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Public health insurance, individual health, and entry into self-employment

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Abstract We investigate the impact of a differential treatment of paid employees versus self-employed workers in a public health insurance system on the entry rate into self-employment. Health insurance systems that distinguish between the two sectors of employment create incentives or disincentives to start a business for different individuals. We estimate a discrete time hazard rate model of entry into self-employment based on representative household panel data for Germany, which include individual health information. The results indicate that an increase in the health insurance cost differential between self-employed workers and paid employees by €10 per month decreases the probability of entry into self-employment by 1.7% of the annual entry rate. This shows that entrepreneurship lock, which an emerging literature describes for the system of employer-provided health insurance in the USA, can also occur in a public health insurance system. Therefore, entrepreneurial activity should be taken into account when discussing potential health-care reforms.

Keywords Health insurance · Health · Entrepreneurship lock · Self-employment

JEL Classification L26 · I13 · J2

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1 Introduction

In many countries, health insurance systems have been designed primarily to protect paid employees, with the implicit assumption that the self-employed are in a position to take care of themselves. Health insurance systems that distinguish between the two modes of work create incentives or disincentives to forego paid employment and become self-employed. Health-care institutions may thus induce an inefficient misallocation of workers away from their most productive use. An emerging body of literature finds that employer-provided health insurance in the USA results in an entrepreneurship lock effect, meaning that workers insured through their employers are reluctant to enter into self-employment because they do not want to lose coverage (e.g., Holtz-Eakin et al. 1996; Fairlie et al. 2011). However, almost nothing is known about the effects of *public* health insurance systems on entrepreneurial activity. Closing this gap in the literature is an important task. Health-care systems are frequently overhauled in many countries, not least because of aging populations. The Patient Protection and Affordable Care Act (PPACA) is a well-known example of a far-reaching health-care reform

that introduced elements of a public health insurance system in the USA.

In this paper, we address the research question if and how much health insurance costs in self-employment in comparison to paid employment affect the decision to switch from paid employment to self-employment within a public health insurance system. In modern knowledge-based economies, entrepreneurial activity, especially opportunity entrepreneurship, is related to innovation, growth, and employment creation (Carree and Thurik 2003; Acs and Audretsch 2005; Van Praag and Versloot 2007). We focus on transitions from paid employment to self-employment because these founders are opportunity entrepreneurs in the sense that they generally have an alternative employment option but see better business opportunities in self-employment (Fossen and Büttner 2013; Fairlie and Fossen 2016).

The German health-care system is particularly well suited to study such effects, because it creates significant variation in incentives for self-employment across workers that changed frequently over time and can be exploited for identification. In the German hybrid system, public and private health insurance co-exist in a highly regulated legal framework. Similar health-care systems can be found across continental Western Europe, Asia, Latin America, and in many of the formerly communist countries in Central and Eastern Europe (Gerlinger and Schmucker 2009).[1]

In Germany, public health insurance is obligatory for most paid employees, while the self-employed can generally choose between private health insurance and voluntary membership in the public health insurance system after leaving paid employment. While public health insurance contributions are a percentage of gross labor income, premiums for private health insurance depend on age and a health assessment at entry, and until 2013 also on gender. Contribution rates into public health insurance varied over providers until 2008. Importantly, membership in public health insurance allows a spouse with income below a certain threshold and children to be covered for free, while private health insurance must be purchased individually. Therefore, when an individual considers switching from paid employment to self-employment, the differential in health insurance costs between the two alternatives depends on the family situation and the age, gender, and health status of all family members. Legal changes in the tax deductibility of health insurance contributions in 2005 and 2010 provide additional variation.

We use the Socio-Economic Panel (SOEP), a representative household panel survey for Germany, which provides information on employment transitions and the determinants of self-employment known from the literature as well as health insurance coverage and the health situation of the household members. This allows us to simulate the individual health insurance cost differential between self-employment and paid employment. Carefully controlling other potentially relevant factors such as income, age, gender, and health of the family members, we estimate the effect of the cost differential on the probability of entry into self-employment for paid employees. A discrete time hazard rate model avoids survivorship bias in the sample of paid employees.

The results indicate that an increase in the health insurance cost differential between self-employment and paid employment by €10 per month decreases the probability of entry into self-employment by 0.015 percentage points, i.e., about 1.7% of the average annual entry rate. This implies an elasticity of −0.47 and shows that entrepreneurial activity is sensitive to changes in the health insurance system that alter the cost differential. Further investigation shows that men respond more strongly to these incentives than women. The results are robust with respect to specification choices and assumptions regarding the health insurance cost differential. Our conclusions are also supported when we estimate reduced form models with the determinants of the health insurance cost differential as explanatory variables instead of the cost differential itself.

Furthermore, for the first time in the literature, our results show that individual poor health has a direct negative effect on the probability of entry into self-employment even after controlling for the health insurance cost differential, which is larger for less healthy persons. In contrast, poor health of a spouse exclusively decreases the entry probability through higher health insurance costs for the family. Parker and Rougier (2007) and Rietveld et al. (2015) report that persons with poor health are less likely to become self-employed but cannot distinguish between direct health effects and the effect of higher health insurance costs in self-employment for less healthy persons.

In the following section, we provide a literature overview and point out our contributions. Section 3 describes Germany's hybrid system of public and private

[1] Even in countries not following Germany's "Bismarck"-type model, public and private health insurance often co-exist. For example, Besley et al. (1998, 1999) analyze the interactions between the public and private health care sectors in the UK.

health insurance. Sect. 4 describes the empirical methodology and Sect. 5 the household panel data. The empirical results are provided in Sect. 6, and Sect. 7 concludes the analysis.

2 Review of the literature

The emerging literature on entrepreneurship lock has its roots in the job lock literature.[2] This literature describes the barrier that employer-provided health insurance potentially poses on job mobility in the USA, since employees may fear to lose coverage for pre-existing conditions if they switch their employer (e.g., Madrian 1994; Gilleskie and Lutz 2002). Verheul et al. (2002) note that health insurance systems increase the costs of entrepreneurship if the transition to self-employment implies that the current health insurance coverage must be given up. Holtz-Eakin et al. (1996) pioneer the empirical analysis of entrepreneurship lock in the USA using the Survey of Program Participation and the Panel Study of Income Dynamics. They investigate if the negative influence of employer-provided health insurance on the probability of transition from paid employment to self-employment decreases if the switching person can be covered under the spouse's health policy. The authors cannot draw clear conclusions because of large standard errors, probably due to limited variation in their explanatory variables.

Using a similar strategy and Current Population Survey (CPS) data, Wellington (2001) finds a significant positive effect of having health insurance through one's partner on the probability of being self-employed. Also based on the cross-sectional CPS, Lombard (2001) similarly reports that married women are more likely to be self-employed if their husbands have health insurance. Estimating probability models of being self-employed implies potential issues of survival bias and reverse causality. We improve on this by estimating hazard rate models of the probability of entry into self-employment based on panel data, where the explanatory variables are observed before a transition is made.

Zissimopoulos and Karoly (2007) focus on self-employment at older ages using the Health and Retirement Study, include indicators of own and spousal health insurance coverage in their empirical transition model, and conclude that their results are only partially reconcilable with job lock. They note that employers who provide health insurance in the USA may also tend to offer quality jobs, which may confound the analysis, as also emphasized by Gilleskie and Lutz (2002). In our German setting, all paid employees with labor income below a fixed threshold are obliged to be covered under statutory public health insurance, so the issue does not arise.

Fairlie et al. (2011) link consecutive CPS surveys to create a short 2-year panel, which allows them to study business creation. Their approach exploits a discontinuity at age 65, when coverage under Medicare begins in the USA. This should make the loss of employer-provided health insurance less relevant and therefore facilitate entry into self-employment. The results support the view that employer-provided health insurance in the USA creates entrepreneurship lock.

None of these articles calculate health insurance costs in the alternatives of paid employment or self-employment. Therefore, the quantitative results of each paper only apply in their immediate institutional contexts. Since we estimate a marginal effect of the individual health insurance cost differential on the probability of entry into self-employment, our estimated effect size can be interpreted more generally.

Four articles analyze the effect of the 1986 Tax Reform Act (TRA86) and its amendments in the USA on self-employment and transition probabilities. This policy reform allowed entrepreneurs to deduct increasing portions of their health insurance premiums from their taxable income. Heim and Lurie (2010) and Gurley-Calvez (2011) use a panel of tax return data, while Velamuri (2012) and Gumus and Regan (2015) employ CPS data. The results from the four articles suggest that a lower after-tax price of health insurance in self-employment increases self-employment and entry rates and decreases the exit rate.[3]

The existing literature is limited to the health insurance system in the USA, which is dominated by employer-provided health insurance. The literature lacks microeconometric investigations of the effects of public health insurance systems on the probability of

[2] We use the term "entrepreneurship lock" as it is used in the literature, describing a barrier to entry into entrepreneurship (Fairlie et al. 2011), i.e., a lockout effect. In contrast, the original term "job lock" means that employees are locked into their current jobs.

[3] Gumus and Regan (2015) find a statistically significant effect on entry only for singles and married men whose wives lack employer-provided health insurance.

entry into self-employment. Most countries in the world implement some form of public health insurance, and this is also relevant for the USA since the introduction of the PPACA. Jackson (2010) and Heim and Lurie (2014) analyze effects of Massachusetts' health insurance mandate policy implemented in 2007. Jackson (2010) compares the likelihood of new firm formation in Massachusetts versus neighboring New Hampshire in the border region, and Heim and Lurie (2014) conduct a difference-in-difference analysis contrasting self-employment in Massachusetts after the reform to other states and before the reform. The authors find negative effects on firm formation and self-employment, respectively, and argue that this could be due to the higher financial burdens for entrepreneurs brought by the policy. In contrast to our analysis, these papers do not quantify the cost increase, which makes it difficult to relate the estimated effect sizes to other contexts.[4]

Like the literature reviewed in this section, this paper focuses on health insurance. Taxes and other components of the social insurance system such as public pension insurance may also affect self-employment. In our empirical estimations, we account for any such effects by including control variables, especially flexible functions of income.[5]

3 Germany's hybrid health insurance system

Germany's health-care system is characterized by the co-existence of public, nonprofit *statutory health insurance (SHI)*, and for-profit *private health insurance (PHI)*. Almost 90% of the population is covered under SHI (Federal Ministry of Health 2013), which is regulated by federal law, primarily the Code of Social Law V. Healthcare is *universal* in the sense that since 2009, health insurance (public or private) is obligatory for all inhabitants of Germany, and even before, only a very small fraction of the population was not covered under any health insurance.[6] The health insurance system involves various discontinuities and changes over time. These create variation in the health insurance costs, which we simulate in detail, and help to identify the effects on entry into self-employment. We describe the most important institutions for Germany relevant during the period of analysis (2000–2011).

Paid employees are *compulsorily insured under SHI* if their gross pay does not exceed the obligatory insurance limit (*Versicherungspflichtgrenze*). This limit is adjusted annually and increased from €3298 per month in 2000 to €4125 in 2011. Employees with higher salary can opt out of the SHI system and choose PHI instead. *SHI contributions* are not risk-related. Instead, they are a certain percentage of the insured person's gross salary, but only up to the contribution assessment ceiling (*Beitragsbemessungsgrenze*). This ceiling is adjusted annually and was increased from €3298 per month in 2000 to €3713 in 2011.[7] Within the SHI system, there are several nonprofit SHI funds to choose from. Until 2008, contribution rates differed between the SHI funds. Since 2009, there is a unique contribution rate, but SHI funds can charge an extra premium if the contributions are insufficient.[8,9]

The spouse of a married, paying SHI member is covered under so-called *family insurance* in the SHI for free as long as his or her monthly income is below the threshold of marginal employment. This threshold was €325 until 2002 and €400 since 2003. Children of a

[4] A related, but distinct stream of literature investigates the determinants of health insurance coverage of the self-employed. This issue is of special interest in the USA, where a large number of self-employed persons lack health insurance (Perry and Rosen 2004). A number of articles (Gruber and Poterba 1994; Heim and Lurie 2009; Selden 2009; Gumus and Regan 2013) estimate the impact of the improved tax deductions of health insurance premiums brought by TRA86 on health insurance demand among the self-employed. They all find significant effects in the expected direction.

[5] Fossen (2009) simulates individual net income after taxes, all social insurance contributions, and transfers in Germany and focuses on the effects of personal income tax reforms on transitions into and out of self-employment.

[6] According to numbers reported by Gress et al. (2005), only 0.12% of the paid employees and 0.85% of the self-employed were not covered under any health insurance in 2003.

[7] Until 2002, the obligatory insurance limit and the contribution assessment ceiling were identical.

[8] These provisions are intended to allow for some degree of competition between the SHI funds, but in practice, competition is rather limited because services are regulated to a large extend and therefore very similar. The differences in contribution rates were rather small, and the extra premium was at most €8 per month. Table A 1 in Appendix A shows the contribution rates of SHI funds and groups of SHI funds by year. Historically, most SHI funds originate from occupational groups or regions, and many insurees simply stay with their parents' SHI fund. The introduction of the more salient extra premiums may have triggered more awareness and more switching between SHI funds since 2009 (Schmitz and Ziebarth 2016).

[9] Those who are covered under statutory health insurance are additionally obliged to be covered under *statutory long-term care insurance*. The contribution rate, payable on top of the rate for statutory health insurance, was 1.7% before and 1.95% since 2009. Employees without children pay an additional 0.25% since 2005. In the following, when we refer to health insurance, we mean health and long-term care insurance.

SHI member are covered under contribution-free family insurance if they are (i) below 19 years of age, (ii) below 24 years of age and with labor income not exceeding the marginal employment threshold, or (iii) below 26 years of age and in education.

Specific regulations apply for *marginal employment*. Employees earning less than the threshold of marginal employment are covered under SHI but do not need to pay contributions. The employer paid a contribution rate of 10% until 2002, 11% until 2007, and 13% since 2007; this is only relevant for our analysis in a specification where we assume that employers are able to shift the burden onto their employees. Since 2003, employee's contributions are gradually faded in within the zone of monthly income between €400 and €800.

In contrast to the SHI, *premiums for PHI* policies are based on risk. PHI premiums are determined by age and an initial health assessment. In the period of our analysis, women had to pay higher premiums than men; health insurance policies sold since December 21, 2013 may no longer discriminate by gender. In contrast to family insurance in the SHI system, PHI policies have to be bought for each family member.[10] Grunow and Nuscheler (2014) report that healthier individuals in Germany tend to self-select into PHI due to the risk-rated premiums. This is consistent with self-selection of healthier persons into self-employment, which allows choosing PHI independently of income (see below).

Contributions to SHI are *split between employers and employees*. Until July 2005, each side paid 50% of the contributions; since then, employees pay 0.9 percentage points of the SHI contribution rate alone.[11] Correspondingly, for high-income employees with PHI, the employer pays half the PHI premium insofar as this amount does not exceed the employer's maximum contribution to SHI, which is determined by the contribution assessment ceiling. The statutory incidence of the contributions is not necessarily equal to the economic incidence. Employers may be able to shift some of their statutory burden to employees by paying lower wages. However, the statutory split is very salient. Employees see their contribution to SHI as a payroll deduction on their paycheck, or they directly pay their share of the PHI premium, but they do not see their employer's contributions. Chetty et al. (2009) document the behavioral importance of salience of taxes. Therefore, in the main analysis, we assume equality of statutory pay burden and economic burden, i.e., the burden is roughly split by half. In a robustness check, we explore the assumption of a full shift of the burden onto the employees.

Self-employed persons are not obliged to be insured in the SHI system.[12] They can buy PHI, or they can choose to be voluntary members in the SHI system if they were SHI members for at least 12 months immediately prior to becoming self-employed, or if they were SHI members for at least 24 months within the last 5 years. Thus, those who switch from paid employment to self-employment are usually eligible for voluntary SHI membership, except for high-income employees with PHI. The self-employed pay the full SHI contributions or PHI premiums, i.e., both the employer's and the employee's shares. If they are covered under voluntary SHI, they have to report their income to their SHI fund; otherwise, the contribution assessment ceiling is applied. To prevent income underreporting, there is a lower limit of income applicable to compute the SHI contributions of the self-employed.[13]

Sickness benefits, which partially replace income from the seventh week of sick leave on, are covered under SHI and usually also under PHI. This also applies to the self-employed who choose PHI coverage or voluntary SHI with the full contribution rate. A difference between paid employees and self-employed persons is that employers are obliged to continue paying wages during the first 6 weeks of a worker's sick leave; for the self-employed, private insurance is available instead. We explore this issue in a robustness check (Sect. 6.2).

Tax deductibility creates additional variation in the costs of health insurance in paid employment and self-employment across individuals and time. Health insurance expenses—SHI contributions as well as PHI premiums—can partly be deducted from the personal income tax (PIT) base. The rules changed various times during our observation period, and these changes affected individual taxpayers in different ways due to the nonlinearity of the tax schedule and the various thresholds involved. We describe the specifics in Appendix B.

[10] PHI also includes private long-term care insurance.

[11] In Saxony, employees pay one percentage point of the long-term care insurance contributions alone, to compensate for an additional holiday.

[12] Exceptions apply for artists, writers, and journalists.

[13] In general, this lower limit is three quarters of a defined reference value, which is adjusted annually. It rose from €2291 per month in 2000 to €2625 in 2011.

4 Empirical methodology and data

4.1 Hazard rate model of entry into self-employment

We are interested in transitions from paid employment to self-employment. In a random utility model, a person i in paid employment in period t chooses to switch to self-employment in the following period if utility in self-employment (se) exceeds utility in paid employment (pe). Utility U_{itj} in alternative $j \epsilon \{se, pe\}$ is assumed to be a function of the health insurance costs for the household in this alternative, HIC_{itj}, observed characteristics x_{it}, and an error term ε_{itj} that includes any relevant unobservables:

$$U_{itj}\left(HIC_{itj}, x_{it}\right) = \alpha\, HIC_{itj} + \beta_j' x_{it} + \varepsilon_{itj} \qquad (1)$$

The parameter α of the health insurance costs is expected to be negative and assumed to be the same in paid employment and self-employment, because €1 disposable for consumption should yield the same utility in both employment states.[14] The parameters β_j of the characteristics x_{it} may vary across alternatives, because these characteristics may shift tastes for one or the other alternative.

The probability of entry into self-employment conditional on the HIC_{itj} and x_{it} equals the probability that utility from self-employment $U_{it,se}$ is higher than utility from paid employment $U_{it,pe}$. Let $entry_{it}$ denote a binary variable that equals one if a person switches from paid employment to self-employment between observation times t and $t + 1$, and zero otherwise. With the standard assumption of type I extreme value disturbed error terms ε_{itj} (McFadden 1974),[15] we obtain

$$\begin{aligned} &\text{Prob}\left(\text{entry}_{it} = 1 | HIC_{it,se}, HIC_{it,pe}, x_{it}\right) = \\ &\text{Prob}\left(U_{it,se}\left(HIC_{it,se}, x_{it}\right) > U_{it,pe}\left(HIC_{it,pe}, x_{it}\right)\right) = \\ &\Lambda\left(\alpha\left(HIC_{it,se} - HIC_{it,pe}\right) + \left(\beta_{se} - \beta_{pe}\right)' x_{it}\right) = \Lambda\left(\alpha\, \text{HICD}_{it} + \beta' x_{it}\right) \end{aligned} \qquad (2)$$

where the health insurance cost differential $HICD_{it} = HIC_{it,se} - HIC_{it,pe}$, $\beta = \beta_{se} - \beta_{pe}$, and Λ is the cumulative logistic distribution function. All the explanatory variables in x_{it} as well as the $HICD_{it}$ are measured *before* potential entries into self-employment, which alleviates potential endogeneity concerns.

The probability of switching to self-employment may change with tenure in paid employment. It may decrease due to habituation, or it may increase due to experience and networks. To account for such potential effects, we include 12 dummy variables indicating the duration of the current spell in paid employment in x_{it}. By conditioning on this very flexible specification of the baseline hazard, the logit model of the transition probability in Eq. (2), estimated on the data in person-period format, can equivalently be written as a general survival model (cf. Jenkins 1995; Sueyoshi 1995; Caliendo et al. 2010; García-Gómez et al. 2010). We use annual data because the covariates are not available at a higher frequency. By applying the discrete time hazard rate model, we take into account state dependence and avoid survivorship bias. The model consistently accounts for both, right-censored spells and left-censored spells, because retrospective employment history information in our data allow us to recover the correct spell duration even in case employment already started before the first survey interview of a person. In a robustness check, we also control for nonrandom selection into the sample of paid employees (see Sect. 6.2).

4.2 Simulation of the health insurance cost differential

The explanatory variable of central interest in this analysis is the differential in expected costs for health insurance between the counter-factual alternative of self-employment and the current situation in paid employment. The relevant cost differential takes into account the deductibility of health insurance costs from the personal income tax base.

We define the *health insurance cost differential (HICD)* as the minimum total increase in SHI contributions and/or PHI premiums (including long-term care insurance) after taxes for the total household per month if the paid employee under consideration switches to self-employment. It may be positive or negative, depending on the individual and household situation.[16]

The health insurance costs in the current situation are calculated from the information about the health insurance situation of the household members contained in our data, including the membership in one of the SHI funds

[14] We discuss potentially different qualities of healthcare and possible shifting of costs further below.

[15] In Sect. 6.2, we show that the estimated effects do not change if we assume normally distributed error terms instead, which leads to a probit model.

[16] The HICD amount depends on the assumption about cost shifting from employers to employees. As mentioned before, in the baseline estimations, we assume that the perceived economic incidence equals the statutory incidence, i.e., the burden is roughly split by half. We assess the sensitivity of the results with respect to this assumption in a robustness check (see Sect. 6.2).

(listed in Table A 1 in Appendix A) with the corresponding contribution rates. For the counter-factual situation of self-employment of one of the household members, we simulate the total household health insurance costs for the person's two options—if available—voluntary SHI membership[17] or PHI. To predict PHI premiums, we first run a regression of observed private health insurance premiums of actually self-employed persons on characteristics determining PHI premiums. These include gender, age, and health when signing the PHI contract, copayments, duration of the contract, and eligibility for government aid for civil servants and their families. Then, we use the estimated coefficients to predict individual PHI premiums. This way, individual health shocks enter the predicted HICD and provide exogenous variation. Appendix C describes the estimation of PHI premiums in detail, and Sect. 6.2 covers a robustness check with respect to the underlying estimation sample.

The income tax deduction is simulated using an adaption of the tax-benefit microsimulation model "STSM" for Germany (Steiner et al. 2012). The simulation accounts for the details of the progressive personal income tax, such as joint taxation of married couples and tax benefits for families with children, and incorporates changes in the tax code over time. These include two reforms of the tax deduction of health insurance expenses and changes in the tax schedule (see Appendix B). This is the second source of exogenous variation.

To calculate the HICD, we assume that the person considering to switch to self-employment expects to earn the same amount in self-employment as he or she currently earns in paid employment. This allows us to focus on the effect of health insurance costs without mixing it with the effect of income expectations that may differ between paid employment and self-employment for other reasons. The rich set of independent variables we include, particularly education and industry, and the flexible functions of current income and age control for differences in expectations.

For the calculation of the HICD, we assume that the person entering self-employment chooses the alternative of voluntary SHI or PHI that is cheaper for the household. High-income paid employees who are already insured under PHI cannot choose to switch back to voluntary SHI, so for them, we calculate the HICD acknowledging that they have to stay in PHI.

[17] With full contribution rate, which enables the receipt of sickness benefits.

PHI policies usually offer somewhat more and better services covered than SHI funds, and physicians tend to treat PHI patients preferentially, because they are often able to charge higher prices to PHI providers. Per se, this may put into question that consumers compare the two options on a cost basis only. We adopt three strategies to account for this.

First, we control for the possession of supplementary PHI policies that any SHI members can buy to supplement their services covered. Most prominently, these additional services typically include eligibility for a hospital room with no more than two beds and treatment by the head physician in a hospital, which full PHI policies usually also cover. This control variable should capture the individual preference for premium-quality healthcare.[18] Second, in a robustness check, we recalculate the HICD by adding the average cost of additional private health insurance policies to the contributions of all SHI members in order to compare costs between SHI and PHI plans with more similar services covered. Third, in a radical robustness check, we assume that when contemplating entry into self-employment, everybody only considers PHI because of the better services covered and nobody chooses voluntary SHI, and recalculate the HICD accordingly. We report the results of these robustness checks in Sect. 6.2.[19]

[18] One might be concerned about potential endogeneity of this control variable. However, its coefficient turns out to be insignificant in all our estimations, and dropping this control variable does not change the other coefficients notably.

[19] As an example for the calculation of the HICD, consider a family forming a household with a male main earner in full-time paid employment and covered under SHI, a wife not participating in the labor market, who stays at home to take care of two young children, and a young adult daughter in paid employment with SHI. The wife and the two children are covered contribution-free under family insurance. If the main earner switches to self-employment, he can stay in voluntary SHI but has to pay both the employee's and employer's shares of the contributions. If he switches to PHI, his wife and the young children lose their family insurance, and the family must buy PHI plans for them as well. The adult daughter remains covered under her SHI. We assume that the cheaper alternative of voluntary SHI or PHI for the whole family is chosen. If somebody in the family is sick (except the adult daughter, who is covered by SHI in any case) or the parents are older, voluntary SHI is likely to be the cheaper option for the family. In contrast, if the adult daughter switches to self-employment, nothing changes for the father, who keeps his SHI coverage, and the mother and young children, who continue to be covered under family insurance through the father's SHI membership. The adult daughter can choose voluntary SHI or PHI for herself without further consequences to the others. PHI will be cheaper for the young women if she is healthy and has higher income. Whatever the cheaper choice, the total HICD for the household differs between the different adult household members potentially entering self-employment, so we have variation even within households.

4.3 Control variables

The current wage and salary income as an employee may have an effect on the probability of transition to self-employment and is also correlated with the HICD because SHI contributions are dependent on income. Therefore, it is important to control for income effects through a flexible functional form; we consider higher order polynomials and spline functions. Similarly, health, age and its square, gender, and the number of children are important control variables because they may have direct effects on the entry probability and are correlated with the HICD through estimated PHI premiums.[20] With similar reasoning, we also include the marital status and the age, health, and income of a spouse, if present. As additional control variables, we include determinants of entrepreneurship known from the literature (e.g., Blanchflower 2000; Parker 2009): education, prior work experience and prior unemployment experience, non-German nationality, intergenerational background (a dummy variable indicating whether the father was self-employed when the respondent was 15 years old), and risk tolerance (the self-reported willingness to take risks on a scale from 0 to 10).[21] We also include 11 industry and 4 regional dummies, as well as a full set of year dummies to control for the business cycle.[22]

4.4 Identification of the effect of the health insurance cost differential

In our econometric estimation, we identify the causal effect of the HICD on the probability of entry into self-employment by exploiting variation over individuals that is exogenous after controlling for possibly nonlinear effects of income, own and spousal health and age, gender, marital status, the number of children in the household, and the other control variables. The remaining partial variation in the HICD stems from (i) the discontinuities created by the various discrete thresholds relevant for the health insurance system as well as their changes over time as described in Sect. 3, along with the variation in contribution rates over SHI funds and time; (ii) the discontinuities in the personal income tax system that affect the amount saved through the tax deduction of the health costs, and the changes in these tax rules over time, as described in Appendix B; and (iii) the effects of specifics in each family's situation, e.g., own and spousal health and the coverage of children under free family insurance, on counter-factual health insurance costs in self-employment through the impact of these specifics on PHI premiums. Thus, for the identification of the causal effect of the HICD, we use the variation created by the details of the health insurance legislation and tax code and the changes of these institutions over time, which are exogenous to the individual, as well as the health insurance cost consequences of own and spousal health shocks, which can reasonably be assumed to be exogenous as well after controlling for income and education.

5 Data

5.1 Representative household panel data with health information

The data requirements for this analysis are fulfilled by the German Socio-Economic Panel (SOEP), a representative annual household survey collecting detailed information about the socio-economic situation of private households in Germany (cf. Wagner et al. 2007). We use the waves 2000, when the SOEP was significantly enlarged, through 2012.[23] During this time, the SOEP covered about 20,000 persons in 11,000 households per year. The data allow us to observe employment transitions and provide all details necessary to simulate the HICD, including the tax deduction, as well as a rich set of control variables.

We require health information of the household members for an adequate prediction of counter-factual PHI premiums in case of self-employment and as control variables in the transition equation. In our main specifications, we use a self-assessed health measure provided annually in the SOEP. Respondents are asked how they would describe their current state of health on a five-point scale (1 = very good, 2 = good,

[20] The effect of children on the entry probability is allowed to vary by gender by including an interaction term.

[21] The general willingness to take risks is observed in 2004, 2006, and in all years since 2008. In the other years, we impute values observed for the same person in other years.

[22] In a robustness check, we include nine occupation dummy variables instead of the industry dummies. The results of interest do not change significantly.

[23] The last year is only used to determine if a transition to self-employment occurred between 2011 and 2012.

3 = satisfactory, 4 = poor, 5 = very poor). Such subjective measures are commonly used in the literature (e.g., Benitez-Silva and Ni 2008; Haan and Myck 2009) and are generally viewed as good overall reflections of individual physical as well as mental health, at least if the analysis is confined to a single country. Kalwij and Vermeulen (2008) report that objective health measures add little on top of self-reported health information in an analysis of employment patterns in Germany. Nevertheless, in a robustness check, we alternatively use a more objective measure, the official degree of disability. This is a percentage asserted by a public medical officer and printed in an official document that grants access to certain benefits. The advantage of the subjective measure is that smaller and temporary differences in a generally good medical condition are captured, which would not lead to the issuance of a disability certificate.

The classification of individuals as self-employed is based on a survey question about the occupational status of each respondent.[24] If respondents are employed or self-employed in more than one position, they are asked to report their status in their primary activity. The sample is restricted to working-age individuals between 19 and 59 years of age to avoid distortions through early retirement decisions.[25] It excludes civil servants, farmers, pensioners, and those currently in education, vocational training, or military service; occupational choices in these groups are likely to follow different patterns.[26] We also exclude family members working for a self-employed relative from the sample, because these individuals are not entrepreneurs in the sense of running their own business.

5.2 Descriptive statistics by employment state

Table 1 shows the means of relevant variables from the survey by employment state. We divide the paid employees further into those who do and those who do not enter into self-employment between the year of observation and the subsequent year and report the difference between these two means and its significance level. The paid employees form the estimation sample at risk of entry into self-employment in the hazard rate model; the others are only included the robustness check controlling for selection into being a paid employee. Table A 2 in Appendix A provides the definitions of the variables.

Almost 90% of the paid employees who do not enter into self-employment within the following year are paying members in SHI, 4.3% are in marginal employment and covered under free family insurance through the spouse's SHI, and 6.5% have PHI. Among those making the transition, 22.6% are already covered under PHI as a paid employee, reflecting the higher mean before-tax labor income of this group (real €3054 versus €2471 per month). The income difference seems to be partly explained by the higher education of those about to venture out on their own: 41% of them have a university degree, but only 23% of the other paid employees. The soon-to-be entrepreneurs as well as their spouses are healthier when looking at the self-assessed measure, but there are no significant differences with regard to the official disability degree. The other variables confirm the known picture. Those who enter into self-employment are more often male, have had a self-employed father, and are more willing to take risks than the other paid employees. They are more often active in the business services and construction industries and less often in manufacturing and "public and personal services" (the latter category includes employed teachers, for example).

Table 2 shows means of simulated variables needed to calculate the HICD for the estimation sample at risk of making the transition from paid to self-employment. We discuss these variables going from top to bottom. The mean current health insurance costs are €188 per month for employees who stay employees and €9 more for those who switch to self-employment in the following year, again reflecting the higher average income of the latter group. In the counter-factual case of self-employment, the persons in the sample would pay an average premium of €363–365 per month if they chose PHI. This variable is predicted using the estimated PHI premium equation and includes premiums for a spouse and children, if these are present and not otherwise covered, as explained in Appendix C. If the person hypothetically entering

[24] The self-employed may or may not employ workers. The concept of entrepreneurship may differ from the concept of self-employment. Entrepreneurship usually implies risk bearing and innovation, whereas self-employment goes along with income risk but not necessarily with innovation.

[25] We obtain similar results when constraining the sample to older or younger workers.

[26] We include civil servants in the sample in a robustness check in Sect. 6.2.

Table 1 Descriptive statistics by employment status

	Not working	Self-employed	Paid employees			
			No entry into self-employment	Entry into self-employment	Difference	Significance of difference
Paying SHI member	0.575	0.432	0.891	0.694	−0.197	***
Family insurance	0.349	0.055	0.043	0.076	0.034	***
Private health insurance	0.070	0.506	0.065	0.226	0.161	***
Supplementary PHI	0.097	0.119	0.175	0.139	−0.035	**
No. of family insured kids	0.632	0.413	0.767	0.675	−0.093	**
Poor health	2.605	2.366	2.439	2.298	−0.141	***
Disability degree	0.039	0.015	0.025	0.018	−0.007	
Age	39.898	43.292	41.362	40.045	−1.317	***
Female	0.723	0.355	0.498	0.396	−0.102	***
No. of children	0.937	0.698	0.655	0.825	0.171	***
Spouse family insured	0.035	0.074	0.113	0.108	−0.005	
Age of spouse	44.537	44.939	43.761	43.466	−0.295	
Spouse paying SHI	0.519	0.416	0.465	0.376	−0.089	***
Spousal poor health	2.541	2.468	2.527	2.432	−0.095	***
Spousal disability degree	0.048	0.036	0.042	0.036	−0.006	
Monthly labor income (th. €)	0.000	3.768	2.471	3.054	0.583	***
Monthly spousal labor inc.	1.938	1.550	1.494	1.832	0.337	***
High school degree	0.177	0.467	0.285	0.471	0.186	***
Apprenticeship	0.491	0.361	0.509	0.388	−0.120	***
Higher techn. college	0.216	0.291	0.262	0.257	−0.005	
University degree	0.121	0.392	0.230	0.408	0.178	***
Married	0.641	0.626	0.668	0.643	−0.025	
East	0.270	0.212	0.245	0.204	−0.041	**
South	0.237	0.263	0.268	0.267	−0.001	
North	0.107	0.104	0.109	0.116	0.006	
Work exp. (10 years)	1.160	1.988	1.901	1.677	−0.224	***
Unemployment exp.	2.290	0.504	0.555	0.564	0.009	
German citizenship	0.903	0.954	0.953	0.945	−0.008	
Self-employed father	0.067	0.159	0.068	0.147	0.079	***
Willingness to take risks	4.288	5.550	4.642	5.651	1.009	***
Duration employment spell	2.899	7.809	9.448	5.773	−3.675	***
Agriculture	0.000	0.013	0.012	0.012	−0.001	
Mining, energy, water	0.000	0.002	0.015	0.008	−0.008	
Manuf. durable goods	0.000	0.049	0.111	0.078	−0.033	**
Manuf. nondurable goods	0.000	0.046	0.137	0.090	−0.047	***
Construction	0.000	0.111	0.056	0.098	0.042	***
Trade	0.000	0.128	0.126	0.151	0.024	*
Hotels, restaurants	0.000	0.029	0.020	0.031	0.012	*
Transport, communication	0.000	0.037	0.049	0.039	−0.010	
Financials, real estate	0.000	0.069	0.062	0.057	−0.006	
Business services	0.000	0.198	0.078	0.145	0.067	***
Public and personal services	0.000	0.238	0.281	0.218	−0.063	***
Missing industry	1.000	0.080	0.051	0.073	0.022	**
N	18,691	9051	56,048	510		

Source: Authors' calculations based on SOEPv29, 2000–2012

Definitions of the variables are displayed in Table A 2 in Appendix A. Stars indicate significance of the differences between the means among the employees not entering and those entering into self-employment.

* Significance at the 10% level

** Significance at the 5% level

*** Significance at the 1% level

Table 2 Mean simulated health insurance costs

	Paid employees			
	No entry into self-empl.	Entry into self-empl.	Difference	Significance of difference
Actual health insurance costs	187.890	197.221	9.332	*
Predicted PHI contributions in SE	363.455	364.702	1.247	
Simulated SHI contributions in SE	379.023	386.654	7.632	
PHI cheaper choice than SHI	0.525	0.586	0.061	***
Tax savings in PHI per month	21.364	25.558	4.194	**
Tax savings in SHI per month	25.556	21.999	−3.557	*
Minimum health insurance costs in SE	279.955	276.760	−3.195	
Health insurance cost diff. after taxes	92.065	79.539	−12.527	**
. in real terms, divided by 100	0.916	0.784	−0.132	**
…. assuming full shift onto employees	−0.730	−0.789	−0.059	
…. SHI plus addit. private health insur.	0.727	0.632	−0.095	*
…. assuming that PHI is the only option	1.537	1.407	−0.130	*

Source: Authors' calculations based on SOEPv29, 2000–2012. Stars indicate significance of the differences between the means among the employees not entering and those entering into self-employment.

* Significance at the 10% level

** Significance at the 5% level

*** Significance at the 1% level

into self-employment chose voluntary SHI membership, he or she would pay about €16–22 more on average. For 53% of the paid employees who do not enter into self-employment, a PHI policy would be the cheaper choice for the household in case of self-employment; this share is 59% for those who actually enter.

The health insurance costs reported so far are before tax. Since these expenses can partly be deducted from the personal income tax base, the higher costs in case of self-employment lead to tax savings of €21–26 on average per month, both with the PHI and with the SHI. Taking into account the tax savings, each person chooses the lower cost option for the household, PHI or SHI, in case of self-employment. This leads to the hypothetical minimum health insurance costs in case of self-employment after taxes of €277–280. The mean is lower than the mean of PHI or SHI costs because of the individual choice of the cheaper option. Finally, we subtract the actual current health insurance costs for the household from the hypothetical costs in case of self-employment, both after taxes, and arrive at the average nominal HICD. It is €92 per month for paid employees who do not enter into self-employment and €80 per month for those who enter. The difference is significant and may indicate that a higher HICD deters persons from entry into self-employment. The next section explores this much more rigorously using the econometric model which controls for important covariates and state dependence. For the estimation, we deflate the HICD amount using the consumer price index and divide by 100.[27]

Figure 1 depicts the distribution of the real HICD in a histogram for all paid employees in the estimation sample. Clearly, the HICD is positive for the most part of the distribution, i.e., health insurance costs for the household increase when a member switches to self-employment because of the loss of the employer's contributions. Insofar, the German health insurance system may constitute a barrier against entry into self-employment. However, there is also an important negative part of the HICD distribution. For example, for a young, healthy and unmarried male, the full premium to PHI in case of self-employment can be

[27] The last three rows of Table 2 show alternative measures of the real HICD under different assumptions, which we discuss in Sect. 6.2.

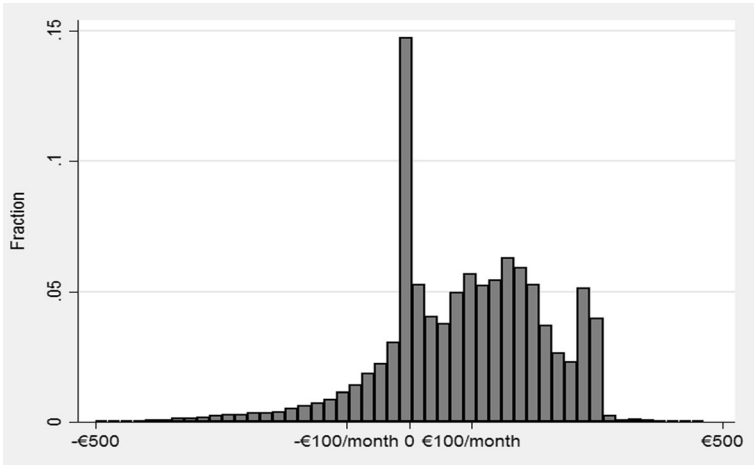

Fig. 1 Histogram of the simulated health insurance cost differential. The histogram shows the distribution of the simulated differential in the monthly health insurance costs between the alternatives of self-employment and paid employment in real euro of 2005. Here, the incidence assumption is that the burden of the health insurance costs is shared between employers and employees according to the statutory division, i.e., roughly by half. Source: Authors' calculations based on SOEPv29, 2000–2012

cheaper than the employee's share to SHI contributions. Thus, the health insurance system may provide incentives to enter self-employment for persons whose income is not high enough to opt out of the SHI as a paid employee. For them, self-employment lifts the barrier to PHI.

The histogram further shows that there is a bunching at zero, which indicates that for almost 15% of the individuals in the sample, health insurance costs for the household would not change at all if they switched to self-employment. For example, this is the case for persons with income below the marginal employment threshold who are insured under free family insurance through their spouse's SHI membership, because they can keep their family insurance in self-employment. Another bunching occurs at the right side of the distribution with a high HICD. Again, marginal employment plays a role here, because a marginally employed person who cannot be covered under family insurance through a spouse or parent is covered under SHI with zero employee's contributions, but not as a low-income self-employed person. In the latter situation, the person has to pay the full income-independent PHI premium, or as a voluntary SHI member, the lower limit of income for the assessment of SHI contributions for the self-employed applies. In both cases, costs increase drastically in comparison to free SHI coverage, and the health insurance system constitutes a significant barrier against self-employment.

6 Econometric results

6.1 Main results: the effect of the health insurance cost differential

Table 3 provides the main results from estimating the hazard rate model of transition from paid employment into self-employment in Eq. (2). The table shows logit coefficients and the average marginal effect of the key explanatory variable, the health insurance cost differential (HICD) between counter-factual self-employment and paid employment. The standard errors are robust to heteroscedasticity and clustering at the individual level across years[28]; those of the marginal effects are obtained using the delta method.

Column (1) provides the main specification for the full sample. The HICD has a negative effect on the probability of entry into self-employment, which is significant at the 1% level. As the HICD is coded in units of €100, increasing the additional costs in case of self-employment by €10 per month decreases the entry probability by 0.015 percentage points on average. This is 1.7% of the annual transition rate from paid employment to self-employment of 0.9%, as indicated at the bottom of the table. The result shows that the decision of paid employees to switch to self-employment is

[28] We obtain very similar standard errors when clustering at the household level, and the reported significance levels of the variables of interest remain unchanged.

significantly influenced by the additional costs (or cost savings) for health insurance for the household.

Column (2) shows that the effect of health insurance costs is even stronger for men, where an increase in the HICD by €10 per month increases the transition probability by 1.9% of the entry rate. For women, the effect has the same sign but is smaller and insignificant (column 3). Nonpecuniary aspects of self-employment like flexibility of time and location of work may be more important for women (Georgellis and Wall 2005).

To compare the effect size of the health insurance costs with other determinants of entrepreneurship that are well-known from the literature, we calculate average marginal effects of some of our control variables as well (see Table A 3 in Appendix A). Using the full sample, we find that an increase of health insurance costs in entrepreneurship by €100 per month decreases the probability of switching to self-employment by about as much as a decrease in the willingness to take risks by one point on the 11-point scale. The standard deviation of the HICD is €120 and that of the willingness to take risks about 2 points. Thus, a one standard deviation change in health insurance costs has more than half the effect of a one standard deviation change in risk tolerance, which is known to be an important determinant of entrepreneurship (Caliendo et al. 2009; Ahn 2010; Skriabikova et al. 2014). Moreover, the effect of an increase in the HICD by €330 per month has the same effect as not having a self-employed father, so an increase in the HICD by one standard deviation has more than a third of the effect size of an intergenerational link, which is known to be highly relevant (Dunn and Holtz-Eakin 2000).

The elasticity of the probability of entry into self-employment with respect to the health insurance costs in self-employment implied by our estimate is about −0.47 for the whole sample and −0.65 for men (keeping the health insurance costs in paid employment constant). We compare this to the elasticities implied by the literature that analyses the effects of the TRA86 tax reform in the USA. Gumus and Regan (2015) only provide estimates for men, and their point estimate for all men implies an elasticity of −0.56, which is similar to ours. However, the coefficient estimated by Gumus and Regan (2015) is not significantly different from zero due to a large standard error. The results of Heim and Lurie (2010) imply a larger point estimate of the elasticity of the probability of starting to earn some income from self-employment of −2.93.[29] They acknowledge that their estimated effects are "somewhat large" (p. 1006) and explain this by the strong increase in the self-employment rate in the USA during the time period under their analysis.

Persons with poorer health are less likely to enter into self-employment, even after controlling for the HICD, which accounts for the higher costs of PHI implied by the poorer health. In the main estimation based on the full sample, a deterioration of health by one point on the five-point scale of self-assessed general health decreases the entry probability by 0.11 percentage points (average marginal effect in Table A 3 in Appendix A), i.e., 12% of the annual transition rate; the standard deviation of the health measure among all employees is 0.82.[30] Similarly, Parker and Rougier (2007) as well as Rietveld et al. (2015) report that older workers with poor health are less likely to move into self-employment in Britain and the USA, respectively. Self-employment is associated with longer work hours than paid employment and considerable strains (Lewin-Epstein and Yuchtman-Yaar 1991), which may deter less healthy persons from this choice, in addition to the implications for health insurance costs discussed. Rietveld et al. (2015) argue that higher costs of health insurance may explain why less healthy individuals less often become self-employed, but empirically, they cannot distinguish this channel from direct health effects. Thus, our separation between the direct health effect and the effect through health insurance costs is a novel contribution to the literature.

The partial effect of poor spousal health is not significant when controlling for the HICD in our estimations. In Sect. 6.3, we show that omission of the HICD leads to a significant negative coefficient of poor spousal health. Thus, poor spousal health affects the entry decision, but only indirectly through the higher PHI costs implied.

[29] The elasticities are derived as follows. This paper: (280)/100 (minimum health insurance costs in self-employment in units of €100, see Table 2) × 1% × (−0.0015) (coefficient of HICD) / 0.009 (mean entry rate) = −0.47%. Gumus and Regan (2015): 1% × (−0.0136) (coefficient of log tax price) / 0.0243 (entry rate in 1999) = −0.56%. Heim and Lurie (2010): 1% × (−0.117) (coefficient of log tax price) / 0.04 (mean entry rate) = −2.93%.

[30] The estimated effect of the HICD remains virtually unchanged when we include dummy variables for each possible answer to the subjective health question instead of the continuous variable and also when we additionally control for the official degree of disability.

Table 3 Self-employment entry probability conditional on health insurance cost differential

	(1) Full sample	(2) Men	(3) Women	(4) Income splines	(5) Alt. health measure	(6) Unobs. heterogen.
HI cost diff. (€100)	−0.1930***	−0.2529***	−0.0621	−0.2069***	−0.1985***	−0.2143***
	(0.0535)	(0.0695)	(0.0728)	(0.0409)	(0.0535)	(0.0549)
Marginal effect	−0.0015***	−0.0021***	−0.0004	−0.0016***	−0.0015***	−0.0022***
	(0.0004)	(0.0006)	(0.0005)	(0.0003)	(0.0004)	(0.0007)
Poor health	−0.1477**	−0.2263***	−0.0587	−0.1318**		−0.1725**
	(0.0626)	(0.0868)	(0.0908)	(0.0615)		(0.0838)
Disability degree					−0.9947**	
					(0.5074)	
Age	0.2114***	0.2034*	0.2211**	0.2081***	0.2132***	0.2948***
	(0.0703)	(0.1045)	(0.1031)	(0.0697)	(0.0707)	(0.0940)
Age squared	−0.0031***	−0.0029**	−0.0033**	−0.0030***	−0.0032***	−0.0042***
	(0.0009)	(0.0013)	(0.0013)	(0.0009)	(0.0009)	(0.0012)
Supplementary PHI	0.0038	0.0923	0.0143	−0.0178	0.0035	−0.0243
	(0.1467)	(0.2116)	(0.2033)	(0.1453)	(0.1467)	(0.1879)
Age of spouse	0.0013*	0.0295*	0.0019**	0.0012*	0.0011	0.0019
	(0.0007)	(0.0151)	(0.0007)	(0.0007)	(0.0008)	(0.0028)
Spousal poor health	−0.1041	−0.1133	−0.0899	−0.1051		−0.1468
	(0.0714)	(0.0969)	(0.1117)	(0.0699)		(0.1010)
Spousal disability deg.					0.1966	
					(0.6498)	
Spousal labor inc. (€100)	0.0012	−0.0063	0.0027	0.0011	0.0014	0.0020
	(0.0014)	(0.0062)	(0.0019)	(0.0014)	(0.0015)	(0.0024)
Female	−1.0934***			−1.1293***	−1.1110***	−1.4780***
	(0.1549)			(0.1552)	(0.1555)	(0.2197)
No. of children	0.2488***	0.2133***	−0.2446**	0.2465***	0.2628***	0.3425***
	(0.0724)	(0.0806)	(0.1140)	(0.0715)	(0.0715)	(0.1021)
Female × no. of childr.	−0.5116***			−0.4972***	−0.5214***	−0.5734***
	(0.1176)			(0.1174)	(0.1168)	(0.1514)
Real wage inc.	−23.450***	−24.199***	−40.695***		−23.549***	−29.404***
	(2.092)	(2.252)	(5.615)		(2.117)	(1.705)
(€10,000)						
Real wage inc. squared	27.203***	26.417***	122.689***		27.348***	33.265***
	(5.869)	(5.859)	(35.688)		(5.923)	(2.511)
Real wage inc. cubed	−9.691***	−9.003***	−126.246**		−9.745***	−11.317***
	(3.470)	(3.294)	(58.646)		(3.504)	(1.139)
Real wage inc.[4]	0.720**	0.660**	28.207*		0.724**	0.828***
	(0.291)	(0.273)	(14.761)		(0.293)	(0.091)
Real wage inc. spline 1				−16.291***		
				(0.830)		
Real wage inc. spline 2				4.564***		
				(1.111)		
Real wage inc. spline 3				−0.818		
				(2.446)		
Real wage inc. spline 4				0.977		
				(3.748)		
Real wage inc. spline 5				0.171		
				(0.289)		
High school degree	0.4619***	0.2132	0.6746***	0.4910***	0.4689***	0.7961***
	(0.1458)	(0.2118)	(0.2047)	(0.1458)	(0.1453)	(0.2087)
Apprenticeship	0.0667	0.4621**	−0.4839**	0.0595	0.0574	0.1407
	(0.1414)	(0.1964)	(0.1990)	(0.1378)	(0.1407)	(0.1989)
Higher techn. college	0.3623**	0.6674***	0.0353	0.3501**	0.3512**	0.5464**
	(0.1487)	(0.2121)	(0.2006)	(0.1468)	(0.1481)	(0.2153)
University degree	1.3945***	1.4948***	1.0900***	1.3836***	1.4091***	1.8840***
	(0.1434)	(0.2050)	(0.2193)	(0.1445)	(0.1427)	(0.2335)
Married	−0.2454*	0.2115	−0.3090	−0.2190*	−0.2604*	−0.2826
	(0.1340)	(0.2082)	(0.2196)	(0.1326)	(0.1350)	(0.1841)
East	−0.3830**	−0.5636 ***	−0.0832	−0.4805***	−0.3653**	−0.5391***
	(0.1497)	(0.1843)	(0.2551)	(0.1497)	(0.1506)	(0.2033)

Table 3 (continued)

	(1) Full sample	(2) Men	(3) Women	(4) Income splines	(5) Alt. health measure	(6) Unobs. heterogen.
South	0.0078 (0.1302)	−0.0166 (0.1779)	0.1072 (0.1999)	0.0205 (0.1274)	0.0298 (0.1316)	0.0037 (0.1821)
North	0.0017 (0.1805)	−0.0567 (0.2355)	0.1243 (0.2637)	−0.0210 (0.1805)	0.0004 (0.1800)	0.0704 (0.2395)
Work exp. (10 years)	0.3742 (0.3175)	0.6266 (0.4799)	0.3320 (0.4477)	0.3283 (0.3176)	0.3603 (0.3182)	0.3004 (0.4251)
Work exp. squared	0.0409 (0.0816)	−0.0746 (0.1150)	0.0506 (0.1243)	0.0444 (0.0813)	0.0401 (0.0817)	0.0847 (0.1016)
Unemployment exp.	−0.1393 (0.0977)	−0.2381*** (0.0718)	0.1460 (0.1399)	−0.1493** (0.0737)	−0.1555* (0.0856)	−0.1600 (0.1008)
Unempl. exp. squared	0.0003 (0.0131)	0.0068** (0.0029)	−0.0412** (0.0171)	0.0020 (0.0084)	0.0017 (0.0108)	−0.0008 (0.0106)
German citizenship	0.0104 (0.2583)	0.0702 (0.3632)	0.0291 (0.3483)	0.0232 (0.2591)	0.0170 (0.2579)	0.0815 (0.3278)
Self-employed father	0.6505*** (0.1566)	0.6662*** (0.2268)	0.6618*** (0.2147)	0.6118*** (0.1578)	0.6312*** (0.1584)	0.8890*** (0.2324)
Willingn. to take risks	0.1720*** (0.0264)	0.1876*** (0.0389)	0.1435*** (0.0352)	0.1734*** (0.0261)	0.1729*** (0.0265)	0.2423*** (0.0347)
10 industry dummies	$p = 0.0088$	$p = 0.0628$	$p = 0.0002$	$p = 0.0099$	$p = 0.0111$	$p = 0.0195$
12 duration dummies	$p < 0.0001$	$p = 0.0032$	$p = 0.0001$	$p < 0.0001$	$p < 0.0001$	$p = 0.0057$
Full set year dummies	$p = 0.0192$	$p = 0.0601$	$p = 0.4251$	$p = 0.0163$	$p = 0.0205$	$p = 0.0231$
Constant	−5.5066*** (1.2502)	−6.2779*** (1.9507)	−7.6076*** (1.8263)	−5.6873*** (1.2417)	−6.0925*** (1.2401)	−8.9007*** (1.8001)
Log var. random effect						1.6622*** (0.2279)
Log likelihood	−2092.07	−1142.45	−878.56	−2128.91	−2093.87	−2057.16
Observations	56,558	28,451	28,107	56,558	56,538	56,558
Mean outcome	0.0090	0.0108	0.0072	0.0090	0.0090	0.0090

Source: Authors' calculations based on SOEPv29, 2000–2012

Logit coefficients for the discrete time hazard rate model of entry into self-employment. Average marginal effects of the health insurance cost differential are also shown; those of further variables appear in Table A 3 in Appendix A. The dependent variable is a binary indicator of entry into self-employment between years t and $t + 1$. In the rows referring to sets of dummy variables, the p values derive from tests of joint significance. Definitions of the variables are displayed in Table A 2. Standard errors are robust to heteroscedasticity and clustering at the individual level

*Significance at the 10% level

**Significance at the 5% level

***Significance at the 1% level

6.2 Robustness checks

In this section, we assess the robustness of the estimated effect of the HICD with respect to specification choices and assumptions taken.[31]

Income splines As mentioned before, it is important to control for possibly nonlinear effects of wage income of paid employees. In column (4) of Table 3, we replace the fourth-order polynomial of income of the main specification by a spline function with five splines of equal width within the interval from zero to €20,000 per month, where the highest spline also includes observations with higher income. We observe that the coefficient and marginal effect of the HICD remains almost unchanged, indicating that the estimates are not sensitive to the functional form with regard to income.

Health measure In column (5), we explore the official degree of disability as an alternative, more objective health measure (see Sect. 5.1) and again find a very

[31] We thank two anonymous reviewers for suggesting some of these robustness checks to us.

similar effect of the HICD as well as a negative partial direct effect of poorer health. A higher disability degree by 10 percentage points decreases the entry probability by 0.076 percentage points (Table A 3 in Appendix A) or 8% of the entry rate.[32]

Unobserved heterogeneity In further specification checks, we allow for unobserved heterogeneity between individuals. In column (6) of Table 3, we consider an individual-specific random effect with a normal distribution. The estimated variance of the individual random effect is significantly different from zero. The logit coefficient of the HICD and the average marginal effect (which contains a draw from the estimated random effect distribution for each individual) become larger in absolute terms, but they are not significantly different from the point estimates in column (1). We also estimate complementary log-log models with an arbitrary discrete distribution of the individual random effect (not reported in the table). We achieve convergence with two mass points based on a quasi-Hessian convergence criterion. The estimated probability of being latent type 1 is 83%, and the average marginal effect of the HICD for this type is −0.0011 (std. err. 0.0004), similar to our baseline estimate. The marginal effect for type 2 (17% probability) is −0.0003 (std. err. 0.0001), but the distinction between the two mass points and the probability of being type 2 are statistically insignificant. We conclude that the main results are robust to the modeling of unobserved heterogeneity.

Selection correction The sample at risk of transition from paid employment to self-employment is the subsample of person-year observations currently working in paid employment. The results from our main estimations can be interpreted as conditional on being a paid employee. To test whether the results change if we account for potential selection effects, we employ a selection correction that allows us to make unconditional statements as well. We use the selection model for binary dependent variables suggested by Van de Ven and Van Praag (1981) with probit equations both for the main equation of entry into self-employment and a selection equation for being in paid employment. The error terms are modeled to follow the bivariate normal distribution with correlation. In both equations, among other variables, we control for the number of children under the age of 17 in the household, gender, and the interaction of these variables. For better identification, in the selection equation, we additionally include the number of children below three and below 6 years of age and their interaction terms with the gender dummy. The presence of young children in the household is likely to influence labor force participation, especially for women, but not the choice between paid employment and self-employment after controlling for the general family situation.

The estimated probit coefficients from this model are reported in Table 4. The coefficients from the selection equation show that most of the variables with exclusion restriction are highly significant. The correlation between the error terms of the selection and the transition equations ρ turns out to be significantly different from zero only among men. The estimated marginal effects of the HICD are very similar to those from the baseline models in Table 3 (note that the probit coefficients cannot be directly compared to the logit coefficients from the main model). This shows that the estimated effects are not driven by selection and that they are also insensitive to the choice of a logit or a probit specification.

Assumptions about the health insurance cost differential Next, we explore the sensitivity of our results with respect to the assumptions taken in order to calculate the HICD. In the main estimations, we assume that the incidence of the burden of the health insurance costs, as perceived by the paid employees when they consider switching to self-employment, equals the statutory incidence, i.e., employers and employees bear roughly half of the contributions. However, it is possible that employers are able to shift the burden onto employees by paying lower wages. Using data from Eurostat on labor costs, Ooghe et al. (2003) estimate that more than half of the burden of social security contributions is borne by the employees in Europe. Gruber (2000) concludes from a literature review that the costs of health insurance are even fully shifted onto the employees.

In column (1) of Table 5, we therefore assume that the total SHI contributions and PHI premiums, i.e., both the statutory employee's and employer's shares, are effectively borne by the employees. This reduces the

[32] For the UK, Jones and Latreille (2011) report that nonwork-limited disabled persons are less likely to be self-employed than the nondisabled, whereas work-limited disabled men are more likely to be self-employed, which could be explained by the greater flexibility self-employment offers in terms of times, hours, and locations.

Table 4 Robustness check: probit specification with selection correction

	Full sample		Men		Women	
	Selection	Main	Selection	Main	Selection	Main
HI cost diff. (€100)		−0.0789*** (0.0186)		−0.1066*** (0.0237)		−0.0167 (0.0290)
Marginal effect		−0.0015*** (0.0004)		−0.0023*** (0.0005)		−0.0003 (0.0005)
Poor health	−0.0399*** (0.0103)	−0.0492* (0.0262)	−0.0596*** (0.0154)	−0.0812** (0.0355)	−0.0192 (0.0141)	−0.0102 (0.0383)
Female	0.2541*** (0.0293)	−0.4477*** (0.0634)				
No. of children	−0.1049*** (0.0199)	0.1148*** (0.0288)	−0.1193*** (0.0210)	0.1126*** (0.0328)	−0.1027*** (0.0186)	−0.0852* (0.0487)
Female × no. of children	−0.0152 (0.0256)	−0.2040*** (0.0497)				
Children below 3 years	0.0058 (0.0338)		−0.0204 (0.0346)		−0.8835*** (0.0339)	
Children below 6 years	0.1054*** (0.0317)		0.0784** (0.0321)		−0.2274*** (0.0276)	
Female × children <3 years	−0.8903*** (0.0473)					
Female × children <6 years	−0.3462*** (0.0416)					
Further controls	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.2421 (0.2040)	−2.5296*** (0.5231)	−0.1427 (0.3778)	−2.6085*** (0.8058)	0.2702 (0.2437)	−3.4665*** (0.7736)
Observations	84,300	56,558	28,451	39,462	28,107	44,838
ρ		−0.0679		−0.1921		−0.0708
Test of $\rho = 0$: p value		0.5220		0.0051		0.6060
Log likelihood	−44,710.33		−21,268.36		−22,903.37	

Source: Authors' calculations based on SOEPv29, 2000–2012

Discrete time hazard rate model specified as a probit model with selection correction. The table shows probit coefficients of selected variables in the equation of selection into paid employment and the equation of transition to self-employment (main). The coefficients of the other control variables, which are the same as in Table 3, are available from the authors on request. Average marginal effects of the health cost differential are also shown (conditional on being a paid employee and based on the sample of paid employees). The dependent variable is a binary indicator of entry into self-employment between years t and $t + 1$. ρ corresponds to the selection correction term. Standard errors are robust to heteroscedasticity and clustering at the individual level

*Significance at the 10% level

**Significance at the 5% level

***Significance at the 1% level

average real HICD between the alternatives of self-employment and paid employment from €91.6 to −€73.0 for the paid employees who do not enter into self-employment and from €78.4 to −€78.9 for those who make the transition (see Table 2). In the baseline assumption, the step into self-employment on average implies higher health insurance costs, because the nascent entrepreneur loses the employer's contributions. If the employer's contributions are fully shifted onto the employee anyway, the situation becomes relatively cheaper in self-employment on average, because self-employment opens up the PHI option, total costs of which are often lower. In this estimation, the point estimate of the average marginal effect of the HICD becomes larger in absolute terms in comparison to the main estimation (column (1) of Table 3), but the confidence intervals of the two estimates overlap, so the result is robust.

In column (2) of Table 5, we return to the baseline assumption regarding incidence but re-calculate the HICD by adding the cost of supplementary PHI to the health insurance costs associated with SHI. We use the mean of the costs of those employees in the sample who actually have supplementary PHI report paying for it. As discussed in Sect. 4.2 in the paper, this makes the services covered by SHI and PHI more comparable. Again, this decreases the average HICD and makes self-employment look more attractive (Table 2). However, the estimated effect of the HICD is very similar to the main estimation.

Finally, we assess the robustness with respect to the assumption that the choice between voluntary SHI and PHI in case of self-employment is determined by the lowest total cost for the household (if both options are available). Instead, in column (3) of Table 5, we assume that everybody considers the HICD associated with PHI in case of self-employment. The estimated effect of the HICD becomes somewhat larger in absolute terms than in the main estimation, but not significantly different. In summary, we conclude that the results are robust to the assumptions taken for the calculation of the HICD.

Civil servants We return to our original simulation of the HICD for the remaining robustness checks. Thus far, we considered transitions from dependent employment to self-employment only. In column (4) of Table 5, we additionally include civil servants in the sample and also add a corresponding dummy variable. We calculate their HICD taking into account that civil servants have lower PHI costs because they and their families (if certain conditions are met) are eligible for financial support from the government in case of sickness. The coefficient of the civil servant dummy variable is negative and significant, indicating that civil servants are less likely to switch to self-employment than employees, presumably because of the high job security and comparably generous pension entitlements of civil servants in Germany. The coefficient and marginal effect of the HICD for the combined sample of employees and civil servants is very similar to the baseline estimate in column (1) of Table 1, which confirms robustness.

Estimation of PHI premiums In our main specification, we predict individual PHI premiums in case of self-employment based on a regression of PHI premiums using the sample of self-employed persons with PHI policies (see Appendix C). The idea behind using self-employed persons only in this auxiliary regression is that the determination of PHI premiums might differ somewhat between self-employed and dependently employed customers, but the disadvantage is that the estimation sample may be selective. In order to use a larger and less selective sample, in this robustness check, we include all self-employed workers as well as paid employees with PHI policies in the regression of PHI premiums (1442 observations).[33] We obtain similar coefficients for the PHI premium equation as in Table C 1 in Appendix C. After recalculating the HICD, column (5) of Table 5 shows that the results from estimating the probability of entry into self-employment remain very robust.[34]

Foreseeable health predisposition For our identification, we treat changes in individual health as exogenous shocks (after controlling for income and education). However, since various diseases, such as certain forms of cancer, are partly hereditary and determined by genes and their interaction with the environment, future health issues may be partly foreseeable by individuals, and this may influence their occupational choices even before health issues arise. While it is impossible to completely control individual expectations about future health developments using our data, we test the sensitivity of our results when we use both the ages of death of the respondent's father and mother as proxies for individual genetic predisposition. Because these variables are not observed for a parent who is still alive, we interact them with dummy variables indicating whether the father or mother is deceased. The coefficients of the additional control variables turn out to be insignificant in the regression of the probability of entry into self-employment, and the estimates presented in column (6) are similar to the baseline results.

[33] We additionally include a self-employment dummy variable in the PHI premium regression and set it to one when we predict health insurance premiums for the case of self-employment.

[34] We also obtain very similar results when we additionally include civil servants in the PHI premium regression (2007 observations in total) and in the subsequent estimation of the probability of entry into self-employment. The lower PHI contributions of civil servants are accounted for by a dummy variable indicating eligibility for civil servant healthcare.

Table 5 Self-employment entry probability: further robustness checks

	(1) Simulation of the HICD with… Full shift	(2) Simulation of the HICD with… Suppl. PHI	(3) Simulation of the HICD with… PHI only	(4) Incl. civil servants	(5) Altern. PHI estimation	(6) Incl. health predisposit.
HI cost diff. (€100)	−0.3393*** (0.0501)	−0.2000*** (0.0530)	−0.2713*** (0.0504)	−0.1911*** (0.0533)	−0.1890*** (0.0531)	−0.2002*** (0.0529)
Marginal effect	−0.0025*** (0.0004)	−0.0015*** (0.0004)	−0.0020*** (0.0004)	−0.0013*** (0.0004)	−0.0014*** (0.0004)	−0.0015*** (0.0004)
Poor health	−0.1189* (0.0623)	−0.1446** (0.0627)	−0.1066* (0.0623)	−0.1476** (0.0622)	−0.1534** (0.0624)	−0.1446** (0.0627)
Civil servant				−1.5230*** (0.4056)		
Further control var.	Yes	Yes	Yes	Yes	Yes	Yes
Log likelihood	−2050.45	−2091.00	−2069.83	−2130.41	−2092.33	−2088.55
Observations	56,558	56,558	56,558	62,500	56,558	56,558
Mean outcome	0.0090	0.0090	0.0090	0.0083	0.0090	0.0090

Source: Authors' calculations based on SOEPv29, 2000–2012

Logit coefficients of selected variables for the discrete time hazard rate model of entry into self-employment; the coefficients of the other control variables, which are the same as in Table 3, are available from the authors on request. Average marginal effects of the health insurance cost differential are also shown. The dependent variable is a binary indicator of entry into self-employment between years t and $t + 1$. Standard errors are robust to heteroscedasticity and clustering at the individual level

*Significance at the 10% level

**Significance at the 5% level

***Significance at the 1% level

Sick leave As mentioned in Sect. 3, a difference between paid employment and self-employment is that employees receive wage continuation from their employer during the first 6 weeks of sick leave from work. To explore whether this influences the decision to become self-employed, in a robustness check, we include the number of sick leave days a worker reports for the previous year and an interaction with wage income in our model of entry into self-employment. These variables capture the value of wage continuation to an individual. However, these additional variables are insignificant, and their inclusion does not change the size or significance of the estimated effects of the HICD or the health status variable. Thus, differences in sick pay do not drive our results.

Lagged HICD determinants Even though we control for the variables that determine the HICD, especially income and age, one may still be concerned that the estimated coefficient of the HICD may partly reflect nonlinear effects of these individual characteristics on self-employment (spurious correlation). Therefore, in another check of robustness, we use variables lagged by 4 years, but within the contemporaneous legislative environment, to simulate the HICD. This should largely purge the HICD coefficient of any uncontrolled effects of individual characteristics but leave identification of the coefficient through changes in the health insurance system and tax system intact. Due to the lagged variables, our sample size shrinks to 25,819 observations in this test. The marginal effect of the HICD becomes −0.0016 (std. err. 0.0004), very similar to the baseline estimate in Table 3. This increases confidence that our results are not driven by spurious correlation.

6.3 The effects of health and the family situation

We have discussed which characteristics of household members influence the HICD, and we have estimated that the HICD has a sizable and significant effect on the probability of transition from paid employment to self-employment. In this section, we take a step back and re-

Table 6 Self-empl. entry probability conditional on determinants of health insurance costs

	Full sample	Men	Women
Paying SHI member	−0.8790***	−1.1358***	−0.3060
	(0.1875)	(0.2186)	(0.2931)
Family insurance	−1.5576***	−1.7346***	−1.2862***
	(0.2177)	(0.3849)	(0.3206)
Poor health	−0.1146**	−0.2283***	−0.0069
	(0.0551)	(0.0750)	(0.0833)
Age	0.2426***	0.2712***	0.2263***
	(0.0610)	(0.0904)	(0.0872)
Age squared	−0.0034***	−0.0037***	−0.0033***
	(0.0008)	(0.0012)	(0.0011)
Supplementary PHI	0.0724	0.2947	−0.0330
	(0.1385)	(0.1989)	(0.1902)
No. of family insured kids	−0.0995	−0.0713	−0.1228
	(0.0748)	(0.0984)	(0.1233)
Spouse family insured	0.6347	0.9678	−1.4753
	(0.7532)	(0.9650)	(5.9009)
Age of spouse	0.0013*	0.0378**	0.0015*
	(0.0007)	(0.0166)	(0.0008)
Spouse family insured × age of spouse	−0.0061	−0.0330	0.3587***
	(0.0175)	(0.0217)	(0.1286)
Spouse paying SHI	0.0905	−0.2645	0.2135
	(0.1839)	(0.2878)	(0.2581)
Spousal poor health	−0.1264*	−0.1931*	−0.0783
	(0.0750)	(0.1119)	(0.1084)
Spouse family insured × spousal poor health	0.0440	0.1887	−15.0509***
	(0.1989)	(0.2181)	(1.5817)
Spousal labor inc. (€100)	0.0006	−0.0029	0.0019
	(0.0015)	(0.0058)	(0.0014)
Female	−0.8831***		
	(0.1333)		
No. of children	0.2406***	0.1996**	−0.1296
	(0.0829)	(0.0984)	(0.1192)
Female × no. of children	−0.4083***		
	(0.1113)		
Further control variables	Yes	Yes	Yes
Log likelihood	−2550.12	−1369.33	−1092.36
Observations	64,773	33,012	31,761
Mean outcome	0.0096	0.0112	0.0080

Source: Authors' calculations based on SOEPv29, 2000–2012

Logit coefficients of selected variables for the discrete time hazard rate model of entry into self-employment; the coefficients of the other control variables, which are the same as in Table 3, are available from the authors on request. Average marginal effects are displayed in Table A 3 in Appendix A. The dependent variable is a binary indicator of entry into self-employment between years t and $t + 1$. Standard errors are robust to heteroscedasticity and clustering at the individual level. Definitions of the variables appear in Table A 2

* Significance at the 10% level

** Significance at the 5% level

*** Significance at the 1% level

estimate the same hazard rate model but exclude the HICD and directly include factors that determine the HICD amount instead. This approach is comparable to the extant literature for the USA, which does not calculate a HICD (Holtz-Eakin et al. 1996; Wellington 2001; Zissimopoulos and Karoly 2007; Fairlie et al. 2011). Table 6 shows the logit coefficients for the full sample and separately for men and women; average marginal effects of the most interesting variables appear in the rightmost three columns of Table A 3 in Appendix A.

Poorer health significantly decreases the probability of entry into self-employment in the pooled sample and for men. Poorer health of the spouse also significantly decreases the entry probability in the pooled sample and for men in these specifications omitting the HICD. The finding that spousal health becomes insignificant when including the HICD in Table 3 indicates that the deterring effect of poor spousal health works through increasing health insurance costs in case of self-employment.

A paid employee currently covered under and paying for SHI, i.e., not in marginal employment, is less likely to enter into self-employment than somebody who already has PHI. While the latter can keep the current PHI contract without a new health assessment when stepping into self-employment, the former has to give up SHI in order to switch to PHI, which requires a new health assessment. This constitutes a barrier comparable to entrepreneurship lock in the USA, where employees are reluctant to lose their employer-provided health insurance. The alternative of remaining in voluntary SHI may be too expensive especially for individuals with higher income, because the employer's contributions are lost. Paid employees with marginal employment who are covered by free family insurance through their spouse or parent are even more hesitant to venture out on their own. Although they may keep their family insurance if their income remains below the marginal employment threshold, they may fear to lose family insurance should their income exceed it. We control for gender, the number of children, and an interaction term of these variables, so any effects of being occupied with childcare should be captured by these variables.

A higher number of children covered under free family insurance decreases the entry probability for both genders, as expected, although this is statistically insignificant, presumably due to the high correlation with the number of children in the household. In contrast, the

number of children in the household, independent of family insurance coverage, has a positive partial effect for men. Thus, we distinguish between two effects: on one hand, an effect of the family situation that is unrelated to health insurance costs and may be related to the wish to have flexibility in the timing and location of work, and on the other hand, the deterring effect of the additional health insurance costs.

We expect that a spouse covered under free family insurance locks in the partner who is an employee and a paying SHI member, because a switch to self-employment and purchase of PHI would imply that the spouse loses family insurance. We anticipate this barrier to be stronger if the spouse covered under family insurance is in poor health or older, because this would make PHI more expensive. Therefore, we include interaction terms. These turn out to be significant for women only; the interaction term with poor health has the expected sign, but not the one with age. The average marginal effects in Table A 3 in Appendix A, which take into account the interaction terms, indicate that a spouse covered under family insurance on average decreases the likelihood of entry for women, significant at the 1% level. For men, there is no significant effect.

In sum, the results from the reduced form estimations are consistent with our main finding that health insurance costs affect the decision to become self-employed. In comparison to the approach pursued here, our main estimations have the advantage that, by directly including the HICD, we are able to separate the effects of health insurance costs from effects of the family situation that are unrelated to health insurance costs.

7 Conclusion

We show that a differential treatment of paid employees and self-employed persons in the health insurance system has significant effects on the entry rate into self-employment, based on representative household panel data for Germany. If the additional costs of health insurance for a self-employed person in comparison to a paid employee increase by €10 per month, the probability of entry decreases by about 1.7% of the annual entry rate. This is a considerable effect in comparison to well-known determinants of entrepreneurship: An increase in the health insurance costs in self-employment by one standard deviation has more than half the effect of a one standard deviation decrease in the willingness to take risks and more than a third of the effect of an intergenerational link. We show that these effects occur in a system with public and universal healthcare. The effect size is at the lower end of the range of point estimates reported by the extant literature considering the system of employer-provided health insurance in the USA.

Furthermore, we provide evidence that individual poor health has a direct negative effect on the probability of entry into self-employment even after controlling for the health insurance cost differential, which is larger for less healthy persons. This indicates that the greater strains associated with self-employment may be a barrier for less healthy persons, in addition to the pecuniary disincentives. In contrast, a spouse's poor health decreases the entry probability through the higher average health insurance costs for the family when switching to self-employment but has no significant direct effect. In the context of taking care of a spouse with poor health, the disadvantages of self-employment may be offset by advantages such as flexibility in location and timing of work.

The results concerning the health insurance costs show that monetary incentives within the health insurance system influence entrepreneurial activity. For example, more generous tax deductions of health insurance costs for the self-employed would increase the entry rate into self-employment. Of course, it is not the primary intention of the health insurance system to stimulate entrepreneurship. However, given the significant effects, future health-care reforms, which may be crafted with intentions unrelated to entrepreneurship, should be analyzed with respect to the incentives and disincentives they create for self-employment in order to avoid unexpected effects on firm formation.

Our approach of estimating a coefficient of the health insurance cost differential has the advantage that the effect size is comparable across countries with different health insurance systems. Future research should exploit the variety of health-care systems in the world, including tax-financed public health services as found in the UK, for example, to explore if monetary incentives with regard to health insurance have similar effects on self-employment choice in different systems. This avenue will lead to a better understanding of the effects of health-care institutions on entrepreneurial activity. In the process of health-care reform that many countries are undergoing, this will allow to take into account the important effects on entrepreneurship, which is

becoming increasingly important in innovation-based economies.

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