benefits in household-income	3.9140	(5.3976)
Share of second job earnings in household-income	11.8092	(9.0810)
(Spouse's earnings)/100	9.0735	14.2749)
Second job is supplied in family business (*reference category*)	0.0527	(0.2239)
Second job is supplied regularly	0.5931	(0.4920)
Second job is supplied occasionally	0.3540	(0.4789)
Second job supplied in a firm	0.4875	(0.5006)
Second job supplied in private households	0.1614	(0.3685)
Second job supplied: other employer (*reference category*)	0.3788	(0.4858)
Second job occupation: Clerks	0.0807	(0.2728)
Second job occupation: Services	0.0869	(0.2822)
Second job occupation: Manufacturing	0.0559	(0.2300)
First job is part-time employment	0.1459	(0.3536)
White-collar worker	0.5559	(0.4976)
Civil servant	0.3881	(0.4880)
First job is temporary employment	0.0869	(0.2822)
Works overtime	0.5931	(0.4920)
Overtime work is paid	0.1832	(0.3874)
Overtime compensation by leisure in days	0.4565	(0.4988)
Desire to work more hours	0.2080	(0.4065)
Desire to work the same hours (*reference category*)	0.1490	(0.3567)
Desire to work fewer hours	0.6428	(0.4799)
Years of education	12.6350	(2.7225)
Age	38.8602	(9.7585)
Age squared	1605.05	(793.665)
Male	0.6428	(0.4799)
Married woman	0.1832	(0.3874)
Dependent children in household	0.3788	(0.4858)
Number of children aged up to 4 years	0.1180	(0.3765)
Number of children aged 5 to 15 years	0.5279	(0.8542)
West German resident	0.7888	(0.4087)

Notes: N=322 observations.
Source: GSOEP, 1998 and 2000.

Table A-5.14: Moonlighting status of 1998 moonlighters in 2000, multinomial logit model

	Employed, but not moonlighting	Not employed
Log of net wage in first job	-0.4233	-0.5673
	(0.4467)	(1.0751)
Log of gross wage in second job	-0.1328	-0.0903
	(0.1953)	(0.5148)
(Non-labor income)/100	-0.0179	-0.0524
	(0.0261)	(0.0672)
(Difference in non-labor income 1998 to 2000)/100	0.0597**	0.1382***
	(0.0279)	(0.0453)
Share of transfer benefits in household-income	-0.0246	-0.0266
	(0.0386)	(0.1183)
Share of second job earnings in household-income	-0.0267	-0.0303
	(0.0182)	(0.0603)
(Spouse's earnings)/100	-0.0064	-0.0205
	(0.0120)	(0.0372)
Second job is supplied occasionally	1.1743*	-0.4866
	(0.6986)	(1.4902)
Second job is supplied regularly	0.3984	-1.5763
	(0.6622)	(1.3554)
Second job supplied in a firm	0.2403	0.1813
	(0.2919)	(0.7893)
Second job supplied in private households	-0.7047*	-0.0627
	(0.4075)	(1.0960)
Second job occupation: Clerks	-0.0299	-1.0659
	(0.5384)	(1.8504)
Second job occupation: Services	-1.1135**	0.9049
	(0.5134)	(1.1348)
Second job occupation: Manufacturing	0.5091	0.7760
	(0.5976)	(1.5024)
First job is part-time employment	0.5191	1.1748
	(0.4685)	(1.0955)
White-collar worker	-0.2044	-0.6925
	(0.3370)	(0.8684)
Civil servant	-0.9673	-0.9393
	(0.6080)	(1.7899)
First job is temporary employment	-0.9084*	0.5440
	(0.4990)	(1.3696)
Works overtime	-0.1113	-1.2673
	(0.2818)	(0.8002)
Overtime is paid	0.2296	-0.1081
	(0.3644)	(1.0099)
Overtime compensation by leisure in days	-0.0844	0.7344
	(0.2932)	(0.8204)
Desire to work more hours	-1.1455**	-0.0612
	(0.4532)	(1.4053)
Desire to work fewer hours	-0.7424*	1.1536
	(0.3952)	(1.3439)
Years of education	0.0302	-0.1346
	(0.0646)	(0.1920)
Age	0.0344	-0.0439
	(0.1193)	(0.2984)
Age squared	-0.0010	0.0007
	(0.0014)	(0.0036)
Male	-0.5087	-0.7731
	(0.4079)	(1.1343)
Married woman	-0.0781	1.1682
	(0.5667)	(1.5142)
Number of children aged up to 4 years	-0.1743	0.9883
	(0.4338)	(0.9574)

(Table A-5.14 continued)		
Number of children aged 5 to 15 years	0.0866	0.0911
	(0.2368)	(0.7364)
West German resident	0.0168	0.8380
	(0.3985)	(1.1613)
Constant	3.1541	2.3738
	(2.7694)	(7.2001)

Notes: Base category: Employed and moonlighting
N=322; LR Chi^2-value=93.07; Prob > Chi^2 = 0.0065; Log likelihood = -221.39; Pseudo R^2 = 0.1737

Source: GSOEP, 1998 and 2000. Own calculations.

Table A-5.15: Moonlighting participation of 1998 female moonlighters in 2000

	Coefficient	Marginal effect
Log of net wage in first job	1.0526	0.2600
	(0.6739)	(0.1669)
Log of gross wage in second job	0.2100	0.0518
	(0.3762)	(0.0929)
(Non-labor income)/100	0.0465	0.0115
	(0.0346)	(0.0085)
(Difference in non-labor income 1998 to 2000)/100	-0.0231	-0.0057
	(0.0406)	(0.0100)
(Spouse's earnings)/100	0.0131	0.0032
	(0.0151)	(0.0037)
Share of second job earnings in hh-income	0.0171	0.0042
	(0.0293)	(0.0072)
Second job is supplied occasionally	-2.7184**	-0.5298***
	(01.360)	(0.1824)
Second job is supplied regularly	-2.4544*	-0.5436**
	(01.280)	(0.2168)
Second job supplied in a firm	-0.3361	-0.0828
	(0.5579)	(0.1367)
Second job supplied in private household	1.6202**	0.3734**
	(0.7916)	(0.1503)
Second job occupation: Clerks	0.7238	0.1789
	(0.7087)	(0.1708)
Second job occupation: Services	1.7903**	0.4085***
	(0.7215)	(0.1340)
Second job occupation: Manufacturing	0.6378	0.1578
	(1.5772)	(0.3786)
Civil servant	0.9289	0.2260
	(1.3131)	(0.2959)
First job is temporary employment	0.1007	0.0249
	(0.9857)	(0.2453)
Works overtime	0.0658	0.0162
	(0.5345)	(0.1318)
Overtime is paid	-0.6024	-0.1438
	(0.6684)	(0.1513)
Overtime compensation by leisure in days	-0.3592	-0.0886
	(0.5458)	(0.1343)
Desire to work more hours	1.3385*	0.3220**
	(0.7401)	(0.1637)
Desire to work fewer hours	0.9275	0.2241
	(0.7242)	(0.1681)
Age	-0.0937	-0.0231
	(0.1982)	(0.0489)
Age squared	0.0012	0.0003
	(0.0025)	(0.0006)
Years of education	0.1540	0.0380
	(0.1134)	(0.0279)
Dependent children in household	0.1671	0.0414
	(0.5974)	(0.1482)
Constant	-4.7081	—
	(4.7033)	

Notes: N=115; LR Chi^2-value=33.48; Prob > Chi^2 = 0.0943; Log likelihood = -62.44; Pseudo R^2 = 0.2114
Source: GSOEP, 1998 and 2000. Own calculations.

Summary in German[1]

Die vorgelegte Dissertation umfasst empirische Studien aus dem Bereich der Arbeitsökonomik, mit dem Schwerpunkt auf der Analyse des Arbeitsangebots und der Analyse von Verdienstfunktionen. Diese beiden Aspekte werden hier unter verschieden anmutenden Fragestellungen beleuchtet und hieraus abgeleitete Thesen werden auf der Grundlage von Mikrodatensätzen überprüft. Es kommen sowohl standardmäßige wie auch weniger häufig in der Literatur vorzufindende ökonometrische Methoden zur Anwendung.

Die Dissertation bietet somit verschiedene Neuerungen: Zum einen werden Fragestellungen untersucht, die eher nicht zum Mainstream der Arbeitsökonomie zu zählen scheinen und daher in der Literatur bisher wenig Beachtung fanden. Da existierende Analysen zu den im Weiteren noch näher erläuterten Themen zumeist auf der Untersuchung US-amerikanischer Daten basieren, können hier mit der überwiegenden Nutzung deutscher Mikrodaten einerseits Einsichten zur Stichhaltigkeit der in der Literatur vorgebrachten Hypothesen gewonnen werden und andererseits können die erzielten Ergebnisse zukünftige komparative Studien ermöglichen bzw. erleichtern. Unter einem technischen Aspekt ist weiterhin anzuführen, dass in dieser Arbeit vorwiegend Methoden zur Analyse von Panel-Daten herangezogen werden, was im Allgemeinen den bisher zumeist auf Querschnittsdaten begründeten Untersuchungen vorzuziehen ist.

Die Fragestellungen an sich umfassen die Aspekte Religion, Gesundheitsverhalten und atypische Beschäftigung. Die Dissertation ist folglich entsprechend aufgebaut: Nach einem einleitenden Abschnitt (Kapitel 2), der die häufiger in der Arbeit verwendeten ökonometrischen Methoden einführend darstellt, widmet sich das anschließende Kapitel den Folgen individueller Religiosität auf einerseits Einstellungen zur Erwerbstätigkeit von Frauen bzw. Müttern und andererseits den zu beobachtenden ‚outcomes', ob also Religion die Erwerbspartizipation und die Erwerbsverdienste beeinflusst (Kapitel 3).

Hieran schließt sich ein Kapitel an, welches Analysen über den Zusammenhang zwischen

[1] Diese Zusammenfassung in deutscher Sprache dient zur Erfüllung der Anforderung gemäß §6 Abs. 6 der Promotionsordnung für die Fakultät Sozial- und Wirtschaftswissenschaften der Universität Bamberg vom 14. Juli 1982, zuletzt geändert durch die „Achte Satzung zur Änderung der Promotionsordnung für die Fakultät Sozial- und Wirtschaftswissenschaften der Universität Bamberg vom 31. Juli 2002".

individuellem Gesundheitsverhalten und, wieder, ökonomischen Ausprägungen beinhaltet (Kapitel 4). Das Gesundheitsverhalten von Individuen bzw. Erwerbstätigen wird am Indikator ‚Tabakkonsum' festgemacht und es wird untersucht, ob und wie sich erwerbstätige Raucher von Nichtrauchern bezüglich der Fehlzeiten, also der Abwesenheit vom Arbeitsplatz unterscheiden und ob sich Differenzen in den Verdiensten ergeben.

Das letzte inhaltliche Kapitel umfasst Studien, die sich mit einer Erscheinungsform der sogenannten atypischen Beschäftigung, der Nebenerwerbstätigkeit, befassen (Kapitel 5). Zunächst wird in einer Deutschland und Großbritannien vergleichenden Studie analysiert, ob und welche Differenzen es in den Determinanten der Nebenerwerbstätigkeit gibt. Daran anschließend werden quasi in einer Art Fallstudie für Deutschland die Auswirkungen einer Änderungen der Rahmenbedingungen für Nebenerwerbstätigkeit auf das Verhalten von Nebenerwerbstätigen untersucht. Konkret: Es wird analysiert, ob und wie sich die Einführung der Sozialversicherungspflicht für geringfügige Beschäftigungsverhältnisse im Jahr 1999 auf die Partizipation in der Nebenerwerbstätigkeit ausgewirkt hat.

Der Aufbau der Arbeit im Einzelnen gliedert sich wie folgt: Kapitel 2 stellt die in dieser Arbeit häufiger zugrundeliegenden Schätztechniken dar. Hierbei sind die aufgeführten Panel-Methoden *random-effects* und *fixed-effects* mehr oder minder Standard in der empirischen Literatur. Daneben wird jedoch auch auf den von Hausman und Taylor entwickelten Instrument-Variablen (HT-IV) Schätzer eingegangen, der bislang selten in der empirischen Literatur Verwendung gefunden hat. Dieser Schätzer hat im Vergleich zu den vorgenannten den Vorteil, dass er den Anwender nicht einer ‚Alles-oder-Nichts' Entscheidung bezüglich der unterstellten Korrelation zwischen individuenspezifischen Effekten und den erklärenden Variablen aussetzt. Der HT-IV Schätzer basiert auf der Annahme, dass jeweilige Teilmengen von zeitinvarianten und über die Zeit variierenden Regressoren mit den individuenspezifischen Effekten korrelieren wie auch nicht korrelieren. Der Schätzer ist konsistent und effizient und hat überdies den Vorteil, dass er keine über das Sample hinausgehenden Instrumente verwendet.

Kapitel 3 beinhaltet Fragestellungen aus der sogenannten 'Religionsökonomik' (Iannaccone, 1998). Zunächst wird in einer komparativen Studie untersucht, ob und wie sich Religiosität auf die Einstellungen zur Frauenerwerbstätigkeit auswirkt. Hierfür werden Daten des ISSP für drei Wellen aus den 1990er Jahren herangezogen. Obwohl die Surveys unterschiedliche

Befragungsschwerpunkte haben, beinhalten sie doch zwei Indikatoren, die für die Analyse hier geeignet erscheinen. Diese sind a) die Einstellung zur traditionellen Rollenaufteilung zwischen den Geschlechtern und b) die Einstellung zu Vollzeit beschäftigten Müttern. Die Teilstichprobe der Männer wird sodann verwendet, um die Auswirkung auf das Erwerbsverhalten der Ehefrauen zu untersuchen. Die Länder, die zur Analyse herangezogen werden, West- und Ostdeutschland, Italien, Neuseeland und Großbritannien, können als Repräsentanten unterschiedlicher Regime verstanden werden, die sich sowohl hinsichtlich ihrer religiös-kulturellen Geschichte wie auch in ihren Wohlfahrtssystemen unterscheiden. Letztere können Frauenerwerbstätigkeit gleichfalls entscheidend beeinflussen, etwa durch die Ausgestaltung von Kinderbetreuungseinrichtungen.

Die empirischen Ergebnisse legen zunächst nicht überraschend nahe, dass allgemein Männer, Angehörige hierarchischer Religionen, wie etwa dem Katholizismus, sowie religiös aktive Individuen weniger zu liberalen Einstellungen hinsichtlich der Erwerbstätigkeit von Frauen neigen. Daneben gibt es gleichwohl Unterschiede zwischen den betrachteten Ländern. West-Deutsche und Italiener stellen die konservativsten Personen. Zwar mag dies für Italien mit einem Bevölkerungsanteil von über 90% Katholiken geradezu erwartungsgemäß sein, jedoch ist dieser Befund für West-Deutschland eher überraschend.

Die ISSP-Daten werden sodann herangezogen, um die Auswirkungen der Religiosität von Ehemännern auf das Erwerbsverhalten der Ehefrauen zu untersuchen. Zunächst findet man, wiederum eher nicht überraschend, dass die Präsenz von Gatten mit traditonellen Ansichten die Wahrscheinlichkeit einer Erwerbsbeteiligung von Ehefrauen negativ beeinflussen. Darüber hinaus haben jedoch weder konfessionelle Zugehörigkeit noch regelmäßige religiöse Aktivitäten einen statistisch bedeutsamen Effekt. Es gilt hierbei gleichwohl zu beachten, dass lediglich Querschnittsdaten zur Analye herangezogen werden konnten. Die anschließende Studie verwendet daher die Paneldaten des Sozio-oekonomischen Panels (SOEP), um zusätzliche, geeignetere Methoden auf die Fragestellung eines möglichen Effekts von Religion und Religiosität auf das Arbeitsangebot verheirateter Frauen anwenden zu können.

Die hierfür durchgeführte Studie bezieht ihre zu testenden Hypothesen sowohl aus der ökonomischen wie auch der soziologischen Theorie. Diesen Thesen zufolge lässt sich *a priori* erwarten, dass die Zugehörigkeit zu eher strikten religiösen Kirchen oder Gruppen einen negativen Effekt auf Frauenerwerbstätigkeit hat. Darüber hinaus spielt der Haushaltskontext eine gleichsam gewichtige Rolle. Hierbei kann sodann die konfessionelle Zusammensetzung der Paare den angeführten Effekt verstärken oder abmildern. Bei Paaren mit gemeinsamer

Zugehörigkeit zu strikten religiösen Gruppen ist ebenfalls ein negativer Effekt zu erwarten. Paaren mit heterogener Konfessionalität ist vorab indes kein eindeutiger Effekt zuzuordnen. Hier kommt zusätzlich der Verhandlungsmacht der Ehepartner bei z.B. möglichen Konflikten über die konfessionelle Erziehung gemeinsamer Kinder eine entscheidende Bedeutung zu.

Die empirischen Resultate können die Thesen nur schwach und eher indirekt stützen. Es gibt z.B. keine eindeutigen Strukturen, die einen Effekt konfessioneller Zugehörigkeit auf die Frauenerwerbstätigkeit nachzeichnen können. Allerdings ist die konfessionelle Zugehörigkeit ein schwacher Indikator für Religiosität. Daher werden Indikatoren für sowohl religiösen Glauben wie für die Teilnahme an religiösem Leben zur weiteren Untersuchung herangezogen. Hier zeigen sich sodann für Querschnitts- wie für Panel-Schätzungen, dass starker religiöser Glaube und höher-frequente Teilnahme an religiösem Leben Einfluss auf das Erwerbsverhalten von verheirateten Frauen hat. Zudem zeigt sich wiederum, dass die Präsenz von Ehemännern mit starker religiöser Überzeugung gleichfalls negativ auf die Erwerbsbeteiligung ihrer Frauen wirkt.

Die genannten Indikatoren werden auch im letzten Abschnitt dieses Kapitels herangezogen, welcher sich mit dem Zusammenhang zwischen Religiosität und Verdiensten von Männern in Deutschland befasst. Die Erkenntnisse bisheriger Studien zeigen, dass Religion sowohl positive wie negative Auswirkungen haben kann. So mag einerseits eine ablehnden Haltung gegenüber der Aufhäufung irdischer und mithin materieller Güter vorherrschen, was sich in niedrigeren Verdiensten niederschlagen könnte. Andererseits sieht z.B. Max Webers ‚Protestantische Arbeitsethik' keinen Widerspruch in irdischem, sich in Vermögen niederschlagendem Streben und göttlichem Wohlgefallen. Hier wäre also ein eher positiver Einfluss zu erwarten.

Die nach dem zweiten Weltkrieg stark unterschiedliche Historie Ost- und West-deutschlands auch in Bezug auf die Entwicklung der Kirchen und des religiösen Lebens zeigt sich sodann auch in den empirischen Ergebnissen. Zunächst scheint auf der Grundlage von Querschnittsdaten für ostdeutsche Männer kein Zusammenhang zwischen Religiosität und Verdiensten zu bestehen; Westdeutsche Erwerbstätige mit konfessioneller Bindung verzeichnen hingegen Lohnabschläge von 6-8%. Allerdings verlieren sich diese negativen Effekte bei der Anwendung geeigneterer Panelmethoden, so dass das möglicherweise nicht unerwartete Ergebnis, dass weder Konfession, noch religiöser Glaube noch Teilnahme an religiösem Leben sich auf Verdienste von Männer auswirkt, zumindest für Westdeutschland gestützt werden kann. Für ostdeutsche Männer bestätigt sich hingegen, dass ein starker

religiöser Glauben mit niedrigeren Verdiensteinkommen einhergeht.

Eine Untersuchung von möglichen Verdienstdifferentialen wird auch im sich anschließenden vierten Kapitel vorgenommen. Konkret wird untersucht, ob sich Unterschiede in den Erwerbseinkommen zwischen Rauchern und Nichtrauchern ergeben und insbesondere ob, wie für die USA in etlichen Studien belegt, Raucher auch in Deutschland niedrigere Verdienste als Nichtraucher beziehen. Die theoretische Grundlage ist hier jedoch alles andere als reichhaltig. Unter den wenigen Argumenten, die Lohnabschläge bei Rauchern hypothetisieren, findet sich die Aussage, dass Raucher Individuen mit höherer Zeitpräferenzrate seien. Demnach wären Raucher weniger bereit, in Humankapital zu investieren, was sich sodann in niedrigeren Einkünften zeigen würde. Neben der Analyse der Verdienstdifferentiale an sich werden vereinfachte Tests für solche theoretischen Aussagen durchgeführt.

Vor dieser Studie wird jedoch zunächst der Frage nachgegangen, ob sich Raucher in einem anderen Bereich des Erwerbsverhaltens von Nichtrauchern unterscheiden, nämlich ob Raucher höhere Fehlzeiten aufweisen. Auch hier könnte eine höhere Zeitpräferenz zu gleichsam häufigerer Abwesenheit vom Arbeitsplatz führen. Zudem würden höhere Fehlzeiten auf eine möglicherweise niedrigere Produktivität von Rauchern hinweisen, was ein weiteres in der Literatur angeführtes Argument für niedrigere Einkommen ist.

Die Resultate der empirischen Analysen deuten sodann darauf hin, dass Raucher häufigere und längere Fehlzeiten als Nichtraucher aufzeigen. Da sich dieser Unterschied auf etwa einem Arbeitstag pro Jahr beläuft, mag man die ökonomische Bedeutung indes als nicht gar so bedeutsam auslegen. Die Anwendung von Zähldatenmodellen legt überdies nahe, dass mit der Ausnahme für junge männliche wie weibliche Raucher Tabakkonsum nur ein schwacher statistischer Indikator für die Abwesenheit vom Arbeitsplatz ist. Die sich anschließende Analyse der Verdienste von Rauchern und Nichtrauchern zeigt, dass in der Literatur vorzufindende Erkenntnisse nur teilweise für den deutschen Fall bestätigt werden können. So sind die Verdienste von Frauen nicht von Tabakkonsum beeinträchtigt. Rauchende Männer hingegen scheinen einen Verdienstabschlag in Höhe von etwa 2% zu tragen. Da dies jedoch aus der Anwendung des OLS-Schätzers auf der Grundlage gepoolter Daten resultiert, verwundert es nicht, dass die vorzuziehenden Methoden für Paneldaten ein anderes Ergebnis hervortreten lassen. Demnach sind auch die Erwerbseinkommen von Männern nicht vom Rauchverhalten betroffen. Vielmehr noch deutet sich ein möglicher positiver Effekt für die Gruppe junger Raucher an. Hier mag folglich spekuliert werden, ob diese Erwerbstätigen

Individuen mit höherer Zeitpräferenzrate sind. So kann argumentiert werden, dass junge, rauchende Männer nicht im gleichem Maße wie nichtrauchende junge Männer in Humankapital investieren. Dies mag sich sodann in für diese Gruppe längerer Erwerbstätigkeit und mithin in der Tendenz zu relativ höheren Verdiensten zeigen. Weiterhin belegen die durchgeführten, vereinfachten Tests nicht, dass Raucher Individuen mit geringerer Produktivität sind. Es findet sich allerdings (statistisch schwache) Evidenz für geringere Renditen für Arbeitserfahrung, also die Zeiten möglicher Erwerbstätigkeit. Dies ist sodann wieder in Übereinstimmung mit der Annahme höherer Zeitpräferenzraten unter Rauchern, was sich hier in einer geringeren Neigung zur Investition in ‚on-the-job' Training ausdrücken könnte.

Studien zur Nebenerwerbstätigkeit werden im letzten Essay, Kapitel 5, dargestellt. Zwar gibt es eine reichhaltige empirische Literatur zu atypischer Beschäftigung, jedoch stehen hier vor allem Teilzeiterwerbstätigkeit und befristete Beschäftigung im Mittelpunkt des Interesses. Nebenerwerbstätigkeit, welche gleichfalls als Ausprägung atypischer Beschäftigung betrachtet werden kann, ist bisher ein eher wenig beachteter Untersuchungsgegenstand, obwohl die vorliegenden Studien zeigen, dass ein von Erwerbstätigen ausgeführter zweiter Job alles andere als eine Ausnahmeerscheinung ist.

Zunächst wird die Theorie der Nebenerwerbstätigkeit kurz diskutiert. War es anfänglich noch vor allem die Annahme der Existenz von Arbeitszeitbeschränkungen, die Erwerbstätige zur Aufnahme eines zweiten Jobs bewegen können, so ist in jüngerer Zeit vermehrt auf die mögliche Heterogenität von Beschäftigungen als Grund der Nebenerwerbstätigkeit verwiesen worden. Evidenz für beide Motive findet sich folglich auch in der sodann dargestellten komparativen Analyse, welche die Determinanten der Nebenerwerbstätigkeit in Großbritannien und Deutschland untersucht. Diese Länder weisen große Unterschiede hinsichtlich der Institutionen auf dem Arbeitsmarkt auf, mit Großbritannien als Fürsprecher eines sehr liberalen, Deutschland hingegen als Vertreter eines eher restriktiven Arbeitsmarktregimes. Hier würde folglich die ausschließliche Annahme von Arbeitszeitbeschränkungen für den Fall des britischen Arbeitsmarktes, auf dem mit höherer Wahrscheinlichkeit optimale, den Präferenzen der Akteure entsprechende Verhandlungsergebnisse realisiert werden können, zu kurz greifen.

Basierend auf Analysen der Mikrodaten des SOEP für Deutschland und des BHPS für Großbritannien zeigt sich, dass die zugrundeliegenden Determinanten der Nebenerwerbstätigkeit mehr Ähnlichkeiten als Unterschiede aufweisen und beide theoretischen Hauptmotive

empirisch stützen. In beiden Ländern gibt es Gruppen von Erwerbstätigen, die sich im Hauptjob Arbeitszeitbeschränkungen ausgesetzt sehen. Gegeben dass der im Zweitjob erzielbare Lohn den Anspruchslohn übersteigt, haben diese Erwerbstätigen einen Anreiz, mehr Arbeit in Form einer weiteren Beschäftigung anzubieten, um sich somit besser zu stellen. Daneben gibt es jedoch auch Evidenz für den heterogenen Charakter von Tätigkeiten. Zum Beispiel sind die Aussicht, eine neue Beschäftigung aufzugreifen oder gar selbstständig zu werden, gute Indikatoren einer höheren Wahrscheinlichkeit, einen Zweitjob innezuhaben. Dies kann damit erklärt werden, dass eine solche weitere Beschäftigung herangezogen werden kann, um Fähig- und Fertigkeiten, die für kommende Aufgaben benötigt werden, zu erwerben oder zu verbessern.

Obwohl also die vorhandenen Unterschiede in den Arbeitsmarktregimes sich nicht in großen Unterschieden im Nebenerwerbstätigkeitsverhalten niederschlagen, bleibt die Zweitbeschäftigung, wie jede andere Form der Erwerbsätigkeit auch, Gegenstand institutioneller Rahmenbedingungen. Wie sich eine Änderung solcher Rahmenbedingungen auswirken kann, zeigt die letzte Studie. Die dargestellte Analyse untersucht ein gleichsam ‚natürliches Experiment', dass sich auf dem deutschen Arbeitsmarkt vollzogen hat. So wurde im Jahr 1999 die Sozialversicherungspflicht für geringfügige Beschäftigung eingeführt. Vor dieser Reform wurden viele Nebenerwerbstätigkeiten im Rahmen dieser Beschäftigungsform geführt. Die sodann obligatorischen Sozialversicherungsabgaben durch die paritätische Belastung von Arbeitgeber und Arbeitnehmer hatten eine Anhebung der Arbeitskosten auf Arbeitgeberseite wie auch eine Senkung des Nettolohns im Zweitjob zur Folge. Gleichwohl konnte aufgrund des Einkommens- und Substitutionseffektes einer solchen Lohnsenkung *a priori* nicht gesagt werden, ob weniger zweite Jobs angeboten würden.

Wenngleich erste, deskriptive Ergebnisse auf ein starkes Sinken der Nebenerwerbstätigkeit hindeuten, könnte eine solch vereinfachte Analyse irreführen. Folglich ist hier eine (pseudo-)kontrafaktische Situation herangezogen worden, um die ‚normale' Entwicklung von den durch die Reform bedingten Änderungen isolieren zu können. Es zeigt sich, dass Nebenerwerbstätigkeit eine eher hohen Schwankungen unterworfene Beschäftigungsform ist. Gleichwohl hatte die Einführung der Sozialversicherungspflicht zunächst große, negative Auswirkungen. Allerdings scheinen sich Nebenerwerbstätige dieser Art exogenen Schocks schnell angepasst zu haben, denn es zeigt sich weiterhin, dass sich im zweiten Jahr nach der Reform die ‚natürliche Dynamik' im großen und ganzen wieder auf dem Niveau der Jahre vor der Reform befand.

Die Ergebnisse multivariater Analysen, die mögliche Determinanten der Entscheidung, eine Zweitbeschäftigung auch nach der Reform beizubehalten, sind indes eher unzufriedenstellend. Nur wenige der herangezogenen Größen können zur Erklärung der Variation in den Daten beitragen. Nicht überraschend zeigt sich zum Beispiel, dass sich vor der Reform nur gelegentlich ausgeübte Nebenerwerbstätigkeit negativ auf die Kontinuität der Zweitbeschäftigung auswirkt. Gleichfalls nicht überraschend ist der positive Effekt des Wunschs nach einer höheren Arbeitszeit. Erwerbstätige, die in 1998 einen Zweitjob als Dienstleistung oder in privaten Haushalten ausgeübt haben, neigen gleichfalls eher dazu, diesen in 2000 beibehalten zu haben.

Es kann nicht abgestritten werden, dass die drei hier dargelegten Essays recht unterschiedliche Fragestellungen zum Inhalt haben. Dennoch hebt sich zum einen in allen Studien ein Hauptergebnis methodischer Natur hervor: die Notwendigkeit, in derartigen empirischen Studien die sogenannte unbeobachtete individuelle Heterogenität zu berücksichtigen. Während sich nämlich die Ergebnisse bisheriger Untersuchungen überwiegend auf die Analysen von Querschnittsdaten beziehen, so finden diese in den Resultaten der Panel-Analysen hier überwiegend keine empirische Unterstützung. Es ist allerdings zu beachten, dass das SOEP die vorrangig verwendete Datenquelle ist. Man kann also nicht auszuschließen, dass bisher vorliegende theoretische Überlegungen für Deutschland schlicht nicht haltbar sind. Gleichwohl dürfte es plausibler sein anzunehmen, dass individuenspezifische Effekte die hier bestehenden Ergebnisse erklären.

Zum anderen sollte das hier zusammgetragene Material nicht als letzte Antwort auf die erörterten Fragen verstanden werden. Vielmehr ist darin ein kleiner Beitrag zur vorhandenen empirischen Literatur zu sehen und als erster Schritt zukünftiger Arbeit aufzufassen, die zeigen wird, dass die ökonomische Analyse vermeintlich abwegiger Fragestellungen sehr wohl dazu beitragen kann, das Verständnis individuellen Verhaltens im Allgemeinen und von Arbeitsangebotsentscheidungen im Besonderen zu erweitern.