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For Peer Review

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Gender Differences in Entrepreneurial Choice and Risk Aversion

– A Decomposition Based on a Microeconomic Model

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February 23, 2010

Abstract:

Why are female entrepreneurs so rare? In Germany, women exhibit both a lower entry rate into and higher exit rate from self-employment. To explain this gender gap, this study estimates a structural microeconomic model of transition rates that includes a standard risk aversion parameter. Inputs into the model are the expected value and variance of earnings from self-employment and dependent employment, estimated separately by gender and accounting for nonrandom selection into self-employment. The gender differential in the transition rates is decomposed using a novel extension of the Blinder-Oaxaca technique for nonlinear models. Women's higher estimated risk aversion explains the largest part of their higher exit rate but only a small portion of their lower entry rate.

JEL classification: J23, J16, D81

Keywords: Entrepreneurship, Self-Employment, Risk Aversion, Gender Differential, Nonlinear Blinder-Oaxaca Decomposition

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1 Introduction

In almost all OECD countries, the share of the self-employed persons among all those employed is much lower among women than among men. Specifically, the averages were 18.3% among men and only 13.4% among women in 2007, according to OECD Annual Labour Force Statistics. In Germany, where the overall self-employment rate is lower, these respective shares were 14.4% and 9.2% (Figure 1).²

INSERT FIGURE 1 ABOUT HERE

This significant gender difference in self-employment rates is puzzling, especially considering that there are reasons why self-employment may even be more attractive to women. For example, if the well-known wage differential between men and women in dependent employment results even partly from employer discrimination in hiring and promoting decisions, women could escape such forms of discrimination by choosing self-employment. Moreover, the greater flexibility that self-employment affords with regard to the timing and location of work may facilitate the combination of paid work with child care, which remains primarily the responsibility of women (Budig, 2006).

Lower self-employment rates among women may reflect discrimination by creditors and consumers, which may have more severe consequences than employer discrimination.³ Risk aversion may provide another explanation, in that the earnings of self-employed workers are much more volatile than those of employees with comparable characteristics (Borjas and Bronars, 1989; Heaton and Lucas, 2000), and extant literature confirm women are more risk averse than men (e.g., Borghans *et al.*, 2009; Caliendo, Fossen, and Kritikos, 2009; Dohmen *et al.*, forthcoming).

² Only in Mexico and Turkey are women's self-employment shares higher than men's, which may reflect the high number of small agricultural establishments in these countries. Blanchflower (2000) offers more detail about self-employment in OECD countries, including the lower self-employment rate among women.

³ Credit constraints for entrepreneurs have been widely discussed (e.g., Disney and Gathergood, 2009; Hurst and Lusardi, 2004). It is plausible that they may be more severe for female entrepreneurs. Borjas and Bronars (1989) discuss consumer discrimination in the context of self-employed African-Americans.

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3 To study gender differences, including those related to employment, the Blinder-Oaxaca
4 decomposition approach and its variations offer a compelling option. Georgellis and Wall
5 (2005) use this technique in logit models to analyze women's lower transition rates from
6 salaried into self-employment. Fairlie (1999) applies the same method to decompose the gap
7 between African-Americans and white workers involved in self-employment in the United
8 States. However, these studies do not address the potential role of differences in risk
9 preferences, nor can they separate this effect from potential lending or consumer
10 discrimination, as Fairlie (1999, page 97) acknowledges explicitly.⁴
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22 Therefore, in an attempt to contribute to explanations of gender differences in self-
23 employment, this study explicitly considers the role of risk aversion. The proposed approach
24 estimates a structural microeconomic model of entries into and exits out of self-
25 employment; the model includes the Arrow-Pratt coefficient of constant relative risk aversion
26 (CRRA) as a parameter. This allows decomposing the gender differentials in transition rates
27 into three components: differences in observed endowments, differences in the
28 econometrically estimated levels of risk aversion, and differences in the other estimated
29 coefficients, which may be related to creditor or consumer discrimination. This decomposition
30 is a novel extension of the Blinder-Oaxaca technique for nonlinear models.
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43 The structural transition models estimated in this paper relate to work by Kanbur (1982)
44 and Kihlstrom and Laffont (1979), who model entrepreneurial choice as a trade-off between
45 risk and returns. They suggest that less risk-averse people become entrepreneurs and receive a
46 risk premium to compensate for the greater variance of their earnings. The historical roots of
47 these models stem from Knight (1921), who argues that the central role of the entrepreneur is
48 to bear uncertainty. Recent empirical studies also find that risk attitudes play a significant role
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⁴ Wagner (2007) also analyzes gender differences among nascent entrepreneurs using a matching approach and controls for mentions of "fear of failure" as a reason not to start a business. Though an interesting variable, fear of failure differs from risk aversion, in that it depends on the person's expected success probability.

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3 in the decision to become and remain self-employed (Caliendo, Fossen, and Kritikos, 2008,
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5 2009; Cramer *et al.*, 2002).
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8 Thus, the proposed microeconomic transition models take into account both the
9
10 expected value and the variance of earnings in self-employment and dependent employment.
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12 In the estimation of the first and second moments of gross earnings, nonrandom selection into
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14 the alternative employment states is controlled for, in line with Kunze's (2005) finding about
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16 the importance of selection in an analysis of gender differentials. Because taxation also
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18 influences entrepreneurial choice (e.g. Bruce, 2002; Cullen and Gordon, 2007; Fossen and
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20 Steiner, 2009; Schuetze, 2000), net income is calculated on the basis of estimated gross
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22 income using an estimated tax function. Lifetime income, rather than just one period,
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24 influences the significant decision to enter or exit self-employment. This is taken into account
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26 by predicting the profiles of the future expected value and variance of net earnings over each
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28 person's lifetime, conditional on the choice to be self- or dependently employed. Annuities of
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30 these streams enter the structural transition model.
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36 Attempts to estimate structural models of entrepreneurial choice by incorporating
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38 earnings and risk have been very rare. Rees and Shah (1986) formulate a model of the
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40 probability of being self-employed assuming a CRRA utility function, but they use a
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42 simplified model without an explicit risk parameter in the estimation. Pfeiffer and Pohlmeier
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44 (1992) specify a similar model and actually estimate its parameters using the first waves of
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46 the German Socio-Economic Panel; however, their model does not allow for individual
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48 differences in the level of earnings risk.⁵
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53 The results obtained in this paper, derived from estimating the structural transitions
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55 models, indicate the presence of risk aversion and confirm the theoretical presumptions:
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58 ⁵ A related stream of literature has analyzed earnings differentials between self- and dependent employment,
59 without considering differences in the variance of earnings. For example, Fraser and Greene (2006) and Taylor
60 (1996) confirm that higher expected earnings from self-employment relative to paid employment significantly
increase the probability of becoming self-employed; Hammarstedt (2006) establishes the same result for Swedish
immigrants; and Dolton and Makepeace (1990) and Rees and Shah (1986) find a positive but insignificant effect.
Hamilton (2000) instead concludes that factors other than earnings induce people to become self-employed.

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3 Higher expected net earnings in self-employment, relative to dependent employment, attract
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6 people to become and remain self-employed, whereas higher variance discourages them from
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8 doing so. Women are more risk averse than men, consistent with prior literature. The
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10 decomposition of the gender differentials in the transition rates indicates that women's higher
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12 estimated risk aversion explains the largest part of their greater exit rate out of self-
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14 employment, though it can explain only a small portion of their lower entry rate.
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17 The next section of this article develops the proposed structural transition model and
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19 translates it into an empirical discrete time hazard rate model. It also briefly describes the
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21 methodology for estimating the lifetime annuities of the expected value and the variance of
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23 net earnings, controlling for selection. Section 3 introduces the data, and then Section 4
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25 presents the estimation results, along with a sensitivity analysis and the decomposition of the
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27 gender differential in the estimated transition rates. Section 5 concludes.
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33 2 Structural Transition Model

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36 The analysis of entrepreneurial choice depends on a model of the decision to switch between
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38 the two states, dependent employment and self-employment, in a discrete time hazard rate
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40 framework.⁶ This approach consistently takes into account duration dependence.⁷ Transitions
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42 from dependent to self-employment (entry model) and from self- to dependent employment
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44 (exit model) are specified analogously; the following sections describe the entry model.
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48 In a given period t , a dependently employed person rationally chooses whether to remain
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50 dependently employed or switch to self-employment in the following period $t + 1$. Assume a
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52 random utility function with CRRA⁸ and increasing utility for money $y > 0$. Utility in the two
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57 ⁶ For more detail about this model, see Fossen (2009a). Fossen (2009b) also uses a similar model to study the
58 effects of progressive income taxation on self-employment.

59 ⁷ Similar analyses of entrepreneurial exit using hazard rate models appear in Evans and Leighton (1989),
60 Audretsch and Mahmood (1995), Taylor (1999), and Haapanen and Tervo (2009), as well as Falck (2007), who
uses German establishment data.

⁸ Alternatively one could assume constant absolute risk aversion (CARA). The advantage of the CARA utility is
that a closed-form representation of expected utility exists if y is normally distributed, and no Taylor

alternative employment states $j \in \{se;e\}$ (self-employment and dependent employment, respectively) may vary across observations, depending on the observable characteristics and covariates x_i , the duration in dependent employment d_i , and an error term ε_{ij} . Thus,

$$U_j(y_{ij}, x_i, d_i, \varepsilon_{ij}) = \begin{cases} \alpha \frac{y_{ij}^{1-\rho}}{1-\rho} + \beta'_j x_i + \varphi_j(d_i) + \varepsilon_{ij}; & \rho \neq 1 \\ \alpha \ln y_{ij} + \beta'_j x_i + \varphi_j(d_i) + \varepsilon_{ij}; & \rho = 1, \end{cases} \quad (1)$$

where i is an index of observations from the pooled sample of dependently employed persons, and y_{ij} is a person's current lifetime annuity of future net income in state j , starting from $t + 1$. Both $y_{i,se}$ and $y_{i,e}$ are random variables, because future income is risky. The parameter α reflects the weight of the risk-adjusted income annuity in the utility function. The coefficient of CRRA (Pratt, 1964), ρ indicates risk preference when $\rho < 0$, risk neutrality when $\rho = 0$, and risk aversion when $\rho > 0$. The error term ε_{ij} captures unobservable tastes that influence utility; they are unobservable to the researcher and thus treated as a random variable, but they are known to the workers in the sample, unlike the realization of future earnings y . These unobserved factors influencing utility in self-employment might include the desire to be independent (Taylor, 1996) or the belief in the power of one's own actions (Evans and Leighton, 1989). The function φ_j describes a potentially nonlinear influence of the spell duration in dependent employment on utility in each of the two states, such as through habituation.

Expected utility with respect to the random income annuity y_{ij} can be approximated by a second-order Taylor series:

$$E(U_j(y_{ij}, x_i, d_i, \varepsilon_{ij})) \approx \begin{cases} \alpha \left(\frac{\mu_{y,ij}^{1-\rho}}{1-\rho} - \frac{1}{2} \rho \mu_{y,ij}^{-\rho-1} \sigma_{y,ij}^2 \right) + \beta'_j x_i + \varphi(d_i) + \varepsilon_{ij}; & \rho \neq 1 \\ \alpha \left(\ln \mu_{y,ij} - \frac{1}{2\mu_{y,ij}^2} \sigma_{y,ij}^2 \right) + \beta'_j x_i + \varphi(d_i) + \varepsilon_{ij}; & \rho = 1, \end{cases} \quad (2)$$

approximation is needed. However, prior research prefers CRRA as the more realistic specification (in the context of entrepreneurship, see Kanbur, 1982; Pfeiffer and Pohlmeier, 1992; Rees and Shah, 1986).

where $\mu_{y,ij} = E(y_{ij})$, and $\sigma_{y,ij}^2 = Var(y_{ij})$. For $\alpha > 0$ and $\mu_{y,ij} > 0$, Equation 2 implies that for risk-averse agents, expected utility decreases with greater variance of earnings; for risk-neutral agents, the variance does not matter; and for risk-loving agents, greater variance actually increases expected utility.

Because an agent chooses the employment state that provides the highest utility, the probability that he or she decides to switch to entrepreneurship is as follows:

$$\begin{aligned} \text{Prob}(trans_i = 1 \mid y_{i,se}, y_{i,e}, x_i, d_i) &= \text{Prob}(E(U_{se}(y_{i,se}, x_i, d_i, \varepsilon_{i,se})) > E(U_e(y_{i,e}, x_i, d_i, \varepsilon_{i,e}))) \\ &= \text{Prob}(\varepsilon_{i,e} - \varepsilon_{i,se} < \alpha(V(y_{i,se}) - V(y_{i,e})) + (\beta_{se} - \beta_e) x_i + \varphi_{se}(d_i) - \varphi_e(d_i)) \\ &= F(\alpha(V(y_{i,se}) - V(y_{i,e})) + \beta x_i + \varphi_{se}(d_i) - \varphi_e(d_i)), \end{aligned} \quad (3)$$

where $trans_i$ is a binary indicator variable that equals 1 if a transition to self-employment occurs between t and $t + 1$, and 0 otherwise; $\beta = \beta_{se} - \beta_e$; F is the cumulative density function of the error term $\varepsilon_i = \varepsilon_{i,e} - \varepsilon_{i,se}$; and

$$V(y_{ij}) = \begin{cases} \frac{\mu_{y,ij}^{1-\rho}}{1-\rho} - \frac{1}{2} \rho \mu_{y,ij}^{-\rho-1} \sigma_{y,ij}^2; & \rho \neq 1 \\ \ln \mu_{y,ij} - \frac{1}{2\mu_{y,ij}^2} \sigma_{y,ij}^2; & \rho = 1 \end{cases} \quad (4)$$

can be interpreted as the risk-adjusted expected income annuity. The probability of remaining in dependent employment is the complementary probability:

$$\text{Prob}(trans_i = 0 \mid y_{i,se}, y_{i,e}, x_i, d_i) = 1 - \text{Prob}(trans_i = 1 \mid y_{i,se}, y_{i,e}, x_i, d_i) = 1 - F(\cdot). \quad (5)$$

The functional form of the functions φ_j of the duration in employment state j is specified as a cubic polynomial (higher-order polynomials are not significant; see Section 4.3):

$$\varphi_j(d_i) = \delta_{1j} d_i + \delta_{2j} d_i^2 + \delta_{3j} d_i^3. \quad (6)$$

It then follows that

$$\varphi_{se}(d_i) - \varphi_e(d_i) = \delta_1 d_i + \delta_2 d_i^2 + \delta_3 d_i^3, \quad (7)$$

where $\delta_k = \delta_{k,se} - \delta_{k,e}$ for $k \in \{1;2;3\}$. The log-likelihood function for the sample of dependently employed persons in the entry model therefore can be written as

$$\ln L = \sum_{i=1}^N [trans_i \ln F(\alpha(V(y_{i,se}) - V(y_{i,e})) + \beta'x_i + \delta_1 d_i + \delta_2 d_i^2 + \delta_3 d_i^3) + (1 - trans_i) \ln(1 - F(\alpha(V(y_{i,se}) - V(y_{i,e})) + \beta'x_i + \delta_1 d_i + \delta_2 d_i^2 + \delta_3 d_i^3))] \quad (8)$$

To complete the specification of the likelihood function, it remains to specify the cumulative density function F of the error terms $\varepsilon_i = \varepsilon_{i,e} - \varepsilon_{i,se}$ in Equation 3. Following McFadden's (1974) random utility model, assume the error terms $\varepsilon_{i,e}$ and $\varepsilon_{i,se}$ are independently and identically distributed, with type-I extreme value distribution. As McFadden shows, it follows that F is the cumulative logistic probability distribution. Alternatively assuming that F is the cumulative normal distribution yields similar results (see Section 4.3).

People can experience multiple spells in self-employment or dependent employment during the observation period. If the person–period observations i are indexed by person, spell number, and spell duration d , the model can be written as a discrete time hazard rate model, in which the hazard rate $\lambda_{pk}(d)$ is the probability that spell k of person p ends in period d , that is, that a transition occurs, conditional on survival until the beginning of d . The function φ is the baseline hazard in the hazard rate model. The maximum likelihood method allows consistently taking into account not only completed spells but also right- and left-censored spells in the estimation. Right-censored spells contribute to the likelihood function through Equation 5. For left-censored spells, retrospective employment history information in the data make it possible to recover the spell duration d and include these spells consistently in the likelihood function (Caliendo, Fossen, and Kritikos, 2008).

The vector x_i controls for variables that emerge as important determinants of self-employment in prior studies: age, education, work experience, unemployment experience, number of children, region, and a constant (e.g., Evans and Leighton, 1989; Taylor, 1996; for German data specifically, see Georgellis and Wall, 2005; Holtz-Eakin and Rosen, 2005). Furthermore, Parker (2008) and Brown, Farrel, and Sessions (2006) find evidence that the household context influences a person's decision to be self-employed. This study accounts for

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3 this influence by controlling for marital status, spouse's employment state if applicable, and
4 the income of other household members in x_i . Section 3 includes a discussion of the data, and
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8 Section 4.3 details a sensitivity analysis with respect to the control variables.
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10 As mentioned, the exit model based on the sample of self-employed persons is specified
11 analogously to the entry model.⁹ The entry and exit models are estimated jointly with the
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Before the transition model can be estimated by maximizing the likelihood function, the expected value of the net income annuity μ_y and its variance σ_y^2 in the two alternative employment states are required for each person in each period, because these statistics enter the likelihood function through V . The methodology for estimating μ_y and σ_y^2 and the related results are described in detail by Fossen (2009a). In short, gross income is estimated using Mincer-type earnings regressions, and the variance in gross income is predicted on the basis of estimated heteroscedasticity functions. Selection into the two employment states is controlled for with a two-step procedure. Furthermore, the German tax benefit system gets approximated by regressing an observed proxy of individual average tax rates on polynomials of gross income and other variables relevant to taxation. Then net income can be calculated from the estimated gross income, using the estimated tax function. Because income matters not just for a single period but over the person's lifetime, the profiles of future expected net income and net income variance are predicted over each person's lifetime conditional on the choice to be an entrepreneur or a wage worker. Annuities of net income and net income variance are calculated using the net present value method; the individual horizon is assumed

⁹ The only difference is that the coefficient α of the risk-adjusted income differential (i.e., difference between self-employment and dependent employment in both models) is expected to be negative in the exit model. In the estimation of the parameters, α is left unconstrained, so a check to determine if α has the expected sign in all models serves as a test of the models' consistency.

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3 to be reached at age 64 years. The real interest rate is assumed to be 5%; a sensitivity
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5 assessment with respect to this real interest rate appears in Section 4.3.
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8 9 **3 Data**

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12 This analysis is based on the German Socio-Economic Panel (SOEP), a representative, yearly
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14 panel survey that includes detailed information about the socio-economic situation of 10,000–
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16 25,000 persons living in 5,000–13,000 households in Germany. This analysis draws on 22
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18 waves, starting with the first one available, from 1984 to 2005.¹⁰ Specific groups are
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20 oversampled in the SOEP, especially migrants (since 1994) and high-income households
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22 (since 2002). Sampling weights allow for population-representative statistics. Wagner, Frick,
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24 and Schupp (2007) provide a detailed description of these data.
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29 The SOEP offers some advantages that are crucial for this kind of analysis. The large
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31 scale of the database, in both the number of persons surveyed and the longitudinal dimension,
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33 provides observations of a sufficient number of transitions into and out of self-employment,
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35 especially by women. Observing the same persons for many years, in addition to gathering
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37 retrospective employment history information, minimizes censoring problems when
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39 estimating the hazard rate models. The rich set of information provided by the SOEP also
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41 allows for controlling the well-known determinants of self-employment, as identified in prior
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43 studies (see Section 2). However, the choice of variables obviously is limited to that which is
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45 available in the SOEP; a general-purpose survey cannot answer all questions that a researcher
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47 would pose in a specific questionnaire designed for this topic. Further research therefore
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49 might inquire, for example, if a respondent who currently is in dependent employment would
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51 like to be self-employed and, if so, what barriers that respondent perceives. It also would be
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53 valuable to include specific questions about people's efforts to obtain credit to finance their
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¹⁰ The 2005 wave is used to obtain retrospective income information for 2004 only.

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3 business and the success of such attempts, as well as other issues directly related to potential
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5 creditor and consumer discrimination.
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8 For an analysis of transitions between employment states, the SOEP sample is restricted
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10 to persons between 18 and 64 years of age and excludes farmers, civil servants, and those
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12 currently in educational, vocational training, or military service. The persons excluded
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14 presumably have a limited occupational choice set or experience different determinants of
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16 earnings and occupational choices that could distort our analysis. Family members working
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18 for a self-employed relative are also excluded from the study data set, because they are not
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20 entrepreneurs in the sense of running their own business. Working persons are classified as
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22 self-employed or dependently employed, based on whether they report self-employment or
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24 dependent employment as their primary activity. A transition can be identified in the data
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26 when a person reports different employment states in two consecutive years, t and $t + 1$.
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31 This study focuses on the choice between full-time dependent employment and full-time
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33 self-employment, because the goal is a comparison of earnings in the two alternative
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35 employment states, not the decision to work full-time or part-time or work or not work. Thus,
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37 as in Taylor (1996) and Rees and Shah (1986), the structural transition models are based on
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39 full-time working persons. Full-time work is defined as a minimum of 35 hours per week.
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41 Part-time work and non-participation are much more relevant for women than for men in
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43 Germany, a point addressed in two ways. First, a two-step procedure controls for nonrandom
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45 selection into the full-time working categories. Second, a robustness check takes transitions
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47 into part-time dependent employment or self-employment into account as well. The results
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49 remain largely unchanged (see Section 4.3).
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54 In the sample of full-time working persons, the unweighted (weighted) male self-
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56 employment rate is 6.9% (6.8%), whereas the female rate is only 4.3% (4.1%). The yearly
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58 transition rate from dependent employment into self-employment, as a percentage of the total
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60 dependently employed population, is 0.94% (0.95%) for men and 0.6% (0.65%) for women.

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3 The yearly transition rate from self-employment to dependent employment, as a percentage of
4 the self-employed population, is 7.5% (6.9%) for men and 7.9% (8.9%) for women. Thus, the
5 lower self-employment rate among women is explained both by a lower entry rate and a
6 higher exit rate. The gender difference in the entry rate is much larger in relative terms. Table
7 A2 in the Appendix provides descriptive statistics for full-time self-employed and
8 dependently employed men and women in the sample. A description of the variables used in
9 this analysis appears in Table A1. All monetary variables are deflated by the Consumer Price
10 Index (2001 = 100).
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24 **4 Empirical Results**

25 **4.1 Net Earnings and Variance Estimation**

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28 After estimating the gross earnings and variance equations, controlling for selection,¹¹ the
29 expected value and variance of gross earnings can be predicted for each worker in the two
30 alternative states of self-employment and dependent employment.¹² The estimated tax rate
31 function allows for the calculation of net earnings and their variance.¹³ The full results from
32 these estimations are reported in Fossen (2009a). The predicted gross and net hourly income
33 profiles over the duration of a spell in self-employment or dependent employment are plotted
34 for self-employed men and women in Figure 2 and for dependently employed men and
35 women in Figure 3 (at mean values of the other explanatory variables). The net income
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52 ¹¹ The coefficient of the selectivity term λ is negative in all earnings regressions, which indicates that the error
53 terms in the selection equation and the earnings equation are negatively correlated. The coefficient is significant
54 in the models of dependent employment only. Insignificant and sometimes negative selection terms in
55 regressions of earnings from self-employment are common (e.g., Borjas and Bronars, 1989; Dolton and
56 Makepeace, 1990; Evans and Leighton, 1989; Rees and Shah, 1986), which suggests that there is no significant
57 selection on unobservables; Taylor (1996), in contrast, reports positive and significant selection effects.

58 ¹² In the earnings variance regression, the explanatory variables are jointly significant for both employment states
59 and genders, which confirms that earnings are heteroscedastic (Breusch-Pagan test). This result shows that the
60 variance of earnings not only differs between dependent and self-employment and by gender, but also between
individual workers, depending on their characteristics and covariates.

¹³ The results from the tax rate regression show that the individual average tax rate increases with gross income
at diminishing rates, which reflects the progressive income tax code in Germany.

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3 profiles fall below the corresponding gross income profiles (the gap equals the tax paid) and
4 are flatter, which reflects the progressive income tax in Germany. In each diagram, the
5 income profiles in the actual and counterfactual employment states can be compared directly.
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7 For reference, scatter dots mark the mean gross hourly incomes of people actually observed
8 with the respective spell duration. The numbers aligned with the dots indicate how many
9 observations with the respective spell duration are available in the sample.
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17 Figure 2 shows that on average, self-employed men would initially earn higher hourly
18 gross income in dependent employment than in self-employment, whereas self-employment
19 rewards them more after approximately 15 years. Net income is higher from self-employment
20 almost from the start. This finding supports the hypothesis that higher net earnings in self-
21 employment induce self-employed persons to choose this state. The picture is similar for self-
22 employed women, though they endure a considerable period of slightly lower net earnings in
23 self-employment before they exceed the counterfactual wages from dependent employment.
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34 INSERT FIGURE 2 ABOUT HERE
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36 Dependently employed people would earn more on average if they were self-employed,
37 both before and after taxes, as Figure 3 shows. Alone this finding could be interpreted as a
38 sign that earnings do not dictate employment choices, or it might even suggest irrational
39 behavior. The structural model developed herein offers a different explanation: If employees
40 anticipate a higher expected value of earnings in the counterfactual state of self-employment
41 but also predict a higher variance of earnings, it may be rational for them to choose dependent
42 employment if they are risk averse.
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53 INSERT FIGURE 3 ABOUT HERE
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55 Figure 4 and Figure 5 shed more light on the variance of earnings in the two employment
56 states; for better comparability, they plot the variation coefficient (the standard deviation over
57 the mean). Again, the profiles are predicted by varying the spell duration and keeping the
58 explanatory variables fixed at their mean values. The scatter dots indicate the actual mean
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3 variation coefficients of earnings for the respective spell durations. As the four diagrams
4 show, the variation coefficients of net earnings are smaller than those of gross earnings, which
5 results from the progressive income tax system in Germany. Moreover, the variation
6 coefficient is larger for self-employment than for dependent employment in all groups, that is,
7 for self-employed and dependently employed men and women, both before and after tax. The
8 difference in the earnings variation in self- and dependent employment is more pronounced
9 for those who are actually dependently employed than for those who are actually self-
10 employed. Thus, switching to self-employment would require the dependently employed
11 workers to tolerate a much higher earnings risk. Risk aversion therefore might explain why
12 employees do not switch to self-employment, despite the higher expected value of earnings.
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27 INSERT FIGURE 4 ABOUT HERE
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33 **4.2 Estimation Results of the Transition Models**

34 After summarizing the individual predicted net earnings and net variance profiles over time as
35 annuities, the structural models of transitions between dependent and self-employment, and
36 vice versa, can be estimated. Table 1 shows the coefficients that result from the likelihood
37 maximization, with their heteroscedasticity robust standard errors in brackets. For each
38 gender, the model of entry into self-employment appears on the left, whereas the model of
39 exit from self-employment is in the right column. A positive coefficient indicates that the
40 corresponding variable increases the probability of a transition to the alternative employment
41 state.
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55 INSERT TABLE 1 ABOUT HERE
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57 The estimated coefficient of CRRA ρ is positive and significant both for men and
58 women, which indicates risk aversion. The estimated degree of risk aversion is low for men
59 and higher, though still moderate, for women. These estimates are consistent with Holt and
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3 Laury (2002), who report a range for the CRRA coefficient around 0.3–0.5. The difference
4
5 between the estimated degrees of risk aversion for men and women is statistically significant.
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7 A Wald test rejects the equality of the ρ parameters at the 10% confidence level ($p = 0.0681$),
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9 based on the robust standard errors reported, and at the 5% level ($p = 0.0275$), based on
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11 nonrobust standard errors. The finding that women are more risk averse than men is consistent
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13 with the literature, as mentioned in the introduction.
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17 The coefficient of the risk-adjusted differential between net income from self- versus
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19 dependent employment α is significant in all models, positive in the models of entry, and
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21 negative in the models of exit. The four models thus consistently confirm the hypothesis that
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23 higher risk-adjusted net income in self-employment, compared with in dependent
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25 employment, induces people to become and remain self-employed.
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31 **4.3 Sensitivity Analysis**

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33 This section assesses the sensitivity of the estimation results with respect to some potentially
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35 critical assumptions. Table 2 shows the crucial risk aversion parameter ρ and its robust
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37 standard error that result from different specifications of the transition models, separately for
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39 men and women. The baseline estimation results reappear in the first rows for reference. The
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41 results indicate that ρ is robust to the exclusion of potentially endogenous variables (row 2); a
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43 more flexible specification of the baseline hazard (row 3); a different definition of the
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45 dependent variable, in which transitions into part-time self-employment or dependent
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47 employment also count as positive outcomes (row 5); and the assumption of a real interest
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49 rate of 2% instead of 5% (row 6). If a probit instead of logit specification is used, the
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51 estimated degree of risk aversion is somewhat higher for men and considerably higher for
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53 women (row 4). Higher risk aversion for women also results with the assumption of a real
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55 interest rate of 8% (row 7). The difference in risk aversion between men and women thus may
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60 be underestimated rather than overestimated in the main specification, and risk aversion may

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3 play a greater role in explaining the gender differential in the self-employment rates. The
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5 standard error of women's ρ also increases in these two specifications, however. The lower
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7 estimated value in the main specification remains within the 95% confidence interval of the
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9 estimate reported in row (7) but not of that reported in row (4).
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13 When instead of annuities over the individually remaining years of economic activity,
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15 only the expected value and variance of net income in the next year are used in the transition
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17 models (row 8), ρ becomes insignificant for both genders, with a very large standard error for
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19 men. It seems unlikely that agents only look at next year's income prospects when deciding to
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21 make a transition between dependent employment and self-employment, which would be
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23 irrational; thus, this specification may not be very informative.
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28 **4.4 Decomposition of the Gender Gap in the Transition Rates**

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30 The goal of this section is to decompose the differentials between the female and male
31
32 transition rates into the components explained by different endowments, as represented by the
33
34 variables, the higher risk aversion estimated for women, and differences in the other estimated
35
36 coefficients. The familiar Blinder-Oaxaca decomposition technique (Blinder, 1973; Oaxaca,
37
38 1973) gets adapted in three ways. First, the variation used herein acknowledges the
39
40 nonlinearity of the estimated transition models, similar to Fairlie (1999, 2007) and Bauer and
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42 Sinning (2008). The observed transition rates \bar{Y} , which equal the proportion of people
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44 making transitions in the subsamples, are very close to the average predicted transition
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46 probabilities \bar{Y} : The relative deviation of \bar{Y} from \bar{Y} is 0.013% for men's and 0.755% for
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48 women's entry rates, and 0.001% for both genders' exit rates. A nonlinear decomposition of
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50 the gender differentials in the average transition rates into two components thus can be written
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52 as
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$$\bar{Y}_M - \bar{Y}_F \approx \bar{\hat{Y}}_M - \bar{\hat{Y}}_F = \left[\frac{1}{N_M} \sum_{i \in M} \hat{Y} | X_i, \hat{\beta}_M, \hat{\rho}_M - \frac{1}{N_M} \sum_{i \in M} \hat{Y} | X_i, \hat{\beta}_F, \hat{\rho}_F \right] + \left[\frac{1}{N_M} \sum_{i \in M} \hat{Y} | X_i, \hat{\beta}_F, \hat{\rho}_F - \frac{1}{N_F} \sum_{j \in F} \hat{Y} | X_j, \hat{\beta}_F, \hat{\rho}_F \right], \quad (9)$$

where N_g is the sample size for gender $g \in \{M; F\}$; X_i is the vector of variables $(\mu_i \sigma_i^2 x_i' d_i)$; $\hat{\rho}_g$ is the risk parameter; $\hat{\beta}_g$ is the vector of remaining coefficients $(\hat{\alpha} \hat{\beta}' \hat{\delta}_1 \hat{\delta}_2 \hat{\delta}_3)_g$ estimated on the subsample of gender g , including a constant; and $\hat{Y} | X_i, \hat{\beta}_g, \hat{\rho}_g$ is the predicted transition probability for a person with characteristics X_i , using the model with the estimated coefficients $\hat{\rho}_g$ and $\hat{\beta}_g$. The second summand in square brackets in this expression is the contribution of the variables to the gender gap; the first is the contribution of the coefficients.

Second, a well-known issue pertains to whether the coefficients for men or women should appear in the second summand to assess the contribution of the variables (index problem). Therefore, this adaptation of the decomposition technique, following Oaxaca and Ransom (1994), uses the coefficients $\hat{\rho}_p$ and $\hat{\beta}_p$ from an estimation of the transition models on the pooled sample of men and women. The point estimate of the coefficient of CRRA, $\hat{\rho}_p$, based on the pooled sample, is 0.3779 (robust standard error = 0.0354).¹⁴ As expected, the estimate lies between those obtained separately for men and women. The first summand then can be split by calculating the difference in the predictions between $\hat{\rho}_M, \hat{\beta}_M$ and $\hat{\rho}_p, \hat{\beta}_p$, as well as between $\hat{\rho}_p, \hat{\beta}_p$ and $\hat{\rho}_F, \hat{\beta}_F$.

Third, as a final novel variation, this approach decomposes the contribution of the coefficients into the contribution of the risk attitude ρ and the contribution of the other coefficients β . Using an abbreviated notation, the complete decomposition can be written as

¹⁴ The full estimation results are available from the author on request.

$$\begin{aligned} \bar{\hat{Y}}_M - \bar{\hat{Y}}_F = & \left[\overline{\hat{Y} | X_{i \in M}, \hat{\beta}_M, \hat{\rho}_M} - \overline{\hat{Y} | X_{i \in M}, \hat{\beta}_P, \hat{\rho}_M} \right] + \left[\overline{\hat{Y} | X_{i \in M}, \hat{\beta}_P, \hat{\rho}_M} - \overline{\hat{Y} | X_{i \in M}, \hat{\beta}_P, \hat{\rho}_P} \right] + \\ & \left[\overline{\hat{Y} | X_{i \in M}, \hat{\beta}_P, \hat{\rho}_P} - \overline{\hat{Y} | X_{j \in F}, \hat{\beta}_P, \hat{\rho}_P} \right] + \left[\overline{\hat{Y} | X_{j \in F}, \hat{\beta}_P, \hat{\rho}_P} - \overline{\hat{Y} | X_{j \in F}, \hat{\beta}_P, \hat{\rho}_F} \right] + \\ & \left[\overline{\hat{Y} | X_{j \in F}, \hat{\beta}_P, \hat{\rho}_F} - \overline{\hat{Y} | X_{j \in F}, \hat{\beta}_F, \hat{\rho}_F} \right]. \end{aligned} \quad (10)$$

The third summand is the contribution of the variables; the sum of the second and fourth summands is the contribution of the risk attitude; and the sum of the first and last summands is the contribution of the remaining coefficients.

Blinder (1973) separately calculates the contributions of the intercept term and the other coefficients and interprets them as two distinct components of discrimination. This is not done in this analysis because the procedure is sensitive to the scaling of the variables and the choice of excluded categories (Cain, 1986; Jones, 1983). The contribution of the β coefficients, which include the intercept, may still partly capture gender differences in unobserved characteristics. Even though the set of explanatory variables is rich, especially because it includes prior work history and tenure, this component may remain sensitive to omitted or erroneously measured variables, if these errors differ by gender.

Table 3 presents the decomposition of the entry rate (left three columns) and exit rate (right three columns) without weighting. Columns 1 and 4 show the average predicted transition rates from the entry and exit models. Columns 2 and 5 provide the differences, which correspond to the five summands in Equation 10, and columns 3 and 4 represent these differences relative to the total gap in the male and female transition rates. The relative difference in row 4 is the contribution of the variables to the gender gap, the sum of rows 3 and 5 equals the contribution of the estimated risk aversion parameter, and the sum of rows 2 and 6 reflects the contribution of the other coefficients. Especially in the exit model, some decomposition steps change the transition rate in the direction opposite the overall gender difference, which means their contributions to the gender gap are negative.

INSERT TABLE 3 ABOUT HERE

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3 Table 4 summarizes the decomposition of the gender differentials in the entry and exit
4 rates into the three components. In addition to the unweighted decomposition, the two right-
5 hand columns present the results obtained by weighting the predicted transition rates using
6 population weights (see Section 3). In both the unweighted and weighted analyses, only 2% of
7 women's lower entry rate can be explained by their higher estimated degree of risk aversion.
8 Approximately 10% (17%) are explained by the variables without (with) weighting. The
9 remaining 88% (82%) are due to differences in the other coefficients; the same endowments
10 make self-employment less attractive for women than for men. This may partly reflect
11 creditor or consumer discrimination.
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27 The variables, which together explain between about 10% and 17% of the gender gap
28 (without and with weighting, respectively), include the estimated annuities of the expected
29 value and the variance of earnings in both employment states. These earnings variables may
30 themselves be partly influenced by discrimination against women. In fact, standard Blinder-
31 Oaxaca decompositions of the gender differentials in estimated earnings (using coefficients
32 from a pooled regression, as in Oaxaca and Ransom [1994]; unweighted) yield results that
33 indicate only 39.9% of the gap in earnings from dependent employment and 34.2% of the gap
34 in earnings from self-employment are explained by observed variables. An analogous
35 decomposition shows that just 26.1% (22.2%) of the gender differential in the variance of
36 earnings from dependent employment (self-employment) can be explained by the variables.
37 Taking this into account, even less of the gender gap in the entry rate can be attributed to
38 gender differences in endowments. The 17% obtained from the weighted decomposition thus
39 represents an upper bound.
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57 In contrast to the differential in the entry rate, the higher average exit rate from self-
58 employment among women can be explained by women's higher estimated risk aversion,
59 whether completely (unweighted decomposition) or to the greatest extent (weighted case).
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3 The gender difference in risk aversion alone implies the differential in the exit rate should be
4 even greater than the differential actually observed. This effect is compensated for by the
5 other coefficients, which have the opposite influence and decrease the women's exit rate.
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7 Both the unweighted and weighed decompositions reflect these general results, but the effect
8 of risk attitude is much stronger in the unweighted analysis. In this case, given the gender
9 difference in risk aversion alone, the differential in the exit rate would be more than three
10 times as great as the differential actually observed.
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20 For the interpretation of this large relative effect, it is important to acknowledge that the
21 gender differential in the exit rate is relatively small though. The unweighted female exit rate
22 is only 4.3% higher than the male exit rate, whereas the unweighted female entry rate is
23 36.3% lower (calculated from the first and last rows of columns 1 and 4 in Table 3). Because
24 the gender differential in the entry rate is much larger in relative terms than the differential in
25 the exit rate, the results from the decomposition of the entry rate are more relevant for
26 explaining the gender gap in the self-employment rate. The relatively small gender differential
27 in the exit rate also may explain why the estimates from the decomposition of the exit rate are
28 less robust to weighting than are those from the decomposition of the entry rate.
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43 **5 Conclusion**

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46 The self-employment rate among women is much lower than that among men in almost all
47 OECD countries. In Germany, women's lower self-employment rate reflects both a lower
48 entry rate and, though to a lesser extent, a higher exit rate. This study has investigated the role
49 of gender differences in the degree of risk aversion. Specifically, it has decomposed the
50 gender differentials in the transition rates between dependent employment and self-
51 employment, and vice versa, into components explained by (1) differences in observable
52 endowments, (2) differences in the econometrically estimated coefficient of CRRA, and (3)
53 differences in other estimated coefficients.
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3 To achieve this decomposition, this study has estimated a structural microeconomic
4 model of the transition probabilities, including the CRRA parameter. The estimation results
5 from this model show that not only the expected value but also the variance of a person's
6 future after-tax income play a significant role in the choice between self- and dependent
7 employment. Higher expected net earnings in self-employment relative to dependent
8 employment attract people to become and remain self-employed, whereas higher variance
9 discourages them from choosing this option. The estimated CRRA coefficient indicates that
10 men and women are moderately risk averse, but women are significantly more risk averse
11 than are men. The estimated structural transition model provides the basis for a nonlinear
12 Blinder-Oaxaca decomposition.
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27 The result from the decomposition of the gender differential in the entry rate into self-
28 employment shows that only about 2% of the gap is due to women's higher risk aversion.
29 Considering the potential discrimination effects on expected earnings, less than 17% of the
30 differential can be explained by gender differences in endowments. The largest portion of the
31 lower female entry rate thus remains unexplained and may potentially be credited, at least in
32 part, to creditor or consumer discrimination against self-employed women.
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41 In contrast to the differential in the entry rate though, most of the higher exit rate of
42 women out of self-employment can be explained by their higher level of risk aversion. The
43 remaining coefficients even reduce the gender gap. The gender differential in the exit rate is
44 much smaller in relative terms than the differential in the entry rate, however, which means it
45 contributes less to the gender differential in the self-employment rate.
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53 Understanding the causes of the low female self-employment rate is important for
54 determining appropriate policies. If discrimination against women leads to a suboptimal
55 allocation, policymakers should aim to increase female entrepreneurship for efficiency
56 reasons. If gender differences in risk preferences, rather than discrimination, lead to the
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3 unequal self-employment rates, government intervention may not be required for efficiency
4 reasons, though it might still be desired to reach equality targets.
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8 Because women's higher risk aversion and gender differences in endowments explain
9 only a small portion of women's lower entry rate into self-employment, the results from this
10 analysis suggest that creditor and consumer discrimination may hinder female entry. State-
11 subsidized credit schemes for female-led businesses in their start-up phase, thus could
12 facilitate the step into self-employment for women. Because gender differences in terms of
13 risk aversion are found to be the primary reason that women exit at a higher rate, further
14 subsidized credit schemes targeted at already established female-led enterprises do not seem
15 necessary. Rather, if policymakers want to reduce the female exit rate, risk-sharing through
16 the government, such as through taxation, may be a suitable instrument to encourage female
17 entrepreneurs to stay self-employed. Comparing the instruments, subsidized credit schemes
18 for female-led start-up firms are more likely to increase women's self-employment rate,
19 because the gender differential in the entry rate is much greater in relative terms, and they are
20 also more likely to increase efficiency. Further research is necessary to investigate how much
21 of the large unexplained portion of the gender differential in the entry rate is due to creditor or
22 consumer discrimination. Collecting data for this specific purpose would be of great value.
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Tables

Table 1: Maximum Likelihood Estimation Results of Structural Transition Probabilities

Variable/Structural Parameter	Coefficient/Estimated Value (Robust Standard Error)			
	Men		Women	
	Dependent → Self- Employment	Self- → Dependent Employment	Dependent → Self- Employment	Self- → Dependents Employment
CRRA coefficient ρ		0.3215 (0.0376)***		0.5560 (0.1229)***
α	0.2894 (0.0200)***	-0.1728 (0.0173)***	0.2646 (0.0385)***	-0.1040 (0.0312)***
duration	-0.2756 (0.0555)***	-0.4455 (0.0716)***	-0.3490 (0.1010)***	0.0075 (0.1216)
dur_sq	0.0139 (0.0047)***	0.0210 (0.0051)***	0.0223 (0.0089)**	-0.0052 (0.0105)
dur_cu	-0.0002 (0.0001)**	-0.0003 (0.0001)***	-0.0004 (0.0002)**	0.0001 (0.0002)
highschool	0.1032 (0.2137)	-0.2798 (0.2684)	0.4444 (0.2502)*	0.0495 (0.3361)
apprenticeship	0.6657 (0.1800)***	1.0243 (0.2986)***	-0.0559 (0.2452)	0.0689 (0.3495)
highertechncol	1.0809 (0.1971)***	0.8438 (0.3196)***	0.2796 (0.2826)	-0.6303 (0.4488)
university	0.5989 (0.2201)***	-0.1926 (0.3051)	0.0924 (0.2873)	-0.8285 (0.4169)**
age_bgn	0.0179 (0.0509)	-0.1912 (0.0695)***	0.0314 (0.0775)	-0.0799 (0.0896)
age_bgn_sq	-0.0010 (0.0007)	0.0018 (0.0009)**	-0.0007 (0.0010)	0.0004 (0.0011)
workexp_bgn	0.0123 (0.0240)	-0.0115 (0.0317)	0.0239 (0.0230)	0.0022 (0.0263)
unemexp	0.0507 (0.0663)	-0.0932 (0.1048)	0.1650 (0.0928)*	-0.1180 (0.1718)
nchild	0.0802 (0.0587)	0.0953 (0.0963)	0.0038 (0.1477)	-0.3243 (0.1866)*
east	0.1916 (0.1571)	0.1556 (0.2232)	0.3899 (0.2694)	0.5226 (0.3406)
north	-0.1321 (0.1986)	-0.3483 (0.2972)	-0.1246 (0.4320)	-0.3544 (0.5182)
south	-0.3420 (0.1549)**	-0.1349 (0.2230)	0.0698 (0.3000)	-0.3054 (0.4386)
otherhhinc	-0.0023 (0.0036)	0.0015 (0.0013)	-0.0141 (0.0068)**	0.0025 (0.0063)
spouse_empl	0.2232 (0.1515)	-0.1332 (0.2130)	-0.0910 (0.2739)	-0.5214 (0.3939)
spouse_selfempl	0.5500 (0.4150)	0.0276 (0.3554)	1.4605 (0.3186)***	1.2113 (0.3188)***
constant	-4.6632 (0.9053)***	2.0283 (1.3404)	-5.3738 (1.3391)***	-0.0682 (1.8956)
Wald χ^2		130.967		47.111
log likelihood		-2110.833		-845.224
N		44440		23067

Notes: Stars (* / ** / ***) indicate significance at the 10% / 5% / 1% level, based on heteroscedasticity robust standard errors. The definitions of the variables appear in Table A1 in the Appendix.

Source: Own calculations based on the SOEP 1984–2005, full-time self-employed and dependently employed persons.

Table 2: Robustness of the Risk Aversion Parameter in the Transition Model

Specification	Men		Women	
	CRRRA coeff. ρ	Std. Error	CRRRA coeff. ρ	Std. Error
(1) Main estimation	0.3215	(0.0376)***	0.556	(0.1229)***
(2) Exclusion of number of children, other household income, and spouse's employment state	0.321	(0.0378)***	0.4965	(0.0810)***
(3) Baseline hazard is a polynomial of fourth degree	0.3209	(0.0375)***	0.5571	(0.1245)***
(4) Probit specification of the hazard rate	0.4098	(0.0403)***	1.1169	(0.2077)***
(5) Transitions to part-time self-employment / dependent empl. counted as positive outcomes	0.3266	(0.0368)***	0.5309	(0.0877)***
(6) Real interest rate 2%	0.3072	(0.0368)***	0.5254	(0.0886)***
(7) Real interest rate 8%	0.3376	(0.0398)***	1.1305	(0.3346)***
(8) Consideration of next year's expected income only instead of lifetime annuity	-0.2505	(0.4041)	-0.0042	(0.0071)

Note: Stars (* / ** / ***) indicate significance at the 10% / 5% / 1% level.

Source: Full-time self-employed and dependently employed persons in the SOEP 1984–2005.

Table 3: Decomposition of Gender Differential in Transition Rates (% , unweighted)

	Dependent → Self-Employment			Self- → Dependent Employment		
	Average predicted entry rate	Difference	Difference in percent of the total difference	Average predicted exit rate	Difference	Difference in percent of the total difference
(1) Men, model: men	0.9379			7.5446		
(2) Men, model: pooled, risk parameter: men	0.8267	0.1112	32.70	7.3052	0.2394	-73.41
(3) Men, model: pooled	0.8312	-0.0045	-1.32	7.6252	-0.3200	98.13
(4) Women, model: pooled	0.7978	0.0334	9.82	7.6207	0.0045	-1.38
(5) Women, model: pooled, risk parameter: women	0.7872	0.0106	3.13	8.4316	-0.8109	248.62
(6) Women, model: women	0.5979	0.1892	55.67	7.8708	0.5608	-171.95
Total		0.3400	100.00		-0.3262	100.00

Source: Own calculations based on the SOEP 1984–2005, full-time self-employed and dependently employed persons.

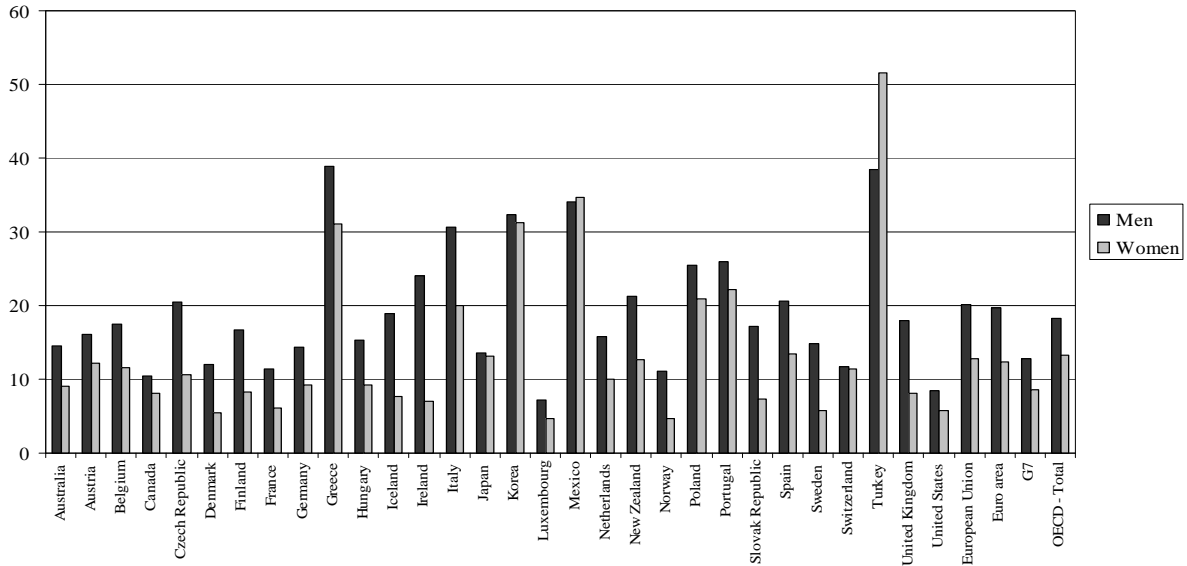
Table 4: Decomposition of Gender Differential in Transition Rates (%): Summary

Contribution to the gender gap of...	Unweighted		Weighted	
	Dependent → Self-Employment	Self- → Dependent Employment	Dependent → Self-Employment	Self- → Dependent Employment
Variables	9.82	-1.38	16.63	88.29
Estimated coeff. of risk aversion	1.81	346.74	1.71	126.93
Other coefficients	88.37	-245.36	81.66	-115.22
Total	100.00	100.00	100.00	100.00

Source: Own calculations based on the SOEP 1984–2005, full-time self-employed and dependently employed persons.

Figures

Figure 1: Share of Self-Employed among Employed Men and Women in OECD Countries (%)



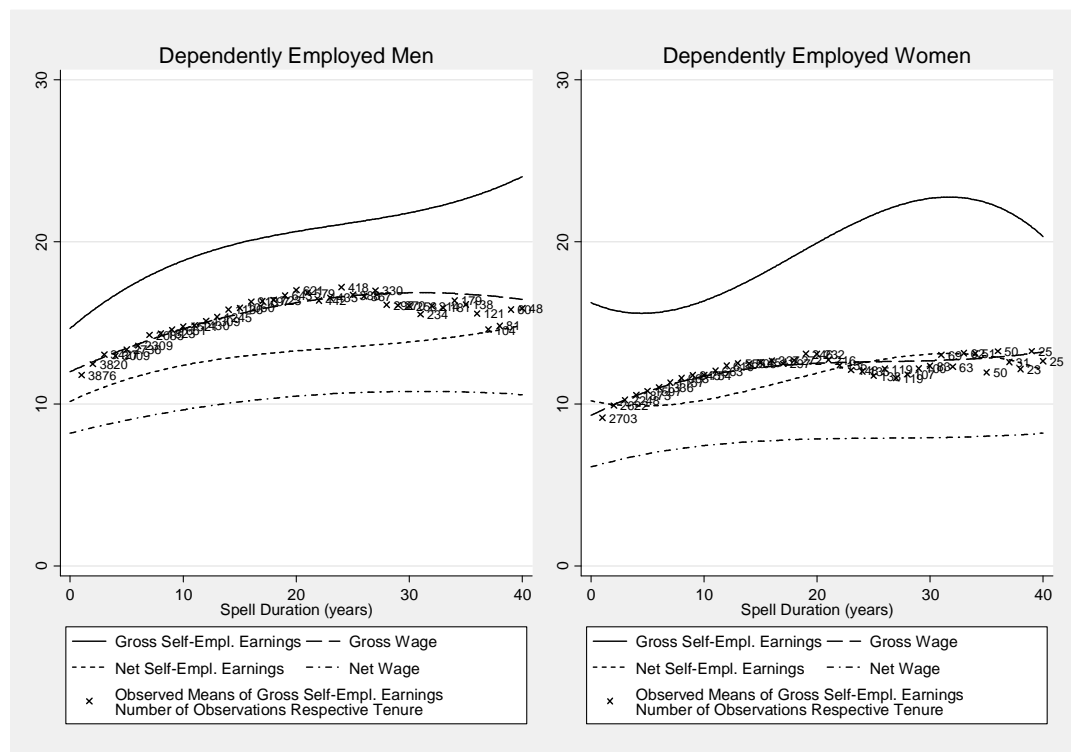
Source: Annual Labour Force Statistics, OECD (2009).

Figure 2: Predicted Hourly Earnings of the Self-Employed (Euros)



Source: Own calculations based on SOEP 1984–2005, full-time self-employed persons.

Figure 3: Predicted Hourly Earnings of Employees (Euros)



Source: Own calculations based on SOEP 1984–2005, full-time dependently employed persons.

Figure 4: Predicted Variation Coefficient of Hourly Earnings of the Self-Employed



Source: Own calculations based on SOEP 1984–2005, full-time self-employed persons.

Appendix

Table A1: Definition of Variables

Variable	Definition
duration	Duration of current spell (self-employment or employment) in years. For left-censored spells, the duration since the last job change is reported, which may be shorter than the overall duration in the current employment state if a person switched jobs within one of these states before entering the panel
highschool	Dummy indicating a high school degree ("Fachhochschulreife" or "Abitur")
apprenticeship	Dummy for having finished an apprenticeship
highertechical	Dummy for having finished higher technical college or similar
university	Dummy indicating a university degree
age_bgn	Age at the beginning of the current spell in self- or dependent employment
workexp_bgn	Years of work experience at the beginning of the current spell
unemexp	Years of unemployment experience
nchild	Number of children under 17 years in the household
east	Dummy indicating residence in one of the five new eastern federal states or East Berlin
north	Dummy indicating residence in one of the northern federal states (Schleswig Holstein, Lower Saxony, Hamburg, or Bremen)
south	Dummy indicating residence in one of the southern federal states (Baden-Wuerttemberg or Bavaria)
female	Dummy for women
otherhhinc	Income of other persons living in the same household per year (€1000)
married	Dummy for married persons
spouse_empl	Dummy for married persons whose spouse is dependently employed and living in the same household
spouse_selfempl	Dummy for married persons whose spouse is self-employed and living in the same household
spouse_notempl	Dummy for married persons whose spouse is unemployed or inactive and living in the same household
german	Dummy indicating German nationality
disabled	Dummy for handicapped/physically challenged persons
fatherse	Dummy for persons whose father is/was self-employed
grossinc_yr	Gross income per year (€10 000)
self-employed	Dummy indicating self-employment

Notes: x_{sq} indicates the square and x_{cu} the cube of a variable x . Dummy variables equal 1 if the condition holds and 0 otherwise.

Table A2: Descriptive Statistics

		<i>Self-Employed</i>			
		Men		Women	
Variable	Unit	Mean	Std. Deviation	Mean	Std. Deviation
duration	years	7.641	7.589	6.226	6.392
highschool	binary	0.349		0.306	
apprenticeship	binary	0.434		0.364	
highertechncol	binary	0.292		0.287	
university	binary	0.306		0.341	
age_bgn	years	36.838	9.204	38.532	9.567
workexp_bgn	years	13.581	9.680	13.911	9.352
unemexp	years	0.312	0.805	0.363	0.798
nchild	number	0.824	1.009	0.592	0.840
east	binary	0.228		0.386	
north	binary	0.155		0.127	
south	binary	0.264		0.210	
otherhhinc (yr)	€ 1000	12.328	30.524	15.907	20.437
married	binary	0.724		0.719	
spouse_empl	binary	0.319		0.237	
spouse_selfempl	binary	0.074		0.154	
spouse_notempl	binary	0.127		0.046	
german	binary	0.945		0.964	
disabled	binary	0.035		0.015	
fatherse	binary	0.209		0.145	
transitions (N)		232		78	
transitions (rate)		0.075		0.079	
N		3075		991	
		<i>Dependently Employed</i>			
		Men		Women	
Variable	Unit	Mean	Std. Deviation	Mean	Std. Deviation
duration	years	9.915	8.559	8.110	7.611
highschool	binary	0.215		0.200	
apprenticeship	binary	0.565		0.529	
highertechncol	binary	0.205		0.210	
university	binary	0.182		0.202	
age_bgn	years	31.043	9.402	30.692	9.284
workexp_bgn	years	9.271	9.209	8.374	8.393
unemexp	years	0.390	0.965	0.371	0.866
nchild	number	0.779	0.992	0.387	0.696
east	binary	0.244		0.358	
north	binary	0.127		0.116	
south	binary	0.286		0.243	
otherhhinc (yr)	€ 1000	12.682	20.808	16.209	20.368
married	binary	0.700		0.531	
spouse_empl	binary	0.283		0.264	
spouse_selfempl	binary	0.017		0.034	
spouse_notempl	binary	0.180		0.039	
german	binary	0.911		0.935	
disabled	binary	0.054		0.046	
fatherse	binary	0.066		0.082	
transitions (N)		388		133	
transitions (rate)		0.009		0.006	
N		41365		22076	

Note: Standard deviations for continuous variables only.

Source: Own calculations based on SOEP 1984–2004, full-time self-employed and dependently employed persons.