

The Rise of Female Entrepreneurs: New Evidence on Gender Differences in Liquidity Constraints

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Abstract

In this paper, we study the importance of liquidity constraints for entrepreneurial activity, using previously unexplored data from the UK. Using inheritances as an instrument, IV estimates reveal that single women drive the overall relationship between personal wealth and the propensity to start a new business. Defining business ownership rather than self-employment as the entrepreneurial outcome measure is also shown to be critical. Using self-employment leads to selection bias and underestimates the impact of personal wealth. The results imply that efforts aimed at relieving the liquidity constraints of single women could help further accelerate the recent rise of female entrepreneurship.

Keywords: entrepreneurship, liquidity constraints

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1. Introduction

Self-employment and small business activity have become increasingly important features of the UK economy. Small firms now account for 48% of all private sector employment, and increases in total employment since the start of the Great Recession have been mostly driven by the growth in self-employment (Office of National Statistics, 2014). Another recent pattern that has emerged is sharply different growth rates by gender in the proportion self-employed. UK Labour Force Surveys show that from 2009 to 2014, the proportion of men in self-employment increased by 6%. Over the same period, the proportion of self-employed females jumped by 22%.

In this paper, we study the importance of liquidity constraints for entrepreneurial activity, using previously unexplored data from the UK. The data are extracted from the UK Wealth and Assets Survey, a large-scale survey that contains a range of different personal wealth and entrepreneurial outcome measures. The data also contain information on individual inheritances, which are exploited as a source of exogenous variation that helps identify the causal impact of personal wealth on the propensity to start a new business. A causal effect of personal wealth on entrepreneurial activity is typically interpreted as a manifestation of liquidity constraints.

Instrumental variables (IV) regressions that use inheritances as an instrument produce a strong and precisely estimated effect of personal wealth on entrepreneurial activity. This is consistent with the previous literature. However, in contrast to previous work, we are able to separate out financial wealth from broader and potentially less relevant personal wealth measures commonly used in the literature. We show that financial wealth has the most quantitatively important impact on entrepreneurial activity amongst the various alternatives. This provides stronger evidence than has been previously offered that liquidity constraints underlie the impact of personal wealth.

An additional contribution of the study is in the analysis of heterogeneous effects. The IV results indicate substantial heterogeneity in the effect of personal wealth by gender and household composition. This new finding is detectable both because of the unusually large number of female entrepreneurs in the Wealth and Assets Survey, and the ability to use a broader definition for an entrepreneur than in previous studies.

In particular, individuals can be classified as entrepreneurs if they have started a business, in contrast to simply having entered self-employment. To date, self-employment has been the most widespread definition of entrepreneurship in the empirical literature. Using business ownership rather than self-employment as the entrepreneurial outcome measure is shown to be critical. The narrower measure of self-employment leads to selection bias and underestimates the importance of personal wealth.

IV regressions that use the business ownership outcome measure, estimated separately by gender and household composition, reveal that it is primarily single women that drive the overall relationship between personal wealth and the propensity to start a new business. The magnitude of the effect is substantial. Amongst single women, a relaxation of financial wealth constraints by £1,000 results in an 8.5% increase in the probability of starting a new business relative to the sample mean. The results are robust to a range of specifications and a placebo test that uses future inheritances as the instrument rather than past inheritances.

Our findings have interesting policy implications. Additional data from the Wealth and Assets survey

indicate that single women are less likely to acquire formal loans in order to start a business, which may underlie the differential liquidity constraints by gender and household composition. Further, the lower propensity to acquire a formal loan may be due to lack of collateral. This suggests that public policy programmes specifically targeted to meet the needs of liquidity-constrained single women have the potential to further accelerate the rate of female entrepreneurship.

The remainder of the paper is structured as follows: Section 2 places our study and its contribution in broader context. Section 3 describes the data used in our analysis. Section 4 outlines the instrumental variables approach. Section 5 presents the IV results. Section 6 discusses the implications of the results. Section 7 concludes.

2. Background

A positive correlation between personal wealth and entrepreneurial activity has consistently emerged from a large literature examining the effect of liquidity constraints (see, e.g., Evans and Leighton (1989), Evans and Jovanovic (1989) and Holtz-Eakin, Joulfaian, and Rosen (1994)). In Evans and Leighton (1989) individuals with greater assets are shown to be more likely to switch into self-employment. Evans and Jovanovic (1989) also demonstrates that wealthier people are more inclined to become entrepreneurs. In this latter paper, a model of entrepreneurial choice is developed in which the observed positive correlation between net family assets and the probability of starting a business arises only if liquidity constraints are present.

Whether the positive relationship between personal wealth and entrepreneurial activity is robust, or indeed due to underlying liquidity constraints, is still subject to some debate. Hurst and Lusardi (2004) question the relationship because they find that business entry rates are fairly constant throughout the US wealth distribution. Nykvist (2008) detects a similar distributional pattern in Sweden, but nevertheless produces evidence that liquidity constraints are present. Meyer (1990) observes that most new businesses require only small amounts of start-up capital, casting doubt on the likelihood that liquidity constraints are binding.

Several difficult identification problems in the relationship between personal wealth and entrepreneurial activity can explain some of the conflicting findings. For example, it may be the case that potential entrepreneurs save before starting a new enterprise, leading to a positive correlation between assets and business start-ups even in the absence of financial constraints. A similarly biased upward impact could arise if many family firms are directly inherited. Although a bias toward zero may also result from inaccuracies in the measurement of personal wealth.

Blanchflower and Oswald (1998) was one of the first studies to note that a potentially ideal experiment, capable of correcting for several of these biases, would be to compare the subsequent entrepreneurial activity of individuals who randomly receive a wealth shock to those who do not. They suggest exploiting inheritances or gifts that individuals receive as proxies for exogenous wealth shocks.

Using data from two waves of the National Child Development Study in the UK, the results in Blanchflower and Oswald (1998) indicate that those who receive windfall income are more likely to be self-employed. Their findings are strongest when considering inheritances received more than three years

prior to entering self-employment. They also present evidence that the results are not likely to be due to direct inheritance of a business.

Other types of exogenous wealth shocks have also been proposed, such as lottery winnings and house price movements. Using data from Sweden, Lindh and Ohlsson (1996) find that receiving a lottery prize is associated with an increased probability of self-employment. However, Taylor (2001), who uses the British Household Panel Survey to analyse the impact of different sources of windfall income on self-employment, produces a statistically weak negative effect of a lottery win. The evidence on house price movements is similarly mixed (see, e.g., Hurst and Lusardi (2004), Nykvist (2008) and Disney and Gathergood (2009)).

In addition to challenging identification problems that have not been completely resolved, the large literature on liquidity constraints has not produced reliable evidence on gender differences in the relationship between personal wealth and entrepreneurial activity. The seminal papers by Evans and Leighton (1989) and Evans and Jovanovic (1989) analyse the self-employment decisions of a sample of white men, using data from the National Longitudinal Study of Young Men. The restriction to men only has typically been due to low numbers of female self-employed in available data. Male self-employment has traditionally been approximately double that of female self-employment.¹

Studies that do succeed in including women in the sample (e.g., Blanchflower and Oswald (1998), Lindh and Ohlsson (1996) and Taylor (2001)) usually specify a female dummy variable to capture gender differences. The data are generally not comprehensive enough to detect gender-based interactions. A notable exception in this regard is Gicheva and Link (2013, 2015), who show that female-led businesses have lower rates of private investment funding.

Our empirical study has several notable advantages over the previous literature. In addition to correcting for potential biases by using inheritances as an instrument, we are able to more closely approximate the effect of liquidity constraints by exploiting detailed information on financial wealth. This improves upon the much broader and noisier proxies for personal wealth that are typically used as the main covariate, such as family income.

A more relevant definition of entrepreneurial activity can also be implemented with the information available in our data. Individuals can be defined as entrepreneurs if they have actually started a business, as opposed to merely being self-employed at the time of the survey. In fact, we show that using self-employment as the main outcome measure leads to selection bias and underestimation of the impact of personal wealth. Moreover, we are able to comprehensively analyse heterogeneity in the effect of liquidity constraints, along the highly policy-relevant dimensions of gender and household composition.

3. Data

The UK Office of National Statistics launched the Wealth and Assets Survey (WAS) in 2006 in response to a need for a representative source of statistics on the wealth of individuals and households. The broad aim of the survey is to gather detailed information on the level and type of assets, liabilities and attitudes

¹See for example the studies by Blanchflower and Meyer (1994) for US and Australia, Holtz-Eakin and Rosen (2005) for Germany and US, and Office of National Statistics (2014) for the UK.

towards financial planning held by private individuals and households, as well as how these change over time.

Initially the survey was designed to be longitudinal with biennial interviews. Newly formed households would be added to the panel in the case of between-wave household dissolution. However, due to the extensive nature of the WAS questionnaire, which requires a substantial time commitment from respondents, it was found that the attrition rate in the WAS is higher than in other household longitudinal surveys.

Each wave of the WAS contains interviews conducted over a two-year period. The first wave commenced in July 2006 with the final interview conducted in June 2008; the second and third waves ran respectively from July 2008 to June 2010, and from July 2010 to June 2012. At the time of writing, the data from the fourth wave conducted between July 2012 and June 2014 has not been released for analysis.

For the initial sample, households were drawn at random from the Royal Mail's postcode address file using a multistage sampling design: for each year 1,200 postcode sectors were drawn with the probability that an individual sector is selected being proportional to the number of unique addresses within each sector. At the second stage 26 addresses were randomly chosen from each postcode sector. Addresses were matched to HMRC data to allow for oversampling of high wealth households, as a higher rate of non-response was expected for this group. The month of interview for each household was randomly allocated over the 2-year period of fieldwork in order to achieve a proportional balance of addresses over time and geography.

The first wave gathered 30,600 household responses, containing 53,300 individual responses. In the second wave 32,200 questionnaires were issued, achieving 20,000 household responses and 34,500 individual responses. To compensate for attrition, 12,000 and 8,000 addresses were added to the survey in waves 3 and 4 respectively, using the same multistage sampling design.

A key advantage of the WAS in the current context is that respondents are asked detailed questions about their wealth and assets as well as their main employment activity. Individuals are queried about any businesses in which they have an owning interest, including the date that each business started, the type of funds used to start the business and the size of the business, measured by the number of employees. This level of detailed information on both personal wealth and entrepreneurial activity in a single data source is unique and previously unexplored.

A salient question is how to measure entrepreneurship given that there are various possibilities. Self-employment is pervasive in the literature, as it is often the only type of measure of entrepreneurial activity available in survey data. However, self-employment is not the most accurate measure of entrepreneurial activity. For example, Lazear (2005) argues that self-employed individuals should be considered entrepreneurs only if they view themselves as having started a business.

Reynolds (1997) also notes that wage employment and entrepreneurial activity are not at all mutually exclusive. Approximately 34% of nascent entrepreneurs are full-time employees. These latter individuals would not report being self-employed. While Fairlie (1999) analyses actual business starts, business owners who are also wage-employees are excluded from the sample. Relying on the broad categorisation of self-employment, or business starts with wage employees excluded from the sample, is highly problematic because it could lead to severe selection biases.

Since respondents in the WAS are asked about both self-employment, wage-employee status and other business activities, we are able to improve upon the bulk of the previous literature and compare and contrast distinct measures of entrepreneurship. In particular, we focus on entry into self-employment, business starts, as well as a broader definition of entrepreneurial activity that combines these two measures. The combined measure is somewhat similar to that in Holtz-Eakin et al. (1994), derived from Schedule C tax returns, and Nykvist (2008), who defines an active business owner as one who ‘carries on the business and works there at least 33 percent of full time’.

In the WAS, respondents are asked about their current main employment, and for those reporting self-employment, the date that at which the spell began. Unlike previous work that has mainly relied on observing individuals in longitudinal data to infer entry into self-employment (e.g., Evans and Leighton (1989) and Taylor (2001)) we calculate transitions into self-employment directly using the date of the interview and the date that the self-employment spell started.

Respondents are also asked to provide information regarding other businesses for which they have an owning interest, including the date the business started.² This enables us to define the following alternative measures of entrepreneurial activity: whether an individual has started a self-employment spell within the 2 years prior to the interview date, whether an individual has started a business within the past two years, and a composite measure combining both self-employment and ownership of a business.

As in the case of entrepreneurship, measures of wealth vary in the literature according to data availability (see, e.g., Evans and Leighton (1989), Johansson (2000) and Holtz-Eakin et al. (1994)). The richness of the asset and liability data in the WAS permits us to construct three distinct and generally more accurate wealth measures than have been used before. The three measures are financial wealth (liquidity), property wealth and total wealth, which we use alternatively in the estimation.

The liquidity measure comprises financial assets (bank/savings account balances and formal financial instruments such as gilts, bonds, stocks and shares) less liabilities (loans, arrears, hire purchase). These are calculated at the individual level, and those with joint accounts are assigned equal shares of the balances. Property wealth is defined as the net value of the residence (current value less outstanding mortgages), and is calculated at the household level.

Total wealth cumulates liquidity and property wealth, and additionally incorporates the value of personal and household physical assets, such as jewellery, household goods and motor vehicles. Following Disney and Gathergood (2009), we do not include pensions in the calculation of total wealth, as these are highly illiquid and cannot be used as collateral. Respondents are also asked to report the value of any inheritances over £1,000 received in the last 5 years.³ All financial measures are expressed in 2010 prices, and the data is trimmed to exclude obvious outliers.

²The specific questions are “*In which year did you start working continuously as a self-employed person?*” for those individuals reporting self-employment as their main employment status and “*In what year did you start or acquire this business?*” for individuals reporting ownership of a business

³The questions are, “*In the last five years, that is since (date), have you personally received an inheritance valued at Â£1,000 or more, that is in money, property, or goods of any kind?*” and, “*What was the total value, at that time, of everything you inherited, after tax and other deductions?*”

3.1. Descriptive Statistics

Table 1 displays sample means and standard deviations for the main variables used in the analysis. The descriptive statistics are also presented by gender and partnership status. Of all dual households classified as being in a partnership, 80.6% report being married, 18.9% are cohabiting and 0.5% are in civil/same-sex partnerships. The full sample contains 17,215 men and 20,812 women (N) as well as 29,235 man-years and 36,141 woman-years (NT). On average, the same individual appears in the sample less than twice. Hence, including individual fixed effects in the regression analysis is not a fruitful strategy.

Table 1: Descriptive Statistics

	All individuals			Single individuals			Partnered individuals		
	All	Men	Women	All	Men	Women	All	Men	Women
Employment Measures									
S/e Main Job	0.109 (0.31)	0.156 (0.36)	0.071 (0.26)	0.085 (0.28)	0.131 (0.34)	0.058 (0.23)	0.116 (0.32)	0.162 (0.37)	0.075 (0.264)
Owns Business	0.098 (0.30)	0.147 (0.35)	0.058 (0.24)	0.067 (0.25)	0.104 (0.31)	0.044 (0.21)	0.107 (0.31)	0.157 (0.36)	0.063 (0.24)
S/e in Any Job	0.138 (0.35)	0.194 (0.40)	0.093 (0.29)	0.105 (0.31)	0.157 (0.36)	0.073 (0.26)	0.148 (0.36)	0.203 (0.40)	0.100 (0.30)
S/e (Main) start	0.026 (0.16)	0.034 (0.18)	0.019 (0.14)	0.021 (0.14)	0.027 (0.16)	0.018 (0.13)	0.027 (0.16)	0.036 (0.19)	0.019 (0.14)
Business start	0.039 (0.20)	0.052 (0.22)	0.029 (0.17)	0.031 (0.17)	0.040 (0.20)	0.026 (0.16)	0.042 (0.20)	0.055 (0.23)	0.030 (0.17)
S/e (Any) start	0.042 (0.20)	0.055 (0.23)	0.031 (0.17)	0.033 (0.18)	0.042 (0.20)	0.028 (0.16)	0.044 (0.21)	0.058 (0.23)	0.032 (0.18)
Demographics									
Age	43.49 (10.25)	44.00 (10.01)	43.08 (10.42)	42.76 (10.78)	43.14 (10.83)	42.53 (10.74)	43.71 (10.07)	44.20 (9.79)	43.27 (10.30)
UK born	0.640 (0.48)	0.647 (0.48)	0.635 (0.48)	0.656 (0.48)	0.665 (0.47)	0.650 (0.48)	0.636 (0.48)	0.643 (0.48)	0.629 (0.48)
White	0.885 (0.32)	0.885 (0.32)	0.886 (0.32)	0.898 (0.30)	0.916 (0.28)	0.888 (0.32)	0.882 (0.32)	0.877 (0.33)	0.886 (0.32)
Religious	0.797 (0.40)	0.774 (0.42)	0.816 (0.39)	0.750 (0.43)	0.709 (0.45)	0.776 (0.42)	0.811 (0.39)	0.789 (0.41)	0.830 (0.38)
D'dent Children	0.483 (0.50)	0.457 (0.50)	0.504 (0.50)	0.320 (0.47)	0.068 (0.25)	0.472 (0.50)	0.531 (0.50)	0.549 (0.50)	0.515 (0.50)
Owns Home	0.727 (0.45)	0.742 (0.44)	0.715 (0.45)	0.472 (0.50)	0.510 (0.50)	0.448 (0.50)	0.802 (0.40)	0.797 (0.40)	0.807 (0.39)
Financial Measures									
Liquidity	11,711 (23,580)	12,743 (24,714)	10,876 (22,587)	8,643 (21,382)	11,768 (24,169)	6,753 (19,262)	12,614 (24,114)	12,974 (24,836)	12,297 (23,457)
Property	113,814 (110,452)	114,139 (109,530)	113,540 (111,227)	66,077 (90,727)	68,562 (91,156)	64,505 (90,424)	127,958 (111,805)	125,063 (110,741)	130,621 (112,711)
Total Wealth	358,035 (342,167)	360,922 (340,305)	355,569 (343,735)	199,811 (259,885)	218,140 (278,592)	187,846 (246,190)	403,952 (349,403)	395,040 (344,821)	412,168 (353,382)
Inheritance	1,123 (14,945)	1,245 (18,500)	1,025 (11,278)	1,142 (12,859)	1,268 (13,545)	1,066 (12,425)	1,118 (15,506)	1,240 (19,490)	1,011 (10,855)
N	38,027	17,215	20,812	9,045	3,529	5,516	28,982	13,686	15,296
NT	65,376	29,235	36,141	14,861	5,599	9,262	50,515	23,636	26,879

Notes: The table shows the sample means of variables used in the analysis by gender and household composition. Standard deviations are reported in parentheses.

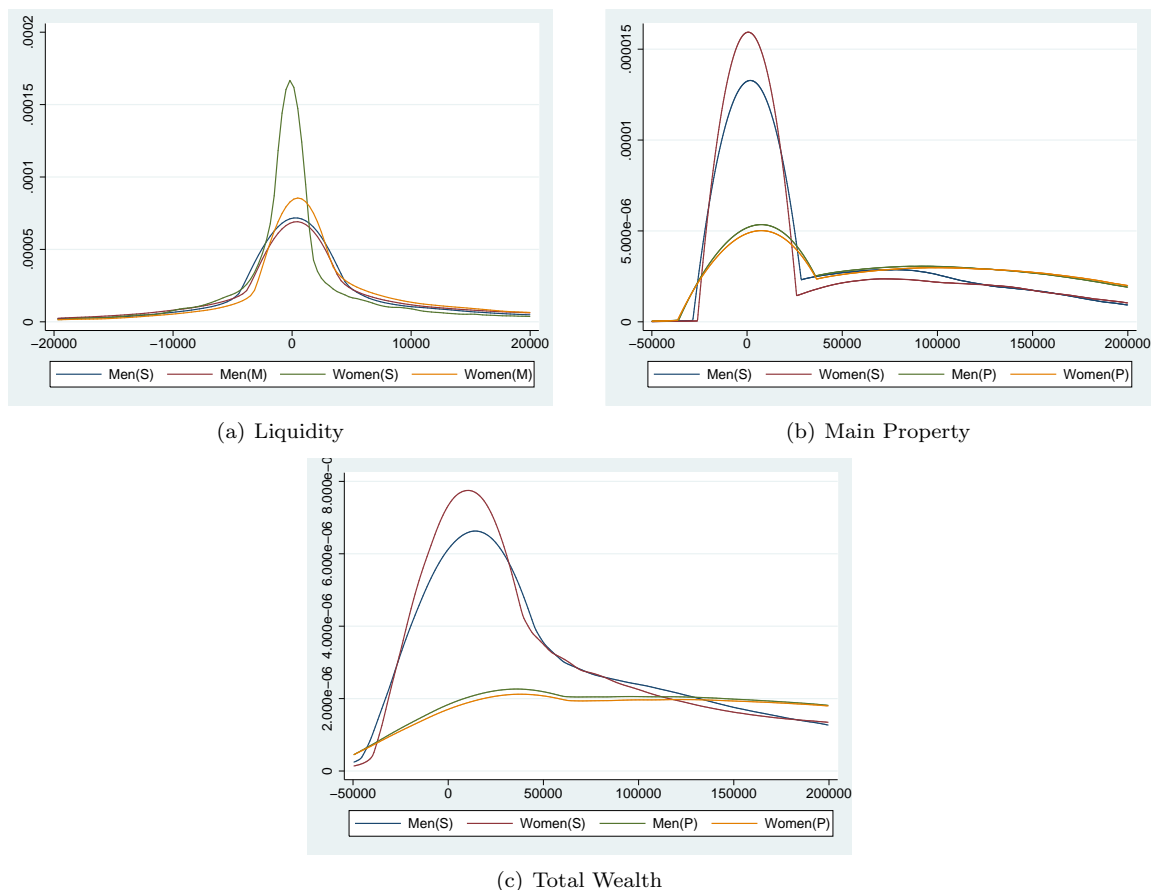
The first six rows of the table display means and standard deviations for various employment measures. Overall, 2.6% report entering self-employment as a main job, and 3.9% became a business owner (of at least one business) within the past two years. The more comprehensive composite measure (any entrepreneurial activity) indicates that 4.2% became either self-employed or a business owner. According to

the composite measure, individuals in partnerships are substantially more likely to become entrepreneurs compared to single individuals. Regardless of partnership status, the composite measure for men is approximately twice that for women.

The demographic variables in the subsequent six rows of the table data do not indicate important differences in age, nationality or ethnicity across the sub-samples. However, single women are more likely to have dependent children than single men. Single individuals are also less likely than partnered individuals to own their residence, with a lower rate of home ownership for single women compared to single men. This latter finding is suggestive of key differences in personal wealth, which can be seen in the financial measures displayed at the bottom of the table.

The first three financial measures show that individuals in partnerships hold considerably more wealth, in terms of liquidity, property and total wealth, than single individuals. Importantly, the difference in personal wealth between men and women is mainly driven by a gender gap in liquidity amongst singles. This is not just a difference in means. In Figure 1, the full distribution of each financial variable is illustrated. The distributions show that single women are more generally liquidity constrained, in comparison to both single men and all partnered individuals.

Figure 1: Distribution of Wealth Measures



Notes: The graphs show the distributions of three wealth measures, (a) Liquidity, (b) Net value of main property, (c) Total wealth, as described in Section 3.1 for single men, single women, partnered men and partnered women.

The fourth financial measure is inheritances. Inheritances are assumed to be exogenous shocks to personal

wealth. Note that mean inheritances for both men and women do not vary by household composition. However, mean male inheritances exceed mean female inheritances by roughly 25%.

3.2. OLS estimation

In order to explore basic correlations between personal wealth and entrepreneurial activity in the WAS, the results of ordinary least squares (OLS) regressions are presented in Table 2. All specifications include demographic, year and area controls. Standard errors are heteroskedasticity-robust and clustered at the individual level.

Table 2: OLS Results

	Liquidity			Main Property			Total Wealth		
	(1) Main	(2) Bus	(3) Any	(4) Main	(5) Bus	(6) Any	(7) Main	(8) Bus	(9) Any
Panel A									
All individuals	0.00005 (0.0000)	0.00019*** (0.0000)	0.00020*** (0.0000)	0.00003*** (0.0000)	0.00006*** (0.0000)	0.00007*** (0.0000)	0.00002*** (0.0000)	0.00005*** (0.0000)	0.00005*** (0.0000)
N	65,349	65,349	65,349	66,277	66,277	66,277	65,352	65,352	65,352
Males	-0.00000 (0.0000)	0.00010 (0.0001)	0.00013** (0.0001)	0.00002 (0.0000)	0.00006*** (0.0000)	0.00007*** (0.0000)	0.00002*** (0.0000)	0.00004*** (0.0000)	0.00005*** (0.0000)
N	29,221	29,221	29,221	30,367	30,367	30,367	29,961	29,961	29,961
Females	0.00010** (0.0000)	0.00028*** (0.0001)	0.00028*** (0.0001)	0.00003*** (0.0000)	0.00007*** (0.0000)	0.00008*** (0.0000)	0.00002*** (0.0000)	0.00005*** (0.0000)	0.00006*** (0.0000)
N	36,128	36,128	36,128	35,910	35,910	35,910	35,391	35,391	35,391
Panel B									
Single Males	0.00007 (0.0001)	0.00018 (0.0001)	0.00024* (0.0001)	0.00003 (0.0000)	0.00010** (0.0000)	0.00011*** (0.0000)	0.00004** (0.0000)	0.00006*** (0.0000)	0.00008*** (0.0000)
N	5,592	5,592	5,592	5,867	5,867	5,867	5,863	5,863	5,863
Single Females	0.00014 (0.0001)	0.00036*** (0.0001)	0.00035*** (0.0001)	0.00006** (0.0000)	0.00011*** (0.0000)	0.00012*** (0.0000)	0.00004*** (0.0000)	0.00009*** (0.0000)	0.00009*** (0.0000)
N	9,257	9,257	9,257	9,276	9,276	9,276	9,180	9,180	9,180
Partnered Males	-0.00002 (0.0001)	0.00008 (0.0001)	0.00010 (0.0001)	0.00001 (0.0000)	0.00005*** (0.0000)	0.00006*** (0.0000)	0.00001* (0.0000)	0.00004*** (0.0000)	0.00004*** (0.0000)
N	23,629	23,629	23,629	24,500	24,500	24,500	24,098	24,098	24,098
Partnered Females	0.00010** (0.0000)	0.00027*** (0.0001)	0.00026*** (0.0001)	0.00003*** (0.0000)	0.00007*** (0.0000)	0.00007*** (0.0000)	0.00002*** (0.0000)	0.00005*** (0.0000)	0.00005*** (0.0000)
N	26,871	26,871	26,871	26,634	26,634	26,634	26,211	26,211	26,211
Controls:									
Wave & Region	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Demographics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The table shows OLS estimates of self-employment start in the main job, a business start or any entrepreneurial start within the past two years on wealth measures (in £1,000s). Robust standard errors, clustered by individual, are reported in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

In the first three columns of Table 2, the coefficients for the impact of liquidity on the three alternative measures of entrepreneurial activity are displayed. In the full sample, the coefficients associated with liquidity and owning a business, and liquidity and any recent entrepreneurial activity (becoming a business owner or entering self-employment) are positive and precisely estimated. The magnitudes of the effects are not particularly large.

The coefficient in column 3 of Panel A implies that a £1,000 increase in liquidity increases the probability that an individual becomes an entrepreneur (composite measure) by 0.02 percentage points, or 0.48% relative to the sample mean. The corresponding impacts for property and total wealth, shown in the subsequent columns, are also precisely estimated but smaller in magnitude than the effect of liquidity. Dividing the sample by gender reveals that the effect of liquidity on entrepreneurial activity is approximately two times larger for women compared to men.

Panel B of Table 2 reports corresponding OLS coefficients within subsamples defined by gender and

partnership status. Focusing on the liquidity measure, it can be seen that the impact of personal wealth on any entrepreneurial activity is largest in magnitude amongst single females. The effects for both single and partnered females are stronger than for single males. The impact for partnered males is negligible in magnitude and not precisely estimated. There is little heterogeneity by gender and household composition in the other two measures of personal wealth.

These OLS estimates should not be interpreted as causal effects. There are a variety of possible upward and downward biases that were already mentioned earlier. It is interesting to note at this point that the IV estimates of the effect of personal wealth on entrepreneurial activity, shown below, are much higher in magnitude and precisely estimated. Thus, on net, the OLS estimates in Table 2 are biased towards zero.

4. Estimation Strategy

In order to obtain an estimate of the causal effect of personal wealth on entrepreneurial activity, we employ a constant-effects linear probability model and estimate the model by two-stage least squares. The model relates an indicator of whether individual i has become an entrepreneur within the past 2 years of the observation date t , $Y_{i(-2 < t < 0)}$, to a measure of personal wealth W_{it} . Also included is a vector of individual characteristics, X_{it} , an aggregate time effect, η_t , and an individual-specific random error at time t , u_{it} . More specifically,

$$Y_{i(-2 < t < 0)} = \beta_0 + \beta_1 W_{it} + \delta X_{it} + \eta_t + u_{it} \quad (1)$$

The first stage equation in the two-stage least squares procedure is,

$$W_{it} = \gamma_0 + \gamma_1 inheritance_{i(-5 < t < 0)} + \delta X_{it} + \eta_t + \epsilon_{it} \quad (2)$$

Equation (2) specifies the relationship between inheritances (in logs) received in the previous 5 years and personal wealth. Also included in the regression are X_{it} , η_t , and an idiosyncratic error component ϵ_{it} .

As the error terms ϵ_{it} and u_{it} are likely to be correlated, OLS estimates of β_1 , already presented in Table 2, are biased and do not have a causal interpretation. A consistent estimate of β_1 , which has a causal interpretation, can be obtained by replacing W_{it} in equation (1) with its predicted value from OLS estimation of equation (2).

The key identifying assumption in this IV application is that inheritances are related to entrepreneurial activity only through the impact on an individual's wealth. This implies that inheritances are excludable from equation (1). Evidence that the instrument is likely to be valid is presented below.

5. Results

In Section 5.1 estimates of the first and second stage equations are reported. In Section 5.2, the robustness of the results is examined. In particular, future rather than past inheritances is used as the instrument.

Interpretation of the results and a discussion of policy implications follow in Section 6.

5.1. First and Second Stage Estimates

Table 3 reports estimates of the impact of inheritances from the first stage equation (equation (2)). Estimates are shown for each of the three alternative wealth measures as dependent variables. For each alternative wealth measure, two specifications are presented, one without and one with demographic controls. All specifications include wave and region effects. Standard errors are robust and clustered at the individual level.

Table 3: First Stage Estimates

	Liquidity		Main Property		Total Wealth	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A						
All Individuals	1.2019*** (0.0627)	1.0712*** (0.0607)	3.8257*** (0.2247)	2.8481*** (0.1973)	9.2579*** (0.4488)	7.6765*** (0.3945)
N	65,376	65,349	66,305	66,277	65,377	65,352
Males	1.2286*** (0.0927)	1.1137*** (0.0903)	3.6267*** (0.3286)	2.8156*** (0.2917)	8.8660*** (0.6596)	7.6014*** (0.5851)
N	29,235	29,221	30,382	30,367	29,975	29,961
Females	1.1818*** (0.0850)	1.0322*** (0.0818)	3.9839*** (0.3074)	2.8573*** (0.2679)	9.5534*** (0.6111)	7.6836*** (0.5339)
N	36,141	36,128	35,923	35,910	35,402	35,391
Panel B						
Single Males	1.7207*** (0.2262)	1.6231*** (0.2244)	3.4190*** (0.5911)	2.5201*** (0.5677)	9.0821*** (1.2628)	7.4831*** (1.1558)
N	5,599	5,592	5,874	5,867	5,870	5,863
Single Females	1.3597*** (0.1643)	1.1992*** (0.1597)	4.4896*** (0.5397)	3.2800*** (0.4935)	10.5710*** (1.0729)	8.7727*** (0.9878)
N	9,262	9,257	9,281	9,276	9,184	9,180
Partnered Males	1.1052*** (0.1007)	0.9858*** (0.0974)	3.8164*** (0.3754)	2.9697*** (0.3345)	9.2451*** (0.7344)	7.8144*** (0.6678)
N	23,636	23,629	24,508	24,500	24,105	24,098
Partnered Females	1.1134*** (0.0985)	0.9704*** (0.0949)	3.6710*** (0.3548)	2.6770*** (0.3143)	9.0174*** (0.6982)	7.2467*** (0.6273)
N	26,879	26,871	26,642	26,634	26,218	26,211
Wave & Region controls	Yes	Yes	Yes	Yes	Yes	Yes
Demographic controls	No	Yes	No	Yes	No	Yes

Notes: The table shows estimates of wealth measures (in £1,000s) on the inheritance amount (in logs) received in the past 5 years as described by equation (2) in Section 4. Robust standard errors, clustered by individual, are reported in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Panel A reveals that personal wealth increases significantly with inheritance amount. This holds for the full sample and the gender subsamples. Adding demographic controls reduces the magnitudes of the coefficients somewhat, but they remain very precisely estimated. All first-stage F-statistics, some of which are presented in Table 4, indicate that the instruments are strong.

In terms of magnitudes, the estimated coefficients in the top row of Table 3, with demographic controls included, imply that a 1% increase in the amount of inheritance increases financial liquidity by £10.71, property wealth by £28.48 and total wealth by £76.76. A 1% increase in the amount of inheritance corresponds to £108, which is 1% of the median inheritance conditional on having received one. The two

subsequent rows in Panel A show that the effect of inheritances on each measure of personal wealth does not vary substantially by gender.

Panel B presents the inheritance coefficients by gender and partnership status. For all three measures of personal wealth, and all gender-partnership combinations, the inheritance coefficients are positive and very precisely estimated. The magnitudes of the coefficients are generally stronger for singles compared to partnered individuals. Amongst singles, the male coefficient is more strongly positive for the liquidity measure but the opposite holds for property and total wealth.

Table 4: IV Estimates

	Liquidity			Main Property			Total Wealth		
	(1) Main	(2) Bus	(3) Any	(4) Main	(5) Bus	(6) Any	(7) Main	(8) Bus	(9) Any
Panel A									
All individuals	0.0004 (0.0003)	0.0009** (0.0004)	0.0008** (0.0004)	0.0002 (0.0001)	0.0003** (0.0001)	0.0004** (0.0002)	0.0001 (0.0000)	0.0001** (0.0001)	0.0001** (0.0001)
N	65,349	65,349	65,349	66,277	66,277	66,277	65,352	65,352	65,352
First stage F-test	310.92	310.92	310.92	208.37	208.37	208.37	378.63	378.63	378.63
Males	0.0003 (0.0005)	0.0006 (0.0006)	0.0005 (0.0007)	0.0002 (0.0002)	0.0002 (0.0002)	0.0003 (0.0003)	0.0001 (0.0001)	0.0001 (0.0001)	0.0001 (0.0001)
N	29,221	29,221	29,221	30,367	30,367	30,367	29,961	29,961	29,961
First stage F-test	152.14	152.14	152.14	93.14	93.14	93.14	168.75	168.75	168.75
Females	0.0004 (0.0004)	0.0011** (0.0005)	0.0011** (0.0005)	0.0002 (0.0001)	0.0004** (0.0002)	0.0004** (0.0002)	0.0001 (0.0000)	0.0001* (0.0001)	0.0001* (0.0001)
N	36,128	36,128	36,128	35,910	35,910	35,910	35,391	35,391	35,391
First stage F-test	159.06	159.06	159.06	113.78	113.78	113.78	207.08	207.08	207.08
Panel B									
Single Males	0.0003 (0.0007)	0.0001 (0.0008)	-0.0000 (0.0008)	0.0006 (0.0005)	0.0004 (0.0006)	0.0004 (0.0006)	0.0002 (0.0002)	0.0001 (0.0002)	0.0001 (0.0002)
N	5,592	5,592	5,592	5,867	5,867	5,867	5,863	5,863	5,863
First stage F-test	52.33	52.33	52.33	19.70	19.70	19.70	41.92	41.92	41.92
Single Females	0.0012 (0.0008)	0.0022** (0.0011)	0.0023** (0.0011)	0.0003 (0.0003)	0.0007* (0.0004)	0.0007* (0.0004)	0.0001 (0.0001)	0.0002* (0.0001)	0.0002* (0.0001)
N	9,257	9,257	9,257	9,276	9,276	9,276	9,180	9,180	9,180
First stage F-test	56.35	56.35	56.35	44.17	44.17	44.17	78.87	78.87	78.87
Partnered Males	0.0002 (0.0007)	0.0008 (0.0008)	0.0007 (0.0009)	0.0001 (0.0002)	0.0002 (0.0003)	0.0003 (0.0003)	0.0000 (0.0001)	0.0001 (0.0001)	0.0001 (0.0001)
N	23,629	23,629	23,629	24,500	24,500	24,500	24,098	24,098	24,098
First stage F-test	102.50	102.50	102.50	78.80	78.80	78.80	136.92	136.92	136.92
Partnered Females	0.0002 (0.0004)	0.0007 (0.0006)	0.0007 (0.0006)	0.0001 (0.0002)	0.0003 (0.0002)	0.0003 (0.0002)	0.0000 (0.0001)	0.0001 (0.0001)	0.0001 (0.0001)
N	26,871	26,871	26,871	26,634	26,634	26,634	26,211	26,211	26,211
First stage F-test	104.66	104.66	104.66	72.55	72.55	72.55	133.43	133.43	133.43
Controls:									
Wave & Region	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Demographics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The table shows IV estimates of self-employment start in the main job, a business start or any entrepreneurial start within the past two years on wealth measures (in £1,000s) instrumented with the log of inheritance amount received in the past 5 years. Robust standard errors, clustered by individual, are reported in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

The second stage estimates are presented in Table 4. Estimates are shown for each of the three alternative measures of entrepreneurship as dependent variables. Each specification includes wave and region effects as well as demographic controls. Standard errors are robust and clustered at the individual level.

Panel A reveals that in the full sample an increase in personal wealth significantly raises the probability of having engaged in any entrepreneurial activity in the past two years (the composite measure). The pattern in the magnitudes of the coefficients suggests that this latter effect is due to the increase in the probability

of having started a business rather than having entered self-employment. Note that the magnitudes of the coefficients are much stronger when using the liquidity measure of personal wealth.

Splitting the sample by gender, it becomes apparent that the overall impact of personal wealth is primarily driven by females. This is mostly clearly seen in the specifications that use liquidity as the personal wealth measure. For the composite measure of entrepreneurial activity, the coefficient for females is more than twice that found for males.

Panel B presents the IV estimates of the impact of personal wealth by gender and partnership status. The magnitudes are generally strongest when using the liquidity measure. This further decomposition clearly shows that the overall impact of an increase in liquidity on entrepreneurial activity is due to the effect amongst single females. The magnitude of the effect is substantial. In column (2) of Table 4, the IV estimate implies that the relaxation of financial wealth constraints by £1,000 results in an 8.5% increase (relative to the sample mean) in the probability that a single female starts a new business.

5.2. Robustness

The large F-statistics reported in Table 4 suggest that there is no weak instruments problem in this application. Therefore, we do not check robustness via Limited Information Maximum Likelihood estimation. Instead, robustness is examined by using additional alternative measures of entrepreneurship as well instrumenting with future rather than past inheritances.

The WAS contains information on the date the business began. Throughout the analysis, the dependent variable for business starts was defined broadly as any business start within two years prior to the interview date. It is also possible to define other time periods. For example, one could define the dependent variable as any business start within the past year, or within the past five years.

In contrast to business starts, there is no control over the timing of the inheritance measure. The date the inheritance was received is not recorded, only whether an inheritance had been received (and its amount) in the previous 5 years. Therefore, in order to increase the likelihood that we are capturing the effect of inheritances received prior to any business start (or entry into self-employment) the time period for business starts was restricted to 2 years prior to the interview date.

Table 5 presents IV estimates when using different time periods for business starts. For each measure of personal wealth, there are three different definitions of the dependent variable, i.e., any business start within the past 1, 2 and 5 years. Focusing on all individuals and the liquidity measure of personal wealth in Panel A, one can see that the impact of personal wealth increases in magnitude as the length of the time period is increased. However, the coefficient for the shortest time period, any business start within the past year, is less precisely estimated.

Panel B demonstrates that the most important relationship between liquidity and the three measures of business starts is amongst single females. The coefficients for single females increase in magnitude as the time period is lengthened. All three coefficients are precisely estimated. Note that the difference in magnitude between the one year and two year definitions of any business start amongst single females is negligible. Therefore, using the two-year definition is robust and slightly more conservative than the five-year definition.

Table 5: Comparison of Business Start Measures

	Liquidity			Main Property			Total Wealth		
	(1) Within 1	(2) Within 2	(3) Within 5	(4) Within 1	(5) Within 2	(6) Within 5	(7) Within 1	(8) Within 2	(9) Within 5
Panel A									
All individuals	0.0007* (0.0004)	0.0009** (0.0004)	0.0011** (0.0005)	0.0003** (0.0001)	0.0003** (0.0001)	0.0004** (0.0002)	0.0001** (0.0000)	0.0001** (0.0001)	0.0001** (0.0001)
First stage F-test	310.92	310.92	310.92	208.37	208.37	208.37	378.63	378.63	378.63
N	65,349	65,349	65,349	66,277	66,277	66,277	65,352	65,352	65,352
Males	0.0004 (0.0006)	0.0006 (0.0006)	0.0007 (0.0008)	0.0001 (0.0002)	0.0002 (0.0002)	0.0002 (0.0003)	0.0001 (0.0001)	0.0001 (0.0001)	0.0001 (0.0001)
N	29,221	29,221	29,221	30,367	30,367	30,367	29,961	29,961	29,961
First stage F-test	152.14	152.14	152.14	93.14	93.14	93.14	168.75	168.75	168.75
Females	0.0008* (0.0005)	0.0011** (0.0005)	0.0015** (0.0006)	0.0003** (0.0002)	0.0004** (0.0002)	0.0006** (0.0002)	0.0001* (0.0001)	0.0001* (0.0001)	0.0002** (0.0001)
N	36,128	36,128	36,128	35,910	35,910	35,910	35,391	35,391	35,391
First stage F-test	159.06	159.06	159.06	113.78	113.78	113.78	207.08	207.08	207.08
Panel B									
Single Males	0.0006 (0.0008)	0.0001 (0.0008)	-0.0005 (0.0010)	0.0006 (0.0005)	0.0004 (0.0006)	-0.0000 (0.0006)	0.0002 (0.0002)	0.0001 (0.0002)	0.0000 (0.0002)
N	5,592	5,592	5,592	5,867	5,867	5,867	5,863	5,863	5,863
First stage F-test	52.33	52.33	52.33	19.70	19.70	19.70	41.92	41.92	41.92
Single Females	0.0021** (0.0010)	0.0022** (0.0011)	0.0025** (0.0013)	0.0007** (0.0003)	0.0007* (0.0004)	0.0009** (0.0004)	0.0003** (0.0001)	0.0002* (0.0001)	0.0003** (0.0002)
N	9,257	9,257	9,257	9,276	9,276	9,276	9,180	9,180	9,180
First stage F-test	56.35	56.35	56.35	44.17	44.17	44.17	78.87	78.87	78.87
Partnered Males	0.0003 (0.0007)	0.0008 (0.0008)	0.0012 (0.0011)	0.0000 (0.0002)	0.0002 (0.0003)	0.0002 (0.0003)	0.0001 (0.0001)	0.0001 (0.0001)	0.0001 (0.0001)
N	23,629	23,629	23,629	24,500	24,500	24,500	24,098	24,098	24,098
First stage F-test	102.50	102.50	102.50	78.80	78.80	78.80	136.92	136.92	136.92
Partnered Females	0.0004 (0.0005)	0.0007 (0.0006)	0.0012 (0.0008)	0.0002 (0.0002)	0.0003 (0.0002)	0.0005* (0.0003)	0.0001 (0.0001)	0.0001 (0.0001)	0.0001 (0.0001)
N	26,871	26,871	26,871	26,634	26,634	26,634	26,211	26,211	26,211
First stage F-test	104.66	104.66	104.66	72.55	72.55	72.55	133.43	133.43	133.43
Controls:									
Wave & Region	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Demographics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The table shows IV estimates of business starts within the past year, two years and 5 years on wealth measures (in £1,000s) instrumented with the log of inheritance amount received in the past 5 years. Robust standard errors, clustered by individual, are reported in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Another important robustness check, that relates to the validity of the instrument, is to perform the IV estimation with future rather than past inheritances as the instrument. This helps address the potential threat to identification that wealthier people are more likely to obtain an inheritance and more likely to start a business, even in the absence of financial constraints. In a study of entry into self-employment using the British Household Panel Survey, Disney and Gathergood (2009), found that future inheritances were just as good at predicting the transition into self-employment as past inheritances.

We examine the effect of future inheritances on past entrepreneurial activity, by exploiting the limited longitudinal aspect of the WAS. There is a relatively small subset of individuals who are enumerated more than once. However, for these individuals, it can be determined whether they already started a business in one wave, and if they received their first inheritance in a subsequent wave. The IV results for this exercise are presented in Table 6.

Panel A of Table 6 does not reveal a relationship of substantial magnitude or statistical significance between personal wealth and entrepreneurial activity when using future inheritances as the instrument. Although the first stage F-statistics are not negligible, they are far smaller than those produced when using past inheritances as the instrument.

Table 6: Future Inheritances and Past Business Starts

	Liquidity			Main Property			Total Wealth		
	(1) Main	(2) Bus	(3) Any	(4) Main	(5) Bus	(6) Any	(7) Main	(8) Bus	(9) Any
Panel A									
All individuals	0.0003 (0.0008)	0.0001 (0.0009)	0.0002 (0.0009)	-0.0000 (0.0002)	-0.0000 (0.0002)	0.0000 (0.0002)	0.0000 (0.0001)	0.0000 (0.0001)	0.0001 (0.0001)
N	17,801	17,801	17,801	17,372	17,372	17,372	17,341	17,341	17,341
First stage F-test	53.54	53.54	53.54	88.90	88.90	88.90	85.74	85.74	85.74
Males	0.0011 (0.0013)	0.0012 (0.0015)	0.0014 (0.0016)	0.0000 (0.0003)	0.0002 (0.0004)	0.0002 (0.0004)	0.0001 (0.0002)	0.0002 (0.0002)	0.0002 (0.0002)
N	7,872	7,872	7,872	7,952	7,952	7,952	7,923	7,923	7,923
First stage F-test	26.89	26.89	26.89	37.85	37.85	37.85	37.71	37.71	37.71
Females	-0.0005 (0.0009)	-0.0010 (0.0010)	-0.0009 (0.0011)	-0.0000 (0.0000)	-0.0002 (0.0002)	-0.0001 (0.0001)	-0.0000 (0.0001)	-0.0001 (0.0001)	-0.0001 (0.0001)
N	9,929	9,929	9,929	9,420	9,420	9,420	9,418	9,418	9,418
First stage F-test	26.52	26.52	26.52	50.32	50.32	50.32	46.94	46.94	46.94
Panel B									
Single Males	0.0007 (0.0015)	0.0027 (0.0022)	0.0024 (0.0022)	0.0004 (0.0015)	0.0030 (0.0032)	0.0026 (0.0029)	0.0003 (0.0009)	0.0020 (0.0020)	0.0017 (0.0018)
N	1,429	1,429	1,429	1,448	1,448	1,448	1,455	1,455	1,455
First stage F-test	13.67	13.67	13.67	1.37	1.37	1.37	1.71	1.71	1.71
Single Females	0.0019 (0.0017)	0.0009 (0.0016)	0.0013 (0.0017)	0.0007 (0.0007)	0.0004 (0.0006)	0.0005 (0.0007)	0.0003 (0.0003)	0.0002 (0.0003)	0.0002 (0.0003)
N	2,439	2,439	2,439	2,256	2,256	2,256	2,248	2,248	2,248
First.Ftest	13.61	13.61	13.61	10.43	10.43	10.43	12.90	12.90	12.90
Partnered Males	0.0013 (0.0019)	0.0005 (0.0021)	0.0010 (0.0022)	-0.0000 (0.0003)	-0.0001 (0.0004)	-0.0000 (0.0004)	0.0001 (0.0002)	0.0000 (0.0002)	0.0001 (0.0002)
N	6,443	6,443	6,443	6,504	6,504	6,504	6,468	6,468	6,468
First stage F-test	15.46	15.46	15.46	41.96	41.96	41.96	37.94	37.94	37.94
Partnered Females	-0.0017 (0.0012)	-0.0020 (0.0014)	-0.0019 (0.0015)	-0.0002 (0.0002)	-0.0003 (0.0002)	-0.0003 (0.0002)	-0.0001 (0.0001)	-0.0001 (0.0001)	-0.0001 (0.0001)
N	7,490	7,490	7,490	7,164	7,164	7,164	7,170	7,170	7,170
First stage F-test	15.17	15.17	15.17	40.54	40.54	40.54	34.97	34.97	34.97
Controls:									
Wave & Region	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Demographics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The table shows IV estimates of self-employment start in the main job, a business start or any entrepreneurial start within the past two years on wealth measures (in £1,000s) instrumented with the log of future inheritances received. Robust standard errors, clustered by individual, are reported in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

The results in Panel B also do not reveal significant relationships. In particular, the previously dominant positive effect of personal wealth on entrepreneurial activity amongst single females is not detectable. The first stage F-statistics are also quite small.

While one cannot completely rule out a positive correlation between personal wealth and the probability of inheritance receipt in the WAS, future inheritances are not a strong predictor of personal wealth for all three measures. Moreover, future inheritances do not exert an important influence on past entrepreneurial activity. These results stand in contrast to the findings of Disney and Gathergood (2009) and mitigate a main threat to identification in our analysis.

6. Discussion

One of the main findings from the empirical analysis of the impact of personal wealth on entrepreneurial activity is that the IV coefficient associated with the composite outcome measure (having become a

business owner or self-employed) is approximately twice the magnitude of the IV coefficient associated with having become self-employed. This suggests that using self-employment as the main proxy for entrepreneurial activity, the most common outcome measure employed in the literature, may substantially understate the importance of personal wealth.

The discrepancy between the effect of personal wealth on the composite measure and on entering self-employment probably arises because a substantial proportion of businesses are started by individuals who are simultaneously full-time wage employees. As mentioned earlier, full-time wage employees who are also entrepreneurs are excluded from the sample when using the self-employment measure. This can be particularly problematic if many businesses originate in a small-scale experiment and the transition out of full-time wage employment and into self-employment occurs only if the venture proves successful.

If it is true that transitions into self-employment mostly proxy successful entrepreneurial activity, rather than all such activity, a survivorship (selection) bias will be imparted on the estimates. Business ventures that do not prove to be successful, partially due to liquidity constraints, do not have an associated transition into self-employment and are not included in the regression. This leads to a selection bias that under-estimates the true importance of personal wealth. Including in the sample full-time wage employees that are also business owners (as in the composite measure) helps correct for the downward selection bias.

The main IV results also indicate that the positive impact of personal wealth on entrepreneurial activity is strongest for the financial wealth (liquidity) measure of personal wealth. Moreover, the overall effect of liquidity on entrepreneurial activity is primarily driven by single females. The estimated financial wealth effect for females implies that an increase of only £1,000 pounds in liquidity raises the probability a single female starts a business or enters self-employment by 8.5% relative to the sample mean. This is quite a bit larger than the effect found in Holtz-Eakin et al. (1994). In this latter paper, it takes a \$100,000 increase in inheritance amount to increase the probability of entering self-employment by 14% relative to the sample mean. Our estimate is more in line with Meyer (1990) who finds that 60-70% of individuals require less than \$5,000 to start their own business.⁴

Why does financial wealth have the strongest impact on the likelihood to be a business owner, out of three wealth measures analysed? We believe that an increase in property or total wealth is less responsive because they include many illiquid assets. Illiquid assets are by their nature more difficult to rapidly convert to seed capital for starting a business. On the other hand, an increase in property wealth used as collateral may aid in acquiring start-up funds, if one is willing and able to borrow against these types of assets for risky ventures. Note that the data cover a period of generally limited credit supply, between the years 2006 and 2012.

The finding that liquidity constraints are most severe amongst single women is perhaps more challenging to explain. It could be due to a differential lack of collateral amongst single women, or gender discrimination in the granting of credit, or a gender gap in risk aversion. In order to try and shed some light on this important and difficult question, Table 7 displays descriptive statistics on the characteristics of businesses that individuals own.

Table 7 shows that approximately two thirds of the 5,380 individual businesses in the data are owned by

⁴Comparisons across the literature need to be made with caution because sample composition, personal wealth measures and entrepreneurship indicators vary widely.

Table 7: Business Characteristics

	All individuals			Single individuals			Partnered individuals		
	All	Men	Women	All	Men	Women	All	Men	Women
Inherited	0.029 (0.17)	0.029 (0.17)	0.030 (0.17)	0.019 (0.14)	0.024 (0.15)	0.011 (0.10)	0.031 (0.17)	0.030 (0.17)	0.034 (0.18)
Own Money	0.769 (0.42)	0.769 (0.42)	0.770 (0.42)	0.792 (0.41)	0.791 (0.41)	0.794 (0.41)	0.764 (0.42)	0.765 (0.42)	0.763 (0.43)
Formal Loan	0.132 (0.33)	0.138 (0.34)	0.120 (0.35)	0.114 (0.33)	0.133 (0.32)	0.087 (0.34)	0.136 (0.28)	0.139 (0.34)	0.129 (0.35)
Informal Loan	0.052 (0.22)	0.055 (0.23)	0.046 (0.21)	0.049 (0.22)	0.048 (0.21)	0.051 (0.22)	0.052 (0.21)	0.056 (0.22)	0.044 (0.23)
Business Size (Employees)	6.413 (38.55)	6.832 (39.00)	5.603 (37.65)	4.517 (29.07)	3.843 (17.88)	5.492 (40.10)	6.804 (40.22)	7.374 (41.68)	5.631 (37.01)
Business Age	8.562 (8.92)	9.342 (9.34)	7.052 (7.84)	8.024 (9.20)	9.578 (10.07)	5.767 (7.20)	8.672 (8.86)	9.300 (9.20)	7.380 (7.96)
N	5,380	3,681	1,986	910	541	369	4,470	3,016	1,454

Notes: The table shows the sample means of characteristics of businesses enumerated in the WAS. Standard deviations are reported in parentheses.

men. Male-owned businesses tend to be older and larger than are female-owned businesses. Respondents in the WAS are also asked about the sources of funding that enable them to start their business. The funding categories are, i) inherited the business, ii) used own money, iii) secured a formal loan, and iv) received an informal loan. The options are not mutually exclusive.

The data reveal that only 3% of businesses were directly inherited. This lends further support to the validity of the instrument. The majority source of start-up funding is one's own money. This latter proportion does not vary by gender (76.9% amongst men and 77% amongst women).⁵ However, single individuals are more likely to use their own money to start a business than are partnered individuals (79.2% amongst singles and 76.4% amongst those with a partner). A non-negligible proportion of business owners, 13.2%, also secured a formal loan. Particularly striking is that single women report having a formal loan much less often than partnered women, single men and partnered men (8.7%, 12.9%, 13.3%, and 13.9%). Informal loans are a less frequent source of start-up funding (5.2%).

The descriptive statistics in Table 7 suggest that the differentially stronger liquidity constraints amongst single women may be partially driven by their lower likelihood to obtain formal loans for start-up funding. Since there is little difference between partnered men and women in the propensity to acquire a formal loan, gender discrimination and loan aversion are not obvious factors. Lack of collateral may be a more likely reason. As mentioned earlier, and displayed in Table 1, single women have the lowest rate of home ownership in the sample.

If lack of collateral is preventing single women from starting businesses, then extending recent policy initiatives aimed at encouraging business start-ups may be particularly helpful. The UK New Enterprise Allowance is one such recent policy initiative, launched in 2011, which provides previously unemployed individuals a weekly allowance for the first 6 months in self-employment. These individuals can also apply for a government-funded loan to help with start-up costs. In addition, they are offered non-financial support, such as legal advice and business mentoring.

⁵This is consistent with the claim of Knight (1921), who asserted that it is entrepreneurs rather than investors who mainly bear the risk of new enterprises.

Following early success, the start-up loan programme was extended. Initially the extended programme was targeted to 18-24 year olds only, but this restriction was removed as demand was so high. Eligibility for the weekly allowance continued to be restricted to individuals in receipt of unemployment benefits, with the aim that self-employment income should be sufficient to replace all benefits within 6 months.

In 2013, a parallel initiative to the New Enterprise Allowance, called X-Forces, was introduced. This latter program specifically targets ex-military personnel and their families. In the spirit of X-Forces, the UK government might consider introducing another parallel initiative that specifically targets liquidity constrained single women. There is obviously precedent for focusing on particular subpopulations. Program extension aimed at aiding liquidity constrained single women might help accelerate the rise of female entrepreneurship.

7. Conclusion

This paper examines the importance of personal wealth for entrepreneurial activity, as an indirect indication of liquidity constraints. The analysis takes advantage of a previously unexploited data source for this purpose - the UK Wealth and Assets Survey (WAS). The WAS contains unusually detailed information, allowing the construction of various measures of personal wealth and entrepreneurial outcomes. This is a key advantage over the previous literature.

The causal effect of personal wealth on entrepreneurial activity is estimated within an instrumental variables framework. Individual inheritance amount reported in the WAS is the source of exogenous variation in personal wealth. The instrumental variables estimates indicate that personal wealth has a strong and precisely estimated effect on entrepreneurial activity. Moreover, the overall relationship between personal wealth and entrepreneurial activity is found to be primarily driven by single women. The estimated impact amongst single women implies that a £1,000 increase in financial wealth leads to an increase in the probability of starting a business by 8.5% relative to the sample mean. This is a larger estimate of the impact of personal wealth than has been previously reported in the literature.

The ability to construct various measures of personal wealth and entrepreneurial activity turns out to be very important. In particular, the analysis shows that using self-employment as the outcome measure, which excludes full-time wage employees that start businesses, leads to a selection bias that under-estimates the impact of personal wealth. Self-employment is the most widely used entrepreneurial outcome measure in the literature.

We also uncover that the strongest personal wealth effects are obtained when financial wealth is used as the proxy for personal wealth, as opposed to property and total wealth. Financial wealth has not been previously used in the literature as a proxy for personal wealth due to data limitations. Our results for financial wealth provide clearer evidence than has been previously offered that liquidity constraints do underlie the often observed positive relationship between personal wealth and entrepreneurial activity.

Analysing data from the WAS on the sources of start-up funding, also shows that the differentially strong liquidity constraints amongst single women may be partially driven by their lower likelihood to obtain formal loans. Lower rates of home ownership amongst single women may indicate that it is a lack of collateral that underlies this lower likelihood to obtain formal loans. This suggests that new public

initiatives aimed at relieving the liquidity constraints of single women might be particularly effective in accelerating the recent rise of female entrepreneurship.

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