HOUSEHOLD DEMAND FOR RISKY FINANCIAL ASSETS IN SOUTH AFRICA

Matthew Ocran[1]

Abstract

The level of stock market participation in South Africa is incredibly low given the presence of a well-developed stock market and a myriad of avenues to invest on the market. This paper therefore sought to examine the determinants of direct ownership of unit trust and shares in South Africa with the aid of National Income Dynamics Study (NIDS) Wave 1 survey data. A logit regression model was used in the estimation. The results of the study suggest that the propensity to hold risky financial assets differ substantially among individuals of different educational levels and marital status. Employment wage income levels were also found to be important in explaining the likelihood of direct ownership of unit trust or equity. Race was also identified to be of importance, albeit in a limited measure, a driver of risky financial asset ownership.

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[1] Economics Department, University of the Western Cape, Cape Town: Email: mocran@uwc.ac.za

1. INTRODUCTION

The financial sector in South Africa is sophisticated and well-developed to the extent that it compares well with that of the leading advanced economies of the world. For instance when one considers the two of the key measures of financial development metrics, stock market capitalization as a proportion of GDP and domestic credit offered by the financial sector as a share of GDP the country outperforms many developed countries. In fact, South Africa is ahead of all her BRICS country partners when it comes to financial sector development. For example, stock market capitalization as a share of GDP in 2012 was estimated at 160 percent for South Africa, 68 percent for India, 116% each for the UK and the US and 84 percent for Australia. When we consider the size of the domestic credit provided by the financial sector as a share of GDP in 2013, the figure was 190 percent for South Africa, 110 percent for Brazil, 77 percent for India, 184 percent and 240 percent for the UK and the US respectively. The number for Australia was 158 percent (WDI, 2014).

The level of stock market participation in South Africa is incredibly low given the presence of a well-developed stock market and a myriad of avenues to invest on the market. The National Income Dynamics Study (NIDS) survey suggest that just about 1 percent of households directly own stocks, this compares poorly with the 34 percent stock market participation in America and about 15 percent in most western European countries.

The puzzle though is that despite the considerable superior returns that the stock market offers for investors in the long term, the financial and economics literature do not have any clear answers for the low participation in the stock market (Gardini and Magi, 2007). Drawing on the portfolio choice theory and with the aid of a probit regression model the paper estimates direct stock market participation in South Africa using the NIDS survey data. The study seeks to contribute to a deepening of the understanding of household portfolio choice in South Africa, a theme that has hitherto received little or no attention at all in the literature particularly in the case of South Africa. The allocation of the financial assets by households is important for the formulation of public policy to stimulate savings and indeed the general financial welfare of households.

The second section of the paper provides a brief overview of the literature on household portfolio choice and the stock market non-participation puzzle. The third section provides the theoretical underpinnings of the empirical model, econometric estimation techniques adopted and a description of the data used. Section four provides the descriptive statistical evidence based on the dataset and the econometric framework chosen for the estimation. The empirical outcomes and associated discussion are presented in Section five. The last part of the paper highlights the main policy recommendations flowing from the results.

2. BRIEF OVERVIEW OF THE LITERATURE

The theoretical attempts at explaining the portfolio choice of economic agents can be gleaned from both the literature on finance and macroeconomics. From the macroeconomics perspective two basic models associated with consumption and savings: Permanent Income Hypothesis (PIH) and the Life Cycle Hypothesis (LCH) are often used as the basic theoretical foundations for portfolio choice. The PIH assert that savings are determined by what agents perceive as their "normal income" that is what they hope to accrue over a considerable period time (Friedman, 1957). Therefore, temporary changes in income have no effect on consumption.

The LCH argues in part that agents plan their consumption and savings over their life-cycle (Ando and Modigliani, 1963). Indeed, the LCH explicitly introduces assets in the consumption function and suggest that if stock prices increases, wealth goes up and consumption increases as a result. Again, agents are said to save during periods of remarkably high income and dissave when incomes are extraordinarily low. The LCH also indicates that economic agents are net borrowers when young and net savers when old. Typically, young people tend to have low incomes while older people command high incomes.

While the theoretical explanation for portfolio choice in the macroeconomic literature is rather circumstantial, the finance literature presents a more explicit discussion of portfolio choice. For instance, the seminal work on portfolio choice attributed to Markowitz (1952) and Tobin (1958) sought to explain the optimal allocation of assets

between risky and risk-free assets. The proportion of the portfolio assigned to risky assets is deemed dependent on agent's level of risk aversion – the two fund separation theorem. Sharpe (1964) contributed to the formulation of the Capital Asset Pricing Model (CAPM). Other contributors were Samuelson (1969) and Merton (1969). In recent time, particularly since the 1990s portfolio theory has incorporated the role of unsurable income risk and its impact on portfolio share of risky assets (Guiso, Helliassos and Jappelli, 2000).

One of the many empirical studies that investigates the drivers of stock market participation in Europe and the developed world is Gardini and Magi (2007), Mankiw and Zeldes (1991), Heaton and Lucas (2000b) among many others.

Empirically, a wide range of factors have been found to explain the demand for risky financial assets. Among these factors are tax effects (Agell and Edin 1990 and Hochguertal et al (1997), entrepreneurial risk (Heaton and Lucas (1997). Age and cohort effects see Porteba and Samwick (1997), Ameriks and Zeldes (2004), Bronetti and Torricelli (2010). On the effect of housing wealth on portfolio decision the following studies among others can be identified, Ioannides, et al (1992) and Cho (2010). Hochguertal and van Soest (1996) also investigated how housing wealth effect relates to portfolio decisions of economic households.

A link between gender and marital status on one hand and portfolio choice on the other is identified in Lupton and Smith (2003), Bertochii et al (2011) and Dohmen et al (2011). Tin (1999) using data on whites and African Americans finds assert that racial differences do have significant effect on portfolio choice in America. Background risk in the form of health risk is also found to be relevant for explaining portfolio decisions across a sample of European countries Health status and health care systems have also received attention in the literature (Atella, et al 2012). Other studies have identified the significance of education, income, wealth and marital status in explaining portfolio choice (Campbell, 2006 and Curcuru et al, 2009).

Other background risks such as income risk and health risk has also be identified as important drivers of household portfolio decision in the literature. Examples of studies that provide evidence of income risks effects include: Bodie, merton and Samuelson, 1992; Heaton and Lucas, 1997 and 2000; Bonarparte, Korniotis and Kumar 2013. On

the question of health risk, the papers include Love and Smith, 2010 and Yogo (2011). Non-background risks such as previous stock return experiences (Malmendier and Nagel, 2011) and the extent of social interaction experiences (Puri and Robinson, 2007) have also been found useful in determining household portfolio choices.

In a recent interesting paper, Adoum (2014) provide evidence of a mechanism through which risk aversion can vary at the household level through retirement transition by examining the balance of power in intra-household portfolio decision making.

The examination of household portfolio choice has become an attractive research proposition in the wake of increasingly availability of large household survey data that covers household portfolio decisions.

Incidentally, there appear to be little attention if any at all of systematic research effort in the developing world particularly in Sub Saharan Africa on household portfolio choice. This is largely because of the absence of large scale household survey data that incorporate questions on household portfolio decisions. Fortunately, the NIDS database helps in dealing with dealing with the paucity of data challenge. The present study draws on the NIDS data to help fill the gap in the literature regarding the absence of portfolio choice information in Sub-Saharan Africa.

3. METHODOLOGY

This section of the paper presents the theoretical and empirical models that inform the subsequent estimations. Also discussed here, albeit briefly, is the data used in the analysis as well as a number of descriptive statistics derived from the sub-sample considered in the analysis.

Theoretical Model

The portfolio choice model adopted for the study draws on the Roy's Identity as given in Perraudin and Sorensen (2000). Assuming a given agent - household is faced with the following portfolio optimization problem:

$$Max_{Dn}\left\{EU\left(\sum_{n=0}^{N} D_n(1+r_n)\right) \mid \sum_{n=0}^{N} D_n = W\right\} \tag{1}$$

Where D_n stands for the holding of asset n, r_n indicates the rate of return on asset n, and W denote current wealth. Again, we assume that the asset with subscript naught generates a risk-free return. The rate of return may be formally given as:

$1+r_0 \equiv \theta_0$ and

$1+r_n \equiv \theta_n$ for $n = 1,.....N$

Where $\theta_n = E(1+r)$ and γ_n is a random variable with mean of naught. The first order conditions (FOC) of the problem is then as follows:

$$E\left(U'(W_{+1}^*)(1+r_n)\right) = \lambda \text{ for } n = 0,1.......N \text{ and } \sum_{n=0}^{N} D_n = W \tag{2}$$

Where λ is a Lagrange multiplier and W_{+1}^* accounts for the optimal random wealth at a point in the future. We may also consider the FOC as implicit function of λ and the asset demand, D_n. Following the implicit function theorem we may solve for the

optimal demand, D_n and then substitute $W_{+1}^* = \sum D_n(1 + r_n)$ into $EU(\bullet)$ to obtain an indirect utility function, $V = V(\theta, W)$. Using the envelope theorem we obtain[2]:

$$\frac{\delta V}{\theta_n}\left(\frac{\delta V}{\delta W}\right)^{-1} = \frac{D_n}{\theta_0} \quad n = 0,1.......N \tag{3}$$

Household portfolio is often characterized with asset holdings of naught for particular financial asset categories such as risky financial assets, by a large section of households. The primary reason that has been found to account for this phenomenon is the existence of frictional costs of various forms (Perraudin and Sorenson, 2000). The two kinds of frictional costs that have been identified in the literature are: (1) costs associated with the trading of financial assets – buying and selling and (2) monitoring costs linked to holding a given portfolio. The literature as indicated by Perraudin and Sorenson (2000) quoting from Haliassos and Bertaut (1995). Largely account for the low household financial asset holdings. It's further argued that if the monitoring cost has a fixed component, then such cost could possibly account for the tendency of low-wealth investors to have zero holdings of certain broad asset classes.

Following Perraudin and Sorenson (200) the adopted model explicitly account for the monitoring cost in the portfolio choice over financial assets conditioning on non-financial asset holdings for which transaction cost are inherently high. The household value function, V_i^j, represents the value function of household i when it invests in a subset of j of the total set of assets available. Assume the assets are: risk-free instruments (b), risky assets (s). It can be argued that agents may hold any of the three set of assets (bs, b and s). Given that all households do hold a certain quantity of money; we can further argue that households may hold various portfolios consisting of combinations of the broad financial asset classes. Consequently, the household unconstrained vale function, V_i, may be given as:

$$V_i = \max\{V_i^{sb}, V_i^b, V_i^s\} \tag{4}$$

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[2] Equation 3 may be considered as an equivalent of the Roy's Identity in a deterministic consumer theory.

The value function $V_i^j \equiv V_i^j(\theta, W_i, X_i)$

Where W_i represent household wealth and X_i, defines a vector of individual demographic characteristics. If V_i is given as:

$$V_i^j = v_i^j + e_i^j \equiv H_x^j(\theta)X'\beta^j + H_w^j(\theta)(W_i + w_i^j)^{1-\rho} + X'\alpha^j + e_i^j \qquad (5)$$

Where H_w^r and H_x^r account for mean asset returns with term $(X_i'\alpha^j + e_i^j)$ being the monitoring cost and w_0^j a constant that stands for the minimum amount of wealth that tis consistent with a well-defined equation (5). And that $w_0^j = \gamma^j\theta$, α^j, β^j and γ^j are portfolio specific parameters and e_i^j is the residual component of the monitoring cost which is individual specific with common observable characteristics while all the parameters are fixed. The superscript, ρ is portfolio dependent.

For a given conditional indirect utility function, V^j, the related Roy's Identity in Equation 3 may be used to obtain the related conditional asset demand function (i.e., the risky asset and non-risky asset demand functions respectively). It can be proved that the partial derivatives of Equation 5 can be substituted into the Roy's Identity to generate a function of the form:

$$D_{ni}^j = D_n^j(\theta, W_i, X_i) \qquad (6)$$

Where D_{ni}^j mean the demand for asset n (for $n = 0.....n_j$) of individual i holding asset portfolio j.

The demand for risky financial assets may therefore be formally given as:

$$D_{si}^s = \gamma_s^s + X_i'\beta^s(W_i + w_0^s) + h_s^s W_i \qquad (7)$$

Empirical Model

Following the discussion above the discrete choice model regarding the probability of a household (P_i) or agent holding a risky financial asset may be generally given as:

$$P_i^j = \Pr\{\text{Households with wealth } W_i \text{ and characteristics, } X_i \text{ chooses portfolios, } j\,\} \quad (8)$$

With $Y_i^j = 1$ if agent owns a unit trust or stock,

$Y_i^j = 0$ if otherwise.

Consequently, the probability that $Y_i = 1$, can be written in the form of a binary logit as:

$$1 - F(-\beta'X_i) = \frac{\exp(\beta'X_i)}{1 + \exp(\beta'X_i)}$$

Where X_i, is a vector of determinants of risky financial asset ownership. The X matrix includes the following: labour income and age of agent as a proxy for life-cycle. Following the literature we control for business cycle risk with dummy representing those in low risk and high risk jobs respectively. Cultural sources of inertia regarding risk financial asset ownership are accounted for by using sex, race and marital status dummies respectively. The other variable considered in the model include: educational attainment. We extend the literature regarding the determinants of risky asset ownership by controlling for financial exclusion. Intuitively, financially excluded economic agents would not be in a position to participate in the stock market. The financial exclusion is defined as ownership of a bank account, savings facility, credit or an insurance product (European Communities, 2008).

Probit models, discriminant analysis and logistic regressions have been found useful in estimating binary response models but the logistic model have an advantage over the others (Harrell 2001). For instance, unlike the probit model and the discriminant analysis technique, the logistic model does not make assumptions about the distribution of the predictor variable. More importantly, the logistic model has the added advantage of being able to provide valid estimates, irrespective of the study design. Consequently, the foregoing study makes use of the logit model in the estimation of risky financial asset ownership.

4. DATA ISSUES AND DESCRIPTIVE STATICS

The data for the study is obtained from the National Income Dynamics Study (NIDS) survey. The NIDS is a panel study of nationally representative sample of individuals of all ages in South Africa. The NIDS survey currently has data on three waves. Each wave or survey is administered with the aid of four questionnaires: Household, Adult, Child and Proxy Questionnaires. The Adult Questionnaire has a set of questions that seek to assess the ownership of financial assets. In order to have access to the other social demographic characteristics of the households, we merge all four questionnaires into one data file.

The NIDS survey is repeated at 2-year intervals with the first wave being the survey of 2008. The most recent wave is that of 2012, the third wave. However, the study used the first wave survey data because of its good representation of the white population sub-group as compared with the later waves. The number of households that were interviewed in the Wave 1 survey numbered 7,301 with 28,247 individuals. A sub-sample of adults between the ages of 15-64years who are employed constituted the sample for the present study. The number of individuals in our sub-sample with reported wage incomes was 2,221.

As part of the preliminary review of the data we examined the financial market participation considering the ownership of a number of assets. For instance, direct unit trust/share ownership was 2% among the employed adult population (see Table 1).

Table 1.   Financial market participation, N = 2,221

Asset/Liability	Ownership
Bank account	49%
Credit card	10%
Hire purchase agreement	9%
Home loan (bond)	7%
Loan (from a bank)	8%
Loan (from mashonisa)	1%
Loan (from micro lender)	1%
Loan (family member)	2%
Pension/retirement annuity	6%
Store card	20%
Unit trust/shares	**2%**
Vehicle asset finance	5%

Source: SALDRU (2013)

Again, a review of the ownership among various income brackets suggests that ownership of unit trust/shares is by and large a high-income group phenomenon. Married and cohabiting individuals also tended to have high ownership rates as compared to the unmarried. There were also differences in ownership based on race and educational level of individuals (See Table 3).

Table 2.   **Risky financial asset ownership by** monthly wage income

Income Group	Frequency
Less than R2, 999	0.2%
R3, 000 – 6,900	4.6%
R7, 000 – 9,999	8.7%
R10, 000 – 14, 999	8.5%
More than R 15,000	25.0%

Source: Author's computations based on NIDS

Table 3.   **Risky financial asset ownership by sub-group**

Demographic	Ownership among sub-group
Marital Status	
Married	4.1%
Living with partner	1.4%
Widow/widower	0.7%
Divorced/separated	1.7%
Never married	0.6%
Race	
African	1.0%
Coloured	1.2%
Asian/Indian	8.1%
White	16.5%
Gender	
Male	1.5%
Female	0.6%
Education	
Up to Grade 9	0.5%
Grade 10 to 12	1.5%
NTC1/NTC2/NTC3/Certificates/Diplomas	6.7%
Bachelors degree and higher	16.3%
Age group (Years)	
15-29	2.5%
30-39	2.8%
40-49	7.2%
50-59	4.9%
60-69	5.8%
70+	2.5%

Source: Author's computations based on NIDS

Table 4.   **Skill Level and Unit Trust/Share Ownership.**

Occupational code	Sub-sample, n	Ownership	Frequency
Legislator	106	9	8.5%
Professionals	334	24	7.2%
Technicians and associated professionals	100	3	3.0%
Clerks	227	9	4.0%
Service workers	339	5	1.5%
Skilled agricultural workers	268	0	0.0%
Craft and related trades	324	1	0.3%
Plant and machinery operators	239	2	0.8%
Elementary occupation	726	3	0.4%
Total	**2,663**	**59**	

Source: Author's computations based on NIDS

5.   MAIN FINDINGS

We estimated both a logit and logistic model of the specified qualitative response model identified for the study. Even though each of the two forms of outputs, provide useful outcomes that lend themselves to interpretation the use of the two provide additional insights and nuances that one form of representation is unable to do. Thus they are complimentary. While the logit model provides coefficients that indicate the likely outcome of an indicator variable with respect to a given benchmark scenario the logistic results indicate the odds ratio of a given indicator variable with respect to the reference indicator variable or benchmark.

Wage income was found to be very important in explaining direct unit trust or equity ownership in South Africa holding all other factors constant. This particular outcome is consistent with the literature and therefore not surprising. The coefficient of log of income in the logit model was very high statistically significant at 1 percent level of significance. The relatively low wage income of a very large proportion of the working population as indicated by the summary statistics may in part contribute to the equity ownership puzzle observed in South Africa.

Educational attainment in South Africa does matter in determining direct ownership of financial assets. There is evidence that the higher the level of educational attainment the higher the probability of risky financial asset ownership. When the odds ratios are considered, it is found that the odds of a bachelors degree or post-graduate degree holder owning a risky financial asset is 10 times larger compared to a pre-matric school leaver. The coefficient and odds ratio for the educational indicator variables were all statistically significant.

Married and cohabiting working people are more likely to directly hold unit trust/equity as compared to unmarried ones. Probably, individuals in spousal relationships are more intent on having financial security as against unmarried ones. The logistic estimations suggest that the odds of owning a unit trust by a married person are 4.1 times larger than the odds for unmarried individuals. On the other hand, the odds for person in a cohabitation arrangement were even higher, 4.5.

Age and gender was found to be useful in explaining the ownership of risky assets, as both indicator variables were statistically insignificant. On race it appears people of the Coloured group are likely to invest directly in unit trust/equity than Africans. However, this was only statistically significant at the 10 percent level of significance. While, whites and Asians are more likely to hold risky financial assets than Africans this was statistically insignificant. For instance the odds for white person is 1.6 times larger than an African, 0.6 for Asians and 0.4 for Coloureds. Again, apart from the odds ratio of Coloureds those for whites and Asians were statistically insignificant.

The study also sought to examine the effect of business cycle risk on risky financial asset ownership. Business cycle skills were accounted for in the model with the level of skills required in various occupations. Thus legislators and managers as well as the professionals were deemed were designated as highly skilled occupations. People in primary employments were rather grouped as unskilled while middle level occupational classification represented "semi-skilled". Nonetheless, these were all insignificant in influencing the direct ownership of unit trust or equity.

The p-value for the chi-square test of all the variables in the model suggests that the model fits the data very well.

Table 5.   Logit model of the Decision to Hold Risky Financial Assets

Variable	Coefficient	Std. Error	P-Value
Constant	-12.634	3.389	0.000
Log(Income)	0.951	0.238	0.000
Log(Age)	-0.238	0.841	0.777
Sex (Female)	-0.117	0.361	0.747
Race (African)			
Coloured	-1.046	0.638	0.101
Asian	-0.469	1.153	0.684
White	-0.489	0.378	0.196
Marital status (Never married)			
Married	1.421	0.554	0.010
Divorced	0.138	0.956	0.885
Widow	0.557	1.206	0.644
Co-habiting	1.497	0.773	0.053
Skill Level (Unskilled)			
Highly skilled	-0.264	0.593	0.656
Semi-skilled	-0.457	0.575	0.427
Level of Education (Pre-Matric)			
Matric	1.530	0.727	0.035
Post-Matric	2.011	0.720	0.005
Bachelors and higher	2.285	0.771	0.003
Number of observations	2,221		
LR Chi^2(16)	154.700		
P-Value for the Chi^2 test for covariates	0.000		
Pseudo R^2	0.334		

Table 6.   Logistic Model of the Decision to Hold Risky Financial Assets

Variable	Odds Ratio	Std. Error	P-Value
Log(Income)	2.590	0.617	0.000
Log(Age)	0.888	0.373	0.777
Sex (Female)	0.890	0.321	0.747
Race (African)			
Coloured	0.351	0.224	0.101
Asian	0.625	0.721	0.684
White	1.630	0.616	0.196
Marital status (Never married)			
Married	4.139	2.293	0.010
Divorced	1.148	1.097	0.885
Widow	1.745	2.105	0.644
Co-habit	4.470	3.454	0.053
Skill Level (Unskilled)			
Highly skilled	0.768	0.455	0.656
Semi-skilled	0.633	0.364	0.427
Level of Education (Pre-Matric)			
Matric	4.621	3.359	0.035
Post-Matric	7.469	5.380	0.005
Bachelors and higher	9.829	7.588	0.003
Number of observations	2,221		
LR Chi^2(16)	154.700		
P-Vale for Chi^2 test for covariates	0.000		
Pseudo R^2	0.320		

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