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Entrepreneurship, Windfall Gains and Financial Constraints: Evidence from Germany

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ENTREPRENEURSHIP, WINDFALL GAINS AND FINANCIAL CONSTRAINTS: EVIDENCE
FROM GERMANY

Abstract

We investigate the link between the propensity to become an entrepreneur and the exogenous release from financial constraints in Germany. This is defined in terms of the movement from employment to self-employment on receipt of a financial windfall. A theoretical framework developing Evans and Jovanovic (1989) is set up and tested with panel data from German households. The results show that financial constraints do exist given that individuals are more likely to start a personal business after receiving a windfall gain. The value of windfall gains has a significant but non linear effect on the decision to become self employed. The data reveal that differences in ability and income affect the change in employment status. We also report that there is no evidence that becoming self employed involves the anticipation of windfall gains.

Keywords: Entrepreneurship, windfall gains, financial constraints.

JEL: G20, M13.

1 Introduction

The question of whether funding gaps inhibit entrepreneurship has generated intense debate within both economic theory and public policy for more than two decades. In their seminal article, Stiglitz and Weiss (1981) show that information asymmetry leads to inefficient credit rationing. In contrast, de Meza and Webb (1987) argue that information asymmetry results in overfinancing for entrepreneurs. An empirical evaluation of these conflicting views is now even more important given that governments have identified entrepreneurship as an important source of employment and growth (Audretsch, 1995).¹

There is a considerable amount of research on the effect of financial constraints on entrepreneurship in the US and the UK using household panel data. However, comparable analyses of European countries such as Germany are still scarce. This paper investigates the extent to which, in Germany, the likelihood of starting a business is affected by financial constraints. Following the approach employed in previous US studies (e.g. Blanchflower and Oswald (1998)) we use household survey data to obtain self-employment information. Our data come from the German Socio-Economic Panel (GSOEP). Germany has experienced a steady decline in the number of start-ups in recent years for example, around 800,000 new firms were set up in 2008 which was roughly one half of the total number of the record year 2001.² The number of full-time start-ups fell from nearly 670,000 in 2003 to about 330,000 in 2008. In 2001, part-time entrepreneurs started over 900,000 new businesses but in 2008 it was less than 470,000. Around two thirds of all start-ups use their own funds with only one third coming from external sources. The overwhelming importance of own funds suggests that entrepreneurs face potential financial constraints, Thus, exogenous positive shocks to personal wealth may be an important driver of start-up activity in Germany.

The German government has introduced a number of policies designed to ease financial constraints and encourage business start-ups. At both federal and state levels

¹The European Commission considers entrepreneurship as a crucial element for achieving its political, social and economic objectives, see <http://www.europa.eu.int/comm/enterprise/entrepreneurship/>. ²Citation: <http://www.kfw.de/DE/Home/Research/Steckbriefe.jsp>.

the government has launched a large number of equity and debt programs aimed at arresting this decline. These programs include guarantees, interest rate subsidies and direct investment by state-owned financial institutions. The state-owned German Bank for Reconstruction (KfW) launches, on a regular basis, programs that promote the financing of start-ups. For example, small start-ups can benefit from a program called Start-up Money. The program started in 1998 and offers loans of up to 50,000 Euros. Larger and more capital-intensive start-ups can apply for subordinated loans from the start-up fund of the European Recovery Program or from the KfW loan program for entrepreneurs. In 2004 the German government created the “ERP-EIF Dachfonds”³, a pool of funds that provides €500 million specifically for equity-investments in high-tech start-ups. It is planned to double the value of this fund in the near future. The German government has also established a credit mediator who negotiates with banks on behalf of the entrepreneur. Start-ups from universities or research institutions are eligible to be supported through scholarships under the EXIST program and founders of particularly technically challenging start-up projects can receive grants.⁴

These numerous attempts by the German administration to improve the access of entrepreneurs to external finance raises the question about the severity of liquidity constraints in Germany. We study this question by evaluating the impact of windfall gains on the probability of moving from employment to self-employment.

Measuring the release from financial constraints is not straightforward, because of the two-way links between access to external financing and personal wealth. To overcome this difficulty, we hypothesize that an exogenous increase in wealth has the effect of increasing the probability of entering entrepreneurship given that financial constraints exist. A positive relationship between the propensity to enter entrepreneurship and the proxy for the exogenous wealth increase would therefore suggest that financial constraints limit entrepreneurship. This hypothesis is tested by employing windfall gains as a proxy for an exogenous increase in wealth.

³ERP and EIF are the abbreviations for European Recovery Program and European Investment Fund respectively.

⁴See <http://www.existenzgruender.de/englisch/self-employment/launch/support-programmes/index.php>

The paper contributes to the existing literature in a number of ways. First, to the best of our knowledge, this is the first study to analyse the impact of financial constraints and their effect on the movement from employment to self-employment in Germany. Second, we consider categories of individuals that exhibit similar characteristics in terms of income and ability. Third, if individuals anticipate a windfall gain, the gain will not be exogenous. We therefore evaluate the exogeneity of the windfall gain by analyzing the effects of different lags and leads of windfall gains on the self-employment decision.

Our main findings can be summarized as follows. We find that windfall gains significantly increase the probability of becoming self-employed. The data reveal considerable variation in the effect of windfall gains across the income and ability subsamples. High income groups are more likely to become self-employed. In addition, high-ability groups are more likely to set up their own businesses after receiving a windfall. Finally, the results suggest that windfall gains are not anticipated and can therefore be considered as an exogenous shock to personal wealth.

The paper is organized as follows: Section 2 briefly describes the literature on financial constraints. In Section 3 we develop the theoretical model and set out the econometric methodology; Section 4 gives a description of the data and reports the results; and finally, Section 5 presents the conclusions and proposes areas for further research.

2 Literature on testing financial constraints

Empirical research into the financial constraints faced by entrepreneurs has to address two major challenges. The first is that financial constraints cannot be measured directly.⁵ It is therefore necessary to use a proxy measure and an increase in net worth provides a means of testing the presence of liquidity constraints, Evans and Jovanovic (1989) and Taylor (2001). The liquidity constraint hypothesis argues that a lack of capital, or

⁵Some studies (e.g. van Praag, de Wit and Bosma (2005)) use direct reports from entrepreneurs about the financial constraints they encountered. However, reported constraints are also an imperfect measure of frictions in the financing markets because they do not reveal whether the rejection is the result of ability estimations by the bank or to asymmetric information.

collateral, will prevent new business start-ups.

The second challenge is that wealth, as the most commonly used proxy for the release from financial constraints, may be endogenously determined.⁶ Xu (1998) shows that individuals considering potential self-employment accumulate personal wealth prior to their decision to switch into self-employment. This would mean that the reported relationship between wealth and self-employment is endogenously, rather than exogenously, determined.

The endogeneity issue has been addressed in a number of papers, for example, Blanchflower and Oswald (1998), Taylor (2001) and Disney and Gathergood (2009). These papers use an exogenous increase in wealth as a proxy for the easing of financial constraints in relation to the self-employment decision. A number of different measures of wealth increase have been used including unanticipated windfall gains (Taylor, 2001); inheritance (Holtz-Eakin, Joulfaian and Rosen, 1994; Blanchflower and Oswald, 1998; Hurst and Lusardi, 2004)) and increased housing wealth (Disney and Gathergood, 2009). All report a significant relationship between the release from liquidity constraints and the entry into self-employment.

In addition, there is evidence from Sweden, Lindh and Ohlsson (1996), that lottery winnings increase the probability of becoming self-employed. More generally, Johansson (2000) uses an income measure of wealth and finds that liquidity constraints are present in Finland. Paulson and Townsend (2004) also find evidence that financial constraints affect entrepreneurial activity in Thailand.

An alternative form of exogenous wealth increase relates to housing assets. Black, de Meza and Jeffreys (1996) for the UK, and Hurst and Lusardi (2004) for the US find evidence of a positive relationship between increases in housing wealth and business start-ups. However, Hurst and Lusardi (2004) show that the relationship becomes insignificant when a fifth-order polynomial is specified and that only for the top 5% of the wealthiest people did the increase in financial resources via housing market gains have a significant

⁶The banking literature suggests that personal wealth is the most natural candidate for capturing the relaxation of financial constraints given that it can serve either as equity or as collateral (Bester, 1985; Besanko and Thakor, 1987).

impact on entrepreneurship.

In contrast to the UK and US housing markets, the peculiarities of the German housing market mean that the impact of housing wealth on the decision to become self employed is likely to be minimal. Owner occupation is still relatively rare. In addition, house prices in Germany have fallen since the mid 1990s. Therefore this form of easing of financial constraints is unlikely to have had a significant impact as an exogenous increase in wealth. We therefore analyse the impact of a broader definition of windfall gain on the decision to move from employment to self-employment.

Additionally, we assess the impact of the exogenous windfall on groups of individuals sharing the same, or similar, characteristics. Such groupings would act as a proxy for individuals whose a priori propensity to enter entrepreneurship is likely to be similar and therefore variations in the entry decision will only be caused by different financial constraints. Finally, windfall gains such as bequests may be anticipated, something which questions their exogeneity as an easing of financial constraints. This proposition is analysed by the testing of lead and lag windfall gains on the decision to become self employed.

3 Theoretical background and empirical implementation

3.1 Model setup

The analytical framework used to identify the basic drivers of the occupational choice follows Evans and Jovanovic (1989). We extend their model in two respects. First, Evans and Jovanovic (1989) model borrowing capacity as a percentage of personal wealth. We, however, account for the fact that total investment is often a sunk cost when the business is started and it is only the entrepreneur's ability to make the business a success that determines whether or not the loan will be paid back. Second, we consider entrepreneurial abilities to be beneficial for all occupations. Ability not only helps to achieve success in self-employment but also increases the wage level.

Consider the representative agent who decides at the start of the period between her own business activity or working for someone else. At the end of the period the individual gets profit from self-employment activity equal to π or wage W . We denote the self-employment decision of employed individuals at time t as $Switch_{it}$. Labour is considered as non-divisible, so that the individual can either work as an entrepreneur or as an employee. Non-divisibility makes W the opportunity cost of entrepreneurship and implies

$$\begin{cases} 1 & ; \pi - W > 0 \\ Switch_{it} = 0 & ; \pi - W < 0. \end{cases}$$

Self-employment generates gross returns of

$$y = \theta I^\gamma \xi \quad (1)$$

where θ is a measure of “ability”, I is the amount of business investment, $\gamma < 1$ reflects the productivity of the investment, and ξ is a log-normal disturbance whose logarithm has variance σ_ξ^2 and $E(\xi) = 1$. We assume decreasing marginal returns on investment. Individuals are considered as risk-neutral. At the time the investment decision is made, the realization of ξ is unknown, and potential entrepreneurs decide based on expected values. The individual owns equity E to start her business but needs additional funds L from financial institutions. One unit of borrowing costs the gross interest rate R . The opportunity cost per unit of equity is r . In the absence of financial frictions the individual would invest

$$I^* = L^* + E \quad (2) \quad \text{where } L^* \text{ is such}$$

that the marginal return of investment equals the gross interest rate R . For simplicity we assume that $r = R$. The borrowing capacity is modeled by $\hat{L}(\theta)$. We

assume that financial institutions rate individuals by collecting information about their personal entrepreneurial abilities. This rating implies an increased borrowing capacity if the (observable) personal abilities go up and vice versa. The individual is financially constrained if $\hat{L}(\theta) > L^*$, that is, the optimal amount of borrowing exceeds borrowing capacity.

The phenomenon of borrowing capacity falling behind the desired borrowing level is a result of asymmetric information. If lenders lack private information about their clients' ability to repay, they may limit their downside risk by binding the amount of credit on the would-be entrepreneur's publicly observable individual characteristics. We derive the following expected net profit from starting a business given that financial constraints exist

$$\pi_n = e [\hat{I}(e)]^{\gamma-1} R(L(e) + \bar{E}) - W(e). \quad (3)$$

Ability e also positively affects the success in employed work. That is, we assume $W(e=0) = w^- > 0$ and $W'(e) > 0$. The derivative of net profits with respect to a marginal increase in personal wealth \bar{E} yields

$$\frac{\partial \pi_n}{\partial \bar{E}} = \frac{\gamma-1}{e} R > 0. \quad [\hat{I}(e)] \quad (4)$$

The marginal return from an additional unit of equity exceeds the costs if the individual is financially constrained. Thus, more equity, and the subsequent increased level of investment, results in higher profits. In cases where the increase is high enough to make gross profits exceed the threshold W , individuals switch into self-employment. Thus our model predicts that for all individuals sufficiently close to the marginal individual

$$\frac{\partial \text{Switch}_{it}}{\partial \bar{E}} > 0.$$

Therefore, the impact of the exogenous wealth increase is our main variable of concern in the empirical framework.

The derivative of net profit with respect to entrepreneurial abilities gives

$$\frac{\partial \pi_n}{\partial e} = \gamma [\hat{I}(e)]^{\gamma-1} R - W'(e). \quad (5)$$

Note that the expression in brackets in (5) is positive as long as the entrepreneur is financially constrained, that is, $I^1 < I^*$. However, the sign of the derivative depends on the magnitude of the impact of ability on W . Unlike Evans and Jovanovic (1989), we allow for multiple switching points in which $\pi - W = 0$. Note that additional personal

wealth may cause switching from wage-employment to self-employment at both moderate and high levels of ability if the function $\pi(\theta, \cdot)$ is concave for lower but convex for higher ability levels. Empirically, we use sub-samples to test how the impact of an exogenous increase in wealth and the move into self-employment is affected by entrepreneurial ability and income from employment.

3.2 Econometric specifications

As Blanchflower and Oswald (1998) and Holtz-Eakin et al. (1994), we proxy the exogenous wealth increase by windfall gains. However, our measure is broader and includes not only inheritance, but also additional extraordinary payments, such as bequests and lottery wins as defined in the GSOEP. Given that our dependent variable is binary, we employ logistic regression. The general estimated specification is the probability that a person enters self-employment

$$P_{it} = E(\text{Switch}_{it} = 1 | V_{it}) = \frac{1}{1 + e^{-V_{it}}}$$

Where P_{it} is the probability that a person becomes self-employed, $\text{Switch}_{it} = 1$, given a vector of explanatory variables V_{it} . Given our theoretical model, we estimate the following specification of the reduced form of the transition from full time employment to self-employment selection by the equation

$$\text{Switch}_{it} = \Lambda(\delta \text{windfall}_{sit_1} + \beta Z_{it} + X_t + \varepsilon_{it}) \quad (6)$$

where i represents individuals, t is time, Switch_{it} is a dummy variable equal to one if the person decides to be self-employed in the next period and zero otherwise, windfall_{sit_1} is a dummy variable equal to one if the person received windfall gains in the previous period and zero otherwise, Z_{it} is a vector of the person-specific variables, X_t is a set of time dummies, and Λ is the cumulative density function of the logistic distribution.

The vector Z_{it} includes factors that reflect ability and several other characteristics of the individual which we use as controls.⁷ The dummy variable gender is equal to one,

⁷These controls are similar to those included by others in

the literature (see, e.g. Evans and Jo-

if the person is female and zero otherwise. The individual's education is represented by education and is measured by the number of years of education. The variable married provides information about the marital status, it is equal to one if the individual is married and lives together with the partner, and is zero otherwise. This variable proxies a typical family background. The variable hhsizes measures the number of persons living in the particular household. Finally we employ four dummy variables which reflect the person's age: 20-30, 31-40, 41-50, and 50+.

Given that the model is testing the impact of windfall gains on the change from employment to self-employment, we include a measure of income opportunity cost for those that were employed because switching would result in the loss of this income for them. We therefore estimate the following regression for employed individuals only

$$\text{Income}_t = \alpha_0 + \alpha_1 \text{educ}_t + \alpha_2 \text{exper}_t + \alpha_3 \text{married}_t + \alpha_4 \text{gender}_t + \text{AGE}_t \Gamma + u + \varepsilon_t \quad (7)$$

where Income_t is labour earnings, Age_t is the set of age dummy variables, exper_t is the length of time with a particular firm in years, while married_t , gender_t , education_t is defined as before. Finally, u and ε_t are the individual fixed effects and the error term, respectively. The predicted values from this regression are rescaled to construct the foregone wages measure, Wage_t . For rescaling we employ monotonic transformation, $\text{Wage}_t = \text{Log}(\text{Income}_t$

$d + \text{Constant})$ which is needed to avoid negative expected values of predicted income.

Besides opportunities, there might be other factors which play a role in decision to switch to self-employment. We generate a measure for individual abilities we estimate specification (7) using whole sample (both employed and self-employed individuals). In this case, Following Griliches (1977), we interpret u as an individual's ability (Ability_t) which is also included in the vector Z_t in specification (6).

vanovic (1989), Evans and Leighton (1989)). We experimented with other controls, including education dummies, country of origin, employment of parents, squared measures of foregone earnings and abilities. None of the additional controls affected our main results.

3.3 Subsamples

The empirical literature investigating the degrees of financial constraints faced by entrepreneurs has identified that individual-specific characteristics play an important role (e.g. Paulson and Townsend (2004)). Given the predictions of our theoretical model, we hypothesise that individuals that belong to different income and ability groups will have different likelihoods of becoming entrepreneurs. Consequently, we split the sample into subsamples based on personal income, as estimated in (7), and on ability. The splits are based on individuals' average values of the characteristics by quartile. For instance, a person with average labour earnings above the 75%th percentile of the distribution will be classed as high income, while a person with average labour earnings below the 25%th percentile will be classed as low income. The same process applies to ability.

4 Empirical Evidence

4.1 Data

To investigate the effects of windfall gains on the likelihood of starting a business, we use the German Socio-Economic Panel (GSOEP). It is a wide-ranging representative longitudinal study of private households and provides information on all household members and consists of Germans living in the Old and the New German States, foreigners, and recent immigrants to Germany. The Panel started in 1984. On average there are about 47,000 personal characteristics per year. Incomplete answers and sample screening produced a sample of 61,380 individual characteristics for the years 2000-2006. We apply a number of selection criteria to the data. First, given that we are investigating the movement from employment to self-employment, we drop all unemployed people from our analysis. Second, to eliminate individuals that are still in school or are close to retirement, individuals older than 65 and younger than 20 are also excluded.

As Taylor (2001), we use data collected annually about labour market activity in the periods between interviews. An individual is defined as self-employed if the person answers the question "What is your current occupational status?" with "Self-employed"

in the current period, but responded with other answers indicating employment in the previous period. Windfall gains are defined in the GSOEP as inheritance, donations, lottery winnings and payments due to assets such as life insurance.

Insert Table 1

Descriptive statistics for the annual means of all variables employed in the analysis are described in Table 1. We see that about one percent of German individuals started their own businesses, and six percent of individuals received windfall gains.

4.2 Econometric Results

In this section we report our results dealing with the link between the likelihood of being self-employed and windfall gains. Table 2 presents results from regressions of the self-employment dummy variable on windfall gains and our control variables for imputed ability and wages, gender, household size, age dummies, marriage and education. We report marginal effects, estimated around mean points.⁸ Column 1 shows the results for the windfall dummy. Column 2 reports the result for the value of windfall gains. Column 3 includes a squared term for the windfall value and tests the hypothesis that above a certain value, the windfall is so large that there is no need to continue working. Column 4 reports the results for the interaction between income and ability. Finally, column 5 shows the results when we exclude all individuals whose parents are self employed. This is done because it is possible that business owners are more likely to leave a bequest, in the form of an existing business, than are non-business owners. In the case of parents who are business owners the inheritance may not result in the movement from employment to self-employment and therefore to the creation of a new business. The receipt of an inheritance could therefore be a proxy for the fact that the individual simply had a parent that was a business owner (Schäfer and Talavera, 2009).⁹ As a result, a finding that inheritance is an important influence on the decision to start a business could

⁸Estimations of marginal effects around median points give similar results. ⁹See also Panunzi, Ellul and Pagano (2009).

be interpreted as suggesting that being the offspring of an entrepreneur increases the probability of starting a business.

Insert Table 2

Column 1 indicates that the likelihood of becoming an entrepreneur increases when a person receives a windfall gain. The coefficient on windfall is positive and statistically significant at 1%. In Germany, receipt of a windfall gain increases the probability of starting an own business by 0.50%. The result supports the hypothesis that additional wealth matters when moving from employment to self-employment and therefore suggests binding financial constraints.

The coefficient of the expected wage variable is insignificant. This finding indicates that the opportunity cost effect of earnings from regular employment is not important in Germany. Unlike Lindh and Ohlsson (1996), we find no evidence that women are less likely than men to become self-employed when receiving a windfall gain. Age decreases the likelihood of becoming self employed in Germany with the strongest results being found in the over 50 age group. The number of years of education is positive and highly significant as is household size. The positive effect of household size in Table 2 may reflect the advantage of a family business in which more “helping hands” are available. If performance is likely to be better when there are more contributing household members, starting a business will be more likely the larger the household size. Marital status does not affect the probability of becoming self-employed.

Column 2 shows that the value of windfalls is an important influence on the decision to enter self-employment with higher valued windfalls more likely to lead to a movement into self-employment. The column 3 result shows that the relationship is non-linear with higher value windfalls making it less likely for the recipient to move from employment to self-employment. An interesting result is reported in Column 4. The windfall dummy remains positive and significant but the ability variable becomes negative. However, the interaction term is positive and significant suggesting that non-linearities are present in the relationship between ability, wages and becoming self-employed. This is explored

further in Tables 3 and 4. Column 5 shows that the probability of starting a business is positively related to windfall gains for those that are not related to business owners.

Insert Table 3

Table 3 reports the results for ability quartiles with column 1 showing the lowest ability and column 4 capturing the highest ability quartile. We find that windfall gains do not affect the probability of becoming self employed in the lowest ability group. However, as hypothesised, the coefficient is significant and positive in the highest ability quartile. The marginal effect on becoming self-employed given a windfall gain is 0.60% for the highest ability group. The significant result for the second ability quartile suggests a non-linear relationship. High-ability women tend to shy away from starting an own business more than high-ability men (Table 3). The reverse is true for low- and lower-medium ability types of women. These results may indicate that in, German society, earning an adequate return on their personal ability is easier for high-ability women in employed occupations than in self-employment.

Table 3 also reports a surprising result for the opportunity costs of self-employment. Low- and lower-medium ability types are more likely to start their own business if their predicted opportunity costs, the wage variable, increase. The explanation may be that the gap between the actual wage of business starters and the predicted value is such that frictions in the labour market may make it impossible to close the gap. In this case, self-employment may offer the only possibility to get a return that better reflects the earning potential expressed by the predicted opportunity costs. Thus, the likelihood of becoming an entrepreneur increases if the earning potential increases. The positive effect of education reported in Table 3 shows that education fosters entrepreneurship in the higher ability quartiles but not in the lower ability quartiles.

Insert Table 4

Table 4 shows the effect of income on the self-employment decision with column 1 reporting the results for the lowest income quartile and column 4 the highest income quartile. The results are significant and positive for the top income quartile only.

The highest marginal effect occurs in the highest quartile, 0.80%. Thus, within the low income groups, the potential benefits are insufficient to make this group move to self-employment after receiving a windfall gain. In contrast, despite the higher opportunity cost, the high income groups are capable of achieving even higher incomes from self-employment and therefore the exogenous increase in wealth moves them over the threshold. These findings are consistent with results obtained by Hurst and Lusardi (2004) who report that the probability of becoming a business owner in the United States is a non-linear function of wealth and that only at the top of the wealth distribution is there a positive and significant relationship between an exogenous wealth increase and entrepreneurship.

The analysis is further developed by looking at the interaction of ability and income. In results not reported here, we find that high income and high ability individuals are more likely to move into self-employment on receipt of a windfall gain. The interaction term results in a marginal effect of 1.2%, higher than for the sample as a whole. The interaction term for low income and ability groups is insignificant, suggesting a non linear relationship.¹⁰

The preceding analysis is based on the underlying assumption that windfalls occur randomly and that individuals do not predict the receipt of particularly inheritances. However, if individuals did predict the receipt of a windfall gain, the assumption that windfalls occur randomly would not hold. Hurst and Lusardi (2004) find that both past and future inheritances predict current business entry. This suggests that inheritances capture more than simple liquidity.

Insert Table 5

Table 5 provides an additional attempt at differentiating between the results reported here and those of Hurst and Lusardi (2004). Instead of instrumenting personal wealth by inheritance, we employ lag and lead windfall dummy variables. Columns 1 and 2 report different lag periods, t-1 and t-2, and columns 3 and 4 contemporaneous and

¹⁰The estimation results are available upon request.

lead periods, t and $t+1$. The significance of the windfall variable changes depending on whether it is a lag or a lead. The results for lags are significant and positive whereas those for leads are insignificant. The results therefore suggest that those moving from employment to self-employment do not anticipate windfall gains.

5 Conclusions

This paper has analysed the impact of a windfall gain on the probability of moving from employment to self-employment in Germany. It therefore assesses the importance of the financial constraints faced by would-be entrepreneurs. We find that windfall gains have a positive impact on the decision to move from employment to self-employment. However, the results differ between different income and ability sub-samples. The analysis shows that the income matters for the top income quartile group. The income results therefore suggest that financial constraints are present for the highest income group but not for lower income groups. Thus the opportunity cost at low incomes is not binding whereas for high income groups the additional anticipated returns are sufficient to move into self-employment when financial constraints are eased. We also find a non linear relationship between ability and the movement from employment to self-employment after the easing of financial constraints. We find no evidence that those moving into self-employment anticipate receiving a windfall gain in the short run. Overall, the results suggest that there are binding financial constraints to entrepreneurship in Germany.

The results have important implications for policy in Germany. Faced with decreases in the number of new business start-ups, the German government has introduced a number of financial programmes designed to encourage the move into self-employment. However, it may be that the types of businesses being supported, and the types of financial help being offered, have to be reassessed. In addition, the limitations placed on the assistance may also have to be re-evaluated.

References

- Audretsch, D. B. (1995), *Innovation and Industry Evolution*, MIT Press, MASS.
- Besanko, D. and Thakor, A. V. (1987), 'Collateral and rationing: Sorting equilibria in monopolistic and competitive credit markets', *International Economic Review* 28, 671-689.
- Bester, H. (1985), 'Screening vs. rationing in credit markets with imperfect information', *American Economic Review* 75(4), 850-55.
- Black, J., de Meza, D. and Jeifreys, D. (1996), 'House prices, the supply of collateral and the enterprise economy', *Economic Journal* 106(1), 60-75.
- Blanchflower, D. G. and Oswald, A. J. (1998), 'What makes an entrepreneur?', *Journal of Labor Economics* 16(1), 26{60.
- de Meza, D. and Webb, D. C. (1987), 'Too much investment: a problem of asymmetric information', *Quarterly Journal of Economics* 102(2), 281-292.
- Disney, R. and Gathergood, J. (2009), 'Housing wealth, liquidity constraints and self-employment', *Labour Economics* 16(1), 79-88.
- Evans, D. S. and Jovanovic, B. (1989), 'An estimated model of entrepreneurial choice under liquidity constraints', *Journal of Political Economy* 97(4), 808{27.
- Evans, D. S. and Leighton, L. S. (1989), 'Some empirical aspects of entrepreneurship', *American Economic Review* 79(3), 519-35.
- Griliches, Z. (1977), 'Estimating the returns to schooling: Some exonometric problems', *Econometrica* 45(1), 1-22.
- Holtz-Eakin, D., Joulfaian, D. and Rosen, H. S. (1994), 'Entrepreneurial decisions and liquidity constraints', *RAND Journal of Economics* 25(2), 334{347.
- Hurst, E. and Lusardi, A. (2004), 'Liquidity constraints, household wealth, and entrepreneurship', *Journal of Political Economy* 112(2), 319-347.
- Johansson, E. (2000), 'Self-employment and liquidity constraints: Evidence from Finland', *Scandinavian Journal of Economics* 102(1), 123-34.

- Lindh, T. and Ohlsson, H. (1996), 'Self-employment and windfall gains: Evidence from the Swedish lottery', *Economic Journal* 106(127), 1515-26.
- Panunzi, F., Ellul, A. and Pagano, M. (2009), Inheritance law and investment in family firms, Working Papers 2009.6, Fondazione Eni Enrico Mattei.
- Paulson, A. L. and Townsend, R. (2004), 'Entrepreneurship and financial constraints in Thailand', *Journal of Corporate Finance* 10(2), 229-262.
- Schäfer, D. and Talavera, O. (2009), 'Small business survival and inheritance: evidence from Germany', *Small Business Economics* 32(1), 95-109.
- Stiglitz, J. E. and Weiss, A. (1981), 'Credit rationing in markets with imperfect information', *American Economic Review* 71(3), 393-410.
- Taylor, M. P. (2001), 'Self-employment and windfall gains in Britain: Evidence from panel data', *Economica* 68(272), 539-65.
- van Praag, M., de Wit, G. and Bosma, N. (2005), 'Initial capital constraints hinder entrepreneurial venture performance', *The Journal of Private Equity* 9(1), 36-44.
- Xu, B. (1998), 'A reestimation of the Evans-Jovanovic entrepreneurial choice model', *Economics Letters* 58(1), 91-99.

Data Appendix

German Socio-Economic Panel (GS OEP)

The GSOEP - windfall gains are derived from positive answers to the following questions:

- Did you or another member of the household receive a large sum of money or other forms of wealth (car, house, etc.) as inheritance, gift, or lottery winnings last year? We refer to money or other forms of wealth worth more than 2,500 EURO.
- Did you receive any sort of compensation or severance package from the company?
- Did you or another member of the household own any of the following savings or investment securities?
 - Savings account;
 - Savings contract for building a home;
 - Life insurance;
 - Fixed interest securities;
 - Other securities;
 - Company assets.

How high was the income received from interest, dividends and profits from these savings and securities in the last calendar year?

Table 1: Descriptive Statistics

Variable	μ	Median	σ	N observations
New Self-employed	0.01	0.00	0.09	61,380
Windfall dummy	0.06	0.00	0.25	61,092
Windfall, 100K EUR	0.02	0.00	0.30	61,000
Female	0.52	1.00	0.50	61,380
Education	12.36	11.50	2.69	61,380
Married	0.72	1.00	0.45	61,380
Age 30+	0.30	0.00	0.46	61,380
Age 40+	0.34	0.00	0.47	61,380
Age 50+	0.26	0.00	0.44	61,380
Household Size	3.02	3.00	1.23	61,380
Wage= Log(Imputed Income)	9.97	10.23	1.00	61,380
Imputed Ability	0.01	-0.01	0.20	61,380

Note: N is sample size, while μ and σ represent standard deviation and mean respectively.

Table 2: Logit Estimates of Individual Self-Employment Decision

	(1)	(2)	(3)	(4)	(5)
Windfall	0.005*** (0.002)			0.005*** (0.002)	0.004*** (0.002)
Windfall value		0.001* (0.000)	0.002** (0.001)		
Windfall value ²			0.000** (0.000)		
Wage	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.000 (0.001)	0.001 (0.001)
Ability	0.001 (0.002)	0.002 (0.002)	0.001 (0.002)	0.085* (0.049)	0.001 (0.002)
Ability × Wage				0.008* (0.005)	
Married	0.002 (0.001)	0.001 (0.001)	0.001 (0.001)	0.002* (0.001)	0.002 (0.001)
Female	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.002 (0.001)	0.001 (0.001)
Age 30	0.002** (0.001)	0.002** (0.001)	0.002** (0.001)	0.002* (0.001)	0.002* (0.001)
Age 40	0.002** (0.001)	0.002** (0.001)	0.002** (0.001)	0.002** (0.001)	0.002** (0.001)
Age 50	0.003*** (0.001)	0.003*** (0.001)	0.003*** (0.001)	0.003** (0.001)	0.003*** (0.001)
Household Size	0.001** (0.000)	0.001** (0.000)	0.001** (0.000)	0.001** (0.000)	0.001** (0.000)
Education	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)
N. observations	61,380	61,271	61,271	61,380	60,526
Pseudo R ²	0.02	0.02	0.02	0.02	0.02
χ ²	119.903	106.964	110.457	122.737	116.243
d.f.	10	10	11	11	10

Note: The table reports marginal effects after logit estimation of the transition into self-employment. Columns 1-4 refer to the whole sample. Column 5 presents results for a subset of individuals that do not have self-employed parents. Regressions include constant and time dummy variables. Huber-White standard errors are reported in the brackets. Marginal effects are estimated around mean points. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 3: Logit Estimates of Individual Self–Employment Decision by ability quartiles

	(1)	(2)	(3)	(4)
Windfall	0.002 (0.003)	0.010** (0.004)	-0.000 (0.002)	0.006** (0.003)
Wage	0.027*** (0.009)	0.008** (0.004)	0.001 (0.001)	-0.001** (0.001)
Married	-0.005* (0.003)	-0.003 (0.002)	-0.001 (0.001)	-0.000 (0.002)
Female	0.022** (0.009)	0.007* (0.004)	-0.002 (0.001)	-0.008*** (0.002)
Age 30	-0.008*** (0.002)	-0.000 (0.002)	-0.001 (0.002)	-0.001 (0.002)
Age 40	-0.011*** (0.002)	-0.001 (0.002)	-0.003* (0.002)	0.002 (0.003)
Age 50	-0.008*** (0.002)	-0.003* (0.002)	-0.003** (0.001)	-0.000 (0.003)
Household Size	0.002*** (0.001)	0.001 (0.001)	0.001 (0.001)	-0.000 (0.001)
Education	-0.002 (0.001)	-0.001 (0.001)	0.001** (0.000)	0.001*** (0.000)
N. observations	14,414	14,372	15,654	16,930
Pseudo R ²	0.03	0.03	0.03	0.05
χ^2	56.500	31.255	25.146	82.294
d.f.	14	14	14	14

Note: The table reports marginal effects after logit estimation of the transition into self–employment. The columns refer to different ability quartiles. Column 1 is the lowest ability quartile and column 4 is the highest ability quartile. Regressions include constant, and time dummy variables. Huber–White standard errors are reported in the brackets. Marginal effects are estimated around mean points. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 4: Logit Estimates of Individual Self–Employment Decision by income quartiles

	(1)	(2)	(3)	(4)
Windfall	0.001 (0.003)	-0.000 (0.002)	0.005 (0.003)	0.008** (0.003)
Wage	-0.000 (0.000)	0.008*** (0.003)	-0.000 (0.002)	0.009 (0.007)
Ability	-0.016*** (0.004)	-0.022*** (0.004)	-0.026*** (0.006)	0.000 (0.004)
Married	-0.001 (0.001)	-0.003* (0.002)	-0.003* (0.002)	0.001 (0.002)
Female	-0.000 (0.001)	0.009** (0.004)	0.000 (0.002)	0.001 (0.005)
Age 30	-0.004*** (0.001)	-0.000 (0.001)	-0.000 (0.002)	-0.001 (0.004)
Age 40	-0.003*** (0.001)	-0.003** (0.001)	0.000 (0.002)	-0.004 (0.004)
Age 50	-0.003*** (0.001)	-0.003*** (0.001)	-0.002 (0.002)	-0.005 (0.004)
Household Size	0.001*** (0.000)	0.001 (0.000)	0.001 (0.001)	0.002** (0.001)
Education	0.000** (0.000)	-0.001*** (0.000)	-0.000 (0.000)	-0.000 (0.001)
N. observations	12,263	15,835	16,414	15,423
Pseudo R^2	0.09	0.05	0.03	0.02
χ^2	101.780	66.101	38.638	40.970
d.f.	15	15	15	15

Note: The table reports marginal effects after logit estimation of the transition into self–employment. The columns refer to different income quartiles. Column 1 is the lowest income quartile and column 4 is the highest ability quartiles. Regressions include constant, and time dummy variables. Huber–White standard errors are reported in the brackets. Marginal effects are estimated around mean points. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 5: Logit Estimates of Individual Self–Employment Decision, Different windfall lags

	windf _{all<i>i</i>,<i>t</i>_2}	windf _{all<i>i</i>,<i>t</i>_1}	windf _{all<i>i</i>,<i>t</i>}	windf _{all<i>i</i>,<i>t</i>+1}
Windfall	0.005*** (0.002)	0.005*** (0.001)	0.002* (0.001)	0.001 (0.001)
Ability	0.001 (0.002)	-0.002 (0.002)	-0.003 (0.003)	0.001 (0.002)
Wage	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)
Married	-0.002 (0.001)	-0.002* (0.001)	-0.002* (0.001)	-0.002** (0.001)
Female	-0.001 (0.001)	-0.002 (0.001)	-0.002 (0.001)	-0.003** (0.001)
Age 30	-0.002** (0.001)	-0.000 (0.001)	-0.000 (0.001)	0.001 (0.001)
Age 40	-0.002** (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.000 (0.001)
Age 50	-0.003*** (0.001)	-0.002** (0.001)	-0.002** (0.001)	-0.001 (0.001)
Household Size	0.001** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)
Education	0.001*** (0.000)	0.001*** (0.000)	0.000*** (0.000)	0.000*** (0.000)
R ²	0.02	0.02	0.02	0.02
χ ²	127.012	169.880	98.933	83.272
d.f.	15	16	15	14

Note: The table reports marginal effects after logit estimation of the transition into self–employment. Sample size is 61,380 observations. Regressions include constant, and time dummy variables. Huber–White standard errors are reported in the brackets. Marginal effects are estimated around mean points. * significant at 10%; ** significant at 5%; *** significant at 1%.