University of Edinburgh

Estimating the Effect of Basic Income on Entrepreneurship

MA Economics Dissertation

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Abstract

This dissertation empirically investigates the hypothesis that a universal basic income would positively influence entrepreneurial activity. After reviewing the existing literature and noting the absence of an ideal dataset, it utilizes the *British Household Panel Survey* data to estimate two models that are used as proxies for basic income; receipt of windfall income and the transition to retirement. The econometric analysis studies the dynamic relationship between the proxy experience and a transition into (new) self-employment. Results from the windfall model show only redundancy payments are a significant predictor of the transition. Retirement is shown to be a consistent positive influence on entrepreneurial entry. Both models are imperfect in approximating true basic income, and questions remain about the type of self-employment that people would transition into, but the empirical results show basic income could be expected to increase self-employment rates.

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I hereby certify that I am aware of the University's plagiarism policy and that this dissertation is my own work, except where indicated by appropriate referencing. I have followed good academic practices and acknowledged all help received as noted in the Handbook.

Signed ..... Date .....

Contents

1 Introduction

The idea of a universal basic income – a guaranteed grant paid to every citizen regardless of their labor force status – can sometimes seem to be presented as a panacea to all societal ills. From poverty and homelessness (Bregman, 2013) through removing menial, degrading jobs (Mason, 2015) to robotization and automatization of the workforce (Hern, 2013). It also seems to be "in the vogue" – it isn't just academics devoting a whole issue of a journal to the topic (Widerquist, 2005b), but also journalists heavily debating the topic in lay media (see above), Swiss citizens holding a referendum on the policy in the near future (Foulkes, 2013) and countries like Nigeria (Krahe, 2009) and India (Fernandez, 2013) experimenting with the policy on smaller scales.

While the issue of sustainability of the policy and of its effect on labor force participation are of highest importance and are thus discussed most often, there is a topic that doesn't appear to be addressed heavily, despite being just as important for the long-term economic development of a country. It is the self-employment issue: what would the effect of a universal income be on economic risk-taking in general and entrepreneurship in particular? I hypothesize that a basic income would incentivize significantly more people to enter self-employment.

The reasoning goes as follows. I assume entrepreneurship is an inherently risky endeavor with a high failure rate. We know entry into entrepreneurship is conditioned on raising sufficient startup capital (Cagetti and Nardi, 2006) and that access to capital is often limited due to insufficient wealth and borrowing constraints (Buera, 2009). However, if successful, entrepreneurship can generate significantly higher lifetime income than wage employment (Henrekson and Sanandaji, 2014). What's more, entrepreneurial (creatively-destructive) innovation is a driver of long-run growth of the economy and living standards (cf. Wong et al., 2005; Acs, 2006). Yet most people are risk-averse and thus prefer the safe option of employment. We can also safely claim that there is a minimum cost of living that one has to cover in order to survive and that many successful ventures aren't profitable for several months to years. As a result, absent any government intervention, we should expect a socially inefficient (under)supply of entrepreneurs due to borrowing constraints and risk aversion. But since universal basic income proposals tend to be sufficient to cover minimum living costs, basic income can be expected to improve entrepreneurial supply as it alleviates liquidity constraints and makes the entrepreneurial "gamble" less risky. Consequently, basic income could lead to higher rates of innovation and (in the long run) economic development.

This dissertation attempts to test this hypothesis empirically by looking at the effect of windfall income and retirement as proxies of basic income. The results provide a reason to be cautiously optimistic, while inviting further research and hoping for better sources of data.

The rest of the paper is organized as follows. Section 2 reviews the literature on basic income and entrepreneurship, providing a background for the empirical models. Section 3 describes the data used and develops the two empirical models. Section 4 presents relevant descriptive statistics about the sample, while section 5 presents multivariate results for both models. Section 6 discusses the results, highlights limitations of the analysis and avenues for further research, and concludes.

2 Literature Review

Despite renewed popular interest, economic literature, especially empirical work, on guaranteed income is sparse at best. Apart from the 2005 special issue of the *Journal of Socio-Economics* devoted to guaranteed basic income (see Widerquist (2005b) for an introduction) – itself mostly theoretical and policy-orientated – one would be hard-pressed to find published empirical work that studies the effect of a universal basic income. I believe that this shortcoming is not due to a lack of interest. It is rather impractical to study effects of a policy that has hitherto never been fully implemented in any country[1].

Lacking the ideal dataset, researches have often turned to policies (whether experimental or fully adopted) that resemble universal income; the negative income tax, the earned income tax credit, as well as regular unemployment benefits. Additionally, one may attempt to proxy the effect of non-labor income with windfall income (lottery winnings, inheritance, severance payments) or other natural experiments (e.g. retirement).

In this section, I first examine the theoretical predictions for the implementation of guaranteed income. Following that, I review the literature on policies mentioned above. Next I step into the entrepreneurship literature, considering first how windfall income may affect self-employment, and then tackling issues of risk, retirement, pull and push drivers of self-employment, and borrowing constraints. I conclude with a summary of how universal income could be expected to influence self-employment and risk-taking in light of the presented research.

Theoretical predictions

Before delving into basic income literature proper, I attempt a thought experiment. Since I am interested in a choice between safe employment (or no activity at all) and uncertain self-employment, it is appropriate to consider models that deal with choice under uncertainty. Under expected utility theory, assuming a risk-averse agent, adding a fixed sum to all outcomes would reduce the difference in utilities between the "gamble" and the sure wage, increasing the threshold level of risk aversion that could make one indif-

[1]There have been several pilot schemes in countries like Nigeria (Krahe, 2009) or India (Fernandez, 2013) introduced recently, but they are still (a) too recent to have provided enough examinable data, and (b) rather limited in scope, being restricted to specific communities in the given countries.

ferent between choosing either occupation. However, if we considered a prospect-theory approach (see Tversky and Kahneman, 1992), a basic income could become one's new reference point, making no difference to one's valuation of the relative gains and losses from self-employment. In short, basic models of choice under uncertainty provide little help in terms of predicting the effect of a basic income on entrepreneurship; more advanced models are needed.

Linden (2004) studies the effects of a basic income in a general equilibrium model of employment where wages are determined through union-led bargaining. Equilibrium unemployment therefore arises and labor force participation is endogenous to the model. The paper distinguishes between *universal citizen's income* (UCI) that is received by every citizen, regardless of their activity (or lack thereof), and *active citizen's income* (ACI) that is conditional on labor force participation (one needs to be at least looking for work). The model's predictions, calibrated to the EU15[2] data, show favorable effects of the ACI on labor market indicators such as unemployment. The state would require higher taxes to finance this policy, but net income is predicted to rise. However, UCI is predicted to lead to a dramatic fall in employment and labor force participation. Taxes would have to increase significantly and net income would fall. However, this model doesn't shed any light on selection into self-employment: a citizen can either be employed, unemployed or out of the labor force.

A theoretical model that does endogenize self-employment was developed by Kumar and Schuetze (2007) as an extension of the Mortensen-Pissarides (MP) search and matching model. Herein an individual chooses to become employed, self-employed or unemployed. Self-employed workers act as firms (exogenous in the original MP model) that hire workers looking for wage employment. The model focuses on unemployment and on self-employment being an alternative to unemployment when wage employment can't be found. It predicts that unemployment benefits and minimum wage laws negatively impact self-employment rates. This would suggest that the more income one has without employment, the less is one likely to be driven to self-employment. However, the model doesn't incorporate a guaranteed income, only unemployment benefits, and neither does it distinguish between entrepreneurial (Schumpeterian) and small-business self-employment (see below).

Empirical research

While no country has ever adopted universal basic income, there have been several policies and policy experiments that come close, and study of which could shed some light on the impact of UBI.

[2]The original 15 countries that were EU Member States before the 2004 expansion: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom (OECD, 2007).

The policy that resembles UBI most closely is the negative income tax (NIT) – see Moffitt (2003) for an overview – that guarantees a certain level of income to all citizens. If one receives no other income, the government would supplement her with the full amount of this guarantee. As her labor (or other) income increases, the transfer payment is phased out until the individual earns more than the income guarantee, at which point she is no longer eligible for the credit.

There have been several field experiments conducted in the US and Canada in the 1970s to test the impacts of a NIT on work effort and labor force participation, among others. Munnell (1987); Widerquist (2005a); Hum and Simpson (1993) all provide good overviews of the four US experiments and the Canadian MINCOME experiment. While the external validity of their results for basic income is limited (the experiments only targeted low-income families and the grant is phased out as it is replaced with labor income), they do shed some light on behavioral responses to income guarantees. In MINCOME, male participants reduced annual work hours only marginally, while women reduced their efforts significantly; this was also true in the US experiments (Hum and Simpson, 1993). Ashenfelter and Plant (1990) and Munnell (1987) find that the plan's generosity correlated with work-effort reduction. However, the data suffer from measurement error as people would underreport income to gain a greater subsidy. As for non-labor outcomes, Munnell argues there is some evidence for higher marriage dissolution rates and higher school attendance. Forget (2013) argues that MINCOME lead to significant improvements in health outcomes in Dauphin, where the experiment was conducted.

While NIT has never been fully implemented on a national scale either, a similar policy – the *Earned Income Tax Credit* (EITC) in the US, or the *Working Tax Credit* in the UK – has been. The major distinction between EITC and NIT is that the EITC doesn't guarantee any income. Only employed citizens are eligible for the credit, which is a supplement to one's labor income. The size of the credit rises initially with income (providing an incentive to earn more), then plateaus for a certain range of incomes, before being phased out as incomes rise higher still (IRS, 2014).

Baughman and Dickert-Conlin (2003) consider a major expansion of the EITC in the 1990s in the United States (expanding the policy to childless households and significantly increasing the credit for households with children). They argue this expansion has provided an incentive for having more children (as the size of the credit increases with more children), especially among non-white women. Neumark and Wascher (2000) exploit state-level variations in EITC (states can supplement the federal EITC) to study its effect on poverty. Using data from the *Current Population Survey*, they argue that the state-level variation has a positive effect on upward mobility.

A different "natural policy experiment" that could approximate the effect of a UBI is retirement. A pension is a guaranteed source of income that one receives regardless of

activity upon retiring. While using retirement in lieu of a UBI presents its own set of challenges (mostly related to age, health and legislation, depending on the country, that may prevent people receiving a state pension from working), one could examine the relationship between entry into self-employment and retirement in order to predict the possible impact of basic income. Indeed, Zissimopoulos and Karoly (2007) study this very phenomenon using data from the *Health and Retirement Study*, a survey of Americans over the age of 50 (Juster and Suzman, 1995). They estimate a multinomial logit model of transition into retirement, self-employment, part-time work or employment, and find that self-employment peaks at around 65 years of age. They argue push factors such as insufficient income or health may drive people to self-employment late in life, while high levels of saved wealth may provide a pull factor (using the wealth as a source of capital).

Finally, having exhausted policy proxies, one can turn to other factors that should elicit similar behavior as a universal basic income. A common instrument empirical work turns to is lottery winnings (and windfall income in general). As this income is generally (1) randomly assigned and (2) independent of work effort, it is often used to study the impact of cash transfers. We shall return to windfall income in general below; here I only wish to include a paper by Marx and Peeters (2008) that analyzed data from the Belgian *Win for Life* (WFL) lottery. The uniqueness of this lottery is that instead of winning a massive jackpot at once, the winner will receive a €2,000 payment every month for the rest of her life, simulating very closely an actual UBI scheme. Granted, as Marx and Peeters point out, a UBI would probably be adjusted for inflation and household size (the WFL isn't), but the labor response should still be closer than any other proxy one may wish to find. They consider the data gathered from lottery's winners and argue no significant changes occurred with regards to labor supply behavior. However, given the uniqueness of the lottery, the sample size is small and attrition presents a real issue. Authors express hope future papers will have access to a greater sample of new winners.

Windfall income

As aforementioned, windfall income is often used in lieu of welfare programs to study the potential impact of cash transfers. One can define windfall income as any income that is transitory and unexpected. This would include lottery winnings, insurance payments, inheritance bequests or job bonuses. However, this definition alone should give one pause. Being transitory and unexpected, they are the very opposite of a long-term welfare program. Unlike the *Win for Life* lottery described above, most lottery winnings (inheritance and insurance payments ditto) are one-off gains. The behavioral response to a windfall should therefore be quite different from that to a basic income or a WFL win.

Friedman's (1957) permanent income hypothesis (PIH) posits that changes in consumption levels are only driven by changes in permanent income. As risk-averse agents prefer to smooth consumption, a transitory income shock will not result in a shock to

consumption, only in a change in wealth. Windfall gains should therefore be saved, while a permanent income guarantee would alter consumption patterns. Laumas (1969) and Reid (1962) both attempted to test this hypothesis empirically. Reid found that windfall gains tend to increase savings (or expenditure on durable goods only), while Laumas argued for a looser version of the PIH: consumption is not completely independent of windfalls (borrowing constraints may be partly implicated), but marginal propensity to consume of windfall income is significantly lower than that of permanent income.

PIH therefore predicts windfall gains would be mostly saved. If we regard investment into starting a business as saving, then one might expect windfall income to induce transitions into self-employment. However, PIH would be of little help in analyzing the impact of a UBI; it would treat it as a permanent income spike, leading to a rise in consumption, but it would predict nothing about the labor-supply response or occupational choice.

There is a newer strand of literature that also seems to question the validity of proxying universal income with windfall gains. The "house money effect" describes a phenomenon, initially observed in casinos, where an early win leads players to bet more. Generally, an unexpected gain makes people less risk-averse with this money. As Thaler and Johnson (1990) explain, an unexpected monetary gain may not be treated as "own money", but rather as "fun money" that can be spent at will, and that one need not be cautious with. Therefore a windfall gain may be expected to induce business startups (as a form of risky investment), but a steady income stream from a UBI scheme is more likely to be treated as "own money", without the corresponding reduction in risk aversion.

Empirical and experimental studies mostly seem to validate the house money effect. Arkes et al. (1994) find windfall gains are spent more readily than other gains, with the unexpected nature of the gain being the likely driver of this behavior. Hankins et al. (2011) use data from winners of the Florida Lottery to analyze whether winning a large jackpot postpones or prevents personal bankruptcy. They conclude that big wins only postpone personal bankruptcy, but don't avoid it. They argue this occurs because the money is freely spent as winners are not equipped to manage such large sums well.

Entrepreneurship, windfall and welfare

Having considered policies that may approximate the universal basic income above, I now look at the relationship between entrepreneurship specifically and existing welfare programs and windfall gains. Bear in mind all the important differences between these welfare schemes and basic income highlighted above when appraising the findings presented here. Lindbeck (1995) argues that an extensive welfare state (focusing on the Scandinavian model) disrupts the connection between effort (work) and reward (income) by providing several disincentives to work, saving and entrepreneurship. He posits that

as these values can become embedded as social norms in the society, the negative impact of such policies may not be visible immediately, but can be damaging in the long run, and hard to reverse even if the welfare state is restricted. Henrekson (2005) considers the Swedish example too, looking at the theoretical effects welfare programs can have on entrepreneurship. He argues these effects are negative, specifically mentioning high taxes, low savings incentives, government service provision and high labor costs. Henrekson claims a high guaranteed standard of living may render necessity entrepreneurship redundant, showing some empirical evidence for Sweden that concurs with the theory.

Koellinger and Minniti (2009) conduct a cross-country panel analysis of unemployment benefits and find a negative relationship between benefits and self-employment rates. However, their results are based on a rather small sample. Ristilä and Tervo (2002) study a similar relationship in greater depth. They look at unemployment rates rather than benefits and find that individual unemployment is an incentive to become self-employed (but this relationship is non-linear as it falls with the length of the unemployment spell), while national unemployment rate is negatively associated with self-employment (perhaps reflecting a downturn in the economy that increases business failure rates).

Looking more generally at income risk, Bird (2001) also analyzes country-level panel data to look at the relationship between the size (generosity) of the welfare state and risk taking. When risk taking is measured as income variance within the country, the results show that (pre-transfer) income risk is positively correlated with higher welfare spending. However, this study seems to fail to realize the (high) possibility of reverse causality: high income variance (inequality) may drive countries to spend more on income redistribution, rather than the other way around. What's more, country-level income variance will likely not capture individual risk taking.

Concerning the relationship between entrepreneurship and windfall income, Taylor (2001) uses data from the *British Household Panel Survey* to estimate the dynamic effect of receiving a windfall gain on the transition into self-employment and on entrepreneurial survival. He argues that windfall income can act as source of credit (startup capital) with borrowing constraints. The empirical analysis shows that both the amount and the specific types of windfall gains are important predictors of transitioning into self-employment. However, windfall gains also motivate exits from self-employment, which could be an indication of self-employment being a necessity (push-driven) that one will exit should she acquire sufficient funds. Lindh and Ohlsson (1996) also consider the importance of liquidity constraints on the decision to become an entrepreneur. Using Swedish micro-data, they study the effect of lottery winnings and inheritance bequests on entry into self-employment. Both are found to be significant and positive.

Pull and push factors of self-employment

One motivation behind this paper is the assumption that entrepreneurship is largely a creative, innovative activity that, while risky, may – when successful – lead to high profits for the entrepreneur and welfare gains to consumers and the society at large. This view could be seen as an amalgamation of the Schumpeterian entrepreneur-iconoclast who defies mainstream thinking and brings innovation, even at a cost of creative destruction, with Knightian stress on incalculable, uninsurable uncertainty of success. Knight's investors may end up choosing the wrong entrepreneurs to invest in, leading to failures. In Schumpeter's world, only successful entrepreneurs would receive investment (Brouwer, 2002).

In Knight's view, entrepreneurship is a process of discovery, an evolutionary process of selection of ideas and innovations. Increasing the pool of attempts (ideas) would therefore seem ideal; if there are barriers that are preventing promising entrepreneurs from developing their projects (risk aversion or borrowing constraints), policies that remove or lower these barriers should be considered. Hence this discussion of basic income as one such potential policy.

However, regarding all self-employment as attempts at Schumpeterian innovation could be misguided. As Henrekson and Sanandaji (2014) argue, self-employment or small business activity is exactly the wrong proxy to use to measure entrepreneurship. Self-employment is often a last-resort solution of unemployed workers struggling to find employment. They propose a different measure – the number of billionaire entrepreneurs (a mark of success at innovation), which they find to be negatively correlated with self-employment.

This distinction is crucial as it highlights the two competing drivers that may lead one to become self-employed. The "entrepreneurial pull" of a potentially innovative idea is one of them, but an equally important one is that of "recession push". As Ristilä and Tervo (2002) find, being unemployed is a significant predictor of becoming self-employed. Kumar and Schuetze (2007) also models self-employment choice as an alternative to unemployment. Ilmakunnas and Kannianen (2001) argue that an increase in social risk insurance (in protection against loss of work/source of income) reduces entrepreneurship, a motive echoed in Henrekson (2005).

Earle and Sakova (2000) attempt to distinguish between the two factors by using unique survey data from transitional Eastern European economies during the fall of communism. Using the break of the regime change as a protection against endogeneity of savings or education choices present in data from developed countries, they conduct a multinomial logit analysis to study selection into (1) employment, (2) own-account self-employment and (3) job creation (firm founding). They find employers respond strongly to earning premia, while own-account workers often tend to have lower incomes on average, suggesting job creators are the Schumpeterian innovators (pull), while own-account

workers tend to be driven into self-employment by the inability to find work (push). Zissimopoulos and Karoly (2007) also find evidence for both motivations in their study of seniors, suggesting that high wealth may be a pull factor, serving as a source of capital, while deteriorated health and old age may work as push factors, as ageing workers struggle to find steady employment.

Role of risk aversion

A major premise of this paper is that self-employment is a risky venture, and that the decision to become an entrepreneur is therefore affected by one's degree of risk aversion. Is this premise warranted? Results from the literature concur. Cagetti and Nardi (2006) develop a model of occupational choice to study the effect of bequests on the decision to become an entrepreneur. They are found to have a significant impact, but their results – calibrated using the *Panel Study of Income Dynamics* data – also show that the number of entrepreneurs depends greatly on risk attitude. Cramer et al. (2002) second this finding in their empirical work that analyzed a unique Dutch longitudinal dataset of school children. Caner and Okten (2010) show, using data from Turkish university entrance exams, that choosing a riskier career is a function of (among other variables) risk preferences (as proxied by parental self-employment). Shaw (1996) developed a model of financial investment, calibrated with the *Survey of Consumer Finances*, to show that relative risk aversion negatively influences investment in financial and human capital. However, Caliendo et al. (2010) claim that risk preferences are crucial for entrepreneurial survival too; using the *German Socio-Economic Panel*, they confirm findings from psychology that there is an inverse U-shaped relationship between risk attitude and business survival. Therefore, while low risk aversion is crucial for entrepreneurial entry, it is the more coolheaded (moderately risk-averse) entrepreneurs that are most likely to survive.

Having established that risk aversion plays a role in entrepreneurial choice, we now need to make one further step to show that one's risk attitudes could potentially change in the face of new experiences. Should my original hypothesis hold, there needs to be a mechanism for one's attitude toward risk to change over the course of her life.

The house money effect described above was one such example of a (temporary) change in risk aversion. But could other experiences trigger this change too? Indeed, this is what Malmendier and Nagel (2011) find in their study of the "Depression Babies" phenomenon. It builds on the empirical observation that people who experienced the Great Depression ("Depression Babies") are less likely to take monetary risks (i.e. invest in stocks or bonds). They study this phenomenon generally using data from the SCF and show that experiencing "good" or "bad" stock market returns in life affects your propensity to take financial risks.

Receiving a guaranteed payment from the government would, however, work some-

what differently, as it would not only affect one's expectations (as experiencing the Great Depression would), but also directly affect income and/or wealth. As described above, prospect theory would predict no change in risk behavior with an increase in endowment (reference point), while expected utility theory would predict a greater proportion of people choosing the entrepreneurship gamble.

Levy and Wiener (2013) attempt to combine expected utility theory and prospect theory in a joint utility function that distinguishes between temporary and permanent risk attitudes. In their model, long-term attitudes to wealth are governed by the standard EUT with diminishing marginal returns (i.e. risk aversion), while temporary wealth disturbances are governed by prospect theory and attitudes to relative changes. The "spread" of the s-shaped PT curve (sensitivity to relative changes) shrinks with total wealth, suggesting one becomes less sensitive to gains/losses as their wealth grows. Hence a move along the long-term wealth axis (receiving UBI) would make one less sensitive to a potential loss of income (and thus less loss averse), potentially inducing them to partake in more risky ventures.

Role of borrowing constraints

A further barrier to entry into entrepreneurship often discussed in literature is that of borrowing constraints. Founding a business often requires significant capital investment; without an access to credit markets, many potential entrepreneurs may be prevented from entering a market due to a lack of capital. Consequently, a guaranteed income could serve as means of overcoming borrowing constraints by providing sufficient funds to cover startup costs. Buera (2009) analyzes the links between wealth, entrepreneurship and borrowing constraints. He finds a major welfare cost of borrowing constraints, primarily on growth of new firms rather than entry into entrepreneurship. Low-income individuals are predicted to respond positively to increases in wealth vis-à-vis entry into self-employment. As described above, Cagetti and Nardi (2006) show the number of entrepreneurs depends significantly on startup costs. Zissimopoulos and Karoly (2007) find that seniors with higher wealth are more likely to transition into self-employment later in life. Lindh and Ohlsson (1996) argue that liquidity constraints are a significant determinant of entry when studying the effects of windfall gains. Taylor (2001) echoes this finding, highlighting business growth is likely restrained by capital too.

Summary

This section has attempted to present and combine the existing strands of literature on basic income and minimum income schemes in general, on windfall income, on entrepreneurial entry, and on risk attitudes. It provides us with several key observations for the following analysis. First, risk attitudes matter in occupational choice and there is a possibility of risk attitudes changing with experiences/over time. Second, borrowing

constraints are a significant barrier to entry for new entrepreneurs. Third, universal basic income could potentially affect both of these factors, and it is highly probable its effects on work behavior will differ significantly from effects of unemployment benefits, EITC or other welfare schemes currently in effect. Fourth, empirically analyzing basic income directly is essentially impossible due to lack of data. Therefore, proxies such as windfall income or retirement need be used. Fifth, windfall income may not be the ideal proxy due to its temporary nature and because of the house money effect.

Combining these insights, the next section presents two empirical models to help shed some light on the possible effects of a basic income on entry into self-employment: a model of windfall gains and a retirement model.

3 Estimation Method

3.1 Windfall model

The first empirical model in this paper is a model that proxies basic income with receipt of one-off windfall income. The identification strategy is modeled closely after the model developed in Taylor (2001), focusing primarily on the transition *into self-employment* upon receiving a windfall payment.

Data and sample

As the model presented below relies on observing dynamic behavioral patterns, the dataset used needs to enable this analysis. The *British Household Panel Survey* (University of Essex. Institute for Social and Economic Research, 2010) fulfills the requirement as a longitudinal dataset that follows the same households and individuals over several years. It surveys over 10,000 individuals from across the United Kingdom. While Taylor (2001) only analyzed waves 4, 5 and 6, this paper can make use of the full dataset, using all 18 waves (covering years 1992-2009). The only restriction made to the sample is that individuals under the age of 21 were dropped from the analysis.

The core interest of this analysis is the following dynamic: an individual's labor force status is observed at time t (self-reported in the BHPS). Subsequently, we observe whether they received a windfall income in period $t+1$, noting both the type and amount of the gain. This is crucial as not all types of windfall income can be expected to have the same effect on risk taking, and not all types of windfall income can be assumed to be exogenous from labor force activity (e.g. receiving a bonus is conditional on being employed). Finally, we measure one's labor force status again in period $t+2$ to check whether it has changed (potentially as a result of windfall income) since period t.

The variable of interest is therefore the probability of becoming self-employed in

period $t+2$ ($S_{i,t+2}=1$), conditional on not being self-employed in period t ($S_{i,t}=0$). I am thus only interested in changes to the self-employment status, not solely in whether one is self-employed in $t+2$.

Estimation method

We begin first by modeling utility to represent the choice between occupations. The choice of employment at time t is modeled as a latent variable/index model, where the model is a function of the income differential, personal characteristics and windfall income at time $t-1$. The vector of personal characteristics contains standard human capital and demographic controls that may serve as a proxy for risk attitude that is unobserved (see Rees and Shah, 1986). I suppress the individual i index for the sake of brevity. All monetary (income) variables are in real (constant 2005 pounds) annual rates. Utility of choosing self-employment can be expressed as follows:

$$U_t^{SE} = \left(\frac{y_{t-1}^{SE}}{y_{t-1}^{E}}\right)^{\beta_1} \mathbf{w_{t-1}}^{\beta_2} \mathbf{X_{t-1}}^{\beta_3} \epsilon_t, \qquad E[\epsilon_t] = 1 \tag{3.1}$$

This utility function can be then transformed into a log-utility index function as shown below:

$$I_t^{SE} = \beta_1(\ln y_{t-1}^{SE} - \ln y_{t-1}^{E}) + \ln \mathbf{w_{t-1}}\boldsymbol{\beta_2} + \mathbf{X_{t-1}}\boldsymbol{\beta_3} + u_t \qquad E[u_t] = 0 \tag{3.2}$$

In this model, $\mathbf{X_{t-1}}$ is a vector of personal characteristics, $\mathbf{w_{t-1}}$ is a vector of windfall incomes of different types (can be also substituted for dummy indicators of receipt of windfall gains), y_{t-1}^{j} is income from occupation j, and β_k are parameters. The different windfall variables and the personal characteristics vector are described in appendix B in tables B.1 and B.2. One therefore chooses self-employment as long as $U_t^{SE} > 1$ or $I_t^{SE} > 0$. If we assume that income is distributed log-normally (as do Rees and Shah, 1986)[3], the log-transformed index function could be then modeled as a probit model where $u_t \sim N(0, \sigma^2)$ (identically and independently for all observations).

However, this model assumes we know the income an individual would receive in both occupations. In reality, we don't observe the income counterfactual, but only observe it after the choice had been made. As a result, we need to estimate expected income at time $t-1$. Alas, as described in Rees and Shah (1986), on whose work the following procedure builds, simply estimating a model like the one presented below would lead to biased estimates due to selection issues. Put simply, as the assignment into employment is not random, it is very likely that individuals self-select into occupations based on

[3]Many scholars argue there are distributions that describe income distributions better than a log-normal distribution. See Mandelbrot (1960); Salem and Mount (1974); Singh and Maddala (1976). However, this discussion is beyond the scope of this paper.

their (unobserved) predispositions and skills; only people who expect to succeed or have enough entrepreneurial talent choose to become self-employed, and vice versa. Therefore a simple OLS estimate of expected income as a function of human capital and other demographic variables would overstate expected incomes. To correct for this, I use the Heckman selection correction as employed in Rees and Shah (1986) and de Wit and van Winden (1989). First, I model expected income at time t for occupation j as a function of human capital variables and other characteristics:

$$y_t^j = s_t^{\gamma_1} e_t^{\gamma_2} a_t^{\gamma_3} h_t^{\gamma_4} \mathbf{X_t^{\gamma_5}} \tag{3.3}$$

Where s represents education (schooling), e stands for experience (tenure at this occupation choice), a codes age, h measures hours worked, and $\mathbf{X}$ is a vector of personal (socioeconomic and demographic) characteristics. Sources for these variables from the BHPS dataset are presented in table B.3 in the appendix. To estimate this model linearly, we take logs to obtain:

$$\ln y_t^j = \gamma_1 \ln s_t + \gamma_2 \ln e_t + \gamma_3 \ln a_t + \gamma_4 \ln h_t + \mathbf{X_t}\boldsymbol{\gamma_5} + \mu_t \tag{3.4}$$

To correct for selection using the Heckman procedure, I first construct a reduced-form equation of occupation choice by substituting 3.4 into 3.2:

$$\begin{aligned} I_t^{SE} &= \alpha_1 \mathbf{X_{t-1}} + \alpha_2 \ln s_{t-1} + \alpha_3 \Delta \ln e_{t-1} + \alpha_4 \ln a_{t-1} + \alpha_5 \Delta \ln h_{t-1} \\ &\quad - \alpha_6 \ln \mathbf{w_{t-1}} + u_t + \mu_{t-1} = \mathbf{B}\alpha \end{aligned} \tag{3.5}$$

This reduced-form equation can be then used to estimate the selection-corrected income:

$$\ln y_t^{SE*} = \gamma_1 \ln s_t + \gamma_2 \ln e_t + \gamma_3 \ln a_t + \gamma_4 \ln h_t + \mathbf{X_t}\boldsymbol{\gamma_5} + \sigma\lambda(\mathbf{B}\alpha) + \epsilon_t \tag{3.6}$$

This correct income expectation can then be used to calculate the expected income differential and to estimate occupation choice:

$$I_t^{*SE} = \beta_0 + \beta_1(\ln y_{t-1}^{*SE} - \ln y_{t-1}^{*E}) + \ln \mathbf{w_{t-1}}\boldsymbol{\beta_2} + \mathbf{X_{t-1}}\boldsymbol{\beta_3} + u_t, \qquad u_t \sim N(0, \sigma^2) \tag{3.7}$$

$$Pr(S_{i,t+2} = 1 | S_{i,t} = 0) = Pr(I_t^{*SE} \geq 0) = \Phi(I_t^{*SE}) \tag{3.8}$$

Caveats

As described in section 2, using one-off windfall gains to proxy the effect of guaranteed basic income presents several issues. While it resembles basic income in being independent of employment and having no restrictions on how one spends it, it is temporary and unexpected, both qualities that the basic income doesn't have. There are several reasons

why the behavioral response to windfall income might differ from that to basic income.

First, the permanent income hypothesis predicts marginal propensity to consume differs between permanent and temporary income. Second, the newer research in behavioral economics shows people treat windfall gains as "house money" (using a different "mental account" than for other, permanent, sources of income), making them less risk-averse with this gain. However, basic income should not be expected to be treated as such, being permanent in nature.

Taylor (2001) uses windfall income to study the importance of borrowing constraints in transition to self-employment (assuming entry into self-employment requires non-negligible startup costs). In his analysis, he finds significant evidence for the existence of borrowing constraints that limit entry into and growth of own enterprises. Basic income can be of course expected to overcome capital constraints in starting a business, but its behavioral impact as a permanent source of income should not be limited to this narrow facet of entrepreneurial/occupational choice. Any results that are presented from this estimation method should therefore be viewed in this light, providing only limited insight into the role basic income could have in overcoming capital barriers to entry. The following retirement model attempts to gain insights into the long-term nature of basic income.

3.2 Retirement model

In search of a better approximation of basic income, the second empirical model this paper uses to study its potential impact on entry into self-employment is the effect of retirement. Retirement serves as a natural experiment for basic income of sorts, whereupon an individual begins to receive a regular, guaranteed pension that is independent of current economic activity, closely resembling the way a universal basic income would work.

Data and sample

This model uses the same dataset as the windfall model, all 18 waves of the BHPS. The dynamic of interest in this case is similar, with an important distinction. First we observe labor force status at time t. Then we observe whether the individual has started to receive a pension in $t+1$. Finally, we again measure their labor force status in period $t+2$, which enables us to see the possible entry into self-employment after the receipt of a retirement pension began. The dependent variable has therefore not changed from the first model. The primary definition of retirement is the period where one begins to receive a pension. Two other definitions are used as robustness checks. Data on the size of the pension received is also gathered.

Estimation method

Goal of this model is to estimate the probability of entry into self-employment as a function of retiring. As such, the econometric specification of this model can be written as shown below:

$$I_t = \theta_0 + \mathbf{R_{t-1}}\theta_\mathbf{1} + \theta_2 e_{t-1} + \theta_3 a_{t-1} + \theta_4 s_{t-1} + \mathbf{X_{t-1}}\theta_\mathbf{5} + v_t, \qquad v_t \sim N(0, \sigma^2) \tag{3.9}$$

$$Pr(S_{i,t+2} = 1 | S_{i,t} = 0) = Pr(I_t \geq 0) = \Phi(I_t) \tag{3.10}$$

As the dependent variable is a binary variable, the choice is modeled as a latent variable model where I_t is the latent index function such that $S_{i,t+2} = 1|S_{i,t} = 0$ if and only if $I_t \geq 0$. Assuming that the error of the model is distributed normally, I model this choice with a probit model.

$\mathbf{R_{t-1}}$ is a vector of retirement variables: a dummy whether one has retired in that period (in all specifications), the amount of the received pension in the first year of retirement (in all specifications), and the average pension. The other regressors are identical to those in the windfall model; detailed descriptions of the variables not in the personal vector can be found in table B.4. Regressors in the personal vector are used to capture unobserved preferences toward risk and occupation style, just like in the windfall model (see Rees and Shah, 1986).

Caveats

While retirement may mimic the mechanism of a basic income, there are major differences between the two policies that must be borne in mind. First, there is the issue of age and age-related health issues. As retirement occurs late in life, one is far more likely to suffer from health issues that may prevent one from being active. Therefore the results of this model are likely to understate the possible effect of transitioning into self-employment as health and age may prevent more people from doing so after retirement than in the population at large.

Relatedly, retirement (usually) begins after a conscious decision to cease working. Therefore the default activity one expects to do in retirement is retirement, not a new entrepreneurial project. As such, it can also fail to capture the effect of a basic income on people of productive age where the implied default is some type of (self-)employment or training.

Furthermore, it can be argued that as retirees come ever closer to the end of their lives, their personal discount rates rise and they are therefore less likely to invest in new projects that may take years to bear fruit, regardless of how innovative or ground-breaking they may appear. Harrison et al. (2002) find some evidence for this argument in their study of discount rates in Denmark. Their experiment reveals retired subjects had significantly

higher discount rates than active subjects, while age itself wasn't a statistically significant factor. It seems to suggest the act of retirement marks a significant break in one's life, a signal of the inevitability of eventual demise, significantly reducing one's incentive to save and invest money.

However, one could argue for a source of exaggeration in this analysis too. As Zissimopoulos and Karoly (2007) point out, poor health and/or old age may serve as push factors that "force" retirees into self-employment as a means of survival, especially when their pension may not be sufficient to cover all their expenses. However, their analysis is not limited to retirement per se, but looks at old age in general. Hence while it is likely people transition into self-employment late in (working) life, finding themselves unemployable due to health, age, or lack of skills in the new labor market, this transition usually comes *before* retirement. The proposed model shouldn't therefore capture this effect as it is concerned with changes around the year of retirement.

While some countries condition the eligibility to receive a state pension on not working (i.e. not receiving labor income), the UK legislation doesn't institute this condition. One can receive a state pension while still working or receiving income from other sources; the only conditions are one's age and whether they paid National Insurance (GOV.UK, 2015). The model's results shouldn't therefore be restricted by legal technicalities.

4 Descriptive Statistics

This section presents relevant descriptive statistics from the data and for the variables and dynamics described in the previous section. Their purpose is to provide the reader with context for the subsequent econometric analysis, and to provide first hints on the size and direction of the effects I may expect to find in parametric estimation.

Table 4.1: Descriptive statistics of the sample

Cohort	Age	Female	Born outwith UK	Education	Annual income (£000's)	Mother self-employed	Father self-employed
Sample	47.9	54.0%	4.9%	11.3	14.1	9.7%	17.6%
Employed	40.0	51.0%	4.5%	12.3	18.3	7.5%	16.1%
Unemployed	37.9	36.1%	6.1%	10.4	8.0	8.2%	14.4%
Self-employed	44.9	26.4%	6.6%	12.1	18.9	15.6%	28.9%
Retired	71.7	57.7%	4.1%	9.4	9.0	16.8%	16.8%
Newly self-employed	41.9	31.5%	7.5%	12.6	18.1	11.8%	21.8%

Table 4.1 presents a breakdown of demographic and socioeconomic characteristics by labor force status; these variables are used in the models presented in the previous section. There are several observations which may be worth highlighting. First, self-employed

workers tend to be older on average. Zissimopoulos and Karoly (2007) offer two potential reasons for this: greater wealth in old age serving as capital, and necessity self-employment due to old age. Second, self-employment seems to be passed down through generations; a higher proportion of self-employed workers have parents who were self-employed too (see Caner and Okten, 2010). Third, there doesn't appear to be a significant difference between employed and self-employed workers in terms of education or income (on average). However, men are disproportionately more likely to be self-employed (only 26.4% of self-employed in the sample are women). Self-employed are also more likely to be immigrants (6.6% versus 4.5%).

Table 4.2: Flows between occupations

	Occupation status in period $t+2$				
Occupation status in period t	Unemployed	Employed	Self-employed	Retired	N
Unemployed	38.12%	45.89%	7.80%	8.20%	4,001
Employed	2.02%	91.77%	2.96%	3.25%	82,012
Self-employed	1.69%	16.40%	78.03%	3.88%	12,074
Retired	0.21%	1.35%	0.27%	98.17%	33,283
N	3,458	79,528	12,250	36,134	131,370

I next present an illustration of flows across labor force statuses, similar to a table in Taylor (2001), in table 4.2. It reveals a very high persistence of paid employment (almost 92% of employed workers stay employed after two years), and greater uncertainty of self-employed work (22% of self-employed drop out after two years, most back into paid employment). This return to employment could indicate that this period of self-employment was not voluntary, but a function of one's loss of employment and inability to find a new job. However, it could also mean that self-employment involves a high degree of risk of failure, and a sizeable number of entrepreneurs fails and returns to employment every year, regardless of what initially motivated them to take up self-employment. But the fact that unemployed workers are more likely to end up self-employed after two years than employed workers may suggest push factors influencing self-employment.

Table 4.3: Transition rates into self-employment

Transition cohort	Transition rate	N
Sample	2.94%	96,079
Any windfall in $t-1$	3.07%	12,852
Windfall $<$ £1000 in $t-1$	2.44%	7,784
Windfall $\in$ (£1000, £5000) in $t-1$	3.83%	2,665
Windfall $>$ £5000 in $t-1$	4.28%	2,429
Retiring in $t-1$	6.94%	894
Not retiring in $t-1$	2.86%	93,785

Turning our attention to the factors of interest in the two empirical models, table 4.3 shows how the rate of transition into self-employment responds to windfall and

retirement. The windfall income here is an aggregate measure of all sources of windfall gains, unlike the econometric model, which breaks up windfall into separate sources. Looking at the windfall table, one sees rather negligible changes in the self-employment rate. It is only windfalls over £1,000 that seem to increase the rate by at least one percentage point. Separating windfall into separate categories should increase precision as different types of windfall may have opposite effects on choice of occupation. However, it seems windfall shouldn't be expected to have large impact on the self-employment transition.

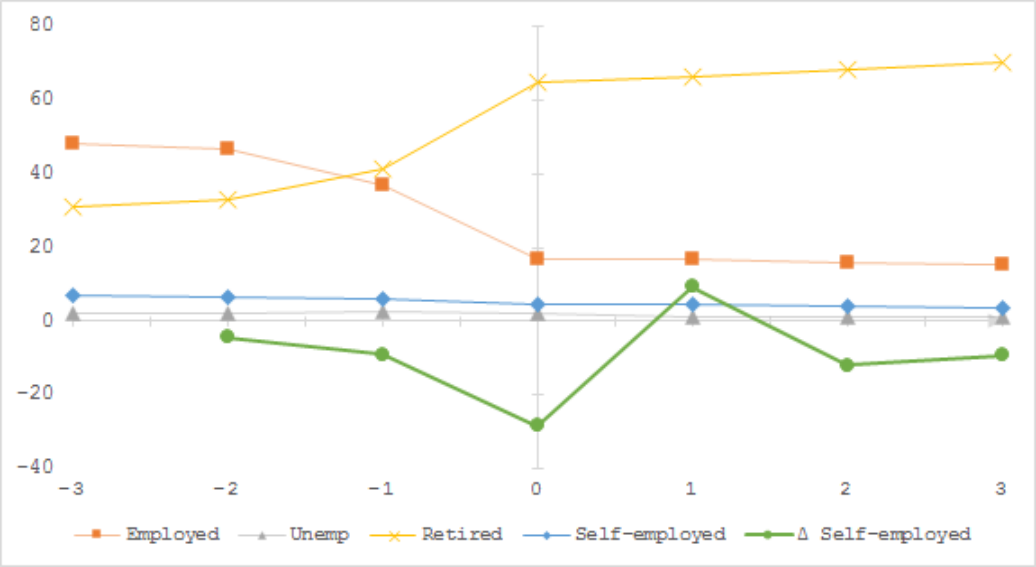

Figure 4.1: Changes in occupation around retirement. Primary definition of retirement used. Percents are plotted against years before/after retirement.

In contrast to windfall, retirement appears to have a greater impact; the rate of transition is 4 percentage points higher than in the population at large. Figure 4.1 depicts these transitions around retirement graphically. While self-employment and employment seem to gradually decline before retirement, self-employment appears to spike markedly in the first year upon retiring. However, this surge seems short-lived as it begins to decline thereafter. In the second model, we could therefore expect more significant and relevant effects, at least for the year immediately following retirement.

Bearing these observations in mind, the next section presents and discusses the multivariate results from the two models presented above.

5 Results

This section presents regression results from the models described in section 3. For each model, I present regression results with coefficients, as well as marginal effects when appropriate. I then present several robustness checks that concern different types of self-employment (own-account and job-creation) to distinguish between their potential dif-

ferences, especially in terms of push and pull factors (see Earle and Sakova, 2000) and innovative potential (see Henrekson and Sanandaji, 2014). Further robustness checks are conducted in the retirement model due to several options of defining the transition to retirement. Replication scripts are available online, see appendix A.

5.1 Windfall model

As the windfall model utilizes the Heckman selection correction for calculating expected income in either self-employment or paid employment, the two-step Heckman procedure is run first to predict income for the final reduced-form transition equation. The results of the selection regressions and the income regressions are presented in appendix C. It is worth pointing out that there is only little evidence for self-selection provided by the procedure; self-selection into self-employment is significant[4] only at the 10% level (models 1 and 4), and into employment only in model 4 (again only at the 10% level).

After running the Heckman procedure, I could then proceed with estimating the transition model. Table 5.1 presents the multivariate results in three alternative specifications, estimated with both OLS and Probit for robustness. Model 1 uses windfall income in thousands of pounds, while model 2 uses logarithms[5]. Model 3 uses binary indicators instead of amounts.

The primary result to observe is that the only type of windfall income consistently positively associated with transition into self-employment is receiving a redundancy payment (also found in Taylor, 2001). In the first model, a thousand pounds increase in the windfall raises one's chances of becoming self-employed by approximately 2 percentage points; in the second model, an approximate one percent increase has the same effect. The fact of receiving the payment in model 3 raises the likelihood by almost 16 percentage points (although significant only at 10% here). Average marginal effects for the probit specifications are similar, though somewhat lower in magnitude across the different models: 0.012, 0.014 and 0.107 respectively.

Coefficients on the other types of windfall income are not significant; the only exception being "other" windfall in the first specification. However, only the first probit specification is significant at least at the 5% level (OLS is significant at the 10% level), and even this result is negative (with an average marginal effect of around -9.5 percentage points). As such, the empirical results don't appear to indicate a significant effect of receiving windfall income on transitioning into self-employment, apart from the redundancy payment, which is conditional on one losing a job and thus being more likely to transition into self-employment (perhaps an evidence for push self-employment).

[4]Significance of the coefficient on the Inverse Mills Ratio.

[5]Since a large majority of people received no windfall income, taking logarithms would remove most of the sample as $\ln 0$ is undefined. I therefore transformed the variable before taking logs by adding one to all observations; people who received no windfall would therefore be coded with $\ln 1 = 0$.

Table 5.1: Self-employment after windfall income

	(1) OLS	(1) Probit	(2) OLS	(2) Probit	(3) OLS	(3) Probit	(4) OLS	(4) Probit
Expected income differential in $t-1$	-0.001	-0.008	-0.003	-0.022	-0.003	-0.021	-0.001	-0.010
	(0.007)	(0.039)	(0.008)	(0.045)	(0.008)	(0.045)	(0.007)	(0.039)
Lottery windfall in $t-1$	-0.002	-0.010	0.001	0.008	0.009	0.052	-0.112	(dropped)
	(0.009)	(0.057)	(0.005)	(0.028)	(0.023)	(0.118)	(0.021)***	
Inheritance windfall in $t-1$	0.000	0.001	-0.001	- 0.001	-0.008	-0.022	0.003	0.024
	(0.001)	(0.006)	(0.005)	(0.029)	(0.046)	(0.279)	(0.057)	(0.321)
Redundancy windfall in $t-1$	0.021	0.069	0.021	0.076	0.158	0.600	0.234	0.784
	(0.005)***	(0.020)***	(0.010)**	(0.031)**	(0.085)*	(0.264)**	(0.125)*	(0.345)**
Insurance windfall in $t-1$	-0.001	-0.025	-0.006	-0.037	-0.045	-0.272	-0.084	-0.565
	(0.001)*	(0.029)	(0.005)	(0.034)	(0.044)	(0.302)	(0.051)*	(0.472)
Accident claim windfall in $t-1$	0.004	0.017	0.001	0.005	-0.007	-0.030	0.231	0.851
	(0.010)	(0.037)	(0.010)	(0.050)	(0.071)	(0.400)	(0.271)	(0.751)
Other windfall in $t-1$	-0.002	-0.535	-0.006	-0.042	-0.019	-0.105	-0.110	(dropped)
	(0.001)*	(0.226)**	(0.004)	(0.035)	(0.041)	(0.265)	(0.016)***	
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F/Wald stat	2.51	59.91	1.92	53.19	1.88	51.84	4.73	53.45
(Pseudo) R^2	0.01	0.03	0.01	0.03	0.01	0.03	0.01	0.03
Sample size	2,695	2,695	2,695	2,695	2,695	2,695	2,695	2,683

Specification 1: Windfall income in £000's. Specification 2: Windfall income in logarithms. Specification 3: Binary regressor for receipt of windfall income. Specification 4: Receipt of windfall > £5,000.

Individual controls as described in the model. Robust SE in parentheses.

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Table 5.2: Self-employment robustness check

	Own account	Employer
Expected income differential in $t-1$	-0.441	-0.522
	(0.089)***	(0.096)***
Lottery windfall in $t-1$	-0.027	-0.083
	(0.035)	(0.064)
Inheritance windfall in $t-1$	-0.008	(dropped)
	(0.037)	
Redundancy windfall in $t-1$	0.015	0.177
	(0.056)	(0.058)***
Insurance windfall in $t-1$	-0.016	(dropped)
	(0.057)	
Accident claim windfall in $t-1$	-0.044	0.040
	(0.071)	(0.070)
Other windfall in $t-1$	-0.138	(dropped)
	(0.077)*	
Individual controls	Yes	Yes
Wald statistic	66.22	79.50
Pseudo R^2	0.09	0.18
Sample size	778	751

The difference between own account entrepreneurs and employers is whether they reported employing other workers.

Individual controls as described in the model. Robust SE in parentheses.

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

As robustness checks, I conducted two further analyses. First, building upon the observation made in section 4 that it is only after windfall income exceeds £5,000 that self-employment seemed to markedly increase in the population, I modified the regression

in specification 3 by replacing the binary regressors with binary regressors that show whether one has received that type of windfall income and this gain exceeded £5,000. The results are presented as specification 4 in table 5.1 and confirm the observation that a redundancy payment increases one's likelihood of entering self-employment. The effect of this windfall has markedly increased now; receiving over £5,000 in windfall gains raises one's likelihood by over 23 percentage points (OLS) or almost 14 percentage points (average marginal effects of the probit model). The OLS model also shows a high significance of two negative coefficients on "other" windfall and winning a lottery. This may suggest that a sufficiently high windfall may reduce one's need to shift into necessity self-employment or work at all[6].

Second, I divided the new self-employed workers into job creators and own-account workers and ran the same regression as in specification 2 (table 5.2). While the sample size is markedly smaller in these regressions due to missing data and thus their precision suffers, their results are similar to the original regression. The likelihood of becoming a job creator increases by 2.2 percentage points when one's redundancy payment rises by 1 percent (marginal effect). The effect is insignificant for an own-account worker. One is less likely to become an own-account worker upon receiving "other" windfall (-4 percentage points average marginal effect), but this effect is significant only at the 10% level.

These specification also reveal that – for the first time – the expected income differential becomes significant, and quite highly at that. The coefficients for both types of self-employment are negative. While it may at first seem counter-intuitive, it is more likely that this result reflects the fact that most entrepreneurs suffer a significant income reduction when starting their new business. The coefficient on this regressor shouldn't therefore be read causally, but rather as evidence for the willingness to accept a pay cut in exchange for the prospect of future gains, independence or creativity.

5.2 Retirement model

The main results from estimating the retirement model are presented in table 5.3. Both specifications are estimated with both OLS and Probit for robustness. Specification 1 only uses the first lag of annual pension income (i.e. the size of the first received pension), while specification 2 also uses an average pension for all the years the individual was retired as an additional regressor.

The key observation in the results is that retiring is positively and significantly ($p < 0.05$) associated with a transition to self-employment, something that was initially hinted at in the descriptive statistics. In OLS models, columns 1 and 2, retiring increases the likelihood of a transition into self-employment by 18.3 and 16.5 percentage points,

[6]The probit model dropped these two regressors as they perfectly predicted failure; a limitation caused by missing/insufficient data.

Table 5.3: Self-employment after retirement

	(1) OLS	(2) OLS	(1) Probit	(2) Probit
Retired in $t-1$	0.183	0.165	0.626	0.559
	(0.078)**	(0.077)**	(0.227)***	(0.227)**
Pension in $t-1$ (£000's)	0.001	-0.008	0.005	-0.029
	(0.003)	(0.007)	(0.010)	(0.025)
Average pension (£000's)		0.011		0.040
		(0.008)		(0.027)
Experience differential in $t-1$	0.018	0.018	0.087	0.086
	(0.005)***	(0.005)***	(0.021)***	(0.021)***
Individual controls	Yes	Yes	Yes	Yes
F-statistic / Wald statistic	3.38	3.29	85.34	86.59
Adjusted R^2 / Pseudo-R^2	0.02	0.02	0.03	0.03
Sample size	3,592	3,592	3,592	3,592

Individual controls as described in the model. Robust SE in parentheses.

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

respectively. Similar effect, if somewhat smaller, is found in the probit models, where average marginal effects (see table 5.4) of retiring are 12.9 and 11.5 percentage points, respectively.

Table 5.4: Retirement average marginal effects

	(1)	(2)	(3)	(4)
Retired in $t-1$	0.129	0.115	0.199	0.149
	(0.047)***	(0.047)**	(0.077)***	(0.051)***
Experience differential in $t-1$	0.018	0.018	0.018	0.018
	(0.004)***	(0.004)***	(0.004)***	(0.004)***
Sample size	3,592	3,592	3,592	3,592

(1) Original model without average pension. (2) Original model with average pension. (3) First robustness check. (4) Second robustness check.

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

A significant influence on this transition is exerted by the experience differential. That is, the more experience one has had in their life of being self-employed, the more likely are they to transition into self-employment again. As this differential is in logs, a one percent increase in the differential raises the odds of becoming self-employed by roughly 2 percentage points in the OLS models, with a similar effect found in probit marginal effects.

As aforementioned, I conducted several robustness checks to see whether the result isn't driven by spurious correlations due to a fortunate choice of definitions. First I test the definition of retirement. Table 5.5 presents results of three alternative specifications, all estimated with probit. The effect of retirement remains positive and significant in the two alternative specifications – if anything, it increases in magnitude (19.9 and 14.9 percentage points as opposed to 11.5).

Second I attempt to distinguish between the types of self-employment that retirees transition into. While being limited by sample size in this estimation (due to a large pool of self-employed workers who don't report whether they employ other workers or not),

Table 5.5: Retirement robustness check (Probit)

	(1)	(2)	Original
Retired in $t-1$	0.964	0.723	0.559
	(0.373)***	(0.246)***	(0.227)**
Pension in $t-1$ (£000's)	-0.032	-0.021	-0.029
	(0.028)	(0.024)	(0.025)
Average pension (£000's)	0.047	0.031	0.040
	(0.030)	(0.027)	(0.027)
Experience differential in $t-1$	0.086	0.087	0.086
	(0.021)***	(0.021)***	(0.021)***
Individual controls	Yes	Yes	Yes
Wald statistic	87.00	89.62	86.59
Pseudo-R^2	0.03	0.03	0.03
Sample size	3,592	3,592	3,592

Specification 1: Change in reported labor force status. Specification 2: Only the first observed pension increase used. Individual controls as described in the model. Robust SE in parentheses.

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

the results in table 5.6 show that when we separate own-account self-employment and job-creating self-employment, it is only for own-account workers that the effect of the retirement remains significant ($p < 0.05$).

Table 5.6: Self-employment robustness check (Probit)

	Own account	Employer
Retired in $t-1$	0.629	-0.144
	(0.292)**	(0.525)
Pension in $t-1$ (£000's)	-0.049	0.014
	(0.033)	(0.031)
Average pension (£000's)	0.024	-0.041
	(0.033)	(0.046)
Experience differential in $t-1$	-0.413	-0.292
	(0.040)***	(0.051)***
Individual controls	Yes	Yes
Wald statistic	186.93	93.54
Pseudo R-squared	0.16	0.14
Sample size	1,153	1,135

The difference between own account entrepreneurs and employers is whether they reported employing other workers. Individual controls as described in the model. Robust SE in parentheses.

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Lastly, as hinted at in section 4, the spike in self-employment after retirement may be rather short-lived. Table 5.7 presents results of regressions of persistence in self-employment on retirement. The dependent variable takes value 1 if the individual is observed as self-employed in period t and was newly self-employed in period $t-1$ or $t-2$; the retirement regressor is now a second/third lag (i.e. whether one has retired in period $t-2$ or $t-3$). Both when using a one-year and a two-year duration, the effect of retirement during the transition is still positively and significantly associated with the likelihood of persisting in self-employment and (in OLS, not shown) negatively and significantly associated with the likelihood of quitting self-employment.

Table 5.7: Self-employment persistence (Probit)

	Persist (One year)	Persist (Two years)	Quit (One year)	Quit (Two years)
Retired in $t-2$ or $t-3$	0.860	0.707	(dropped)	(dropped)
	(0.261)***	(0.306)**		
Pension in $t-1$ (£000's)	-0.013	-0.003	0.119	-0.127
	(0.026)	(0.027)	(0.045)***	(0.092)
Average pension (£000's)	0.059	0.037	-0.188	0.094
	(0.030)**	(0.029)	(0.051)***	(0.073)
Experience differential in $t-2$ or $t-3$	0.258	0.318	-0.184	-0.202
	(0.023)***	(0.025)***	(0.037)***	(0.039)***
Individual controls	Yes	Yes	Yes	Yes
Wald statistic	246.95	292.54	71.19	57.47
Pseudo-R^2	0.10	0.12	0.05	0.05
Sample size	3,143	2,790	3,091	2,666

One is regarded as having persisted in self-employment if they were newly self-employed in period $t-2$ or $t-3$ and still are in t.

Individual controls as described in the model. Robust SE in parentheses.

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Moreover, the effect of the tenure differential still remains positive and highly significant, suggesting an important role of experience/talent in entrepreneurial success. What's more, average pension is a significant predictor of persistence in the one-year duration, but not in the two-year duration. It must only be noted that the probit specification of quitting dropped the retirement variable as it perfectly predicted failure; we can therefore only rely on the OLS estimation. This is a consequence of the natural tightening of the sample as we increase the time span of the analysis.

The next section first discusses the relevance and validity of these results, especially their potential to form expectations about the possible effect of a basic income on entrepreneurship. It then details the limitations of this paper and provides suggestions for further research and improvements. Finally, it concludes the paper.

6 Discussion and Conclusion

6.1 Discussion of the results

Results from the two models presented above considered two alternative proxies for approximating the effect basic income may have on the transition into self-employment. As for the windfall model, it is only redundancy payment that is found to be consistently and significantly associated with higher chances of entering self-employment. Since receiving a redundancy payment is a consequence of losing one's paid employment, this result could be read in two ways. Firstly, one could see in it an evidence of necessity self-employment; after losing a job, people try working for themselves whilst searching for a "real" job. However, an alternative explanation is possible: that the combination of losing a job and receiving a sizable redundancy payment provides the necessary freedom and means to

start a business (something suggested in Taylor, 2001). And when I separated new entrepreneurs into job creators and own account workers, it was only for job creators that the redundancy payment remained significant. This provides evidence that this transition is driven by entrepreneurial pull enabled by losing a job and receiving a windfall that can overcome liquidity constraints; it is not (only) necessity self-employment.

The retirement model is more straightforward in results: the effect of becoming retired is consistently and significantly associated with a higher likelihood of transitioning into self-employment, and this effect is quite substantial in size. Even after altering retirement definitions, the results still hold. And the apparent pattern of the short-lived self-employment hinted at in descriptive statistics was not confirmed by the analysis. If anything, becoming self-employed after retirement makes one more likely to remain self-employed for longer. However, there is a major caveat to these results: when I separate new entrepreneurs into own-accounts and job creators, it is only an own-account worker that one is more likely to become upon retirement. This seems to suggest that the type of self-employment retired people engage in is not of the innovative Schumpeterian variety, but more of the necessity/small-business/hobby variety.

Both models seem to hint at one critical issue: transitioning into self-employment is significantly determined by previous experience. (The windfall model may conceal this at first glance, but when you look at the Heckman results tables in the appendix, similar evidence is found.) Having spent more years as self-employed in life before increase the likelihood of transitioning into self-employment again. Because of self-selection issues, this variable can be capturing two complementary factors. One, it can merely reflect learning on the job (experience) – as one gains expertise in self-employment, it becomes easier for them to start new ventures again. However, it can also be capturing unobserved talent (ability) or non-pecuniary preferences for independence at work that make people self-select into occupations. Either way, the transition into self-employment is very likely not limited only by financial factors.

A key aspect of the results for the purpose of this paper is their relevance to estimating the effect of a basic income. The main points of departure from basic income were described in previous sections. Here I only wish to focus on specific findings. First, the retirement model seems to suggest that people will try to supplement their guaranteed income with other productive activity. Whether this is due to an innate desire not to be idle, or a necessity induced by insufficient retirement income is unclear, and the results from the analysis seem to be conflicting on this topic. What can be said is that the style of this entrepreneurship is likely of limited scope, most likely without any other employees. A universal basic income may create similar effects; whether due to a desire for greater financial comfort and higher consumption, or due to boredom, people may become more likely to attempt small "freelance" projects. However, one can only generalize from this model so far. Retirement differs significantly from the general active age in many ways;

health and higher discount rates being just the most obvious cases. There is therefore reason to think that this analysis underestimates the potential effect of a basic income on self-employment, especially in investing in larger-scale ventures that may involve creating jobs or require more time to develop and launch.

Second, the windfall results offer rather unclear lessons for basic income. The consistency of the effect of redundancy payments may suggest that being "freed" from employment (with the addition of sufficient capital) induces one to invest in that project that had incubated in their minds for a long time. The argument that we are only capturing necessity self-employment due to a loss of employment is somewhat weakened by the robustness checks, where it is the job-creating entrepreneur who is positively affected by redundancy, not the own-account worker. However, the effect is relatively small in size and may not be economically relevant. This may be due to the transitory nature of windfall income; as such, our ability to generalize to basic income is somewhat suspect. What's more, the analysis with binary indicators of windfall over 5,000 pounds seems to suggest that very high windfall may be detrimental to entrepreneurship; the financial security afforded by a big windfall may reduce the necessity to work. This may therefore predict a negative effect of basic income on economic activity, especially if the size of the income is sufficiently high to afford sufficient financial security. Then again, the same caveats about the transitory nature of windfall apply.

Third, the important role of experience (and/or preferences and talent) in self-employment choice highlight that even in the presence of a basic income and the lack of necessity to work in order to survive, many individuals may not be induced to choose entrepreneurship as their occupation due to innate abilities and preferences – or simply because they don't have the appropriate education and experience with starting a business. However, an argument could be made that a basic income will provide such people ample opportunity to acquire these skills and that only innate talent and preferences will be the ultimate deciding factor, not the (lack of) managerial skills that can be learned.

6.2 Limitations and further research

As discussed in the previous sections, the primary limitation of my empirical analysis is the lack of better data. Ideally, one would want a large basic income policy experiment conducted over the course of decades, an experiment that is properly randomized and with an appropriate control group, and that is universal (unlike the experiments conducted in the 1970s that only focused at low-income families). Barring this admittedly unrealistic wish, an access to reliable data from win-for-life lotteries such as the one described in Marx and Peeters (2008) with greater sample sizes and time spans, and no attrition, would serve as the best approximation of a basic income among all the policies and lotteries we already have. Should such data become available in the future – as Marx and

Peeters themselves express hope for – it would provide a major opportunity to study the potential effects of basic income on human economic behavior. Similarly, this paper used British data from the BHPS. Utilizing similar surveys from other countries (such as the American *Current Population Survey* or the *German Socioeconomic Panel*) could be a way to check the external validity of these results.

Furthermore, the nature of the data used in this paper prevents me from confidently estimating the type of self-employment one transitions into. As Henrekson and Sanandaji (2014) argue, small business activity may not be a good proxy for innovative entrepreneurship. Since the major motivation for this paper was the hypothesis that entrepreneurship is innovative and (in the long run) highly welfare-improving, it is of essence to see whether the type of entrepreneurship that would be induced by basic income is such type of self-employment. In line with Earle and Sakova (2000) I attempted to distinguish between own-account workers that are likely to be small business owners or necessity self-employed workers without Schumpeterian entrepreneurial potential, and job creators, relying on the assumption that the ability to provide employment for other workers is a sign of a successful, innovative venture with entrepreneurial potential. However, this is a rather simplistic and limited distinction. For example, many innovative and "creatively-destructive" firms start as one-person projects, only later growing in scale to warrant employees. The potential of a new business can't therefore be truly predicted by its size, especially in early stages. Relatedly, the evidence that suggest a significant role of ability in entrepreneurial transition highlights the fact that my analysis may be biased as long as I am not able to measure ability and preferences without error (despite partially controlling for it with experience, parental self-employment history, education, and other characteristics). While time-invariant individual heterogeneity can be controlled for with panel data and fixed-effects analysis, the dynamic nature of this paper's analysis (and the transition we are actually interested in) precludes the use of fixed effects due to serial correlation.

Another avenue for further research could be developing theoretical models that combine occupational choice and basic income. Looking back at section 2, one could extend the Kumar and Schuetze (2007) matching model that includes self-employment with basic income. Or the Linden (2004) model of basic income could be extended to include self-employment as a distinct occupational choice, rather than only having people decide between employment and unemployment (and inactivity). While empirical work is often restricted to working with data from one country, models of this nature could serve as tools for any government as they can be parametrized with data from any country.

6.3 Conclusion

This dissertation has attempted to provide an empirical test of the hypothesis that an introduction of a universal basic income would induce people to take up innovative entrepreneurial projects that may not be immediately profitable, but prove to be important (creatively-destructive in the Schumpeterian sense) down the road. The mechanisms hypothesized for this behavior were (1) overcoming liquidity constraints, (2) minimizing or removing the negatives of failure, or (3) providing sufficient leisure time to create and develop new ideas.

This paper used two empirical models to approximate the effect of basic income. The windfall model looked at the receipt of unexpected, exogenous windfall income such as lottery wins or insurance payments. The regression results show that it is only redundancy payments that consistently positively influence transition into self-employment. This could provide evidence for the first proposed mechanism: overcoming liquidity constraints. However, windfall gains are an imperfect approximation of basic income due to their transitory nature and as such should be treated with caution.

The second model considered the transition into retirement. An argument was made that retirement mimics a basic-income scenario since one begins to receive a labor-independent source of income and is no longer (socially) expected to work. Across all the specifications, retirement is found to be a significant and (size-wise) relevant factor in influencing the transition into self-employment. The fears that this self-employment is short-lived were not borne out by the data. However, caution is advised in assessing these results too, as old age and the "default" of not working may underestimate the potential effect. Also, the type of self-employment one engages in after retirement is most likely rather limited in scope.

In short, one could reasonably expect self-employment rates to increase upon instituting a basic income in an economy. However, this paper didn't address the issue of overall employment, which some models (see Linden, 2004) predict would decline markedly with a truly universal basic income. Neither has this paper analyzed the costs of such a policy to the government (issue also addressed by the same model). Also, whether the ventures that would be induced to form with basic income were innovative entrepreneurial projects, or simply small "subsistence" businesses is unclear; the evidence from the two analyses is mixed and their predictive power in this regard rather limited. Therefore estimating the total welfare effect of a basic income is well beyond the scope of this paper, but it does provide insights into a smaller component of this issue; entrepreneurial behavior under guaranteed income.

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A Replication Data

The original BHPS data set can be obtained via the UK Data Service at `http://ukdataservice.ac.uk/` (University of Essex. Institute for Social and Economic Research, 2010). The data set used in this dissertation was *INDRESP: a table of individual responses. The Stata .do file that generates the cleaned data set from the original BHPS data set and runs all the analyses presented in this dissertation can be found online at `https://github.com/metjush/UBI_replication_dissertation` for replication purposes.

B Variable Definitions

Table B.1: Windfall income variables

Windfall income type	BHPS variable name
Life insurance payment	*windfa(y)
Accident claim	*windfc(y)
Lottery win	*windfg(y)
Redundancy payment	*windfd(y)
Inheritance/bequests	*windff(y)
Other source	*windfh(y)

Table B.2: Personal characteristics variables

Variable name	BHPS variable used	Notes
Married	*mlstat	
Ethnic dummies	*race	Dummy variables for "black" and "asian".
Female	*sex	
Born outside the UK	*plbornc	
Health limits daily activity	*hllt	
Doesn't have children	*nchild	
Industry dummies	*jbsic and *jbsic92	Industry dummies based on the first number of the 3-digit SIC code.
Geographic dummies	*region	Dummies for whether one lives in London, Scotland, Northern Ireland or Wales (rest of England as the baseline).
Parental history of self-employment	*pasemp, *masemp	Dummies for whether father/mother were self-employed

Table B.3: Human capital variables

Variable name	BHPS variable used	Notes
Education (years of schooling)	*isced	ISCED levels of the highest completed level of education are used to approximate the number of years spent in education.
Experience	*jbstat, *jbbgy	Experience in either employment or self-employment is measured as the number of years the individual spent in either occupation, adjusted for the number of years they have spent in their first observed job, based on their reported year of entry into this job.
Age	*age	
Hours worked	*jbhrs, *jshrs	Hours worked per week are reported for employees and self-employed workers separately.

Table B.4: Retirement model variables

Variable name	BHPS variable used	Notes
New retiree (primary)	*fiyrp	Variable is equal to one when the individual received a pension in period t and not received one in period $t-1$.
New retiree (check 1)	*fiyrp	Using the primary definition, I restrict the definition to only include the first observed transition (some individuals will have fluctuations in their pensions).
New retiree (check 2)	*jbstat	Variable is equal to one when the individual is observed as retired in period t and not retired in $t-1$.
Experience	*jbstat, *jbbgy	See table B.3 above.
Age	*age	
Education (years of schooling)	*isced	See table B.3 above.
Pension in first year of retirement	*fiyrp	The amount of pension income received the year they retired.
Average pension	*fiyrp	The average annual pension the individual received after retiring.

C Heckman-corrected Income Regression Results

Table C.1: Heckman-corrected income estimation (employed workers)

	(1) Thousands	(2) Logs	(3) Dummies	(4) Over £5000
	Step 2: Log(Annual income)			
Log(Years of education) in $t-1$	0.674	0.673	0.674	0.674
	(0.038)***	(0.038)***	(0.038)***	(0.038)***
Log(Experience) in $t-1$	0.131	0.128	0.129	0.137
	(0.035)***	(0.035)***	(0.035)***	(0.035)***
Log(Age) in $t-1$	0.201	0.204	0.203	0.195
	(0.059)***	(0.059)***	(0.059)***	(0.059)***
Log(Hours worked) in $t-1$	0.842	0.843	0.843	0.841
	(0.029)***	(0.029)***	(0.029)***	(0.029)***
Individual controls	Yes	Yes	Yes	Yes
	Step 1: Employment selection			
Lottery windfall in $t-1$	-0.472	-0.064	-0.231	-5.791
	(0.226)**	(0.023)***	(0.093)**	(0.000)†
Inheritance windfall in $t-1$	-0.003	-0.018	-0.242	0.089
	(0.006)	(0.020)	(0.188)	(0.229)
Redundancy windfall in $t-1$	-0.032	-0.071	-0.622	-0.710
	(0.013)**	(0.026)***	(0.227)**	(0.305)***
Insurance windfall in $t-1$	0.038	0.053	0.405	0.784
	(0.022)*	(0.026)**	(0.216)*	(0.368)**
Accident claim windfall in $t-1$	-0.038	-0.003	-0.029	-0.663
	(0.056)	(0.034)	(0.270)	(0.582)
Other windfall in $t-1$	-0.002	-0.003	-0.134	0.397
	(0.008)	(0.026)	(0.195)	(0.386)
Experience differential in $t-1$	-0.613	-0.615	-0.617	-0.618
	(0.022)***	(0.022)***	(0.022)***	(0.022)***
λ	0.079	0.073	0.074	0.091
	(0.053)	(0.053)	(0.053)	(0.053)*
Individual controls	Yes	Yes	Yes	Yes
ρ	0.15	0.14	0.14	0.17
σ	0.54	0.54	0.54	0.54
Sample size	3,718	3,718	3,718	3,718

Specification 1: Windfall income in £000's. Specification 2: Windfall income in logarithms. Specification 3: Binary regressor for receipt of windfall income. Specification 4: Receipt of windfall > £5,000.

Individual controls as described in the model. Robust SE in parentheses.

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; †: Perfectly predicting success/failure, probit would've dropped the variable.

Table C.2: Heckman-corrected income estimation (self-employed workers)

	(1) Thousands	(2) Logs	(3) Dummies	(4) Over £5000
	Step 2: Log(Annual income)			
Log(Years of education) in $t-1$	-0.581	-0.568	-0.565	-0.568
	(0.373)	(0.372)	(0.372)	(0.373)
Log(Experience) in $t-1$	0.649	0.468	0.476	0.632
	(0.278)**	(0.279)*	(0.281)*	(0.289)**
Log(Age) in $t-1$	0.788	0.598	0.599	0.763
	(0.586)	(0.581)	(0.581)	(0.590)
Log(Hours worked) in $t-1$	0.955	0.948	0.946	0.941
	(0.233)***	(0.234)***	(0.234)***	(0.233)***
Individual controls	Yes	Yes	Yes	Yes
	Step 1: Self-employment selection			
Lottery windfall in $t-1$	0.592	0.072	0.236	5.807
	(0.257)**	(0.025)***	(0.103)**	(0.000)†
Inheritance windfall in $t-1$	0.003	0.024	0.271	0.048
	(0.008)	(0.022)	(0.204)	(0.256)
Redundancy windfall in $t-1$	0.027	0.047	0.370	0.457
	(0.014)**	(0.032)	(0.282)	(0.380)
Insurance windfall in $t-1$	-0.105	-0.049	-0.315	-6.232
	(0.061)*	(0.031)	(0.252)	(0.000)†
Accident claim windfall in $t-1$	-0.013	-0.007	0.004	0.580
	(0.094)	(0.043)	(0.331)	(0.793)
Other windfall in $t-1$	0.008	-0.010	-0.153	0.024
	(0.007)	(0.028)	(0.230)	(0.392)
Experience differential in $t-1$	0.582	0.584	0.586	0.588
	(0.026)***	(0.026)***	(0.026)***	(0.026)***
λ	0.758	0.444	0.457	0.726
	(0.388)*	(0.385)	(0.390)	(0.408)*
Individual controls	Yes	Yes	Yes	Yes
ρ	0.28	0.17	0.17	0.27
σ	2.72	2.68	2.68	2.71
Sample size	3,484	3,484	3,484	3,484

Specification 1: Windfall income in £000's. Specification 2: Windfall income in logarithms. Specification 3: Binary regressor for receipt of windfall income. Specification 4: Receipt of windfall > £5,000.

Individual controls as described in the model. Robust SE in parentheses.

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; †: Perfectly predicting success/failure, probit would've dropped the variable.